AMI DEPOSIT
1969

NO. 1964

HANDBOOK OF THE

STAFF OBSERVATION CAR

COMPRISING

1-TON TRUCK CHASSIS
WHITE, MODEL TEB-O

AND

STAFF OBSERVATION BODY
MODEL 1918

(EIGHTY-SEVEN PLATES)

AUGUST 15, 1918



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WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, August 15th, 1918.

This manual is published for the information and government of the United States Army.

By order of the Secretary of War.

C. C. WILLIAMS
Maj. Gen. Chief of Ordnance, U. S. A.

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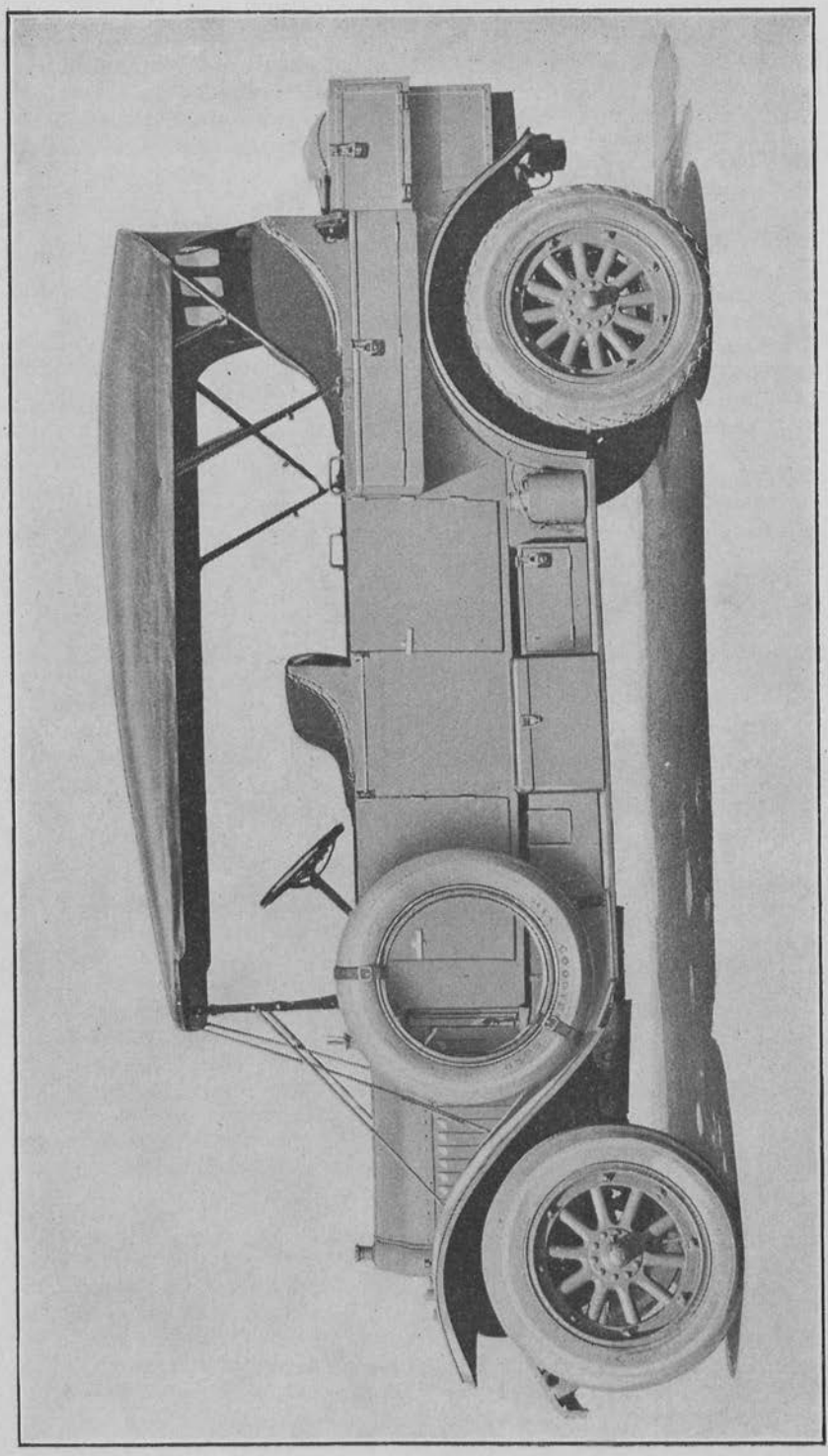
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PLATE 1



STAFF OBSERVATION CAR

HANDBOOK OF THE STAFF OBSERVATION CAR

CHAPTER I

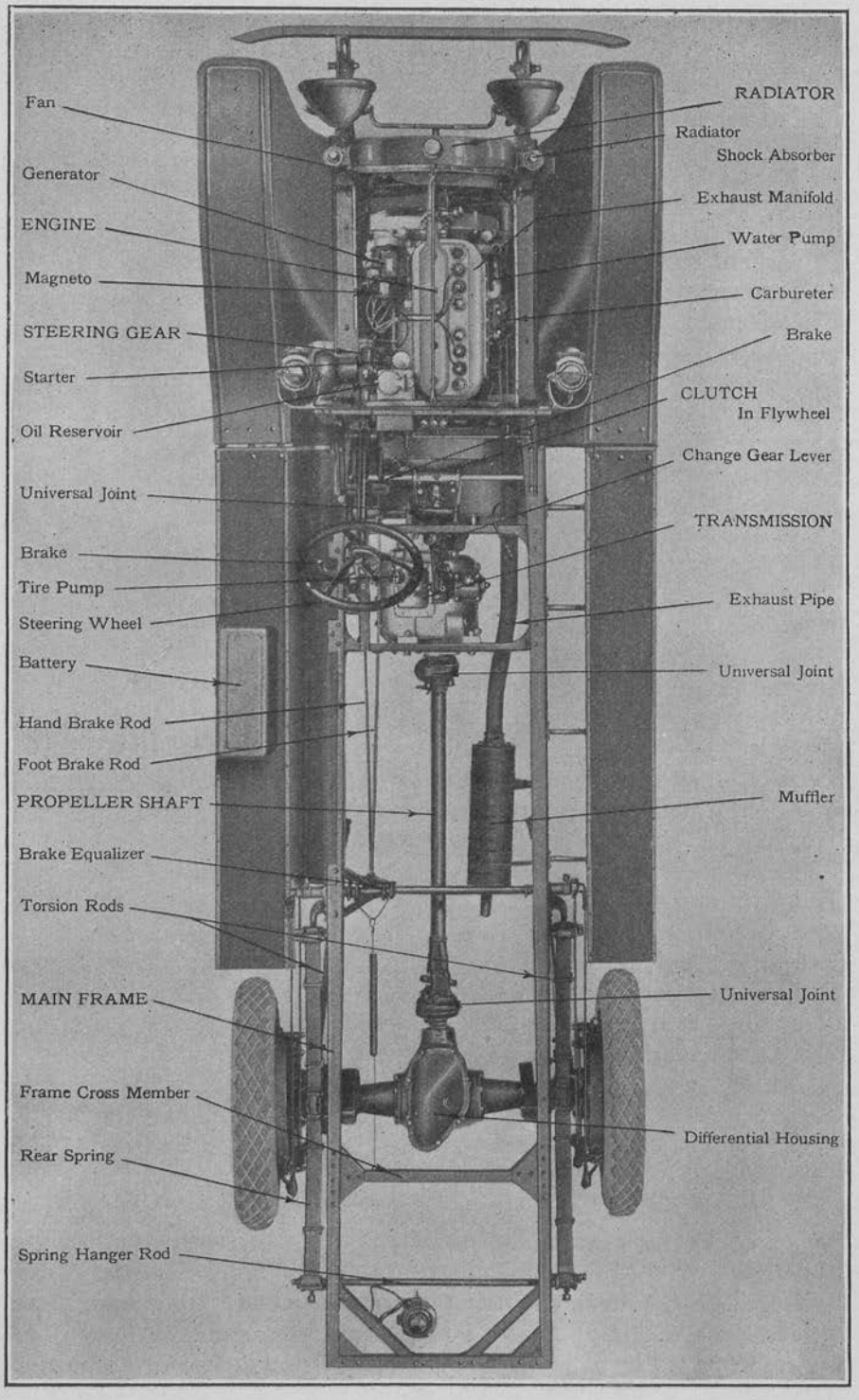
TABLE OF WEIGHTS AND OUTLINE SPECIFICATIONS

Rated Load Capacity (Body allowance plus normal load)	ton,	1
Body Weight Allowance	pounds,	1500
Chassis only	do	3850
Oil, Water and Gasoline	do	190
Chains	do	69
Tool kit	do	37
Chassis Weight on Front Tires (without load)	Percentage,	54
Chassis Weight on Rear Tires (without load)	do	46
Gross Weight (capacity load)	pounds,	7150
Load Weight on Front Tires	Percentage,	20
Load Weight on Rear Tires	do	80
Gross Weight on Front Tires	do	31
Gross Weight on Rear Tires	do	69
Overall Length of Chassis (without body)	inches,	205
Overall Width of Chassis (at widest part)	do	61
Chassis Wheel Base	do	140
Permissible Loading Space back of Driver's Seat	do	97
Width of Frame (outside dimension, widest part)	do	34
Height of Rear End of Frame from Ground (empty)	do	33.75 (33¾)
Diameter of Turning Circle	feet,	60 Right 45 Left
Tread of Wheels	inches,	56
Road Clearance under Front Axle (lowest point)	do	10.75 (10¾)
Road Clearance under Rear Axle (lowest point)	do	10
Length of Staff Observation Car, Overall	do	205
Width of Body	do	69
Height of Body, overall (including top)	do	97
Weight of Body (without equipment)	pounds,	1990

BRIEF DESCRIPTION OF THE STAFF OBSERVATION CAR

The Staff Observation Car is provided with a nine-passenger touring type body, Model 1918, mounted on a 1-Ton Truck Chassis, White, Model TEB-O. The front and rear seats comfortably seat three persons each, and folding auxiliary seats accommodate three more. The car is protected by a one-man-folding khaki top and clear vision side

PLATE 2



TOP VIEW OF CHASSIS, SHOWING MAJOR ASSEMBLIES

curtains which open with the doors, four of which are provided. The front and rear seats are spring upholstered, and an exhaust heater is placed on the floor in front of the rear seat.

The car carries a complete set of mechanic's hand tools and body equipment tools, the latter consisting of shovels, pick, lantern, etc. The body is fitted with numerous chests for special equipment.

The chassis is of White manufacture, conventional in design, and has a rated capacity of 1 ton. It is mounted on 36 inch x 6 inch pneumatic tires, with an extra one, inflated and mounted on a spare rim, carried on the left running board. An engine-driven tire pump is mounted on the transmission case.

The car is powered with a four-cylinder block cast engine. A single plate clutch, running in oil, is enclosed in the engine flywheel. A four-speed selective sliding gear transmission is mounted on a sub-frame back of the engine. An I-beam front axle and a semi-floating type rear axle are standard construction. All springs are semi-elliptical. Two universal joints, the rear one of which has a slip joint and an exposed propeller shaft, are used. Final drive is through plain bevel pinion and gear. Rear axle torque is absorbed by the springs, and the drive is through two torsion rods. Cooling is obtained with a cellular radiator, assisted by a centrifugal water pump and a belt driven fan. The car is electrically lighted and started.

BRIEF DESCRIPTION OF WHITE CHASSIS, MODEL TEB-O

ENGINE—Four-cylinder, four-cycle, L-head cylinders cast in block. Bore, 4.25 (4¼) inches; stroke, 6.375 (6⅜) inches. 28.9 horse power, N. A. C. C. formula.

COOLING—Centrifugal pump water circulation.

RADIATOR—Cellular type, unit shell and core. Spring mounted.

OILING—Special White system. See page 65.

IGNITION—Eisemann high tension magneto, Type G-4.

CARBURETER—Double jet White special, with hot air stove.

FUEL FEED—Gravity, from tank under front seat.

CLUTCH—Single plate, running in oil.

TRANSMISSION—Selective sliding gear, four speeds forward and one reverse.

DRIVE—Shaft drive, through two universals to plain bevel pinion and gear.

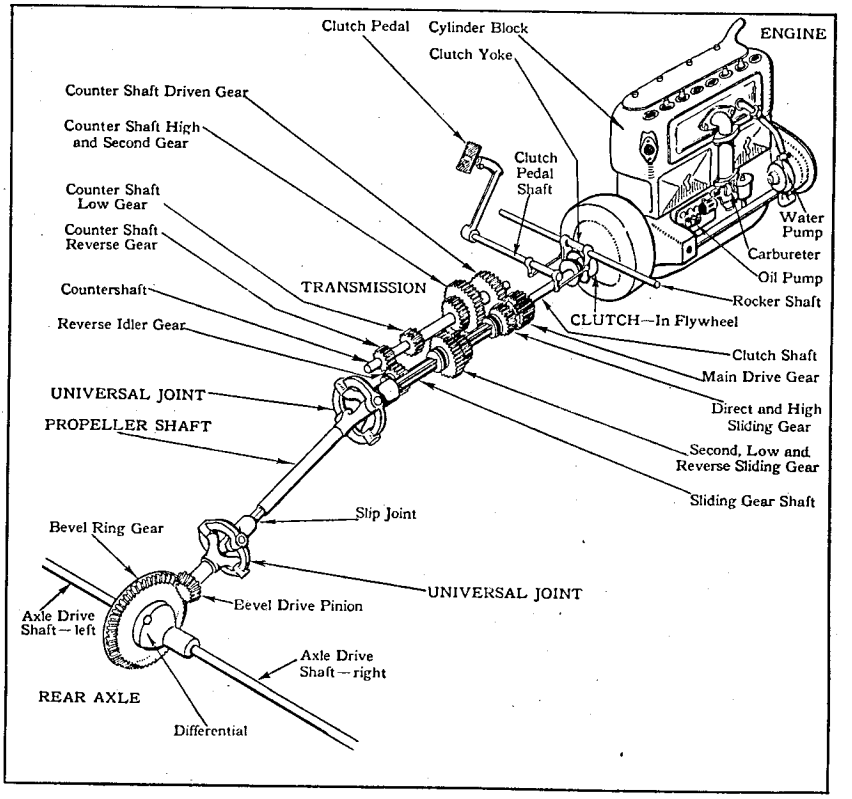
PROPULSION—Through two radius rods.

TORQUE—Through rear springs.

FRAME—Channel section, pressed steel. Four cross members.

SPRINGS—Front—Semi-elliptical 40.625 (40⅝) inches long, 2 inches wide, 10 leaves. Rear—Semi-elliptical, 50.375 (50⅜) inches long, 2.25 (2¼) inches wide, 11 leaves.

PLATE 3



POWER DIAGRAM

POWER DIAGRAM EXPLANATION

The power of the engine is transmitted to the rear wheels in the following manner:

The power developed by the engine is first transmitted through the flywheel of the engine to the transmission, or gear box, through the plate clutch. The clutch normally is engaged so that, as long as the gears are in mesh and the engine running, power will be transmitted through the clutch and to the rear wheels. To disconnect the engine from the rear wheels it is only necessary to depress the clutch pedals.

Four forward gear ratios, or "leverages," are provided in the transmission or gear box by means of selective sliding spur gears.

From the transmission the power is transmitted through a universal joint to the propeller shaft, through the universal on the rear of the propeller shaft, and then to the pinion shaft. In the rear axle the power is delivered uniformly to the two wheels by means of a bevel gear differential.

AXLES—Rear—Built up housing, semi-floating type, wheels running on ball bearings. Incorporating bevel pinion and ring gear and bevel pinion type differential, mounted on ball bearings. Front—Drop forging, I-beam section carbon steel, heat treated. Adjustable tie rod. Ball pedestal bearing on spindle body. Wheels mounted on ball bearings.

BRAKES—Two sets: Pedal operated service brake, external contracting. Hand operated emergency brake, internal expanding. Both brakes engage with brake drums on rear wheels.

TIRES—36 inches x 6 inches, pneumatic.

STEERING—Front wheels only used for steering. Steering gear of worm and sector type. 18-inch wood steering wheel.

CONTROLS—Left hand steering gear, with gear shift lever at right of driver. Emergency brake at driver's left. Spark and throttle levers mounted on sector in steering wheel. Ignition ground switch located on side of control box on dash. Carbureter choke on left side of dash. Lighting switches, speedometer and ammeter in control box on dash. Accelerator pedal located on base of steering gear column. Clutch and brake pedals located from left to right, respectively.

LIGHTING—Two electric headlights, two oil-electric side lamps, oil-electric tail lamp, electric dash light.

STARTING—Two unit, Leece-Neville 6-volt system. Generator has ground return. Motor is double wired, and equipped with a Bendix drive, engaging with the flywheel. Switch is under driver's heel.

BATTERY—The starting and lighting battery is a Willard type STR4, 6-volt, and of 128 ampere-hour capacity.

BRIEF OPERATING INSTRUCTIONS

PRELIMINARY TO STARTING THE ENGINE

Put gear lever in neutral.

Set emergency brake.

Advance gas lever one-third of the travel, move up on quadrant.

Retard the spark, move up on quadrant.

Turn on the ignition switch.

Choke carbureter by turning the lever on the left side of the dash.

Depress starter button.

If it is necessary to start the engine by cranking, first turn the compression release lever on the left side of the frame next to the radiator to the front of the car.

Prime engine through priming cups if necessary in cold weather.

AFTER ENGINE STARTS

Advance the spark.
Retard throttle lever until engine runs smoothly.
Release starter button immediately.
Open the carbureter choke.
Turn the compression release lever to the rear of the car if the engine was started by hand cranking.

TO START CAR

Release hand brake.
Release clutch.
Increase engine speed slightly.
Engage low speed gear.
Slowly engage clutch.

GEAR CHANGES

(*See page 21*)

As car gains momentum, release clutch and accelerator, shift to second. Engage clutch and depress the accelerator. Repeat the operation to gain third (or direct) speed. Third speed is the speed that is used under all normal conditions. Fourth (or high) is an over-drive through a pair of gears, and should be used only when little power is required.

GEAR CHANGES TO LOWER SPEEDS

Necessitated by heavy roads or steep grades.

In changing to lower speed, disengage the clutch, do not retard throttle. Instantly shift to lower gear, engage clutch and open throttle to gain speed.

TO REVERSE CAR

Reduce engine speed, release clutch, apply foot brakes. When car has stopped, engage reverse gear, release brake and engage clutch.
Never engage reverse gear when car is moving forward.

TO STOP CAR

Reduce engine speed, release clutch, apply brakes, place gear shift lever in neutral, set emergency brakes.

TO STOP ENGINE

Turn off ignition switch.
Advance gas lever slightly to supply initial charge to assist starting.

DETAIL OPERATING INSTRUCTIONS

PLACING CAR IN SERVICE

Unloading—Great care should be exercised in unloading the car, as carelessness may cause serious loss later.

Inspection—Regardless of the condition under which the car is received the *first* duty of anyone charged with its care and operation is to give it a systematic and detailed inspection.

This initial inspection should cover all possible shortages of easily removable parts, including accessories and tools, such defects as loose parts and any damage that may have been caused in shipment, or at the hands of the previous operator, and any other conditions that would affect its proper operation.

Refer to Chapters IX and X for itemized list of equipment.

Preliminaries—After the inspection of the shipment, so far as completeness goes, see that the drain cocks under radiator and water pump and in the plug in cylinder water jacket are closed and not leaking, and that all hose connections are tight. The radiator should then be filled with clean water to the bottom of filler neck on radiator. Care should be exercised in selecting water. Get soft water, if it is procurable. *Fill with hot water only in winter.*

Engine—To prevent corrosion during shipment, exposed metallic surfaces are usually covered with a heavy "slush." Before lubricating the engine, remove and carefully clean all surfaces covered with this "slush" if it has been used. Kerosene applied with a cloth or brush will facilitate the complete removal of this protective covering.

Repairs and Replacements—Such repairs and replacements as are necessary to the proper operation of the car must be given attention immediately. If permanent repairs cannot be made at once, temporary repairs should be made and advantage taken of the first opportunity to make these permanent.

General Lubrication—Just how long a car will give first-class service depends more upon proper lubrication than upon any other feature of its care. This is particularly true of a new car and no precaution should be overlooked to make certain that every lubricated part of a new car has a full supply of lubricant. As a precautionary measure the cars are shipped by the manufacturer fully lubricated. However, when placing the car in service this fact should be completely ignored and every lubricated part given careful attention.

Turn to the lubrication charts on pages 25 and 34, and make certain that every point indicated on this chart has been supplied with the lubricant specified for the particular point before the car is put in operation. The Lubricant Specifications will be found on page 24.

SPECIAL INSTRUCTION WHEN FIRST PUTTING CAR IN COMMISSION

Engine Oiling—The oil reservoir on the left side of the dash under the hood should be filled with No. 2A cylinder oil. The crankcase must be filled in addition to the reservoir. See "Filling Crankcase" on page 24. The grease cups on the water pump and the fan bearing should be turned down. Note if there is a water leak at the pump gland. The spark plugs should be removed, and with a squirt can, a couple of spoonfuls of engine oil should be squirted onto the top of each piston, and the engine revolved by hand a number of times after replacing plugs, so that the oil may be worked down the cylinder walls.

Rusting in Shipment—Dampness and moisture may get to the working parts, and on arrival they may be rusted badly, grease lost out of important places, and equipment stolen or lost. In the former case the engine should be handled very carefully, because the pistons might have rusted fast or valves seized in their guides. Kerosene applied with an oil can to the valve guides will loosen them. Fill gasoline tank with clean gasoline.

Transmission Oiling—Remove the oil level plug on the right side of the transmission case and pour No. 4 transmission oil through the filling hole on the top of the case until it runs out of the level hole.

Wheel Bearing Oiling—If there is time, the wheel hub caps should be removed and a careful inspection made of the amount of grease in the wheels and spindle bearings.

Rear Axle—Take out oil level plug in the back of the rear axle housing and if lubricant does not flow out fill through upper hole until it does. Use Specification No. 3504 transmission oil. See page 31.

Springs—Fill and turn down all grease cups on the springs.

Universal Joints—Use Specification No. 3505 grease in universal joint grease cups. These should be filled before starting.

Battery—If the car has stood idle for any length of time the battery will need charging. If it has just been received after shipment the battery will be dry. In either case see page 164 for further instructions.

Running Engine Idle—The engine should then be started and allowed to run idle, without any load, for from one-half to one hour before starting the car. After standing on freight cars or on board ship for a long time piston rings may gum fast, valves rust in or the gasoline line clog up, and this preliminary running will repay for the trouble in the time saved in adjustments later on.

Preliminary Running—After going into service the car should be driven very carefully for the first week in order that the various parts may work into place and the rough edges wear off. The first five hundred miles are the most important in the life of the car, and abuse early will surely result in poor efficiency later on, when the best will be required.

STARTING ENGINE

PRELIMINARY TO STARTING

Before attempting to start, be certain you have enough fuel, oil and water for the run. See that the oil reservoir is full, and be sure that the crankcase is properly filled (see page 24) to supply the initial lubrication. Also be certain that all lubricating instructions (see under Lubrication, page 24) have been carried out. Make a superficial examination to see that nothing about the car is broken or out of place; look underneath and notice if there is dripping, which indicates a leak except in the case of water coming out through the radiator overflow. You can tell by the feel and odor whether it is water, oil or gasoline. Guard against accidents on the road due to any excessively loose part of the running gear or controls, such as steering knuckles, tie rod, drag link, wheels, etc., by examining them before starting. After you have decided that the car is ready to be started, proceed to, as follows:

STARTING

Before cranking the engine, always see that the gearshift lever is in neutral position and the hand brake set. If you make a practice of setting the hand brake every time you shift into neutral, when stopping, you will be on the safe side. When stopping, set the hand throttle lever one-third open. This sets it for the next start. Get into the habit of doing these things automatically.

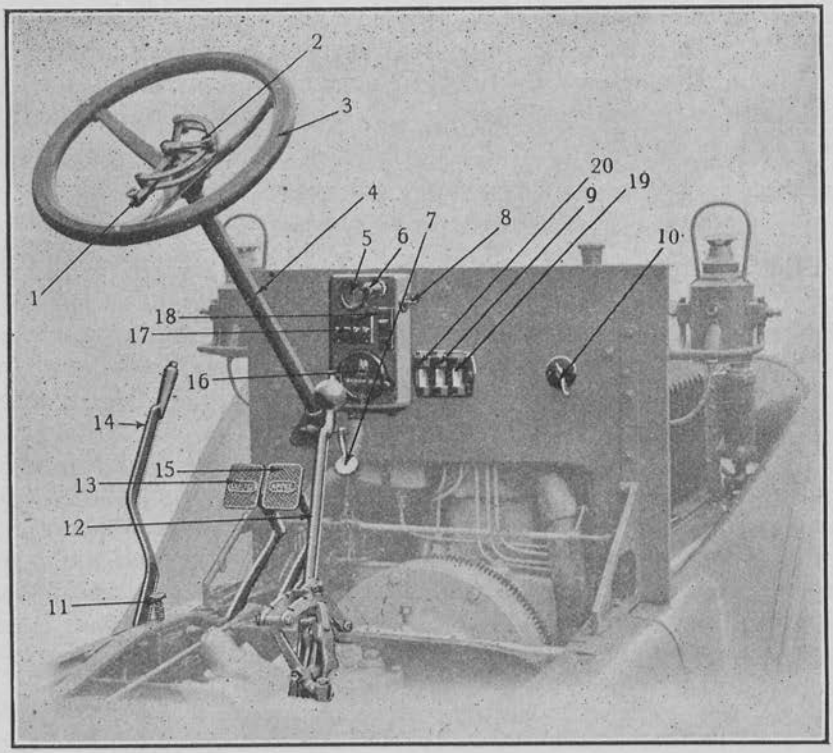
Retard the spark by pushing the spark lever up on the quadrant.

Turn ignition switch key a quarter turn either way, and then crank the engine.

After the engine has started firing, get a good idling position for the throttle lever on the steering wheel quadrant and advance the spark as far as possible.

When Engine Does Not Start—If in cranking the engine it does not respond in a reasonable time, investigate instead of draining the battery by cranking further. Go at the work systematically, keeping in mind all the time that there are three important systems the failure of which will prevent the engine starting. These systems are: The fuel, the ignition and the valve systems. If there is fuel and spark and the valves are working properly the engine should start. In case engine fails to start, see page 38 for further information.

PLATE 4



CONTROLS OF WHITE, MODEL TEB-O, CHASSIS

Ref. No.	Part No.	Name
1	00304 GA	Carbureter control lever.
2	00301 GA	Spark control lever.
3	21 MM	Steering wheel.
4	015 TED	Steering stem.
5	1601½ GM	Ammeter.
6	1616 TED	Dash lamp.
7	00217 GAF	Accelerator.
8	TEB-O	Magneto switch.
9	351½ GA	Oil sight feed—to center bearing.
10	00718 TED	Carbureter index plate.
11	1646 TED	Starting motor switch.
12	0180½ GFB	Change gear lever.
13	191 GE	Clutch pedal.
14	050 TB	Hand brake lever.
15	35½ GEC	Foot brake.
16	TEB-O	Speedometer.
17	1613½ GA	Switch lighting panel.
18	1608⅝ GM	Circuit breaker.
19	351½ GA	Oil sight feed—to rear bearing.
20	351½ GA	Oil sight feed—to front bearing.

Starting Engine in Winter—If the car has stood idle for any length of time, turn the motor over once by hand before engaging the starter to ascertain if the water pump has frozen through failure to drain the cooling system. Even if the system has been drained, a few drops of water entrapped in the stuffing box may bind the pump sufficiently to cause damage to the pump drive or the starting system if the switch is closed before the pump has been thawed out. *When refilling cooling system in winter, always use hot water.*

Oil in Winter—In the winter time cranking may be more difficult than in warm weather, because of the thickening of the oil around the interior moving parts. Once the engine is started in cold weather, let the engine idle for a while, until the oil has become sufficiently thin to circulate properly. Cold oil is like cold molasses; it will not flow readily. Running an engine fast with cold oil may cause burning out of the bearings.

CONTROL SYSTEM

The control system consists of those parts necessary to start, shift the gears, accelerate and keep the car moving forward, and those needed to stop it. Thus, the complete system consists of clutch and brake pedals, gear shift and hand or emergency brake lever, throttle and spark control levers, accelerator pedal and ignition switch.

THE CONTROLS AND THEIR USE

STEERING WHEEL

The steering wheel controls the direction of the car. Turning the wheel clockwise turns the car to right, and vice versa. Do not attempt, however, to turn the wheel forcibly when the car is at rest. This throws needless strain on the steering connections. If you wish to observe the movement of the wheel, jack up the car.

PEDALS

CLUTCH PEDAL

In front of the driver are two large pedals and one small one. The large one on the left is the clutch pedal. The one on the right is the foot brake pedal and is ordinarily used. The clutch pedal, when untouched, is in its normal position and when in this position the clutch is engaged. When the clutch pedal is depressed the clutch is released and the engine disconnected from the rear wheels.

BRAKES PEDAL

The foot brake pedal, untouched, is in normal position, and in that position the brakes are not applied. When the pedal is depressed the foot brakes (one acting on each rear wheel) are applied.

ACCELERATOR PEDAL

The accelerator pedal is mounted on the dash plate at the base of the steering gear column. It provides a foot control for the carbureter, and hence regulates the speed of the car.

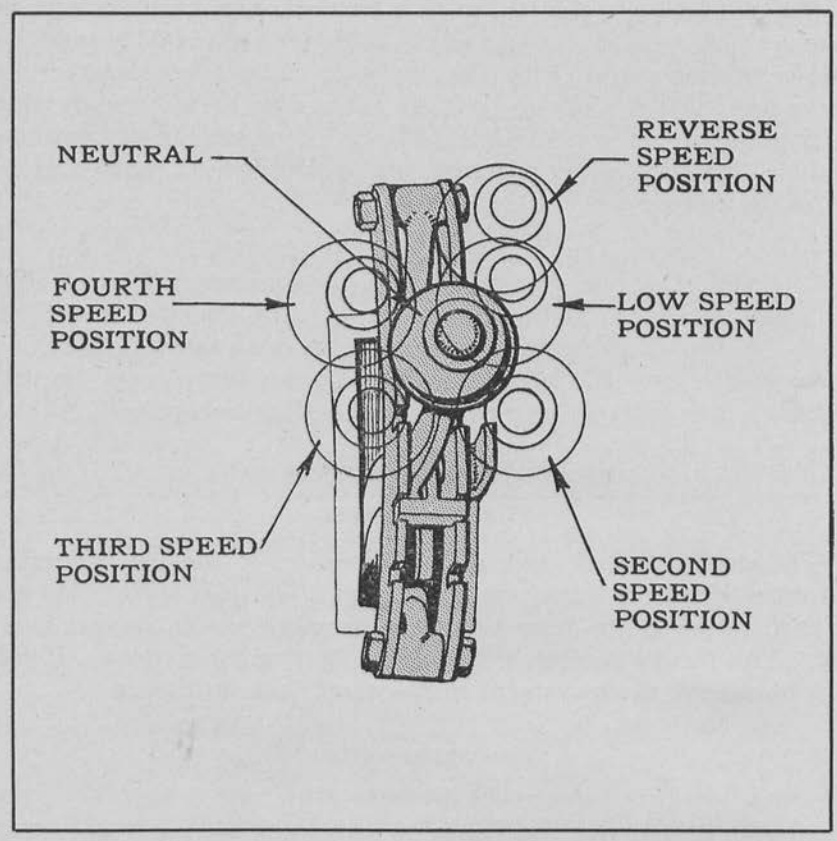


PLATE 5—GEAR SHIFT DIAGRAM

LEVERS

HAND BRAKE LEVER

In the floor boards in the driver's compartment are mounted two hand levers. The one in the center, to the right of the driver's seat,

is the change gear lever. The one to the left of the driver's seat is the brake lever. Be sure that it is in its most forward position before starting the car. It is well to occasionally use the emergency brake to determine its condition.

GEAR SHIFT LEVER

Grasp the handle of the change-gear lever lightly and move it sideways, which indicates neutral position, and then backward and forward through the different speed positions until you have become thoroughly familiar with its movements (engine not running). If you grip the lever hard, the muscles of the wrist become rigid and you lose the flexibility necessary for proper shifting of gears. In practicing gear shifting without the engine running, press downward with the left foot on the clutch pedal before attempting to move the lever, that you may acquire the habit. *Never force the lever if the gears do not engage at once,* but with the lever in *neutral* engage the clutch for a moment if the engine is running and then disengage it by depressing the clutch pedal. This will rotate the gears slightly and permit them to engage. Repeat if they do not engage readily on the first or second trials.

GEAR SHIFT LEVER POSITIONS

The gear shift lever is moved into the following positions in order to make the necessary gear engagements in the transmission. The illustration of the quadrant on this page shows where the lever ought to be for the different speeds.

Neutral—Central position, and the only place where the lever may be rocked from side to side.

Low or First Speed—Depress the button on top of the lever, move the lever to the right, and push forward to the first notch.

Second Speed—Keep the lever to the right, and pull straight back as far as possible.

Direct or Third Speed—Push the lever forward one notch into Neutral, move the lever to the left and pull back.

High or Fourth Speed—Keep the lever to the left, and push straight forward as far as possible.

Reverse—From Neutral, move the lever to the right, push forward through Low, and continue forward as far as possible.

STEERING WHEEL CONTROL LEVERS

SPARK CONTROL

The spark control lever should be maintained in as advanced a position as possible without causing the motor to knock.

THROTTLE CONTROL

Since both the hand throttle control lever on the steering column and the foot accelerator on the toe boards control the throttle opening of the carbureter, either may be used, the choice being largely a matter of preference, although it is good practice to set the hand lever at the desired position when the car encounters a long, steady pull, and to use the foot accelerator when roads or traffic conditions are such as to make necessary a more flexible means of control. In the latter case both hands are free to control the car and the foot control is always preferable when shifting gears.

DRIVING

ORDINARY RUNNING

The engine speed may be controlled either by the accelerator pedal or the hand lever, above the steering wheel. In using either of these bear in mind the sensitiveness of the throttle, and do not open the throttle wide suddenly, but gradually. Get accustomed to using the accelerator pedal, using the hand lever only to set idling point or for traveling at a fixed speed.

DRIVING UP AND DOWN GRADES

In driving down grade there are three forms of resistance that can be used to control the speed of the car: Its momentum can be arrested by means of the brakes, the gears may be shifted into a lower speed, or the engine may be used as a brake by shutting off the ignition. The lower the gear used the greater the resistance, so that the greatest possible resistance in the transmission is had with the gears in the first speed. Added resistance may be had by shutting off the ignition, and, of course, still more by using the brakes. All three forms (the gears in first, the ignition off and brakes applied) hardly need be used. The object is to refrain from using the brakes, because keeping them applied wears the bands and causes them to heat on long grades.

In ascending a grade use your judgment about the ability of the car. If it is very steep, shift to a lower gear before you get on the grade. If you think it can be done in high without the motor knocking, do not shift. Make as quick a shift as possible, if it is necessary to do shifting on an up-grade. If you happen to stall the engine on the grade, shift immediately into neutral and apply the hand brake, at the same time cramping the wheels, so as to back into the bank in case the brakes fail to hold.

Never leave the car standing on a grade without the emergency brake set. If the grade is particularly steep, or the car must be left standing for an extended period, the wheels should be blocked.

Retard spark lever if engine pounds on slow, hard pull.

If the spark control lever has been retarded during the climbing of a hill, be sure to advance it after the hill has been negotiated, otherwise a retarded spark will cause the motor to overheat.

These instructions are applicable when the car must negotiate soft roads, mud, sand or snow. Under these conditions, shift to lower gears before the engine begins to labor.

STARTING ON GRADE

When starting on a hill, after the car has been brought to a standstill, it is necessary to release the brake and engage the clutch simultaneously. The engine should be speeded up before engaging the clutch. If the car is being held with the foot brake, use the hand throttle to speed up the engine or, if held with the emergency brake, use the accelerator pedal to speed up the engine.

"RIDING" THE CLUTCH

In driving along do not "ride" the clutch, that is, do not keep your foot on the clutch pedal. Even slight pressure on the clutch pedal causes excessive wear of the clutch bearings and may cause slight slippage.

USE OF BRAKES

The foot brake is used under all ordinary conditions. The emergency brake is designed for use only as an additional safeguard or to hold the car on a grade.

STOPPING

In slowing the car down, always slow down the engine first and anticipate your stop, so as to avoid excessive use of the brakes. In slowing down or stopping, apply the brakes intermittently, that is, apply and release them alternately after the clutch is released. Get into the habit of using the brakes progressively in this way, especially on slippery pavements.

After the car has been brought to a standstill, the gears shifted into neutral and the hand brake applied, turn the ignition switch to the vertical position, and advance the throttle lever to one-quarter open. This gets these controls ready for the next start.

LUBRICATING INSTRUCTIONS

PRELIMINARY ADVICE

Study the lubricating sketches on the following pages for parts that require attention. Perfect and continuous lubrication means less wear of parts, less trouble and a better running car. Lubricant is of little value mixed with dirt, so before oiling or greasing a part, be sure there is absolutely no dirt on or in the parts to be lubricated.

Use clean cloths to wipe these surfaces after they have been cleaned with kerosene. Make periodic lubrication a habit. Attend to certain parts daily, as indicated on Lubricating Charts, pages 25, and 34, to others weekly, and to others monthly. These are maximum periods.

SPECIFICATION OF LUBRICANTS

After each part mentioned in the lubricating instructions, and indicated on the lubricating chart, will be found a reference number which indicates the kind of oil or grease best suited to the lubricating needs of each part. The meaning of the various figures is explained below:

2A Engine oil, medium, Specification No. 3502

2B Engine oil, heavy, Specification No. 3602

4 Heavy, straight mineral gear compound, Specification No. 3504

5 Light cup grease, Specification No. 3505

6 Medium cup grease, Specification No. 3506

8 Heavy, straight mineral oil, Specification No. 3508

9 Steam cylinder oil, Specification No. 3509

ENGINE

No. 2A, daily

FILLING OIL RESERVOIR

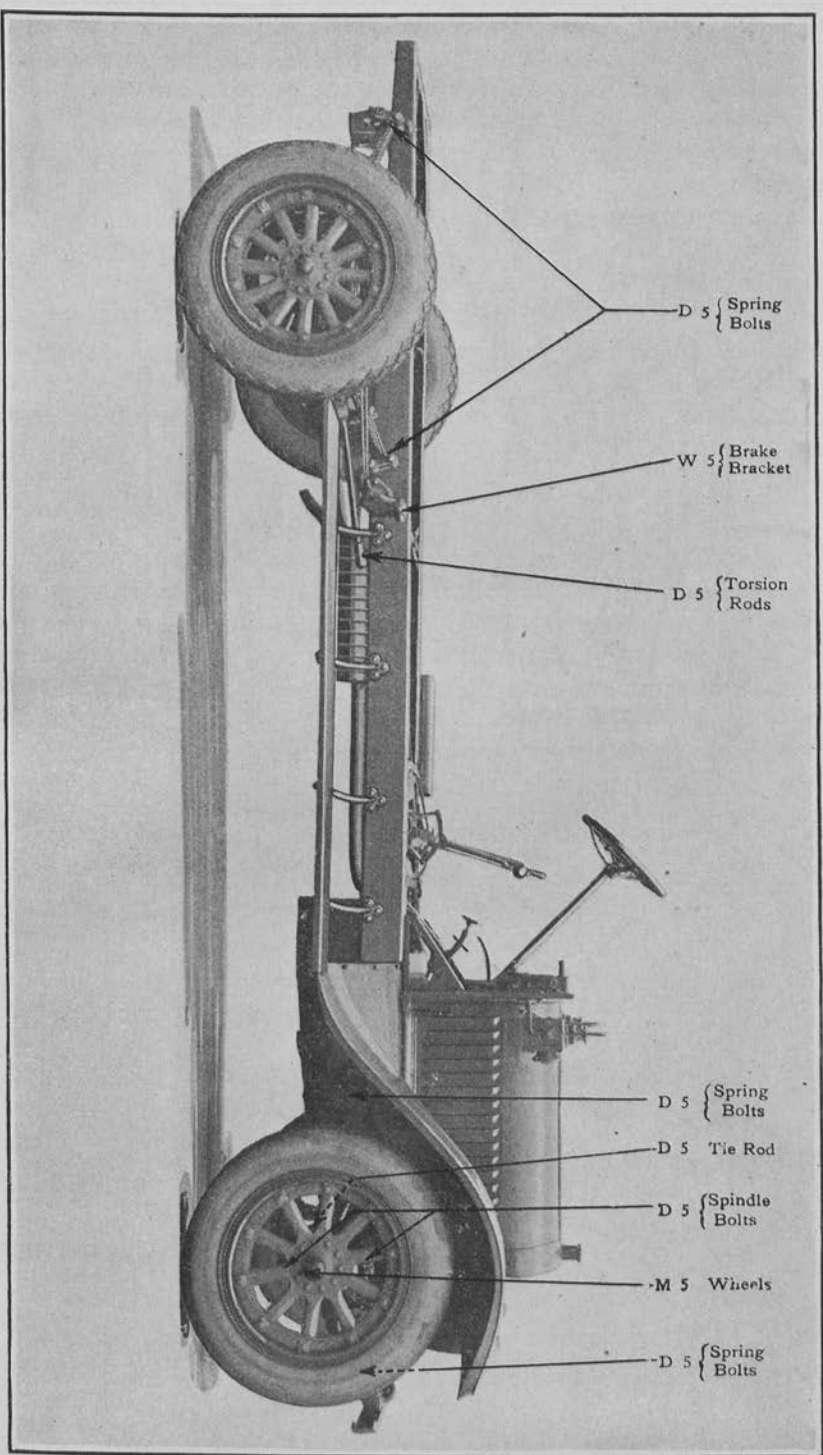
The oil reservoir is mounted on the left side of the dash under the hood and is the only source from which the pump is supplied. Capacity, 4 quarts. To be filled daily.

FILLING CRANKCASE

The crankcase and the timing gear case of a new engine must be filled in addition to the oil reservoir. To fill the crankcase, open the crankcase overflow valve by pulling out the valve stem extension under the radiator (See plate 13). Pour oil into the crankcase vent pipe on the left-hand side of the engine until it runs out of the overflow valve. Next remove the timing gear case oil plug in the crankcase to the right and in front of the magneto and pour in oil until it also runs out of the crankcase overflow valve. Finally, replace the plug and close the valve.

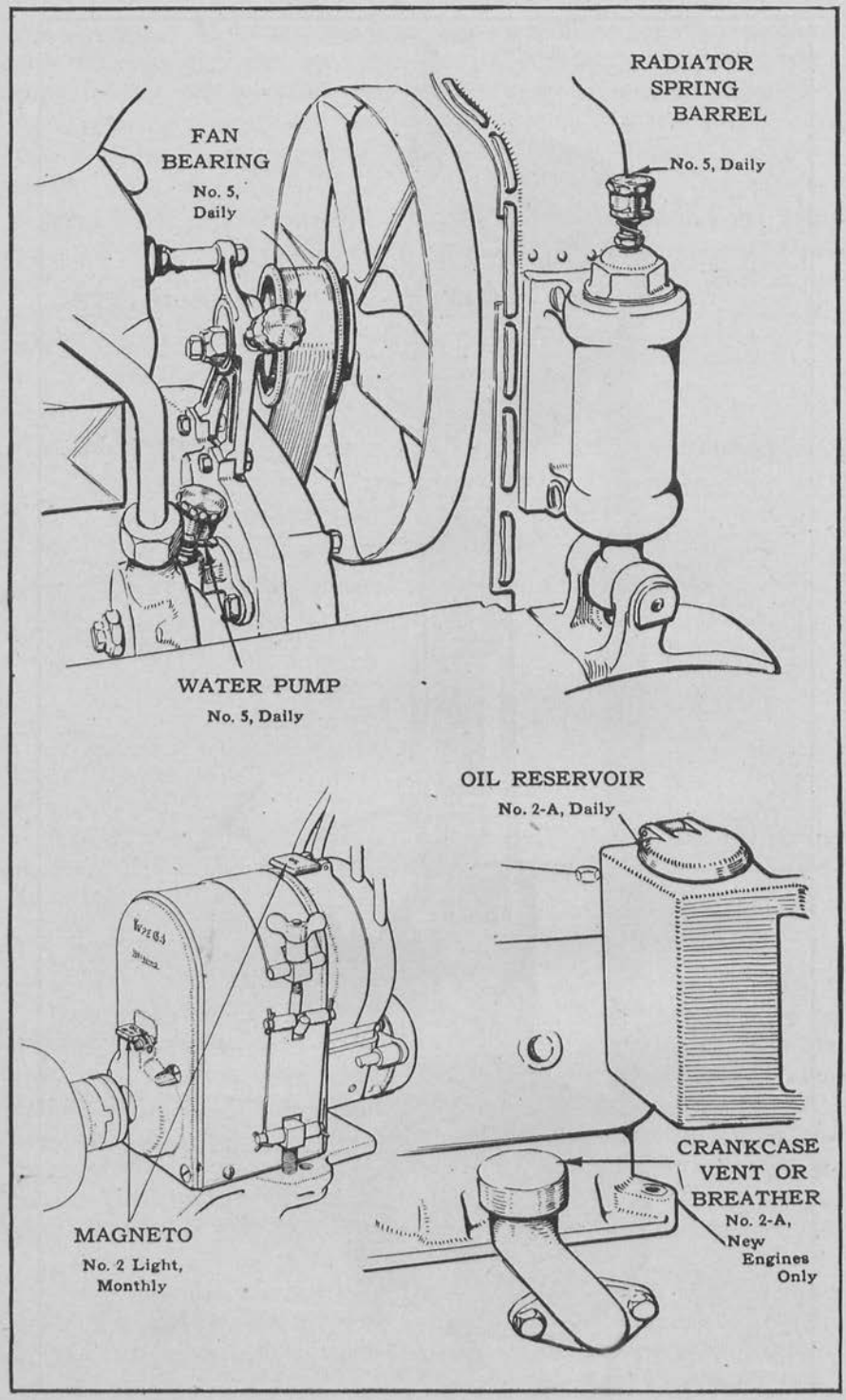
The crankcase will not need further filling through the vent pipe unless the pump should fail, in which case the oil level must be brought up to overflow valve level as in the case of the new engine.

PLATE 6



LUBRICATING CHART—RIGHT SIDE OF CHASSIS

PLATE 7



ENGINE LUBRICATING SKETCHES

MONTHLY CLEANING OF CRANKCASE

Every month, or after about 1000 miles running, the engine crankcase should be drained and cleaned, and the oil supply entirely renewed. Remove the three pipe plugs along the bottom of the crankcase and allow all the oil to run out. Replace the plugs, and pour about two gallons of kerosene through the crankcase vent pipe. Run the engine slowly for about a minute, and then drain the kerosene from the crankcase through the three plugs. Fill the engine with oil as under "Filling Crankcase" before starting.

ADJUSTMENT OF OIL PUMP

The oil pump is set at the factory, and should not be changed unless it will not maintain the proper oil level in the crankcase. Before changing the adjustment, see "Oil Pump Adjustment," page 67.

MAGNETO

No. 2 light, monthly

Two drops only of a light, clean oil injected into the oil wells every month or so will be sufficient. Two of these oil wells are located on the side of the distributor housing, oiling the armature ball bearing, the distributor plain bearing, and the oil well in the timing lever body. The other oil well is in the magneto end cover, and lubricates the front armature ball bearing.

FAN BEARING

No. 5, daily

Fill grease cup in fan bracket weekly with No. 5 grease. Turn cup down one turn daily.

WATER PUMP

No. 5, daily

Fill grease cup on water pump weekly with No. 5 grease. Turn cup down one turn daily.

RADIATOR SPRING BARREL

No. 5, daily

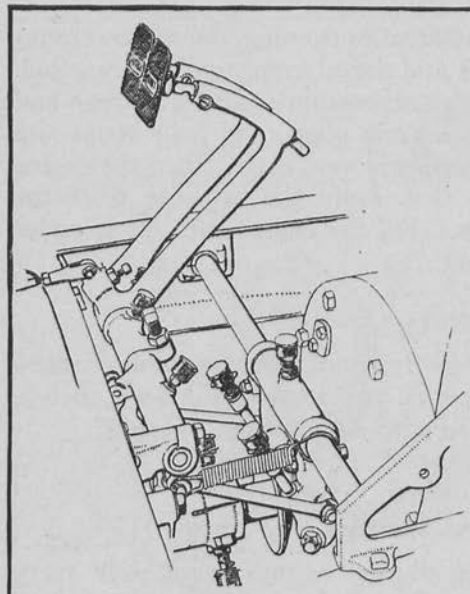
Fill the two grease cups on the radiator spring barrels weekly with No. 5 grease. Turn cups down one turn daily.

FRONT MOTOR SUPPORT

No. 5, daily

Fill the grease cup on the front motor support with No. 5 grease, and screw down one turn daily. This cup is in front of the car, under the starting crank.

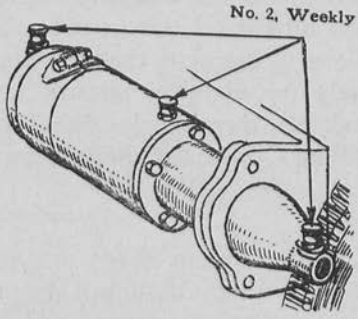
PLATE 8



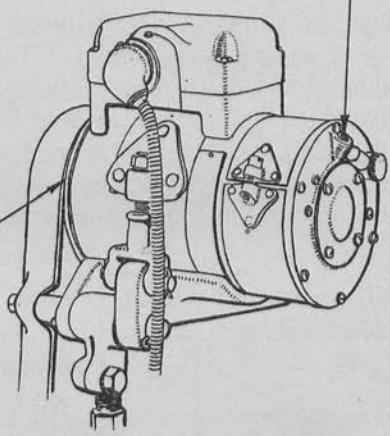
CLUTCH PEDAL
SHAFTS AND CLUTCH
All Grease Cups, No. 5, Daily
Clutch, No. 2, Monthly

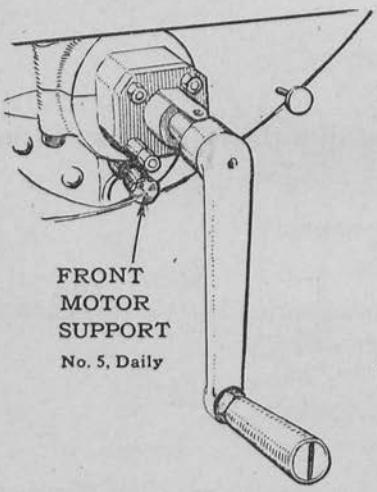
ELECTRIC
GENERATOR, No. 2, Weekly

ELECTRIC STARTING
MOTOR
No. 2, Weekly

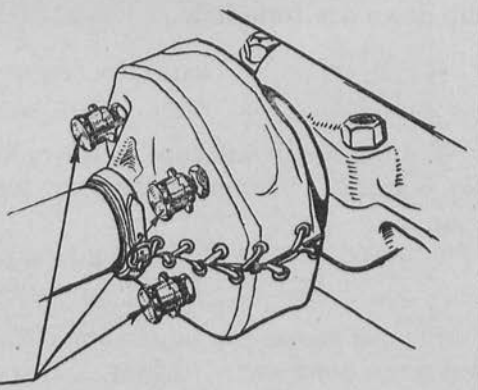


No 2, Weekly





FRONT
MOTOR
SUPPORT
No. 5, Daily



UNIVERSAL JOINTS
No. 5, Daily

LUBRICATING SKETCH

ELECTRIC STARTER

No. 2, weekly

Inject a few drops of No. 2 cylinder oil into the oil holes at both ends of the starting motor. (On electrically equipt only.)

ELECTRIC GENERATOR

No. 2, weekly

Inject a few drops of No. 2 oil into the oil holes at both ends of the generator. (On electrically equipt only.)

CLUTCH

No. 2, monthly

Each month, or every 2000 miles, drain the clutch and refill with one pint kerosene. Start the engine, and depress the clutch pedal several times to clean the clutch parts. Drain the kerosene and refill with No. 2 oil. Capacity, one pint.

CLUTCH YOKE

CLUTCH AND BRAKE PEDAL SHAFT

No. 5, daily

Fill the two grease cups on the clutch yoke, the one on the yoke shaft, and the three on the brake and pedal shaft weekly, with No. 5 grease. Turn all cups down one turn daily.

TRANSMISSION UNIVERSAL JOINTS

No. 5, daily

Fill and turn down daily the two cups on the front and the four on the rear transmission universal joints. Use No. 5 grease.

DRIVE SHAFT UNIVERSAL JOINT

No. 5, daily

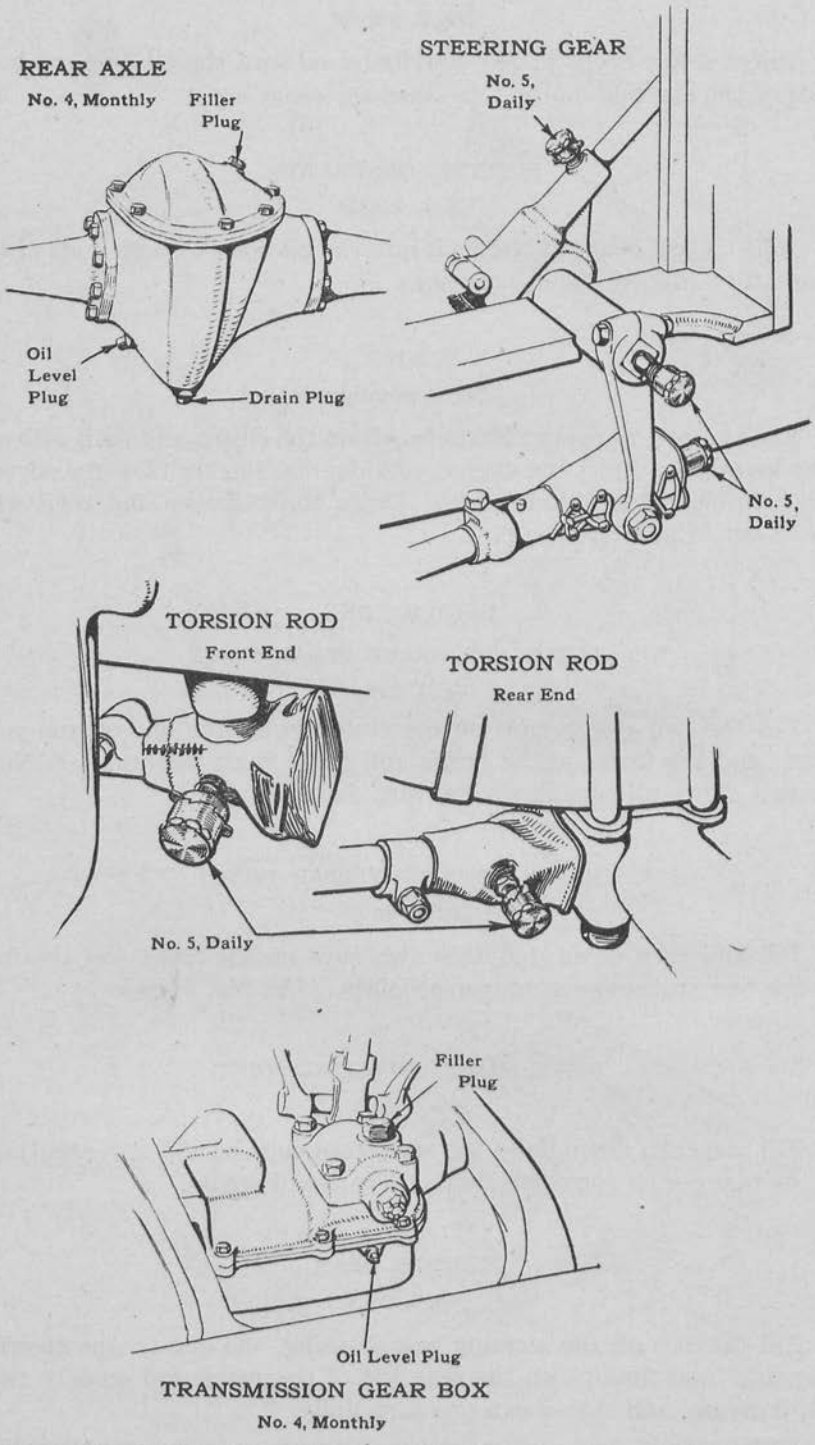
Fill and turn down daily the six grease cups on the universal joint at the rear end of the drive shaft. Use No. 5 grease.

STEERING GEAR

No. 5, daily

Fill the cup on the steering gear housing, the one on the steering gear arm and the one on the rear end of the reach rod weekly with No. 5 grease, and turn down one turn daily.

PLATE 9



AXLE TRANSMISSION AND STEERING GEAR LUBRICATING SKETCHES

THROTTLE AND MAGNETO CONTROL SEGMENTS

No. 2, weekly

A few drops of No. 2 oil weekly in all the oil holes of the control segments will be sufficient.

GEAR BOX

No. 4, monthly, in summer
(Dilute with No. 2, in winter)

Add No. 4 transmission oil to the gear box every month through the filling hole on top of the box until the oil level is brought up to oil level plug on the side of the box. Every two months, or each 2000 miles, drain the case through the hole in the bottom and flush out the inside with kerosene. Refill with fresh oil. Capacity, 2 gallons.

REAR AXLE

No. 4, monthly, in summer
(Dilute with No. 2, in winter)

Add No. 4 transmission oil to the rear axle housing every month through the plug on the top of the housing until it flows from the level hole in the side. Every two months, or each 2000 miles, drain out the oil, flush with kerosene, and refill with fresh oil. Capacity, 1 quart.

REAR WHEELS

No. 5, daily

Fill with No. 5 grease, and turn down daily the two grease cups on the rear ends of the axle sleeves.

REAR AXLE BRACKET AND BRAKE BAND

No. 5, daily

Fill the grease cups on the brake band bracket on the ends of the rear axle with No. 5 grease weekly, and turn down one turn daily.

TORSION RODS

No. 5, daily

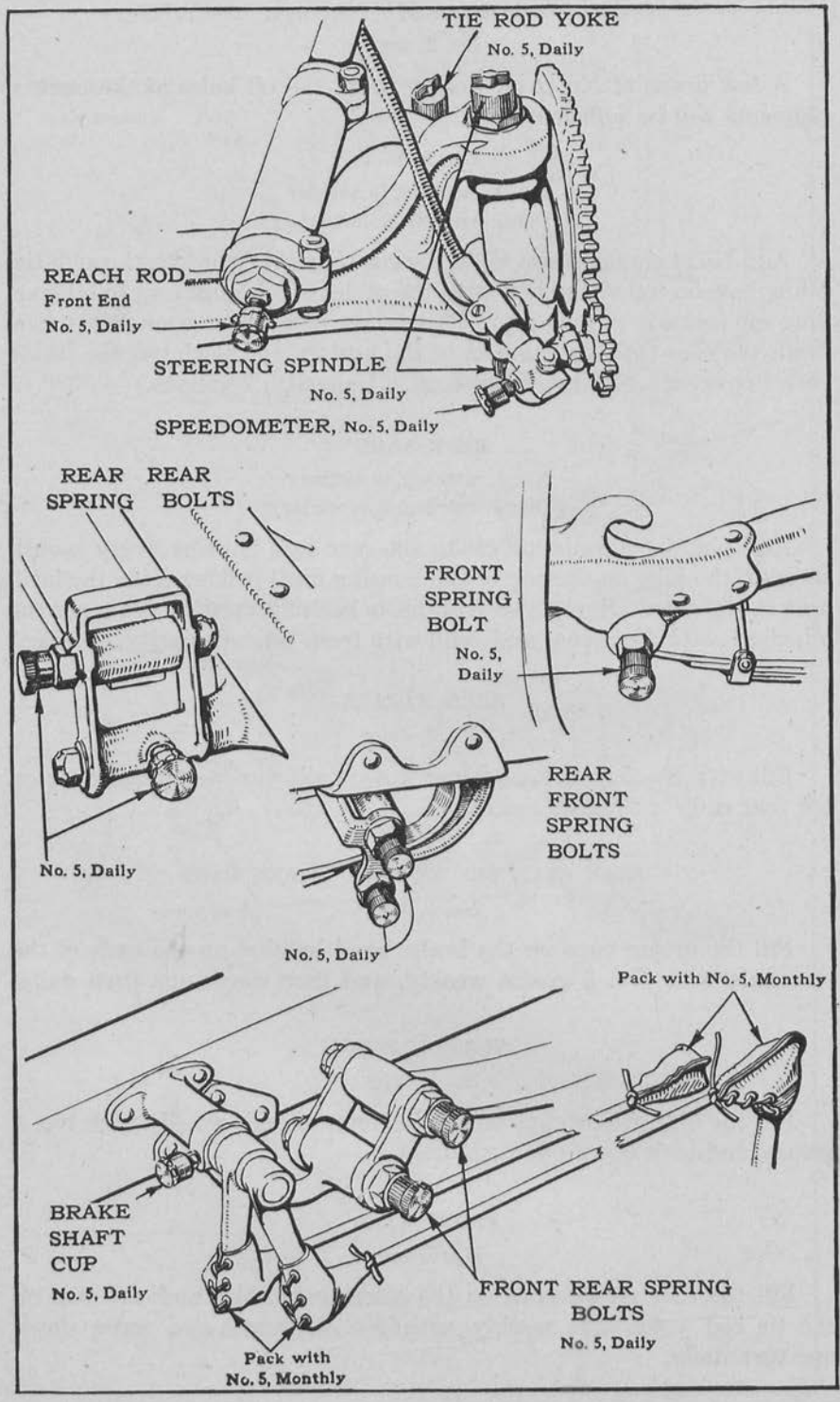
Fill the four grease cups on the torsion rod ends weekly with No. 5 grease, and turn down one turn daily.

FRONT AXLE

No. 5, daily

Fill the four grease cups on the steering spindles and the two on the tie rod yoke ends weekly with No. 5 grease, and screw down one turn daily.

PLATE 10



FRONT AXLE AND SPRING BOLT LUBRICATING SKETCHES

REACH ROD

No. 5, daily

Fill the two grease cups on the ends of the reach rod weekly with No. 5 grease, and screw down one turn daily.

SPEEDOMETER GREASE CUP

No. 5, daily

Fill the cup on the speedometer driven gear bracket weekly with No. 5 grease, and screw down one turn daily.

SPEEDOMETER SHAFT

No. 9, monthly

Disconnect the drive shaft from the speedometer and pour into the housing monthly about an ounce of No. 9 oil.

BRAKE SHAFT BRACKETS AND ROD ENDS

No. 2, weekly

Squirt a few drops of oil weekly on the brake rod yoke ends and into the oil holes in the brake shaft brackets.

FRONT SPRING BOLTS

No. 5, daily

Fill the two cups on the front ends of the springs and the four on rear ends weekly with No. 5 grease and screw down one turn daily.

REAR SPRING BOLTS

No. 5, daily

Fill the eight cups in the shackle bolts at the ends of the rear springs weekly with No. 5 grease and screw down one turn daily.

SPRING LEAVES

No. 6, monthly

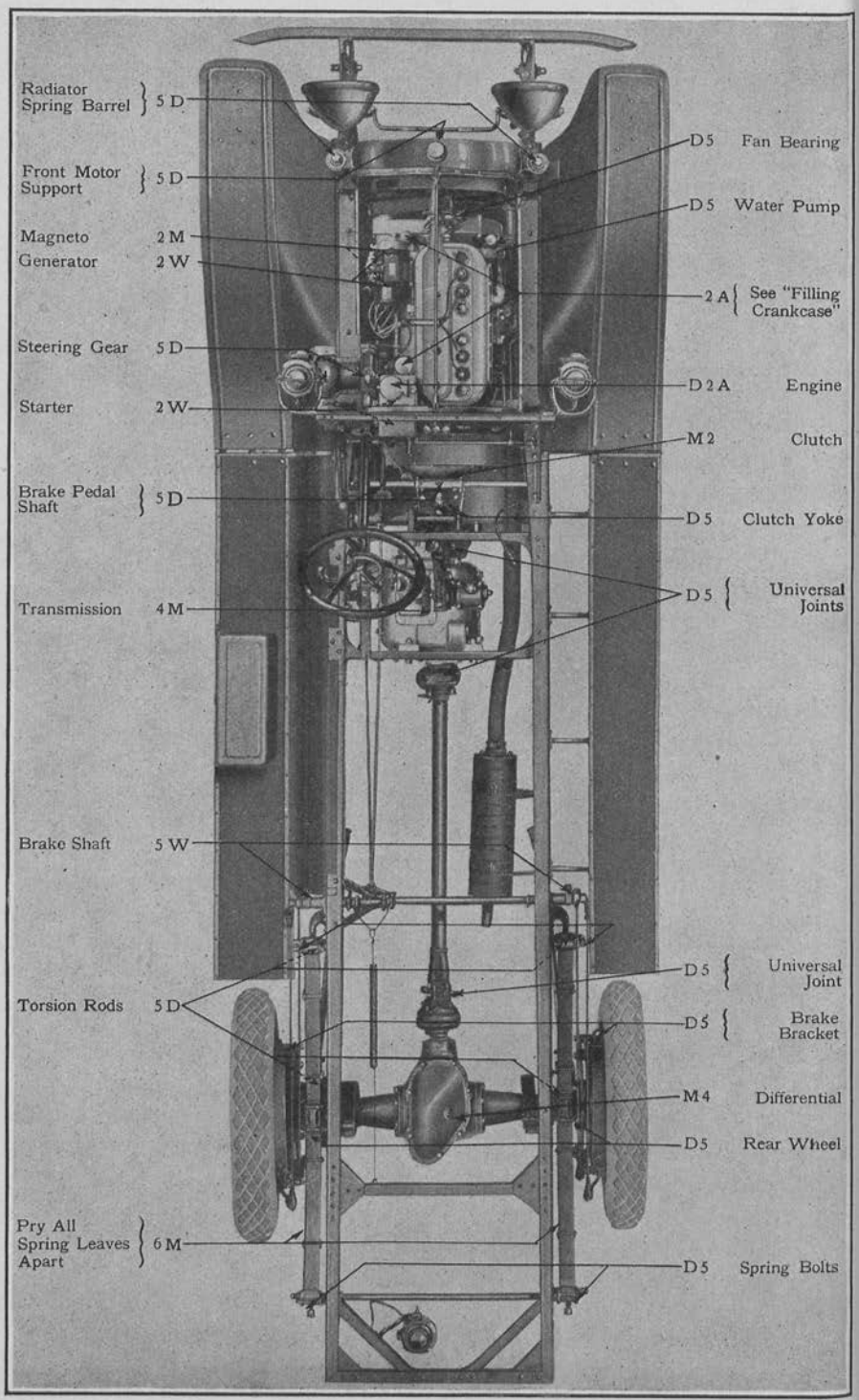
Take the weight of the body off the springs by jacking up the frame. Remove the rebound clips, pry the leaves apart by driving a cold chisel between them, and smear their surfaces with No. 6 grease or with graphite.

FRONT WHEEL HUB BEARINGS

No. 5, monthly

Remove the plugs in the outer flanges and once a month inject a gun full of No. 5 grease.

PLATE 11



LUBRICATING CHART, TOP VIEW OF CHASSIS

MAINTENANCE ROUTINE

It is essential for the proper care and maintenance of the White, Model TEB-O, Chassis that the following maintenance routine schedule be rigidly adhered to. Preparedness for emergencies can only be obtained by keeping the car in excellent condition, and this necessitates proper adjustment at regular intervals of time.

The following items refer only to inspection and adjustments. Repair, or replacements detected as necessary should be made at the earliest opportunity.

DAILY MAINTENANCE ROUTINE

Engine

Examine all wiring terminals for tightness.
Clean magneto externally.
Note tension of fan belt.
Inspect oil supply in engine crank case.
Inspect oil pump for performing its proper function.
Inspect radiator water supply.
Inspect hose connections for leaks.
Inspect gasoline tanks for proper fuel supply.
Inspect fuel pipe line and all connections for leaks.

Brakes

Inspect for undue wear or looseness and tighten if necessary.
Inspect for proper operation.

General

Inspect and thoroughly clean all lamps.
Inspect tires for air pressure, cuts or damage.
Tighten all loose bolts and nuts.
Fill and clean acetylene generator, on chasses carrying this equipment.

Lubrication

See charts on pages 25 and 34 for parts needing daily attention. (D)

WEEKLY MAINTENANCE ROUTINE

Engine

Inspect all wires for proper support and freedom from damage.
Thoroughly clean engine externally.
Inspect all oil pump connections for oil leaks.
Inspect all water connections for leaks.
Inspect carbureter control connections.
Do not attempt to alter carbureter adjustment unless this is shown to be necessary when the car is in service.
Remove magneto distributor cover and clean with gasoline and clean cloth.

Operate engine at low speed and, with one wire at a time separated from spark plug, inspect the spark given for length and apparent hotness.

Keep engine free from carbon; inject tablespoonful of kerosene into each cylinder through spark plug hole. This should be inserted when the motor is hot, and left stand over night.

Remove, clean and adjust all spark plugs.

Starter and Generator

Remove cover ring over the brushes and clean commutators on both starter and generator with a cloth moistened with gasoline.

Springs

Inspect center bolt of spring and spring clips for apparent tightness.

Wheels

Inspect front wheels for alignment with rear wheels.
Inspect tires for undue damage and wear.
Jack wheels up and inspect bearing adjustment.
Inspect spindles and spindle bolts.
Inspect tie rod adjustment.

Clutch

Inspect entire clutch mechanism.

Transmission

Clean and inspect all control connections.

Differential

Inspect differential and pinion shaft bearing adjustment.

Body and Equipment

Inspect body bolts, hood fasteners and all similar bolts for apparent tightness.

Inspect tool equipment for completeness.

Battery

Test the gravity of the electrolyte, and add distilled water if solution is low, on chasses carrying electric lighting and starting equipment.

Lubrication

See charts on pages 25 and 34 for parts needing weekly attention. (W)

MONTHLY MAINTENANCE ROUTINE

Engine

Determine if carbon is present in quantity in the engine.

Examine and inspect engine for loose parts, leaks, noises.

Grind valves if necessary. See page 49 for instructions on doing this work.

Ignition

Clean magneto collector ring, polish and adjust breaker points.
Inspect magneto cam for correct advance.

Starting Motor and Generator

See that the brushes fit the commutators, and clean the commutators lightly with worn sand paper, on chasses carrying electric lighting and starting equipment.

Clutch

Inspect clutch cover for oil leaks.
Inspect clutch operation.
Inspect clutch alignment.

Transmission

Clean externally and inspect for leaks, particulary the drain plug and the rear bearing.

Springs

Thoroughly inspect and clean spring shackle connections.
Inspect springs to ascertain damage, if any.

Differential

Clean and inspect differential housing for oil leaks.
Inspect brake arms and equalizers on differential housing.

Wheels

Remove hub cap and inspect for proper lubrication.
Inspect condition of bearings.

Universal Joint

Remove the boots, and inspect for worn bushings and loose bolts Clean with kerosene and a brush.

General

Inspect transmission arm bolts.
Inspect front motor support bolts.
Inspect oil pan and transmission bolts.
Inspect steering gear for lost motion and lubrication.
Inspect speedometer drive.

Lubrication

See charts on pages 25 and 34 for parts needing monthly attention. (M).

COMMON TROUBLES

IMPORTANT ADVICE

Do not touch any adjustments or tamper with any parts until you know what causes the trouble. Otherwise you may get everything out of adjustment.

ENGINE FAILS TO START

Lack of Gasoline—See that fuel tank is full and 3-way cock is open. If fuel line is free, gasoline will run out of drain cock at the bottom of the carbureter.

Lack of Ignition Current—This may be due to neglect in throwing on the switch or to a broken or disconnected wire. May also be caused by "grounding" on some part of engine or frame of wire from magneto to ignition switch.

Dirty Spark Plugs—These are due to an excessive amount of oil in the engine and too long service without attention, whereby the points become coated with carbon. Dirty spark plugs should be removed and cleaned with gasoline.

Spark Plugs—Points are improperly set. (See under "Engine Misses.")

ENGINE STOPS

Lack of gasoline.
Disconnected switch or wires, or "grounded" magneto switch wire.
Lack of oil or water.
Carbureter flooding.

ENGINE MISSES

Broken or Disconnected Wiring—If the engine misses, short circuit the spark plugs one after another, by touching a hammer or screw driver from the metal of the cylinders to the terminals of the spark plugs. When one is reached which makes no difference in the running of the engine, this is probably the plug at fault.

Dirty or Broken Spark Plugs—Remove and clean. Be sure porcelain insulator is not cracked.

Points of Spark Plugs Improperly Set—If these points are too close together or too far apart, missing may result. Spark plug points should be set approximately 0.025 inch apart—about the thickness of a dime.

Defective Carbureter Adjustment.

Loss of Compression in any Cylinder—Valve may be stuck or there may be dirt under it. Examine the valve tappet to see whether the valve seats properly. To locate cylinder that is weak on compression, turn over the engine by hand, testing each cylinder in turn.

Water in Gasoline—Indicated by engine running and stopping and running again by fits and starts.

Overheating—Engine runs with some pounding and slowly. Close throttle completely. See "Engine Overheats."

LOSS OF POWER

The engine will run but will not pull the car under a heavy load.
May be due to:
Loss of compression.
Too rich a mixture through carbureter flooding.
Valves not seating properly and not holding compression.
Weak ignition.
Lack of oil or water.
Lack of gasoline. If this is due to partial stoppage of the gasoline pipe, the engine will spit back through the carbureter when the throttle is opened.
Dragging brakes.

LACK OF GOOD COMPRESSION

This is generally due to leaky valves. These should be adjusted or their seats reground. Scored cylinders are a very common cause and are the result of insufficient lubrication.

POPPING BACK THROUGH CARBURETER

This usually indicates too weak a mixture and may be caused by:
Dirt in gasoline passage or nozzle—Try pet cock on carbureter.
Air leak in the intake passage and connections.
Inlet valves holding open.
Water in gasoline.

ENGINE OVERHEATS

Lack of Proper Lubrication.

Defective Water Circulation—Inspect all water passages, making sure that the gaskets (washers) at flange joints have not swollen in such a way as to cut down the opening.

Slipping Fan Belt—Belt should be tightened.

Too Much Gasoline—Too rich a mixture is indicated by black smoke at the exhaust. The engine will sometimes continue to fire after the switch has been turned off, even though the water is not hot enough to indicate overheating. This firing is caused by a carbon deposit in the cylinders, which becomes incandescent.

Too Little Gasoline—Too lean a mixture is indicated by lack of acceleration, popping in the carbureter or back-firing when the throttle is suddenly thrown open.

ENGINE KNOCKS

Connecting Rod Bearings too Loose or Burned Out—Loose bearings give a light knock at high speed. Burned out bearings knock whether running under load or idling.

Lack of Proper Lubrication of Engine.

Faulty Carbureter Adjustment.

A Loose Piston in One of the Cylinders—Knocks only under full load at low speeds.

Carbon in Cylinders—This carbon becomes heated and may cause premature ignition. Remove cylinder heads and clean cylinders.

Crankshaft Bearing Loose—Heavy pound at slow engine speed under heavy load. The adjustment of this bearing should by all means be made as soon as possible.

Overheating Due to Lack of Water.

CHAPTER II

ENGINE

CHAPTER CONTENTS

ENGINE
FUEL SUPPLY SYSTEM
IGNITION SYSTEM
COOLING SYSTEM
ELECTRIC STARTING SYSTEM

ENGINE—BRIEF DESCRIPTION

The engine is a standard design of White make, having four block-cast, L-head cylinders with heads integral. The block is mounted on an aluminum crankcase and is in two halves, horizontally split. Its cylinders are 4.25 (4¼) inches diameter bore, by 6.375 (6⅜) inches stroke; water cooled with centrifugal pump circulation; lubrication by the special White partial make-up system; ignition is by magneto with variable spark, and carburetion by a float-feed spraying type White carbureter, fed by gravity from the gasoline tank. The valves and valve operating mechanism are on the right, together with the carbureter, water pump and oil pump.

ENGINE OPERATION

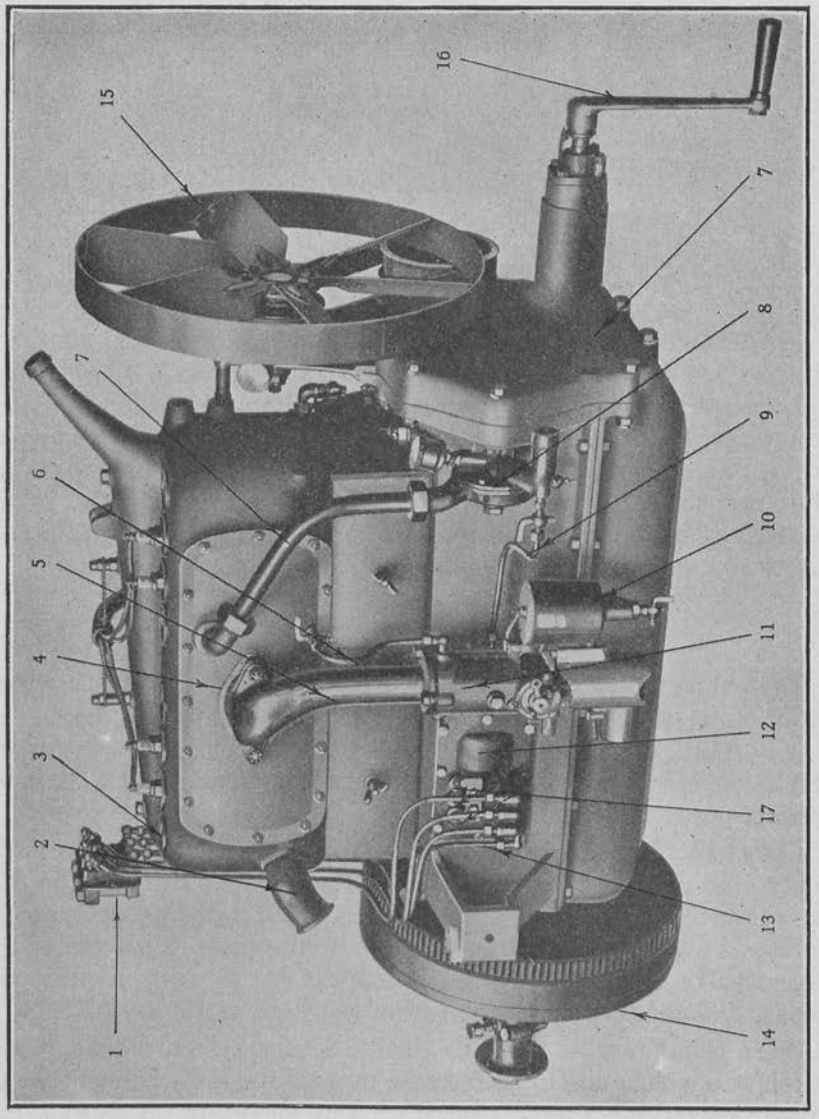
The engine operates in the four-stroke cycle, which is the same as that of all truck, tractor and passenger car engines made in the United States. There are four distinct strokes of the pistons necessary for the completion of a cycle, these four strokes being called: Intake, compression, power and exhaust.

Upon being cranked by hand, a piston descends while its intake valve is open, and draws a charge of gas into the cylinder through the carbureter and the intake pipe. When piston is just past the bottom of its stroke, and again returning upwards, the intake valve closes and, as the exhaust valve is at this time also closed, the gas is trapped within the cylinder and compressed by the piston's upward motion.

When piston reaches top of its stroke, the spark occurs and explodes the mixture which, due to its increase in pressure, drives down the piston with considerable force, thus storing up energy in the flywheel for the succeeding strokes.

When piston nears the bottom of its stroke the exhaust valve opens, allowing the expanded and now useless gases to escape, and stays open during the following upward movement of the piston, allowing the ejection of the remaining burned gases.

PLATE 12



RIGHT SIDE OF ENGINE

PLATE 12—RIGHT SIDE OF ENGINE

Ref. No.	Part No.	Name
1	00350 GF	Oil sight feed.
2	107¼ GF	Exhaust pipe flange elbow.
3	00327¾ GEC	Valve port plug.
4	106 GEB	Cylinder side plate.
5	0071 BGED	Carbureter intake pipe.
6	00776½ TED	Carbureter water jacket line.
7	00335 GEC	Water inlet pipe to cylinder.
8	325 GE	Water pump.
9	00776 TED	Carbureter water jacket line to pump.
10	00706 GED	Carbureter.
11	00721 TED	Carbureter water jacket.
12	354 GFB	Oil pump.
13	00785 TED	Oil line, reservoir to pump.
14	150¾ GEC	Clutch cover.
15	0291 GE	Fan.
16	0166 GAB	Starting crank.
17	0364½ GE	Oil pump adjusting nuts.

CYLINDER ASSEMBLY

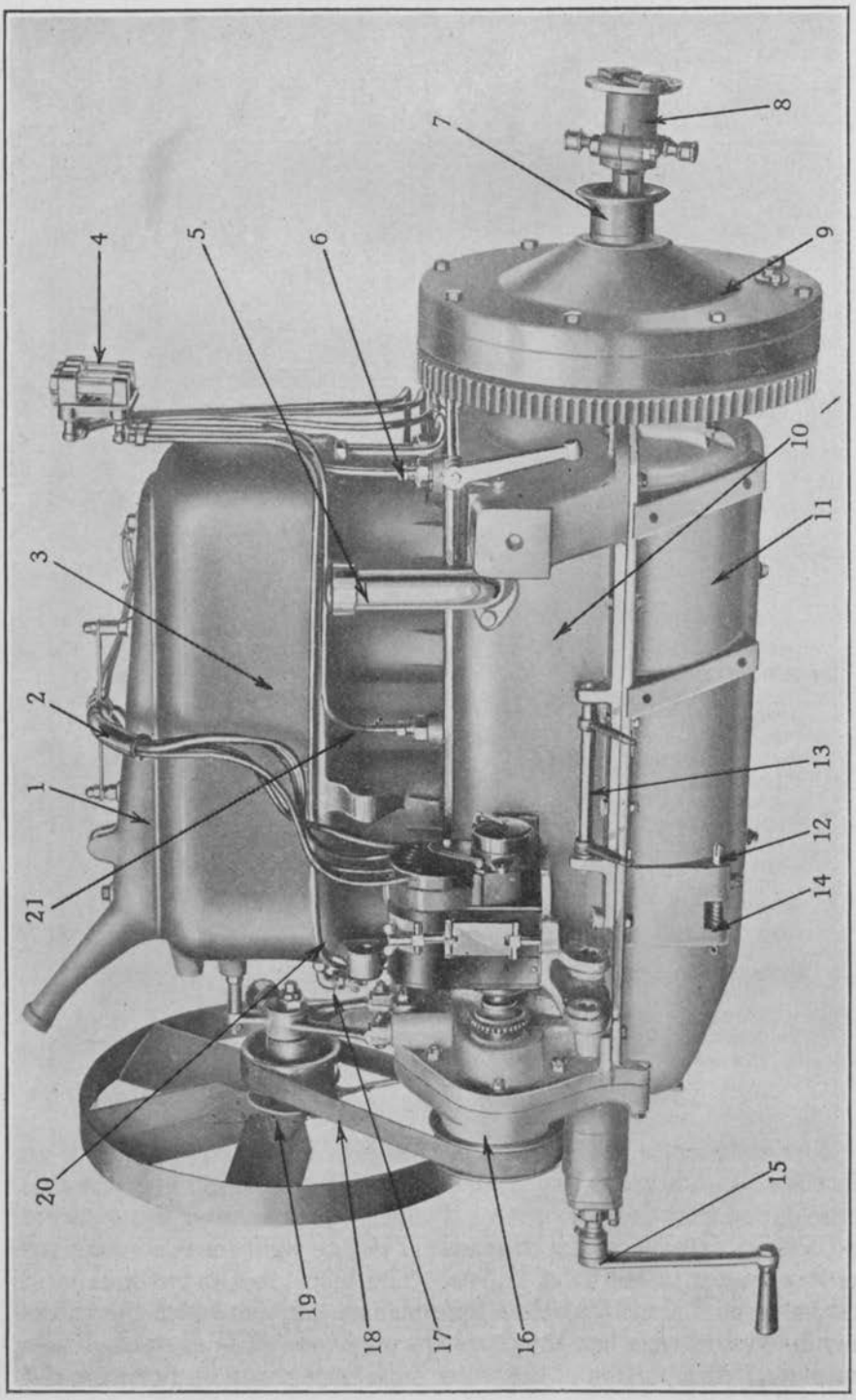
CYLINDER DIMENSIONS

Cylinder, Material			Cast iron
Bore	inches	4.25	(4¼)
Stroke	do	6.375	(6⅜)
Piston displacement	cubic inches	361.68	(361⅝)
Finished length of cylinder bore	inches	10.25	(10¼)
Finished height of cylinder from bolt flange to top plate surface	do	13.25	(13¼)
Cylinder Head Plug Hole, Diameter	do	2.125	(2⅛)
Threads	per inch	14	
Valve Port Holes, Diameter	inches	2.125	(2⅛)
Threads	per inch	14	
Water Jacket Drain Plug, Size	inch	0.25	(¼)
Clyinder Top Plate Stud, Diameter	do	0.437	($\frac{7}{16}$)
Threads	per inch	18	
Cylinder Side Plate Cap Screws, Number			sixteen
Diameter	inches	0.312	($\frac{5}{16}$)
Threads	per inch	20	
Valve Guides, Length	inches	4.187	(4 $\frac{3}{16}$)
Diameter	do	0.375	(⅜)

CYLINDER DESIGN

The cylinders are of grey iron, cast in a block, and bolted to an aluminum crankcase. The cylinder casting has the inlet passages cored out so that the carbureter attached to a carbureter water jacket and a short external elbow or manifold on the right feeds through the cored passages to the inlet valves. The block has an integral head and valve port plugs that close the openings through which the valves may be withdrawn when the plugs are removed. The engine cylinder top plate, with a portion of the water outlet pipe, is a unit, bolted to the top of the casting.

PLATE 13



LEFT SIDE OF ENGINE

PLATE 13—LEFT SIDE OF ENGINE

Ref. No.	Part No.	Name
1	0106½ GEC	Cylinder cover.
2	00464 GA	Ignition cable conduit.
3	105 GEC	Cylinder block.
4	00350 GF	Oil sight feed.
5	102¾ GEB	Crankcase vent pipe.
6	00786½ GEC	Oil line, sight feed to rear bearing.
7	0131 GED	Clutch brake.
8	0425 GED	Alignment joint.
9	150¾ GEC	Clutch cover.
10	100 GEC	Crankcase.
11	101 GED	Crankcase pan.
12	0101½ GE	Crankcase pan drain valve.
13	0299½ GE	Magneto control lever tube.
14	0101¾ GA	Drain valve spring.
15	0166 GAB	Starting crank.
16	103 GEC	Timing gear case cover.
17	00709¼ GAH	Cylinder drain cock.
18	369½ TED	Fan belt.
19	0291 GE	Fan.
20	00786 GEC	Oil line, sight feed to front bearing.
21	00786¼ GEC	Oil line, sight feed to center bearing.

The cy' nder assembly consists of the cylinder block and the parts supported thereby, namely, the fan bracket stud, cylinder plugs, engine valves, valve bushing studs, cylinder top plate stud, ignition conduit stud, side plate and screws, side plate inlet elbow, intake pipe and studs, valve cover plate and studs, cylinder drain plug, cylinder drain cock and cylinder plug.

CYLINDER SCORED

Cylinders may become scored because of engine operation for long periods when overheated, lack of lubrication, tight pistons, loose or broken wrist pin, piston out of round, connecting rod out of alignment.

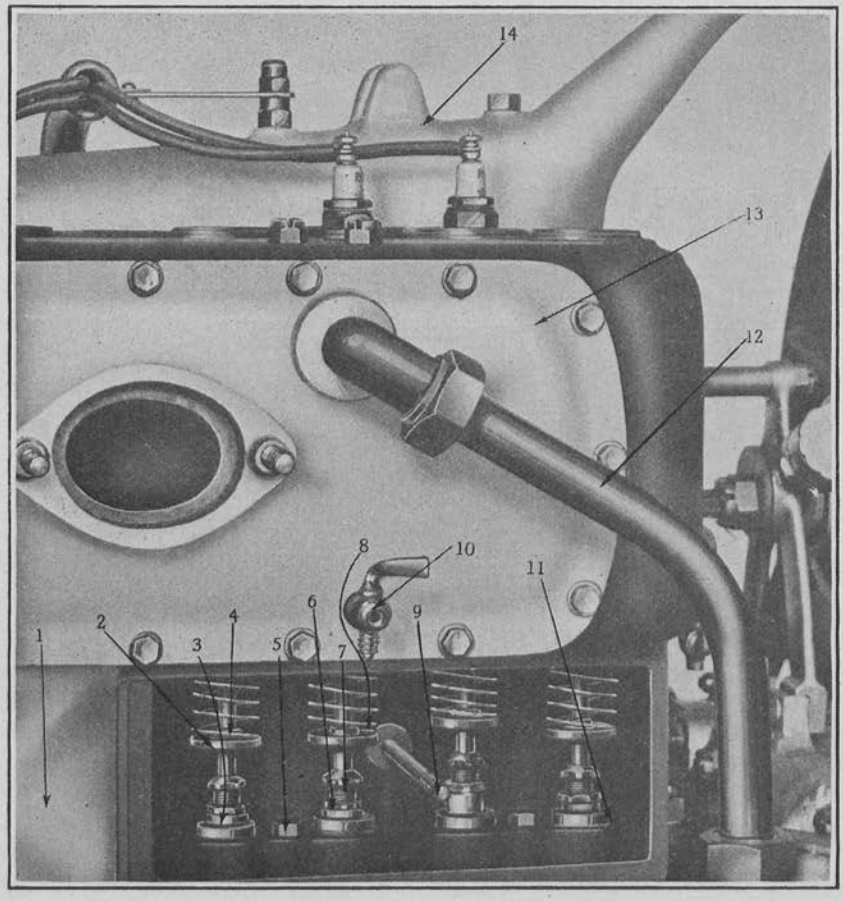
CYLINDER JACKET CRACKED

If a cylinder water jacket is cracked, an emergency repair can be made by calking or by shellac saturated cloth strips stuck over crack and permitted to dry before filling cooling system with water.

CYLINDER TOP PLATE

The cy inder top, or top water jacket cover, is made of aluminum and is held in place on the cylinder block by four cap screws. Between the top plate and the cylinder block is the top plate gasket, made of composition packing, for the purpose of making a water-tight seal at this point. Extending upward and forward from the top plate, and cast integral with the same, is the connection upon which the upper radiator hose is placed. The end of the connection terminates in a knob for holding and keeping tight the radiator hose.

PLATE 14



SIDE OF CYLINDER BLOCK,
SHOWING VALVE TAPPETS AND SPRINGS

Ref. No.	Part No.	Name
1	169 GEC	Valve cover plate.
2	0143¼ GE	Valve collar bushing.
3	0147 GK	Valve tappet.
4	0143¼	Valve key.
5	S0147½ GE	Valve tappet bushing stud.
6	S0146 GAB	Valve adjusting cap nut.
7	S0147 GAB	Valve tappet adjusting cap.
8	148 GE	Valve spring.
9	S0169 GEC	Valve cover plate stud.
10	00709¼ GAH	Cylinder drain cock.
11	147½ GEC	Valve tappet bushing.
12	00335 GEC	Engine cylinder inlet pipe.
13	106 GEB	Engine cylinder side plate.
14	0106½ GEC	Engine cylinder top plate.

CYLINDER SIDE PLATE

The cylinder side plate, made of aluminum, is on the right hand ide of the cylinder block. It is held in place on the cylinder block by 13 cap screws. The side plate is drilled and tapped for the water inlet elbow and for the side plate plug. Centrally located in the side plate is the carbureter intake pipe boss. Between this boss and the intake pipe is a gasket of superheat packing. The intake pipe is held by two bolts through the intake pipe and cover plate. Between the side plate and cylinder block is a gasket made of graphite packing equal in quality and thickness to the composition packing used at the center.

VALVE PORT PLUG DIMENSIONS

Valve Port Plug, Material		Gun metal	
Height	inches	1.375	(1 3/8)
Diameter	do	2.125	(2 1/8)
Threads	per inch	14	
Diameter across flats of hexagonal socket	inches	1.50	(1 1/2)
Spark Plug Hole, Diameter	inches	0.875	(7/8)
Threads	per inch	18	
Gasket, Port Plug, Outside Diameter	do	2.375	(2 3/8)
Inside diameter	do	2.125	(2 1/8)
Thickness	do	0.093	(3/32)
Cylinder Head Plugs, Material		Gun metal	
Diameter	inches	2.125	(2 1/8)
Threads	per inch	14	

VALVE PORT PLUG

Above the valves and screwed into the cylinder are eight valve plugs made of gun metal. Four of these plugs are drilled and tapped for the four spark plugs. The latter screw into the cylinder casting above the intake, the remaining four plugs above the exhaust valves. Between each of the valve plugs and the cylinder, forming a gas tight joint, are the valve port plug gaskets. These gaskets are made of copper, packed with asbestos. It is very essential to the correct operation of the engine that the spark plug valve port plugs are screwed in the holes above the inlet valves. In this way the spark plugs are not in dead gas pockets and are in such position as to be cooled by the incoming fresh gases.

VALVE GEAR

VALVES AND SPRINGS

The valves are built up with a special head that is attached to the valve stem. The valve stems are slotted at the bottom to receive the valve spring retainer lock. This lock is in the form of a key, which is slipped through the slot in the valve stem and upon which the valve spring retainer rests. The valve stems slide in valve stem guides that are cast integral with the cylinder block.

VALVE DIMENSIONS

Valve, Material		Steel	
Outside diameter	inches	1.968	(1 31/32)
Valve Head, Thickness	do	0.25	(1/4)
Valve Seat, Angle	degrees	45	
Width, Projected	inches	0.125	(1/8)
Valve Stem, Diameter	do	0.375	(3/8)
Valve Key Slot, Height	do	0.437	(7/16)
Width	do	0.125	(1/8)
Distance from bottom end of valve stem	do	0.50	(1/2)
Valve Stem, Length over valve head	do	8.875	(8 7/8)
Valve Port, Clear diameter	do	1.687	(1 11/16)
Valve Lift, Inlet	do	0.312	(5/16)
Exhaust	do	0.312	(5/16)

VALVE SPRING DIMENSIONS

Valve Spring, Material		Steel wire	
Outside diameter	inches	1.343	(1 11/32)
Inside diameter	do	1.047	(1 3/64)
Free length	do	4.00	
Length when compressed in place	do	2.75	(2 3/4)
Compression when in place	pounds	55	
Valve Spring Retainer, Material		Case hardened steel	
Diameter	inches	1.50	(1 1/2)
Valve Spring Retainer Key, Material		Steel	
Length	inches	1.00	
Width	do	0.406	(13/32)
Thickness	do	0.125	(1/8)

VALVE LIFTERS AND GUIDES

Valve lifters are provided for each valve. They are of the roller type. The rollers are inserted in a milled slot in the lower end of the lifter and held in place by a small pin. The latter is fastened in place by another smaller pin. The roller follows the cam and in doing so rises and falls according to the contour of the latter.

At the upper end of the valve lifters there is a screw and lock nut. The head of the first is case hardened as it strikes the bottom of the valve stem, and were it not hardened would wear too fast. The screw is used to provide adjustment so that, when the valve stem wears, the increase in clearance between the valve stem and the adjusting screw can be taken up. The nut is provided to lock the valve adjusting screw in place when the proper clearance between the valve stem and the lifter has been obtained. In ordinary practice it is desirable to allow from 0.008 to 0.010 (eight to ten thousandths) inch clearance. If less is used the valves are held open when the valve stems have expanded and there is leakage of compression and also burning of the valve and its seat, so that it may have to be recut.

The valve guides are inserted in the lower flange of the cylinder and are held in place by means of a single stud and nut at the center between each pair of valve guides. The guides are slotted at the bottom so as to clear the valve roller, which projects outside of the diameter of the valve lifter. This projection also prevents the valve lifter from rotating and thereby getting the valve roller out of line with the cams on the camshaft. In order to prevent the valve lifter guide from turning and doing the same thing, there is a lip or flange cast on the top of the valve guide which half encircles the hold-down stud. This positively prevents the valve guide from turning in the cylinder flange and assures that the valve lifter roller axis will always be parallel to that of the camshaft, as is desired.

VALVE LIFTERS AND GUIDE DIMENSIONS

Valve Lifters, Material		Nickel steel	
Outside diameter	inches	0.796	($\frac{51}{64}$)
Inside diameter	do	0.50	($\frac{1}{2}$)
Length	do	2.875	($2\frac{7}{8}$)
Width of roller slot	do	0.312	($\frac{5}{16}$)
Number of threads for adjustment screw	per inch	20	
Valve Lifter Roller, Material		Nickel steel	
Diameter	inches	1.00	
Thickness	do	0.307	($\frac{5}{16}$)
Valve Lifter Roller Hole, Diameter	do	0.376	($\frac{3}{8}$)
Valve Lifter Roller Pin, Material		Case hardened steel	
Diameter	inches	0.375	($\frac{3}{8}$)
Length	do	0.75	($\frac{3}{4}$)
Valve Lifter Guides, Material		Cast iron	
Inside diameter	inches	0.796	($\frac{51}{64}$)
Length	do	2.437	($2\frac{7}{16}$)

VALVE GRINDING

In order to maintain gas tight joints, the valve faces must fit their seats perfectly. If they do not, there will be a loss of compression and a loss of power.

When valves or seats become dirty or pitted, they should be ground. To remove them, first remove all valve port plugs with the special wrench in the tool kit; also remove the valve cover plates. Lift up the springs with the spring compressor provided, taking out the valve keys at the end of the valve stems. Then remove valve springs and collars and lift out the valves. Close the ports between the valves and the cylinder with a clean cloth. Mix a little cylinder oil with flour emery or powdered carborundum. Spread a little of this grinding compound uniformly over the valve face. Place the valve back in its original position.

Insert a screw driver into the slot in the valve head; then turn with a semi-circular movement of the screw driver, exerting very little pressure. This can be done easily by holding the handle between the palms

of the hands. Occasionally remove the valve from the seat, turn part way around and continue as before. When done correctly a light silvery color will be given to both seat and face.

Clean valve stems and guides thoroughly, making sure that no grains of the abrasive remain. Remove cloth from cylinder port. Oil the valve stem and guide. Replace valve, put back key and valve spring retainer; when this has been done on all valves, readjust valve lifter tappets to 0.010 (ten thousandths) inch on exhaust and 0.008 (eight thousandths) inch on intake.

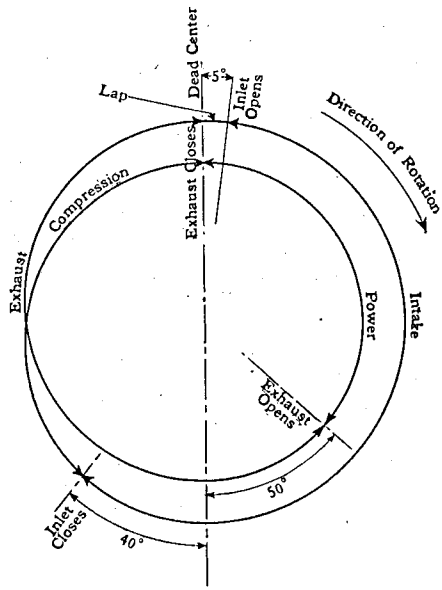


PLATE 15—VALVE TIMING DIAGRAM

Do not grind exhaust valves more frequently than necessary; at Monthly Maintenance Inspection should be enough. An occasional application of kerosene on the valves and stems is beneficial. Intake valves seldom need grinding. Exhaust valves are subjected to greater heat and require more attention. The first, fourth, fifth and eighth valves are the exhaust. The spark plug valve post plugs should always be kept over the intake valves.

VALVE TIMING

The proper operation of the engine demands that the valves open and close with reference to the location of the piston in its cycle of movement with considerable accuracy. The rotation of the camshaft is timed with reference to the rotation of the crankshaft by means of a proper meshing of the gears which connect the two.

The timing gears at the front of the engine are marked so that there should be no difficulty in replacing them and putting the engine in proper time if it has been disassembled. However, in case some difficulty in the timing is encountered, the following information is of value.

Inlet valve opens 5 degrees past the upper dead center and closes 40 degrees after the lower dead center. The exhaust valve opens 50 degrees before the bottom dead center and closes at the top dead center.

FLYWHEEL TIMING MEASUREMENTS

To facilitate in timing the engine, the degrees mentioned in the previous paragraph are here given in inches measured on the circumference of the flywheel. According to this, the exhaust valve closes at the top dead center, and the intake valve opens 0.774 (49/64) inch on the flywheel rim past the upper dead center. The exhaust must never close before dead center, but may close as late as 0.75 (¾) inch past dead center. If this is observed and checked for one cylinder, the rest of the valves will be timed properly.

For further checking, the following figures are given: The exhaust valve should open 50 degrees or 7.75 (7¾) inches before the lower dead center and the intake valve should close 40 degrees or 6.19 (6 13/64) inches past the lower dead center.

FIRING ORDER

The cylinders of the engine are numbered from the radiator back, calling the first, or one nearest the radiator, Number 1; the second, Number 2, and so on. Having this order of cylinder location in mind, the firing order of the engine is 1-3-4-2.

PISTON ASSEMBLY

PISTON DIMENSIONS

Piston, Material		Cast iron
Length	inches	5.218 (5 7/32)
Diameter above top ring	do	4.235 (4¼)
Between two top rings	do	4.240 (4¼)
Between two lower rings	do	4.243 (4¼)
Skirt below piston pin	do	4.245 (4¼)
Piston Ring Grooves, Width	do	0.25 (¼)
Depth	do	0.169 (3/16)
Piston Pin Hole, Diameter	do	1.110 (1⅛)
Piston Pin Bosses, Length	do	1.50 (1½)

PISTON

The pistons are cast from special iron and are carefully annealed and should weigh within plus or minus of 0.5 (½) ounce of one another. The piston carries three packing rings, all located at the top above the piston pin.

PISTON PIN BOSSES

Provision is made for fastening the piston pin into the piston, as follows: The pin is clamped in the connecting rod by means of a clamp bolt, one side of which has been milled out to fit the bolt and thus aid in holding the pin rigidly and centrally in the connecting rod. The piston pin fits in the piston bosses, which form a bearing for it.

PISTON PIN LUBRICATION

In the piston pin bearings in the piston bosses are two oil grooves extending lengthwise of the bearing and also one oil groove crossing these, extending concentric with the bearing. Below the piston rings is an oil groove, or wiping ring, extending entirely around the piston. Connection between this groove and each of the piston pin bearings is made by two drilled holes, one to each of the pin bearing concentric oil rings. Thus, as long as the cylinders are well lubricated the piston pin will not lack lubrication.

PISTON TROUBLES

The piston, moving up and down in the cylinder, must constantly be protected by a film of oil, otherwise both it and the cylinder wall will be scored. If run long enough without oil, the piston will seize in the cylinder. The usual piston trouble encountered is due to excessive piston wear, which causes oil leakage into the combustion chamber and gas leakage downward into the crankcase. Also piston pin wear is not unusual. The latter causes knocking. Both are brought about by lack of, or insufficient, lubrication. Piston and rod may be removed through the crankcase.

TO ALIGN PISTON AT RIGHT ANGLES TO CRANKSHAFT

With the cylinder removed and the connecting rod and piston in position, a level may be used to ascertain parallelism between the top of the piston and the top of the crankcase, which is parallel to the center line of the crankshaft. A better method, however, is to use two try-squares. One of these should be mounted on a straightedge laid across the crankcase. This square should be used to hold the piston in a vertical position. Take the second try-square, place it on the top of the crankcase, parallel to the crankshaft, and bring the blade up against the side of the piston. If the piston is square with the crankcase and crankshaft, no light should be observed between the blade of the square and the skirt of the piston below the piston pin. To check, repeat on the opposite side of the piston.

INSERTING PISTON IN CYLINDERS

The insertion of the pistons, after cleaning or repairing, is accomplished in the following manner. Assemble completely the four pistons and connecting rods on the crankshaft and, by means of a chain block, lower the cy inder down over the pistons. Turn the crankshaft so that two pistons are up and two are down. The bottom edge of the cylinder is beveled to aid in compressing the rings and make the insertion of the pistons an easier matter. Lower the cylinder still more and at the same time turn the crankshaft so that the two lower pistons may be entered into the cylinder. The pistons should be covered with oil to aid in the insertion. With the four pistons entered, the cylinder block may be lowered to the crankcase.

PISTON RING PRECAUTIONS

Great care should be exercised so that loose piston rings are not allowed to wear the square faces of the piston ring slot to a bevel. If these square edges are worn to a bevel, it will be impossible to prevent the passage of gases above, behind and below the piston ring and the edges of the slot. Compression will be lost and carbon will form behind the rings.

FITTING PISTON RINGS

Accuracy and care should be used in fitting piston rings to a piston. Three factors have to be taken into consideration:

1st. *The fit of the piston ring in the cylinder to get proper ring break.*
2nd. *The fit of the piston ring in the slot on the outside of the piston.*
3rd. *The fit of the piston ring when placed on the piston.*

The average engineer should be able to get perfect adjustment on new piston rings if the following precautions are observed:

INSTALLATION OF PISTON RINGS

Fit the piston ring in the cylinder first. There are two methods of placing the piston ring square in the cylinder in order to get the proper ring "break."

1st. If the cylinders are removed, place the ring to be tested squarely in the cylinder. To ascertain if the ring is square in the cylinder bore, insert the piston and push the ring up a couple of inches with it. Romove the piston and examine the ring "break."

2nd. When the cylinders are not removed, first take out the piston and connecting rod through the bottom of the crankcase, insert the piston ring squarely in the bottom of the cylinder, by taking accurate measurement from the bottom edge of cylinder. When the piston ring is fitted in the bottom of the cylinder, using a small hand mirror will make examination of the "break" an easy matter.

Allowance has to be made for piston ring expansion lengthwise so that, when the piston and cylinder are up to operating temperature, the free ends of the piston ring will not meet and cause binding of the ends of the piston ring and, in turn, the piston ring against the cylinder wall. The top piston rings should have a "break" of 0.005 (five thousandths) of an inch.

When material has to be removed from the end of the piston ring, split to provide the necessary "break" for expansion, clamp a fine mill file in a vice, open the piston ring, and clamp the ends of the piston ring squarely over it and remove material. Be careful never to damage the piston ring split surfaces where they come together horizontally.

CARE IN HANDLING PISTON RINGS

Piston rings should be handled carefully and when opened to put on the piston should not be sprung sideways. The piston ring can be easily sprung so that it will produce a rocking motion when laid on a flat board or bench. It is impossible to fit a rocking or warped piston ring. Piston rings should not be carried indiscriminately with other tools in the tool box. Make provision to carry piston rings separately and stack one on top of the other.

FITTING RINGS TO PISTON SLOTS

The piston ring slot should be scraped absolutely clean of all carbon deposits and washed off with kerosene. It is useless to fit a piston ring unless this condition exists, because the deposits will produce a bind, interfering with accurate fitting. Scrape the piston ring slot clean with a flat metal scraper. If it is not possible to remove all of the carbon, 000 sand paper, used under a flat stick, should be employed, bearing on it lightly while cleaning the slot. Never use a file in the piston ring slot. Never use emery cloth for cleaning piston ring slots. Rinse the slots when finished, cleaning with kerosene, and wipe dry with a cloth.

After the piston ring has been fitted in the cylinder, it should be fitted to the piston slot by revolving the piston ring on the outside of the piston and inside the slot. The vertical expansion of the piston ring in the slot has to be provided for. The rings should have only clearance enough to fit in the slot, not over 0.001 (one thousandth) inch. If the piston ring does not have free movement in the slot, some of the material will have to be removed from the top or bottom edge of the ring. Obtain a flat board, over which spread a sheet of fine emery cloth. Lay the ring flat on this and rotate until a sufficient

quantity of material has been removed to secure the necessary clearance. Wash the piston ring with kerosene and wipe clean before trying the piston ring in the slot.

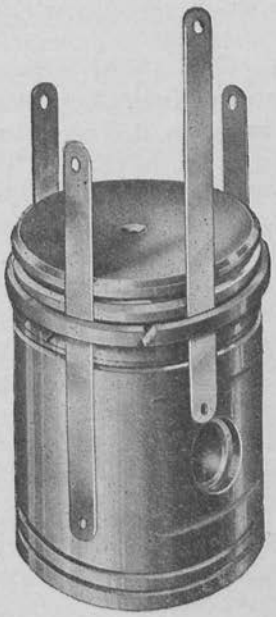


PLATE 16—REPLACING PISTON RINGS ON PISTON

MOUNTING RINGS ON PISTON

One of the most convenient tools to have is a piston ring remover, as by its use the piston ring will not be sprung out of round by careless handling or forcing. If removers are not available, three or four metal guides 0.25 (¼) to 0.5 (½) inch wide, 0.0325 (1/32) inch or less thick, and about 6 inches long, should be provided. Hack saw blades, ground off smooth, are ideal for this purpose. In taking off or replacing piston rings, these guides should be spaced equally around the piston and underneath the piston ring.

Place the piston ring in the piston slot to test for freedom of movement horizontally and for correct clearance in the vertical direction.

PISTON PIN DIMENSIONS

Piston Pin, Material	Case hardened nickel steel		
Length	inches	4.00	
Outside diameter	do	1.109	($1\frac{7}{64}$)
Inside diameter	do	0.687	($\frac{11}{16}$)
Piston pin fastening	By clamp bolt to connecting rod		

PISTON PIN

The piston pin is made of chrome nickel tubing and has its corners rounded off. One side is milled to a given radius to fit the connecting rod clamp bolt. One end has a 0.125 (1/8) inch wide by 0.125 (1/8) inch deep slot milled in it for the purpose of inserting a tool to turn the piston pin until it lines up with the connecting rod clamp bolt.

FITTING PISTON PINS

With this design of piston and piston pin, careful fitting is necessary. In replacing a piston or piston pin, it is necessary to remount the piston pin bosses and fit the piston pin to them. When the pin is properly fitted, it should just slip through the piston pin bosses under its own weight when well lubricated. If the pin is looser than it should be, replace with a new pin.

CONNECTING ROD ASSEMBLY

CONNECTING ROD DIMENSIONS

Connecting Rod, Material		Special chrome steel	
Length, center to center	inches	12.00	
Connecting Rod Section, Width	inches	0.75	(3/4)
Height	do	1.562	(1 9/16)
Thickness	do	0.187	(3/16)
Connecting Rod Upper End, Inside diameter	do	1.109	(1 7/64)
Piston Pin Binder Bolt, Diameter	do	0.437	(7/16)
Threads	per inch	18	
Connecting Rod Big End, Inside diameter	inches	2.937	(2 15/16)
Width	do	2.125	(2 1/8)
Connecting Rod Bolts, Material		Steel	
Number required per rod		four	
Diameter	inches	0.437	(7/16)
Length	do	1.75	(1 3/4)
Threads	per inch	18	
Connecting Rod Bushing, Material		Bronze	
Length	inches	2.50	(2 1/2)
Inside diameter	do	2.375	(2 3/8)
Outside diameter	do	2.937	(2 15/16)
Outside diameter of flanges	do	3.25	(3 1/4)
Thickness of babbitt facing	do	0.187	(3/16)

TO ADJUST CONNECTING ROD BEARING

Remove the spark plugs to release compression, blue the crank pin with a thin film of color, insert piston in the cylinder and mount the upper half of the connecting rod bearing on the crank pin and revolve crankshaft slowly. Remove connecting rod and piston, scrape all high spots and continue blueing and scraping until most of the bushing shows solid blue. The cap bushing should be fitted to the bushing on the upper part of the rod so that, when the connecting rod cap is pulled up snug but not tight, there will be about 0.001 inch clearance between the step in the connecting rod cap and the connecting rod proper. This allowance is for the final tightening up of the bearing, when the bushings have been fully scraped. Having obtained the proper clearance between the cap and the connecting rod, with both halves of the bushing in place but not mounted on the crank pin, proceed to fit the con-

necting rod bearing cap bushing to the shaft. Fit this bushing by spotting and scraping as outlined for the upper half. When the upper and lower halves of the connecting rod bushing have a good bearing, as shown by the solid color, replace the rod on the crank pin, put the connecting rod cap in place and draw up tight.

If a castellated nut is tight when in such a position that the cotter pin hole does not line up, the nut should be removed and a light cut taken off the face of the nut (with a file), permitting its being turned to a proper position, so that the cotter pin can be inserted when tight.

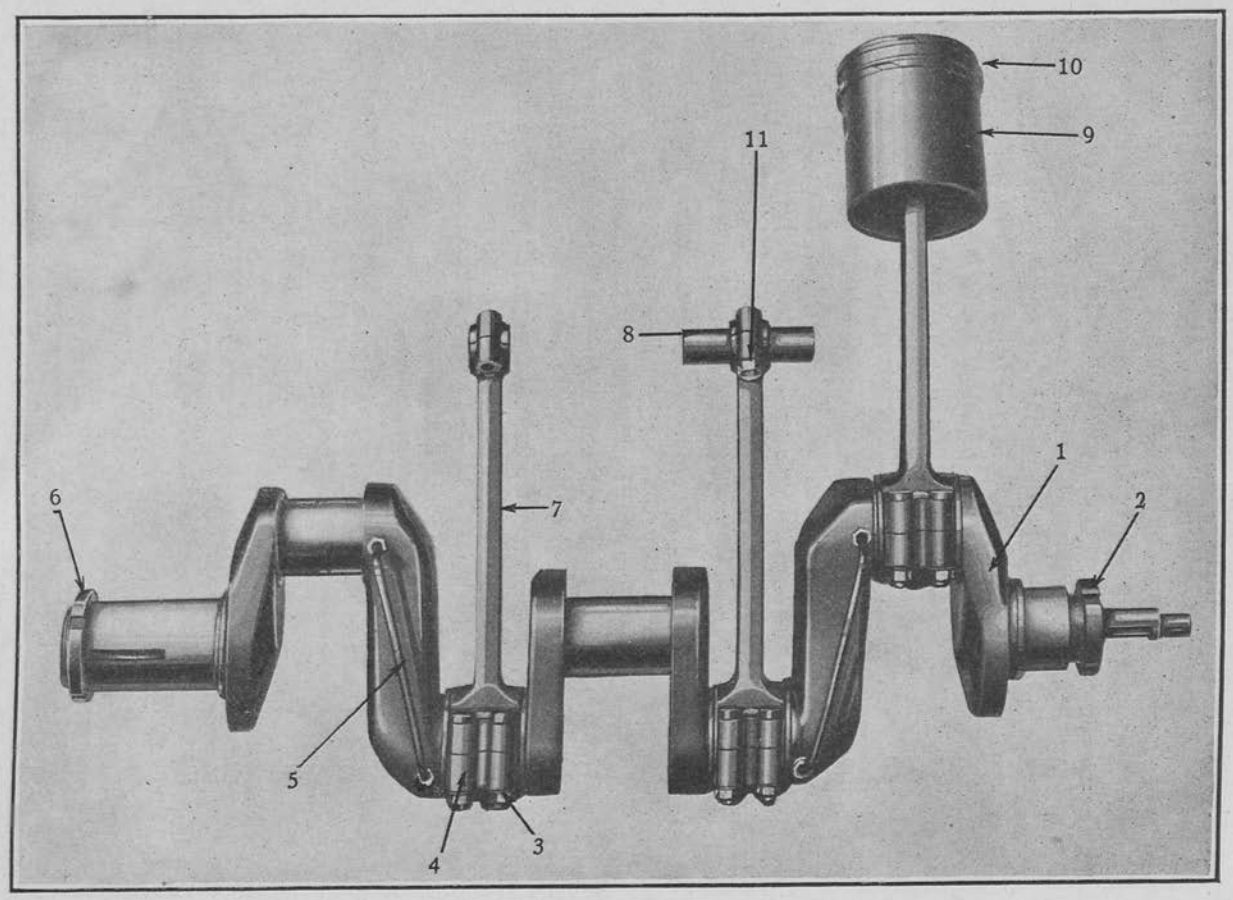
TO DETERMINE LOOSE CRANK PIN BEARING

The crank pin bearing is commonly called the connecting rod bearing. This bearing is located in the lower or big end of the connecting rod. To determine any looseness in the crank pin bearings, remove the lower crankcase. Turn the crankshaft with the flywheel until the crank pins of Number 1 and Number 4 connecting rods are about level with the edge of the crankcase. Have an assistant take hold of the flywheel and oscillate it about two or three inches. While this is being done, place the finger tips so that they rest partly upon the cheek of the crankshaft and partly upon the bushings of the connecting rod big end. In the oscillation of the crankshaft, there will be a give and take in the connecting rod bearing if there is any looseness. This movement will be readily felt at the finger tips, even if there is only a looseness of 0.001 inch. Repeat with other bearings in the same manner.

CRANKSHAFT ASSEMBLY

CRANKSHAFT DIMENSIONS

Crankshaft, Material		Chrome nickel steel	
Oil hole diameter	inches	0.234	($\frac{15}{64}$)
Oil tube outside diameter	do	0.312	($\frac{5}{16}$)
Oil tube, Material		Copper	
B. & S. Gauge		Number 18	
Crankshaft Bearing, Diameters—			
Front	inches	2.559	($2\frac{9}{16}$)
Intermediate or middle	do	2.375	($2\frac{3}{8}$)
Rear	do	2.755	($2\frac{3}{4}$)
Crank Pin, Diameter	do	2.375	($2\frac{3}{8}$)
Crankshaft Gear Hub, Diameter	do	1.187	($1\frac{3}{16}$)
Crankshaft Bearing, Lengths—			
Gear hub	do	1.75	($1\frac{3}{4}$)
Front	do	1.375	($1\frac{3}{8}$)
Intermediate or center	do	3.25	($3\frac{1}{4}$)
Rear	do	1.653	($1\frac{5}{8}$)
Flywheel Taper, Length	do	2.346	($2\frac{3}{8}$)
Maximum diameter	do.	2.755	($2\frac{3}{4}$)
Taper	per foot	0.625	($\frac{5}{8}$)
Flywheel end of crankshaft, Diameter	inches	2.50	($2\frac{1}{2}$)
Threads	per inch	12	
Crankshaft Front End, Diameter	inches	2.125	($2\frac{1}{8}$)
Threads	per inch	14	
Crankshaft Keys, Woodruff			
Crankshaft gear		Size Number 25	
Flywheel		Size Number T	



CRANKSHAFT, PISTON AND CONNECTING ROD ASSEMBLY

PLATE 17
CRANKSHAFT, PISTON AND CONNECTING ROD ASSEMBLY

Ref. No.	Part No.		Name
1	0126	GED	Crankshaft.
2	S087	GE	Crankshaft bearing lock nut.
3	0127½	GA	Connecting rod cap bolt.
4	0137½	GEC	Connecting rod bearing cap.
5	00126¼	GED	Crankshaft oil tubes.
6	S087	M	Crankshaft rear bearing lock nut.
7	0127	GEB	Connecting rod.
8	124	GE	Wrist pin.
9	122	GEG	Piston.
10	117	GEB	Piston rings.
11	S0141¼	GA	Connecting rod binder bolt.

CRANKSHAFT

The crankshaft is of the four-cylinder form, in which all throws are in a single plane, having four crank pins, one for each connecting rod big-end bearing. It has three bearings, one at each end and one at the center. The end bearings are annular ball, while the middle is the plain split type with bronze backed babbitt liner. The front end of the crankshaft is drilled and tapped for the starting crank ratchet screw. This screw holds the starting crank in place. The ratchet is held from turning on the crankshaft by means of a Woodruff key. Next to the ratchet is the machined portion upon which fits the crankshaft gear. This is also prevented from turning on the crankshaft by a Woodruff key. The front ball bearing is retained in place by the crankshaft front bearing lock nut screwed onto the end. On the rear of the crankshaft is screwed the rear bearing lock nut, which holds the flywheel in place. The flywheel is prevented from turning on the shaft by having the shaft tapered and by means of a Woodruff key. The hub of the flywheel passes through the crankcase, being made oil tight at this point by a felt washer packing. The inner edge of the flywheel hub presses against the crankshaft rear ball bearing, holding the same in place. The inner edge at the flywheel hub must always be fitted against the bearing.

CRANKSHAFT LUBRICATION

The middle crankshaft bearing is lubricated by a lead from the oil pump. The ball bearings are lubricated by the mist in the crankcase, while the connecting rod bearings are lubricated as follows: At each end of the shaft in the crank flanges are oil collector rings pressed

into machined recesses from which oil leads run. Two holes are drilled through each of the end crank cheeks, one to the adjacent rod bearing; the other across the crank pin. The location and connections between the various crank pins and the oil collector rings are clearly shown in the Oiling Diagram, plate 20, on page 67.

Whenever the crankshaft has been removed, great care must be observed in replacing it to see that the oil leads, which run to the oil collector rings at the front and rear ends of the crankshaft, are carefully replaced. If these two oil leads do not extend into the oil collector rings, two difficulties will be immediately encountered: Either the oil will run onto the edge of the collector ring and will be thrown off instead of being retained by the collector ring, or, if the oil feed tube is still further out, the ball bearing will act as effective pumps and draw all of the oil from the oil feed tube. In either case, the crank pin bearings will be absolutely starved for oil, and burned-out bearings and scored crank pins will be the result.

KNOCKS IN BEARINGS

The center bearing is that most liable to develop looseness, because of the fact that it carries a greater load than the two other bearings and is of the plain bearing type.

TIGHTENING CRANKSHAFT BEARINGS

If the crankshaft bearings are loose, it should be determined whether the center plane or the ball bearings at the end are at fault. If the ball bearings are loose, they must be replaced. The same is true of the center bearing whenever a new bushing is available.

FITTING CRANKSHAFT MIDDLE BEARING

In scraping in the middle crankshaft bearing the area of contact of bearing surface is the important factor. As the two end bearings on the crankshaft are of the annular ball type, they cannot be taken up when worn but must be replaced with new bearings. It is essential, therefore, that the center bearing be carefully fitted to the crankshaft so that it is on the same center line with the two end ball bearings; otherwise there will be a constant strain on the crankshaft. Therefore, the center crankshaft bearing should be scraped in only when the two end bearings are in place and supporting the crankshaft. If the center journal of the crankshaft does not touch the bushing in the upper half of the bearing, the bushing should be shimmed up until it does touch the crankshaft, and then scraped in until it is showing a good bearing all over its surface. If a new bushing cannot be obtained for this bearing, in order to lower it, so that it may be scraped in, some thin brass sheets may be placed back of the bushing.

In fitting the center main bearing of the crankshaft, it is very important to note and provide for the end thrust which is put upon this bearing. This bearing is provided with thrust faces at each end. It must be fitted so that there is very little movement—that is, fore and aft—of the crankshaft. About 0.003 (3/1000) inch end play is permissible. In scraping in this bearing, the forward end thrust bearing should be carefully scraped so as to show an even bearing surface. The rear face of the bearing should be tested in the same manner, but its accuracy is not as important as that of the front end. The bearings are all relieved at the parting line to insure a free circulation of oil through them.

CRANKSHAFT BEARING DIMENSIONS

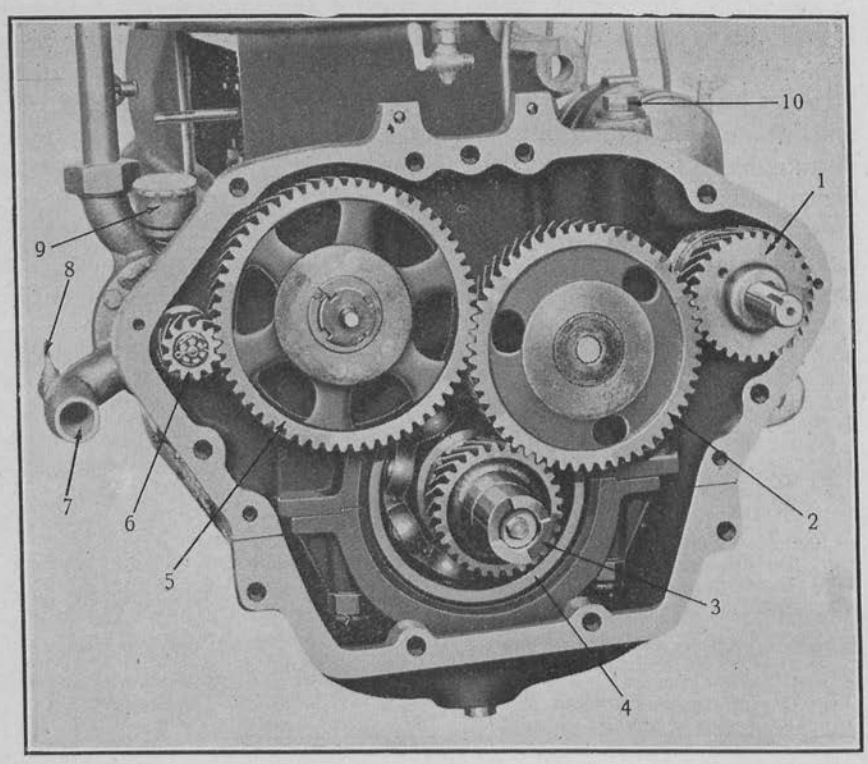
Front Ball Bearing, Size	Number	413	
Outside diameter	inches	6.299	($6\frac{9}{32}$)
Inside diameter	do	2.559	($2\frac{9}{16}$)
Width	do	1.456	($1\frac{7}{16}$)
Rear Ball Bearing, Size	Number	414	
Outside diameter	inches	7.086	($7\frac{1}{16}$)
Inside diameter	do	2.755	($2\frac{3}{4}$)
Width	do	1.653	($1\frac{5}{8}$)
Center Bearing Bushing, Length	do	3.25	($3\frac{1}{4}$)
Inside diameter	do	2.375	($2\frac{3}{8}$)
Outside diameter	do	3.125	($3\frac{1}{8}$)
Outside flange diameter	do	3.875	($3\frac{7}{8}$)
Thickness of babbitt facing	do	0.093	($\frac{3}{32}$)

CAMSHAFT ASSEMBLY

CAMSHAFT DESCRIPTION

Since the valves are all on one side, they are opened by the action of a single camshaft, having eight cams. The valve tappets have roller followers, which rest upon eight cams forged integral with the camshaft, and are actuated when the camshaft rotates. The camshaft is driven by means of a large spur gear on its forward end and meshing with an idler gear, which, in turn, meshes with the crankshaft gear. The forward end of the camshaft is inserted in a flanged hub, which is riveted to the camshaft gear. This hub has two slots in the rear end, in which tongues extending out from the camshaft slide. This steel hub runs in a bronze bushing. Drilled in the front end of the camshaft is a hole accommodating a spring, which, in turn, presses against a camshaft thrust screw fastened to the timing gear case cover. On the rear end of the camshaft is a thrust button, against which presses a lever, that may be operated by the driver when cranking the car. The purpose of this arrangement is to move the camshaft forward and thus permit small cams on one side of the main exhaust cams to operate the exhaust valve push rod tappet rollers. In this way the exhaust valves

PLATE 18



TIMING GEARS

Ref. No.	Part No.	Name
1	293 GED	Magneto shaft gear.
2	111 GEE	Intermediate gear.
3	0165 GA	Starting crank ratchet.
4	112 GEC	Crankshaft gear.
5	110 GED	Camshaft gear.
6	326 GED	Water pump gear.
7	325 GEC	Inlet to water pump.
8	00562½ GA	Water pump inlet cock.
9		Grease cup on pump bearing.
10	003270	Crankcase oil hole plug.

are held open for the first part of the compression stroke and the compression is reduced, facilitating the cranking of the engine by hand. This is not used when an electric starter is part of the equipment unless the engine is hand cranked.

ENGINE GEAR DIMENSIONS

WHITE, MODEL TEB-O, CHASSIS

Name of Gear	No. of Teeth	Diam. of Gear		Width of Gear, Inches	Bore of Hub, Inches
		Pitch Inches	Outside Inches		
Engine Intermediate Gear	54	6.378 (6 3/8)	6.584 (6 9/16)	1.000	1.187 (1 3/16)
Camshaft Gear	58	6.850 (6 7/8)	7.057 (7 1/16)	1.000	1.312 (1 5/16)
Crankshaft Gear	29	3.425 (3 7/16)	3.631 3(5/8)	1.000	1.187 (1 3/16)
Fan and Magneto Shaft Gear	29	3.425 (3 7/16)	3.631 (3 5/8)	1.000	0.984 (63/64)
Water Pump Gear	12	1.417 (1 7/16)	1.623 (1 5/8)	1.125 (1 1/8)	0.625 (5/8) Tap

The camshaft is mounted on three bushings. The forward bushing is the one running in the flange bushing to which the camshaft gear is riveted; the middle and rear bushings are held in place in the crankcase. In addition to the cams, the oil pump drive gear is forged integral with the camshaft.

CAMSHAFT DIMENSIONS

Camshaft, Material		Nickel steel	
Overall length	inches	29.718	(29 23/32)
Diameter between cams	do	1.00	
Camshaft Bearing, Diameters—			
Center	inches	1.81	(1 13/16)
Rear	do	1.00	
Camshaft Bearing, Lengths—			
Front	do	3.437	(3 7/16)
Center	do	2.50	(2 1/2)
Rear	do	1.875	(1 7/8)
Camshaft Gear Sleeve, Diameter	do	2.125	(2 1/8)
Bearing length	do	3.437	(3 7/16)
Inside diameter	do	1.812	(1 13/16)
Camshaft Spring, Diameters—			
Outside	do	0.75	(3/4)
Inside	do	0.594	(19/32)
Free length	do	3.50	(3 1/2)
Length when compressed	do	3.00	
Cams, Width	do	0.875	(7/8)
Base circle diameter	do	1.062	(1 1/16)
Lift	do	0.312	(5/16)
Valve Opening Period—			
Intake	degrees	215	
Exhaust	do	230	
Oil Pump Drive Gear, Width	inches	0.50	(1/2)
Outside diameter	do	1.800	(1 13/16)
Pitch diameter	do	1.600	(1 5/8)
Diametral pitch		10	
Number of teeth		16	

CRANKCASE ASSEMBLY

CRANKCASE DESCRIPTION

The crankcase is cast from aluminum and is in two units, upper and lower. The cylinder block is bolted to the upper half of the crankcase and the camshaft and crankshaft are carried inside of it. In a compartment at the forward end of the crankcase are the timing gears. This crankcase is split along the center line of the main bearings. The crankshaft bearings are carried in the upper half, being held in place by caps with a couple of studs and nuts for each cap. The lower crankcase is divided into three sections, two of which are oil splash chambers in the crankcase and the other a sort of reservoir in the timing gear case. The two rear engine supporting arms are cast integral with the upper crankcase, while the front support is cast integral with the gear case cover.

CRANKCASE, UPPER DIMENSIONS

Crankcase, Material			Aluminum
Length, overall	inches	30.125	(30 1/8)
Cylinder Stud, Material			Steel
Number required			three
Diameter	inches	0.75	(3/4)
Length	do	3.562	(3 9/16)
Threads	per inch	14	
Inside diameter for oil leads	do	0.250	(1/4)

CRANKCASE, LOWER DIMENSIONS

Crankcase, Material			Aluminum
Overall length	inches	30.125	(30 1/8)
Holding bolts, Number required			seventeen
Oil Drain Valves, Diameter	inches	0.50	(1/2)
Length	do	4.937	(4 15/16)

TIMING GEAR COVER PLATE

The timing gear cover plate, made of aluminum, is bolted to the forward end of the upper and lower crankcase. It forms a housing for the timing gears, starting crankshaft, and also the front support for the engine and the forward fan and magneto drive shaft bearing. It contains two timing gear thrust plugs.

TIMING GEAR REMOVAL

In order to remove the camshaft it is necessary to take off the timing gear cover plate on the front end of the engine and also to take out the valve tappets, which would interfere with the removal of the shaft. As the front engine support is integral with the cover plate, the front end of the engine must be supported when the cover plate is removed. To do this a jack must be placed under the forward end of

the engine. A pry bar will pull the timing gears out of the case far enough to give a good hand hold so the camshaft can be removed. Prior to removing the front cover plate, it is necessary to remove the radiator. This is done as follows: Loosen the outlet and inlet hose clamp screws on the engine end of the hose. Remove the radiator shock absorber trunnion pins through holes provided in the fenders and lift off the radiator.

LUBRICATING SYSTEM

OIL RESERVOIR DIMENSIONS

Oil Reservoir, Material		Aluminum	
Capacity	U. S. gallons	1.00	
Filler opening, Diameter	inches	2.75	(2¾)
Oil Strainer, Mesh	per inch	40	
Oil Reservoir, Height	inches	11.00	
Width	do	4.50	(4½)
Length	do	5.25	(5¼)

OIL RESERVOIR

The lubricating oil tank is an aluminum casting with an opening in the top, in which is inserted a strainer. The opening is covered with a hinged cover. At the bottom of the tank is the oil reservoir screen held in place with a pipe fitting. The oil reservoir is held in place on the left hand side of the dash by screws.

OIL PUMP DIMENSIONS

Oil Pump Casting, Material		Cast iron	
Height	inches	7.562	($7\frac{9}{16}$)
Width	do	5.00	
Oil Pump Cylinders, Number of		three	
Diameter	inches	0.3125	($\frac{5}{16}$)

OIL SIGHT FEED ASSEMBLY

The oil sight feed assembly includes the three inlet and the three outlet oil sight feed elbows. These form connections from the three oil leads to the pump. The sight feed glasses are held in place by the sight feed cap and valve seats, under which there is a gasket, and the whole retained in the oil sight feed casting. The latter is held in place on the dash by screws. In the operation of the car, filtered oil is placed in the oil reservoir until the same is full. The course of the oil from the tank is as follows: From the tank, which is mounted on the dash under the hood, by gravity through a tube to the pump on the lower right side of the engine crank case, thence by force feed through three separate pipes to the sight feed indicators, on the dash, thence by gravity through two of the tubes to the crankshaft collector rings, thence through oil ways in the crankshaft to the connecting rod bearings, and through the third tube to the crankshaft center bearing. The surplus and thrown off oil falls into the crankcase basin.

The flow of oil from each of the three oil plungers through their respective sight feeds to bearings is as follows:

The forward plunger feeds through right sight feed to rear collector ring and third and fourth connecting rod bearings.

The center plunger feeds through the center sight feed to center bearing.

The rear plunger feeds through the left sight feed to front collector ring and first and second connecting rod bearings.

The sight feed indicators on the dash show the driver at all times the amount of oil which is being fed.

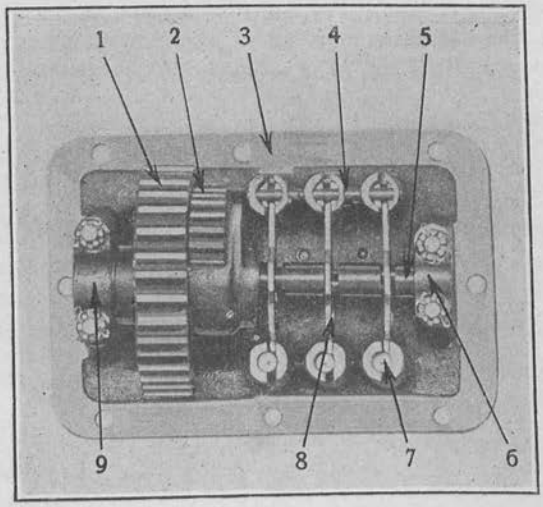


PLATE 19—OIL PUMP ASSEMBLY

Ref. No.	Part No.	Name
1	363 GEC	Oil pump drive gear.
2	0363¼ GE	Oil pump idler pinion.
3	354 GFB	Oil pump frame.
4	S0358 GF	Oil pump adjusting stud stop pin.
5	0365 GF	Oil pump crank.
6	355¼ GE	Oil pump bearing cap.
7	S0364 GE	Oil pump plunger.
8	0364 GE	Oil pump rocker arm.
9	355 GE	Oil pump bearing cap.

OIL SIGHT FEED DIMENSIONS

Oil Sight Feed Glass Tubing, Outside diameter	inches	0.75	(¾)
Inside diameter	do	0.625	(⅝)
Length	do	1.75	(1¾)

OIL PUMP ADJUSTMENT

In adjusting the oil pump, to increase the flow, turn the oil pump adjusting nuts to the left, or counter-clockwise. To decrease the flow,

turn to the right, or clockwise. Too much oil in the crankcase will cause the engine exhaust to be smoky. In making these adjustments, it is necessary to see that about the same amount of oil passes through each of the sight feeds. Proper feeding may be interfered with by dirt in the oil pump checks. This condition should be instantly remedied by disconnecting the oil pipe line union nuts at the pump end, removing and cleaning the checks.

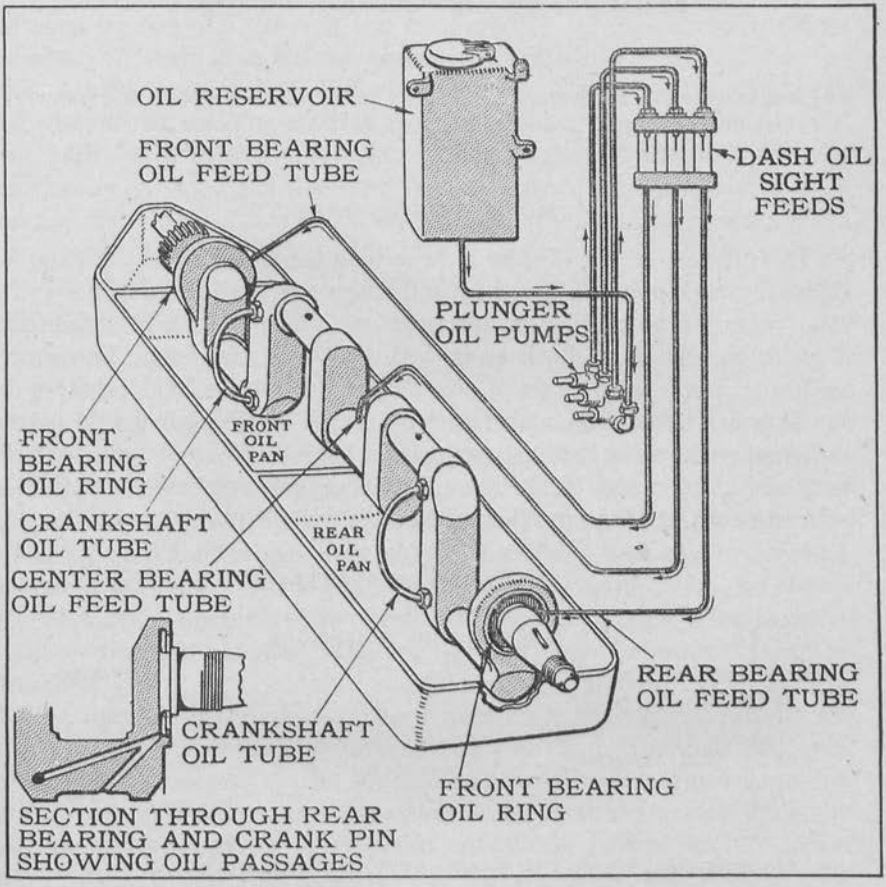


PLATE 20—LUBRICATING SYSTEM DIAGRAM

OIL PUMP ACTION

The mechanical oil pump action is as follows: The oil pump rockers are mounted in the oil pump cover and are actuated by the oil pump crank. On the oil pump crank are eccentrics which move the rockers up and down. The rockers, in turn, move the plungers. The stroke of the pump plunger is varied by means of adjusting nuts, which, in being turned, screw in and out a stud connected to the rocker. As the rocker end is moved up or down, the stroke is made either shorter or longer.

OIL PUMP REMOVAL

To remove the oil pump casting, which contains the oil pump assembly, it is necessary to disconnect the pump leads by unscrewing the connecting unions and by removing the oil pump frame screws. The pump cover and parts may be taken out of the crankcase as a unit.

EXHAUST PIPE AND MUFFLER ASSEMBLY

EXHAUST PIPE ELBOW DIMENSIONS

Exhaust Pipe Elbow, Material		Malleable iron
Inside diameter	inches	2.50 (2½)
Wall thickness	gauge	0.187 ($\frac{3}{16}$)

MUFFLER DESCRIPTION

The purpose of the muffler is to reduce the pressure of the gases by expansion to a point where they will emerge into the atmosphere with little noise. The muffler is designed as follows: It is a cylindrical shape tube, closed at both ends with cast iron headers. The center section is made from rings of sheet steel, which are held together by box seams. Inside the center section of the muffler are baffle plates, and, in operation, the exhaust gases are caused by these plates to expand from one chamber to the next so that the back pressure is eliminated before the outlet of the muffler is reached.

FUEL SUPPLY SYSTEM

GASOLINE TANK DIMENSIONS

Gasoline Tank, Material		Sheet steel
Height	inches	9.00
Width	do	15.00
Length	do	33.00
Filler Cap, Material		Malleable iron
Diameter of threads	inches	4.75 (4¾)
Capacity	U. S. gallons	16.5 (16½)

DESCRIPTION GASOLINE TANK, SETTLING CHAMBER AND VALVE

The gasoline tank is rectangular in shape and is made of sheet steel. A filler opening, which is covered by a screwdown cover, is located in the center and top of the tank. In this opening is placed the gasoline strainer made of a brass screen. Surrounding the screen, and extending slightly below the lower end, is a circular baffle plate, the purpose of which is to keep the gasoline from bending the screen when the tank is being filled. Extending centrally across the tank in a vertical position is a straight baffle plate. This not only acts as a baffle or splash plate for the tank, but also creates a reserve space which carries the emergency supply of gasoline.

At the bottom of the tank, on each side of the central baffle plate section, are pipe flanges in which are screwed the gasoline pipe line connections. Leading from the flanges are nipples and elbows, and the pipe connection from one side extends lengthwise of the tank to meet the pipe connection of the other tank division, and both lead to a three-way valve, so that it is possible to take fuel from one side of the tank only, and in this way a reserve of gasoline is always maintained.

The gasoline tank is located under the seat. The fluid flows from the tank by gravity through the gasoline line to the carbureter float chamber. Always keep the vent in the tank filler cap free from obstructions. On the gasoline line, under the foot board, is the settling chamber and shut-off valve. The settling chamber collects water and sediment, which should be drawn off weekly. The drain cock at the bottom of chamber is closed when the lever points down. The gasoline shut-off valve at the top part of the chamber is open when its lever points down and closed when it points to the side. The carbureter float chamber may be drained through the carbureter drain cock, which is closed when its lever points down.

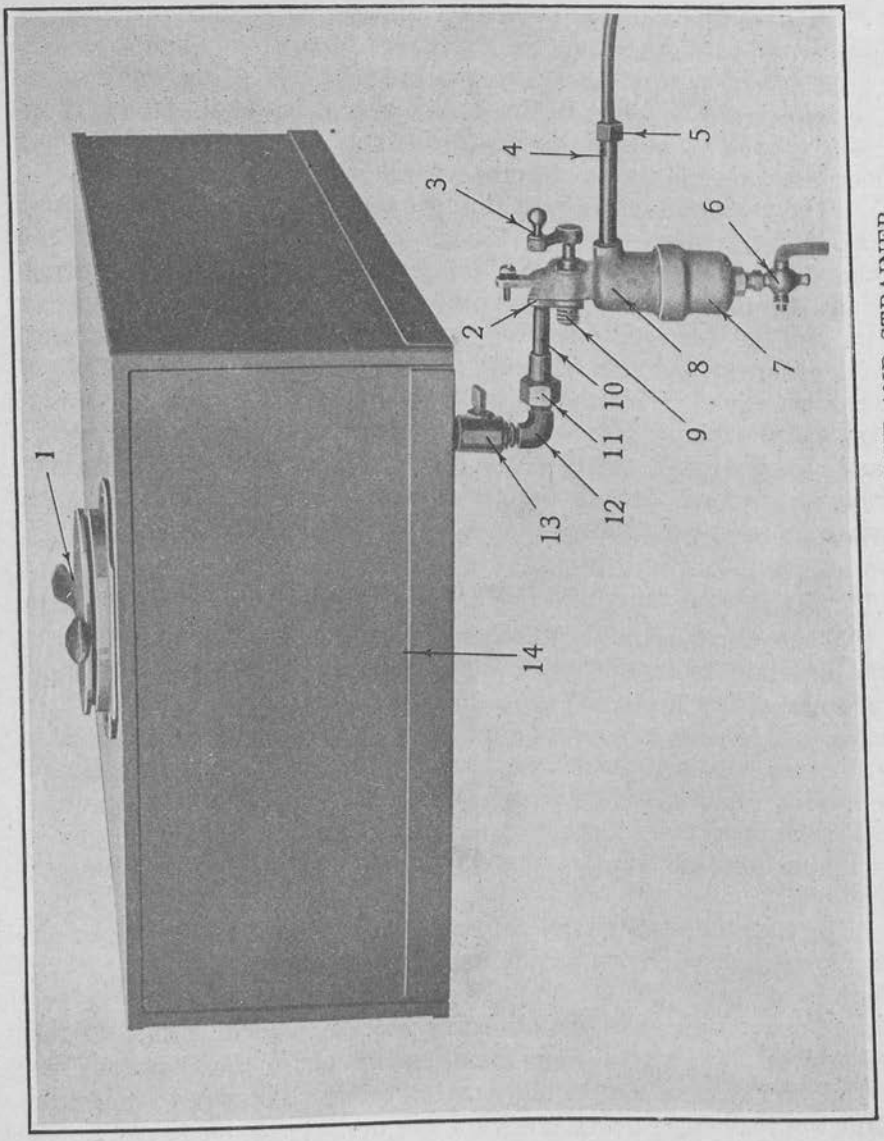
CARBURETER OPERATION

When starting, the carbureter air control valve on the right side of the dash may be completely closed if the engine is cold, and opened as far as necessary if the engine has retained some degree of heat. *This valve must be promptly opened after the engine starts.* Failure to do this will cause flooding, which may stop the engine, and render starting somewhat difficult. If it is suspected that the engine is flooded, leave the valve open, open throttle one-third full, and crank engine rapidly. If this action fails to start the engine, see page 37 under "Common Troubles."

The only adjustment on the carbureter is for regulating the air supply when the engine is running and the car is standing still. If there is too much air, or the mixture is too "lean," a spitting in the muffler may result, and the adjusting screw should be turned to the right, or in. Similarly, if there is not enough air, or the mixture is too "rich," unevenness may follow, and the adjusting screw should be turned to the left, or out. Too rich a mixture may be due to dirt in the air inlet screens, which must be kept clean. The correct mixture gives the engine an even, regular rotation. Further regulation of the quantity of air and gasoline for every position of the throttle valve is automatic. Leaking of gasoline from the carbureter when the engine is not running indicates that the gasoline level is too high. Sediment in the seat of the needle valve may cause this and it can be removed by lightly turning the needle valve with the fingers.

For cleaning, the nozzles can be taken out by removing the carbureter nozzle plugs with wrench and the nozzles themselves with a

PLATE 21



GASOLINE TANK, SHUTOFF VALVE AND STRAINER

screw driver. Similarly, loosen the taper plug with screw driver in order to take out the starting nozzle.

The flow of gasoline from the tank should be shut off at the shut-off valve whenever removing the needle valve or nozzles.

Cold air interferes with the proper atomizing of gasoline and its mixing with air for the charge. It is consequently necessary in cold weather to permit the engine to "warm up" by running idle for a few moments. It is also advisable, while the car is standing, to retain as

PLATE 21

GASOLINE TANK, SHUTOFF VALVE AND STRAINER

Ref. No.	Part No.	Name
1	00561 TBC	Gasoline tank filler cap.
2	00563¾ GF	Gasoline settling chamber.
3	00502 GF	Gasoline settling valve lever.
4	S00201¾ GF	Gasoline settling chamber nipple.
5	S00413 A	Gasoline settling chamber nipple nut.
6	00449 GA	Gasoline settling chamber drain cock.
7	562¼ GF	Gasoline settling chamber, bottom.
8	00562 GF	Gasoline settling chamber, top.
9	00563¼ GFB	Gasoline settling chamber valve spring.
10	00562¼ GTB	Gasoline settling chamber nipple.
11	539 C	Gasoline settling chamber union nut.
12	TEB-O	Gasoline settling chamber elbow
13	00618⅛ TED	Gasoline tank three-way valve.
14	617 TED	Gasoline tank.

much heat as is possible by covering the hood with a blanket. Heat for the carbureter is furnished by pumping warm water through its water jacket and also by supplying hot air by means of a tube running to a stove on the exhaust pipe. In warm weather these sources of heat supply may not be needed and can be shut off by moving their valve levers to the crosswise position.

INTAKE MANIFOLD DIMENSIONS

Intake Manifold Water Jacket, Material		Brass
Length	inches	7.312 ($7\frac{5}{16}$)
Inside diameter	do	1.500 ($1\frac{1}{2}$)

INTAKE MANIFOLD

The intake manifold comprises the carbureter intake pipe and the water jacket. The intake pipe is the standard design of intake elbow, while the water jacket design is as follows: The body of the jacket is cast brass with flanges at the top and bottom arranged for gaskets. The top of the jacket is bolted to the elbow, while the carbureter is bolted to the lower flange. The top and lower portions of the water jacket casting are machined so that the water jacket tube, made from standard brass tubing, may be pressed into the machined portion, making a watertight joint at either end. At one side near the top is a tapped hole for a pipe leading from the water jacket of the engine. At the lower end is another tapped hole for the other pipe connecting with the water pump. In this way the intake manifold is heated by the hot water from the engine jacket. One pipe connection leads to the water pump and the

other from a cock in the cylinder water jacket side plate. In hot weather the temperature of the manifold may be reduced by turning the cock off and preventing the circulation of water.

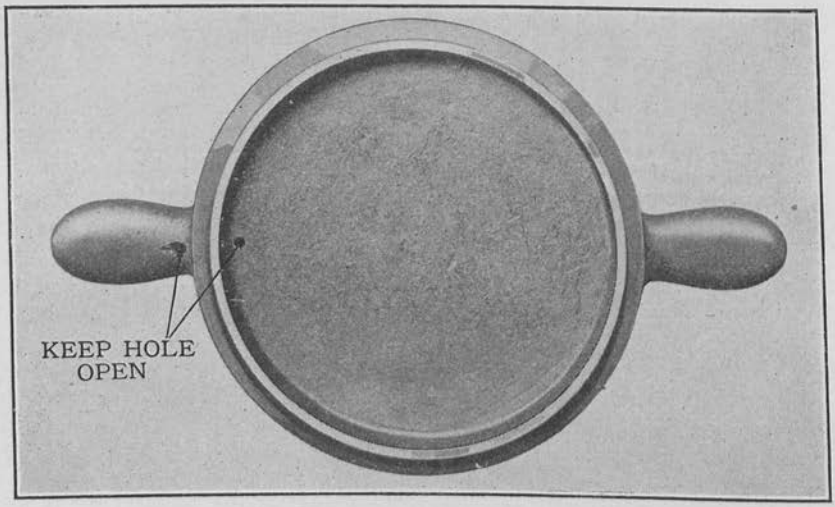


PLATE 22—FUEL TANK COVER

(To insure a uniform supply of fuel, clean vent hole weekly)

IGNITION SYSTEM

MAGNETO

MAGNETO OPERATION

The magneto is an alternating current generator which supplies current to cause a spark at the spark plug terminals, which spark fires the explosive mixture at the proper time. The magneto is mounted on the left side of the engine on a bracket cast integral with the crankcase. It is held in place by magneto screws and by a clamp band. It is driven by the rear end of the fan drive shaft. A coupling of the Oldham type is enclosed between the end of the fan drive shaft and the magneto, so as to take care of any disalignment between the two assemblies.

The magneto used in this car is an Eisemann Type G-4, Edition II, straight high tension magneto, that is, one that does not employ an outside coil for stepping up the voltage. Both primary and secondary windings are on the armature shaft and both windings have a grounded end. The armature shaft revolving in the magnetic field existing between the permanent magnets, causes a low voltage current to be produced in the primary winding. This winding is connected with the breaker or interrupter, so that the current flow of the primary may be

broken or interrupted in order to induce a secondary current of high voltage in the secondary winding. At the instant of interruption of the primary current, the secondary is induced and this is the current which flows to the distributor and thence through cables to the spark plugs.

MAGNETO CLAMP BAND DIMENSIONS

Magneto Clamp Band, Material			Steel
Thickness	inches	0.031	($\frac{1}{32}$)
Width	do	1.50	($1\frac{1}{2}$)
Length, center to center, long band	do	10.00	
Short band	do	2.812	($2\frac{13}{16}$)
Developed length, long band	do	12.562	($12\frac{9}{16}$)
Short band	do	5.968	($5\frac{31}{32}$)
Magneto clamp band nut, diameter	do	0.25	($\frac{1}{4}$)
Threads	per inch	20	
Magneto clamp band studs, diameter	inches	0.25	($\frac{1}{4}$)
Threads	per inch	20	

MAGNETO TIMING

As the spark occurs when the primary circuit is broken by the opening of the platinum contacts on the breaker mechanism, it is necessary that the magneto be so timed that, at full retard position of the timing lever body, the platinum contacts will open when the respective piston of the engine has reached its highest point on the compression stroke. To check this, the engine should be turned by hand until piston Number 1 is on the dead center (firing point); remove the distributor plate from the magneto and turn the armature shaft until the setting mark on the distributor disc is in line with the setting screw. When the armature is in this position, the platinum contacts are just opening and the metal inserts of the distributor discs are in connection with the carbon for Number 1 cylinder. The driving medium must now be fixed to the armature shaft without disturbing the position of the latter, and the cable connected to the spark plugs.

MAGNETO MAINTENANCE

Aside from lubrication, there is little attention required. Eisemann Type G-4, II Edition, should receive 20 drops of 3-in-1 or similar oil every two weeks, distributed as follows: One drop in the oil hole, one most convenient (on side of breaker box), 5 drops on each side of the distributor and 14 drops in the large covered hole at the driving end of the magneto.

TO CLEAN BREAKER POINTS

The platinum contacts of the breaker mechanism should be occasionally cleaned with gasoline, and, for obvious reasons, thoroughly dried before starting the engine. The distributor disc and collector ring should likewise be cleaned once or twice in four months with a cloth moistened with gasoline.

If the engine misfires or refuses to start, and the ignition is inspected, it should be found out first whether the trouble lies in the magneto or in the spark plugs. The latter should be examined first, as they are the most frequent cause of trouble.

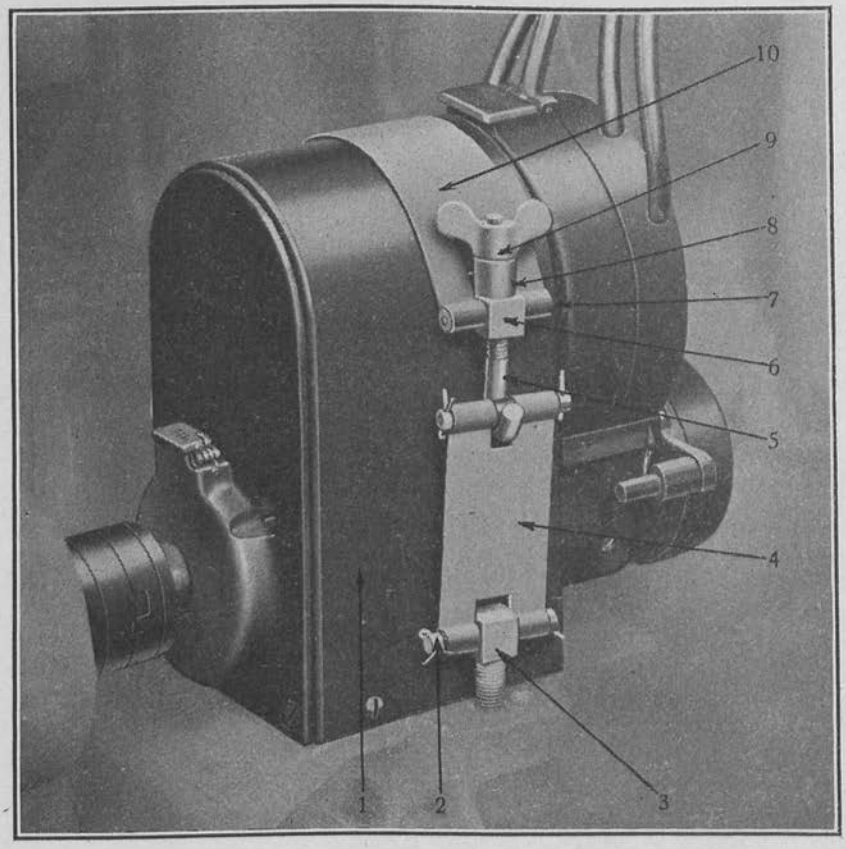


PLATE 23—DETAILS OF MAGNETO AND MOUNTING

Ref. No.	Part No.	Name
1		Magneto.
2	S0456½ GAF	Magneto clamp band.
3	S0456 GAD	Magneto clamp band stud pins.
4	0457½ GAF	Magneto clamp band extension.
5	S0457½ GAF	Magneto clamp band hook bolt.
6	S0457¼ GAF	Magneto clamp band trunnion.
7	S02190	Magneto clamp band pin.
8	S0457¾ GAF	Magneto clamp band hook bolt collar.
9	0457¾ GAF	Magneto clamp band wing nut.
10	0457 GAF	Magneto clamp band.

If the missing is in one cylinder only, or in different cylinders, the corresponding spark plug should be examined to see that the gap is not too large. This gap between the electrodes should be approximately 1/32 inch. Also the spark plug may be short-circuited through carbon or oil, or the insulation may be cracked. Cleaning with gasoline or replacing is the remedy for carbonized or oily plugs.

The wiring should be carefully examined and checked in accordance with the firing order of the engine. If cables are cracked, or worn, they should be replaced. All connections must be kept clean and tight.

Clean breaker contact with gasoline until the contact surface appears quite white, or, if pitted, use a fine file—but very carefully—so that the surfaces remain square to each other. For this purpose a manicure file may be used, or a special magneto file. The correct gap of the contact points is 0.010 inch (0.25m/m) and in no case should it be more than 0.012 inch (0.3m/m). As these contacts wear away in time, they should be regulated by giving the adjustable screw a forward turn, care being taken to securely tighten the lock nut. This can be accomplished without removing the timing lever or make-and-break mechanism.

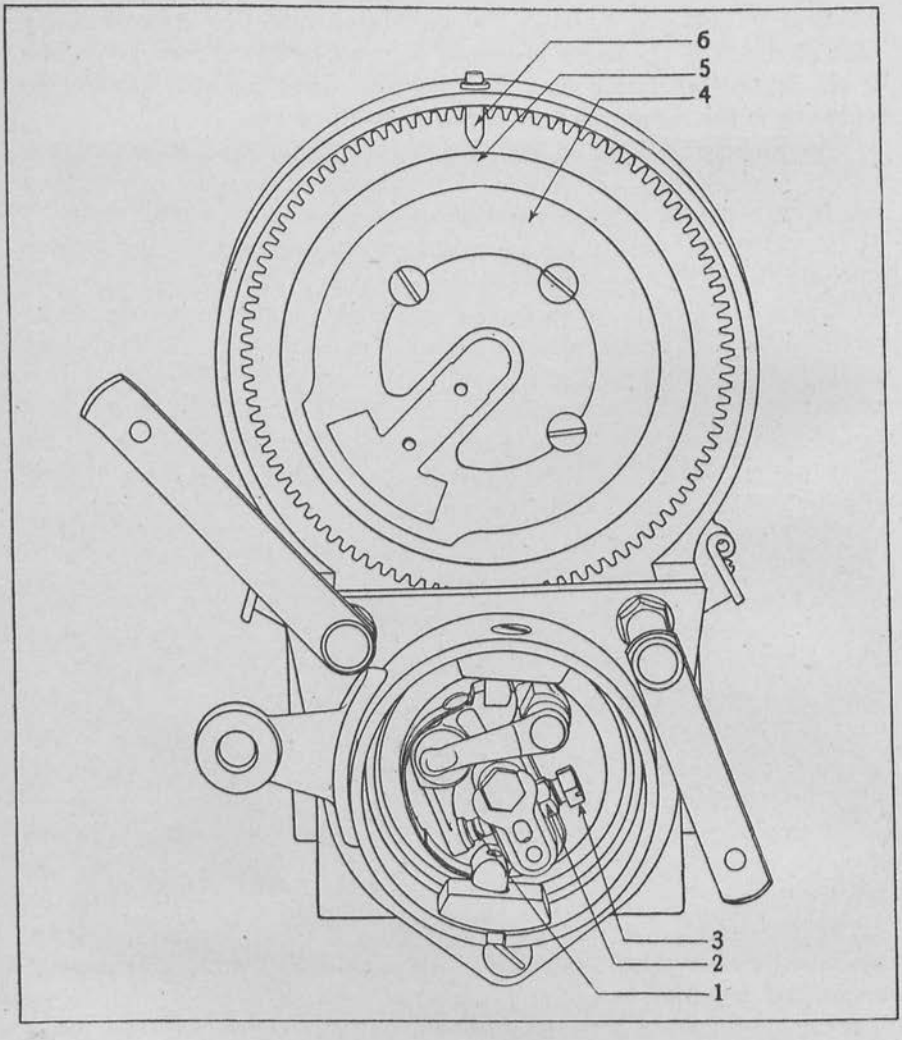
If the platinum contact riveted to the contact arm, or that of the adjustable screw, should be worn down entirely, it would necessitate a change of either or both. When the adjustable screw is replaced or adjusted, care must be taken that the lock nut is securely tightened in place.

If, after following these instructions, the engine still refuses to start, the magneto should be tested by removing the distributor plate and resting a screw driver on the gear casing, holding same about ⅛ inch from the collector ring. Then if, upon rotating the armature, a spark jumps across the 0.125-inch gap, it shows that the trouble does not lie in the magneto, but in some other part of the engine, possibly the carbureter.

But if a spark does not jump across the 0.125-inch gap previously mentioned, the magneto is at fault. See page 38 for further information on ignition troubles.

A remagnetization of the magnets will only be necessary if these have been taken away from the apparatus and allowed to remain a long time without both ends of the magnets being connected with a piece of soft iron—a so-called keeper. The same th ng occurs if the armature is taken out of the pole pieces without a conducting rod of iron being laid across both poles. This piece must remain on the poles until the armature is again placed between the pole pieces. Often the magnets, after being taken down, are put back in the wrong position and in this way the magnetic power is neutralized. To prevent this mistake, all magnets are marked—the north pole being designated by the letter "N" stamped in the magnet. When replacing magnets, care should be taken to place the same poles on the same side.

PLATE 24



END VIEW OF MAGNETO, SHOWING DISTRIBUTOR

Ref. No.	Part. No.	Name
1	A973	Contact breaker points.
2	A952	Adjusting screw lock nut.
3	A961	Adjusting screw.
4	A1008	Distributing disk.
5		Setting mark.
6	A936	Setting screw.

TO TEST FOR SHORT CIRCUIT

To test the ignition switch and wiring for a short circuit, simply remove the breaker box and cap with wire, and if a spark can then be secured, difficulty will be in part removed.

TO CLEAN DISTRIBUTOR

The distributor may be cleaned of carbon and dirt, with several drops of lubricating oil rubbed on, either with a finger or a bit of waste or c oth. This will loosen the carbon, after which the distributor may be wiped clean with a small piece of waste.

TO TIME DISTRIBUTING FINGER

If the distributor wheel has been removed, it should be replaced with care. The distributing finger should be so timed that, regard'ess of the amount of breaker box advance, or retard, the spark will always occur while the finger is under a carbon brush. This may be set by advancing the breaker box half its full travel and rotating armature shaft in the direction of rotation (anti-clockwise) until the platinum breaker points just begin to separate. The distributor wheel should then be replaced so that the center of the distributor finger comes directly under the center of a carbon brush.

BREAKER ADJUSTMENT

The correct opening of the circuit breaker points is from 0.010 inch to 0.012 inch. If they are set too close excessive arcing will occur and the points will burn, and cause weak spark at high speeds. If set too wide, result w ll be burning of points and weak or no spark at high engine speeds, in which case low tension winding does not have time to "build up," thus decreasing strength of spark.

TO INSTALL NEW BREAKER POINTS

When the platinum points have been worn down by service, or excessive filing, and new ones must be installed, if it is possible to secure them already mounted, such should always be done.

If unmounted points only can be secured for replacement, they are usually supplied with a small, round teat 0.063 (1/16) inch diameter on the back of point. To mount point, drill a 0.063 (1/16) inch diameter hole, 0.094 (3/32) inch deep in the mounting, and solder point on (sweat on), filing off any excess solder. If soldering equipment is not at hand, the point may be mounted temporarily by squeezing teat out of round with a pair of pliers and forcing into hole.

The point should be soldered in at the first opportunity, as it may work loose and cause trouble which is very difficult to find. After the points have been mounted, they should be adjusted with a maximum

break of 0.012 inch and the points must bear evenly, all over, on their face (that is, in contact with each other), being filed, if necessary, to secure square contact.

If a platinum point cannot be obtained, a nickel or silver point produced from a coin will make it possible to run, but the engine will show very little power.

IGNITION CABLE ASSEMBLY

CABLE LENGTHS

Magneto Spark Plug Wires, Length			
Number 1 Cylinder	inches	40.75	(40¾)
Number 4 Cylinder	do	35.50	(35½)
Number 3 Cylinder	do	34.00	
Number 2 Cylinder	do	30.00	
Magneto Ground Wire	do	54.00	

IGNITION SWITCH

The ignition switch is of the type that, when it is turned to the "On" position, no current passes through the switch. When it is turned to the "Off" position, the ground circuit is closed and the engine stops.

MAGNETO COUPLING DIMENSIONS

Magneto Coupling, Material		Case hardened steel	
Inside diameter	inches	0.875	(⅞)
Outside diameter	do	1.625	(1⅝)
Depth of groove	do	0.203	(13/64)
Width of groove	do	0.25	(¼)
Thickness	do	0.375	(⅜)

MAGNETO DRIVE SHAFT DIMENSIONS

Magneto Drive Shaft, Material			Steel
Length	inches	7.406	(7 13/32)
Diameter for gear	do	0.984	(63/64)
Maximum diameter	do	3.707	(3 11/16)
Diameter for threads	do	0.875	(⅞)
Threads	per inch	20	
Magneto drive shaft ball bearing, Size	Number	405	
Outside diameter	inches	3.149	(3 5/32)
Bore	do	0.984	(63/64)
Width	do	0.826	(13/16)
Magneto Drive Shaft Key, Woodruff	Number	11	
Magneto Drive Shaft Bearing Spacer, Material			Steel
Outside diameter	inches	1.375	(1⅜)
Inside diameter	do	1.00	
Length	do	1.171	(1 11/64)
Generator Sprocket, Driver—			
Number of teeth			thirty-one
Outside diameter	inches	3.707	(3 11/16)
Width	do	0.468	(15/32)

COOLING SYSTEM

RADIATOR DIMENSIONS

Radiator, Water capacity	U. S. gallons	3.00	
Height	inches	26.75	(26¾)
Width	do	24.125	(24⅛)
Thickness of core	do	4.00	
Radiator hose, Inside diameter	do	1.25	(1¼)
Outside diameter	do	1.75	(1¾)
Top hose, Length	do	8.00	
Bottom hose, Length	do	7.00	
Radiator shock absorber springs, Material		Spring steel	
Upper spring, Outside diameter	inches	2.25	(2¼)
Inside diameter	do	1.50	(1½)
Length	do	3.00	
Lower spring, Outside diameter	do	2.25	(2¼)
Length under load	do	3.50	(3½)
Radiator Shock Absorber Trunnion Pin, Material		Steel	
Diameter	inches	1.00	
Length	do	3.062	(3 1/16)
Radiator Tie Rod, Material		Steel	
Length overall	inches	32.25	(32¼)
Diameter	do	0.531	(17/32)
Threads	per inch	20	

RADIATOR

The radiator is of the cellular type. The radiator has brass tanks at top and bottom, and malleable iron sides. The radiator has a frontal area of 441.4 square inches. There are 6,806 tubes 3.75 (3¾) inches long.

Central, and at the top, is the radiator cap of hard rubber over the filler opening. The filler is equipped with a strainer. Leading down on one side is the copper overflow tube. At the bottom is the radiator drain cock.

RADIATOR SHOCK ABSORBER

The radiator is supported on either side by spring shock absorbers. The two shock absorber cylinders are riveted to each side of the radiator frame and are designed as follows: The radiator support studs, one on each side, have an eye on the lower end through which a trunnion pin passes, the latter being held in place in brackets mounted on the frame. The radiator is carried on coiled springs, through which the stud passes. On the outside of the springs is the shock absorber barrel. Inside the barrel, on the top of the one spring and below the other, are washers supported by a steel spacer. Between these washers are packing rings. This arrangement of washer packing rings forms a piston, making the shock absorber carried on an air cushion as well as on springs. The washers are held in place by a nut screwed into the stud. The barrel is carried on the springs by adjusting nuts screwed into each end, the top one of which is used to adjust the radiator heighth. This adjustment may have to be made after continued service to prevent radiator from striking frame.

SOLDERING

TO PREPARE RADIATOR PARTS FOR SOLDERING

If a radiator cell becomes broken it may be soldered. Before soldering copper, the parts must be cleaned until bright, with a wire scratch brush scraper, file or emery cloth; then they must be coated with a soldering flux to remove all grease and foreign material.

Soldering flux is sometimes referred to as "cut acid," since a very satisfactory flux can be prepared by dissolving zinc (from an old dry battery, if necessary) in muriatic acid, until all gassing ceases. If extra strength muriatic acid is used in making "cut acid," it should be diluted with about an equal volume of water before adding the zinc. If the gassing does not occur at once, heating the acid will assist the action.

In this connection, always pour acid into water, but never pour water into acid, as, if the acid is very strong, a rapid boiling may throw acid out.

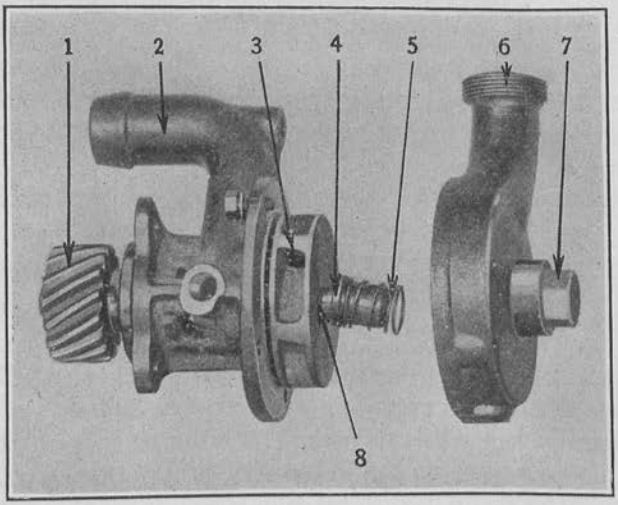


PLATE 25—WATER PUMP PARTIALLY DISASSEMBLED

Ref. No.	Part No.	Name
1	326 GED	Water pump shaft gear.
2	325½ GEC	Water pump body.
3	00331 GE	Rotor.
4	S00330¼ GA	Water pump shaft bearing.
5	0326½ GA	Water pump shaft bearing spring.
6	325 GE	Water pump frame.
7	00330 GA	Water pump and spring cap.
8	S0326 GED	Water pump shaft.

SOLDERING TIN

Clean, bright tin can be soldered by using powdered resin, or tallow, for a flux.

SOLDERING IRON AND STEEL

Cast iron, malleable iron, steel and black iron, or sheet iron, should be scraped bright, then cleaned with sulphuric acid before applying the "cut acid." This being done, solder as for copper. In the case of cast iron, the parts being soldered must be heated.

The essentials of good soldering are sufficient heat, cleanliness of the parts to be soldered and of the soldering copper, or "iron," as it is usually called, and purity of flux, or "cut acid."

The soldering iron should be filed bright, then tinned with solder, after being cleaned with salamoniac. If salamoniac is unavailable "cut acid" will work fairly well.

Always have the soldering iron hot enough to heat the work, but never permit it to get red hot, since that will cause the solder to attack the copper, producing "hard solder," which only melts at near a red heat, and is useless for soldering purposes. In case an iron is "burnt," file it freely.

The best solder for most jobs is known as "half-and-half," being composed of equal parts of tin and lead.

WATER PUMP DIMENSIONS

Water Pump Body, Material			Cast iron
Water Pump Cover, Material			Cast iron
Water Pump Rotor, Material			Brass
Outside diameter	inches	2.984	(2 $\frac{23}{64}$)
Width	do	0.687	($\frac{11}{16}$)
Water Pump Shaft, Material			Case hardened steel
Diameter at main shaft bearing	inches	0.562	($\frac{9}{16}$)
Diameter inside pump body	do	0.375	($\frac{3}{8}$)
Diameter over gear threads	do	0.625	($\frac{5}{8}$)
Gear threads	per inch	16	(left hand)
Shaft length overall	inches	5.187	(5 $\frac{3}{16}$)
Water Pump Bushing, Material			Hard bronze
Water pump bushing, large, inside diameter	inches	0.562	($\frac{9}{16}$)
Outside diameter	do	0.687	($\frac{11}{16}$)
Diameter flange	do	0.812	($\frac{13}{16}$)
Length overall	do	1.156	(1 $\frac{5}{32}$)
Water pump bushing, small, inside diameter	do	0.375	($\frac{3}{8}$)
Outside diameter	do	0.50	($\frac{1}{2}$)
Diameter flange	do	0.625	($\frac{5}{8}$)
Length overall	do	1.812	(1 $\frac{13}{16}$)

WATER PUMP DESCRIPTION

The water pump consists of the following important parts: The water pump body, the water pump cover, and the water pump rotor. The water pump body and cover are held together by screws. The pump is held in place on the crankcase by two stud bolts. The rotor

is carried on a tapered portion of the shaft and is held in place by a left-hand threaded nut. The shaft is carried on three bushings, or bearings. The water pump shaft gear is held in place by being threaded on the pump shaft. At the bottom of the rotor case is a drain cock. Open this cock in cold weather, when draining the cooling system, to prevent freezing. Extending out from the pump body is a pipe connection, leading to the water passage. This connection draws water through the carbureter water jacket. The pump is designed with a spring take-up that keeps the pump packing tight until it needs replacement.

TO THAW FROZEN PUMP

During cold weather, after an engine has been stopped for a sufficient time to permit any water in the cooling system to freeze, the engine should not be started until it is ascertained that no water has collected in the water pump, and frozen the pump rotor to the pump housing. The pump may be warmed with a gasoline blow torch, hot water or cloths soaked with gasoline may be applied to the pump and lighted to thaw the ice.

To avoid freezing in winter, cover the lower portion of the radiator with cardboard to obstruct air flow. The lower portion is always colder than the top, because the water, when it gets to the bottom, already has been cooled. The water, as it enters the top of the radiator, is hot, having just come from around the cylinders.

CARE IN FREEZING WEATHER

During freezing weather, the cooling system should be drained of all water where a fresh supply is available, or the engine and radiator properly protected with blankets, etc.

FAN DIMENSIONS

Fan, Material			Sheet steel
Outside diameter	inches	20	
Width, projected	do	2.00	
Number of fan blades			six
Bearings, Size	Number	304	
Outside diameter	inches	2.047	(2 3/64)
Inside diameter	do	0.787	(25/32)
Width	do	0.59	(9/16)
Fan Driven Pulley, Diameter	do	4.312	(4 5/16)
Width	do	2.125	(2 1/8)
Fan Pulley Shaft, Material			Steel
Diameter	inches	0.787	
Length	do	6.093	(6 3/32)
Threads	per inch	14	
Fan Adjustment, Type			Eccentric
Eccentricity	inches	0.218	(7/32)
Key, Woodruff	Number	9	

FAN AND BRACKET

The fan is made of sheet steel. It has six blades riveted to a sheet steel spider or hub. To the tips of the blades is riveted a sheet steel band. The blades, spider and band thus form a rigid unit. The fan blade assembly is attached to the hub or spider flange of the driven pulley by six bolts. The driven pulley is mounted on two ball bearings carried by the fan shaft. The fan shaft, in turn, is carried in the fan shaft eccentric, which turns in the fan bracket, thus forming an arrangement for varying the tension on the fan belt. The bracket is held in place by two cap screws through its lower part, that screw into the crankcase, and by a stud screwed into the front of the cylinder block water jacket.

FAN DRIVE PULLEY DIMENSIONS

Fan Drive Pulley, Material		Malleable iron	
Diameter	inches	5.812	(5 13/16)
Width	do	2.125	(2 1/8)
Hub hole diameter, maximum	do	0.982	(63/64)
Taper	per foot	0.625	(5/8)
Key, Woodruff	Number	11	

FAN BELT AND DRIVE PULLEY

The fan belt is of the spliced type and has a hinge metal fastener with a cat gut pin. The drive pulley is carried on the outer end of the fan and magneto drive shaft and has a tapered bore, being held rigidly to the shaft by a lock nut and a Woodruff key. The pulley forms a retainer for the outer ball bearing. The hub is finished so as to form an oil-tight joint for the gear case cover. Felt packing is placed in the cap carrying the ball bearing, and this felt is next to the pulley.

REASONS WHY FAN BELT JUMPS OFF PULLEY

The fan belt may jump off a pulley if it is too loose, if two pulleys are not in the same plane, or if the ends of the belt are not cut squarely, thus causing the belt to be curved. Should the fan blades strike the belt it will jump off, or an uneven place in the belt may cause it to leave the pulley.

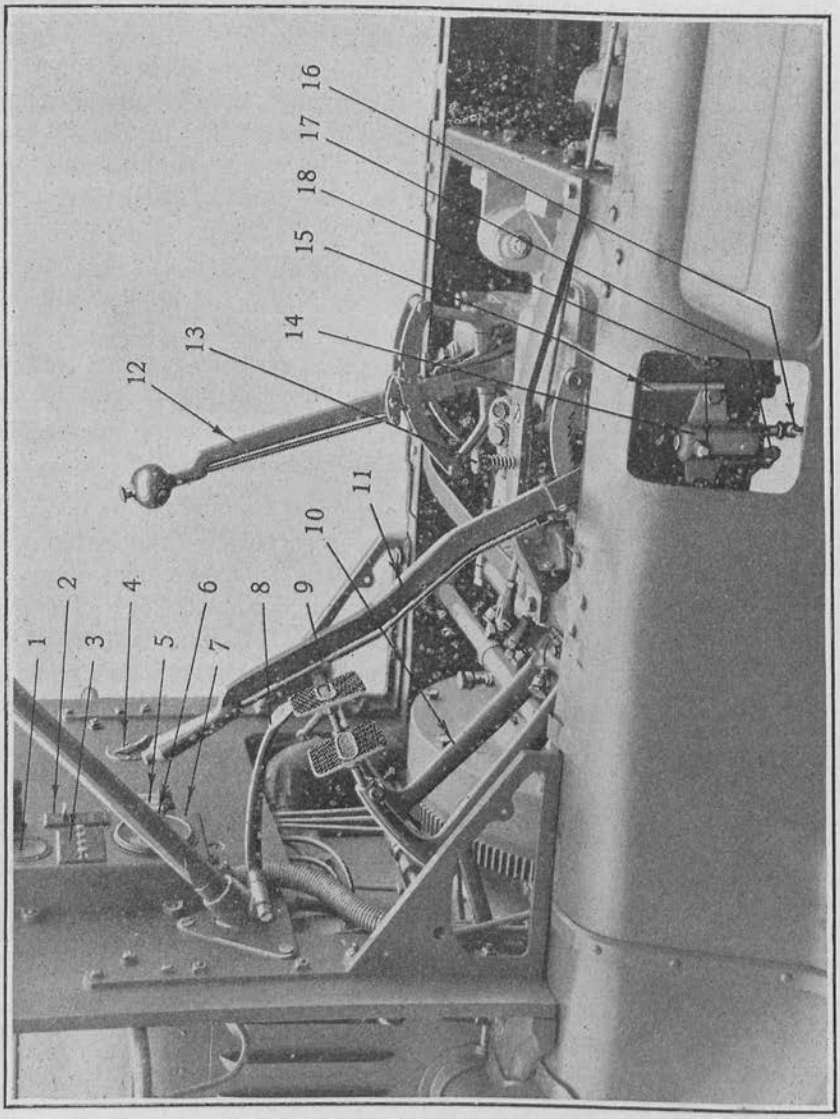
REASONS FOR FAN BELT SLIPPAGE

A fan will not run at proper speed if the belt is oily or greasy, if the belt is too loose, or if the fan is too tight in the bearing.

TO CLEAN COOLING SYSTEM

The circulating system may be cleaned by uncoupling the hose connection and thoroughly flushing the radiator and cylinder jackets with water under pressure. The cylinder jackets may be cleaned by removing the upper manifold and scraping or dissolving the sediment or by pouring hot washing soda solution (saturated) into the cooling system.

PLATE 26



CONTROL LEVERS, PEDALS AND INSTRUMENTS

PLATE 26

CONTROL LEVERS, PEDALS AND INSTRUMENTS

Ref. No.	Part No.	Name
1	1601½ GM	Ammeter.
2	1608⅝ GM	Automatic circuit breaker.
3	1613 GA	Switch panel.
4	00718 TED	Carbureter index plate.
5	351½ GA	Oil sight feed.
6	TEB-O	Speedometer (67A).
7	1600 TED	Switch control box.
8	00217 GAF	Accelerator.
9	35 GE	Foot brake lever.
10	191 GE	Clutch pedal.
11	050 TB	Hand brake lever.
12	0180½ GFB	Transmission change gear lever.
13	1646	Starting motor switch.
14	0201 TED	Air line oil trap.
15	0209 TED	Air pump engaging rod.
16	00200 TED	Air line oil trap drain cock.
17	00201¼ TEB-O	Air line—pump to air trap.
18		Hose connection.

CHAPTER III

CONTROL SYSTEM

CHAPTER CONTENTS

CONTROL LEVERS
CONTROL PEDALS
STARTING DEVICES
STEERING SYSTEM

CONTROL LEVERS, PEDALS AND STEERING SYSTEM

Sitting in the driver's seat, all necessary controls are within easy reach. In the center of the front compartment, at the right of the driver, is the gear shifting lever, while at the left-hand side of the driver is the hand brake lever. In front of the driver is the steering gear and wheel, with the spark and throttle control levers mounted on a stationary quadrant immediately above the wheel. On the dash board there are three units, the instrument box, oil sight feeds and carbureter adjustment. The instrument box, located on the left-hand side of the dash board, carries the speedometer-odometer, ignition switch, automatic circuit breaker and light switches, ammeter and dash light. The oil sight feeds, located at the center of the dash board, indicate whether or not oil is flowing to the main bearings. There is one sight feed for each of the main bearings, making three in all. On the right-hand side of the dash board the carbureter adjustment is located. On the toe boards, at the left of the steering column, is found the clutch pedal, and to the right of the steering column, the foot brake pedal. To the right of the brake pedal, and slightly above it, is the accelerator pedal.

CONTROL LEVERS

GEAR SHIFT LEVER

The gear shift lever is the one located at the center of the front compartment. It is mounted on a change gear quadrant or bracket which projects up through the floor boards. The upper end of the lever is provided with a latch button, which must be depressed before the gears can be shifted. The latch, or gear shift dog, engages with notches in the quadrant, which positively hold the gear selected in mesh. Four forward speeds are provided on the White, Model TEB-O, Chassis, of which the third is direct drive and the fourth a "stepped-up" or over-geared, indirect speed. Hence it is always desirable to drive on third speed, which is direct, unless exceptionally smooth and level roads or down grades are encountered. On these it is convenient to use the indirect fourth speed.

GEAR SHIFT LEVER POSITIONS

The gear shift lever is moved from neutral in the following directions to engage the various forward speeds and reverse:

Neutral—The central position of the lever, the only one in which it may be moved sidewise.

First Speed—Release latch, move to right and push forward to first notch.

Reverse Speed—Further forward movement beyond first speed engages the reverse.

Second Speed—Move to right and pull back.

Third Speed or Direct Drive—Move to left and pull back.

Fourth or Indirect Speed—Move to left and push forward.

USE OF GEAR SHIFT LEVER

When the gear shift lever is in neutral, it may be rocked sidewise. This is the only position in which the lever may be so manipulated. Before starting the engine, always be sure that the lever is in the neutral position. The neutral notch is the second notch on the quadrant from the rear.

In starting the car, when the engine is in operation, first disconnect the engine from the transmission gear box by depressing the clutch pedal. Then move the gear shift lever to the right and forward to the first notch, or first speed position. Gradually engage the clutch by letting up on the clutch pedal. When enough momentum has been gained by the car, the gears may be shifted into second speed.

To shift into second speed, depress the clutch pedal again, move the gear shift lever through neutral position, keeping it all the way to the

right during this movement, into the second speed notch, which is the rear one on the right-hand side. Again engage the clutch and increase the momentum of the car by speeding up the engine before attempting to shift to third speed.

To shift to third speed, the clutch is operated as before, while the gear shift lever is pushed forward to neutral, moved across the neutral position to the left-hand side of the quadrant and then pulled back into the left-hand rear notch, in which position the third or direct drive is engaged. Drive the car on this speed as much as possible.

To shift to fourth speed, which is the indirect and highest one, depress the clutch pedal and move the gear shift lever forward into the front left-hand position. Engage the clutch again and regulate the speed of the car with the hand or foot throttle.

CHANGING SPEEDS UP AND DOWN

The same procedure cannot be followed in changing gears from a higher speed to a lower speed as is followed in changing from a lower speed to a higher one.

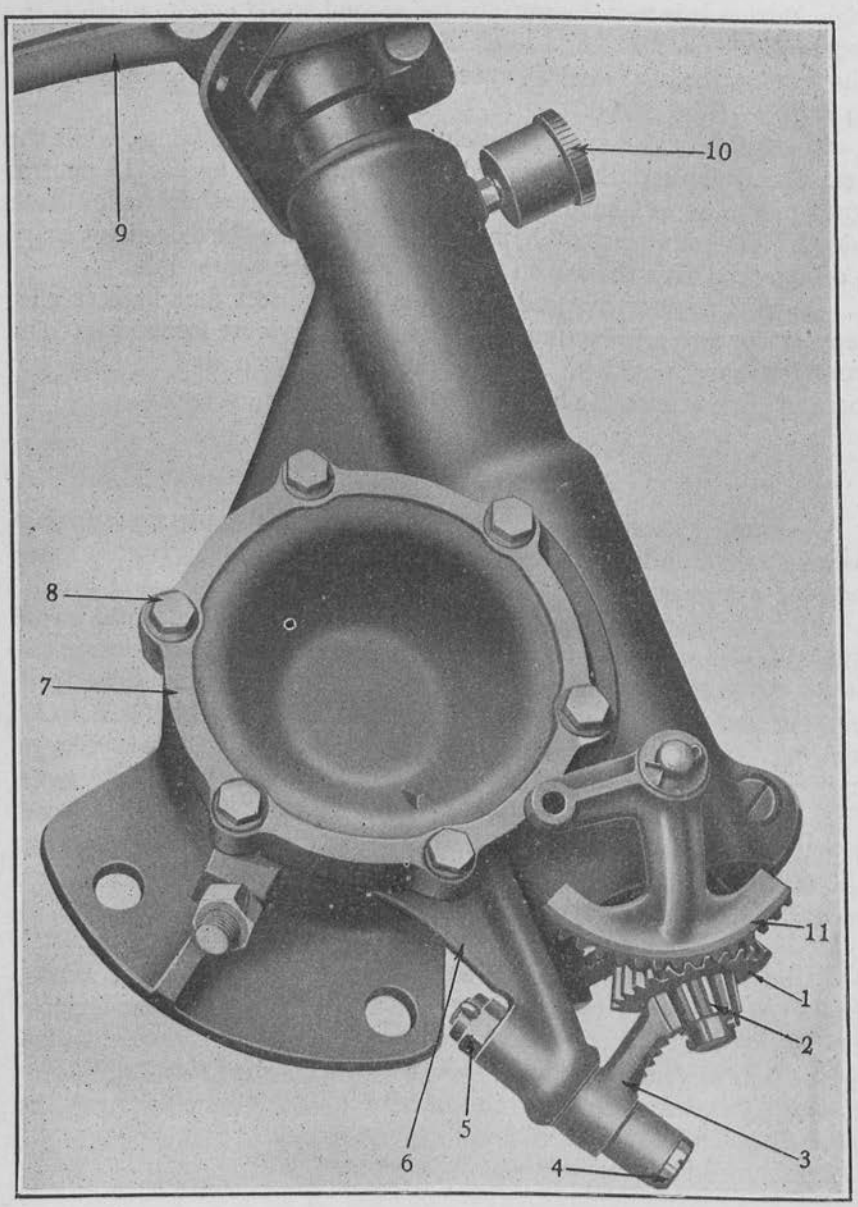
When changing from a lower speed to a higher one, the clutch pedal should be depressed to its full extent so as not only to disengage the clutch, but to apply the clutch brake, which will prevent the clutch from spinning and thereby reduce the speed of the gears which are to be engaged. Unless this is done, there will be a clashing or grinding of gears, which causes undue wear and indicates an inexperienced driver. If the clutch pedal is only partially depressed, the driver should pause slightly in the neutral position, in order to allow the clutch to stop spinning before he attempts to engage the gears of the next higher speed.

When changing down, or from a higher to lower speed, the clutch pedal should never be depressed so far as to engage the clutch brake. The clutch should merely be slipped enough to allow the gear lever to be pulled into neutral. When the gear lever is in neutral, speed up the engine with the clutch engaged, then barely disengage the clutch so as not to allow the same to touch the clutch brake, and quickly throw the gear shift lever into the next lower speed position.

EMERGENCY BRAKE LEVER

There are two brakes on the White, Model TEB-O, Chassis, one a hand brake and the other a pedal brake. The brake lever is located at the extreme left of the front compartment of the car. The emergency brake, as the lever operated one is called, is provided with a latch so that it may be locked in any position. This is to permit the holding of the car upon a grade when the driver has to leave it. The brake is

PLATE 27



LOWER END OF STEERING GEAR, RIGHT SIDE

PLATE 27—LOWER END OF STEERING GEAR —RIGHT SIDE

Ref. No.	Part No.	Name
1	00300½ GA	Carbureter hand control bevel pinion.
2	00303½ GA	Magneto control bevel pinion.
3	00303 GF	Magneto control bevel gear.
4	S0303 GA	Magneto control bevel gear bolt.
5	S0585 GA	Magneto control bevel gear bolt nut.
6	16 TE	Steering stem case.
7	17 GE	Bearing stem case cover.
8	S0105	Bearing stem case cover screws.
9	00217 GAF	Accelerator pedal.
10	0099 K	Steering stem case grease cup.
11	00300 GE	Throttle control segment.

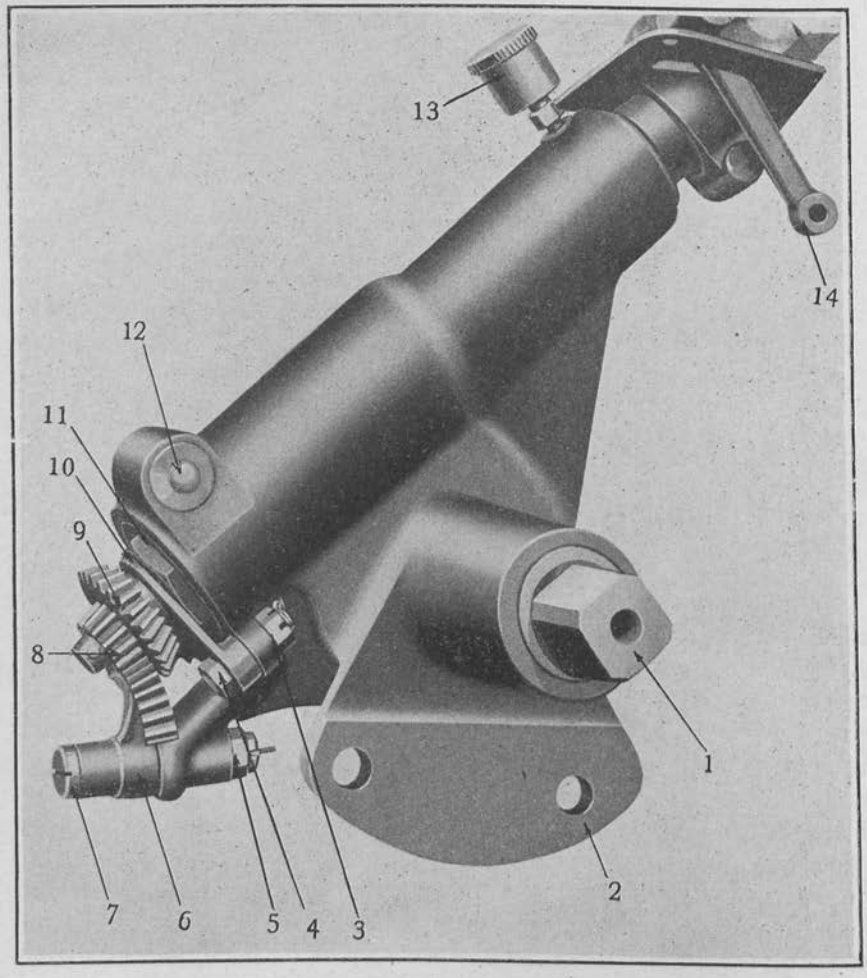
released when it is in its forward position and is applied when drawn backwards. A rod connects the lower end of the emergency lever with the equalizer attached to the emergency cross brake shaft levers. The latter are carried in bushings located in the brake shaft brackets, which are riveted to the side members of the frame. The cross brake shaft extends through the frame and, from its ends, two brake rods go to each of the brake operating arms located on the rear axle. Temporary adjustment for the emergency brakes may be made by disconnecting the emergency brake rod yokes from the emergency brake levers on the rear axle and shortening the rods. This is done by screwing the yokes further up on the rods. The proper method is to remove the rear wheels, so the internal brake adjustments can be reached.

CONTROL PEDALS

There are three control pedals on the White, Model TEB-O, Chassis, all of which project through the toe boards. On chasses which are equipped with electric lighting and starting, there is a fourth pedal, or button, which projects through the heel board.

The pedal mounted to the left of the steering column operates the clutch; the pedal located to the right of the steering column operates the foot brake; the third pedal or smaller pedal, located just above and to the right of the brake, provides the foot control of the throttle and is called the accelerator pedal. The button on the floor boards used with the electrically equipped cars is operated by the heel and controls the electric starter.

PLATE 28



LOWER END OF STEERING GEAR, LEFT SIDE

Ref. No.	Part No.	Name
1	015 TED	Steering stem.
2	16 TE	Steering stem case.
3	S01430	Stationary tube support bracket bolt nut.
4	S0105½ G	Stationary tube support bracket bolt.
5	S0585 GA	Magneto control bevel gear bolt nut.
6	00303 GF	Magneto control bevel gear.
7	S0303 GA	Magneto control bevel gear bolt.
8	00303½ GA	Magneto control bevel pinion.
9	00300½ GA	Carbureter hand control bevel pinion.
10	305¾ GA	Hand control stationary tube support.
11	14 GAB	Bearing stem thrust bearing adjusting nut.
12	S014¼ GEB	Thrust bearing adjusting nut locking bolt.
13	0099 K	Steering stem case grease cup.
14	00217 GAF	Accelerator pedal.

CLUTCH PEDAL

The purpose of the clutch pedal is to disconnect the engine so that the gears in the transmission may be shifted, or to stop the car when desired. The clutch pedal is located on the left-hand side of the toe boards and is mounted upon what is called the clutch pedal shaft. It operates a suitable linkage, which disconnects the clutch, and which is fully described in Chapter IV. The clutch pedal is adjustable, so that it may be lengthened or shortened to suit the particular driver who is handling the car.

CLUTCH BRAKE

Linked to the clutch rocker lever, operated by the clutch foot pedal, is the clutch brake. The clutch brake band is made of malleable iron and is carried on one end by the link to the rocker lever; the other end is pivoted on the transmission front cross member. On the brake shoe is riveted an asbestos fabric clutch brake facing. This shoe bears against the transmission universal joint ring. The brake operates as follows: When the clutch is depressed part way, the brake shoe does not engage with the universal joint ring, but when the clutch pedal is fully depressed, the shoe engages with joint, forming a brake. It is provided to stop the clutch spinning when changing from a lower to a higher speed only.

FOOT BRAKE PEDAL

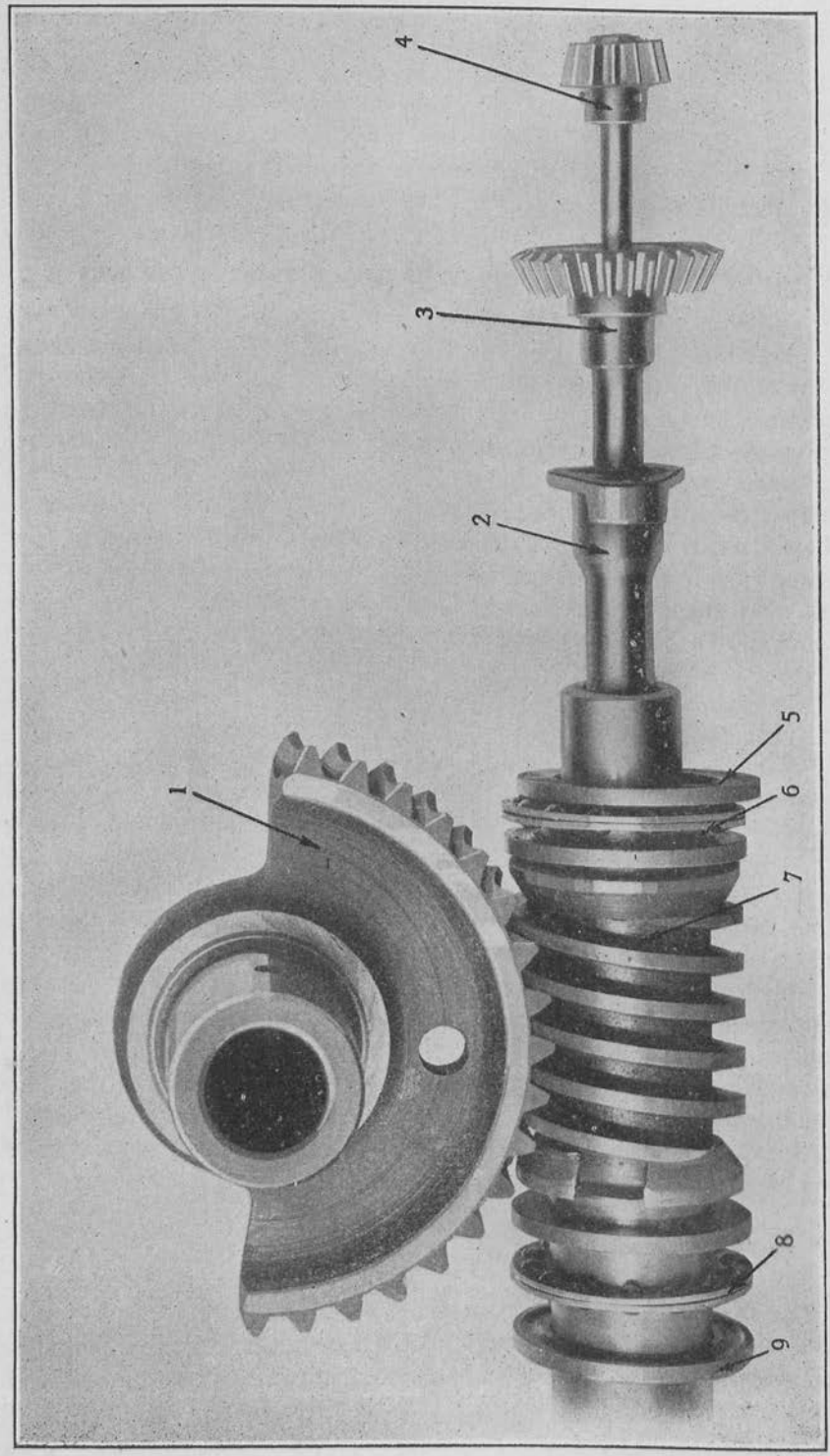
The foot brake is the right one of the two projecting through the toe boards. It is connected to the rear foot brake cross shafts through an equalizer. From this brake cross shaft two brake rods extend to each of the brake operating levers of the external brakes on the rear axle. The purpose of the brake cross shafts is to transmit the action of either the foot pedal or the emergency brake lever to their respective brakes, which operate on each of the rear wheels.

The foot brakes are provided with adjustments as follows: The clearance of the brake linings is taken up by adjusting screw nuts on the connecting screws between the brake band ends. These brake bands are further adjusted for wear by wing nuts. In addition to the liner adjustment, the foot brake may be adjusted by disconnecting the foot brake rod yokes from the brake levers and shortening the rods. This is done by screwing the yokes further up on the rods.

ACCELERATOR PEDAL

The accelerator pedal is located beside the clutch and brake pedals above the toe boards. Its purpose is to provide a foot throttle for the regulation of the car's speed without requiring the driver to remove his hands from the steering wheel. It is interconnected with the hand

PLATE 29



STEERING GEARS, WORM AND SECTOR

PLATE 29

STEERING GEARS, WORM AND SECTOR

Ref. No.	Part No.	Name
1	023 GEC	Bearing stem segment.
2	305¾ GA	Hand control stationary tube support.
3	00300½ GA	Carbureter hand control bevel pinion.
4	00303½ GA	Magneto control bevel pinion.
5	023½ GAC	Steering stem thrust washer.
6	023¼ GAB	Steering stem thrust ball bearings.
7	025 GE	Steering stem worm.
8	023¼ GAB	Steering stem thrust ball bearings.
9	023½ GAB	Steering stem thrust washer.

throttle linkage but operates independently of the latter, which only serves to set the minimum throttle opening to which the foot throttle will return when the foot is taken off the accelerator. It is most convenient to use when driving in traffic, hilly country, over rough roads, or when changing gears, while the hand throttle should be used when driving at a steady speed over smooth roads or where a uniform speed may be maintained.

STARTING BUTTON OR SWITCH

The operation of the electric cranking device, on electrically equipped chasses, is as follows: On the left of the driver's compartment, so arranged that it may be pressed down by the driver's heel, is the starting switch or starter button. Before starting the engine, be sure that the change gear lever is in the second notch from the rear of the change gear quadrant, *which is neutral position.* Turn the magneto switch to "On" position. Place throttle control lever in driving position, one or two inches forward from point on quadrant nearest the seat (closed position). Place the magneto control lever halfway between full retard and full advance. Depress the starter button until the engine starts, releasing same promptly after the start is made. In winter, the engine will start with less drain on the battery if the clutch is released.

When the starting switch button is depressed, the circuit from the storage battery to the motor is closed. This current drives the motor, which, in turn, drives the engine. Releasing the switch opens the battery circuit and, as the engine speeds up, the Bendix drive disconnects the motor from the engine.

STARTING CRANK

In addition to the electric starter, the car is provided at the front end of the engine with a starting crank. This forms a means of starting the engine when no electric starter is provided. In starting by hand, turn the compression release lever on the left side of frame towards the front of the car. The starting crank is pushed in and rotated at the same time until it engages with the starting crank ratchet. Then give the crank a smart upward pull. Should the engine back-fire when cranking, the pull-up method will permit the crank to slip from the fingers, while *downward cranking may result in a broken arm.*

As soon as the engine starts, the compression release lever should be turned toward the rear of the car.

STEERING WHEEL CONTROLS

HAND THROTTLE

Just above the steering wheel, and mounted upon a stationary quadrant, are two small hand or finger levers. These levers operate tubes which run down through the steering column and are connected to their respective pieces of apparatus by rods with yoke and eye connections. The lower and longer one of the two levers above the steering wheel is the hand throttle. This is used for setting the minimum opening of the throttle when the foot throttle is regularly used to control the speed of the car. When driving over smooth, level roads at a constant speed, it is often convenient to set the hand throttle for the speed desired and thus relieve the foot of the constant strain which is experienced when trying to drive at a constant speed with the foot throttle or accelerator pedal.

SPARK ADVANCE CONTROL

The upper or shorter lever mounted on the stationary quadrant, above the steering wheel, controls the advance of spark. This control is usually set at an advance running position and does not have to be retarded unless the car encounters a heavy grade, in which case, as soon as there is any evidence of the motor laboring or pounding, due to the advanced spark, the lever should be pulled backwards, thus retarding the spark.

STEERING SYSTEM

STEERING GEAR

An inclined steering column is provided on the White, Model TEB-O, Chassis. The column is supported by a dash plate, bolted upon the rear of the dash board. At the top of the steering column

there is mounted a hardwood wheel, above which the hand throttle lever and quadrant are placed. The steering column does not turn with the steering wheel, but remains stationary and carries the magneto hand control or spark advance lever.

The steering lever of the steering gear is on the outside of the frame, passing over the side rail of the main frame for this purpose. The steering lever is operated by the steering wheel through the medium of the steering stem worm and segment. The steering lever of the steering gear is connected to the steering rod by means of a steering lever ball. The rod connects to the left front wheel bearing stem arm ball. This connecting link between the steering gear and the front axle is designated as the short steering rod and distinguishes it from the long steering rod, which connects the steering arms of the front axle. The short steering rod is mounted on a ball and socket joint at each end, and these should be carefully examined every week and the grease cups screwed down daily.

STEERING GEAR ADJUSTMENT

There are practically no adjustments on this steering gear. The wear between the worm and wheel may be taken up by rotating the eccentric bushing supporting the worm segment shaft. The thrust bearing adjusting nut bushings may wear and, if such is the case, the thrust bearing adjusting nut locking bolt at the lower end of the steering column should be unscrewed to loosen the clamping action against the thrust bearing adjusting nut, the latter turned to the right until the slackness is taken up and the locking bolt again tightened. Care should be taken that this adjustment is not made too tight. This can be felt by turning the steering wheel. All lost motion that is apparent to the driver on the steering wheel is not always due to the steering gear, but very frequently to the looseness of the tie rod and drag link joints on the front axle. Be sure to lock the thrust bearing adjusting nut when the proper adjustment has been obtained.

STEERING GEAR LUBRICATION

Follow the lubricating instructions for the steering gear on page 29 under "Lubricating Instructions."

TURNING RADIUS

This car is designed to turn in a 46-foot diameter circle to the right and 60-foot circle to the left. Set screws are provided on the front wheel bearing stem arms to prevent the wheels from interfering with the chassis, should the driver attempt to turn in a closer circle than this. If there is interference noted when turning the wheels to the maximum in either direction, the adjustment of these stops should be investigated at once.

STEERING GEAR DIMENSIONS

Steering Gear Worm, Material		Case hardened steel	
Diameter, outside	inches	1.812	(1 12/16)
Pitch	do	1.547	(1 35/64)
Length of worm	do	1.750	(1 3/4)
Number of threads		triple	
Angle of worm		Left-hand	
Depth of thread	inches	0.286	(9/32)
Steering Worm Wheel, Material		Steel forging	
Diameter, outside	inches	3.961	(3 31/32)
Pitch	do	3.495	(3 1/2)
Throat	do	3.760	(3 3/4)
Angle including teeth	degrees	65	
Width of gear	inches	1.000	
Steering Worm Wheel Shaft		Forged with gear	
Diameter	inches	1.437	(1 7/16)
Square end, side	do	1.125	(1 1/8)
Length of shaft	do	4.437	(4 7/16)
Length of square	do	1.500	(1 1/2)
Steering Gear Arm, Material		Chrome nickel steel	
Length center to center	inches	7.500	(7 1/2)
Size of square at top	do	1.125	(1 1/8)
Bore at lower end	do	0.687	(11/16)
Diameter of ball attached to arm	do	1.125	(1 1/8)
Steering Gear Worm Wheel Bushing, Material		Bronze	
Diameter, outside	inches	1.750	(1 3/4)
Inside	do	1.500	(1 1/2)
Outside flange	do	2.000	
Length, overall	do	4.500	(4 1/2)
Flange, thickness	do	0.187	(3/16)
Eccentricity for adjusting worm	do	0.0312	(1/32)
Tie Rod Yokes, Material		Steel drop forging	
Width of yoke	inches	3.125	(3 1/8)
Slot in yoke	do	1.562	(1 9/16)
Diameter of bolt holes	do	0.625	(5/8)
Tie Rod Pin, Material		Case hardened steel	
Length, overall	inches	4.500	(4 1/2)
Under head	do	3.750	(3 3/4)
Diameter, head	do	1.187	(1 3/16)
Bolt	do	0.625	(5/8)
Thread	do	0.562	(9/16)
Number of threads	per inch	16	
Steering Arm, Double, Material		Steel drop forging	
Long or drag link arm, center of taper to center of arm	inches	7.625	(7 5/8)
Long arm, center, back of front axle center line	do	0.500	(1/2)
Short arm, center of taper to center of arm	do	1.000	
Short arm, center, back of front axle center line	do	6.750	(6 3/4)
Long arm boss, top face above center line of taper	do	3.000	
Short arm boss, top face below center line of taper	do	1.187	(1 3/16)
Taper, Maximum Diameter	do	1.562	(1 9/16)
Length	do	1.932	(1 15/16)
Per foot	do	3.000	
Woodruff key used	Number	25	
Thread, diameter	inches	0.875	(7/8)
Number of threads	per inch	13	
Steering Arm, Single, Material		Steel drop forging	
Dimensions same as for short arm above.			
Steering Arm Yoke Pin Bushing, Material		Bronze	
Diameter, outside	inches	0.824	(13/16)
Inside	do	0.625	(5/8)
Length	do	1.562	(9/16)

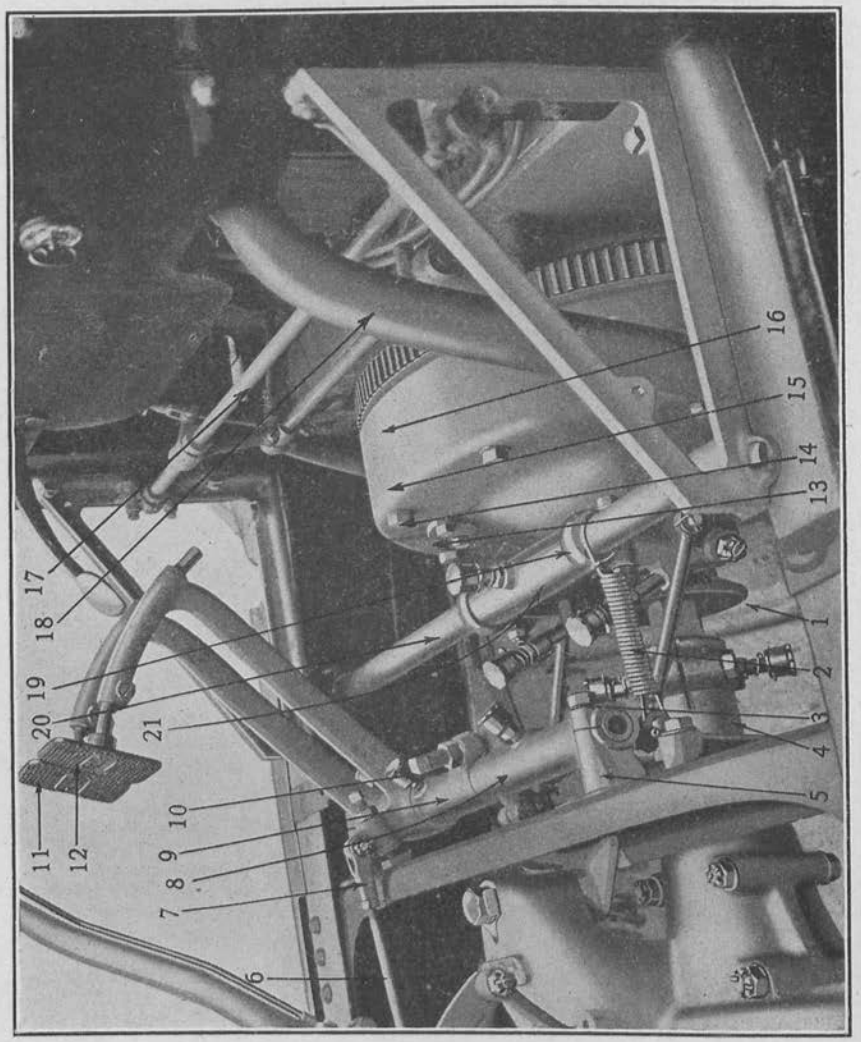
STEERING WHEEL DIMENSIONS

Steering Wheel Spider, Material		Malleable iron	
Spider Arms, number		three	
Thickness	inches	0.312	($\frac{5}{16}$)
Width, maximum	do	1.187	($1\frac{3}{16}$)
Minimum	do	0.875	($\frac{7}{8}$)
Hub, Bore, square	do	1.000	
Steering Wheel Rim, Material		Wood	
Diameter, outside	inches	18.125	($18\frac{1}{8}$)
Inside	do	14.250	($14\frac{1}{4}$)
Section, width	do	1.437	($1\frac{7}{16}$)
Thickness	do	1.250	($1\frac{1}{4}$)

DRAG LINK DIMENSIONS

Drag Link, Material		Steel tube	
Diameter, outside	inches	1.000	
Inside	do	0.750	($\frac{3}{4}$)
Length of tube	do	24.250	($24\frac{1}{4}$)
Number of threads, rear end	per inch	20	
Front end	do	14	

PLATE 30



CLUTCH, FLYWHEEL AND PEDAL ASSEMBLIES

PLATE 30—CLUTCH, FLYWHEEL AND PEDAL ASSEMBLIES

Ref. No.	Part No.		Name
1	0134¾	GED	Clutch pullout shoe.
2	0175¼	GEC	Clutch shaft spring.
3	S0107¼	GE	Foot lever shaft bracket binder screw.
4	0425	GED	Transmission universal joint coupling.
5	039	GA	Foot lever shaft bracket.
6	081½	GTB	Foot brake rod, front.
7	084	CC	Brake rod end.
8	180¼	GEC	Clutch rocker lever.
9	019¼	GE	Foot lever connection.
10	S0192	GA	Foot brake lever adjusting screw.
11	191½	GEC	Clutch foot lever pad.
12	35½	GEC	Foot brake lever pad.
13	00151	GEC	Clutch adjusting plate lock.
14	S0150¼	GEE	Clutch cover bolts.
15	150¾	GEC	Clutch cover.
16	150	GEE	Clutch flywheel.
17	0724	GEC	Carbureter control shaft.
18	108¼	TED	Muffler exhaust pipe with flange.
19	13¾	GTA	Clutch rocker shaft collar.
20	0173	GTB	Clutch rocker shaft.
21	174	GED	Clutch rocker.

CHAPTER IV

MAIN CLUTCH

CHAPTER CONTENTS

FUNCTION AND OPERATION
BRIEF DESCRIPTION
DETAIL DESCRIPTION
CARE AND OPERATION

CLUTCH FUNCTION AND OPERATION

The clutch is a device which serves to connect or disconnect the engine from the transmission and, therefore, the rear wheels. It provides the means whereby the driver may stop the car without stopping his engine. The clutch is operated by means of a foot pedal, the left-hand one of those projecting through the toe boards. The main clutch, or clutch, as it is designated for short, is normally engaged so that the power is transmitted from the engine to the rear wheels without any effort being exerted by the driver. To disconnect the engine from the rear wheels, the clutch must be disengaged or released, to do which the driver merely has to press down upon the clutch pedal. The clutch is normally held in engagement by a coiled spring. In addition to disconnecting the engine from the road wheels when the driver desires to stop the car, the clutch is also used to disconnect the engine from the transmission unit or change speed gear box while the gears are being shifted.

BRIEF DESCRIPTION OF CLUTCH

The clutch used on the White Model TEB-O Chassis is distinguished as one of the single plate type. It is completely enclosed inside of the flywheel by what is called the clutch cover. It runs in oil, and the single plate used bears on each side against asbestos fabric friction discs which are riveted to the flywheel and the friction plate ring.

The single clutch disc, or clutch friction plate, as it is called, is attached to the clutch shaft, which is connected to the main drive pinion in the transmission. It, therefore, is the driven member of the clutch assembly, while the flywheel and the friction plate ring are the driving members.

The clutch friction plate is clamped between the flywheel and the friction plate ring by means of six V-shaped wedges, which are operated through a toggled joint mechanism, also carried inside of the clutch unit.

The clutch is kept in engagement by means of a helical spring, one end of which bears against the toggle spider and the other against the clutch cover. The clutch is disengaged by pulling the toggle spider rearward, thus withdrawing the wedges and relieving the wedging action upon the clutch friction plate. To assist in releasing the clutch, eight clutch friction plate springs, carried in the flywheel, are provided. These force the clutch friction ring away from the clutch friction plate as soon as the wedges are withdrawn.

On account of the design of the clutch, clutch pedal and clutch operating mechanism, the latter two units should be considered at the same time as the clutch assembly.

The clutch pedal is mounted upon the clutch pedal shaft or foot lever shaft, which is attached to the second cross member of the frame, with suitable brackets provided for this purpose. This cross member is located just ahead of the transmission gear box and back of the flywheel. The clutch throwout yoke, or clutch rocker, as it is called, is not carried upon this shaft, but upon another shaft called the clutch rocker shaft and placed between the clutch pedal shaft and the flywheel. The clutch rocker shaft is mounted in brackets located at its ends and attached to the side rails of the main frame. Two lever arms attached to an extension of the clutch pedal shaft operate the clutch rocker through the medium of two clutch rocker rods on links. The introduction of these clutch rocker rods gives a greater reduction between the clutch pedal and the clutch rocker, thereby making the operation of the clutch pedal much easier.

The clutch rocker carries two No. 302 ball bearings, which engage with the clutch pullout shoe. These bearings are arranged so as to take the entire thrust of the clutch spring, when the latter is disengaged.

DETAIL DESCRIPTION OF CLUTCH

The clutch proper will first be considered, then the clutch operating mechanism. The clutch proper consists of the following main units: The flywheel, clutch cover, clutch friction plate, friction facing, clutch friction plate ring, clutch friction plate notch ring, clutch wedges, clutch toggle, clutch toggle spider, clutch spring and clutch shaft.

FLYWHEEL

The cast iron flywheel is mounted upon the rear end of the crankshaft to which it is held by means of a key, tapered shaft and nut. On the outside of the flywheel an annular groove is turned, to which the starting gear for the electric starter is attached, on the cars which carry electrical equipment. When this gear is furnished, longer clutch cover bolts are used than when it is not carried. In the latter case, nuts are substituted for it. The clutch friction surface inside of the flywheel is faced with an asbestos fabric disc which is riveted to it. The outside, or rearmost, face of the flywheel is turned square and counterbored to carry the clutch cover concentric with the flywheel.

FLYWHEEL STARTER GEAR DIMENSIONS

Flywheel Starter Gear, Material			Steel
Number of teeth		140	
Pitch, diametral (stub tooth)		8/10	
Width of face	inches	1.250	(1 1/4)
Diameter, outside	do	17.700	(17 11/16)
Pitch	do	17.500	(17 1/2)
Bolt circle	do.	16.312	(16 5/16)
Counterbore	do	16.875	(16 7/8)
Inside	do	15.437	(15 7/16)
Counterbore depth	do	0.500	(1/2)

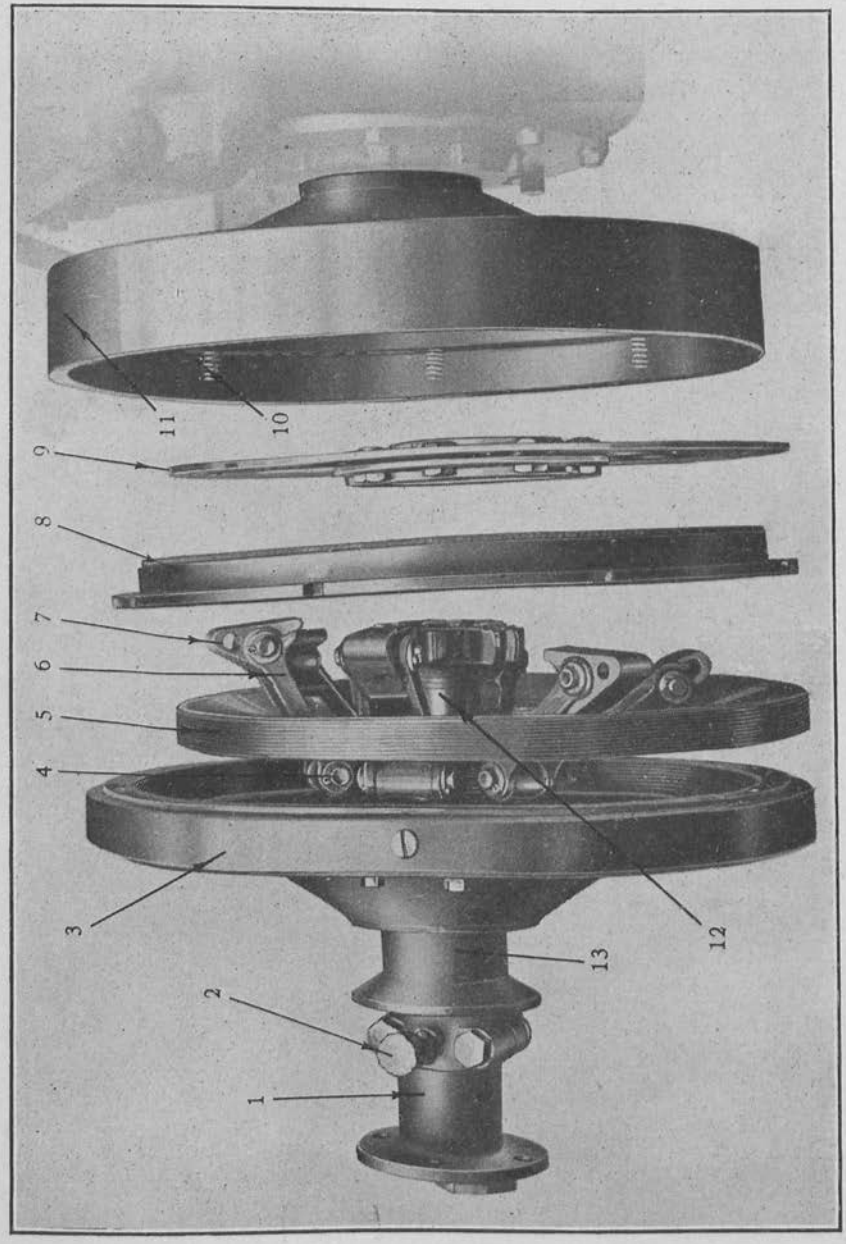
FLYWHEEL DIMENSIONS

Flywheel, Material			Semi-steel
Diameter, outside	inches	17.750	(17 3/4)
Counterbore	do	16.875	(16 7/8)
Width	do	2.500	(2 1/2)
Counterbore, depth	do	1.812	(1 13/16)
Friction surface, outside diameter	do	15.625	(15 5/8)
Inside diameter	do	10.500	(10 1/2)
Hub, Bore, maximum diameter	do	2.750	(2 3/4)
Taper	inches per foot	0.625	(5/8)

CLUTCH COVER

The clutch cover is a casting which closes the rear end of the flywheel and not only serves to enclose and protect the entire clutch mechanism from dirt, and water, but provides means of conveniently adjusting the clutch when this is necessary. It is the same outside diameter as the flywheel and is provided with a hub at the center, through which the clutch toggle spider sleeve slides. This sleeve, however, is keyed to the clutch cover and rotates with it. The cover has a pilot ring

PLATE 31



MAIN CLUTCH PARTIALLY DISASSEMBLED

PLATE 31

MAIN CLUTCH PARTLY DISASSEMBLED

Ref. No.	Part No.	Name
1	0425 GED	Transmission universal joint coupling.
2	0099 O	Grease cup to crankshaft centering ball.
3	150¾ GEC	Clutch cover.
4	S0151½ GEC	Clutch wedge strap pin.
5	151¼ GEC	Clutch friction plate ring (notched).
6	0174¾ GEC	Clutch wedge strap.
7	174¼ GEC	Clutch wedge.
8	151¾ GEC	Clutch friction plate ring (plain)
9	0150½ GEC	Clutch friction plate.
10	0150¼ GEC	Clutch friction plate spring.
11	150 GEE	Flywheel.
12	131¾ GEC	Clutch toggle spider.
13	0134¾ GED	Clutch pullout shoe.

turned on its forward face, which engages with the counterbore in the flywheel, thereby assuring the concentric location of the two with respect to one another. Inside of the clutch cover, threads are provided to permit the adjustment of the clutch and, by this adjustment, compensate for wear of the friction faces. The cover is held in place by eight clutch cover bolts equally spaced around the circumference of the flywheel. At one side of the flywheel the clutch adjusting plate lock is attached by a couple of cap screws. This lock engages with notches cut in the friction plate notched rings. Through the opening provided when the lock plate is removed, the notches can be reached and the notched ring turned relative to the clutch cover.

The clutch cover also forms the support for the clutch spring, which is mounted on the outside of the clutch cover hub extension. This projects from the inside of the cover plate (when mounted on the flywheel).

CLUTCH FRICTION PLATE

The clutch friction plate is a steel disc held in place with eight bolts and nuts upon the clutch friction plate flange. When the clutch is engaged, this clutch friction plate is clamped between the two asbestos fabric rings and transmits the power from the flywheel to the transmission. The clutch friction plate, therefore, is the driven member of the clutch.

FRICTION FACING

Asbestos fabric friction facing is riveted to the surface of the flywheel, against which the clutch friction plate bears, and to the clutch

friction plate ring, which bears against the opposite side of the clutch friction plate. This asbestos fabric facing is riveted to both the flywheel and the clutch friction plate ring.

CLUTCH FRICTION PLATE RINGS

There are two clutch friction plate rings, one of which is faced with asbestos fabric and bears against the clutch friction plate, and one which is threaded and screwed into the clutch cover and is designated as the clutch friction plate notched ring.

The clutch friction plate, upon which the asbestos fabric is riveted and which bears against the clutch friction plate, carries a rim with eight notches in it, equally spaced. These notches permit the clutch cover bolts to pass through. The bolts cause the clutch friction plate to rotate with the flywheel and hence transmit part of the engine power to the clutch friction plate. The clutch friction plate ring is backed up by eight small helical springs carried in the flywheel rim and bearing against the flange between the clutch cover bolts. These springs serve to disengage the clutch by pushing it quickly away from the clutch friction plate as soon as the engaging wedges are withdrawn. The rearward face of the clutch friction ring is beveled off so as to receive the clutch wedges. A slight distance to the rear of the clutch friction ring is the notched clutch friction ring, which is screwed into the clutch cover. The latter is beveled on its forward face the same amount that the former is on its rearward face. It is between these two bevel faces that the clutch wedges operate.

CLUTCH WEDGES AND TOGGLES

Six wedges are imposed between the two friction plate rings by the action of an equal number of toggle arms or clutch wedge straps, as they are called. These connect the clutch toggle spider, which is slidably mounted in the clutch cover but which rotates with the latter to the clutch wedges. The clutch toggle spider has a sleevelike extension which surrounds the clutch shaft and which is key-seated so as to slide in the cover and rotate with it. It is held in place by the clutch pullout shoe. The latter is screwed onto the rear end of the clutch toggle spider sleeve.

THE CLUTCH SHAFT

The clutch shaft carries six teeth or keys upon its periphery that engage with the friction plate flange that is bolted to the friction plate. This gives a flexibility between the clutch shaft and the friction plate that permits the latter to always be self-aligning and perfectly free in its action. The forward end of the clutch shaft is carried on a ball that is pressed into the rear end of the crankshaft. It, therefore, is supported at its forward end by this ball and at its rear end by a universal joint attached to the forward end of the transmission drive pinion.

CLUTCH DIMENSIONS

Clutch Cover, Material		Cast iron	
Diameter, outside	inches	17.750	(17¾)
Outside pilot	do	16.875	(16⅞)
Threads	do	15.625	(15⅝)
Hub, bore	do	2.500	(2½)
Threads for Friction Plate Ring, notched	per inch	12	
Key in hub, depth	inches	0.125	(⅛)
Width	do	0.250	(¼)
Bolts, diameter	do	0.437	(7/16)
Number used		eight	
Clutch Friction Disk, Material		Saw steel	
Diameter, outside	inches	15.500	(15½)
Inside	do	4.000	
Bolt circle	do	5.000	
Bolts	do	0.437	(7/16)
Thickness of plate	do	0.125	(⅛)
Number of bolts		eight	
Clutch Facing, Material		Asbestos fabric	
Diameter, outside	inches	15.500	(15½)
Inside	do	10.500	(10½)
Rivet hole circle	do	13.000	
Rivets	do	0.187	(3/16)
Thickness	do	0.125	(⅛)
Clutch Friction Ring, Plain, Material		Cast iron	
Diameter, outside flange	inches	16.812	(16 13/16)
Outside disk	do	15.625	(15⅝)
Inside	do	10.500	(10½)
Rivets	do	0.187	(3/16)
Thickness, Ring	do	0.875	(⅞)
Angle of Bevel Face	degrees	18	
Clutch Friction Ring, Notched, Material		Cast iron	
Diameter, outside threads,	inches	15.625	(15⅝)
Inside	do	10.500	(10½)
Thickness of ring	do	0.875	(⅞)
Number of threads on periphery	per inch	12	
Angle of bevel face	degrees	18	
Number of notches on face		eighty-one	

CLUTCH OPERATING ASSEMBLY

The clutch operating assembly is made up of two groups of essential parts, one of which is the clutch and brake pedal group mounted on the clutch brake shaft, and the other is the clutch rocker and its shaft.

CLUTCH PEDAL SHAFT ASSEMBLY

The clutch pedal assembly is mounted upon the clutch pedal or foot lever shaft. The latter is carried in two brackets located at either end and attached to the forward side of the cross member of the main frame. This shaft is stationary and is clamped in place by splitting the brackets on one side and using one of the holding bolts to clamp the shaft in place. The clutch pedal is clamped onto a tube which not only forms the support for the clutch pedal, but also provides the mounting for the brake pedal. This tubular shaft is mounted upon two bushings that rotate upon the stationary cross pedal shaft. At the right end of this tubular clutch shaft there are two arms extending downward, to which the clutch rocker rods are attached by split pins. Another arm is provided which projects out horizontally to the rear. This arm

operates the clutch brake. As it projects to the rear, it necessarily raises as the clutch is depressed, hence pulling up on the link which connects it with the clutch brake shoe. The clutch brake shoe operates against the outside of the clutch universal joint housing. It is pivoted at the right-hand side of the shaft and hence is pulled up against the lower side of the universal joint housing when the clutch pedal is depressed.

CLUTCH SHAFT DIMENSIONS

Clutch Shaft, Material		Nickel steel	
Diameter, drive disc end	inches	3.312	($3\frac{5}{16}$)
Shaft	do	1.375	($1\frac{3}{8}$)
Square, across corners	do	1.656	($1\frac{21}{32}$)
Length overall	do	10.500	($10\frac{1}{2}$)
Thickness, clutch end	do	0.750	($\frac{3}{4}$)
Side of square end	do	1.250	($1\frac{1}{4}$)
Diameters of gear end, bottom of tooth	do	2.750	($2\frac{3}{4}$)
Outside	do	3.312	($3\frac{5}{16}$)
Pitch	do	3.149	($3\frac{5}{32}$)
Number of teeth		16	

CLUTCH ROCKER DIMENSIONS

Clutch Rocker, Material		Malleable iron	
Bore of hub	inches	1.000	
Length of hub	do	5.875	($5\frac{7}{8}$)
Two bushings combined	do	3.000	
Distance, center to center, rocker bearing stud to rocker shaft	do	4.125	($4\frac{1}{8}$)
Angle of rocker bearing studs	degrees	30	
Size of rocker bearings	Number	302	
Clutch Rocker Shaft, Material		Nickel steel	
Diameter	inches	1.000	
Length	do	29.750	($29\frac{3}{4}$)

CLUTCH ROCKER SHAFT

The clutch rocker shaft is carried in two brackets bolted to the side members of the main frame. It is located about half-way between the flywheel and the clutch pedal shaft. The clutch rocker is mounted on this shaft with two bushings. The clutch rocker shaft does not rotate. In order to properly locate the clutch rocker with reference to the clutch pullout shoe, two split collars are pressed on either side of the clutch rocker. By using these it is possible to allow the clutch rocker to center itself before they are brought up on either side of it and clamped in place. At the lower end of the clutch rocker there are two annular ball bearings which bear against the clutch pullout shoe and relieve the friction and wear which would result if they were not used. This is due to the fact that the clutch pullout shoe rotates with the flywheel at all times.

The ball bearings are held in place by shoulder studs and are protected by means of washers. Grease cups, provided to insure their proper lubrication, are carried on extensions of the clutch rocker. The clutch rocker rods connect the clutch rocker with the clutch pedal sleeve.

PEDAL DIMENSIONS

Clutch Pedal, Material		Malleable iron	
Radius of action	inches	11.000	
Bore of hub	do	1.375	(1⅜)
Width of hub	do	1.750	(1¾)
Brake Pedal, Material		Malleable iron	
Radius of action	inches	11.000	
Bore of hub	do	1.500	(1½)
Width of hub	do	3.000	

CARE AND OPERATION

CLUTCH ADJUSTMENT

The adjustment of the clutch is comparatively simple. All that is necessary is to remove the clutch adjusting plate lock, which is held in place by two cap screws. Have somebody disengage the clutch and hold it in the disengaged position while the adjustment is being made. When the clutch is disengaged, the pressure against the notched clutch friction plate ring is relieved, and a screw driver inserted through the adjustment plate hole will serve as an instrument to rotate the notched clutch friction plate ring. This ring is provided with a right-hand thread. Hence, to adjust the clutch or to make it tighter when engaged, the notched clutch friction plate ring should be rotated in a clockwise direction when looking at the clutch from the rear. When the clutch ring has been rotated enough, the notched clutch friction plate is again locked in place by the clutch adjusting plate lock.

CLUTCH BRAKE DIMENSIONS

Clutch Brake Drum Diameter	inches	4.250	(4¼)
Width	do	1.000	
Clutch Brake Band, Material		Malleable iron	
Section, shape		Channel	
Depth	inches	0.750	(¾)
Width	do	1.000	
Thickness	do	0.125	(⅛)
Clutch Brake Facing, Material		Asbestos fabric	
Length	inches	5.000	
Width	do	1.000	
Thickness	do	0.312	($\frac{5}{16}$)

CLUTCH REMOVAL

To remove the clutch without disturbing the transmission, the two bolts holding the universal driving coupling onto the clutch shaft are removed; then the four bolts holding the universal driving coupling onto the universal driving coupling ring, the latter being attached to the front end of the main driving pinion shaft in the transmission, are removed. The removal of these permits the universal driving coupling to be slid forward on the clutch shaft far enough for it to clear the front end of the transmission shaft when the clutch is being withdrawn from

the flywheel. Next remove the eight clutch cover holding bolts. After these are removed, the clutch cover, both clutch friction plate rings, the clutch brake plate and its flange and the clutch shaft may all be pulled to the rear until they clear the rear edge of the flywheel. Then the entire clutch may be lowered down and out of the chassis if the under pan has been removed beforehand. The under pan should be taken off before the clutch is disassembled, as it will be much more convenient to work on the clutch when this has been removed, and it is necessary to remove it before the clutch can be taken out of the car.

REPLACEMENT OF FRICTION SURFACE

Until the friction surfaces, which are made from asbestos fabric, have worn down to such an extent that the copper rivets holding these surfaces in place begin to strike the plate, it is unnecessary to do more than adjust the tightness of the clutch by rotating the notched clutch friction plate ring. New rings should be obtained when this condition arises, and the old rings taken out by punching out the rivets, the new friction rings of asbestos fabric inserted and riveted in place. Great care should be taken to see that the rivet heads are carried well below the surface of the friction material, otherwise the clutch cannot be adjusted many times before the friction plate begins to bear on the rivet heads.

NEW FRICTION FACING RINGS

When replacing friction rings, care should be taken to have a perfect bearing both on the inside and outside circumference of the rings. On account of the method used in manufacturing these rings, they tend to become thicker on the inside circumference than on the outside if not in use. Therefore, when replacing friction surfaces, a straightedge should be laid across these friction facing rings to be sure that they are not higher at the inside edge than they are at the outside. If they are higher, they should be dressed down with a coarse file. This precaution should be observed when replacing the friction facing rings on both the flywheel and the friction plate.

CHAPTER V

TRANSMISSION UNITS

CHAPTER CONTENTS

TRANSMISSION GEAR SHIFT
TRANSMISSION OPERATION
TRANSMISSION CARE AND REPAIR
PROPELLER SHAFT
UNIVERSAL JOINTS
TIRE PUMP

TRANSMISSION UNITS

Transmission units comprise the following assemblies: Transmission gear box, containing the gears, by means of which the ratio between the engine and the rear wheels is varied; the propeller shaft, which joins the transmission gear shift unit and rear axles; the three universal joints, one of which is located at either end of the propeller shaft and the third between the clutch and the transmission gear box; and the power tire pump, located on top of the transmission gear box.

FUNCTION OF TRANSMISSION

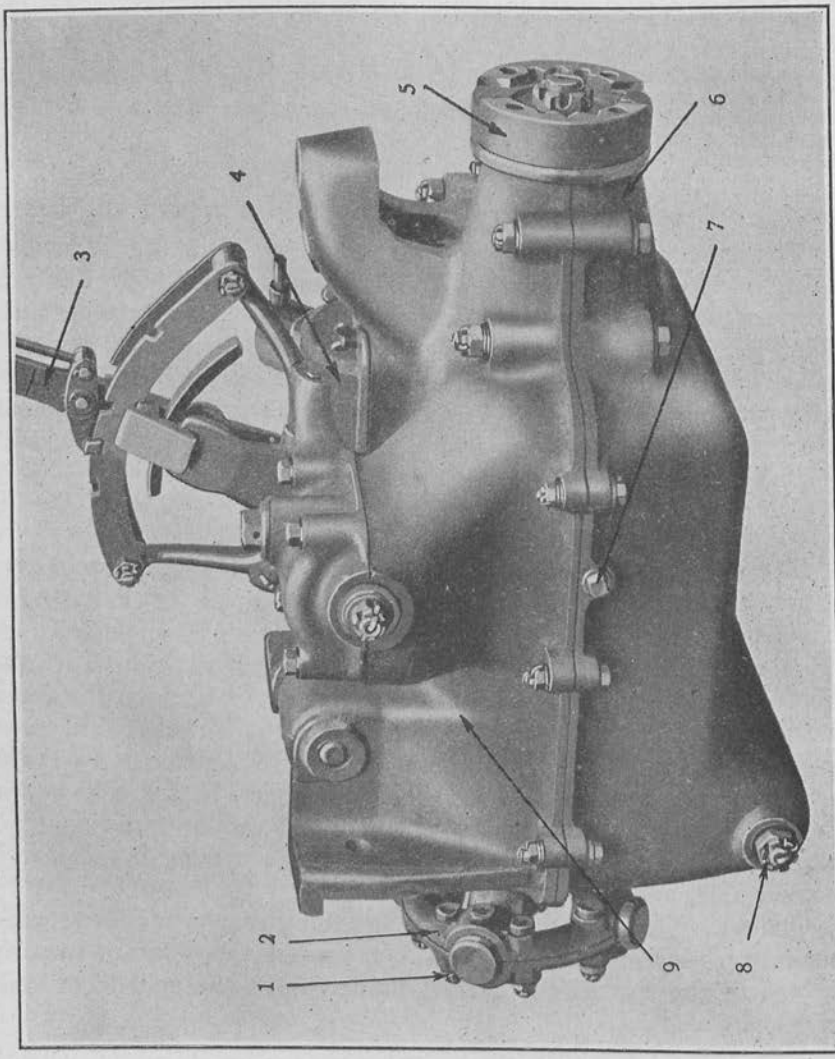
The transmission gear shift unit consists of a combination of gears mounted upon shafts and the whole contained in a cast iron two-piece housing, which is supported by the second and third cross members of the frame. The function of the transmission is to alter the tractive effort at the road wheels or the ratios between the engine and the wheel revolutions. The gears might be considered as levers, and in the transmission a variation of leverage is obtainable by changing the number of teeth in the particular gears that are in action. The gear reduction, or "leverage," obtained in the transmission is again multiplied by the gear reduction of the driving bevel gear in the rear axle.

The transmission is of the selective sliding gear type and provides four forward lever speeds. The different speeds are obtained by shifting one of the two sliding gears mounted upon the splined or main drive shaft.

RELATION OF TRANSMISSION SHAFTS

There are four shafts in the transmission unit, one of them the main drive gear or clutch gear shaft, and the second the main drive shaft or sliding gear shaft. The latter is often called the "splined" shaft. These two shafts rotate about the same axis but are not positively connected together, although the latter is supported at the front end by a double row ball bearing located in the

PLATE 32



RIGHT SIDE OF TRANSMISSION

PLATE 32—RIGHT SIDE OF TRANSMISSION

Ref. No.	Part No.	Name
1	073½ TBC	Drive shaft trunnion, front.
2	073½ GF	Universal joint toggle.
3	0180½ GFB	Change gear lever.
4	575 TEF	Tire pump frame.
5	0425½ GED	Transmission universal joint ring.
6	0425¾ GED	Transmission universal joint ring grease retainer.
7	574 TEF	Transmission case, lower half.
8	0972½ GF	Reverse shifter lever shaft.
9	573 TEF	Reverse shifter lever, upper half.

rear end of the former. The other two essential shafts are the countershaft and the reverse idler gear shaft.

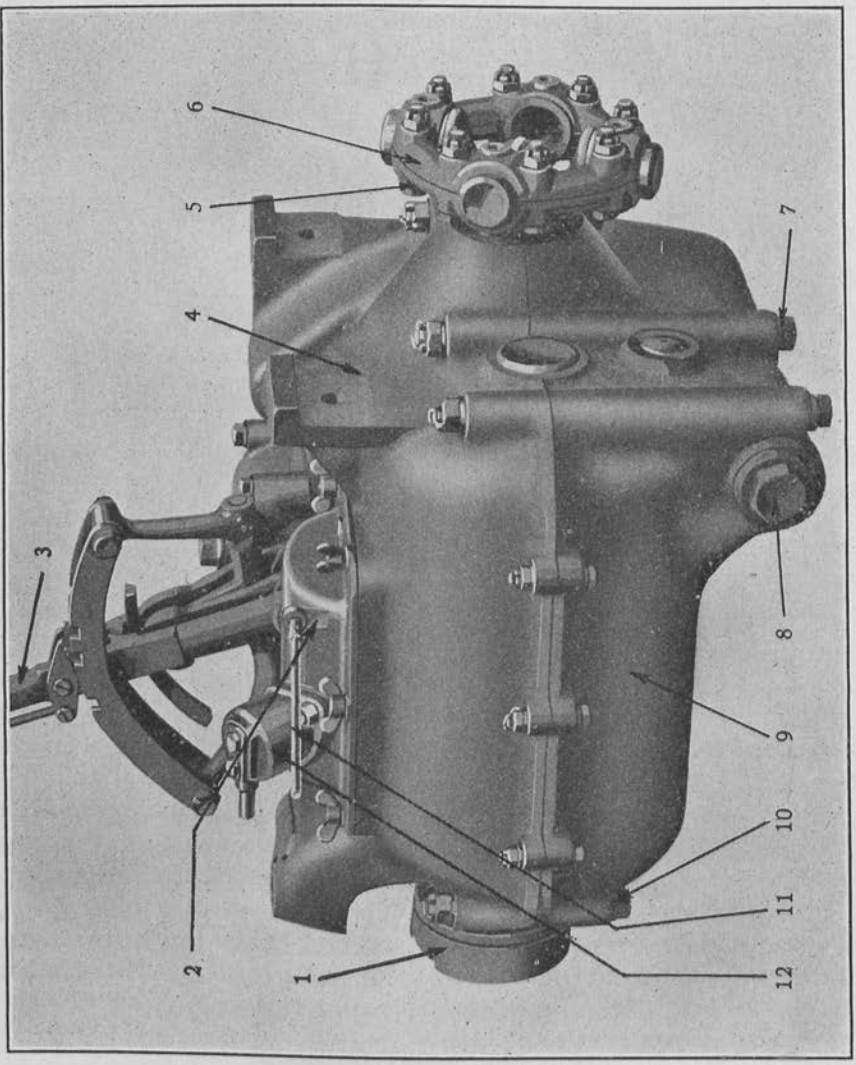
The power from the clutch is delivered to the transmission through the main drive gear or clutch gear shaft. The power transmitted through the transmission is finally delivered to the rear drive system, that is, the universal joints, propeller shaft and rear axle, through the main drive or "splined" shaft, to the rear end of which the universal joint is attached. The main drive shaft, the clutch shaft and the countershaft are all carried upon annular ball bearings. The reverse idler shaft is carried in the lower half of the transmission case and is stationary.

The entire transmission gear case is made up in four units: The upper half, which supports the entire case; the lower half, which is bolted to the upper half; the cap which holds the gearshift lever shaft in place and carries the gear shift quadrant; and the transmission cover plate, which not only closes the opening in the top of the transmission case, upper half, but also carries the tire pump. All of these parts of the transmission case are made from cast iron.

OPERATION OF TRANSMISSION

The operation of the transmission cannot be clearly understood until one has in mind the location of the various gears and their names. The main drive or clutch gear is located in the front end of the transmission and receives the power direct from the clutch shaft. It drives the countershaft driven or back gear, with which it is constantly in mesh, hence the common designation of these two gears as the "con-

PLATE 33



LEFT SIDE OF TRANSMISSION

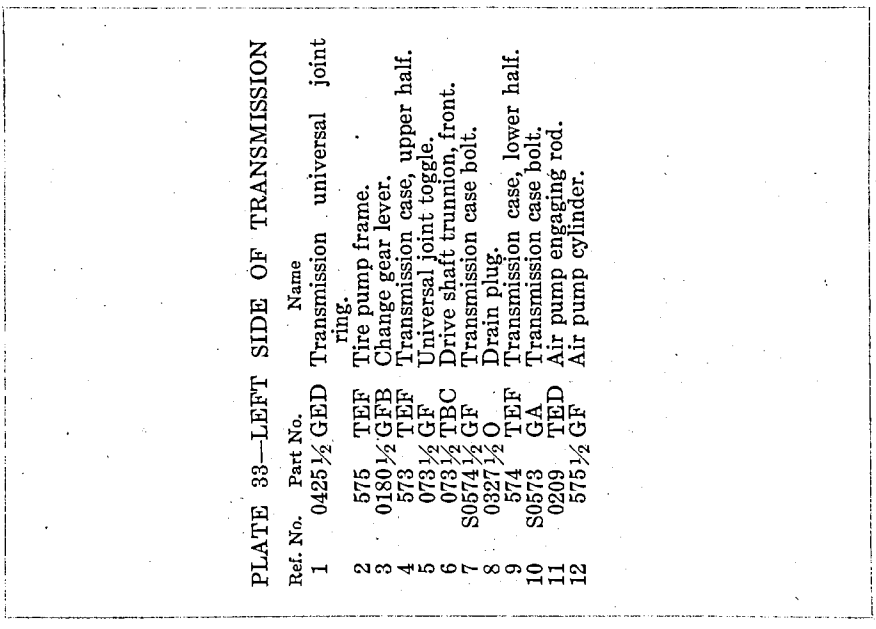


PLATE 33—LEFT SIDE OF TRANSMISSION

Ref. No.	Part No.	Name
1	0425½ GED	Transmission universal joint ring.
2	575 TEF	Tire pump frame.
3	0180½ GFB	Change gear lever.
4	573 TEF	Transmission case, upper half.
5	073½ GF	Universal joint toggle.
6	073½ TBC	Drive shaft trunnion, front.
7	S0574½ GF	Transmission case bolt.
8	0327½ O	Drain plug.
9	574 TEF	Transmission case, lower half.
10	S0573 GA	Transmission case bolt.
11	0209 TED	Air pump engaging rod.
12	575½ GF	Air pump cylinder.

stant mesh" gears. On the countershaft there are four other gears in addition to the countershaft driven or back gear. These gears vary in diameter and the number of teeth on each. The gears on the countershaft, starting from the front end, are the back gear or countershaft driven gear, the high speed, the second speed, the low speed and the reverse gear. The countershaft driven gear or back gear is pressed onto the countershaft and keyed in place. It is held against its shoulder by the front ball bearing and a castellated nut. The fourth and second speed gears are forged integral, also pressed and keyed onto the countershaft and held in place by a slotted nut. The low and reverse gears are cut integral with the countershaft.

On the main or "splined" shaft there are mounted three gears. Starting from the front end, the first of these gears is the high speed sliding gear, which is a single gear with a shifter fork collar on the rear side, by means of which it may be shifted longitudinally on the "splined" shaft. The next two gears are the second and low speed gears. Since the two gears are forged together, this pair of gears is distinguished from the high speed gear as the sliding double gear, while the high speed gear is called the sliding single gear. The sliding double gear is also provided with a gear shift collar on the rear end, by means of which the pair are moved longitudinally on the "splined" shaft. The path of power through the transmission can now be determined for the various speeds. This will be clearer if reference is made to the accompanying illustrations, which show these gears in their various relative positions.

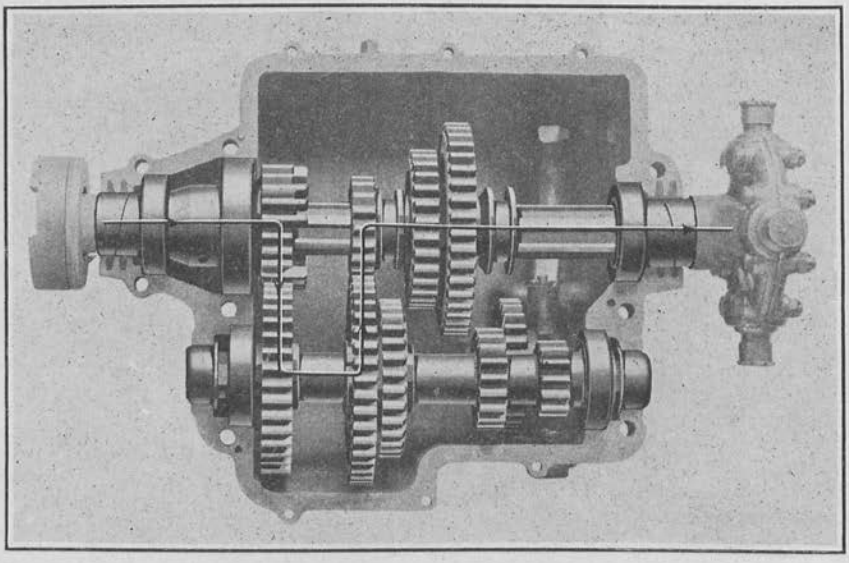


PLATE 34—TRANSMISSION GEARS IN FOURTH OR TOP SPEED

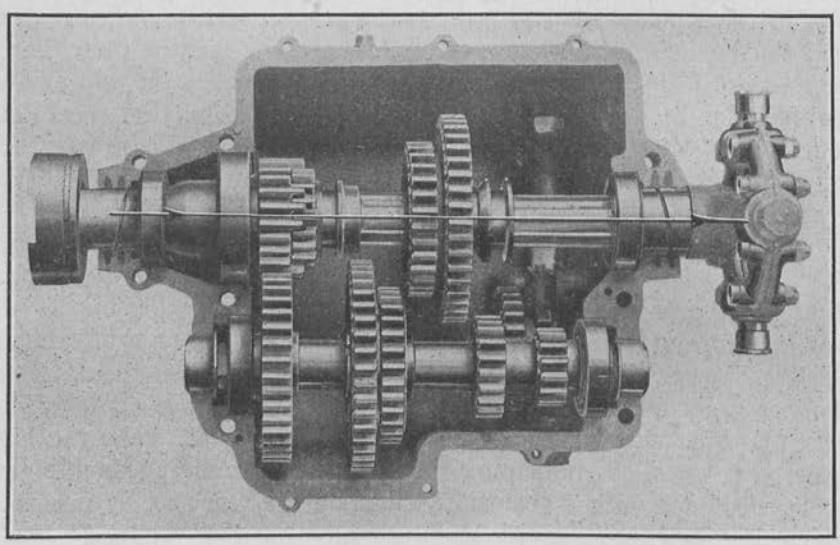


PLATE 35—TRANSMISSION GEARS IN DIRECT OR THIRD SPEED

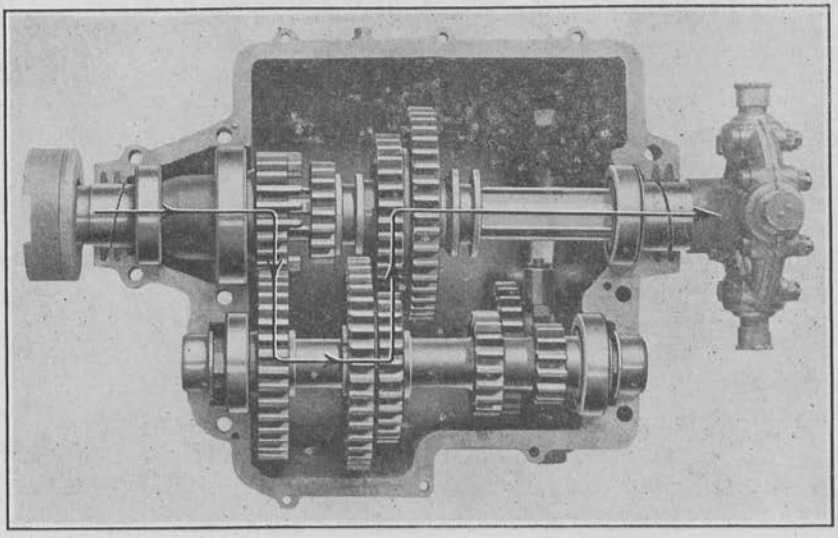


PLATE 36—TRANSMISSION GEARS IN SECOND SPEED

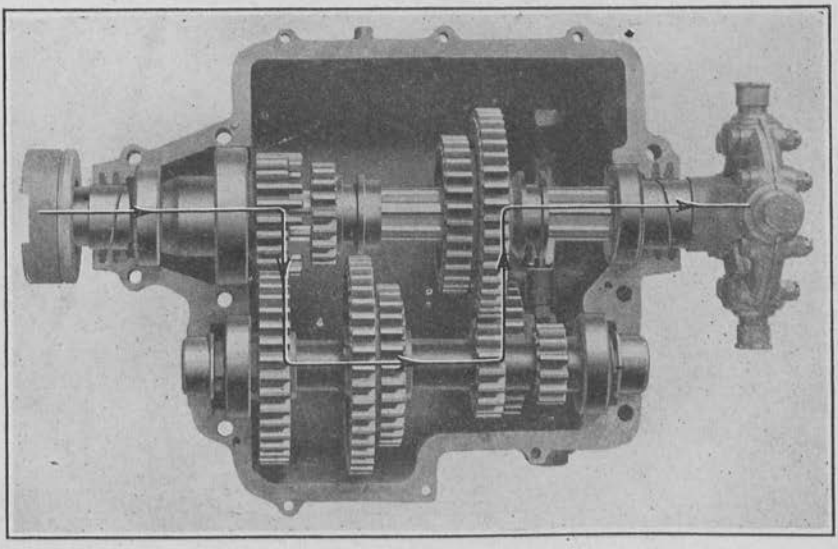
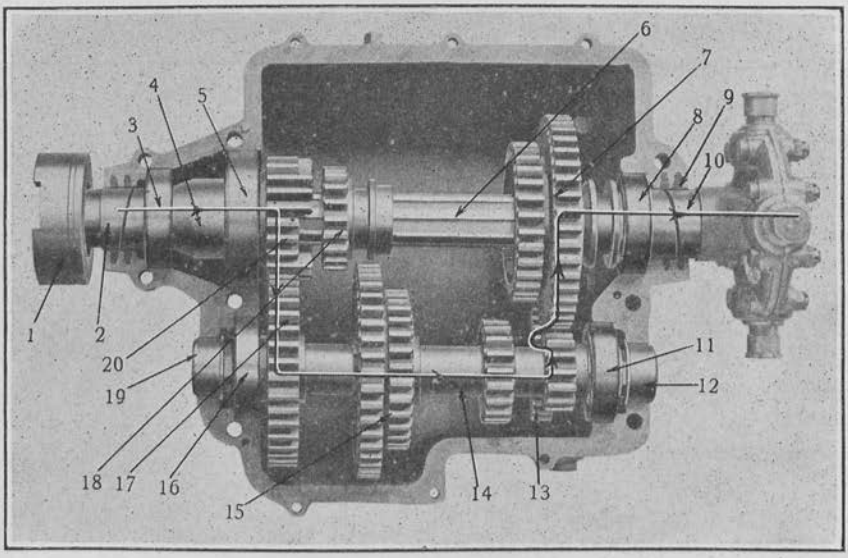


PLATE 37—TRANSMISSION GEARS IN FIRST OR LOW SPEED

PLATE 38



TRANSMISSION GEARS IN REVERSE SPEED

Ref. No.	Part No.	Name
1	0425½ GED	Transmission universal joint ring.
2	09161 GED	Transmission universal joint head.
3	308	Transmission clutch gear bearing, front.
4	960 GF	Transmission clutch gear bearing spacer.
5	310	Transmission clutch bearing, rear.
6	0901 GFB	Transmission sliding gear shaft.
7	0909 GF	Transmission sliding double gear.
8	408	Transmission sliding gear shaft bearing, rear.
9	901¼ GA	Transmission case oil retainer felts.
10	073½ GF	Universal joint toggle.
11	308	Transmission back gear shaft bearing.
12	09770½ GF	Transmission back gear shaft oil retainer cap.
13	0913 GF	Transmission reverse gear.
14	0971 GF	Transmission back gear shaft.
15	0911 GF	Transmission double back gear.
16	308	Transmission back gear shaft bearing.
17	0910 GF	Transmission back gear.
18	0908 GF	Transmission sliding gear.
19	09770½ GF	Transmission back gear shaft oil retainer cap.
20	0907 GF	Transmission clutch gear.

NUMBER OF SPEEDS

There are four forward speeds, and one reverse, provided on the White, Model TEB-O, Chassis. Of these speeds, the fourth is a stepped-up, indirect one, while the third is the direct drive. On account of the direct drive being on three speeds, it is desirable always to use this speed where possible. The stepped-up or fourth speed should be used only on level roads or down grades where a maximum speed is desired.

FOURTH OR STEPPED-UP SPEED

When the gears are engaged so as to get the fourth or stepped-up speed, the single or high speed sliding gear is pushed backward until it meshes with the fourth speed gear on the countershaft. Then the drive is through the clutch or main drive gear to the countershaft driven or back gear, through the countershaft to the fourth speed countershaft gear, thence through the high speed sliding gear to the "splined" or main drive shaft.

THIRD SPEED OR DIRECT DRIVE

On third speed, or direct drive, the single or high speed sliding gear is advanced forward of the neutral position until it engages teeth cut in the rear side of the clutch or main drive gear. When in this position it locks the "splined" shaft to the main drive gear or clutch shaft. The power is then transmitted directly from the main drive gear or clutch shaft to the "splined" shaft and to the rear wheels without going through any of the countershaft gears.

SECOND SPEED

In second speed, the sliding double gear is moved forward from the neutral position until the front gear of the pair is in mesh with the second speed gear mounted on the countershaft. The power is then transmitted from the main drive or clutch gear to the countershaft driven or back gear, through the countershaft to the second speed countershaft gear, thence through the smaller double gear to the main drive or "splined" shaft, and thence to the rear wheels.

TRANSMISSION CASE DIMENSIONS

Transmission Case, Upper Half, Material		Cast iron	
Size of Ball Bearings, front, small	Number	308	
Front, large	do	310	
Rear	do	408	
Countershaft	do	308	
Diameter of Housing for Bearing—			
Front, small	inches	3.543	($3\frac{9}{16}$)
Front, large	do	4.330	($4\frac{5}{16}$)
Rear	do	4.330	($4\frac{5}{16}$)
Countershaft	do	3.543	($3\frac{9}{16}$)
Transmission Case, Lower Half, Material		Cast iron	
Dimensions for Bearings, same as above.			

FIRST OR LOW SPEED

The double gear is moved to the rear from its neutral position in order to engage the low speed countershaft gear. When in this position the power is transmitted from the main drive or clutch gear to the countershaft driven or back gear, through the countershaft to the low speed gear, thence through the larger of the double gears to the main drive or "splined" shaft, and thence to the rear wheels.

REVERSE

The reverse is operated by means of a double shift in the gear box, although it merely means moving the gear shift lever from low speed position to reverse speed position, which is simply a movement of the lever further forward in its quadrant. To engage the reverse gear, starting from neutral, it is necessary to first pass through the low or first speed position, and, vice versa, it is necessary to go through the low speed gear when returning from reverse to the neutral position.

Starting with the double gear in the low speed position, it is moved further to the rear to engage the reverse speed. To engage this reverse speed, it is necessary not only to shift the double gear to the rear, out of mesh with the low speed gear, but also to slide the reverse idler gear, mounted upon the stationary reverse idler gear shaft, to the rear. The latter motion is accomplished by the use of a reverse shifter lever carried in the lower half of the transmission case and carried upon the reverse shifter lever shaft, which is fixed in the case. The reverse idler gear is drawn out of mesh, when the gears are returned to first speed or to neutral, by means of a spring which operates on the reverse shifter lever.

When the power is transmitted through the reverse gears, it will be from the clutch or main drive gear to the countershaft driven or back gear, through the countershaft to the countershaft reverse gear, thence through the reverse idler gear to the larger double gear. From these it is transmitted through the main drive or "splined" shaft to the rear wheels, but as the idler gear has been introduced into the system, the main drive shaft will now rotate in the opposite direction to which it does normally, and thus give the reverse speed.

GEAR RATIOS

The variation in "leverage," as it might be expressed, between the engine and the ground is designated as the gear reduction of the transmission. This is also expressed as the gear ratio, or the difference in speed, between the engine and the rear wheels. With the gears used in the White, Model TEB-O Chassis, the following gear reductions, or ratios, are obtained:

Indirect or fourth speed ..... 0.76 to 1
Third or direct drive speed ..... 1.00 to 1
Second speed ..... 1.66 to 1
Low or first speed ..... 3.05 to 1
Reverse speed ..... 4.07 to 1

With the standard rear axle reduction, the following total reductions from the engine to the wheels are obtained.

High or fourth speed ..... 3.56 to 1
Third or direct drive speed ..... 4.66 to 1
Second speed ..... 7.75 to 1
Low or first speed ..... 14.20 to 1
Reverse speed ..... 18.92 to 1

CAR SPEEDS

ENGINE SPEED
1000 Revolutions per Minute

High or fourth speed ..... Miles per hour, 30.00
Third or direct drive speed ..... do do do 22.95
Second speed ..... do do do 13.80
Low or first speed ..... do do do 7.53
Reverse speed ..... do do do 5.65

ENGINE SPEED
1500 Revolutions per Minute

High or fourth speed ..... Miles per hour, 45.00
Third or direct drive speed ..... do do do 34.50
Second speed ..... do do do 20.70
Low or first speed ..... do do do 11.30
Reverse speed ..... do do do 8.50

TRANSMISSION SHAFTS

MAIN DRIVE GEAR SHAFT

The main drive gear shaft is carried at the front end of the transmission gear box upon two ball bearings, a large and a small one. This shaft is forged integral with the main or clutch drive gear. The two ball bearings are clamped upon this shaft by a shoulder on the forward side of the main drive gear and the front universal joint head. A spacer of tubular form is placed between the two bearings to hold them at the proper distance apart when they are clamped in place. The universal joint head is drawn up on the front end of the main drive or clutch shaft by means of a castellated nut. The rear end of the main drive or clutch gear is counterbored to receive the main or "splined" shaft support bearing, which is a double row annual type of bearing.

Since the transmission case is divided along the center line of the main and countershaft, the two annular ball bearings which carry the clutch or main drive gear shaft are clamped in place by the two halves of the transmission case when it is assembled. To insure that these bearings are accurately and properly clamped in place, through bolts are placed on each side of these bearings, making four in all.

TRANSMISSION GEAR DIMENSIONS

WHITE, MODEL TEB-O, CHASSIS

Name of Gear	No. of Teeth	Diam. of Gear		Width of Gear Inches	Bore of Hub Inches
		Pitch Inches	Outside Inches		
Clutch Gear	19	95mm. 3.740 ($3\frac{3}{4}$)	4.212 ($4\frac{7}{32}$)	1.250 ($1\frac{1}{4}$)	Forged integral with shaft.
High Speed Sliding Gear	16	80mm. 3.149 ($3\frac{5}{32}$)	3.622 ($3\frac{5}{8}$)	1.250 ($1\frac{1}{4}$)	Broached to fit splined shaft.
Intermediate Sliding Gear	25	125mm. 4.921 ($4\frac{15}{16}$)	5.315 ($5\frac{5}{16}$)	1.000	Broached to fit splined shaft.
Low Sliding Gear	32	160mm. 6.299 ($6\frac{7}{32}$)	6.614 ($6\frac{5}{8}$)	1.000	Broached to fit splined shaft.
Countershaft Driven Gear	29	145mm. 5.708 ($5\frac{23}{32}$)	6.023 $6\frac{1}{32}$)	1.062 ($1\frac{1}{16}$)	1.687 ($1\frac{11}{16}$)
Countershaft High Gear	32	160mm. 6.299 ($6\frac{7}{32}$)	6.614 ($6\frac{5}{8}$)	1.000	2.062 ($2\frac{1}{16}$)
Countershaft Intermediate Gear	23	115mm. 4.527 ($4\frac{17}{32}$)	4.921 ($4\frac{15}{16}$)	1.000	2.062 ($2\frac{1}{16}$)
Countershaft Low Gear	16	80mm. 3.149 ($3\frac{5}{32}$)	3.622 ($3\frac{5}{8}$)	1.000	Integral with countershaft.
Countershaft Reverse Gear	12	60mm. 2.362 ($2\frac{11}{32}$)	2.803 ($2\frac{13}{16}$)	1.000	Integral with countershaft.
Reverse Idler Gear	20	100mm. 3.937 ($3\frac{15}{16}$)	4.330 ($4\frac{5}{16}$)	0.937 ($\frac{15}{16}$)	1.312 ($1\frac{5}{16}$)

NOTE—
All gears are 5 Module Pitch and Form. This is the French system of cutting gear teeth.

TRANSMISSION SLIDING GEAR OR "SPLINED" SHAFT

The transmission sliding gear or "splined" shaft is carried upon two ball bearings. One of these is the double row annular bearing which slips into the rear end or counterbore of the main drive or clutch gear. This bearing is held onto the front end of the main drive or "splined" shaft by a castellated nut and washer. From this bearing to the rear annular bearing the shaft is provided with six splines milled integral with the shaft. These splines drive the sliding gears but permit the movement of these gears longitudinally on the shaft. The rear ball bearing is held in place by the hub of the rear universal joint. The bearing is clamped between the shoulder at the rear end of the "splined" shaft and the hub of this universal joint. The universal joint is held in place on the rear end of the main drive shaft by a nut and driven through a square which is milled upon the rear end of the shaft.

TRANSMISSION SHAFT DIMENSIONS

Countershaft, Material		Chrome steel forging	
Diameter, ends for ball bearings	inches	1.564	(1 9/16)
At middle maximum	do	1.812	(1 13/16)
For intermediate gears	do	2.062	(2 1/16)
For countershaft driven gear	do	1.687	(1 11/16)
Intermediate gear thread	do	1.937	(1 15/16)
Number of threads	per inch	16	
Length, overall	inches	14.817	(14 13/16)
Splined or Main Drive Shaft, Material		Chrome nickel steel	
Diameter, over thread at front end	inches	0.750	(3/4)
For pilot bearing at front end	do	1.181	(1 3/16)
Over splines	do	1.937	(1 15/16)
At bottom of splines	do	1.634	(1 5/8)
For rear bearing	do	1.574	(1 9/16)
Rear end threads	do	0.875	(7/8)
Over corners of square	do	1.574	(1 9/16)
Size of square, side	do	1.251	(1 1/4)
Threads, front end	per inch	14	
Rear end	do	20	
Reverse Idler Shaft, Material		Chrome nickel steel	
Diameter, large end	inches	1.125	(1 1/8)
Gear portion of shaft	do	1.062	(1 1/16)
Threaded portion	do	0.750	(3/4)
Length, overall	do	6.562	(6 9/16)
Number of threads	per inch	14	
Reverse Shifter Shaft, Material		Steel forging	
Diameter, large end	inches	0.875	(7/8)
Reduced diameter	do	0.687	(11/16)
Threads	do	0.562	(9/16)
Length of shaft, overall	do	9.062	(9 1/16)
Number of threads	per inch	16	

SHAFT LOCATION

The shafts are located in place by anchoring the ball bearings in the transmission case. The main drive or "splined" shaft is anchored in place by flanged collar or thrust ring, which drops into a notch cut in the upper and lower halves of the transmission case. The outer race of the rear bearing, therefore, butts up against a shoulder on the case on its rear side and against this thrust or clamp on its front side.

The main or clutch drive gear shaft is held in place by locking the smaller or front annular ball bearing in the transmission case by a similar but smaller thrust ring than is used for the rear bearing.

COUNTERSHAFT

There are three gears attached to the countershaft and two cut integral with it. The countershaft reverse and low speed pinions are the ones which are cut integral with it. The fourth and second speed gears, which are an integral forging, are pressed onto the largest diameter of the countershaft, keyed in place with a Woodruff key and locked in position with a slotted ring nut. At the front end of the shaft, on a s'ightly smaller diameter, the countershaft driven or back gear is pressed onto the shaft and prevented from rotating with a Woodruff key. It is prevented from working off the front end of the shaft by the front ball bearing, which is pressed up against it, and a castellated nut and washer behind the latter. At the rear end of the countershaft a similar ball bearing is provided and held in place on the shaft in the same manner.

REVERSE GEAR SHAFT

The reverse gear shaft is carried in the bottom of the transmission case just above the reverse shifter lever shaft and directly beneath the countershaft. It is held in place by a castellated nut and washer.

REVERSE SHIFTER LEVER SHAFT

The reverse shifter lever shaft is one which is held in the lower half of the transmission case by means of a castellated nut and washers and is at right angles to the shafts of the transmission. It carries the reverse shifter lever, by means of which the reverse gear is shifted into engagement when this speed is required.

GEAR SHIFT LEVER MECHANISM

The gear shift lever and its mechanism is distinctly different from anything which is generally used on other motor vehicle equipment and, therefore, should be carefully studied. The gear shift lever is independent of the shift mechanism so far as the direct shifting of the gears is concerned. It is merely the medium whereby the proper shifting mechanism may be picked up and operated. It is provided with a pivot at the bottom, which allows it to be removed laterally, and is carried upon a shaft which is free to rotate. At the upper end of the gear shift lever there is a button by means of which the transmission latch or gear lever dog is raised when the button is depressed. This latch or dog locks the gear lever in whatever speed it may be engaged or keeps it in neutral when the lever is in that position. This is the only means of locking the gears in mesh.

There are two gears which have to be shifted, the high or fourth speed and direct drive gear, which is also designated as the sliding single gear, and the two low and reverse gears, which are designated as the sliding double gear. These two sets of gears are operated by shifter forks which are interconnected through a train of levers inside of the gear box and terminate in two engaging levers, as they are called, which are outside of the gear case and directly under the gear shift lever quadrant. Moving the lever laterally, either to the left or to the right, on its pivot, connects it to either one or the other of these two engaging levers. If the gearshift lever is then pushed forward or pulled backward, it moves the engaging lever, which it has picked up, in the same direction. Hence, it transmits this motion through the train of levers to the proper shifter fork inside of the transmission case and moves the corresponding gear in the direction desired by the driver.

To prevent accidentally engaging the other set of gears which are in neutral, while one set of gears is being shifted, a latch or interlock is provided. The interlock is in the form of a T-shaped piece carried on a pivot, located at the bottom of the T, and on the gear shift quadrant, the axis of which is at right angles to that of the gear shift lever shafts. This latch is provided with suitable slots and connected with the gear shift lever so that it will always pick up the engaging lever which is left in neutral while the other is being shifted, and thereby positively prevents any motion of the gear that is in neutral.

LUBRICATION OF TRANSMISSION

The transmission is provided with a filler plug located in the top of the gear shift lever shaft cap. The transmission lubricant can be introduced at this point. On the right hand side of the transmission case, just below the parting line of the upper and lower halves, is an iron pipe plug which should be withdrawn whenever the transmission case is replenished with lubricant. This plug fixes the minimum level at which the oil should be carried in the case. Felt washers are provided at both front and rear ends of the transmission case to prevent leakage of this oil out around the shafts. If the level of oil is carried too high there will be excessive oil leakage.

The transmission case should be drained of lubricant and thoroughly washed out with kerosene, not gasoline, at the end of the first five hundred to one thousand miles of operation, in order to remove any small particles of metal or chips which may have worn off during the first period of operation. Thereafter, the case should be drained out, cleaned with kerosene and replenished with clean oil every fifteen hundred or two thousand miles. In the meantime, the oil supply should be kept up to the proper oil level as prescribed under "Maintenance Routine" on pages 31 and 37.

REPAIR OF TRANSMISSION

The transmission is a unit in itself and may be removed for repair without disturbing any of the other elements of the chassis. To remove the transmission it is necessary to disconnect the rear universal joint as well as the front one. The clutch coupling, which is held in place with two through bolts, should first be disconnected, and then the four bolts which hold the universal coupling to the front end of the transmission removed. As the transmission is held in place on the frame at three points, there will be little difficulty in disconnecting it.

If an examination of the transmission only is required, this can be readily done by draining the transmission case, cleaning it out with kerosene and then inspecting it through the large opening provided in the top by the removal of the cover plate, which carries the entire mechanical tire pump. The cover plate is held in place with six wing nuts so that it is not difficult to remove this in order to examine the transmission.

REMOVING TRANSMISSION, LOWER HALF

It may be convenient at times to leave the upper half of the transmission case in the frame and merely remove the lower half of the transmission. This is quite frequently the case when it is desired to repair stripped or broken gear or perhaps a worn ball bearing. To do this, proceed as before, by removing the universal joints at both ends of the transmission. Then carefully block up the lower half in place, proceed to remove all the bolts which hold the lower to the upper half. Remove the inspection cover plate with the tire pump from the top of the case, so as to see what you are doing, and then carefully lower the bottom half of the transmission, making sure that all of the transmission gears, shafts and bearings are carried down with the lower half. If there is any tendency for them to stick in the upper half, gently tap them down with the handle of a hammer. Never use the steel end of the hammer on any of the parts inside of the transmission.

PROPELLER SHAFT AND UNIVERSAL JOINTS

LOCATION

The propeller shaft and universal joints are located, and transmit the power, between the transmission gear shift box and the rear axle. There are two joints, one located at each end of the tubular propeller shaft.

FUNCTION OF UNIVERSAL JOINTS

Universal joints are necessary in power transmitting shafts to permit relative motion between the two units interconnected. Thus, an axle moves up and down, due to inequalities of the road, altering its up

and down position relative to the transmission. If a propeller shaft were rigidly connected to both transmission and axle, it would bend or break with the movement of the axle. The universal joints allow the propeller shaft to move up and down, or sideways if necessary (universal movement, or movement in any direction) without throwing any strain upon or disaligning the shafts in either the transmission gear box or the rear axle.

PROPELLER SHAFT

The propeller shaft extends from the transmission to the rear axle. This shaft is tubular between the universal joints. At the rear end of the shaft, a solid square end is brazed onto the tube. At the front end the tube is brazed into the front drive shaft trunnion. A long drive shaft, like the one used on this chassis, is prevented from whipping by the employment of a large tubular shaft. By using tubular construction, the shaft may be made stiff enough without increasing the weight.

CONSTRUCTION OF UNIVERSAL JOINTS

The two main universal joints are similar in construction and are both located between the transmission gear box and the rear axle, while one universal joint is used on the White, Model TEB-O, Chassis between the clutch and the transmission gear box. The latter will be described in detail after considering the construction of the two main universal joints at the rear of the transmission. Each universal joint is made up with two trunnions, which are assembled so that their axes are at right angles. They are held together by the two halves of the universal joint ring, which are bolted together. The trunnion end of each of these universal joints is exactly the same, but the portion of each trunnion which is attached to the shafts differs on all four units. The drive of the transmission gear shaft trunnion which is attached to the rear end of the transmission main drive or "splined" shaft, has a square hole broached in it to take the drive from that shaft. The drive shaft trunnion which is attached to the front end of the tubular propeller shaft is also different because of this mounting. The front trunnion of the rear universal joint has a latch extension and is broached out square so as to take the square rear end of the propeller shaft. The fourth or rear drive shaft trunnion is attached to the rear axle bevel pinion shaft by means of a tapered square and slotted nut. Each of these four trunnions is, therefore, not interchangeable, on account of their distinctive difference, and can readily be distinguished or designated when making replacements. A capped bushing is fitted over each of the trunnions so that no wear comes upon the rings and so that wear may be taken up readily after the universal joints have been in service for a considerable period of time.

The squared rear end of the propeller shaft, which fits into the square hole in the forward rear universal joint trunnion, is provided to allow for variations in the length of the propeller shaft, due to movement of the springs.

PROPELLER SHAFT DIMENSIONS

Propeller Shaft Tube, Material			Steel
Diameter, center, maximum	inches	2.250	(2 1/4)
Ends	do	2.250	(2 1/4)
Length, of shaft	do	51.000	
Of tube	do	42.500	(42 1/2)
Thickness of tube wall	do	0.156	(5/32)
Size of Square End, Diameter	do	2.250	(2 1/4)
Side	do	1.750	(1 3/4)

UNIVERSAL JOINT LUBRICATION

The universal joints are well lubricated with grease, provided the ten grease cups on this assembly are regularly filled and screwed down. A separate grease cup is provided on all four of the trunnion bushings and two grease cups, in addition, provided to lubricate the square sliding portion on the rear end of the propeller shaft. Both universal joints and the slip joint on the rear end of the propeller shaft are completely enclosed with flexible leather boots that are laced in place and fitted to their particular joints. These keep the dirt and mud out of the working parts of the universal joints and retain the grease that works out of the bushings. The grease cups protrude through the boots so there should be absolutely no reason for their not being filled weekly and turned up daily when the car is in regular service.

UNIVERSAL JOINT DIMENSIONS

Trunnions, Material			Nickel steel forging
Width of trunnions, overall	inches	6.000	
Length of individual trunnion	do	1.250	(1 1/4)
Diameter of individual trunnion	do	1.125	(1 1/8)
Universal Joint Bushings, Material			Hardened steel
Diameter, outside	inches	1.375	(1 3/8)
Outside flange	do	1.687	(1 11/16)
Inside	do	1.125	(1 1/8)
Length, overall	do	1.625	(1 5/8)
Thickness of flange	do	0.125	(1/8)

DISASSEMBLING UNIVERSAL JOINTS

Each universal joint is held together by the two halves of the universal joint ring. When disassembling the universal joint, it is only necessary to remove the leather boots that cover them and take out the eight bolts, which hold the two halves of the universal joint ring together. The universal joint is then completely disassembled. In removing the rear axle, it is unnecessary to disconnect any of the universal joints, as the squared rear end of the propeller shaft will readily slip out of the rear universal joint trunnion.

MECHANICAL TIRE PUMP

TIRE PUMP ASSEMBLY

The mechanical tire pump is carried on the cover plate of the transmission gear box. To this cover plate is attached the tire pump cylinder and the two bearings which carry the tire air pump crankshaft and driving gear. The air pump gear is shifted into or out of mesh by means of a handle which projects through the left side member of the frame, adjacent to the air line oil trap which is bolted on the outside of the left side rail of the frame. A pipe line connects the air line oil trap mounted on the frame with the discharge outlet of the air pump cylinder. A small door in the running board shield on the left-hand side of the shaft and just ahead of the battery box gives access to both the air line oil trap and the air pump engaging rod or handle. The tire pump tube may be attached to this air line oil trap when it is desired to inflate the tires. The air line is carried in the tool box.

TIRE PUMP DIMENSIONS

Driving Gear, Material		Steel forging	
Diameter, outside	(mm 100) inches	3.937	($3\frac{15}{16}$)
Pitch	(mm 90) do	3.545	($3\frac{35}{64}$)
Hub	do	1.250	($1\frac{1}{4}$)
Width, face of Gear	do	0.625	($\frac{5}{8}$)
Overall	do	1.687	($1\frac{11}{16}$)
Bore, square	do	0.625	($\frac{5}{8}$)
Pitch	French Module System	5	
Number of teeth	do	18	
Cylinder, Material		Cast iron	
Bore	inches	1.750	($1\frac{3}{4}$)
Crankshaft, Material		Nickel steel	
Stroke	inches	2.000	
Diameter, Shaft	do	0.625	($\frac{5}{8}$)
Crank pin	do	0.625	($\frac{5}{8}$)
Connecting Rod, Material		Malleable iron	
Length	inches	2.312	($2\frac{5}{16}$)
Diameter Crank Pin Bore	do	0.750	($\frac{3}{4}$)
Piston pin bore	do	0.427	($\frac{7}{16}$)
Piston, Material		Cast iron	
Length	inches	1.500	($1\frac{1}{2}$)
Diameter	do	1.750	($1\frac{3}{4}$)
Piston Rings, Material		Cast iron	
Number required		two	
Width	inches	0.187	($\frac{3}{16}$)

TIRE PUMP CONSTRUCTION

The tire pump is a small cast-iron cylinder attached to the transmission gear box cover plate by means of a flange and two cap screws. The transmission cover plate is held in place on top of the transmission gear box with six wing nuts. The air pump drive shaft is supported on the under side of the transmission gear box cover plate by means of two bearings, each of which is held in place by a couple of screws.

AIR PUMP CYLINDER

The air pump cylinder is provided with two valves, an inlet and an outlet. The opening to the inlet valve is covered with a screen to keep dirt from being drawn into the cylinder. Over the outlet, or check valve, in the air cylinder, there is a small port plug or cap, through which this valve may be withdrawn when necessary for its examination or regrinding.

AIR PUMP DRIVE SHAFT

The air pump drive shaft is provided with a small crank at one end, to which the connecting rod of the air pump is attached. This is the outboard end. Between the two bearings, the shaft is squared to carry the air pump drive gear. The latter is provided with a gear shift collar, so that it may be engaged with one of the transmission gears or disengaged by merely rotating the air pump engaging rod, which, as mentioned above, projects outside of the left frame side rail where it can be conveniently reached.

AIR PUMP PISTON AND ROD

The air pump piston is provided with two compression rings. The upper end of the connecting rod is pinned to the piston pin so that the latter rotates inside of the piston bosses. The connecting rod is bushed at its lower end, where it fastens on the crank pin of the drive shaft. The connecting rod is held in place by a washer and a split pin.

AIR LINE OIL TRAP

On the outside of the frame there is a very simple casting provided, which acts as an oil trap or separator for the air delivered by the pump. It is essential that this be drained every time before tires are inflated so as to remove any accumulation of oil which may have been left in the oil trap from previous operation. It should also be drained as soon as the tires have been inflated. The first instruction is given because one never knows what the previous operator may have done and it is very detrimental to tires to get any oil into them.

CHAPTER VI

AXLE AND WHEEL ASSEMBLIES

CHAPTER CONTENTS

FRONT AXLE
REAR AXLE
BRAKES
TORSION RODS
WHEELS

AXLE ASSEMBLIES

The axle assemblies on the White, Model TEB-O, Chassis consist of an I-beam front axle, which is used solely for steering and supporting the front end of the chassis; a rear axle of the built up semi-floating type, which carries the propelling mechanism of the car and supports the rear end of the chassis; the brakes, both of which are carried upon the rear axle and operate inside and outside of the brake drums attached to each rear wheel; the torsion rods, which not only preserve the proper alignment between the rear axle and the frame, but also take the thrust of the drive; and the front and rear wheels.

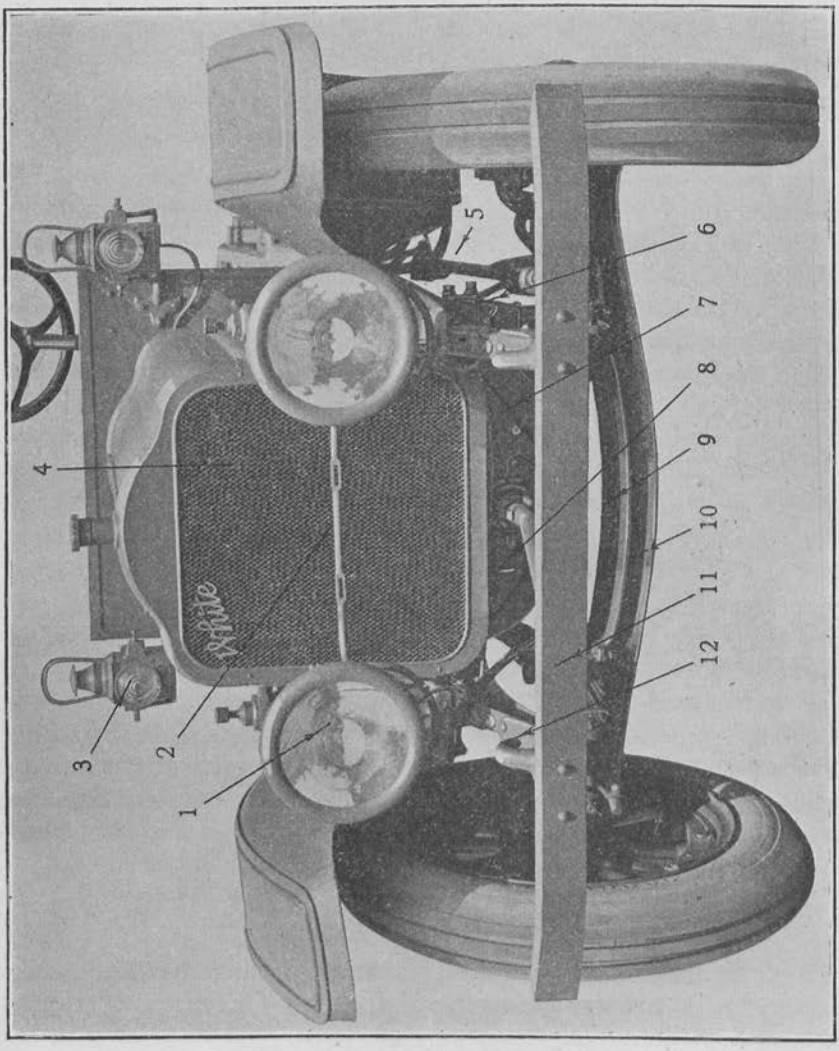
FRONT AXLE

The function of the front axle is to steer and support the front end of the car. It is provided with what are called steering knuckles, each of which carries one of the front wheels and is interconnected with the knuckle on the other side so that, when one of the wheels is turned, the other one turns in the corresponding direction. The rod which connects the two wheels is called the tie rod or long steering rod. This rod is interconnected with the steering knuckles by means of the steering arms, one arm being attached to each of the steering knuckles. The left-hand steering knuckle has a double arm, the upper one of these two arms being connected to the drag link which transmits the motion from the steering gear to the front axle.

FRONT AXLE DESIGN

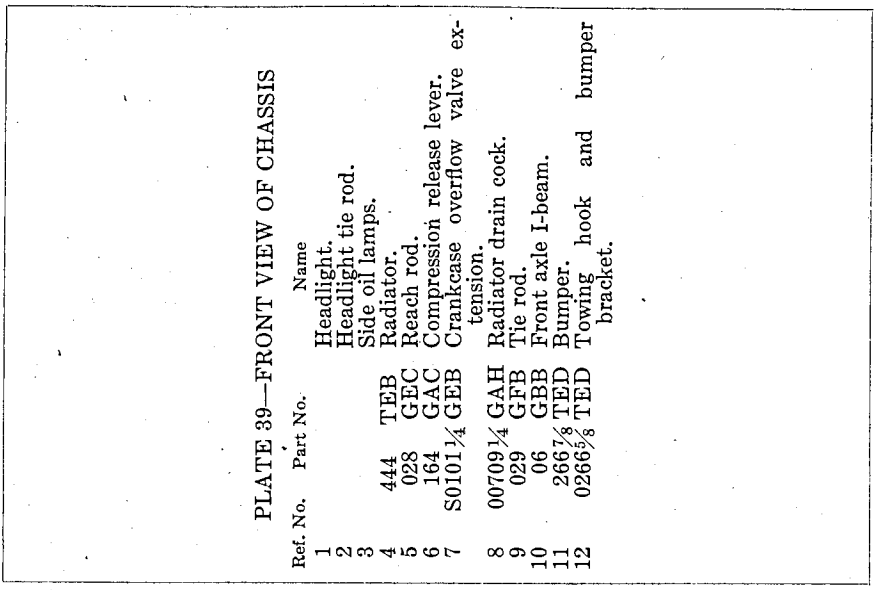
The front axle, or bed, is a single pieced drop forging, the outer ends of which are forked to carry the steering knuckles. This design of steering knuckle is called the Elliot type. Pads are forged integral with the upper flange of the I-beam section front axle, upon which the springs rest and which provide means for attaching the springs to the axle bed. Both the upper and the lower ends of the axle bed forks are bored and threaded to carry the steering knuckle. Steps are provided on the axle bed so as to limit the turning radius of the car. This is done to prevent the tires from rubbing against the fenders, frame or some other part and therefore being injured or unduly worn. With the large tires used on

PLATE 39



FRONT VIEW OF CHASSIS

PLATE 39—FRONT VIEW OF CHASSIS



Ref. No.	Part No.	Name
1		Headlight.
2		Headlight tie rod.
3		Side oil lamps.
4	444 TEB	Radiator.
5	028 GEC	Reach rod.
6	164 GAC	Compression release lever.
7	S0101¼ GEB	Crankcase overflow valve extension.
8	00709¼ GAH	Radiator drain cock.
9	029 GFB	Tie rod.
10	06 GBB	Front axle I-beam.
11	2667⁄8 TED	Bumper.
12	0266⁵⁄8 TED	Towing hook and bumper bracket.

the White, Model TEB-O, Chassis, it is impossible to get the same turning radius in both directions and the stops on the axle are provided so as to limit the turning radius to the proper amount on each side.

FRONT AXLE DIMENSIONS

Front Axle, Material		Steel drop forging	
Type			I-beam
Center to center steering knuckles	inches	50.625	(50⅝)
Center to center spring seats	do	27.250	(27¼)
Top of steering arm to top of spring seat	do	4.000	
Center of wheel to top of spring seat	do	2.500	(2½)
Center of wheel to top of axle at middle	do	5.000	
Section of I-beam, height	do	2.500	(2½)
Width	do	1.750	(1¾)
Thickness	do	0.375	(⅜)
Yoke, type			Elliott
Diameter thread, at top	inches	1.125	(1⅛)
At bottom	do	1.750	(1¾)
Pitch of thread, at top	per inch	11	
At bottom	do	14	
Steering Spindle, Material		Steel drop forging	
Height, overall	inches	8.250	(8¼)
Diameter, stem, at top	do	0.922	(59⁄64)
At bottom	do	0.875	(⅞)
Inner wheel bearing seat	do	1.771	(1¾)
Outer wheel bearing seat	do	1.181	(1 3⁄16)
Thread on end of spindle	do	0.875	(⅞)
Number of threads	per inch	13	
Length of spindle	do	7.062	(7 1⁄16)
Front Axle Tie Rod, Material		Steel drop forging	
Length, overall	inches	43.250	(43¼)
Center to center of yokes	do	46.875	(46⅞)
Drop at center below center line through ends	do	2.000	
Section of I-beam, height	do	1.500	(1½)
Width	do	0.875	(⅞)
Thickness	do	0.187	(3⁄16)
Diameter of threaded ends	do	1.000	
Number of threads	per inch	14	

STEERING KNUCKLE CONSTRUCTION

The steering knuckle construction used on the White, Model TEB-O, Chassis is designed different from the conventional and for that reason should be carefully noted. The steering knuckle and steering spindle are forged integral. The steering knuckle and spindle are not only integral but are solid, as there is no king pin or steering knuckle pin used in the White front axle. The steering arms are attached to the steering knuckles by means of keys and nuts. The steering knuckles are not interchangeable, there being a left-hand and right-hand one. This is due to the inclination of the front wheel spindle, which is not at right angles to the axis of the steering knuckle. This inclination of the wheel spindle is provided in order to bring the center of the tire, or the point of contact between the tire and the ground, as nearly beneath the axis of the steering knuckle as possible.

The steering knuckle is held in the yoke end of the front axle bed by a ball thrust bearing at the top and by a bushing at the lower end, which is screwed in and which surrounds the lower spindle or trunnion, the latter being machined on the lower end of the steering knuckle. The entire weight of the chassis is carried upon the ball thrust bearing at the top of the steering knuckle. On account of this bearing, the steering action of this heavy chassis is almost as sensitive as that of a light passenger car. The ball thrust bearing is carefully protected from dust and mud by a metal cap pressed into the form of a ferrule, which is inserted between the lower ball thrust bearing race and the steering knuckle, and surrounds the former. Any up and down play in this bearing is quickly taken up by adjusting the lower bushing, which is screwed into the lower portion of the front axle yoke. Grease cups are provided both at the top and the bottom of the steering knuckle, the former being located in the upper portion of the front axle yoke and the latter in the bottom of the lower front axle bushing.

STEERING KNUCKLE ARMS

There are two types of steering knuckle arms used, one of which is located on the left-hand side of the chassis and has two parts, the upper part connecting with the drag link and the lower part with the tie rod. The right-hand steering knuckle has but a single arm, which connects with the tie rod. The arm which connects with the drag link of the steering gear has a ball connection attached to the upper side of its outer end. It is held in place by means of a castellated nut and a split pin. The arms, which attach to the cross tie rod, are provided with bushings and the tie rod yoke pins rotate in these bushings.

TIE ROD AND YOKES

The tie rod is a drop forging, threaded at both ends and located back of the front axle, where it is fully protected. It is dropped at the

center to provide clearance under the front end of the motor. Drop-forged yokes are screwed onto either end of it. The threaded portion of each yoke is split on one side and a clamp or binding bolt is provided to prevent any looseness or movement of the yoke where it is threaded onto the rod. The tie rod yoke pins are machined with a large head, one side of which is milled off so as to prevent rotation with respect to the yoke. Grease cups are machined integral with the head, and force the grease through the center of the bolt to an annular groove, which delivers it to the center of the bushing that is pressed into the end of the steering knuckle arm. The tie rod yoke bolts are held in place by a castellated nut and split pin located on the bottom of the yoke pin

FRONT WHEEL HUB

The front axle hub is made up in two pieces, the front wheel hub proper and the front wheel hub flange. The latter has a cylindrical extension instead of being a plain disc type flange. Into this extension the front wheel hub proper is pressed for a considerable distance and in it also both the front wheel outer annular ball bearing and the hub cap are carried. Threads are provided on the inside of it to hold the hub cap in place. The larger or inner annular ball bearing is carried in the large counterbore of the front wheel hub proper. The outer race of the larger front wheel bearing is clamped in place by the bearing retainer. The latter is provided with a felt washer at the inside, where it is adjacent to the front wheel spindle, so as to retain lubricant as well as possible. The inner races of both front wheel bearings are clamped onto the front wheel spindle by means of a washer and castellated nut. A cone shaped tubular spacer is inserted between the inner race of the larger and smaller bearings, so as to hold them at the proper distance apart when they are clamped in place. Ten front wheel hub bolts are provided to clamp the two parts of the front wheel hub together and hold the spokes tightly in place.

FRONT WHEEL BEARINGS

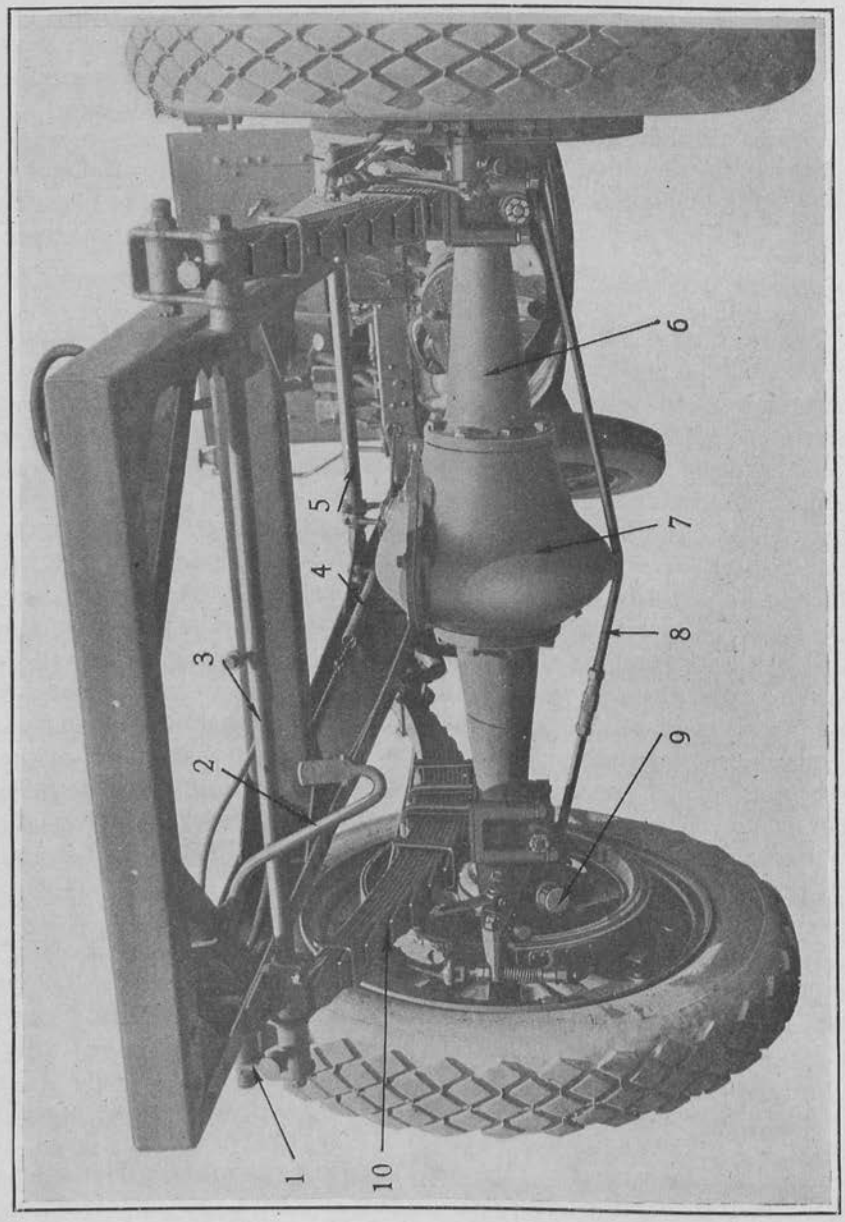
Annular Ball Bearings—	
Inner	Number 309
Outer	do 306

REAR AXLE

REAR AXLE ASSEMBLY

The rear axle assembly consists of the following units: The differential housing, which is closed on top by a small cover or inspection plate; the right and left rear axle sleeves, which are bolted to each side of the differential housing and upon which the rear springs rest; the bevel driving gears, their bearings and the differential; the rear axle shafts, wheel hubs and brake drums, and the brakes.

PLATE 40



REAR VIEW OF CHASSIS

PLATE 40—REAR VIEW OF CHASSIS

Ref. No.	Part No.	Name
1	046 GBC	Rear spring rear shackle.
2	271 GTB	Tail lamp bracket.
3	044½ GBE	Rear spring hanger rod.
4	098¼ GAE	Foot brake tension spring.
5		Brake equalizer shaft.
6	047 GF	Axle sleeve, right.
7	54 GB	Axle gear case.
8	056½ GEC	Axle truss rod.
9		Rear wheel bearing grease cup.
10	034 GBX	Rear spring.

REAR AXLE HOUSING

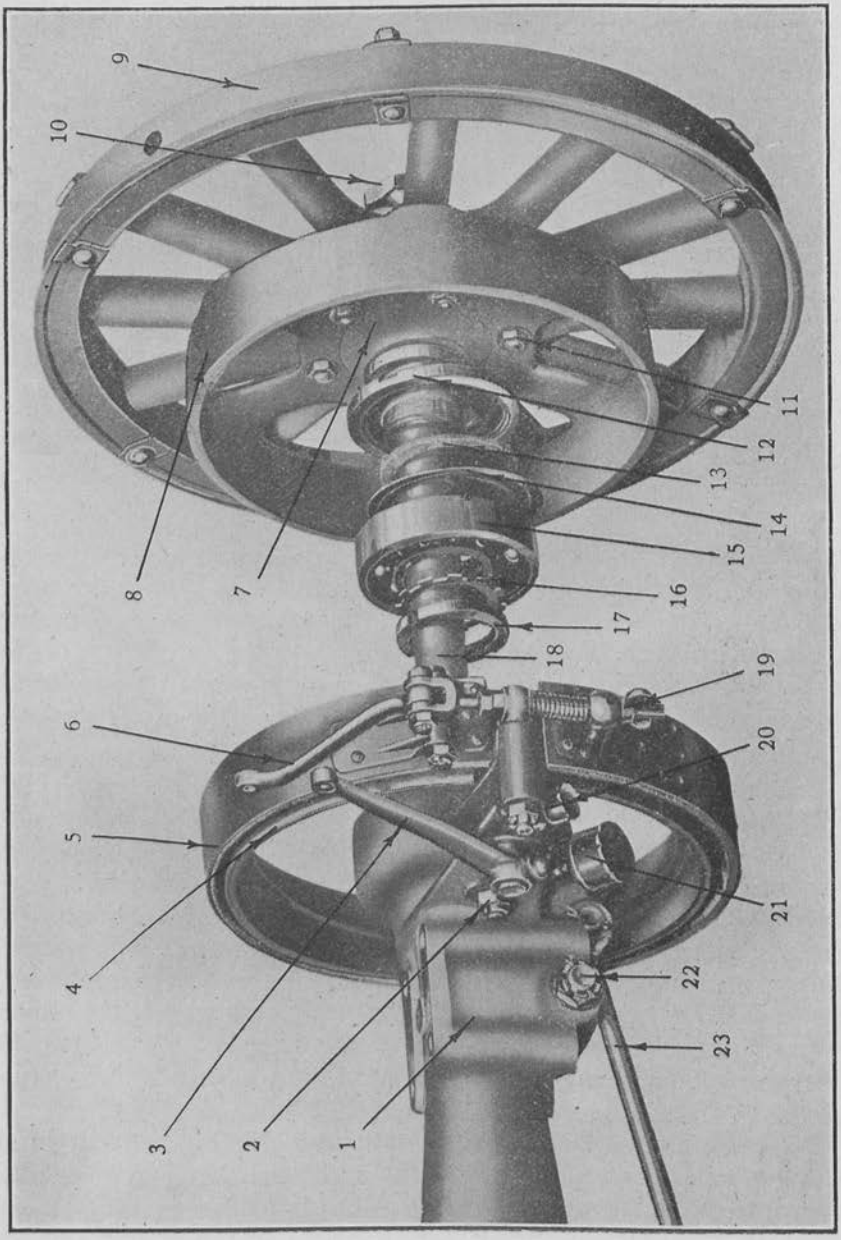
As mentioned above, the rear axle housing is made up of three steel castings. The center one houses the differential and the drive bevel gears, while the two outside portions, or sleeves, as they are called, not only are attached to the rear springs and carry the full weight of the car, but are also provided with suitable arms which act as the brake supports and take the entire braking torque when the car is stopped.

DIFFERENTIAL HOUSING

The differential housing or rear axle case is provided with proper bearing supports at each side for the differential bearings. Provision is also made for supporting the two bevel drive pinion, bearings. The differential bearings are held in place by means of threaded lock washers or collars screwed into the case from each side. The inner ball bearing, which supports the rear end of the rear axle bevel drive pinion shaft, merely slips into its housing, while the outer rear axle bevel pinion bearing is clamped between a shoulder in the differential housing and a cover which clamps the bearing in place and also acts as a bearing cap and retainer for the bevel drive pinion shaft.

The rear axle sleeves are bolted onto each side of the differential housing or rear axle gear case. At the outer end they carry the rear wheel or outer ball bearing. This ball bearing takes practically the entire load of the chassis. Each rear bearing is held in place by means of two hooked bolts which bear against a rear axle bearing clamp ring. This clamps the bearing in place in the rear axle sleeve. As all these hook bolts project out under the adjacent rear spring and are readily

PLATE 41



DETAILS OF REAR WHEEL AND AXLE END

PLATE 41—DETAILS OF REAR WHEEL AND AXLE END

Ref. No.	Part No.	Name
1	047 GF	Rear axle sleeve, right.
2	049½ GEC	Rear axle bearing retainer hook bolt.
3	076 O	Hand brake ring wing.
4	75½ GC	Hand brake ring.
5	075 GF	Foot brake band.
6	040 GB	Foot brake band lever.
7	087 TED	Rear wheel hub, right.
8	087½ TED	Rear wheel brake drum.
9	87 TEB-O	Rear wheel with felloe.
10	0086½ GB	Rear wheel hub cap.
11	0.5" x 3.25"	Rear wheel hub bolt.
12	048 GB	Rear axle outer bearing retainer plate.
13	048¼ GB	Rear axle outer bearing felt washer.
14	048½ GB	Rear axle outer bearing retainer.
15	313	Rear axle sleeve outer bearing.
16	087¼ M	Rear axle hub bearing lock washer.
17	S087 M	Rear axle hub bearing lock nut, right.
18	061 GB	Rear axle spindle.
19	094¾ TDC	Foot brake band adjusting wing nut.
20		Hand brake shaft grease cup.
21		Rear axle sleeve outer bearing grease cup.
22	030¾ GEC	Torsion rod ball bracket.
23	056½ GEC	Rear axle truss rod end, right.

accessible, it is not a difficult operation to take off one of the rear wheels, together with the rear axle drive shaft.

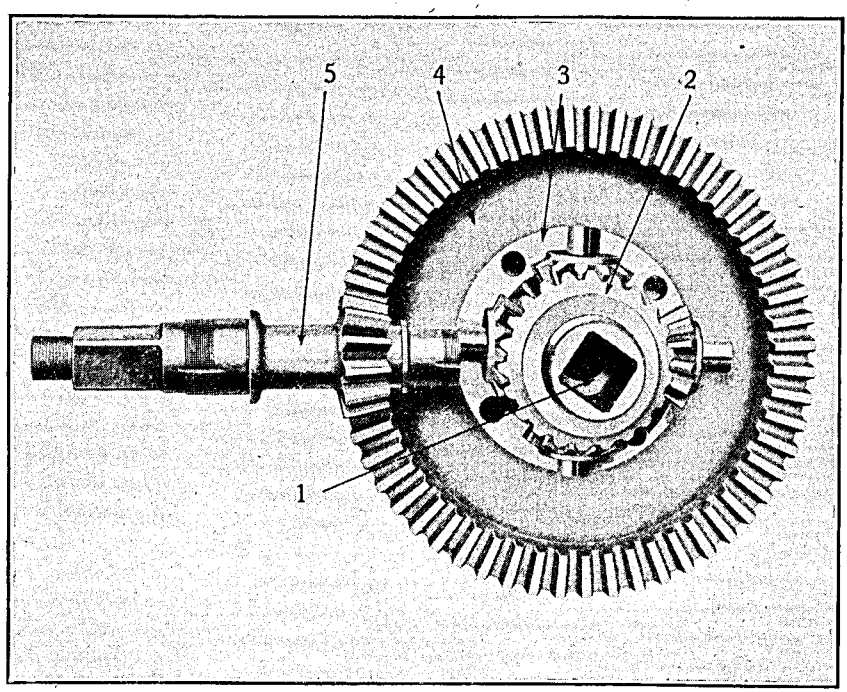
DIFFERENTIAL MOUNTING

The differential is made up in two halves, between which the four differential pinions and the two differential compensating bevel gears are enclosed. Bushings are placed between the hubs of the compensating gear and the differential housing. In addition, thrust washers are placed behind each of these compensating gears to permit adjustment and compensation after the differential has been in service for a considerable period of time. The compensating gears have a square hole broached through the end hub, into which the square inside ends of the rear axle drive shafts fit. The rear axle differential spider has four trunnions, upon which each of the differential bevel pinions rotate. It is centrally located in the differential case by small cylindrical projections machined integral with the inside end of each of the rear axle drive shafts.

REAR AXLE BEVEL GEARS

There are two rear axle bevel gears, the rear axle bevel drive pinion, which is the smaller one, and the rear axle bevel driven or ring gear. The smaller is forged integral with its shaft, to the forward end of which the rear trunnion of the propeller shaft and universal joint assembly is attached. The bevel ring gear is attached to the differential housing by eight bolts and castellated nuts. No adjustment is provided for the bevel drive pinion save what can be obtained by placing shim

PLATE 42



BEVEL GEAR, DRIVE PINION AND SHAFT

Ref. No.	Part No.	Name
1	060½ GB	Differential spider.
2	060 GB	Differential compensating gear.
3	057 GBB	Differential case, left half.
4	055¾ GBD	Rear axle drive gear.
5	066¾ GBD	Rear axle pinion.

washers between the outer bevel pinion ball bearing and the differential housing. As these axles are machined, there is small necessity of this change being made.

The differential housing is so machined on either end that it fits into the annular ball bearings provided on either side for the purpose of supporting it in the differential housing. These bearings are slipped into place and the proper mesh of the bevel ring gear with the bevel pinion obtained by rotating the adjusting rings or nuts provided on the outside of each of these ball bearings. Locking rings are provided to prevent these adjusting nuts from rotating when the mesh of the bevel gears is properly adjusted. When the rear axle sleeves are in place, these locking rings cannot get out and the adjustment of the bevel gear mesh can only be changed by wear. All of the adjustment of the

REAR AXLE GEAR DIMENSIONS

WHITE, MODEL TEB-O, CHASSIS

Name of Gear	No. of Teeth	Diam. of Gear		Face of Gear, Inches	Bore, Inches
		Pitch Inches	Outside Inches		
Bevel Drive Pinion....	12	2.742 (2¾)	3.280 (3 $\frac{9}{32}$)		Forged integral with drive pinion shaft.
Bevel Driven Gear...	56	12.80 (12 4/5)	12.876 (12⅞)	1.187 (1 $\frac{3}{16}$)	4.375 (4⅜)
Differential Pinions...	12	2.40 (2 2/5)	2.75 (2¾)	1.000	0.876 (⅞)
Compensating Gears..	22	4.40 (4 4/5)	4.592 (4 $\frac{9}{16}$)	1.000	1.500 Square (1½)

NOTE—
Pitch used on bevel drive gears, 4.375 (4⅜) diametral.
Pitch used on differential gears, 5 diametral.
Pressure angle, 14.5 (14½) degrees.

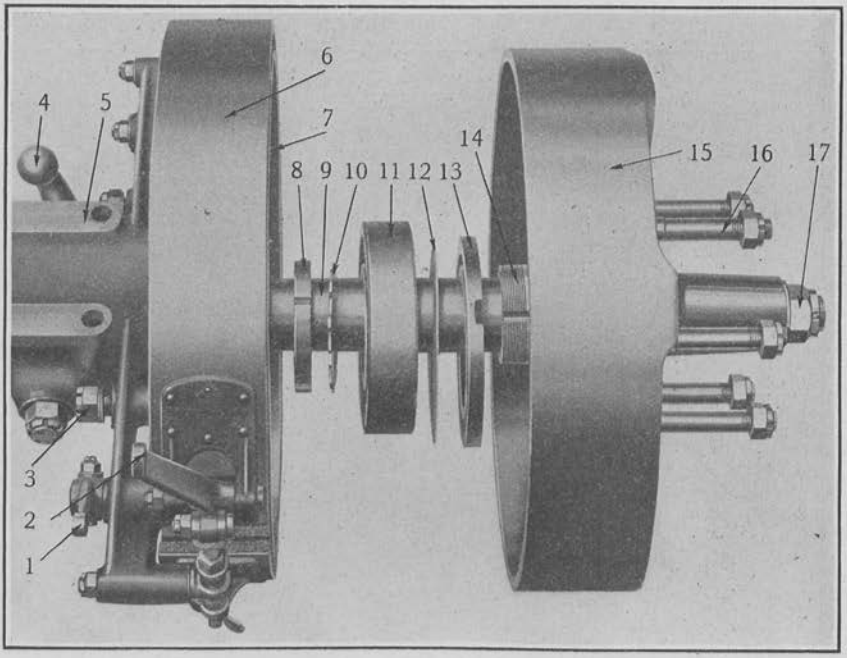
rear axle ring gear must be made before the rear axle sleeves are bolted in place, as it cannot be made after that.

DISASSEMBLING REAR AXLE

If it is only desired to remove the rear wheel and one of the rear axle drive shafts, the two hooked bolt nuts found on either side of the axle sleeve, just under the rear springs, should be loosed up, the hook bolts pushed inward until the hooks clear the bearing retainer and then rotated so that the hooks do not interfere with the withdrawal of this retaining washer. The entire wheel brake drum, rear axle hub, outer bearing and rear axle drive shaft can then be withdrawn from the rear axle assembly. This is clearly shown in plate 41. On account of the open construction of the brake assembly, it is possible to reach in with the fingers and determine just exactly where these hooked bolts are with reference to the slots in the retaining ring, into which they must fit when reassembling the rear axle drive shaft and wheel.

One precaution should be noted: When removing the rear wheels for any reason, take off only one at a time, unless it is absolutely necessary to take both of them off. This will insure the proper alignment of the differential spider when the removed rear axle drive shaft is replaced. As long as there is no marked wear of the differential spider, little difficulty will be had in inserting both of the rear axle drive shafts, but if there is wear and both of the drive shafts have been withdrawn, some difficulty may be experienced in inserting the little projection on the inside of the rear axle drive shaft.

PLATE 43



REAR AXLE BRAKES AND WHEEL BEARING DISASSEMBLED

Ref. No.	Part No.	Name
1	076 O	Hand brake ring wing, right.
2	040 GB	Foot brake hand lever, right.
3	049½ GEC	Rear axle bearing retainer hook bolt.
4	030¾ GEC	Torsion rod bracket ball.
5	047 GF	Rear axle sleeve, right.
6	075 GF	Foot brake bands.
7	75½ GC	Hand brake ring.
8	S087 M	Rear axle hub bearing lock nut, right.
9	061 GB	Rear axle spindle.
10	087¼ M	Rear axle hub bearing lock washer.
11	313	Rear axle sleeve, outer bearing.
12	048¼ GB	Rear axle outer bearing felt washer.
13	048 GB	Rear axle outer bearing retainer plate.
14	087 TED	Rear wheel hub, right.
15	087½ TED	Rear wheel brake drum.
16	0.5″ x 3.25″	Rear wheel hub bolt.
17	S010½ GB	Rear axle spindle nut.

REAR HUB CONSTRUCTION

The rear hub is a forging which is pressed onto the tapered outer end of the rear axle drive shaft and driven by a squared portion found on

the outer end of the latter. It is held in place on the rear axle drive shaft by a castallated nut. The only purpose of the rear axle hub cap is to protect this nut. This hub cap need never be removed unless it is desired to take the rear axle drive shaft out of the rear wheel hub. The inside end of the rear wheel hub is machined to carry the outer rear axle sleeve bearing. The inside race of this bearing is clamped onto the rear axle hub with a slotted nut. The inside flange of the rear wheel hub is machined to take the brake drum. Twelve hub bolts are used to hold the outer flange of the hub in place and these bolts also serve to lock the brake drum in place.

REAR AXLE SHAFT DIMENSIONS

Rear Axle Shaft, Material		Chrome nickel steel	
Diameter, maximum	inches	1.875	(1⅞)
Minimum	do	1.562	(1 9/16)
Stud that enters differential spider	do	1.121	(1 7/32)
Hub nut thread	do	0.875	(⅞)
Squares, side, differential end	do	1.500	(1½)
Wheel hub end	do	1.125	(1⅛)
Length, overall	do	31.812	(31 13/16)

DIFFERENTIAL FUNCTION AND OPERATION

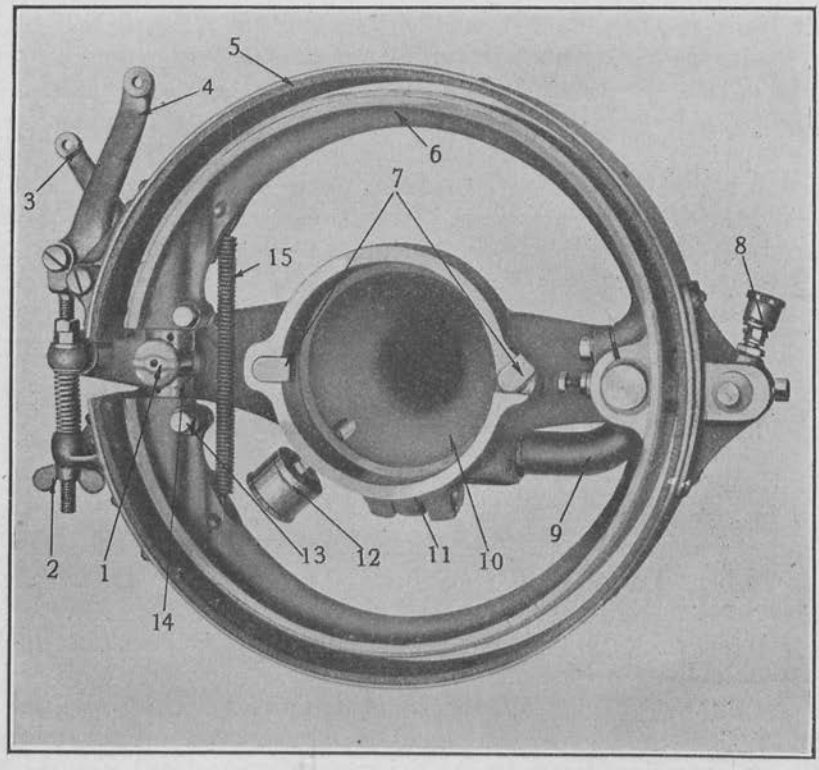
The function of the differential is to properly divide the power between the two rear wheels when turning corners. When turning, both rear wheels do not travel the same distance, the one on the inside, towards the turn, traveling a shorter distance than the one on the outside. Consequently, if the differential were not provided, there would be no means of compensating for the difference in speed at which these two wheels have to rotate when making the turn and one or the other of them would have to slip. The differential, therefore, is the means whereby the power is equally distributed between the two rear wheels although they are rotating at different speeds, and, on account of this characteristic, is frequently called the compensating gear, instead of the differential gear.

BRAKES

BRAKE DETAILS

Both the hand and foot brakes operate upon the same drums attached to the rear wheels. The drums are steel castings bolted to the rear wheel hub with twelve bolts. This drum is not enclosed, so that the brakes may be readily flushed out and cleaned either with water, if they are filled with dirt, mud or sand, or with gasoline if any oil has worked out on the surface of the brake bands. The foot brake is an external contracting band, while the hand brake is an internal expand-

PLATE 44



BRAKE BAND ASSEMBLY

Ref. No.	Part No.	Name
1	076 O	Hand brake ring wing, right.
2	094¾ TDC	Foot brake band adjusting nut.
3	040¾ TBC	Hand brake ring wing lever.
4	040 GB	Foot brake band lever.
5	075 GF	Foot brake bands.
6	75½ GC	Hand brake ring.
7	049½ GEC	Rear axle bearing retainer hook bolts.
8	O	Brake guide grease cup.
9	030¾ GEC	Torsion rod bracket.
10	047 GF	Rear axle sleeve, right.
11	056½ GEC	Truss rod, right end.
12		Wheel bearing grease cup.
13	S0680¼ GED	Brake ring adjusting screw clamp bolt.
14	S075 GTB	Brake ring adjusting screw.
15	075¾ GB	Brake ring spring.

ing brake. The latter is a combination of both the shoe and band brake types. There is a steel casting of thin section over half of its circumference and then it is ribbed up towards the open side to carry the bosses against which the operating cam bears.

BRAKES DIMENSIONS

Brake Drum, Material		Malleable iron	
Width of braking surface	inches	2.250	(2¼)
Diameter of drum, inside	do	17.000	
Outside	do	17.750	(17¾)
External Brake Lining, Material		Asbestos fabric	
Width	inches	2.500	(2½)
Thickness	do	0.187	(3/16)
Length, Developed	do	53.562	(53 9/16)
Internal Brake Lining, Material		Adkin's metal	
Width	inches	2.437	(2 7/16)
Thickness	do	0.125	(⅛)
Length, developed	do	50.500	(50½)

Both brakes are lined with asbestos fabric which is riveted onto the respective brake band with copper rivets. The brake anchorage, which is on the front side of each brake band, and the brake operating mechanism, which is diametrically opposite on the rear side of each brake band, are carried upon ribbed arms extending forward and backward horizontally from each of the rear axle sleeves. The brake operating arms and shafts, which are part of this brake assembly, are provided with bushings so that any wear can be compensated for and also so that there will be no tendency for the steel brake operating shaft to rust in place and bind, since the bushings are made from non-ferrous or non-rusting metal.

BRAKE ADJUSTMENT

Both the hand and foot brakes are provided with adjustments so that the wear of the brake lining can be taken up a number of times before it is necessary to replace with new lining. The brakes are not adjusted in the same manner, so that each will have to be considered by itself.

FOOT BRAKE ADJUSTMENT

The foot brake is a band type brake anchored at the front side upon a stud attached to the brake supporting arm on the axle sleeve. On the rear or open end of the brake band is the mechanism by means of which the band is contracted upon the brake drum. To adjust the tightness of the foot brake, a temporary adjustment may be made by turning up on the wing nut on the end of the foot brake adjusting screw. It should be noted that there are no supports for the brake band other than that provided by the anchorage on the front side of the contracting mechanism at the rear. It is essential, therefore, to observe that both the upper and lower portions of the band do not drag upon the brake drums. A stop adjustment is provided for this particular portion upon the foot brake adjusting screw. This stop is in the form of two nuts, one an adjusting nut and the other a check or lock nut. These two nuts when screwed down tend to raise the upper

portion of the brake band and keep it from dragging upon the upper portion of the brake drum. The adjusting screw spring presses beneath the support against which these adjusting nuts abut and through which the adjusting screw slides. The spring forces the lower half of the brake band downward and away from the bottom portion of the brake drum. The clearance of the lower half of the brake band is, therefore, regulated by the adjustment of the single nut provided for this purpose. To properly take up wear and adjust these brake drums it is, therefore, necessary not only to turn up on the single nut, but also to raise the adjusting nuts so as to allow the upper half of the band to come closer to the brake drum. Whenever adjustments are made, however, care should be taken that the bands do not drag, either on the top or the bottom, when the brake is released.

HAND BRAKE ADJUSTMENT

The hand brake adjustment cannot be made without first removing the rear wheel. Before the rear wheel is removed, however, the clearance between the upper and lower portions of the internal or hand brake and the brake drum should be carefully ascertained. It is essential to do this because the adjustment made on this brake cannot be observed while it is being made, and if it is wrong after the wheel and brake drum have been replaced in the axle, it will necessitate the removal of them again to correct this mistake.

After the wheel has been removed, the adjusting mechanism of this brake can readily be reached. It consists of two adjusting screws which are in the form of cylindrical anvils, against which the brake expanding cam operates. These adjusting screws have holes in the sides into which a nail or prick punch may be inserted in order to rotate them. They are accurately locked in place by means of binder bolts or nuts on the side of the boss which holds the adjusting screw. With the brake cam in the released position, adjust each half of the brake band separately, being sure that the distance from the center of the axle to the surface of the band is the same on both sides; otherwise the brake will tend to wear on one side only and throw undue strain on both the cam and its anchorage on the opposite side, if this is not carefully watched when making the adjustment.

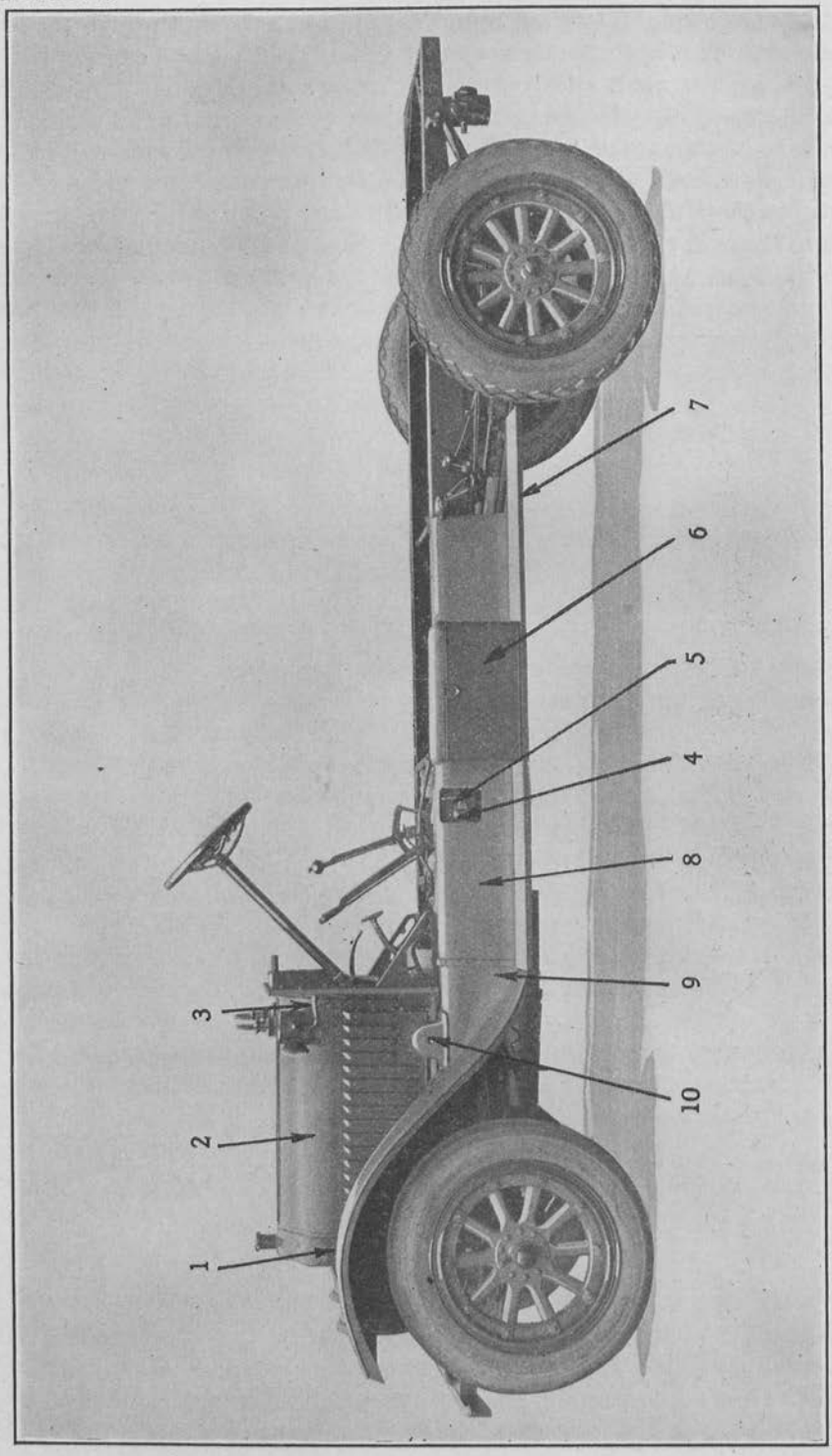
TORSION ROD

FUNCTION

Since both ends of the rear springs are shackled, they take none of the forward thrust of the rear axle and hence some other means of transmitting the thrust of the rear axle to the chassis must be provided. This is done with the torsion rods, as they are called. They should more appropriately be called radius rods or thrust rods, as they do not

take the torque, the latter being transmitted entirely through the rear spring. The radius rods are solid rods, threaded at either end and provided with ball and socket joint cases at both ends. These cases are screwed onto the ends of the torsion rod and clamped in place by means of a clamp or binder bolt. The balls to which each end of this rod is attached are clamped between two hardened and ground steel ball sockets clamped in place by adjusting plugs, which are screwed into the ends of the ball socket cases. These adjusting plugs are locked in position by a binder or clamp bolt. Grease cups are provided on both ends of these radius or torsion rods and they are, in addition, completely enclosed in leather boots, which are laced onto them.

PLATE 45



LEFT SIDE OF WHITE, MODEL TEB-O, CHASSIS

PLATE 45

LEFT SIDE OF WHITE, MODEL TEB-O, CHASSIS

Ref. No.	Part No.	Name
1	279 TED	Front fender, left.
2	600 TE	Hood.
3	274 TED	Dash.
4	0201 TED	Tire pump oil trap.
5	0209 TED	Tire pump engaging rod.
6	1631 TED	Battery box.
7	240½ TED	Running board.
8	281½ TED	Running board filler strip, left.
9	15¾ TED	Running board filler strip end piece.
10	623¾ TED	Steering lever cover.

CHAPTER VII

FRAME AND CHASSIS FITTINGS

CHAPTER CONTENTS

FRAME
SPRINGS
FENDERS AND HOOD
DASH ASSEMBLY
BRAKE LINKAGE

CHASSIS UNITS

The chassis units include the frame and the units attached directly thereto, which are not an integral part of some other main unit of the car. This group also includes the dash, hood and fenders, which are a part of the White Chassis, as distinguished from those parts which are an integral part of the body that is mounted upon this chassis. Since these parts are common to the chassis, and not to the several bodies which are mounted upon it, they are fully described here.

The chassis units, therefore, include the main frame, the front and rear springs, the brake linkage, and the bumper as part of the main frame units, and in addition the following parts which are assigned to this portion of the chassis for the reason mentioned above: The hood, the dash board and instruments located thereon, the front fenders, the running boards and the running board shields.

FRAME

The frame is the backbone of the car. Directly or indirectly all main units are attached to it. The frame is made from pressed chan-

nel section steel. The side rails taper off towards either end. At the front end the frame side rail is brought down to carry the front spring hanger. From a point directly over the front axle to the rear end of the frame, the top line of the frame is straight and horizontal, so that any type of body may be readily fitted to it. The frame is of uniform width from the back of the dash board to the rear end, but is narrowed forward of the dash board in order to give a greater turning radius. This permits a larger cramp of the front wheels. Special castings are fitted to the front end of the frame side rails, to which tow hooks and a bumper are attached.

FRAME DIMENSIONS

Frame, Material		Pressed channel steel	
Height, maximum	inches	6.0625	
Thickness of frame	do	0.187	($\frac{3}{16}$)
Width, across channels at front	do	29.000	
At rear	do	34.000	
Width of frame channel	do	1.750	($1\frac{3}{4}$)
Overall length of frame	do	1.970	
Distance rear of frame to dash	do	1.420	

FRAME CROSS MEMBERS

There are five cross members in the frame, the front one and the two rear ones being well gusseted, so as to prevent any distortion of the frame angularly. The front cross member not only ties the front end of the frame together, but also provides the trunnion on which the front end of the engine is carried. Between the first and second cross members of the frame come the two engine supporting arms, which not only support the engine, but also act as a sort of auxiliary cross member of the frame. They only give it partial rigidity, because the bolts which hold the engine in place have springs under their heads to allow a slight give of the frame without causing distortion of the crank case. The second and third cross members of the frame provide the support for the transmission and the clutch and brake pedal operating mechanism. The fourth cross member of the frame is provided to stiffen the frame just back of the rear axle and to prevent any twisting of the frame at this point, due to the method of supporting the springs outside of the frame. The rear cross member not only serves to tie the rear end of the frame together, but also provides the best point for putting in the diagonal gussets or cross braces, which help to keep the frame side rails and cross members square with one another.

SPRINGS

The springs used on the White, Model TEB-O, Chassis are semi-elliptic both in front and rear. The front springs are carried directly

beneath the front ends of the frame side rails. The rear springs are carried just outside of the rear end of the frame side rails. Drop forge brackets are provided to support the springs or spring shackles, as may be the case, at both ends of the springs.

FRONT SPRING

The front spring is attached to the front end of the frame by means of a spring bolt, while the rear end is attached to the frame bracket by a shackle and two spring bolts. The front spring is held in place on the front axle by means of two spring clips. It is further provided with three rebound clips around the spring leaves, one of these being forward of the spring seat and the other two to the rear of the spring seat. The spring shackle on the front spring is of the hanging or tension type.

FRONT SPRING DIMENSIONS

Dimensions Given Without Load.			
Length, center to center spring eyes	inches	40.625	(40 5/8)
Center to front eye	do	17.875	(17 7/8)
Center to rear eye	do	22.750	(22 3/4)
Width	do	2.000	
Opening, top of spring to line connecting centers of spring eyes	do	3.625	(3 5/8)
Thickness at center	do	3.000	
Number of leaves			ten
Spring Bolt diameter	inches	0.625	(5/8)
Spring Eye Bushing, Material			Bronze

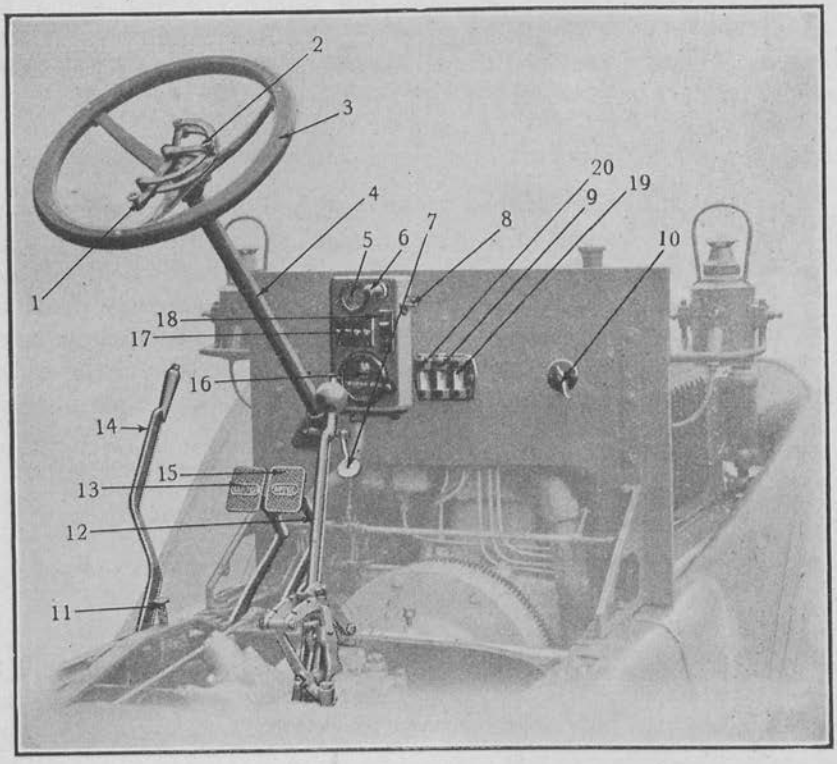
REAR SPRING

Since the rear springs are carried outside of the frame line, the brackets supporting them have to be offset. The front bracket is attached to the side and bottom of the frame side rail. The rear spring bracket is directly under the side rails and the shackle, which carries the rear end of the rear spring, is mounted upon a bar which extends all the way across the frame and, therefore, supports both rear ends of the rear springs. The rear springs are shackled at both ends with hanging or tension shackles. The rear springs are attached to the rear axle by two spring clips each. They are also provided with four spring leaf clips, two of which are on the front and two on the rear half of the spring. The rear spring seats are an integral

REAR SPRING DIMENSIONS

Dimensions Given Without Load.			
Length	inches	50.375	(50 3/8)
Width	do	2.250	(2 1/4)
Opening, top of spring to line connecting centers of spring eyes	do	7.875	(7 7/8)
Thickness at center	do	3.375	(3 3/8)
Number of leaves			eleven
Spring Bolt diameter	inches	0.750	(3/4)
Spring Eye Bushing, Material			Bronze

PLATE 46



CONTROLS OF WHITE, MODEL TEB-O, CHASSIS

Ref. No.	Part No.	Name
1	00304 GA	Carbureter control lever.
2	00301 GA	Spark control lever.
3	21 MM	Steering wheel.
4	015 TED	Steering stem.
5	1601½ GM	Ammeter.
6	1616 TED	Dash lamp.
7	00217 GAF	Accelerator.
8	TEB-O	Magneto switch.
9	351½ GA	Oil sight feed—to center bearing.
10	00718 TED	Carbureter index plate.
11	1646 TED	Starting motor switch.
12	0180½ GFB	Change gear lever.
13	191 GE	Clutch pedal.
14	050 TB	Hand brake lever.
15	35½ GEC	Foot brake.
16	TEB-O	Speedometer.
17	1613½ GA	Switch lighting panel.
18	1608⅝ GM	Circuit breaker.
19	351½ GA	Oil sight feed—to rear bearing
20	351½ GA	Oil sight feed—to front bearing.

part of the rear axle sleeves and hence the entire torque from the engine when driving, or the brakes when stopping the car, has to be taken through them.

RUNNING BOARDS AND FENDERS

The running board and fender group includes the front fenders only, the running boards and running board shields. The front fender is attached to the frame by a drop-forged fender iron at the front end and supported at the rear by the forward end of the running board. The front fenders are provided with an opening, covered by a sliding door on each side of the radiator, so that the radiator trunnion bolts may be removed without having to remove the front fenders. A running board shield is provided on each side of the chassis to close the gap between the running board and the body. On some models a tool box is substituted for this running board shield, in which case it naturally will not be found. Each running board is supported by four drop-forged step hangers, which are riveted onto the side of the frame.

HOOD

The hood is made up in four pieces, two upper and two lower parts. The lower sections are provided with louvres, through which the hot air from the engine is driven out. They are also provided with a handle as a convenient means of lifting the sides. The hood is provided with a hinge at the top center, between the two upper halves, and another hinge along the division between the upper and lower portions on each side.

The space between the fender and the hood is protected by the hood ledges, or deck board, and the hood is fastened down in place by four spring hood latches, two of which are used on each side.

DASH

The dash board is mounted on the frame and held in place by two angular brackets located on either side at the rear. These brackets not only support the dash board but also carry the toe boards. They are provided with a bearing at either side, on which the carbureter control shaft is supported. On the front side of the dash are located the two oil lamp brackets, and upon those cars having no electric equipment, an acetylene searchlight will also be found upon the dash.

On those cars that are equipped with electric apparatus, there will be found—in addition to the carbureter regulator, oil sight feeds and magneto switch—an instrument box. On this are the electric lighting switches, automatic circuit breaker switch, electric dash lamp, magneto switch, ammeter, and speedometer-odometer.

BRAKE LINKAGE

The brake linkage consists of those parts which interconnect the brake pedals and the brake lever with their respective brakes on the rear axle. The brake pedal mounting and details have already been considered in connection with the clutch. The hand or emergency brake lever is mounted upon a bracket, which is attached to the left side rail of the frame just to the left of the driver's seat. The foot brake and the hand brake are not directly connected to the levers actuating the brakes on the rear wheel. A cross brake shaft is provided for this purpose and located just back of the rear spring front hangers. This cross shaft also carries a tubular shaft surrounding it. The tubular shaft operates the hand or emergency brakes, while the clutch brake shaft inside operates the foot or running brakes. The foot pedal and the hand brake lever are connected to the cross brake shafts between the equalizing bar in order to give the same pull upon each brake rod, and thereby give as uniform as possible a distribution of the braking effort on each rear wheel. Bushings are provided inside of each tubular brake shaft so that there should be no tendency for the emergency and foot brake shafts to bind together.

The brackets which support the cross brake shafts are provided with grease cups easily reached, and to insure proper action of the brakes these cups should be carefully attended to periodically. The brake rod yokes between the outer ends of the brake shaft and the rear axle brake levers are enclosed in lever boots which are laced in place and which should be packed with grease every month.

BUMPER DIMENSIONS

Bumper, Material		Channel steel	
Length, overall	inches	60.000	
Height of channel	do	3.000	
Width of channel	do	1.500	(1½)

SPRING SHACKLES DIMENSIONS

Front Spring Shackle, Material		Steel forging	
Width, inside	inches	2.060	(2 1/16)
Outside	do	2.560	(2 9/16)
Length, center to center	do	2.000	
Shackle Bolt Holes, diameter	do	0.625	(5/8)
Rear Spring Front Shackle, Material		Steel forging	
Thickness	inches	0.312	(5/16)
Length, center to center	do	3.000	
Shackle Bolt Holes, diameter	do	0.750	(¾)
Rear Spring Rear Shackle, Material		Steel forging	
Width, inside	inches	2.312	(2 5/16)
Outside	do	3.312	(3 5/16)
Length, center to center	do	3.000	
Shackle Bolt Holes, diameter top	do	0.750	(¾)
Bottom	do	1.187	(1 3/16)

SHACKLE BOLTS DIMENSIONS

Front Spring Shackle, Material		Case hardened steel	
Diameter	inches	0.625	(5/8)
Length under head	do	3.432	(3 7/16)
Diameter of threads	do	0.562	(9/16)
Threads	per inch	16	
Front Spring Front Bolt, Material		Case hardened steel	
Diameter	inches	0.625	(5/8)
Length under head	do	3.432	(3 7/16)
Diameter of threads	do	0.562	(9/16)
Threads	per inch	16	
Rear Spring Front Shackle Bolt, Material		Case hardened steel	
Diameter	inches	0.750	(3/4)
Length under head	do	3.687	(3 11/16)
Diameter of threads	do	0.562	(9/16)
Threads	per inch	16	
Rear Spring Yoke Bolt, Material		Case hardened steel	
Diameter	inches	0.750	(3/4)
Length under head	do	3.937	(3 15/16)
Diameter of threads	do	0.562	(9/16)
Threads	per inch	16	
Rear Spring Rod, Material		Nickel steel	
Diameter	inches	0.937	(15/16)
Length, overall	do	43.562	(43 9/16)
Diameter of threads at ends	do	0.562	(9/16)
Threads	per inch	16	

SPRING CLIP DIMENSIONS

Rear Spring Clip, Material		Nickel steel	
Diameter	inches	0.625	(5/8)
Length, inside, long arm	do	9.375	(9 3/8)
Short arm	do	8.750	(8 3/4)
Developed	do	26.312	(26 5/16)
Front Spring Clip, Material		Nickel steel	
Diameter	inches	0.500	(1/2)
Length, inside	do	4.875	(4 7/8)
Developed	do	12.375	(12 3/8)

WHEEL GATHER OR TOE IN

Wheels are toed in, or gathered, 0.375 (3/8) inch to facilitate steering and counteract tendency of wheels to toe out when car is in motion.

WHEELS OUT OF ALIGNMENT

Wheels may be thrown out of alignment because of poor tie rod adjustment, steering knuckle arm bent, or axle bed bent.

TO ALIGN WHEELS

To align the wheels, turn the steering wheel so that the wheels are approximately parallel with the frame. Then, with a piece of string or stick measure the distance between the inside edges at the front and the rear of the front tires. If the wheels are properly aligned the front edges of the front of the tires will measure 0.375 (3/8) inch less than the rear, which is the proper amount the wheels should be toed in.

Should there be a difference of more or less than 0.375 (3/8) inch, shorten or lengthen tie rod between the two steering arms until the wheels toe in the proper distance. The adjustment of this rod is on the right-hand side facing the car.

Excessive tire wear will result if the wheels are not properly aligned, and steering will be very difficult if the wheels toe out in front. As the natural tendency of the front of the wheels is to toe or spread out while traveling, the adjustment must be made so that they will not toe out (beyond a straight line). The alignment of the wheels should be inspected (and adjusted if necessary) every week.

DO NOT TURN WHEELS WHEN STANDING

The wheels should never be turned by the steering wheel while the car is standing still, as this puts undue strain on the entire steering mechanism.

CHAPTER VIII

LIGHTING AND STARTING DEVICES

CHAPTER CONTENTS

GENERAL DESCRIPTION OF ELECTRIC SYSTEM
ELECTRIC GENERATOR DESCRIPTION
STARTING MOTOR DESCRIPTION
BATTERY DESCRIPTION
CARE AND REPAIR
LIGHTS

GENERAL DESCRIPTION OF ELECTRIC SYSTEM

The electric system used on the White, Model TEB-O, Chassis that carries the Staff Observation Body is furnished by the Leece-Neville Company. The electric generator and electric starting motor are separate units. Electricity is furnished by a Willard storage battery carried in a battery box on the left-hand running board. In addition to these three major units of the electric system, there are the following minor units: The starting switch, that is mounted on the chassis and operated by an electric button which projects through the floor boards on the left side of the front compartment; an automatic circuit breaker, also mounted on the front of the instrument box; the "reverse current" circuit breaker, that is mounted on top of the generator; the electric light switches, that are mounted on the instrument box; the necessary wiring to connect the generator, starting motor, battery, switches and lights; and the electric lights.

The starting and lighting system is a 6-7½ volt one. A single wire system, with ground return, is used. This is protected by an automatic circuit breaker that prevents the discharge of the battery when a short circuit occurs.

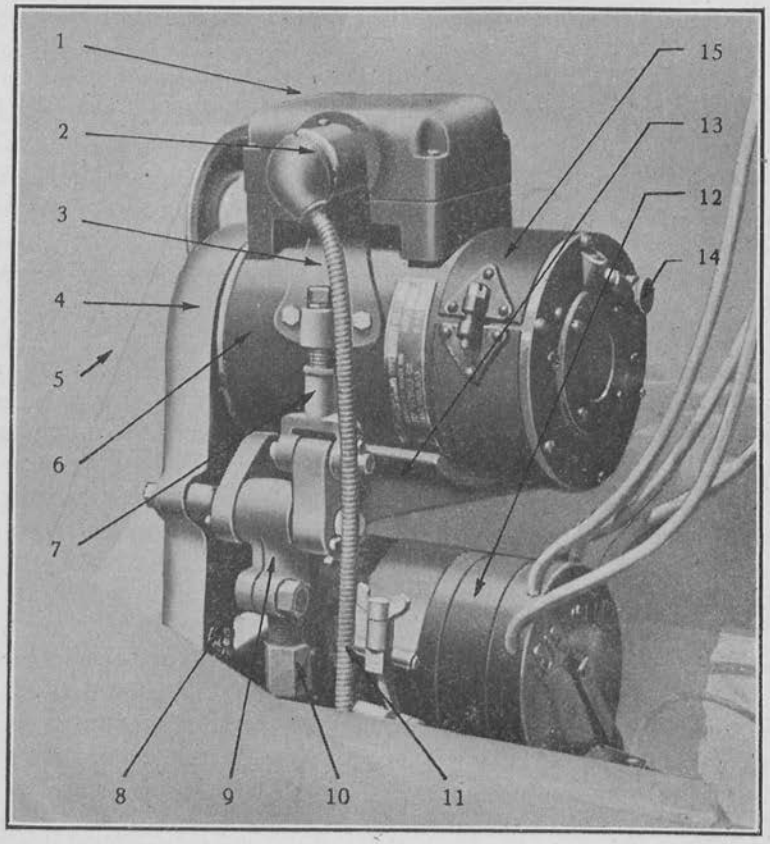
ELECTRIC GENERATOR DIMENSIONS

Generator, Make		Leece-Neville	
Diameter	inches	5.000	
Length under body	do	7.500	(7½)
Generator sprocket, driven, Number of teeth		25	
Pitch		25	
Outside diameter	inches	2.992	
Width	do	0.468	(15/32)
Generator sprocket, driver. (See magneto drive shaft dimensions, page 78.)			
Generator drive chain, Make		Whitney Silent Chain	
Width	inches	0.500	(½)
Pitch	do	0.375	(⅜)
Length	do	28.5	(28½)

ELECTRIC GENERATOR DESCRIPTION

The electric generator is mounted in the left side of the motor on a special bracket provided for its support. The generator is driven by

PLATE 47



ELECTRIC GENERATOR

Ref. No.	Part No.	Name
1		Circuit breaker.
2	1620 TED	Generator connection plug.
3	1527 1/4 GM	Generator clamp band end.
4	1550 1/2 GEC	Generator chain guard.
5	367 1/2 TED	Fan belt.
6	1645 TED	Generator.
7	01530 7/8 GEC	Generator band clevis.
8	01561 1/2 TED	Generator chain.
9	01565 3/4 GF	Generator band toggle.
10	S01565 1/4 GEB	Generator band adjusting screw.
11	A1642 1/2 TED	Battery charging wire conduit.
12		Magneto.
13	1530 GEC	Generator shelf.
14	TEB-O	Generator third brush adjusting wheel.
15	TEB-O	Generator brush opening band.

means of a silent chain and sprockets, the driving one of which forms part of the magneto coupling and is mounted on the magneto and fan shaft. The chain is partially protected by a cover.

The generator itself is cylindrical in shape and is held in place upon its bracket by a strap similar to that which holds the magneto. The generator is of the four pole type and carries three brushes, the two main brushes being located at 90 degrees to one another, and the regulating brush to one side of them. The brushes are carried in a special brush holder, that may be adjusted by taking off the brush opening band which is clamped onto the rear end of the generator housing.

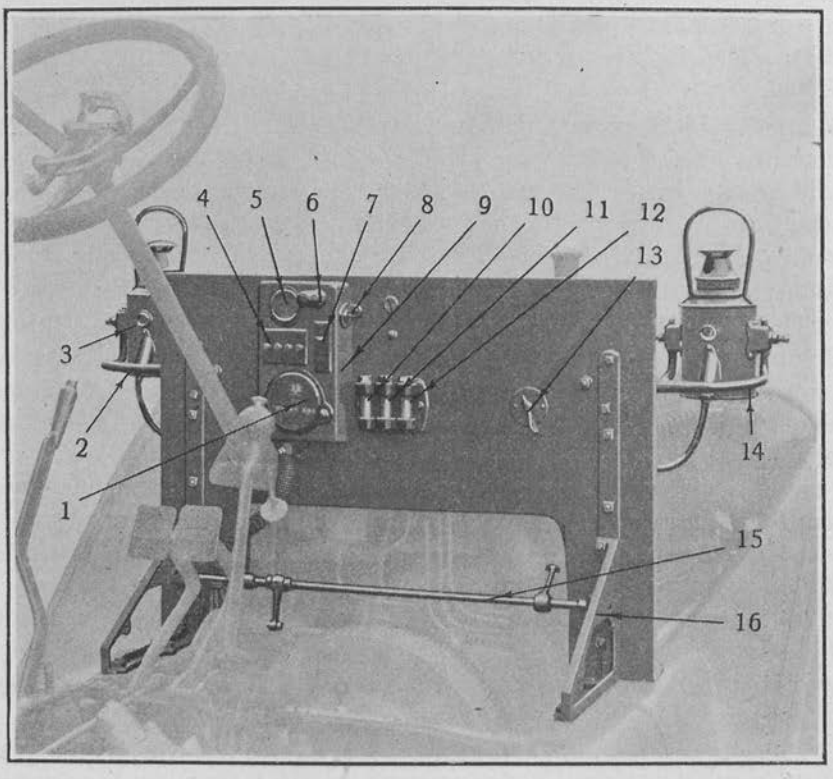
The main circuit breaker, or "reverse current cutout," is located on top of the generator housing. The purpose of this circuit breaker is to prevent the battery from discharging through the generator when the engine is not running, or when it is running at such slow speed that the generator is not producing a higher voltage than that of the battery. It might be likened to the check valve in the water line between a pump located in the cellar of a house and a water tank located in the garret. As long as the pump is not working, or until the pump can deliver pressure enough to lift the water into the tank, the valve automatically prevents the water of the tank from flowing back through the pump. The circuit breaker, or "reverse current cutout," is the device which permits the electricity to flow out of the generator into the battery, but prevents it from doing the reverse.

There is another circuit breaker in the electric system, the purpose of which is to open the circuit between the ammeter and the electric lights, if there is a short circuit in the lighting wiring that would discharge or allow the storage battery to run down. The action of this circuit breaker is described on page 161.

PURPOSE OF AMMETER

The ammeter is connected between the battery and the lights. It is also connected between the generator and the battery. It records the amount of electricity going into the storage battery or the amount being discharged by the battery. When the car is being driven at a good speed, with the lights lit and the generator charging at a fairly high rate, the electricity from the generator will go directly to the lights, unless there is a surplus, in which case it will go through the ammeter to the battery. The ammeter will then indicate a charging of the battery. As soon as the output of the generator is less than that used up by the lights, it will give all of its output to them and the extra amount required will be drawn from the battery, in which case the ammeter will show discharge. When the engine is not running and there is no current being delivered by the generator, the ammeter should show discharge if the lights are burning.

PLATE 48



DASH AND INSTRUMENTS

Ref. No.	Part No.	Name
1	TEB-O	Speedometer.
2	0270½ TED	Side lamp bracket, left.
3		Combined oil-electric side lamp.
4	1613 GA	Lighting switches.
5	1601½ GM	Ammeter.
6	1616 TED	Dash light.
7	1608⅝ GM	Circuit breaker.
8	TEB-O	Magneto ground switch.
9	1600 TED	Switch control box.
10	351½ GA	Sight feed to front bearing.
11	351½ GA	Sight feed to center bearing.
12	351½ GA	Sight feed to rear bearing.
13	00718 TED	Carbureter index plate.
14	0270 TED	Side lamp bracket, right.
15	0724 GEC	Carbureter control shaft.
16	272 TED	Dash irons.

GENERATOR MOUNTING

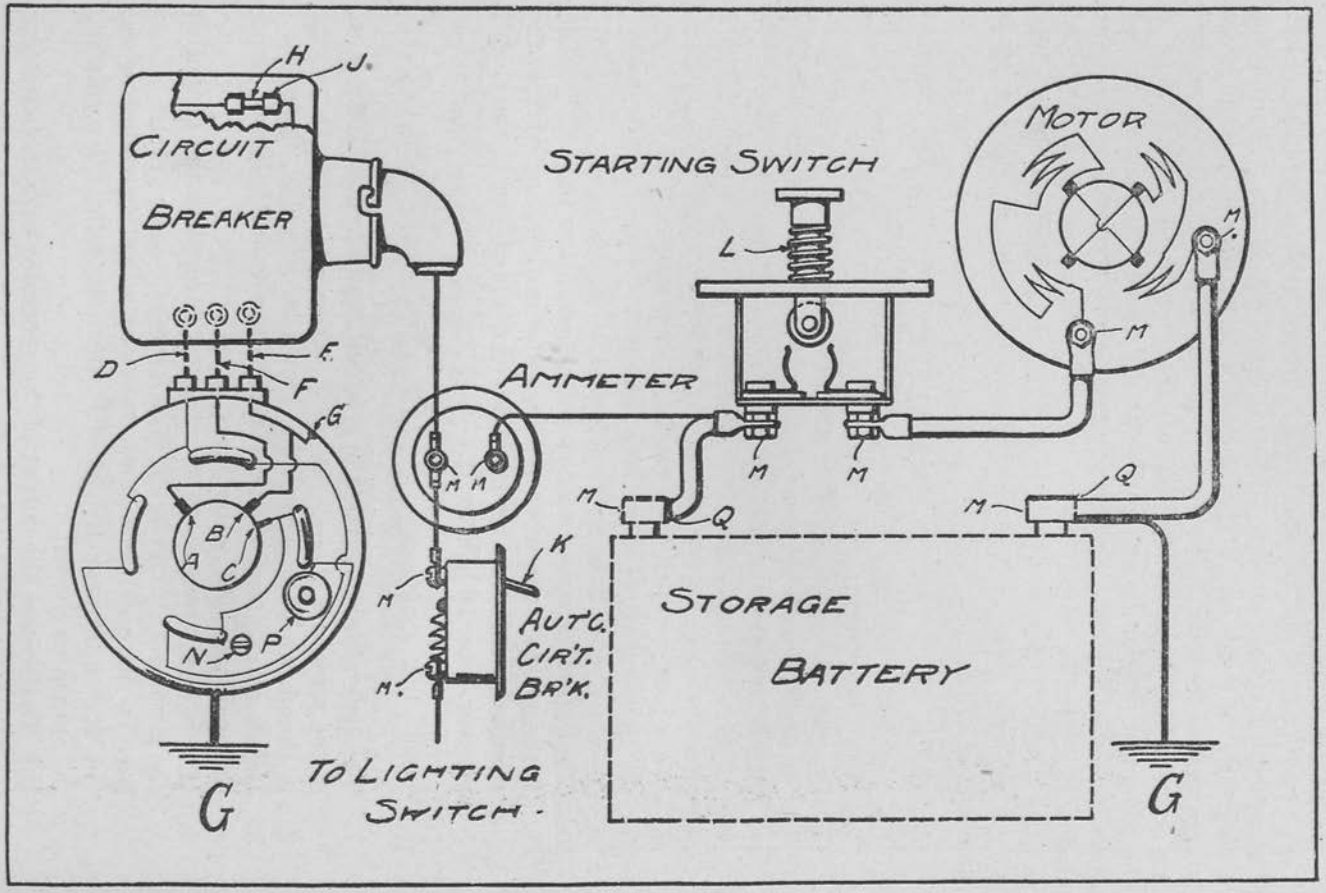
The generator is carried on a bracket hinged to the side of the motor. The generator is held in place on this bracket by a strap. The bracket is hinged at the inside end so that it may be raised up and down in order to compensate for wear in the silent chain which drives it. The adjusting screw, which connects the bottom support with the outside edge of the generator bracket, is provided with right and left-hand threads at opposite ends. By rotating this adjusting screw the slack in the silent chain drive may be readily taken up. The adjusting screw is locked in place when the proper adjustment of the chain has been obtained by means of clamp bolts on the parts into which the adjusting screw is threaded at either end.

CARE OF GENERATOR

1. Keep the brushes clean.
2. See that the commutator is smooth and clean.
3. See that the brushes move freely within their respective holders.
4. Brush holders must be tight and rigid.
5. All brushes must make perfect contact on the commutator.
6. Brush springs must bear directly on brushes.
7. Worn brushes must be replaced with new ones.
8. All terminal connections must be tight.
9. All wires must be securely soldered to the terminals.
10. The generator must be oiled at frequent intervals.
11. If the engine is run when the generator is disconnected from the storage battery, remove the fuse, which is shown in the circuit breaker, page 160, letter H.

GENERATOR PERFORMANCE

1. The generator is regulated to produce 15 amperes at 1200 r. p. m. of the armature.
2. A thumb wheel adjustment is shown on page 156, figure 14.
3. Before attempting to operate the thumb wheel, loosen screw shown on page 160, letter N.
4. If it is found necessary at any time to regulate the output of the generator, it can be done as follows:
   (a) To increase the output, turn the adjusting thumb wheel shown on page 160, letter P, which operates the regulating brush to the left.
   (b) To decrease the output of the generator turn the adjusting thumb wheel to the right.
5. Tighten screw after adjustment is made.
6. The position of the two large brushes, page 160, A and B, should not be changed.



DETAILS OF LIGHTING AND STARTING SYSTEM

GENERATOR CIRCUIT BREAKER PERFORMANCE

1. The circuit breaker is connected to the generator as shown on page 160 by letters D, E and F.
2. The circuit breaker is connected to the storage battery as shown in car wiring diagram.
3. The circuit breaker prevents a discharge from the storage battery when the generator is not operating.
4. The circuit breaker connects the generator and storage battery when the generator is operating.
5. The circuit breaker does not regulate the output of the generator.
6. A 5-ampere fuse designated on page 160, letter H, is inserted between clips designated letter J.

The 5-ampere fuse is $\frac{5}{8}$ x $\frac{1}{4}$ inch.

GENERATOR FUSES

1. The fuse connects the charging circuits of the generator and circuit breaker.
2. The fuse may burn out from any one of the following causes:
   (a) Loose connections between the circuit breaker and generator as shown on page 160, letters D, E and F.
   (b) The main brush shown on page 160, letter B, not making contact with the commutator.
   (c) Open circuit in the car wiring.
   (d) Loose connections at the storage battery terminals, page 160, letter M.
   (e) Corroded battery terminals, page 160, letter M.
   (f) Insufficient water in the storage battery.
3. If the fuse burns out, insert a new 5-ampere fuse.
4. If a fuse heavier than 5 amperes is used and any of the above conditions exist, the voltage will increase, which may burn out generator, circuit breaker or both.

AMMETER AND ACTION

1. The ammeter indicates the output or charging rate of the generator when the lights are off.
2. The ammeter indicates the discharge rate or lamp load when the generator is not running.

AUTOMATIC CIRCUIT BREAKER

The automatic circuit breaker, overload type, is designated as Type 100-SC. The automatic circuit breaker is connected with the ammeter and light switch as shown in car wiring diagram.

ACTION OF AUTOMATIC CIRCUIT BREAKER

1. The automatic circuit breaker arm, page 160, letter K, flies up when a short occurs in a light circuit.
2. The automatic circuit breaker arm flies up when there is an excessive discharge from the storage battery.
3. The automatic circuit breaker prevents a discharge when there is a short circuit.
4. The automatic circuit breaker arm should never be held in the "On" position by an external force.
5. Reset the automatic circuit breaker after the short circuit has been removed.

A short circuit may be located as follows:

(a) Turn off all the lights.

(b) Set the automatic circuit breaker arm in the "On" position.

(c) Operate each light switch separately until you find the one that causes the breaker arm to fly to the "Off" position.

NOTE—When the lamp filaments are cold the arm may fly to the "Off" position if all lamps are switched on at once.

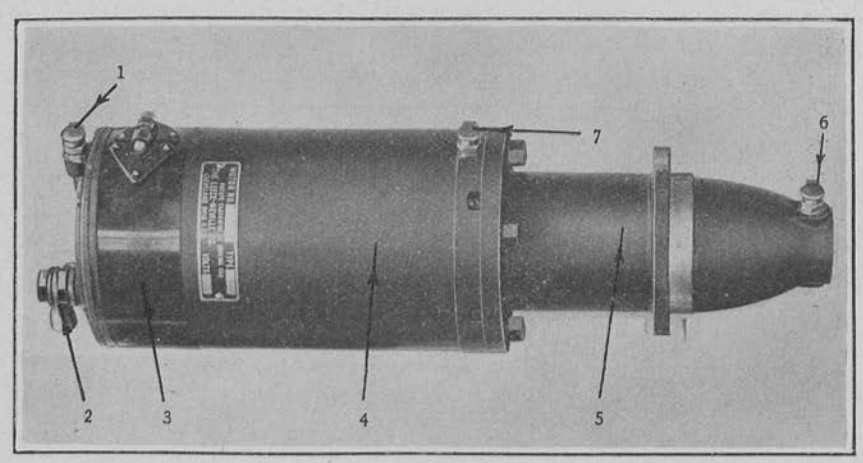


PLATE 50—ELECTRIC STARTING MOTOR

Ref. No.	Part No.	Name
1	8121 M	Oil cup.
2	8125 M	Cable terminal.
3	8101 M	Brush cover ring.
4	8102 M	Field ring.
5	8105 M	Bendix drive housing.
6	8121 M	Oil cup.
7	8121 M	Oil cup.

ELECTRIC STARTING MOTOR

ELECTRIC STARTING MOTOR DESCRIPTION

The electric starting motor is a four-pole, 6 volt, series wound type motor. It carries an outboard type of Bendix starting mechanism which is provided with a standard S. A. E. flange. The Bendix starting gear meshes with a gear that is bolted onto the flywheel of the White, Model TEB-O, chasses which have electric equipment. The electric motor is supported by a spring bracket bolted onto the left hand side of the lower crankcase. This bracket carries the S. A. E. arm at the rear end to support the S. A. E. flange provided on the Bendix starter housing. At the front end it is provided with a strap similar to that used for the electric generator, which holds the starting motor housing in a cradle provided on the body of the starting motor bracket. The starting motor is provided with end plates, the forward one of which carries the brush holder, the rear one the Bendix starter mechanism. The motor is provided throughout with plain bearings and for this reason it should receive lubricating attention every day. These bearings are located, one at either end of the armature and one at the outside end, the out board bearing, as it is called, of the Bendix starter mechanism.

ELECTRIC STARTING MOTOR DIMENSIONS

Electric starting motor, Make		Leece-Neville	
Diameter	inches	5.000	
Length, overall	do	9.000	
Electric starting motor bracket, Material		Cast iron	
Fastening screws, Diameter	inches	0.500	(½)
Threads	per inch	18	
Starting motor clamp band, Material		Steel	
Width	inches	3.000	
Length center to end, long band	do	6.875	(6⅞)
Length center to end, short band	do	4.375	(4⅜)
Type of starter	Drive	Bendix	
Starter pinion, Material		Steel	
Diameter, outside	inches	1.825	(1 13/16)
Pitch	do	1.625	(1⅝)
Number of teeth		13	
Width	inches	1.000	
Diametral pitch, stub tooth	do	8/10	

CARE OF MOTOR

1. Keep the brushes clean.
2. See that the commutator is smooth and clean.
3. See that all brushes move freely within their respective holders.
4. Brush holders must be tight and rigid.
5. All brushes must make perfect contact on the commutator.
6. Brush springs must bear directly on the brushes.
7. Worn brushes must be replaced with new ones.
8. The wire terminals must be tight with the motor terminal studs, page 160, letter M.

9. All wires must be securely soldered to the terminals.
10. The motor must be oiled at frequent intervals.

STARTING SWITCH DESCRIPTION

The starting switch is merely a large, well insulated copper contact switch, which is held out of contact by a stiff spring. It is operated by depressing a heel button which projects through the floor boards of the front compartment in the body. The starting switch is supported by a strap attached to the second and third cross members of the main frame.

CARE OF STARTING SWITCH

1. The wire terminals must be tight with the motor switch terminal studs.
2. All wires must be securely soldered to the terminals.
3. Oil push rod at frequent intervals, page 160, letter L.

STORAGE BATTERY

The storage battery is a Model No. 4701-YS Willard 6-7 volt storage battery. It is carried in a pressed steel box, with a hinged top cover, located on the left-hand running board of the White, Model TEB-O, chassis.

GENERAL INSTRUCTIONS FOR BATTERY CARE

If battery is to stand idle, it should first be fully charged.

Voltage readings should be taken only when the battery is charging or discharging.

Never let solution get below top of separators.

Keep cells clean and free from dirt and all foreign substances.

Keep connections clean and all bolted connections tight.

Never bring a naked flame near the battery while charging, nor immediately afterwards.

CHARGING INSTRUCTIONS

Charging current must always be "direct" and never "alternating."

When charging, the positive terminal of battery must be connected to the positive terminal of the charging current.

Battery should be charged at "Start rate" specified on name plate until all of the cells are gassing freely and then continued for about six hours at the "Finish rate" until the specific gravity and voltage reach a maximum, that is, show no further rise during a period of two hours.

If temperature of battery exceeds 110 degrees F. the charging rate should be decreased.

In an emergency, batteries may be charged at a higher rate in a shorter time, if the following general rules are followed:

"Do not allow the cells to gas violently and do not allow the temperature of electrolyte to exceed 110 degrees F. Remove vent plugs while charging."

REPLENISHING WITH WATER

Pure water must be added to all cells regularly and at sufficiently frequent intervals to keep solution at proper height of one inch above top of separators.

Electrolyte must not be added to replace evaporation or to bring up the specific gravity except where electrolyte has been lost by slopping or leaking.

ADJUSTING GRAVITY OF BATTERY

With the battery fully charged the specific gravity of electrolyte should be between 1.275 and 1.285.

If necessary to adjust gravity, it should always be done when cells are fully charged, as indicated by free gassing and stationary gravity for several hours.

If gravity is above 1.285, a small amount of electrolyte should be drawn out with a hydrometer syringe and discarded and then replaced with pure water. If, on a fully charged battery, the gravity is below 1.275, remove a small amount of electrolyte and replace with same amount of 1.400 specific gravity electrolyte. 1.400 specific gravity electrolyte consists of about seven parts by volume of pure sulphuric acid, and nine parts by volume of pure water. The acid should be poured into the water and allowed to cool below 90 degrees F. before being used.

TAKING BATTERY OUT OF SERVICE

When batteries are to be shipped, battery should first be fully charged, vent plugs removed, acid dumped out, battery being allowed to drain, upside down, about one hour. Battery should then be turned right side up, vent plugs replaced and covered with standard soft rubber red export nipple and standard red export tag tied to the battery handle.

PREPARING EXPORT BATTERIES FOR SERVICE

When battery is to be prepared for service, remove and discard red soft rubber nipples from tops of vent plugs. Black hard rubber vent plugs are standard equipment and remain on battery in service.

Immediately after removal of soft rubber nipples, remove black vent plugs and fill with 1.285 electrolyte (2½ parts by volume of

distilled water and one part by volume of chemically pure sulphuric acid); then put on charge at finish rate for not less than 36 hours, or until gravity stops rising.

After charging, insert black vent plug.

PREPARING BONE DRY BATTERIES FOR SERVICE

Remove vent plugs and fill with 1.275 electrolyte (approximately 2½ parts by volume of distilled water and one part by volume of chemically pure sulphuric acid); allow to stand for twelve hours; adding 1.275 electrolyte if necessary to obtain proper level in cell. Then put on charge at finish rate for not less than 72 hours, or until gravity stops rising, adjusting gravity at end of charge to 1.280 SP. GR. at 70 degrees F. Temperature during charge should be kept below 110 degrees F. While charging, add distilled water to replace any electrolyte lost by evaporation. After charging, insert black vent plugs.

DISASSEMBLING BATTERY FOR REPAIRS

1. Empty all electrolyte from battery into a rubber, lead, glass or earthenware vessel.
2. Fill each cell with hot water.
3. Loosen the two tie-bolts at the side of the case with a large screwdriver.
4. With a ¾-inch drill make a hole ¼-inch to ⅜-inch deep in top connector or terminal connectors, directly above center of post.
5. Pry off the connector with screwdriver.
6. With a large pipe wrench or other suitable wrench, unscrew the lead-plated brass nuts from each post.

   Note: If cover and nuts are in good condition, disregard instructions Nos. 6, 8 and 10, and see No. 11.
7. With a hot chisel or putty knife, dig out the sealing compound between the cover and jar and also between jar and case, being sure to get all the compound from between the jars down to the wood partition.
8. Heat the cover by waving a flame around the edge and pull up same very carefully by hooking finger through the vent plug chamber.
9. Put in each partition between the cells, two 2-inch screws about three-quarters of the way into the wood partitions, leaving enough of the screws projecting to obtain a firm grip on same with a pair of pliers.

   Apply heat to partition and sides of the jar to loosen all the compound that may be between the jar and the partition. Then with two pairs of pliers, gripping the screws, pull up the partition.

10. With two pairs of post tongs (or two pairs of pliers), one on each post, pull up the elements slowly.
11. If the cover is not broken and the sealing nuts are in good condition, it will not be necessary to remove nuts or separate the cover from the element. Heat cover and with two pairs of tongs pull up the element.
12. If the nuts and cover are removed, it will be necessary to build up the posts and threads with a special thread post builder, as follows:

    Place lower half of post builder over post stub, being careful to see that post builder sets squarely on flange of connecting strap and makes good fit with remaining threads in post. Lead is then burned into top of threaded section.

    Next insert upper half of post builder into lower half by taking care that upper half is properly sealed. Then burn in lead to top of post builder.

    Upper half of builder is lifted off and lower half unscrewed in the direction of a right-handed nut.

    Positive and negative posts require different upper half of post builder and care should be taken that proper ones are used.

    Before replacing, the threads on the lead-plated nuts must be thoroughly cleaned out by removing all excess lead.

LIGHTS

Two electric head lights is standard equipment on the White, Model TEB-O, Chassis used with the Staff Observation Car Body. The side and tail lamps are standard Adlake lamps, except that they are provided with electric sockets so that they may be used either in connection with the electric equipment or with oil.

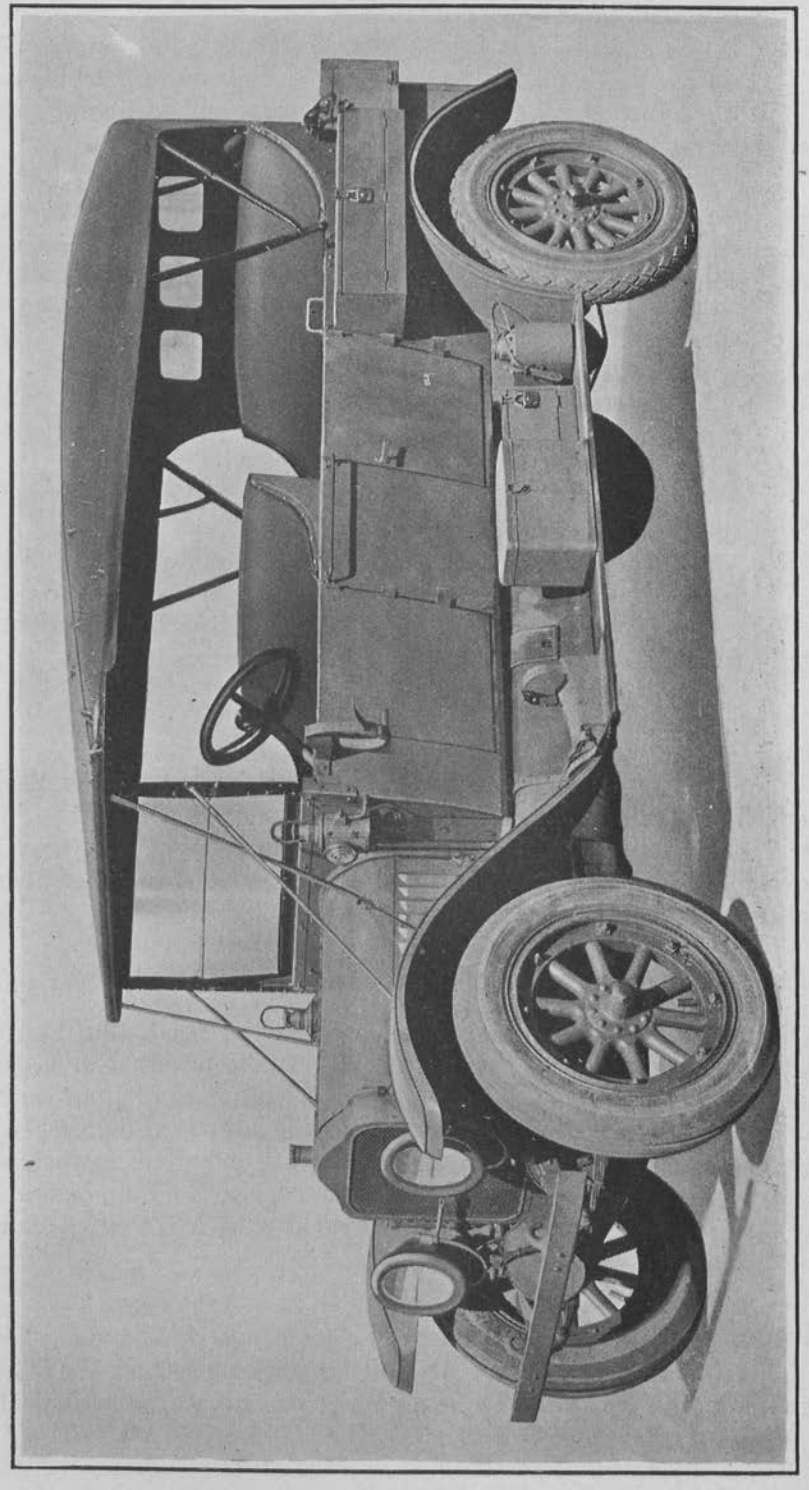
BULB SIZES REQUIRED

Standard electric light bulbs are used in the head, side and tail lamps. The head lights carry 6 volt, 24 candle power, No. G-16½ electric bulbs. The side lamp bulbs are 6 volt, 8 candle power, No. G-10. Two combination oil and electric side lamps are required with each electrically equipped chassis. They are mounted on each side of the dash board. A 6 volt, 2 candle power, No. G-6 bulb is used for the dash light. The tail light is provided with a 6 volt, 4 candle power, No. G-8 bulb.

OIL LAMPS

Three combination electric and oil lamps are used on the White, Model TEB-O, Chassis. These are the two side and the single tail

PLATE 51



THREE-QUARTER FRONT VIEW OF STAFF OBSERVATION CAR

lamp. The following instructions are given for their care, in addition to those instructions required for the electric equipment provided with them and which is fully explained elsewhere in this chapter.

CARE OF OIL SIDE LAMPS

Use kerosene oil only. Keep the lamps clean inside and out.

TO FILL OIL FOUNT

Release catch at top of door by pushing toward side of lamp with thumb and lift up on the door. Remove the fount by pulling straight out until clear of the guides. Remove burner and fill the fount through the opening. Do not fill too full, allow about a quarter inch air space.

REPLACING FOUNT

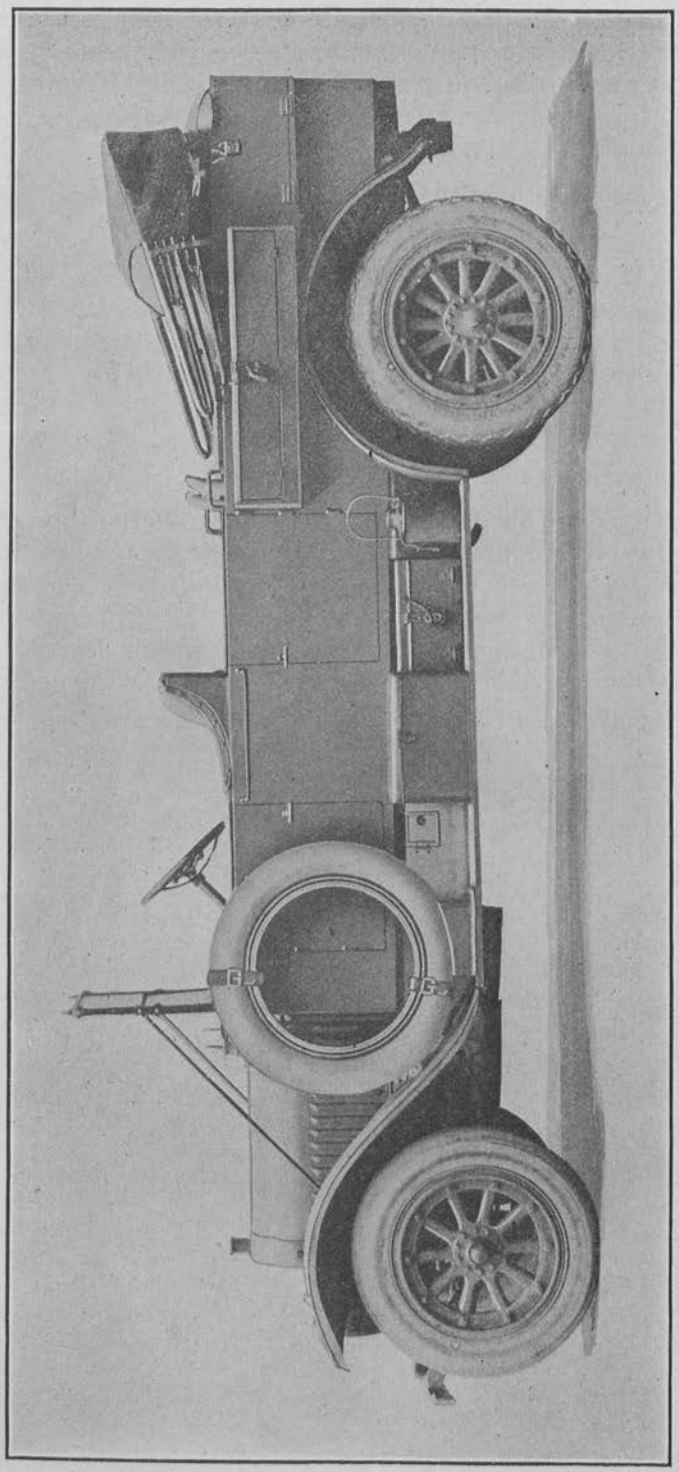
When replacing the fount be sure it is under both guides, then push it as far into the lamp as it will go. Push the wick, raising stem into slot on the side of the door frame, so it will not interfere with the closing of the door.

The flame should not be turned too high at first—start it low—it soon grows to normal size, but if started too high, will smoke, fogging the lenses and filling the ventilator with soot.

TO TRIM WICK

Do not trim wick with scissors, but rub off charred part occasionally.

PLATE 52



LEFT SIDE VIEW OF STAFF OBSERVATION CAR, TOP DOWN

CHAPTER IX

BODY AND EQUIPMENT

CHAPTER CONTENTS

BRIEF DESCRIPTION
DETAIL DESCRIPTION
BODY EQUIPMENT TABLE

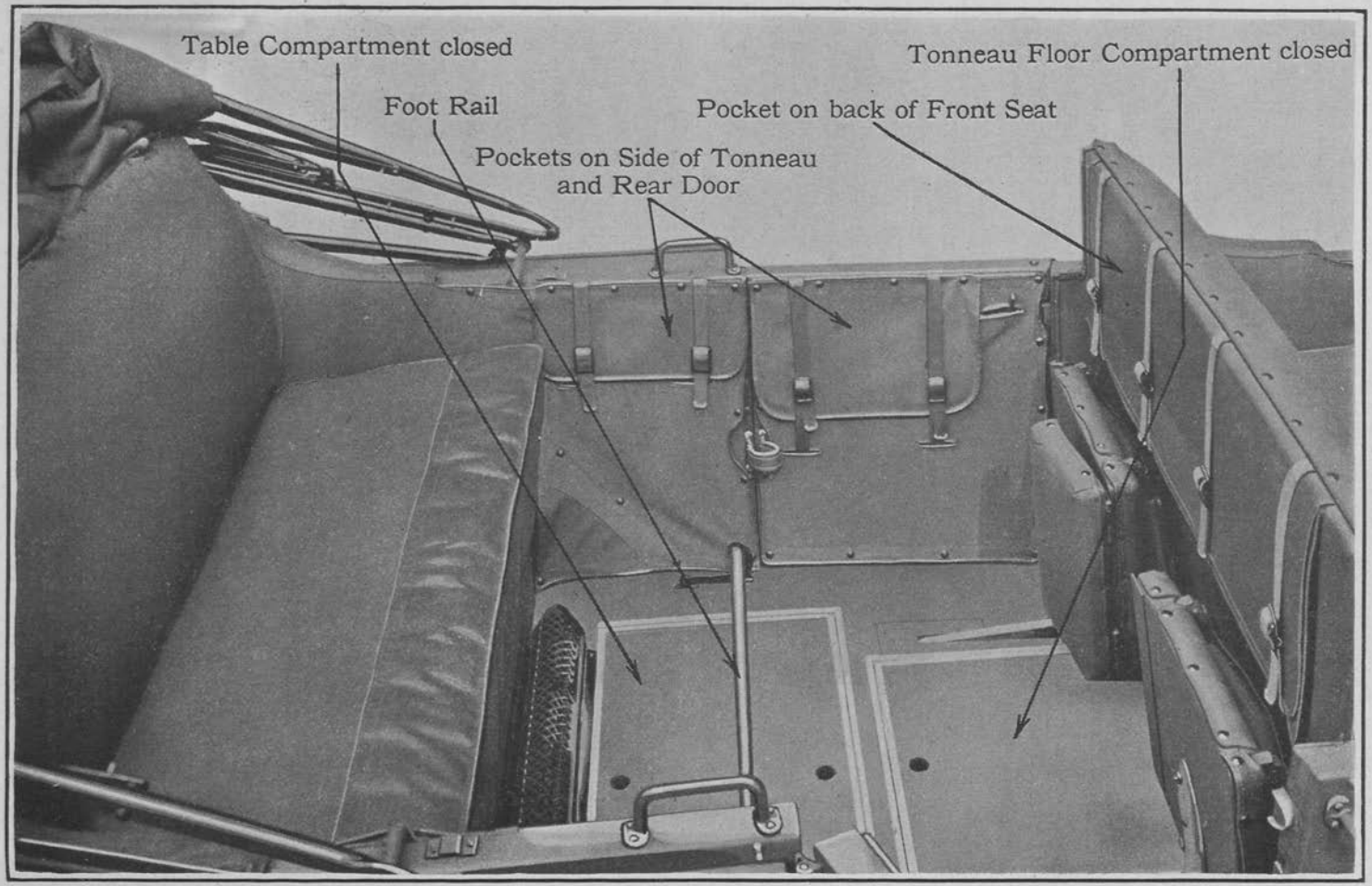
STAFF OBSERVATION BODY

BRIEF DESCRIPTION OF BODY

The Staff Observation Body is mounted upon a White, Model TEB-O, Chassis. This is a four-cylinder chassis having separate power plant, plate clutch, and a four-speed forward and one reverse transmission. An I-beam front axle and semi-floating bevel driven rear axle are used. A pressed steel channel section frame, mounted on semi-elliptical springs, both front and rear, supports the power plant, transmission and body. The car has a wheel base of 140 inches, the wheels being mounted upon 36 inch x 6 inch cord tires.

The body proper is made up very much after the form of a large touring car. There are four doors, two of which give access to the front compartment and two to the tonneau. When the spare tire and rim are carried on the left-hand running board, it is impossible to open the left-hand door, so that, under ordinary operating conditions, the body is virtually a three door one.

The body is provided with two auxiliary folding seats in the tonneau that are so designed that they make a single seat when raised. On account of the width of the front and rear seats, it is possible, therefore, to carry nine passengers without crowding. A one-man type of folding top is provided and a rain vision windshield to which the front end of the top is fastened. In addition to the top fastening provided on the upright of the windshield, straps are used to help hold down the front end of the top. Behind the body on a rear extension of the frame side rails, are carried two large accessory chests. Upon these chests are also carried, in suitable receptacles, both the long and short handle shovels, and the axe and hatchet, which are part of this car's equipment. On the right-hand running board, there is a long tool box. On the left-hand side, there is a smaller tool box located to the rear of the battery box. The battery box is also carried on the board just to the rear of the spare tire, and between the two doors on the left-hand side. Body tool boxes are carried on each side of the tonneau above the rear mud guards. These boxes are not interchangeable and are designated, right and left, according to the side of the car upon which they are carried. The safety can and the lantern are carried in two cylindrical pockets attached to the running



TONNEAU OF STAFF OBSERVATION CAR

board shield, just ahead of the rear fenders. The lantern is usually carried on the right-hand running board and the safety can on the left-hand.

BODY COMPARTMENTS

There are two main compartments in the body, the front compartment and the rear compartment. The forward compartment carries all of the instruments and is usually called the driver's compartment, while the compartment back of the rear seat is called the tonneau. There are storage compartments under both the front and rear seats, although that under the front seat is completely taken up by the gasoline tank. The compartment under the rear seat, however, provides considerable storage space. In addition, there are two other compartments located under the tonneau floor. The rear one of these is shallow, and is that in which the tonneau table is carried. The forward one is deeper and provides carrying space for a large number of small articles that must be well protected. On the back of the front seat, on each of the rear doors and on each side of the tonneau, back of the doors, there are large bellows type pockets in which maps, papers, etc., may be conveniently carried. All of the cushions and the entire interior trimming of the body are protected by covers. The pockets mentioned above are part of these covers.

The one-man-folding top which is provided carries complete curtain equipment, so that the car may be enclosed in inclement weather. Rods are provided that go in sockets on the top of each of the doors and over which the outer end of the top curtains may be slipped. By means of this construction it is possible to swing the curtains with the doors when they are opened instead of having to unfasten them. This makes it as convenient to get in and out of the car with the top curtains in place as when they are not in use.

DETAIL DESCRIPTION OF STAFF OBSERVATION CAR BODY

SEAT DIMENSIONS

The front seat is 43 inches wide inside of the trimming, or padding, on the sides and is 17.25 (17¼) inches high to the front edge. The depth of the front cushion from front to rear is 16 inches.

The rear seat cushion measures 51.5 (51½) inches wide inside of the trimming, is the same height as the front, and is 18.5 (18½) inches deep fore and aft.

The auxiliary seats are provided with small hair pads, 15 inches deep fore and aft. The top of the cushion on these seats is 13 inches above the tonneau floor. When these auxiliary seats are folded down, they go into pockets provided in the back of the front seats, giving a clean tonneau space from the front edge of the rear doors to the front of the rear seat cushion.

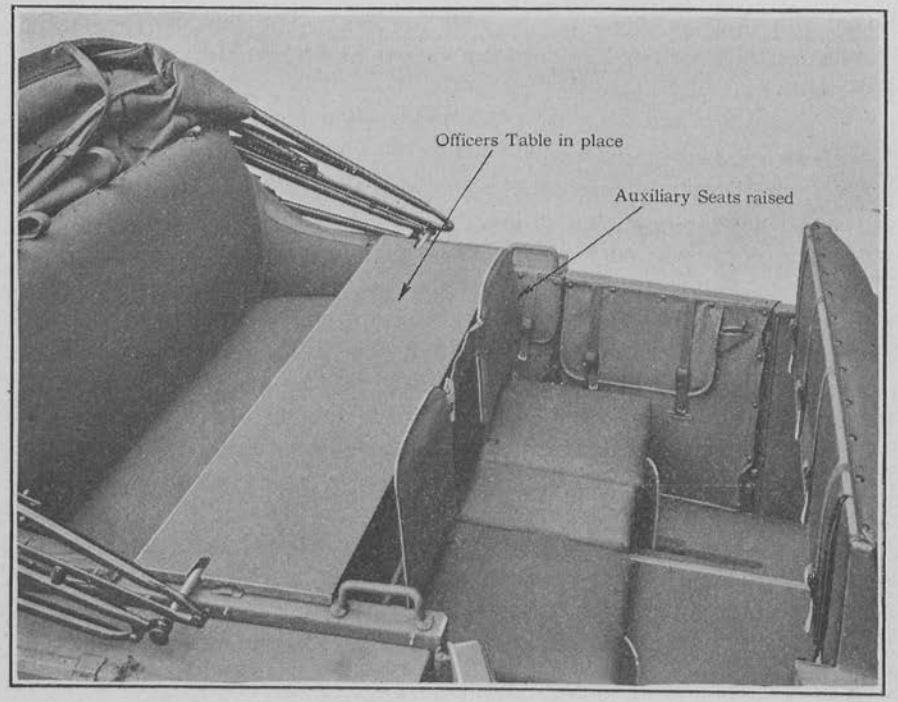


PLATE 54—TONNEAU, SHOWING SEATS AND TABLE

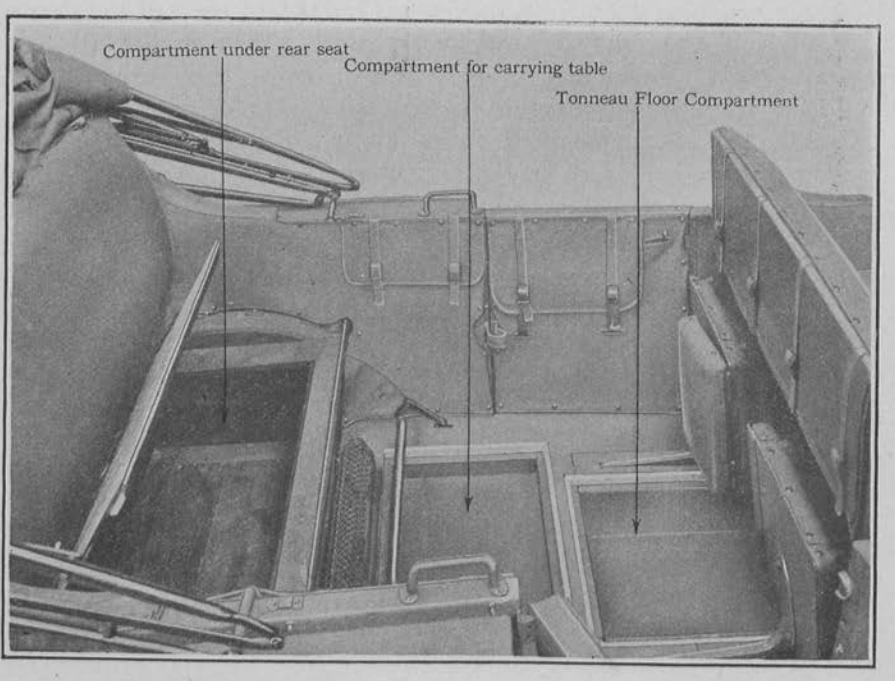


PLATE 55—TONNEAU, SHOWING COMPARTMENTS

BODY COMPARTMENTS

DRIVER'S COMPARTMENT

The driver's compartment is approximately 43 inches wide, and the distance from the rear of the dash board to the front edge of the front seat cushion is 27 inches.

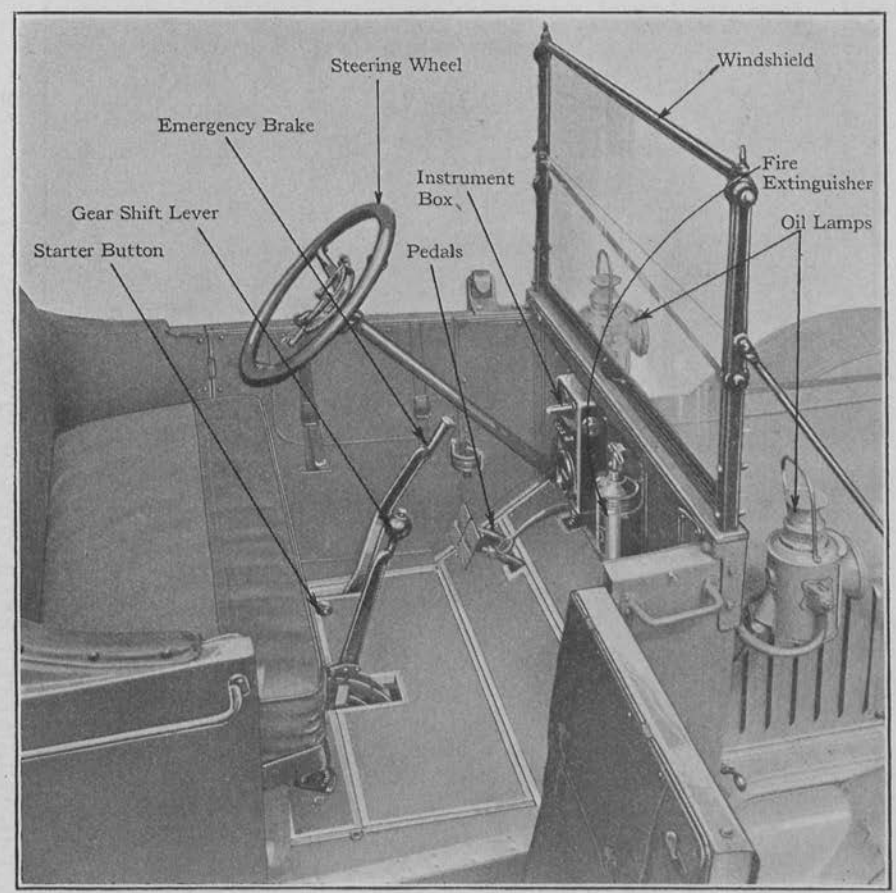
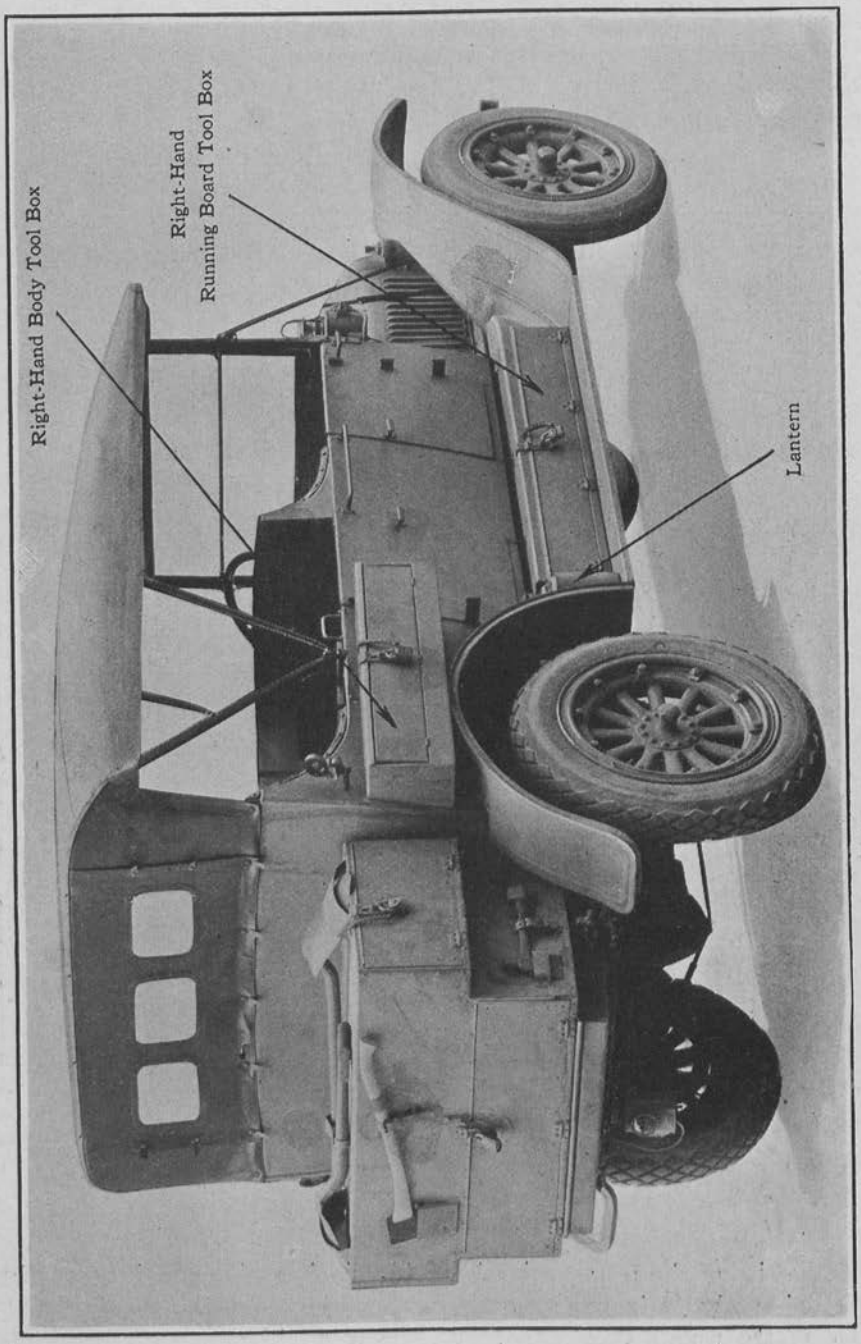


PLATE 56—DRIVER'S COMPARTMENT

TONNEAU DIMENSIONS

The size of the tonneau is 51.5 (51½) inches wide and it measures approximately 42 inches from the rear of the front seat to the front edge of the rear seat cushion. When the auxiliary seats are raised, there is a distance of 10 inches between the back of the auxiliary seats and the front edge of the rear cushion.

PLATE 57



THREE-QUARTER REAR VIEW OF STAFF OBSERVATION CAR

FRONT SEAT COMPARTMENT

The front seat compartment is reached by opening a lid upon which the front seat cushion rests. This gives access to the gasoline tank for filling. The gasoline tank occupies all of the compartment under the front seat.

REAR SEAT COMPARTMENT

The rear seat compartment can be reached either through the trap door provided in the top of it and upon which the rear seat cushion rests, or through a door in the heel door of the rear seat. On those cars equipped with an exhaust heater, the latter door cannot be opened.

Space under the rear seat is 37 inches long, 19.5 (19½) inches wide from front to rear, and 8 inches deep measured vertically.

TONNEAU FLOOR COMPARTMENTS

There are two compartments under the tonneau floor boards. The smaller and shallower one of these is located at the rear. The officers' table is carried in this. It is made from pressed steel and is hung from the tonneau boards. It measures 2 inches deep, 29.5 (29½) inches wide across the car, and 15.375 (15⅜) inches from front to rear.

The larger tonneau floor compartment is 4 inches deep and varies in width from top to bottom, the bottom measuring 14.812 (14 13/16) inches wide and the top 17.812 (17 13/16) inches wide. Across the car the width is 19.25 (19¼) inches. This receptacle is also made from sheet steel and is suspended from the tonneau floor boards.

OUTSIDE TOOL BOXES AND CHESTS

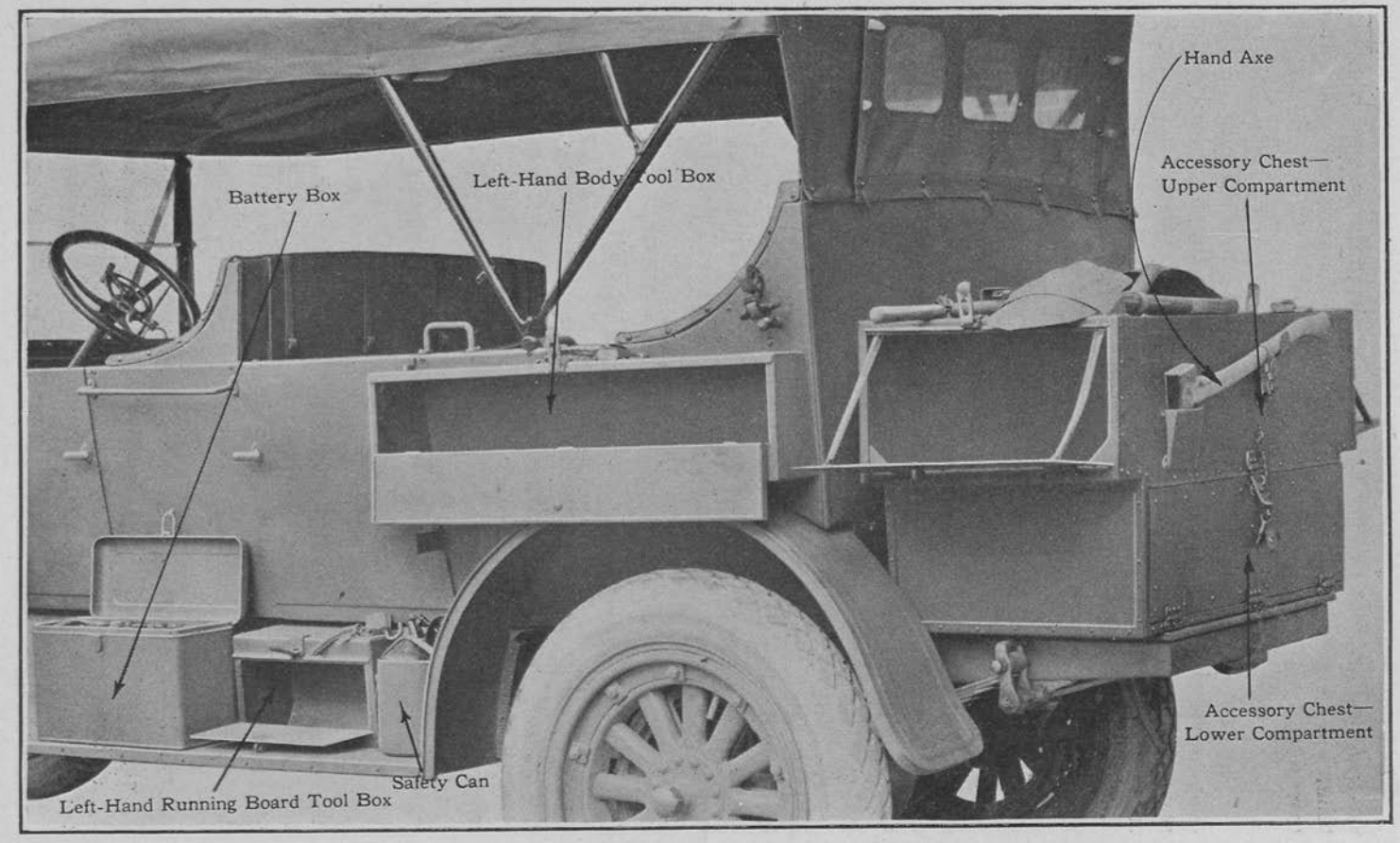
RUNNING BOARD TOOL BOXES

There are two running board tool boxes, one located on the right side running board and a small one on the left-hand running board. Each of these boxes is provided with a hasp and padlock, by means of which they may be locked. The door of the long running board tool box is carried upon four hinges, which are located at the bottom edge. The inside measurements of this box are approximately: 65.5 (65½) inches long, 9.5 (9½) inches high and 7.5 (7½) inches wide, or deep.

The left running board tool box is provided with but two hinges, also located at the bottom edge of the door. This box has the following approximate inside measurements: 17 inches long, 9.5 (9½) inches high and 7.5 (7½) inches wide, or deep.

BODY TOOL BOXES

There are two body tool boxes, located one on each side of the tonneau, back of the tonneau doors and just above the rear mud guards. These boxes are provided with a door on the side, hinged along the bottom edge with three butt hinges and locked by means of a hasp and



REAR LEFT VIEW, SHOWING TOOL BOXES

padlock. These boxes are tapered from front to rear and, therefore, are not interchangeable. They are designated as the right and left-hand boxes, according to the side of the car upon which they are attached. Their measurements inside are as follows: Length, 40 inches; height inside, 8.375 (8 3/8) inches, and average width, 6.5 (6 1/2) inches.

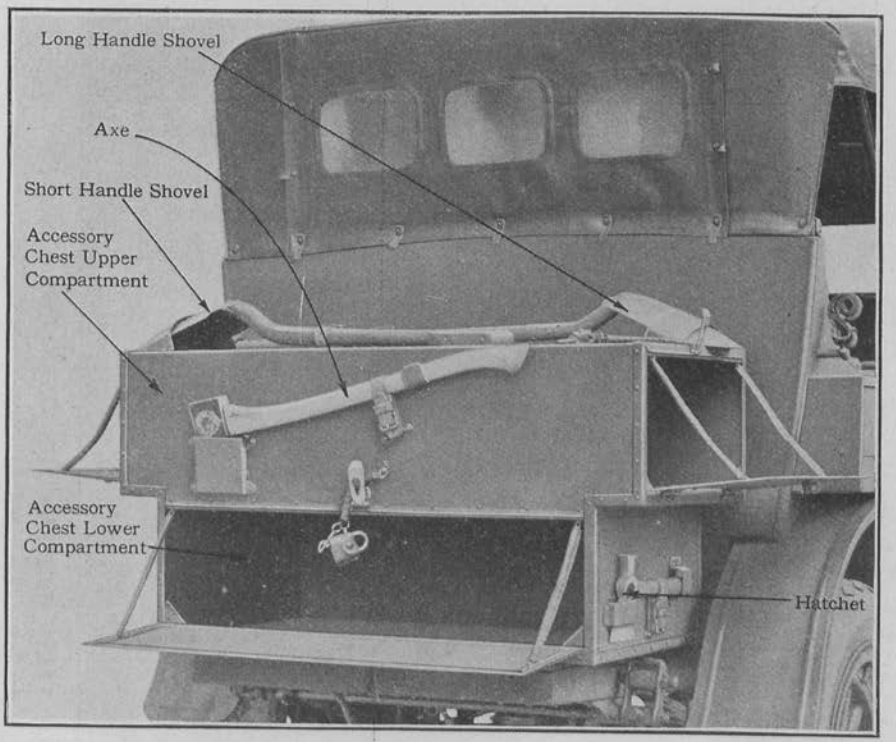


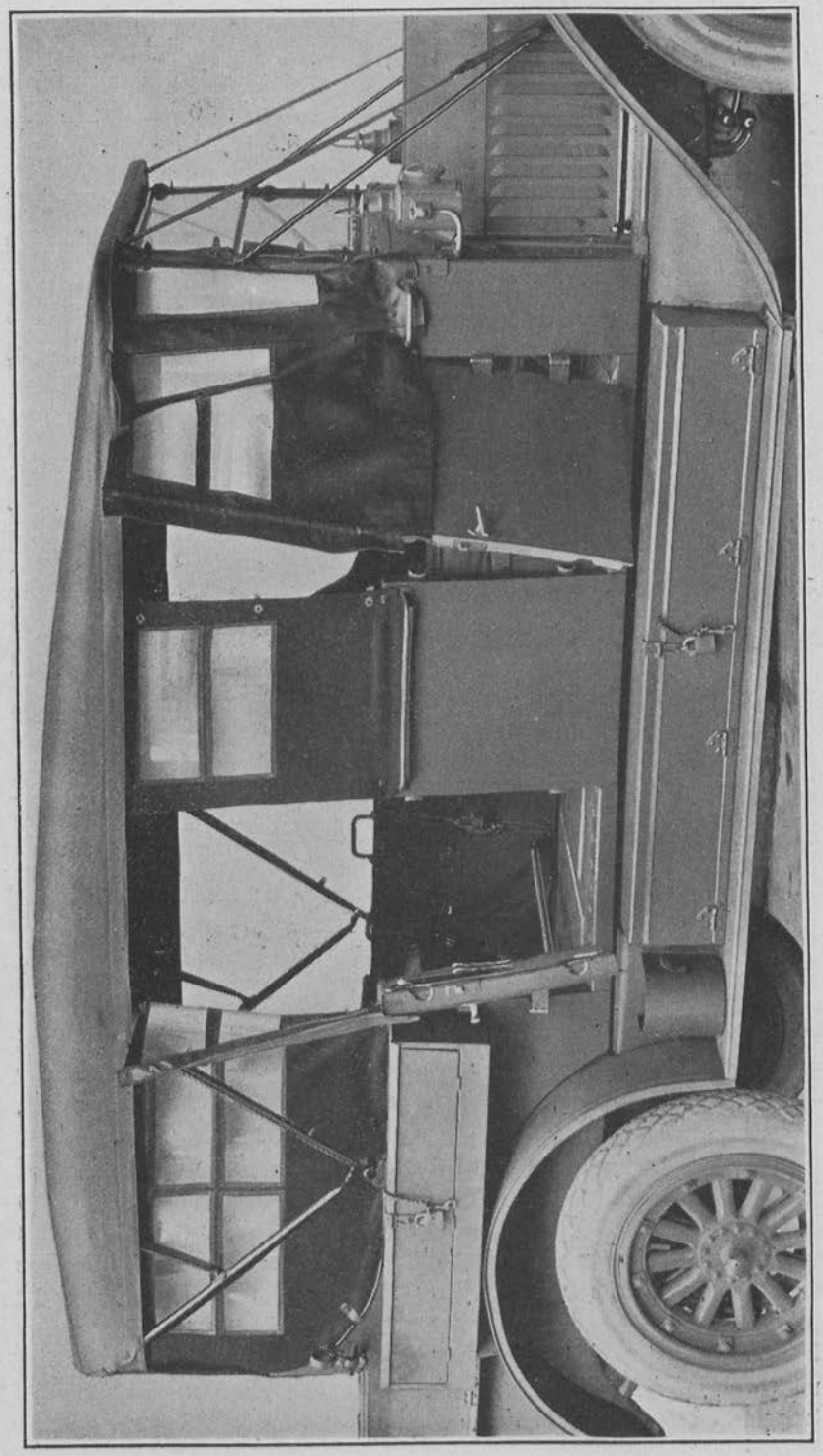
PLATE 59—ACCESSORY CHEST

ACCESSORY CHESTS

On the rear extension of the frame are carried two chests, called the accessory chests. The lower one of these is provided with a rear door hinged at the bottom, and the upper one with doors at either end, also hinged at the bottom. Padlocks and hinges are provided to lock all three doors provided on the accessory chests. The dimensions of the chests are as follows: The upper chest measures inside 48.75 (48 3/4) inches, width 22.625 (22 5/8) inches from front to rear, and 12.25 (12 1/4) inches high. The lower accessory chest measures 41.5 (41 1/2) inches across the car, 22.625 (22 5/8) inches wide from front to rear, and 12 inches high.

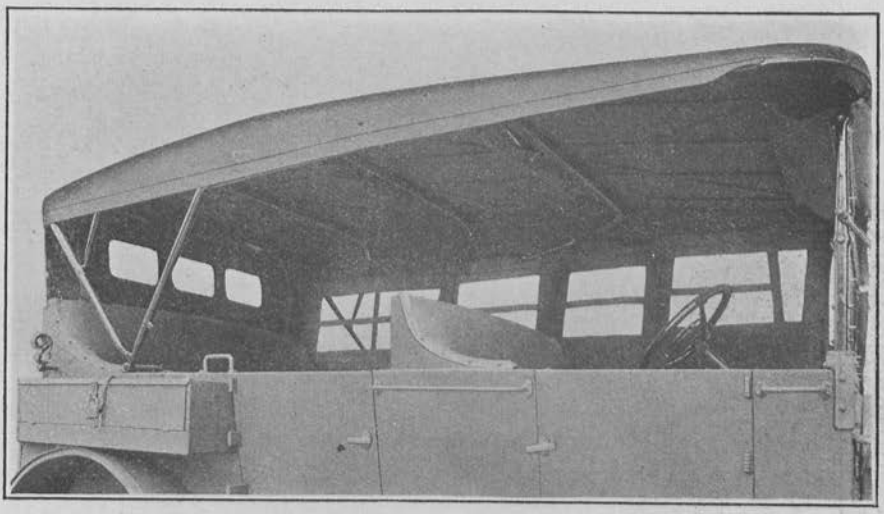
The axe is fastened to the rear of the accessory chest, and the hatchet to the right hand end of the lower chest. The two shovels are strapped onto the top of these chests.

PLATE 60



RIGHT SIDE VIEW OF STAFF OBSERVATION CAR, CURTAINS DOWN

PLATE 61



TOP, CURTAINS PARTLY DOWN

TOP ASSEMBLY

The top assembly is of the one-man-folding type. It is carried in top bow sockets mounted upon each side of the tonneau and held down in front by latches, which are attached to the uprights of the windshield. Two straps are provided to give the front end of this top additional support. Inside of the top there are four rolls of top curtains. These do not interfere with the raising or lowering of the top and are conveniently arranged so that the top curtains may be put up in the quickest way possible when required.

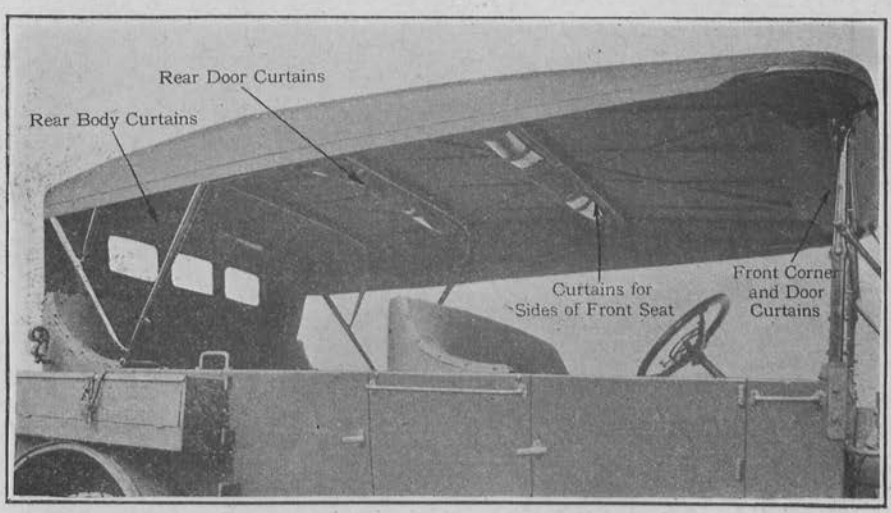
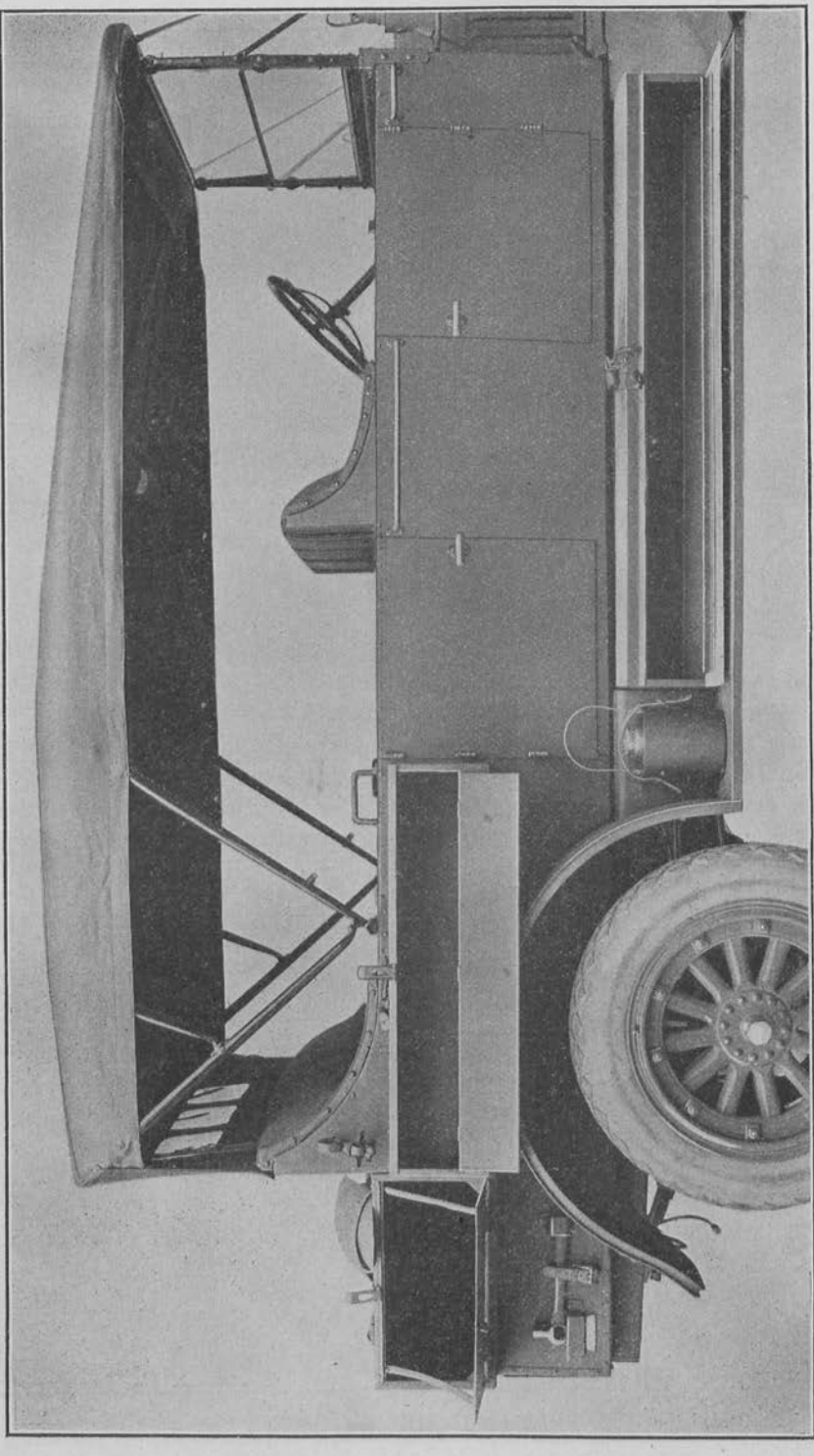


PLATE 62—TOP, CURTAINS UP

PLATE 63



RIGHT SIDE VIEW OF STAFF OBSERVATION CAR BODY

TOP CURTAINS

The distribution of the top curtains in the four places provided in the top is as follows: The two curtains required for the front door and front corner of the body are carried in a pocket attached to the front end of the top, just inside of the windshield. On the second cross bow, starting from the front end of the top, are carried the curtains which protect the section of the body between the two doors. On the third cross bow are carried the curtains which fasten onto the tonneau doors, and in the rear upper corner of the top are carried the two curtains which enclose that portion of the body back of the tonneau doors.

CARE OF CURTAINS

The curtains should be rolled up, after having been used, only when they are dried out. If it is necessary to roll the curtains up before they are dried out, they should be unfolded as soon as an opportunity is presented and allowed to dry before they are permanently rolled up. The front door and front corner curtains are not fastened to the top and so, when they are removed, they should be immediately put in the pocket at the front end of the top provided for this purpose. The other curtains are fastened to the top by straps and rings so that they cannot be lost. Be sure to fasten both curtains up before attempting to roll them, unless it is necessary to keep one set of curtains up. Buttons are provided to support the unattached end of each of the curtains before they are rolled up. By observing this precaution in rolling up the top curtains, the life of the celluloid windows will be greatly increased.

WINDSHIELD

The windshield rests upon the front end of the dash board and body. It is attached to this by brackets bolted to the corners of the body. The windshield is divided into two halves, upper and lower, both of which are provided with swivels so that the lower may be used for ventilating purposes when necessary. The windshield is provided with support rods extending down from either upright to the lamp bracket.

TOOL AND SPARE TIRE BRACKETS

On the left-hand side of the body, beside the driver but outside of the body, is the upper spare tire holder. Near the ends of this piece are rectangular holes for the strap holding the tire to pass through. The lower tire holder is bolted to the running board and is made of 0.25 (¼) inch by 1.5 (1½) inch steel stock formed into a U shape. Across the top is a piece so arranged that it may be locked to the U shaped piece, thus securing the tire.

ARMY ARTILLERY FIRE CONTROL EQUIPMENT

The following table is a list of Fire Control Equipment for a Battery and Battalion of 8 inch Howitzer, Vickers M-VI and VII—9.2 Howitzer, Vickers M-I and II—240 mm. Howitzer—Schneider.

The Staff Observation Car will carry such part of this equipment, for the various organizations to which Staff Observation Car is issued, as occasion may require, or as may be definitely allotted to it.

ORDNANCE MATERIAL	Battery	Battalion
Prismatic Compass	2	3
80 Meter Steel Tape	2	3
Arms, metal, 1 meter long, grad. 1/20,000	3	3
Azimuth Instrument	2	2
Periscopic Azimuth Instrument	2	2
Protractor, metal 6" rad., grad. mils	2	2
Aiming Rule	5	0
Batteries, extra for flashlights	18	16
Range and Deflection Board	1	1
Bulbs, extra for flashlights	4	4
Flash Lights, electric	9	8
Range Tables	12	12
Range Tables, abridged	12	12
B. C. Telescope	1	1
Stop Watches	6	6
Plotter Aircraft Observation	1	1
Deviation Board	1	1
Aiming Circle	2	0

SIGNAL CORPS MATERIAL	Battery	Battalion
Amplifiers, Comp. 3-4v. and 2-40v. St. Battery	1	0
Axes, hand	8	4
Bags, tools, service	1	1
Bars, digging, standard	2	2
Batteries, extra, Tungsten, Type A	9	8
Batteries, extra, Eveready No. 703	24	24
Batteries, extra, for t. m. signal lamp	5	5
Bells, vibrating 110 chm. 15 volt	2	2
Belts, Linemans' with safety strap	1	1
Binding Posts	15	10
Books, field message	10	10
Bulbs, extra for flashlight	4	4
Cable, 1 pair lead k. m	1	1
Carts, reel, hand	2	2
Charging Sets, 15 and 110 volts	0	1
Climbers, pairs, with straps	1	1

ARMY ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

SIGNAL CORPS MATERIAL—*Continued*	Battery	Battalion
Barometer, grad. millimeters and inches	1	1
Cross Arms, 1 m. x 10 cm. x 5 cm	140	93
Electrolyte, 28" Baume 10 L. carb'ys	0	1
Envelopes, field message	0	500
Flashlights, electric complete	9	8
Fuses, extra 1 amp. for 4 x 12 line boards	40	40
Glasses, field, Huet, 8 power	4	4
Grips, Buffalo No. 2	1	1
Hammers, sledge	2	2
Hydrometers, Baume	1	2
Insulators, clamp	16	12
Insulators, pigtail	100	60
Insulators, pony	23	17
Insulators, wooden knob, French, 25 cm	220	220
Insulators, wooden knob, French, 45 cm	640	600
Knives, electricians'	8	4
Lamps, signaling, type t. m., French	5	5
Marlin, (Lbs.)	5	5
Pliers, wire cutting, 8 inch	8	8
Megaphones	1	1
Nails, 10 cm. long, keys	2	2
Panels, each side 9 meters long, white	1	1
Panels, each side 9 meters long, black	1	1
Panels, each side 3 meters long, white	3	3
Panels, each side 3 meters long, black	3	3
Panels, rectangular (Sapinottes) white	3	3
Panels, rectangular (Sapinottes) black	3	3
Poles, lance	100	60
Projectors, 24 cm., with batteries	0	2
Projectors, 35 cm., with bateries and tripod	0	1
Projectors, 14 cm., case	1	0
Pulley Blocks, double W. E. No. 760,330	2	0
Radio Sets, type E 10, complete	0	1
Receiving Sets, type A, complete	1	0
Reels, Breast, French type	1	2
Rope, 15 mm. diameter, meters	35	0
Screw Drivers, 6 inch	4	2
Screws, lag. 10 mm. x 10 cm. (for cross arms)	300	220
Screws, wood 5 mm. x 50 mm., gross	2	4
Spoons, digging	1	1
Staples, insulated, Blake	400	660
Switchboard, telephone, 4 line monotype	2	2
Switchboard, telephone, 12 line monotype	1	1
Tape, friction, pounds	3	3
Tape, rubber, pounds	2	2
Telephone, model 1375 B	12	12
Voltmeter, Weston No. 280	0	1
Watches, wrist, luminous, with wristlet	5	1
Wire, G. I. for guys, No. 12, km	1	1
Wire, twisted, pair outpost, km	8	8
Mercurial Barometer, grad. mm	0	1
Thermometers, grad. centigrade and Fahrenheit	2	2
Poles, 23 to 25 m. long, 10 cm. dia. (Sapinottes)	250	220

ARMY ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

ENGINEER CORPS MATERIAL	Battery	Battalion
Alidade, open sight	1	2
Alidade, telescopic	2	2
Artillery Board (Planchette de tir.)	1	3
Chest, instrument	1	1
Chest, rod	1	1
Clinometer, hand	1	2
Field Chest	1	1
Level Rod Planetable, with tripod	1	2
Ranging Poles	4	6
Record, hand tally	1	2
Stadia Rod	2	4
Tally Pins	12	24
Tape, repair outfit	1	2
Tape, steel, 100 m. long	1	2
Transit	1	1
Beam Compass Bar	1	2
Bureau of Standards Circular No. 47	1	1
Contour Pens, swivel	1	1
Curvimeter	1	1
Curves, irregular	1	1
Dividers, bow spring	1	1
Dividers, with Pen and Pencil	1	1
Drawing Boards, 24″ x 36″	1	2
Drawing Boards, 18″ x 24″	1	2
Drawing Instruments	1	1
Engineer Field Manual	1	1
Ephemeris, French if possible	1	1
Geometry	0	1
Johnson's Surveying	0	1
Log. Tables, 7 place degrees	2	2
Log. Tables, 5 place grades	2	2
Log. Tables, 5 place mils	6	6
Orientaur Officer's Manual	2	2
Parallel Rulers, 12″ rolling	2	2
Pens, large	1	1
Pens, medium	1	1
Pens, small	1	1
Planimeters	0	1
Proportional Dividers	1	2
Protractors, 12″ diam. degrees	2	2
Protractors, 6″ diam. degrees	2	2
Protractors, 12″ diam. grades	2	2
Protractors, 6″ diam. grades	2	2
Protractors, 12″ diam. mils	2	2
Protractors, 6″ diam. mils	2	2
Reconnaissance Sets	1	1
Scales, map, 30 cm. metric 1/20,000 and 1/50,000	4	6
Scales, map 30 cm. metric 1/50,000 and 1/10,000	4	6
Searles, field	0	1
Section Liner	0	1
Smithsonian Geographic Tables	0	1
Spline Weights, 3¼ to 3¾ lbs.	0	12
Spline, xylonite, grooved 36″	0	1
Straight Edge, 2 meters long	0	1
Straight Edge, 1 meter long	2	3
Tape, map steel	2	4
Tapes, pocket steel	4	6
Transit Books	12	12
Trautwine's Handbook	0	1

ARMY ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

ENGINEER CORPS MATERIAL—*Continued*	Battery	Battalion
Triangles 12″, 30 and 60 degrees	2	2
Triangles 6″, 30 and 60 degrees	2	2
Triangles 12″, 45 degrees	2	2
Triangles 6″, 45 degrees	2	2
Trigonometry, plane	0	1
Typewriter, Corona	0	1
Typewriter, Corona ribbon	0	3
T-Square, 36 inch	1	3
Vertical Angle Tables	2	2
Wilcox's French Military Dictionary	0	1
Celluloid Sheets, 20 x 35	36	36
Clock Oil, bottle	3	3
Computation Paper Pads, ruled	30	30
Computation Paper Pads, unruled	30	30
Cross Section Paper, opaque	2	2
Cross Section Paper, transparent	2	2
Drawing Ink, black waterproof	9	9
Drawing Ink, green waterproof	2	2
Drawing Ink, blue waterproof	2	2
Drawing Ink, brown waterproof	2	2
Drawing Ink, brick red waterproof	2	2
Drawing Paper, double mount Para, 24″ x 36″	24	24
Drawing Paper, thin eggshell, 24″ x 36″	36	36
Drawing Paper, single mount, 35″ x 10 yards	3	3
Erasers, pencil, ruby	15	18
Erasers, ink typewriter disc	9	9
Erasers, steel	3	3
Erasers, art gum	9	9
Erasers, sponge	6	6
Glue, pint cans	3	3
Horn Centers, 5″ dia	3	3
Ink, fountain pen, bottles	4	4
Lumber Crayon, boxes, red	3	3
Magnifying Glass, pocket	1	2
Manila Envelopes, 10″ x 15″	48	48
Manila Paper, sheets, 24″ x 36″	512	512
Map Tube, galvanized iron, 6″ x 37″	2	2
Oil Stone, 3″ with case	1	2
Paint Boxes	1	1
Paste Jar	3	3
Pencils, red	15	15
Pencils, blue	15	15
Pencils, brown	15	15
Pencils, green	15	15
Pencils, drawing, Venus, 9 H	36	36
Pencils, drawing, Venus, 6 H	36	36
Pencils, drawing, Venus, 3 H	36	36
Pencils, writing No. 2	84	84
Pencil Points, for beam compass	36	36
Pencil Points, for dividers	36	36
Pen Holders, writing	8	8
Pen Holders, drawing	8	8
Pen Holders, crowquil	3	3
Pens, crowquil	14	14
Pens, drawing, Gillett No. 303	60	60
Pens, drawing, Gillett No. 170	24	24
Pens, drawing, Gillett No. 290	24	24
Pens, drawing, Gillett No. 404	60	60
Pens, drawing, Gillett No. 291	36	36

ARMY ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

ENGINEER CORPS MATERIAL—*Continued*	Battery	Battalion
Pins, red, blue, black and green, cubes	18	18
Reading Glass, 3″	1	2
Rubber bands, box	4	4
Sandpaper Pads	7	7
Sealing Wax, stick	2	2
Shears, 12″	1	2
Sponges for Cups	6	6
Sponge Cup, with sponges	2	2
Thumb Tacks	288	288
Tracing Linen, roll 36″ x 10 yards	2	2
Tracing Paper, roll veg. 30″ x 1 yard	2	2
Water Colors, extra sets for boxes	1	1
Water Color Ink, Prussian Blue	3	3
Water Color Ink, Burnt Sienna	3	3
Water Color Ink, Hockers' Green	3	3
Water Color Ink, Crimson Lake	3	3
Water Color Ink, Burnt Umber	3	3
Water Color Ink, Chinese White	13	3
Water Color Ink Brushes	24	24

DIVISIONAL ARTILLERY FIRE CONTROL EQUIPMENT

The following table is a list of Fire Control Equipment for a Regiment of 75 mm gun—4.7 inch gun—155 mm Howitzer—155 mm gun—horsed and motorized.

The Staff Observation Car will carry such part of this equipment, for the various organizations to which Staff Observation Car is issued, as occasion may require, or as may be definitely allotted to it.

ORDNANCE MATERIAL	Battery	Each Headquarters	Total Regiment		Brig. Hdq.
			Light	Heavy	
B. C. Telescope, Mod. 1915, tripod, cases, accessories	2	1	15	16	1
Aiming Circle, tripod and cases (Mod. 1916)	1	1	9	10	0
Observation Telescope Monocular, tripod and cases	1	1	9	10	1
B. C. Periscope, Mod. 1918, tripod and cases	1	2	12	14	0
Range Finder, 1 meter base, tripod and cases	1	1	9	10	0
Sitogoniometer and Case	2	1	15	16	1
Observation Circle with Field Glass Support, tripod and cases	2	1	15	16	1
Prismatic Compass, tripod and cases (Mod. 1918)	2	2	18	20	2
Firing Board, 50 x 76 cm., zinc covered, with waterproof cover	2	1	15	16	0
Ruler, xylonite or zinc, 60 cm. graduated	2	1	15	16	1
Protractor, zinc, semi-circular, in mils	2	1	15	16	1
Squares, zinc	2	2	18	20	2
B. C. Ruler, wooden, with string	10	10	90	100	10
Strings, extra for B. C. ruler	8	8	72	80	8
Steel Tape, 90 meter	1	2	12	14	1
Slide Rule, Mod. 1917, for solution of triangles and case	1	1	9	10	1
Time Interval Recorders, chains and shock absorbers	3	3	27	30	3
Flash Lights, with hoods	5	5	45	50	5
Flash Lights, without hoods	16	16	144	160	16
Aiming Posts	12	0	72	72	0
Rocket Board	2	1	15	16	0
Jacobs Staff and Field Glass Support	3	1	21	22	3
Zinc Sheets, 50 x 76 cm., for maps	4	2	30	32	4
Protractor, celluloid, semi-circular (Mod. 1917)	3	3	27	30	3
Dry Cells, No. 6, extra for lighting device and case	16	0	96	95	0
Pick Mattock and Carrier (infantry)	2	2	18	20	2
Dry Cells, Batteries, extra for flash lights and case	30	30	270	300	30

DIVISIONAL ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

SIGNAL CORPS MATERIAL	Battery	Headquarters Company	Total Regiment		Brig. Hdq.
			Light	Heavy	
Accumulators, 4 volt, 100 amp. hours	0	2	2	2	2
Accumulators, 40 volt, 3 amp. hours	0	2	2	2	2
Batteries, dry, No. 6	0	9	9	12	4
Amplifiers, 3 terminal, French	0	1	1	1	1
Batteries, Eveready No. 703, extra	6	12	48	52	12
Bells, vibrating, 50 ohm. or equivalent	0	6	6	8	2
Carts, wire, hand (Brouette Doroulense)	1	3	9	10	3
Books, field message	0	25	25	25	100
Cases, battery	1	2	8	9	2
Climbers, with straps (pairs)	1	3	9	10	1
Clips, testing, Muller universal or Frankel	8	18	66	72	18
Fuses, 1 amp., for 4 No. 12 line boards	24	24	168	180	24
Field Glasses, Huet, 6 power (pairs)	8	21	69	74	11
Headsets, telephone	4	9	33	34	0
Insulators, wooden knob	100	100	700	700	100
Flag Kits, combination, standard	12	50	122	137	16
Inspector's Pocket Kits	3	6	24	26	6
Electrician's Knives	4	8	32	36	0
Megaphones	2	3	15	16	0
Nails for Insulators	100	100	700	700	100
Panels, artillery brigade, black	0	0	0	0	1
Panels, artillery brigade, white	0	0	0	0	1
Panels, artillery type, white	0	3	3	4	0
Panels, artillery type, black	0	3	3	4	0
Pliers, side cutting, 8 inch	2	6	18	20	6
Poles, sectional bamboo (2 section 2 m. each)	0	6	6	8	6
Projectors, 24 cm. with batteries	0	10	10	13	5
Projectors, 14 cm., 3 in. case complete with baty. and cases	1	0	6	6	0
Receiving Sets, artillery, type "A-1, "complete (French)	0	4	4	5	2
Reels, breast	0	0	0	0	6
Radio Sets, type "E-10" B15 (French)	0	0	0	0	1
Switch Boards, telephone, 12 line monotype	0	3	3	4	2
Tape, friction, pounds	3	6	24	26	3
Telephones, Western Electric	6	12	48	52	12
Watches, wrist, luminous dials	0	20	20	25	20
Wire, outpost, twisted (pairs, k/m)	8	24	72	80	86
Thermometer, centigrade and Fahrenheit	3	0	18	18	0
Switch Boards, telephone, 4 line monotype	2	6	18	20	0

DIVISIONAL ARTILLERY FIRE CONTROL EQUIPMENT—*Continued*

ENGINEER CORPS MATERIAL	Battery	Headquarters Company	Total Regiment		Brig. Hdq.
			Light	Heavy	
Alidade, brass, open sight, levelling	1	3	9	10	1
Alidade, miniature telescopic, with declinator	0	1	1	1	0
Alidade, periscope	0	1	1	3	0
Abney, clinometer	1	3	9	10	1
Clinometer, telescopic, with slide rule	1	3	9	10	0
Planetable, 18 x 24, tripod attach., fibre case waterproof cover	1	3	9	10	1
Planetable, 16 x 16, tripod attach., fibre case waterproof cover	*1	3	9	0	0
Tripod, ext. leg, Gurley movement, with case	*1	3	9	0	0
Tripod, ext. leg, Johnson movement, with case	*1 (2)	3	9	20	1
Declinator, with 2 clamp screws	2	6	18	20	1
Drawing Instruments (1 pr. compasses, ext. leg, drg. pen, prop. dividers	1	3	9	10	1
Stadia Rod, 10 ft. folding	1	3	9	10	0
Plumb Line	2	6	18	20	1
Scales, plotting, 1/20,000 and millimeters	3	9	27	30	2
Steel Arrow (tally pins, 10 in set)	1	3	9	10	1
Glass, magnifying, pocket	1	3	9	10	1
Chests for topographic equipment	1	3	9	10	1
Protractor, xylonite, rectangular	1	3	9	10	1
Compass, watch	20	60	180	200	20
Compass, marching	10	30	90	100	10
Boards, sketching, with extension tripod	1	6	12	14	1
Ruler, boxwood, triangular, 8 inch	1	6	12	14	1
Tally Machine	1	6	12	14	1
Clinometer, reconnaissance	1	6	12	14	1
Celluloid Sheets	12	72	144	168	12
Eraser, pencil, art gum	1	6	12	14	1
Eraser, drawing, rubber	2	12	24	28	2
Holders, for timing pads	1	6	12	14	1
Thumb Tacks, box	1	6	12	14	1
Pencils, drawing	12	72	144	168	12
Pads, timing	4	24	48	56	4
Pencils, colored, assorted	12	72	144	168	12
Protractors, pencil point	4	24	48	56	4
Knife, steel eraser	2	12	24	28	2
Pocket for pencils	1	6	12	14	1
Tape, adhesive, rolls	2	12	24	28	2
Sandpaper Pads	2	12	24	28	2
Paper, drawing, single 24″ x 5 yds. roll in Japan tube	1	3	9	10	1
Chest, for sketching equipment	1	6	12	14	1
Alidade, boxwood, open sight	1	3	9	10	1
Planetable, 24 x 31″, tripod attach., fibre case, waterproof cover	†1	4	0	10	0

NOTE—*Issued to 75 mm. Battery only. †Not issued to 75mm. Battery.

SEACOAST GUN FIRE CONTROL EQUIPMENT

The following table is a list of Fire Control Equipment for a Regiment of 5-inch and 6-inch Converted Seacoast Guns.

The Staff Observation Car will carry such part of this equipment, for the various organizations to which Staff Observation Car is issued, as occasion may require, or as may be definitely allotted to it.

SIGNAL EQUIPMENT	Number for 1 Battery	Number for Battalion Hdqtrs.	Number for Regimental Hdqtrs.	Total for 1 Regiment
Barometer, aneroid	1	1	1	10
Barometer, mercurial	...	...	1	1
Batteries, tungsten, type A	10	10	10	100
Buzzers, service	5	...	5	50
Cases, battery	1	1	1	10
Connector, buzzer, type A	6	6	6	60
Connector studs, 19 pt	12	12	12	120
Cords, buzzer	10	10	10	100
Glasses, field, E. E.	20	20	20	200
Kits, inspector's pocket	5	5	5	50
Kits, flag, combination artillery	16	16	16	160
Megaphones	2	2	2	20
Heliographs	1	4	3	21
Daylight flash-signal outfits	1	4	3	21
Night flash-signal outfits	1	4	3	21
Switchboards, outpost	...	1	2	5
Wire, field, miles	6	12	12	84
Telephones, complete, model 1917	6	6	6	60
Plugs, buzzer	2	2	2	20
Reels, hand	5	5	5	50
Rods, ground, type D	6	6	6	60
Tape, insulating, pounds (¼-pound rolls)	2	2	2	20
Thermometers, centigrade	2	2	2	20
Thermometers, Fahrenheit	1	1	1	10
Watches, wrist	20	20	20	200
Wire, buzzer, miles	2	2	2½	20½
Wireless set, special	...	1	1	4

FIRE CONTROL EQUIPMENT	Number for 1 Battery	Number for Battalion Hdqtrs.	Number for Regimental Hdqtrs.	Total for 1 Regiment
Azimuth instruments, (special)	2	2	2	20
Azimuth instruments, (periscopic)	2	2	2	20
B. C. ruler for 5-inch guns	10	10	10	100
B. C. ruler for 6-inch guns	10	10	10	100
B. C. telescope	...	1	1	4
B. C. telescope case	...	1	1	4
B. C. telescope tripod	...	1	1	4
B. C. telescope tripod case	...	1	1	4
Correction book	1	1	1	10

CONTENTS:

Height chart.
Atmosphere, muzzle velocity, and wind charts, range 50 per cent zone chart, wind component indicator, deflection board, and deflection corrector.

SEACOAST GUN FIRE CONTROL EQUIPMENT—Continued

FIRE CONTROL EQUIPMENT—Cont'd	Number for 1 Battery	Number for Battalion Hdqtrs.	Number for Regimental Hdqtrs.	Total for 1 Regiment
Elevation slide rule (without ribbon)	1	1	1	10
Flashlight, with hood	5	5	5	50
Flashlight, without hood	16	16	16	160
Logarithmic ribbon for elevation slide rule, without scale of angles	1	1	1	10
Logarithmic ribbon for elevation slide rule, with scale of angles	1	1	1	10
Logarithm tables	3	3	3	30
Metal arms, graduated in meters	3	3	3	30
Plotting board	1	1	1	10
Prismatic compass	2	2	2	20
Prismatic compass case	2	2	2	20
Prismatic compass tripod	2	2	2	20
Prismatic compass tripod case	2	2	2	20
Protractor	2	2	2	20
Range and deflection board	1	1	1	10
Range tables	12	12	12	120
Scale, metric	1	1	1	10
Slide rule, model 1917	1	1	1	10
Steel tape, 30-meter	1	1	1	10
Straightedge, 24-inch, model 1917	1	1	1	10
T. O. B. clock	1	1	1	10
T. A. B. clock	1	1	1	10

RECONNAISSANCE EQUIPMENT	Number for 1 Battery	Number for Battalion Hdqtrs.	Number for Regimental Hdqtrs.	Total for 1 Regiment
Curves, French	1	1	1	10
Celluloid, sheets	8	8	24	96
Clinometer	...	1	1	4
Compass, watch	20	20	60	240
Compass, marching	10	10	30	120
Drawing instruments, field	1	1	1	10
Drawing ink, black, ¾-ounce bottle	6	6	6	60
Drawing ink, red, ¾-ounce bottle	1	1	1	10
Eraser, pencil	2	...	4	16
Holders' timing pad	...	1	1	4
Pace tallies	...	1	1	4
Pencil pockets	...	1	1	4
Pads, timing	4	4	12	48
Paper, sketch (gross)	½	...	1	4
Pencils:				
Blue	2	...	4	16
Drawing	4	4	12	48
Green	2	...	4	16
Red	2	...	4	16
Protractors, Pencil point	2	...	4	16
Planetables, complete	1	1	1	10
Ranging rods	4	4	4	40
Stadia, computer	1	1	1	10
Stadia rods	1	1	1	10
Tape, adhesive, rolls	2	...	4	16
Transit	1	1	1	10

CHAPTER X

EQUIPMENT

CHASSIS AND BODY EQUIPMENT OF STAFF OBSERVATION CAR

CHASSIS EQUIPMENT

Piece Mark		No. Per Car
	Battery, Willard-Str. 4, Gov't. No. 4701-YS or equal, formed and ready for service	1
	Batteries, extra, for flashlight, Tungsten, American Eveready No. 793	2
White No. 367½-GEC	Belt, fan	1
	Book, magneto	1
White No. 166¼-GA	Boot, crank	1
	Box, tool, with 3 trays	1
	Bulb, extra for flashlight, Mazda, American Eveready or equal No. 1197	1
	Bumper, front, with towing hooks	1
	Case, lamp bulb	1
	Bulbs, 6V, 24 cp., G 16½ or equal	2
	Bulbs, 6V, 8 cp., G 10, or equal	2
	Bulbs, 6V, 4 cp., G 8, or equal	1
	Bulbs, 6V, 2 cp., G 6, or equal	2
	Chains, tire, 36" x 6", Weed or equal, sets	2
	Chain, towing, "American" American Chain Co. No. 2800	1
	Cover, for Hall No. 379 headlight	2
	Cover, for radiator, (furnished when required by special service)	1
	Drift, copper, ⅜" x 4"	1
	Drift, copper, ⅝" x 6"	1
MC8A1	Extinguisher, fire, complete with bracket, "Fyr-Fyter," "Pyrene" or equal	1
White Nos. 0892C-893C	File and handle	1
	Flashlight, American Eveready No. 1991, without rubber hood	1
White No. 00709¾-GA	Gasket, carbureter nozzle plug	1
	Gaskets, engine cylinder and valve plug	6
White No. 719¼-GEC	Gasket, carbureter intake pipe, upper	1
White No. 719¼-GED	Gasket, carbureter intake pipe, lower	6
White No. S00404-GF	Glands, oil line compression union	4
White No. 00887-C	Gun, grease	1
White No. 00887-GA	Gun, oil	1
White No. 896½-G	Hammer	1
	Handbook of Staff Observation Car	1
White No. 895¾-TBC	Handle, wrench, carbureter socket	1
White No. 0894¼-GE	Handle, valve plug socket wrench	1
White No. 873-GF	Jack	1
White No. 873½-GBE	Handle for Jack	1
White No. 0143½-GA	Keys, engine valve spring	2
	Lamps, head, Hall No. 479 or equal	2
	Lamps, side, Adlake No. 4496	2
	Lamp, tail, Adlake No. 4497	1
	Lamp, dash, Vesta No. 70 or equal	1
	Lamp, extension, with cord	1
White No. 00714-GEF	Nozzle, carbureter, low speed	1
White No. 00714-GEE	Nozzle, carbureter, high speed	1
White No. S007-13-GED	Nozzle, carbureter, starting	1

CHASSIS EQUIPMENT OF STAFF OBSERVATION CAR—*Continued*

Piece Mark		No. Per Car
White No. S004-13-A	Nuts, oil line compression union gland	4
	Outfit, tire repair	1
	Paulin, 12′ x 12′	1
	Pins, cotter, extra	30
White No. 367¼-GEG	Pins, fan belt connector	3
White No. 0894-C	Pliers	1
	Plug, spark	2
White No. 0991-GF	Puller, cotter pin	1
White No. 874-O	Pump, tire, hand	1
	Rims, demountable, Firestone Kelsey, 36″ x 6″	1
White No. 895-C	Screwdriver, 3″	1
White No. 0896-C	Screwdriver, 6″	1
	Signal, horn, warning, "Klaxon" No. K3, "Stewart" No. 114, "Long Horn" model J, or equal	1
	Speedometer, Stewart-Warner 67A or equal	1
White No. 0148-GE	Springs, engine valve	2
White No. 267¾-TEF	Straps, Kick	2
	Syringe, Battery Hydrometer	1
	Taps, friction, ¾″, roll	1
	Tires, 36″ x 6″, Pneumatic, Goodyear or equal	1
	Tubes, inner, 36″ x 6″	2
White No. 0143-GEC	Valves, engine	2
White No. 00364¾-GFB	Valves, oil pump, check complete	2
	Wire, copper, No. 18, 25 foot spool	1
White No. 891-E	Wrench, auto 9″	1
White No. 0890-E	Wrench, bicycle	1
White No. 0869-GA	Wrench, magneto	1
White No. 0886-GE	Wrench, M. hub	1
White No. 895½-GF	Wrench, open end, No. 25	1
White No. 0893½-GAB	Wrench, open end, No. 31	1
White No. 0897-GAB	Wrench, open end, No. 27	1
White No. 0895½-GAB	Wrench, open end, No. 29	1
White No. 0894¾-GA	Wrenches, valve adjusting	2
White No. 0895½-GA	Wrench, carbureter socket	1
	Wrench, demountable rim	1
White No. 0894½-GE	Wrench, valve plug socket	1

BODY EQUIPMENT

	Axe	1
	Board, wood table for map and plotting work	1
	Buckets, canvas, water, complete	2
	Can, safety, 1 gallon	1
	Hatchet	1
	Lantern complete	1
	Mat, cocoa fibre	1
	Oil, medium, gasoline engine, gallon	1
	Pads, lantern bracket complete	2
	Shovel, long handle	1
	Straps, lantern	2
	Straps, 12″ long, Style AV, 7 holes 1 for axe. 1 for long handle shovel. 1 for hatchet.	3
	Straps, 15″ long, Style AV, 7 holes 1 for short handle shovel. 1 for long handle shovel.	2

This car is equipped with lockers and compartments to receive such Signal Property and Fire Control Instruments as is prescribed to be carried thereon for organization in which it serves.

CHAPTER XI

NOMENCLATURE

STAFF OBSERVATION CAR

The Nomenclature of Parts is arranged in the following order, which is practically that of the progress of power through the chassis: Engine Group, Steering or Control System, Clutch, Transmission System, which includes the change gear box, propeller shaft, universal joints and mechanical tire pump, Axles, Springs, Wheels and Body.

The Equipment of both the Chassis and the Body have been taken from this chapter and will be found in the following chapters: The Chassis Equipment List in Chapter X and the Body Equipment List in Chapter IX. In this chapter will also be found complete lists of Fire Control Instruments required for Army, Divisional and Sea Coast Artillery.

The Property Classification, of all parts included in this Chapter, XI or Nomenclature, is PART I, CLASS IV, SECTION 9.

For easier reference, the following Index to the Nomenclature Chapter or Part of the Staff Observation Car Handbook is given.

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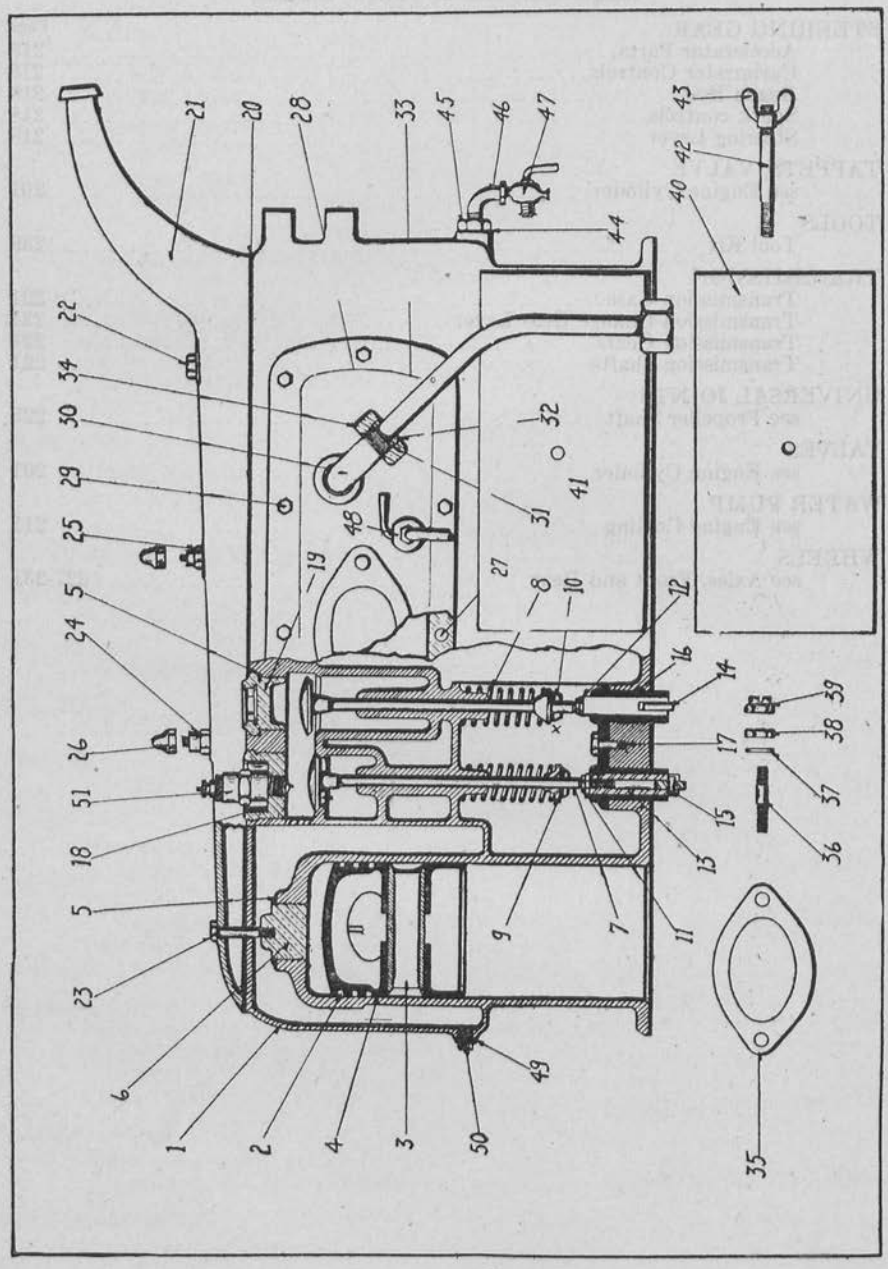
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PLATE 64



CYLINDER BLOCK ASSEMBLY

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Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Engine—CYLINDER BLOCK

See illustrations on pages 42, 44, 46, 200

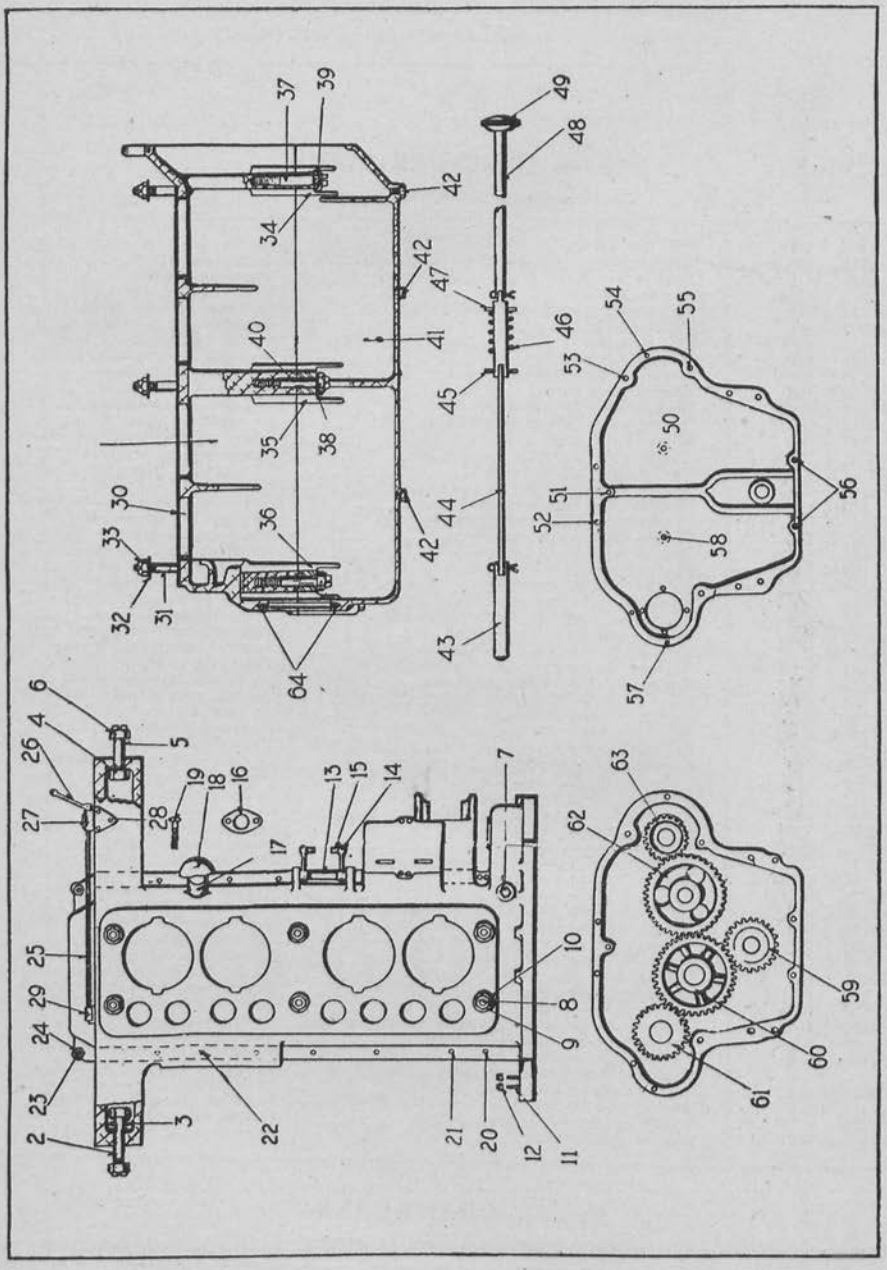
1	105 GEC	1	Cylinder block — On crankcase
2	117 GEB	8	Engine piston rings, R. H.-4; 117½ GEB-L.H. — On piston
3	0124 GE	4	Engine piston pins — Upper end piston
4	122 GEG	4	Engine pistons — In cylinder block
5	00327¼ GE	12	Cylinder plug valve and plug gasket — In top of cylinder block
6	00141 GE	4	Cylinder plug — In upper end of cylinder
7	0143 GEC	8	Engine valves — On right side cylinder block
8	0148 GE	8	Engine valve springs — On right side cylinder block
9	0143¼ GE	8	Engine valve collar bushings — On end of valve stem
10	0143½ GA	8	Engine valve keys — On end of valve stem
11	S0147 GAB	8	Engine valve lift adjusting caps — Upper end valve lift
12	S0146 GAB	8	Engine valve adjusting cap nuts — On valve lift caps
13	0147 GK	8	Engine valve lifts — Lower right side cylinder block
14	0147¼ GAB	8	Engine valve lift rolls — Lower end valve lifts
15	S0147½ GA	8	Engine valve lift roll pins — Through lift rolls
	S0147¾ GA	8	Engine valve lift roll lock pin — Through lift roll pins
16	147½ GEC	8	Engine valve plug bushings — Lower right side cylinder block
17	S0147½ GE	4	Engine valve plug bushing studs — Through lift bushing crabs
18	00327¾ GEC	4	Engine valve plugs (intake) — Above intake valves
19	00327 GEB	4	Engine valve plugs (exhaust) — Above exhaust valves
20	158½ GEB	1	Engine cylinder top plate gasket — On top cylinder block
21	0106½ GEC	1	Engine cylinder top plate — On top cylinder block
22	S0573 GA	1	Engine cylinder top plate stud — On top cylinder block—No. 1
	00141¼ GA	4	Engine cylinder top plate stud gasket — Top cylinder block
23	S0141½ GA	1	Engine cylinder top plate stud — Top cylinder block—rear
24	S0141¾ GE	1	Engine cylinder top plate stud — Top cylinder block, No. 3
25	S0141 GEB	1	Engine cylinder top plate stud — Top cylinder block, No. 2
26	S00217½ GA	2	Engine ignition conduit stud nut — On middle top plate studs
27	158 GEB	1	Engine cylinder side plate gasket — On right side cylinder block
28	106 GEB	1	Engine cylinder side plate — On right side cylinder block
	106¾ GEB	1	Side plate water distributor — Inside of side plate
29	S0106 GA	13	Engine cylinder side plate screws — Through side plate
	S0106 GE	3	Cylinder side plate stud — In right side cylinder block
	00533 A	16	Cylinder side plate stud gasket — On side plate studs
30	335¼ GE	1	Engine cylinder side plate inlet elbow — In forward end of side plate
31	335¾ GE	2	Engine cylinder inlet pipe gaskets — Under inlet elbow
32	S0335 GE	2	Engine cylinder inlet pipe collars — On inlet elbow
33	00335 GEC	1	Engine cylinder inlet pipe — From pump to elbow
34	S0335½ GE	2	Engine cylinder inlet pipe nuts — On inlet pipe
35	158¾ GEB	1	Engine cylinder port gasket — Under intake manifold
36	S0720 GEC	2	Engine cylinder intake pipe stud — In right side cylinder block
37	00120¼ E	2	Engine cylinder intake pipe stud gasket — On intake pipe stud
38	S0141½ GA	2	Engine cylinder intake pipe stud nuts — On intake pipe stud
39	S0585 GA	2	Engine cylinder intake pipe stud nuts — On intake pipe stud
40	169½ GEC	2	Engine cylinder valve cover plate gasket — Lower right side cylinder block
	S0585 GA	4	Engine valve plug bushing stud nuts — On lift bushing crab stud
41	169 GEC	2	Engine cylinder valve cover plate — Lower right side cylinder block
42	S0169 GEC	2	Engine cylinder valve cover plate studs — Lower right side cylinder block
43	0169¼ GA	2	Engine cylinder valve cover plate stud nuts — On plate cover studs
44	00709¾ GA	1	Engine cylinder drain plug gasket — Under drain plug
45	00709½ GA	1	Engine cylinder drain plug — Front end of cylinder block
46		1	Engine cylinder drain cock ell (¼" street ell) — In drain plug
47	00709¼ GAH	1	Engine cylinder drain plug drain cock — In drain ell
48		1	Engine cylinder side plate plug (⅛" pipe plug) — In forward end of side plate
49	00328 C	1	Engine cylinder plug gasket — In rear end cylinder block
50	S00105¾ GK	1	Engine cylinder plug — In rear end cylinder block

Engine—CRANKCASE

See illustrations on pages, 42, 44, 202

1	100 GEC	1	Engine crankcase — Forward end main frame
2	S0131¼ TA	1	Engine crankcase bracket bolt — Rear right bracket
3			(This part not used)
4	01723¼ G	2	Engine crankcase bracket bolt washers — On bracket bolts
5	S0211 GED	1	Engine crankcase bracket bolt — In rear left bracket
	0210½ GAF	2	Engine leg shim — Between bracket and frame
6	S0132½ GA	2	Engine crankcase bracket bolt nuts — On bracket bolts
7	00327 O	1	Engine crankcase oil hole plug — Behind timing gear case cover

PLATE 65



CRANKCASE ASSEMBLY

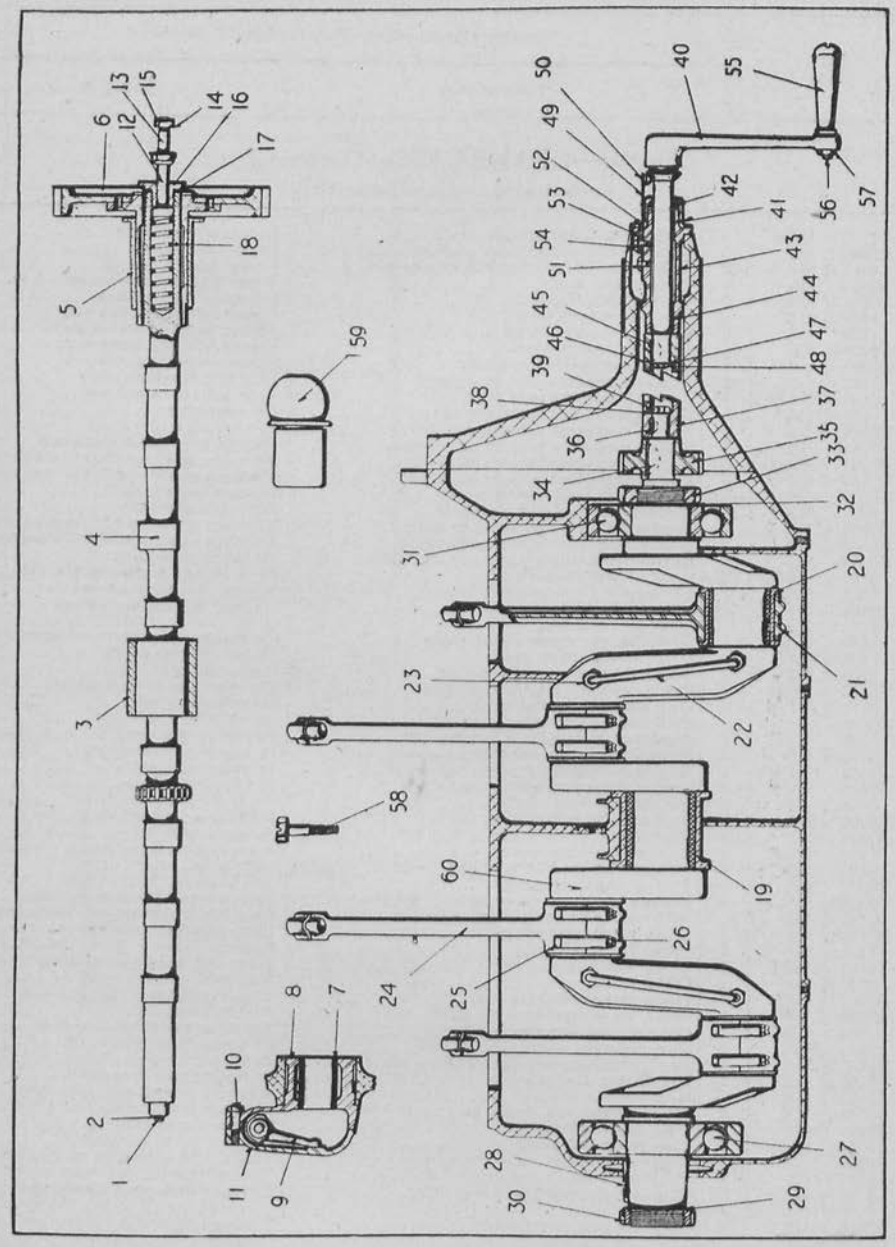
Engine—CRANKCASE—*Continued*

See illustrations on pages 42, 44, 202

Ref. No.	Part No.		No. Per Car	Property Classification—Part I, Class IV, Section 9 — Name of Part	Location
8	S0100	GEB	3	Engine crankcase cylinder studs	In top of crankcase
9	S0901	GA	3	Engine crankcase cylinder stud nuts	On cylinder studs
10	0913¼	GF	3	Engine crankcase cylinder stud washers	On cylinder studs
11	S0325¾	GA	2	Water pump studs	Rear right side timing gear case
12	S0574¼	GA	3	Water pump stud nuts	On water pump studs
13	0299½	GE	1	Magneto control lever tube	Center left side crankcase
14	299	GE	2	Magneto control levers	Center left side crankcase
	S0299½	GE	1	Magneto control shaft	Center left side crankcase
15	S00302¼	GAB	3	Magneto control lever studs	Center left side crankcase
16	102⅛	GE	1	Engine crankcase vent pipe gasket	Rear left side crankcase
17	102¾	GEB	1	Engine crankcase vent pipe	Rear left side crankcase
18	102¼	GAB	1	Engine crankcase vent pipe cap	On vent pipe
19	S0178½	GE	2	Engine crankcase vent pipe screws	In vent pipe
20	S0103¾	GA	4	Engine crankcase bottom cap dowels	Bottom side upper crankcase
21	S0101	GA	8	Engine crankcase bottom cap bolts	Through upper and lower crankcase
22	S0100½	GA	3	Engine crankcase bottom cap studs	Through upper and lower crankcase
	S0585	GA	15	Bottom cap stud and bolt nuts	On crankcase bolts
	0973½	GA	14	Bottom cap stud bolt washers	On crankcase bolts
*22	S0100½	GA	4	Engine crankcase bottom cap studs	Through upper and lower crankcase
23	S0100¾	GF	2	Engine crankcase bottom cap studs	Through upper and lower crankcase
24	S0143	G	2	Engine crankcase bottom cap stud nuts	On crankcases tud
25	0161	GEE	1	Compression release shaft	Back of rear crankcase bracket
26	163	GEC	1	Compression release shaft lever	On rear left engine bracket
27	0162	GK	1	Release shaft lever bracket	On rear left engine bracket
28				(This part not used)	
29	159	GA	1	Compression release casing cover	On crankcase at rear end camshaft
30	105⅝	GEC	1	Cylinder shimming gasket	Under cylinder block
	105⅛	GEC	1	Crank case and cylinder gasket	Under cylinder block
31	S0105¼	GEB	3	Engine cylinder stud and oil lines	Top rear end of crankcase
32	0913¼	GF	3	Stud and oil line washers	On cylinder stud
33	S0259¾	TA	3	Stud and oil line nuts	On cylinder stud
34	133	GFB	1	Engine crankcase front bearing cap	In timing gear case
35	125½	GE	1	Engine crankcase center bearing cap	In upper crankcase
36	132	GFB	1	Engine crankcase rear bearing cap	In upper crankcase
37	S0132	GF	6	Engine crankcase bearing cap studs	In upper crankcase
38	0913¼	GF	6	Bearing cap stud washers	On bearing cap studs
39	S0901	GA	6	Engine crankcaso bearing cap stud nuts	On bearing cap studs
40	S0132	GF	6	Bearing cap studs (same as No. 37)	In upper crankcase
41	101	GED	1	Engine crankcase bottom cap	Bolts at bottom of upper crankcase
*41	101	GEC	1	Engine crankcase bottom cap	Not used
42	00374	C	3	Bottom cap drain plugs	Not used
43	0101½	GE	1	Bottom cap drain valve (rear)	In bottom of lower crankcase
44	0101⅜	GE	1	Bottom cap drain connecting link	Rear left hand side of bottom cap
45	S0101¾	GA	1	Drain valve spring stop	Between front and rear valves
46	0101¾	GA	1	Drain valvo spring	In front valve
47	0101¼	GEC	1	Drain valve front	Front left hand side of bottom cap
*47	0101½	GE	1	Drain valve	Not used
48	S0101¼	GEB	1	Drain valve extension rod	Under radiator
49	00359½	GA	1	Drain valve extension rod knob	Under radiator
50	103	GEC	1	Engine crankcase timing gear cover	Front part of crankcase
	0261¼	GA	1	Engine timing gear cover bushing	In timing gear case cover
	S0147½	GA	1	Engine timing gear cover bushing pin	In timing gear case cover
51	S0103¼	GE	3	Gear cover dowels	In timing gear case cover
52	S0103½	GE	2	Gear cover studs	Through timing gear case cover
53	S0101	GE	3	Engine crankcase timing gear cover bolts	Through timing gear case cover
	S0913	GA	7	Gear cover bolt nuts	On gear cover bolts
	0573¾	GA	9	Gear cover bolt washers	On gear cover bolts
54	S0720	GA	1	Engine crankcase water pump stud	Front right extension of crankcase
55	S0425	GA	2	Engine crankcase gear cover bolt	Through timing gear case cover
56	S0101½	GA	2	Engine crankcase gear cover bolt	Through bottom of timing gear case cover
57	S0325	GA	1	Magneto gear cover stud	Through right side timing gear case cover
58	S0110½	GF	2	Gear cover thrust plugs	In timing gear case cover
59	112	GEC	1	Crank shaft gear	In timing gear case
60	110	GED	1	Cam shaft gear with hub	In timing gear case
61	326	GED	1	Water pump gear	In timing gear case
62	111	GEE	1	Intermediate gear with hub	In timing gear case
	00111½	GE	1	Intermediate gear bushing	In intermediate gear
	S00111¼	GE	1	Intermediate gear dowel pin	In intermediate gear
63	293	GED	1	Magneto shaft gear	In timing gear case
64	104¾	GK	2	Crank shaft bearing felts	In rear end of crankcase

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 66



CRANKSHAFT AND CAMSHAFT ASSEMBLIES

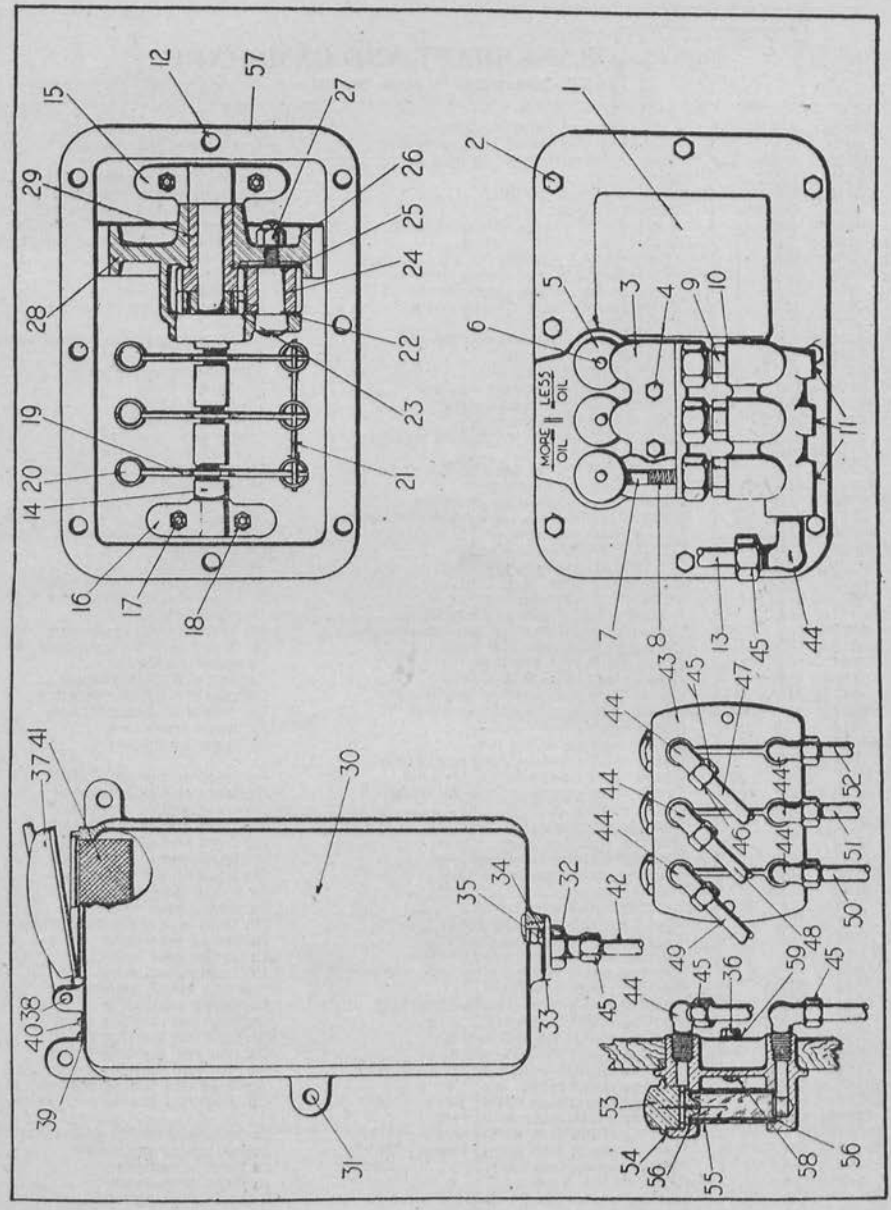
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Engine—CRANKSHAFT AND CAMSHAFT

See illustrations on pages 58, 204

1	S0970 GA	1	Cam shaft end thrust button	In rear end of camshaft
2	0970¼ GA	1	Cam shaft end thrust button washer	In rear end of camshaft
3	00100¼ GEC	1	Gam shaft center bearing box	On center of camshaft
4	0149 GED	1	Cam shaft	To the right of crankshaft
5	00110¼ GEC	1	Cam shaft gear bushing	On front end of camshaft
6	110 GED	1	Cam shaft gear	On front end of camshaft
7	00159¾ GE	1	Compression release casing bushing	In cage at rear end of camshaft
8	159½ GE	1	Compression release casing	In crankcase at rear of camshaft
9	160 GA	1	Compression release lever	In release casing
10	S0105 GA	1	Compression release casing cover screw	In release casing
11	159 GA	1	Compression release casing cover	On release casing
	S0574 GA	2	Compression release casing screws	In release casing
	292¾ GK	1	Bearing cap felt	
	159¼ GE	1	Compression release casing gasket	Under compression release casing
12	S0149¼ GEC	1	Cam shaft thrust plug	At front end of camshaft
13	S0110½ GF	2	Timing gear thrust bolts	Through camshaft gear
14	0973½ GA	2	Timing gear thrust bolt washers	On thrust bolts
15	S0585 GA	2	Timing gear thrust bolt nuts	On thrust bolts
16	S0110 GEC	1	Cam shaft gear screw cap	In camshaft gear
17	0110¾ GEC	1	Cam shaft gear cap screw lock washer	Under gear cap screw
18	0110½ GEC	1	Cam shaft spring	In front end of camshaft
19	00125 GE	1	Crank shaft center bearing box (2 halves)	In center of upper crankcase
20	00137 GEB	8	Connecting rod bearings	In lower end of connecting rod
	S00100¼ GEC	4	Connecting rod bearing dowels	In lower end of connecting rod
21	0137½ GEC	4	Connecting rod bearing caps with bearings	On lower end of connecting rod
22	00126¼ GED	2	Crank shaft oil tubes	On crankshaft between oil throws
	S00404 GF	2	Crank shaft oil tube gland	On oil tubes
23	S0126¾ GKC	4	Crank shaft oil tube nipples	In crankshaft
24	0127 GEB	4	Connecting rods	Between piston and crankshaft
25	01271/2 GA	16	Connecting rod cap bolts	In lower end of connecting rod
	00161½ GA	2	Compression release shaft bushing	In release shaft bracket
	0127¼ GA	16	Connecting rod bearing cap bolt washer	On lower end of connecting rod
26	S0573¼ GA	16	Connecting rod cap bolt nuts	On lower end of connecting rod
27	414	1	Crank shaft rear bearings	In upper crankcase
28	0150¼ GA	1	Crank shaft key (T Woodruff)	In rear end of crankshaft
29	087¼ M	1	Crank shaft rear bearing lock washer	On rear end of crankshaft
30	S087 M	1	Crank shaft rear bearing lock nut	On rear end of crankshaft
31	413	1	Crank shaft front bearing	In upper crankcase
	S0125½ GF	1	Center bearing dowel pin	In upper crankcase
32	087¼ GA	1	Crank shaft front bearing lock washer	
33	S087 GA	1	Crank shaft front bearing lock nut	On front end of crankshaft
34	0112¾ GA	1	Crank shaft gear key (No. 25 Woodruff)	On front end of crankshaft
35	112 GEC	1	Crank shaft gear	On front end of crankshaft
36	0294½ K	2	Starting crank ratchet keys (No. 9 Woodruff)	On front end of crankshaft
37	0165 GA	1	Starting crank ratchet	On front end of crankshaft
38	0165½ GA	2	Starting crank ratchet washers	On front end of crankshaft
39	S0106 GA	2	Starting crank ratchet screws	On front end of crankshaft
40	0166 GAB	1	Starting crank	In end of crankshaft
41	166¾ GA	1	Starting crank dust cover	In timing gear cover
42	167¾ GA	1	Starting crank dust cap felt	On front end of starting crank
43	166½ GA	1	Starting crank bearing guard	In timing gear cover
	S0105 GA	4	Starting crank dust cover screws	In timing gear cover
	074½ O	4	Starting crank bearing stud lock washers 1/8"	In timing gear cover
44	S0039 MR	2	Starting crank bushings	Starting crank housing
45	0294½ K	2	Starting crank keys (No. 9 Woodruff)	In timing gear cover
46	0165 GA	1	Starting crank ratchet	On rear end starting crank
47	0165½ GA	2	Starting crank ratchet washers	On rear end starting crank
48	S0106 GA	2	Starting crank ratchet screws	On rear end starting crank
49	0168 GA	1	Starting crank stop spring with button	On rear end starting crank
50	S0168½ GA	1	Starting crank stop	On front end timing gear cover
51	S0168¼ GA	1	Starting crank stop spring screw (short)	On front end timing gear cover
52	168¾ GA	1	Starting crank stop spring felt	
53	0504 C	1	Starting crank stop spring screw washer	In front end timing gear cover
54	S0168¾ GA	1	Starting crank stop spring screw (long)	Inside timing gear cover
55	167½ GA	1	Starting crank handle	In front of radiator
	166¼ GA	1	Crank handle boot	In front of radiater
56	0167 GA	1	Starting crank handle shaft	Bolts to starting crank
57	S0167 GA	1	Starting crank handle shaft nut	On end of shaft
58	S0141¼ GA	4	Connecting rod binder bolts	In upper end connecting rod
59	S0131½ GEC	1	Crank shaft ball	In rear end of crankshaft
60	0126 GED	1	Crank shaft	In upper crankcase
	S00368 C	4	Crank shaft oil plug	In crankshaft throws
	0126¾ GFD	2	Crank shaft oil collector ring	Front and rear end crankshaft

PLATE 67

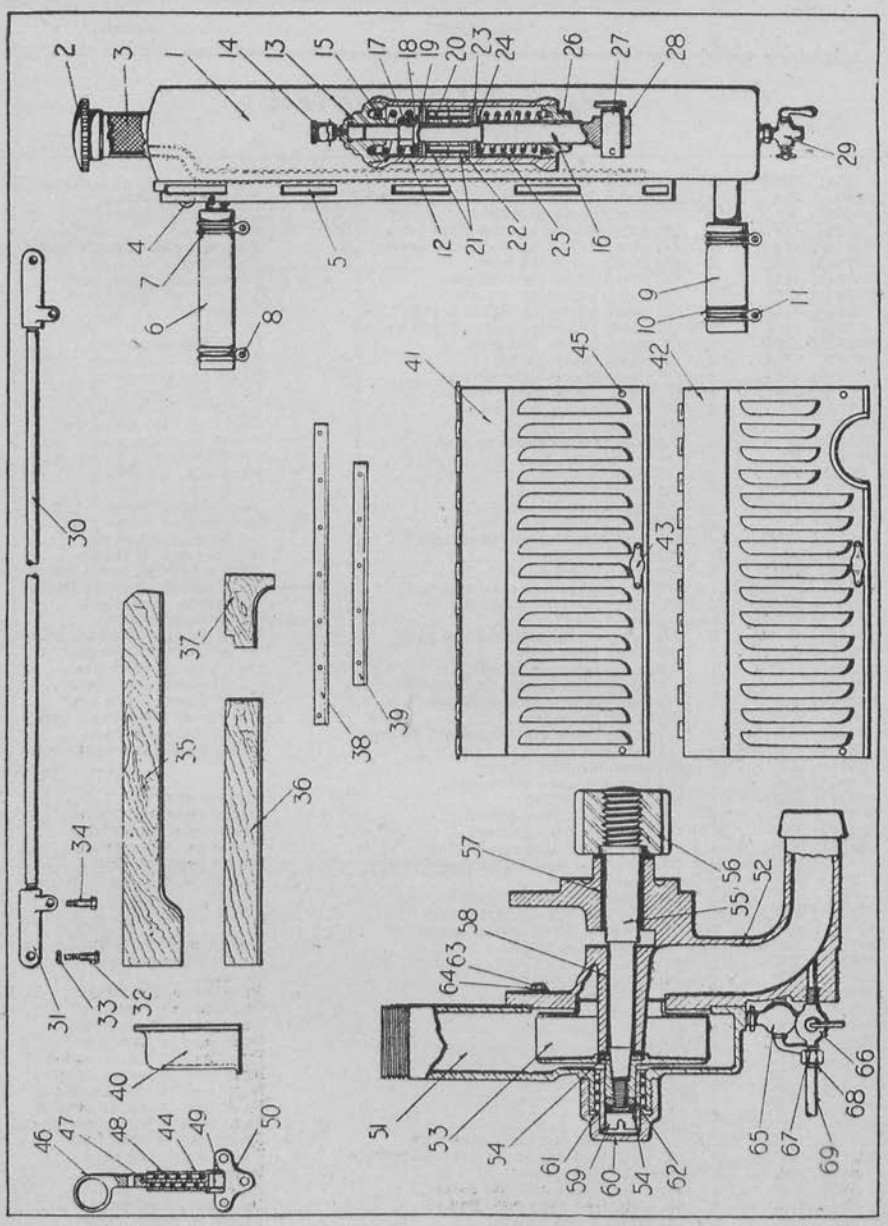


OIL PUMP, OIL TANK AND SIGHT FEED ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			***Engine*—OILING SYSTEM**	
			See illustrations on pages 42, 44, 66, 204	
1	354 GFB	1	Oil pump casting	Rear right side of crankcase
2	S0106 GA	8	Oil pump frame screws	Frame to crankcase
	00533 A	8	Oil pump screw gaskets	Under screw heads
3	0356 GF	1	Oil pump adjusting stop plate	On frame
4	S0168¾ GA	2	Oil pump adjusting stop plate screw	Through stop plate to frame
5	0364½ GE	3	Oil pump adjusting nuts	On frame
	S0364¾ GA	1	Oil pump adjusting stud pin	Through adjusting nuts
6	S0364½ GE	3	Oil pump adjusting nut studs	Through adjusting nuts
7	0364¼ GE	3	Oil pump adjusting nut stop pins	In frame
8	0396½ O	3	Oil pump adjusting nut stop pin springs	In frame
9	00364¾ GFB	3	Oil pump checks complete	In oil line connectors
	00371 GEC	3	Oil pump check valves	In oil line connectors
	0371½ GEB	3	Oil pump check valve springs	In oil line connectors
	371¼ GEC	1	Oil pump check spring washer	In oil line connectors
10	00120¼ E	3	Oil pump check washers	Under oil line connectors
11	S00368 C	3	Oil pump taper plugs	Under oil line connectors
12	00533 A	8	Oil pump frame screw gaskets	Frame to crankcase
13	00785 TED	1	Oil pump line	To oil tank
14	0365 GF	1	Oil pump crank	Back side of frame
15	355 GE	1	Oil pump bearing cap	Back side of frame
16	355¼ GE	1	Oil pump bearing cap	Back side of frame
17	S0325¾ GA	4	Oil pump bearing cap studs	Back side of frame
18	S0574¼ GA	4	Oil pump bearing cap stud nuts	On bearing cap studs
19	0364 GE	3	Oil pump rockers	On back side of frame
20	S0364 GE	3	Oil pump plungers	Back side of oil pump frame
21	S0358 GF	1	Oil pump adjusting stud stop pin	Back side of oil pump frame
22	0363½ GE	1	Oil pump stationary pinion	Pinned to crankshaft
	0365½ GF	1	Oil pump crank pinion	On oil pump frame
23	S0047½ E	8	Oil pump crank pinion dowel pins	In oil pump stationary pinion
24	0363¼ GE	1	Oil pump idler pinion	On oil pump drive gear
25	S0363¼ GEC	1	Oil pump idler pinion stud	On oil pump drive gear
26	0143¼ O	1	Oil pump idler pinion stud washer	On oil pump drive gear
27	S0574¼ GA	1	Oil pump idler pinion stud nut	On oil pump drive gear
28	363 GEC	1	Oil pump drive gear	Meshes with camshaft gear
29	0363½ GE	1	Oil pump drive gear stationary pinion	On pump crankshaft
30	350½ GB	1	Oil reservoir	Left side of dash under hood
31	S015½ TED	3	Oil reservoir dash screws	
	S015¼ GE	3	Oil reservoir dash screw nuts	
32	00414 GF	1	Oil reservoir fitting	Bottom of tank
33	00311½ E	1	Oil reservoir fitting gasket	Under reservoir fitting
34	00414¼ GE	1	Oil reservoir fitting screen	Under reservoir fitting
35	00414½ GE	1	Oil reservoir fitting screen ring	Under reservoir fitting
36	TEB-O	2	Oil sight feed dash screw nuts (14-20)	Under reservoir fitting
37	355 GF	1	Oil reservoir cover	On top of reservoir
38	0358 GA	1	Oil reservoir cover hinge pin	
39	0356 GA	1	Oil reservoir cover hinge spring	
40	S0405 A	3	Oil reservoir hinge spring screws	
41	00397 GF	1	Oil reservoir strainer	Under reservoir filler
42	00785 TED	1	Oil line	Reservoir to pump
43	00350 GF	1	Oil sight feed casting	On dash
44	00402 GF	6	Oil sight feed elbows	On sight feed casting
45	S00413 A	14	Oil line union nuts	On sight feed casting
46	S00404 GF	14	Oil line unions	On sight feed casting
47	00785¾ GEC	1	Oil line	Sight feed to pump, rear
48	00785¼ GEC	1	Oil line	Sight feed to pump, center
49	00785½ GEC	1	Oil line	Sight feed to pump, front
50	00786½ GEC	1	Oil line	Sight feed to rear bearing
51	00786¼ GEC	1	Oil line	Sight feed to center bearing
52	00786 GEC	1	Oil line	Sight feed to front bearing
53	S00351½ GE	3	Oil sight feed cap and valve seats	Upper cap in sight feed
54	00351¾ GE	3	Oil sight feed cap and valve seat gaskets	Under sight feed caps
55	351½ GA	3	Oil sight feed glasses	In dash sight feed
	352¼ GE	6	Sight feed glass cylinder gasket	On ends of feed glass
56	351¼ GA	6	Oil sight feed glass cork gaskets	On ends of feed glass
57	354¼ GE	1	Oil pump frame gasket	Under oil pump frame
58	TEB-O	2	Oil sight feed dash screws (1" 14-20 R. H. machine)	
59	0722¾ GA	2	Oil sight feed dash screw washers	Under sight feed screws

PLATE 68



WATER PUMP, HOOD, RADIATOR AND DECK BOARD ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

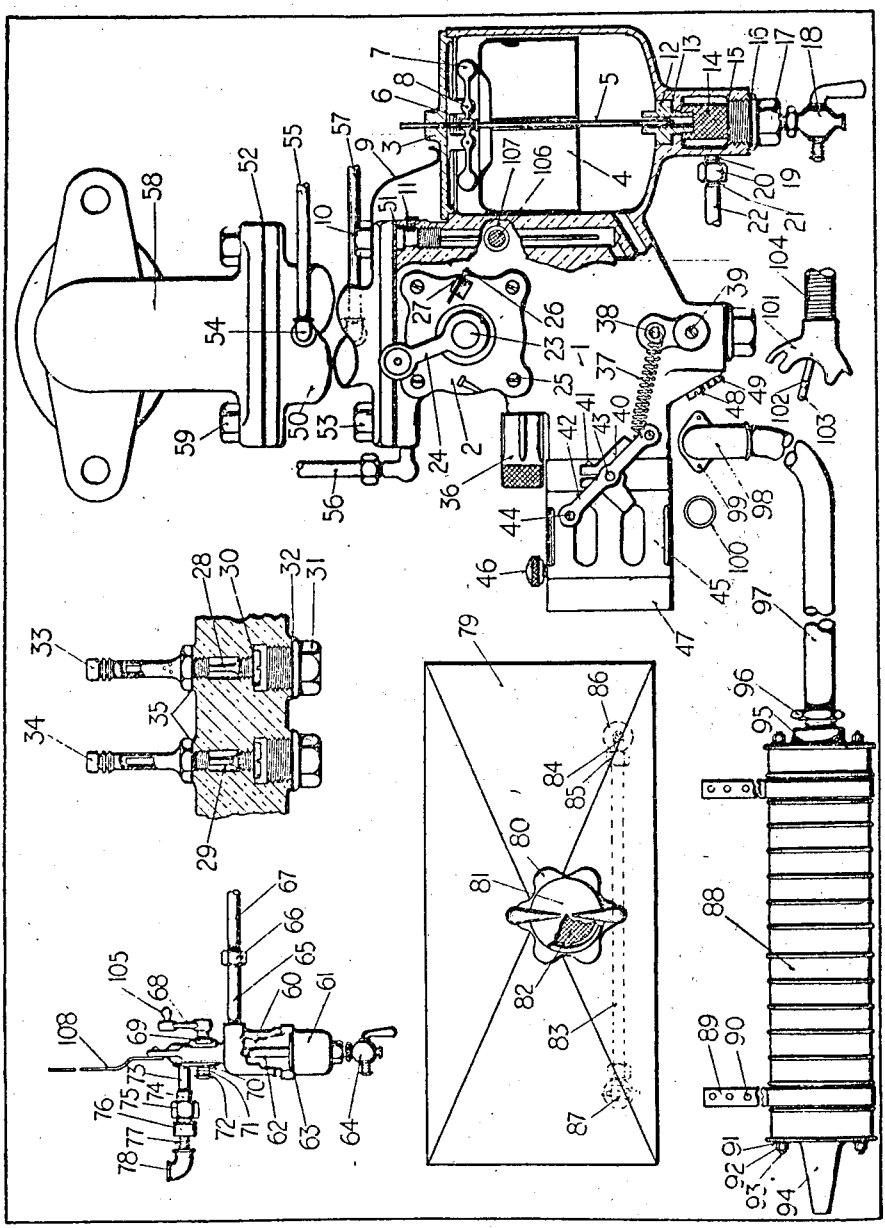
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Engine—COOLING SYSTEM

See illustrations on pages 42, 80, 208

1	444 TEB	1	Radiator	In front of engine
	443¼ TED	1	Radiator mud shield	On radiator
2	00445 GA	1	Radiator cap	On radiator
3	00444½ GA	1	Radiator strainer	On radiator
4	00604 GED	1	Radiator tie rod bracket	On radiator
5	TEB-O	1	Radiator hood beading lace	On radiator bead
6	773 GF	1	Radiator outlet pipe hose	Lower hose
7	00483 GE	2	Radiator outlet pipe hose clamps	On outlet hose
8	14-20 x 1¼"	2	Outlet pipe hose clamp screws	
9	773 GE	1	Radiator inlet pipe hose	On radiator
10	00483 GE	2	Radiator inlet pipe hose clamps	On hose
11	14-20 x 1¼"	2	Inlet pipe hose clamp screws	On radiator
12	606 TC	2	Radiator shock absorber barrels	On radiator shell
	S00606 TA	4	Radiator adjusting locking block	
	S0100½ GA	2	Radiator shock absorber studs	On lock block
	S0100½ GE	4	Radiator adjusting locking block bolts	
13	0606¼ TC	2	Shock absorber spring adjusting nuts (upper)	On stud
14	0099 K	2	Spring adjusting nut grease cups	Upper end absorber barrel
15	0606½ TC	2	Shock absorber springs (upper)	On radiator
16	0607 TA	2	Radiator support studs	Inside of barrel
17	S0607 TA	2	Radiator support stud nuts	On studs
18	607¾ TA	2	Support stud nut washers (spring lock)	On studs
19	0604¼ TAB	2	Shock absorber washers (upper)	Around center of stud
20	0607½ TA	2	Radiator support stud spacers	In absorber barrel
21	607¾ TA	4	Shock absorber packing rings	On studs
22	605½ TAB	4	Shock absorber packing ring felts	On studs
23	604¼ TAB	2	Shock absorber washers (lower)	Around stud
24	604 TA	4	Radiator shock absorber support stud washers	Around stud
25	603¼ TC	2	Radiator shock absorber springs (lower)	On stud
26	606¾ TA	2	Radiator shock absorber adjusting nuts (lower)	On end of stud
27	S0604¾ TA	2	Radiator shock absorber trunnion pins	Through stud
28	0603¾ TA	4	Radiator shock absorber trunnion pin washers	On trunnion pin
29	00709¼ GAH	1	Radiator drain cock	On radiator
30	0605 TED	1	Radiator tie rod	Radiator to dash
31	084 EE	2	Radiator tie rod ends	On tie rod
32	S031½ CC	2	Radiator tie rod end pins	On rod ends
33	S031¾ GB	2	Radiator tie rod end pin nuts	
34	S0382 G	2	Radiator tie rod end binder screws	
35	275 TED	1	Deck board R.H.	On dash
36	275½ TED	1	Deck board L.H.	On dash
37	275¾ TED	1	Deck board L.H. rear	On dash
	S0275 TA	4	Deck board screw (⅜" R.H. machine)	
	TEB-O	4	Deck board screw nuts (⅜" square)	
38	00600¼ TEB-O	1	Hood deck strip R.H.	Between dash and deck
39	00600¾ TEB-O	1	Hood deck strip L.H.	Between dash and deck
40	623¾ TED	1	Steering lever cover	On left fender
41		1	Hood R.H. half (600 TED Hood Complete)	Over engine
42		1	Hood L.H. half (600 TED Hood complete	Over engine
43	00636 GEB	2	Hood handles	On hood
	0636¼ GEB	4	Hood handle washers	On handle
44	00602¾ GE	4	Hood fastener barrels	On sills
45	00603 GE	4	Hood catch studs	On hood
46	00602 GE	4	Hood fastener latches	On hood
47	S00602 GE	4	Hood fastener latch screws	
48	00602½ GE	4	Hood fastener latch springs	On latches
49	00601¼ GE	4	Hood fastener latch pins	Through latches
	603½ GE	4	Hood catch latch pin washer	On latches
50	00601 GE	4	Hood fastener bases	On sills
51	325 GE	1	Water pump frame	Right side upper crankcase
	0099 GK	1	Water pump grease cup	On water pump
	325¾ GE	1	Water pump frame gasket	On pump frame
52	325½ GEC	1	Water pump casting	Right side upper crankcase
	328 GE	1	Water pump casting gasket	Under pump cover
53	00331 GE	1	Water pump bucket	In frame
54	331½ GA	2	Water pump shaft washers	On pump shaft
55	S0326 GED	1	Water pump shaft	Through pump
	0973½ GA	1	Water pump shaft washer	On pump shaft
56	326 GED	1	Water pump shaft gear	On pump shaft
57	00326¼ GA	1	Water pump bushing (large)	Around shaft
58	00325¼ GA	1	Water pump bushing (small)	Around shaft
59	S00330¾ GA	1	Water pump shaft bearing	End of shaft
60	00330 GA	1	Water pump and spring cap	End of shaft

PLATE 69



CARBURETER, MUFFLER AND FUEL TANK ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
	Engine—COOLING SYSTEM—_Continued_			
	See illustrations on pages 42, 80, 208			
	S00330½ GA	1	Water pump and spring cap pin	Through spring cap
61	0326½ GA	1	Water pump shaft bearing spring	Around end of shaft
62	S0326¼ GAB	1	Water pump shaft nut L.H. thread	
63	S0325¼ GE	4	Water pump frame cap screw	
64	00533 A	4	Water pump frame cap screw washer	
65	00449 GA	1	Water pump frame drain cock	Under frame
66	00562½ GA	1	Water pump line cock	On frame
67	S00413 A	1	Water pump line nut	
68	S00404 GF	1	Water pump line gland	On carburetor line
69	00776 TED	1	Water pump line	Between pump and carbureter
	Engine—FUEL SYSTEM			
	See illustrations on pages 70, 72, 210			
1	00706 GED	1	Carbureter body	Bolts to intake manifold
2	00708 TED	1	Carbureter throttle valve cover	Right side of carbureter body
	00715¾ GA	1	Carbureter throttle valve cover bushing	In throttle valve cover
	708¾ GEB	1	Carbureter throttle valve cover gasket	Under throttle valve cover
	00715¼ GA	1	Carbureter throttle valve cover bushing	In throttle valve cover
3	00707 GAB	1	Carbureter float chamber cover	Above float chamber
4	00707½ GA	1	Carbureter float	In float chamber
5	0711 GM	1	Carbureter needle valve	In float chamber
6	00711½ GA	1	Carbureter needle valve spool	On needle valve
7	00712 GAB	2	Carbureter needle valve weight	On float chamber cover
8	☆" x ¾"	2	Needle valve weight brass cotter pins per m	Through float weights
9	0713 GAH	1	Carbureter float chamber cover spring	Under water jacket screw
10	S00713 GED	1	Cover spring screw and starting nozzle	Rear screw through water jacket
	00533 KK	1	Carbureter cover spring screw gasket	Under cover spring
11	S00368 C	3	Carbureter taper plug (¼"–30)	In body above float chamber
12	00712½ GM	1	Carbureter needle valve seat	In bottom of float chamber
13	00211¼ GA	1	Carbureter needle valve seat washer	Under needle valve seat
14	00706½ GA	1	Carbureter dirt trap strainer	Under float chamber
15	0713¼ GA	1	Carbureter dirt trap strainer washer	Under dirt screen
16	00709¾ GA	1	Carbureter plug gasket	Under dirt screen plug
17	00709½ GA	1	Carbureter float chamber plug	Under float chamber
18	00709¼ GA	1	Carbureter float chamber drain cock	In float chamber drain plug
19	00402 GF	1	Gas line elbow	Under float chamber
20	S00413 A	2	Gas line nut	On gas line elbow
21	S00404 GF	2	Gas line gland	In gas line elbow
22	00790 TED	1	Gas line to tank	
23	00715 GEE	1	Carbureter throttle valve	In carbureter body
24	00715½ GA	1	Carbureter throttle valve lever	Right side of carburetor
	S0167 O	1	Carbureter throttle valve lever taper pin	Through throttle valve lever
25	S0708 GA	4	Carbureter throttle valve cover screw	Through throttle valve cover
26	S0420 F	1	Carbureter lever adjusting screw	On throttle valve cover
27	S00708¼ GA	1	Carbureter lever adjusting screw binder screw	On throttle valve cover
28	00714 GEE	1	Carbureter nozzle (high speed)	Inside carbureter body
29	00714 GEF	1	Carbureter nozzle (slow speed)	Inside carburetor body
30	714¾ GA	2	Carbureter nozzle lead gasket	Under nozzle plugs
31	00709 GAB	2	Carbureter nozzle plugs	In bottom of carbureter body
32	00709¾ GA	2	Carbureter nozzle plug gaskets	Under nozzle plugs
33	00714½ GEE	1	Carbureter nozzle sheath (high speed)	Around nozzle
34	00714½ GEF	1	Carbureter nozzle sheath (slow speed)	Around nozzle
35	00533 KK	2	Carbureter nozzle sheath washer	Under sheath
36	S00706 GED	1	Carbureter air adjusting screw	Above air regulator
	S00706¼ GAB	1	Carbureter air adjusting screw stop pin	In body
	00706¼ GAB	1	Carbureter air adjusting screw stop pin spring	In adjusting sleeve
37	0703½ GED	1	Carbureter air shutter shaft spring	In adjusting sleeve
	00704¼ GED	1	Carbureter hot air shutter	Rear of carbureter
38	00703⅜ GED	1	Carbureter air shutter spring post	On lower carbureter body
39	S00368 C	3	Carbureter plug (Same as Ref. No. 11)	In shutter post
40	00703¾ GED	1	Carbureter hot air lever stop	On shutter shaft
41	8–32 x ⅜"	1	Lever stop binder screw	Through lever stop
42	00703¼ TED	1	Carbureter shutter shaft lever	On end of shutter shaft
43	00703 TED	1	Carbureter shutter shaft	Through air regulator
44	S00703 TED	1	Carbureter shutter shaft bushing	In air regulator
	S00703¼ GED	1	Carbureter control wire binder	In shaft lever
	S00718¼ GED	1	Carbureter control wire binder	In shaft lever

Engine—FUEL SYSTEM—*Continued*

See illustrations on pages 70, 72, 210

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
45	00703½ GED	1	Carbureter air regulator slide	Around air regulator
46	S00703½ GAH	1	Carbureter air regulator binder screw	In air regulator slide
47	S00707¾ GED	1	Carbureter air regulator	Lower part of carbureter body
48	S00325 C	1	Carbureter body plug	In body under regulator
49	S00368 C	3	Carbureter plug (Same as Ref. No. 11)	In body under regulator
50	00721 TED	1	Carbureter water jacket	Between carbureter and intake manifold
	00721¼ TED	1	Carbureter water jacket tube 1½" x 1⅝" x 7 5/16"	Inside of water jacket
51	719¼ GED	1	Carbureter water jacket and carbureter gasket	Between carbureter and jacket
52	719¼ GED	1	Carbureter water jacket and manifold gasket	Between jacket and manifold
	719¼ GEC	1	Carbureter intake pipe gasket (upper)	Between manifold and side plate
53	S0107¼ GA	1	Carbureter water jacket screw	Holds carbureter to water jacket
54	00402 GF	2	Carbureter water jacket elbow	In water jacket
55	00776½ TED	1	Carbureter water jacket line (to cylinder)	Upper elbow to cylinder
57	00776 TED	1	Carbureter water jacket line (to water pump)	Lower elbow to pump
	S00706¾ GAB	2	Carbureter water jacket plug	In water jacket
58	00719 GED	1	Carbureter intake pipe	Carbureter to engine
59	S0107¼ GA	2	Carbureter intake pipe screw	Holds carbureter jacket to manifold
60	00562 GF	1	Gasoline settling chamber top	Upper half of settling chamber
61	562¼ GF	1	Gasoline settling chamber bottom	Lower half of settling chamber
62	00564¾ GF	1	Settling chamber tube, with ring and screen	In upper half of chamber
63	564 GF	1	Gasoline settling chamber gasket	Between upper and lower half
64	00449 GA	1	Gasoline settling chamber drain cock	In bottom chamber
65	S00201¾ GF	1	Gasoline settling chamber nipple	In upper chamber
66	S00413 A	1	Gasoline settling chamber nipple nut	On end of nipple
67	00790 TED	1	Gasoline line	To carbureter
68	00502 GF	1	Gasoline settling chamber valve lever	
69	00563 GFB	1	Gasoline settling chamber valve	Above strainer body
70	00563¾ GF	1	Gasoline settling chamber valve washer	Above strainer body
71	00563¼ GFB	1	Gasoline settling chamber valve spring	On rear of valve
72	001637¼ GAGR	1	Gasoline settling chamber valve spring washer	On rear of valve
73	00562¼ GTB	1	Gasoline settling chamber nipple	On rear of valve
74	0538½ A	1	Gasoline settling chamber union end	Above valve
75	0539 C	1	Gasoline settling chamber union end nut	On settling chamber nipple
76	S 0617¾ TCD	1	Gasoline settling chamber union end brass	On settling chamber nipple
77	TEB-O	1	Gasoline settling chamber standard, ¼" x 1" nipple	On settling chamber nipple
78	TEB-O	1	Settling chamber standard ¼" elbow, brass	On settling chamber nipple
79	617 TED	1	Gasoline tank	Under front seat
80	00560 TBC	1	Gasoline tank filler hole flange	In center of tank
81	00561 TBC	1	Gasoline tank filler hole flange cap	On top of tank
82	00963 TED	1	Gasoline tank filler hole strainer	Under filler cap
83	00790⅝ TED	1	Gasoline line connecting line	Under tank
84	00402 GF	1	Gasoline tank outlet elbow	Under tank
85	S00413 A	2	Gasoline tank line nuts	On gasoline line
86	00495 GA	2	Gasoline tank outlet flange	On bottom of tank
87	00618⅛ TED	1	Gasoline tank shut-off valve (three-way)	Under tank
	00618⅜ TED	1	Gasoline tank shut-off valve handle	Under left end of tank
	00563¼ GFB	1	Gasoline tank shut-off valve spring	On 3-way valve
	001637¼ GAGR	1	Gasoline tank shut-off valve spring washer	On 3-way valve
	00563¾ GF	1	Gasoline tank shut-off valve spring washer	On 3-way valve
88	108 GEC	1	Muffler	Under center of car
89	108⅛ GE	2	Muffler bands	Muffler to side rail
90	TEB-O	6	Muffler band screw (5/16" x 1" machine screw)	In muffler bands
91	074½ O	6	Muffler bolt nut lock washer (5/16")	On band screws
92	S0199½ G	6	Muffler bolt nut (5/16"-18P)	On band screws
93	S0108¼ GED	3	Muffler bolts (22¾" long)	Through muffler
94	109¼ GEC	1	Muffler head, rear	
95	109 GEC	1	Muffler head, front	
96	109½ GEC	1	Muffler head nut	On ends of muffler bolt
97	108¼ TED	1	Muffler exhaust pipe with flange	Between engine and muffler
98	107¼ GF	1	Exhaust pipe flange elbow	On front end exhaust pipe
99	S0107¼ GF	2	Exhaust pipe flange screws	Through flange to manifold
100	00107½ GF	1	Exhaust pipe flange gasket	Between flange and manifold
101	704 TED	1	Hot air jacket	Clamps to exhaust pipe
102	0704½ TED	1	Hot air clamp band (one-half)	Around exhaust pipe
	0704⅝ TED	1	Hot air clamp band (one half)	Around exhaust pipe
103	S0167 C	1	Hot air clamp band screw	Through clamp bands
	054¼ GF	1	Hot air clamp band screw washer	Under clamp screw
104	0704¾ TED	1	Hot air jacket tube	From jacket to carbureter
105	S00502 TCD	1	Gasoline settling chamber valve lever knob	On settling valve lever
106	00705 GA	2	Carbureter air inlet screen	In air intake
107	00705½ GA	2	Carbureter air inlet screen washer	In air intake
108	0562¾ TCD	1	Settling chamber angle iron	Holds settling chamber

NOMENCLATURE OF PARTS—Continued

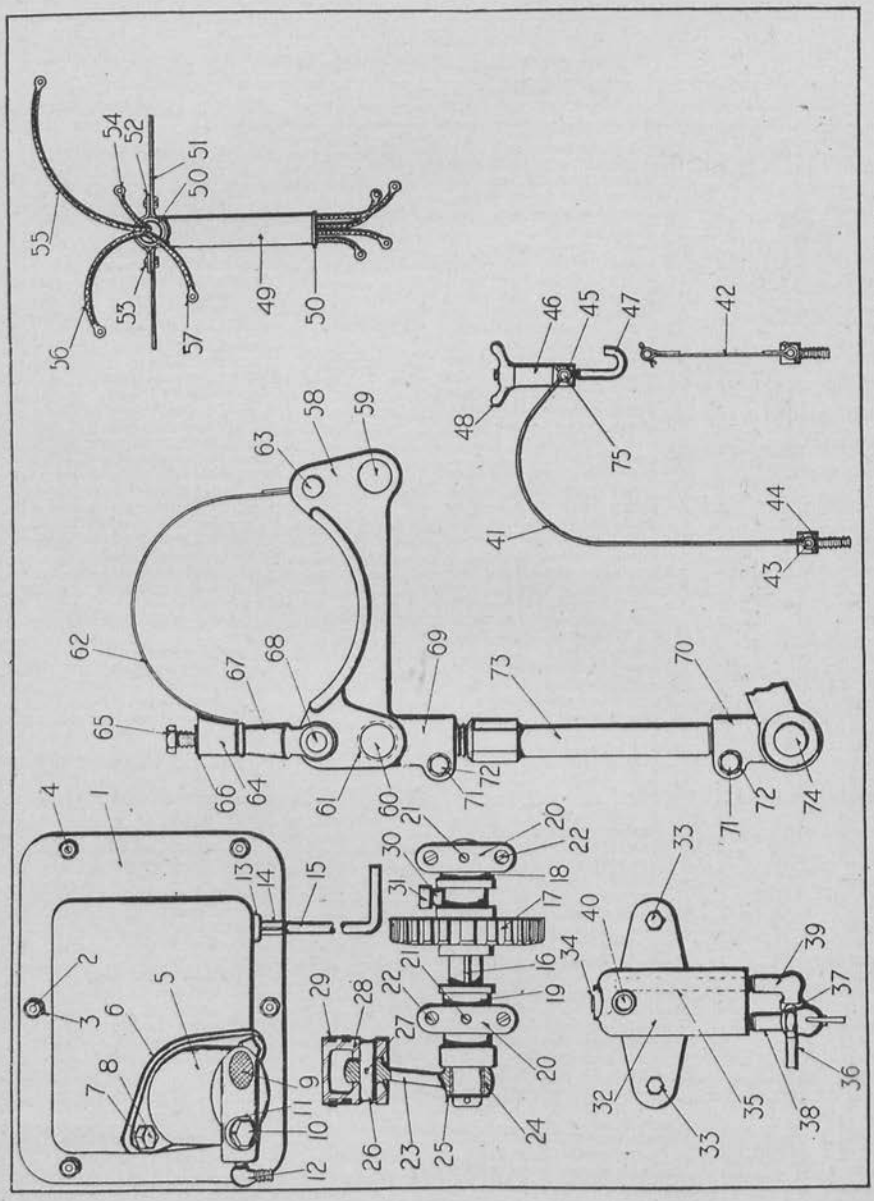
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Transmission—TIRE PUMP

See illustrations on pages 74, 112, 214

1	575 TEF	1	Transmission cover and air pump frame	On top of transmission
2	S081 A	6	Transmission cover and air pump frame stud nuts	
3		6	Transmission cover and air pump frame stud washers (⅛" spring lock)	
4	S0575 GA	6	Transmission cover and air pump frame studs	In top of transmission case
5	575½ GF	1	Air pump cylinder	In cover frame
6	575¾ GEC	1	Air pump cylinder gasket	Under cylinder boss
7	045¼ GA	2	Air pump cylinder screw lock washers	Under cylinder nuts
8	S0178½ GE	2	Air pump cylinder screws	In transmission cover
9	00742¼ GF	1	Air pump cylinder inlet valve screen	In cylinder head
10	00742½ GF	1	Air pump cylinder check valve cap	In cylinder head
11	00742¾ GF	1	Air pump cylinder check valve cap gasket	Under check valve cap
12	00484 GM	1	Air pump cylinder elbow	In cylinder head
13	0205¼ TED	1	Air pump engaging rod collar	In cover frame
14	0206½ TED	1	Air pump engaging rod connection	Through cover frame
15	0209 TED	1	Air pump engaging rod (long)	To outside of frame
	0205 TED	1	Air pump engaging rod (short)	Inside cover frame
	627¼ TED	1	Air pump engaging rod door	In left splash guard
16	0202 GF	1	Air pump crank shaft	On under side of cover frame
17	0207 TEF	1	Air pump gear	Rear end of crankshaft
18	00574¾ GF	1	Air pump crank shaft bearing	On under side of cover frame
19	00574½ GF	1	Air pump crank shaft bearing (two halves)	On under side of cover frame
20	575¾ GF	2	Air pump crank shaft bearing caps	On under side of cover frame
21	S0071 GG	2	Air pump crank shaft bearing cap dowels	On under side of cover frame
22	S0575¾ GF	4	Air pump crank shaft bearing cap screws	On under side of cover frame
23	00208 GF	1	Air pump connecting rod	On end of crankshaft
24	00208¾ GF	1	Air pump connecting rod bushing	Lower end connecting rod
25	0172¾ G	1	Air pump connecting rod washer	On end of crankshaft
26	S0208 GF	1	Air pump connecting rod wrist pin	In piston
27	S0167 O	2	Air pump connecting rod and engaging lever pins (No. 0 taper ¾" long)	Through connecting rod and wrist pin
28	383 GF	1	Air pump piston	In pump cover frame
29	348 O	2	Air pump piston rings	On air pump piston
30	0205½ GF	1	Air pump engaging lever pin	On sliding gear
31	00206 GF	1	Air pump engaging lever	On sliding gear
32	0201 TED	1	Air line oil trap	On left frame member
33	S0107¼ GE	2	Air line oil trap bolts	On left frame member
	S0585 GA	2	Air line oil trap bolt nuts	
34	S00325 C	1	Air line oil trap plug	On top of oil trap
35	00201¾ GF	1	Air line oil trap elbow extension	On bottom of oil trap
36	00201¼ TEB-O	1	Air line	Pump to trap
37	S00413 A	2	Air line union nuts	On air line
	S00404 GF	2	Air line union glands	On bottom of oil trap
38	00200 TED	1	Air line oil trap extension drain cock	On bottom of oil trap
39	00402 TED	1	Air line oil trap elbow	In side of oil trap
40	S00201 GF	1	Air line dirt trap cap	In side of oil trap
41	0457 GAF	1	Magneto clamp band	Around magneto
42	0457½ GAF	1	Magneto clamp band extension	Around magneto
43	S0456½ GAF	3	Magneto clamp band pins	Through ends of band
44	S0456 GAD	2	Magneto clamp band studs	On ends of band
45	S0457¼ GAF	1	Magneto clamp band trunnion	
46	S0457¾ GAF	1	Magneto clamp band hook bolt collar	Under band wing nut
47	S0457½ GAF	1	Magneto clamp band hook bolt	Under band wing nut
48	0457¾ GAF	1	Magneto clamp band hook bolt wing nut	Under trunnion
49	00464 GA	1	Magneto wire conduit tube	On cylinder top cover
50	463½ GA	2	Magneto wire conduit tube bushings	In ends of conduit
51	0464½ GEC	1	Magneto wire conduit bracket (long)	On upper end conduit
52	0464¼ GA	1	Magneto wire conduit bracket (short)	On upper end conduit
53	TEB-O	2	Magneto wire conduit bracket screws and nuts (No. 10-32 x ⅜") brass	
	S0458 GAF	2	Magneto dowel pin	In magneto seat
	00302½ TA	1	Magneto control lever	Left side upper crankcase
	S00302¼ TBC	1	Magneto control lever stud	Left side upper crankcase
	S00741½ G	1	Magneto control lever stud nut	
	S0302½ GA	1	Magneto control lever binder bolt	In ends of control levers
	S0302¾ GA	1	Magneto control lever binder bolt nut	
	0302¾ TBC	1	Magneto control lever arm	At rear of magneto
54		1	Magneto conduit feed wire No. 1 (40¾" long)	
55		1	Magneto conduit feed wire No. 4 (35½" long)	
56		1	Magneto conduit feed wire No. 3 (34" long)	
57		1	Magneto conduit feed wire No. 2 (30" long)	
		1	Magneto ground wire (54" long) with terminals	

PLATE 70

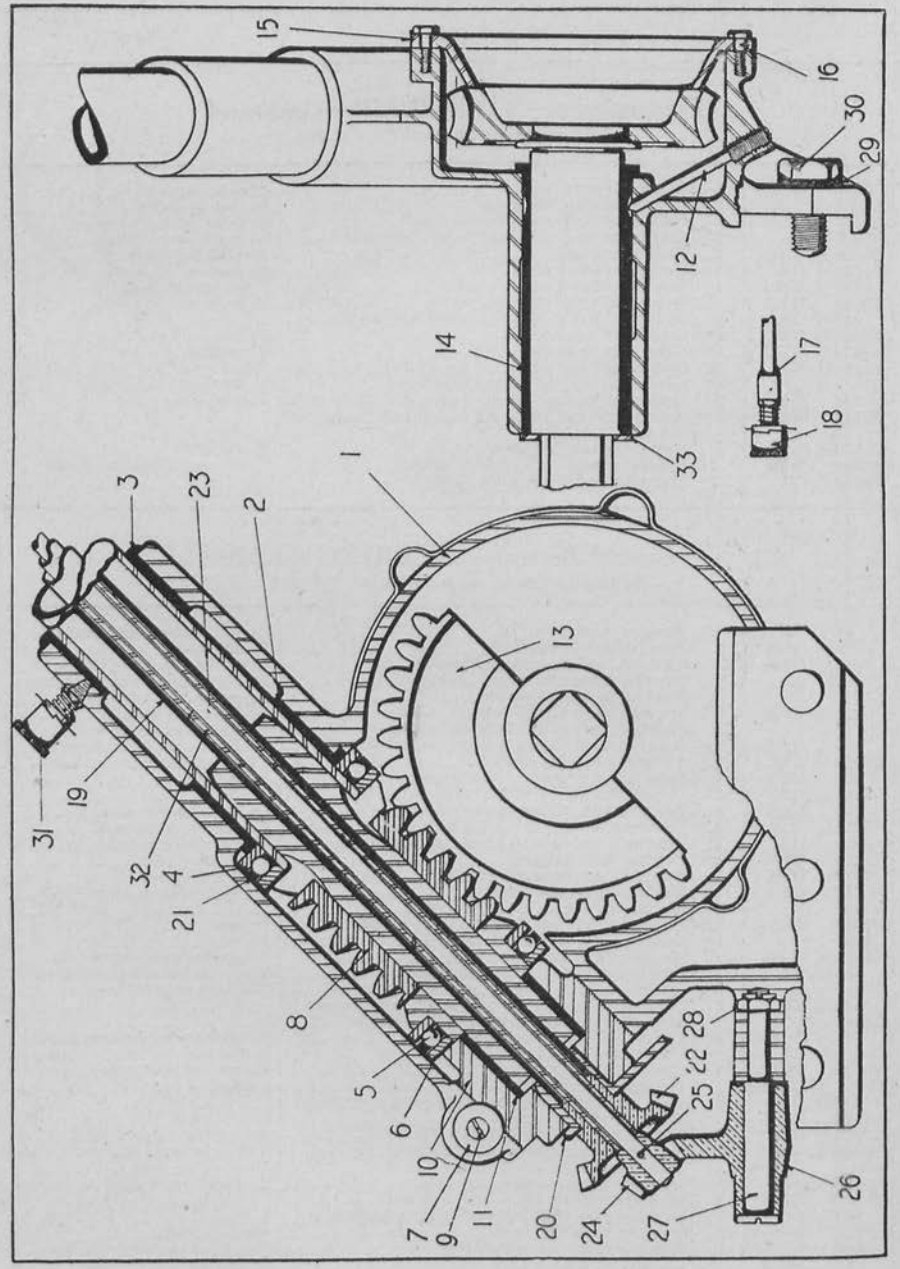


AIR PUMP, GENERATOR BRACKET, MAGNETO CONDUIT AND MAGNETO STRAP ASSEMBLY

NOMENCLATURE OF PARTS—Continued

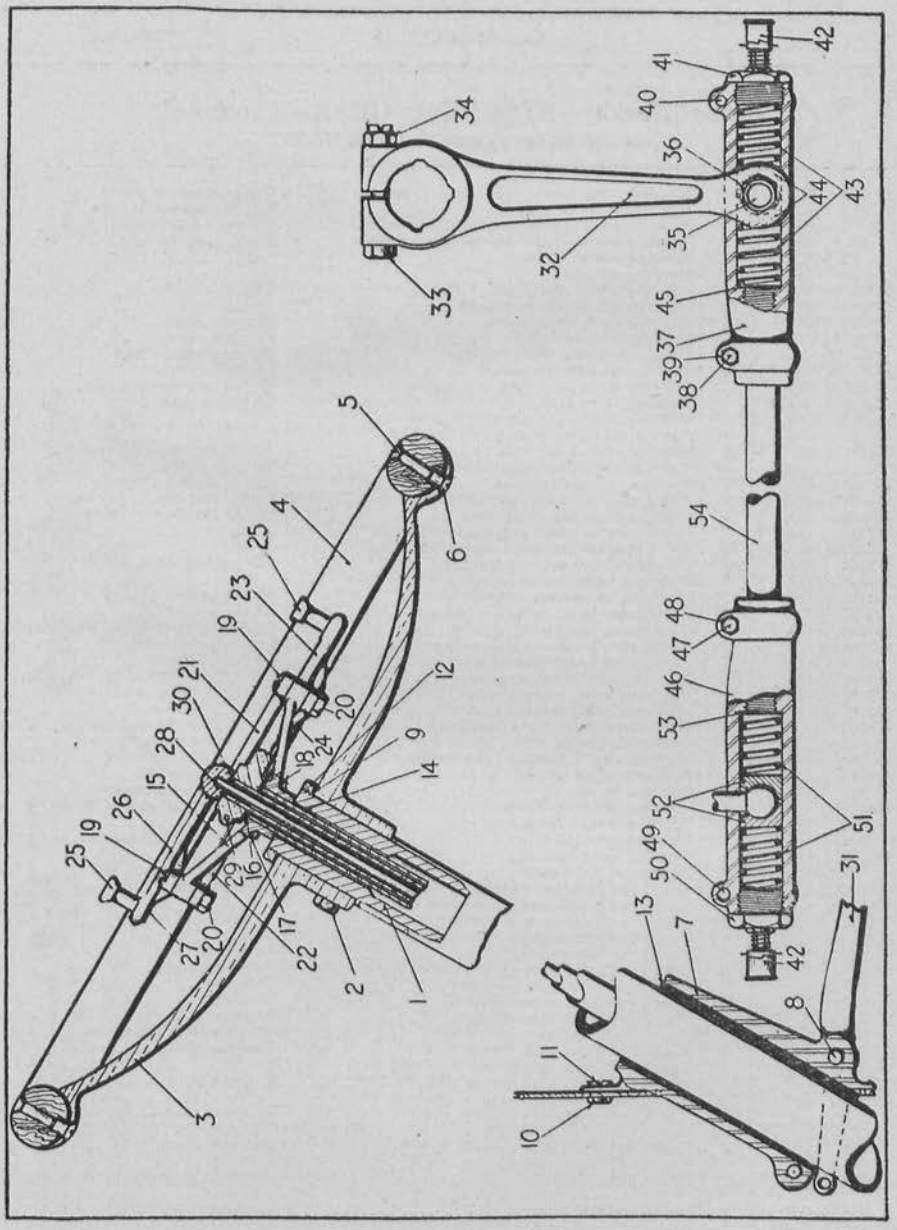
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Transmission*—TIRE PUMP—*Continued	
			See illustrations on pages 74, 112, 214	
58	1530 GEC	1	Generator shelf	Above magneto
59	01566½ TED	1	Generator shelf pin (long)	In rear of shelf
60	S01566 TED	1	Generator shelf pin (short—upper)	In front part of shelf
61	S00941/2 TA	2	Generator shelf adjusting toggle bushings	In front part of shelf
62	01530¾ GEC	1	Generator band	Around generator
63	S01527½ GEC	1	Generator band pin	In rear end of band
64	1527¼ GM	1	Generator band end	Front end of band
65	S0680 GED	1	Generator band clamping screw	In band end
66	045¼ GA	1	Generator band clamping screw lock washer	
67	01530⅞ GEC	1	Generator band clevis	Under band end
68	S01530⅞ GEC	1	Generator band clevis pin	Through clevis end
69	01565¾ GF	1	Generator band adjusting toggle end	Under band end (left)
70	01565¼ GF	1	Generator band adjusting toggle end	Under band end (right)
71	S0101 GAB	2	Generator band adjusting toggle end binder bolts	Through band end
72	S0143 G	2	Generator band adjusting toggle end binder bolt nuts	
73	S01565¼ GEB	1	Generator band adjusting screw	Under shelf
74	S01566 GFB	1	Generator band pin (short—lower)	Lower end adjusting screw
75	S0219 O	1	Magneto clamp band pin (plain)	
			***Control Devices*—STEERING GEAR**	
			See illustrations on pages 88, 90, 92, 216, 217	
1	16 TE	1	Steering stem case	On left frame side member
	016⅜ GB	1	Steering stem case shim	Under case
2	0018½ GA	1	Steering stem case lower bushing	Upper end steering worm
3	0018 GA	1	Steering stem case upper bushing	Above steering worm bushing
	S0018 TA	2	Steering case bushing pin	Lower end of housing
4	023½ GAB	2	Steering stem thrust bearing washer (upper)	Under lower bushing
5		28	Steering stem thrust bearing balls, ¼"	At ends of steering worm
6	023½ GAC	2	Steering stem thrust bearing washer (lower)	Under lower thrust bearing
7	S0014 GEC	1	Adjusting locking block	Through lower end of caso
8	025 GE	1	Steering stem worm	In case
9	S014¼ GFB	1	Thrust bearing adjusting nut locking bolt	
10	14 GAB	1	Bearing stem thrust bearing adjusting nut	In lower end of case
11	0014½ E	1	Bearing stem thrust bearing adjusting nut bushing	Under adjusting nut
12	S019 GA	1	Bearing stem eccentric bushing lock screw	Under steering case
13	023 GEC	1	Bearing stem segment	In steering case
14	0024 GEC	1	Bearing stem segment bushing	In side of case
15	17 GE	1	Bearing stem case cover	On right side of case
16	S0105 O	6	Bearing stem case cover screws	
17	S0023 TA	1	Bearing stem segment grease cup extension	In case
18	0099 O	1	Bearing stem segment grease cup	In case
19	0305¼ GAR	1	Hand control stationary tube	Around control tubes
20	305¾ GA	1	Hand control stationary tube support	Lower end stationary tube
	S0105½ G	1	Stationary tube support bracket bolt	Through support bracket
	0181¾ GF	2	Stationary tube support bracket bolt washers	
	S0143 O	1	Stationary tube support bracket bolt nut	
21	023¼ GAB	4	Thrust bearing ball retainers	Around thrust bearing balls
22	00300½ GA	1	Carbureter hand control bevel pinion	Lower end stationary tube
	00300 GE	1	Throttle control segment	Lower end stationary tube
	S0300 GA	1	Throttle control segment stud	On end of segment
	112¼ O	1	Throttle control segment stud washer	
23	0302 GAR	1	Magneto control tube	Inside stationary tube
24	00303½ GA	1	Magneto control bevel pinion	Lower end control tube
25	S00300½ GA	2	Magneto control bevel pinion pins	Through bevel pinions
26	00303 GF	1	Magneto control bevel gear	On steering case
27	S0303 GA	1	Magneto control bevel gear bolt	Through gear
28	S0585 GA	1	Magneto control bevel gear bolt nut	
29	054¼ GG	2	Steering stem case bolt spring lock washers	
30	S016 GA	2	Steering stem case bolts	Case to frame
31	0099 K	1	Steering stem case grease cup	On upper end steering case
32	0308 GAR	1	Carbureter control tube only	Inside stationary tube
33	023¼ GEC	1	Steering segment thrust washer	On side of case

PLATE 71



STEERING GEAR ASSEMBLY

PLATE 72



STEERING GEAR AND DRAG LINK ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Control Devices*—STEERING GEAR—*Continued	
			See illustrations on pages 88, 90, 92, 216, 217	
1	022 GA	1	Steering stem head	Under steering wheel
	015 TED	1	Steering stem	Inside stationary tube
2	S020 TBD	1	Steering wheel spider binder block bolt	Through spider hub
	020¾ TBD	1	Steering wheel spider binder block bolt	Steering wheel center
3	20 TBD	1	Steering wheel spider	
4	21 MM	1	Steering wheel rim	
5	S0020½ TA	3	Steering wheel rim bolts	Through spider to rim
6	0020¾ TA	3	Steering wheel rim bolt nuts	
7	015½ TED	1	Steering stem dash plate	Bolts to dash
8	0217½ GE	1	Accelerator pedal shaft	In dash plate
	0217¾ GE	1	Foot accelerator shaft washer	On accelerator shaft
	S00217½ GA	2	Foot accelerator shaft nut	On end of shaft
9	030¼ TA	1	Steering stem head lock nut washer	Upper end steering stem
10	S015½ TED	3	Steering stem dash plate bolts	Through dash
11	S015¼ GE	3	Steering stem dash plate bolt nuts	
	0143¼ G	3	Dash plate screw washer	
12	S0147¾ G	1	Steering stem head lock nut	Upper end steering stem
13	0015¼ GBB	1	Steering stem dash plate bushing	In dash plate
14	00309½ GA	1	Stationary tube bushing	Inside stationary tube
15	00307 GA	1	Hand control quadrant support	Upper end stationary tube
16	00309 GA	1	Hand control tube bushing	Inside stationary tube
17	S0307 GA	1	Hand control quadrant support bolt	Through quadrant support
18	S0307½ GA	1	Hand control quadrant support bolt nut	
19	S0306 GA	2	Magneto hand control quadrant bolts	Through quadrant
20	S0306½ GA	2	Magneto hand control quadrant bolt nuts	
21	00305½ GA	1	Magneto hand control quadrant	Above spider
22	00305 GA	1	Carbureter hand control quadrant	Above spider
23	00304 GA	1	Carbureter hand control lever	In center of steering wheel
24	00304½ GA	1	Carbureter hand control lever spring	In control lever
	0304¾ GA	1	Carbureter hand control lever spring catch	In control lever
25	S00304 GA	2	Hand control lever buttons	On end of control levers
26	00301 GA	1	Magneto hand control lever	In center of steering wheel
27	00301½ GA	1	Magneto hand control lever spring	In control lever
28	S0167 O	1	Magneto control lever taper pin (No. 0)	Through lever and rod
29	S0304¼ GA	1	Carbureter hand control lever bolt	Through control lever
30	00308½ GED	1	Magneto hand control tube bushing	Around control rod
31	00217 GAF	1	Accelerator pedal	On dash bracket
32	013 GEC	1	Steering lever	Connects with reach rod
33	S0425 GA	1	Steering lever binder bolt	Through split end of lever
34	S0913 GA	1	Steering lever binder bolt nut	
35	013½ GBE	1	Steering lever ball	On lower end of lever
36	S0192½ GA	1	Steering lever ball nut	On ball stud
37	31½ F	1	Reach rod joint case	Rear end of reach rod
38	S0178¾ GF	1	Reach rod joint case binder bolt	Clamps case
39	S0574¼ GA	1	Reach rod joint case binder bolt nut	
40	S031 GE	1	Reach rod joint case binder bolt	Rear end of case
	S0574¼ GA	1	Reach rod joint case binder bolt nut	
41	033 F	1	Reach rod joint case plug	In end of case
42	0099 O	2	Reach rod joint case grease cups	In case plugs
43	031¼ F	2	Reach rod joint case springs	In cases
44	032 F	2	Reach rod joint case sockets	In cases
45	0313¾ F	1	Reach rod joint case washer	In cases
46	031½ GFB	1	Reach rod joint case	Front end of reach rod
47	S041 GA	1	Reach rod joint case binder bolt	Clamps case
48	S0573¼ GA	1	Reach rod joint case binder bolt nut	
49	S033 GF	1	Reach rod joint case binder bolt	Clamps plug
	S0585 GA	1	Reach rod joint case binder bolt nut	
50	033 GF	1	Reach rod joint case plug	In front case
51	031¼ GF	2	Reach rod joint case springs	In case
52	032 GF	2	Reach rod joint case sockets	In case
53	031¾ GF	1	Reach rod joint case washer	In case
54	028 GEC	1	Reach rod only	Between steering lever and spindle arm
	898½ GF	1	Reach rod end boot	Around front case
	898 GBB	1	Reach rod end boot	Around rear case

NOMENCLATURE OF PARTS—Continued

Ref. No	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

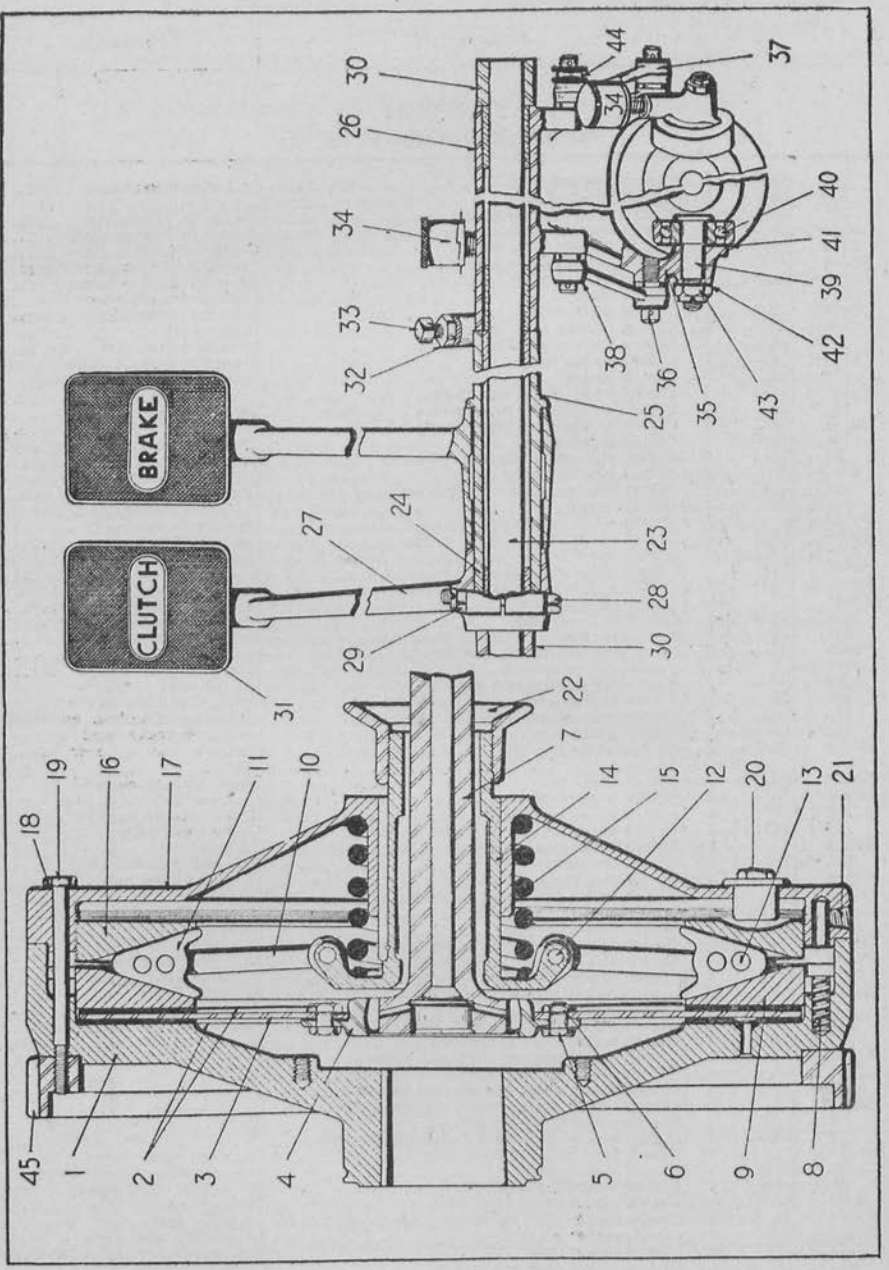
CLUTCH

See illustrations on pages 98, 102, 220

1	150	GEE	1	Clutch flywheel	In back of crankcase
*1	150	GED	1	Clutch flywheel	
2	151½	GEC	2	Clutch friction plate shoes	On clutch driven disc
3	0150½	GEC	1	Clutch friction plate	Bolted to driving shaft
4	0130	GED	1	Clutch friction plate flange	Center of friction plate
5	S0131	GEC	8	Clutch friction plate bolts	Through friction plate flange
6	S0131¼	GEC	8	Clutch friction plate bolt nuts	On friction plate bolts
7	0131	GED	1	Clutch shaft	Shaft to transmission
	0175¼	GEC	1	Clutch shaft spring	Between rocker arm and clutch shaft
8	0150¼	GEC	8	Clutch friction plate springs	In flywheel
9	151¾	GEC	1	Clutch friction plate ring (plain)	Next to driven disc
10	0174¾	GEC	12	Clutch wedge straps	Pinned to pullout sleeve
11	174¼	GEC	6	Clutch wedges	Between friction plate rings
12	S0151½	GEC	6	Clutch wedge strap pins (long)	In pullout sleeve
	041½	GA	24	Clutch wedge strap pin washers	On ends of strap pins
13	S0151	GEC	6	Clutch wedge strap pins (short)	In wedges
14	131¾	GEC	1	Clutch toggle spider	Through clutch cover
	130¼	GEC	1	Clutch pull-out spider sleeve key	In spider
15	0131½	GEC	1	Clutch tension spring	Inside clutch cover
16	151¼	GEC	1	Clutch friction plate ring (notched)	Inside clutch cover
17	150¾	GEC	1	Clutch cover	Bolts to flywheel
18	00120¼	E	8	Clutch cover bolt gaskets	Under bolt heads
19	S0150¼	GEE	8	Clutch cover bolts	Cover to flywheel
*19	S0150¼	GK	8	Clutch cover bolts	Cover to flywheel
20	00151	GEC	1	Clutch adjusting plate lock	In clutch cover
	S0151¼	GED	2	Clutch adjusting plate lock screws	In clutch cover
21	S00325	O	1	Clutch oil drain plug	In rim of clutch cover
22	0134¾	GED	1	Clutch pull-out shoe	On end of pullout spider
23	036	GEC	1	Foot lever shaft	Between side rails
24	S0039	MR	2	Foot lever connection bushings	In clutch pedal hub
25	0191¼	GE	1	Foot lever connection	In clutch pedal hub
	0099	OO	1	Foot lever shaft grease cup	In foot lever connection
26	180¼	GEC	1	Clutch rocker lever	On right end clutch shaft
	175	GEC	1	Clutch brake band	On transmission front cross member.
	175½	GEC	1	Clutch brake shoe	On clutch brake band
	S0175	GEC	1	Clutch brake pull rod	Between rocker lever and brake band
	S0176	GEC	1	Clutch brake pin	Lower end clutch band
	S0176¼	GEC	1	Clutch brake bushing	In upper end clutch band
	S0178¾	GF	1	Clutch brake band bolt	Brake band to support
	176½	GEC	2	Clutch brake band bolt washers	Under band bolt
	S0585	GA	1	Clutch brake band bolt nut	On bolt
27	191	GE	1	Clutch foot lever	Left end of clutch shaft
28	S0103	GA	1	Clutch foot lever binder bolt	In clutch lever hub
29	S0585	GA	1	Clutch foot lever binder bolt nut	On binder bolts
30	39	GAB	2	Foot lever shaft brackets	On frame side members
31	191½	GEC	1	Clutch foot lever pad	On clutch lever
32	S0192½	GA	1	Foot brake lever adjusting screw nut	In brake pedal hub
33	S0192	GA	1	Foot brake lever adjusting screw	In brake pedal hub
34	0099	-O	3	Clutch rocker lever grease cups	In rocker lever
	S0023	TA	2	Clutch rocker grease cap extensions	In rocker lever
35	174	GED	1	Clutch rocker	On pullout sleeve
	172	GBB	1	Clutch rocker shaft bracket, R. H.	On right frame member
	172¼	GAB	1	Clutch rocker shaft bracket cap	In the bracket
	S0180¼	GA	4	Clutch rocker shaft bracket cap bolt	In the bracket
	S0574¼	GA	4	Clutch rocker shaft bracket cap bolt nut	In the bracket
	074½	O	4	Clutch rocker shaft bracket bolt washer (7/16")	In the bracket
	S0172¾	GA	1	Clutch rocker shaft bracket cap dowel pin	In the bracket
	172½	GBB	1	Clutch rocker shaft bracket, L. H.	On left frame side member
	172¾	GAB	1	Clutch rocker shaft bracket cap with dowel	On left frame side member
	S0174½	GA	3	Clutch band pull rod stud	In clutch rocker lever
	0173	GTB	1	Clutch rocker shaft	Above clutch pullout sleeve
	13¾	GTA	2	Clutch rocker shaft collar	On ends of rocker shaft
	S031	GE	2	Clutch rocker shaft collar bolt	Through collar
	S0574¼	GA	2	Clutch rocker shaft collar bolt nut	On collar bolt
36	S0174¼	GA	2	Clutch rocker studs	In side of rocker arms
37	0173½	GEC	2	Clutch rocker rods	Between rocker and pedal shafts
	0973½	GA	4	Clutch rocker lever rod washer	On rocker studs
38	0174¼	GA	2	Clutch rocker hitch-up stud washers	On rocker lever studs
39	S0174	GED	2	Clutch rocker bearing studs	In pullout bearing

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 73

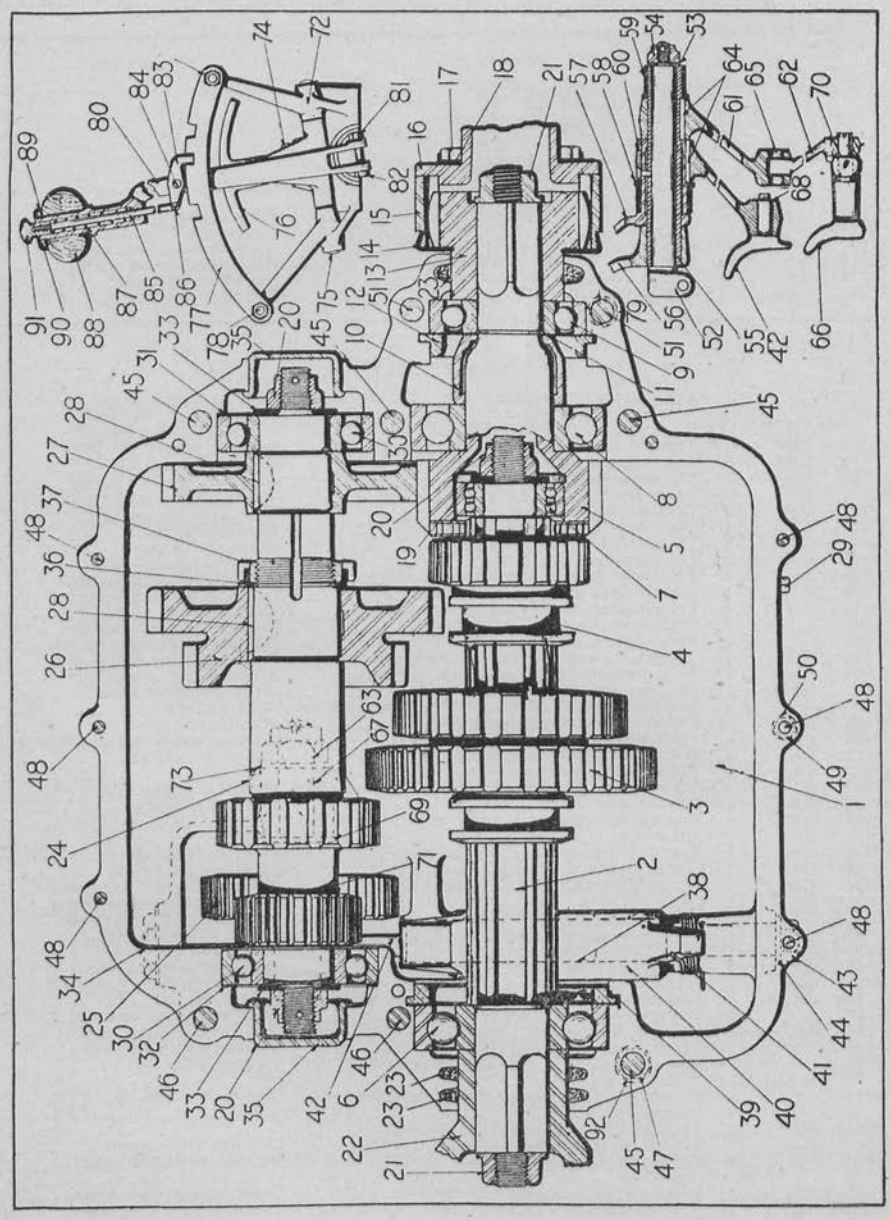


CLUTCH, FLYWHEEL AND PEDAL ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			CLUTCH—*Continued*	
			See illustrations on pages 98, 102, 220	
40	302	2	Clutch rocker bearing	Press against pullout sleeve
41	0174½ GED	2	Clutch rocker bearing washers	Under rocker bearings
42	030¼ GF	2	Clutch rocker bearing stud washers	Under bearing stud nuts
43	S0573¼ GA	2	Clutch rocker bearing stud nuts	On rocker bearing studs
44	0173¼ GA	2	Clutch shaft pull back springs	On rocker lever stud
45	01561 GEE	1	Starter flywheel gear	Bolted to flywheel
			TRANSMISSION	
			See illustrations on pages 110, 112, 114, 115, 116, 222	
1	574 TEF	1	Transmission case (lower half)	Back of engine
	573 TEF	1	Transmission case (upper half)	Back of engine
	576 GF	1	Transmission case lever cap	On upper case
	S0071 GE	2	Transmission case lever cap dowel pins	Through lever cap
2	0901 GFB	1	Transmission sliding gear shaft	Main shaft
3	0909 GF	1	Transmission sliding double gear	Rear sliding gear
4	0908 GF	1	Transmission sliding gear	Front sliding gear
5	0907 GF	1	Transmission clutch gear	In front of main shaft
6	408	1	Transmission sliding gear shaft bearing	Rear end main shaft
7	206 C	1	Transmission sliding gear shaft bearing	In clutch gear
8	310	1	Transmission clutch gear bearing	Next to clutch gear
9	308	1	Transmission clutch gear bearing	Front clutch gear bearing
10	960 GF	1	Transmission clutch gear bearing spacer	Between clutch gear bearings
11	960¼ GF	1	Transmission clutch gear bearing spacer shim	Front of spacer sleeve
12	0907¾ GF	1	Transmission clutch gear thrust ring (front)	Around spacer shims
13	0961 GFD	1	Transmission universal joint head	On end of clutch gear
14	0425¾ GEC	1	Transmission universal joint ring grease retainer	On joint head
15	0425½ GED	1	Transmission universal joint ring	Around joint head
16	0425 GED	1	Transmission universal joint coupling	Between clutch and transmission
	S030 TA	2	Transmission universal joint coupling bolts	Into coupling ring
	S0913 GA	2	Transmission universal joint coupling bolt nuts	
	0099 O	1	Transmission universal joint coupling grease cup	In joint coupling
17	S0131 GA	4	Transmission universal joint coupling bolts	Through coupling
18	0425¼ GEC	4	Transmission universal joint coupling bolt lock washers	
19	0901½ GA	1	Transmission sliding gear shaft washer	Front end gear shaft
20	S0901 GA	3	Sliding and back gear shaft nuts	Front end gear shaft
21	S064 F	2	Sliding gear shaft and clutch gear nuts	In front and rear universals
22	073½ GF	1	Universal joint toggle	Rear end sliding gear shaft
23	901¼ GA	6	Transmission case oil retainer felts	Rear end sliding gear shaft
24	0971 GF	1	Transmission back gear shaft	To left of main shaft
25	0913 GF	1	Transmission reverse gear	Below back gear shaft
26	0911 GF	1	Transmission back gear (double gear)	Center of back gear shaft
27	0910 GF	1	Transmission back gear	Front end of back gear shaft
28	0112¾ GA	2	Transmission back gear keys (No. 25 Woodruff)	In gear
29	00386 A	1	Transmission case oil level plug	Right side lower case
	00386½ A	1	Oil level plug washer	
30	308	2	Transmission back gear shaft bearings	On ends back gear shaft
31	0971½ GF	1	Transmission back gear shaft shim washer (1/32" thick)	On back gear shaft
32	0971¾ GF	1	Transmission back gear shaft shim washer (1/64" thick)	Next to bearings
33	0901½ GF	2	Transmission back gear shaft washers	
34	0327½ O	1	Transmission case drain plug	Left sido lower case
35	0970½ GF	2	Transmission back gear shaft dust cap and oil retainer	On back shaft bearings
36	067¼ GB	1	Transmission back gear lock washer	Center of back gear shaft
37	067½ GB	1	Transmission back gear lock nut	Center of back gear shaft
38	0972½ GF	1	Transmission reverse shifter lever shaft	Across rear end lower case
39	0901¾ GF	1	Transmission sliding gear shaft thrust ring (rear)	
40	972 GF	1	Transmission reverse shifter lever	On reverse shifter shaft
41	0972¼ GA	1	Transmission reverse shifter lever spring	On reverse shifter shaft
42	0973 GA	2	Transmission change gear shift lever shoe	On reverse shifter shaft
43	S0972 GA	1	Transmission reverse shifter lever shaft nut	Outsido end shifter shaft
44	0972¾ GF	1	Transmission reverse shifter lever shaft washer (order thickness wanted)	

PLATE 74



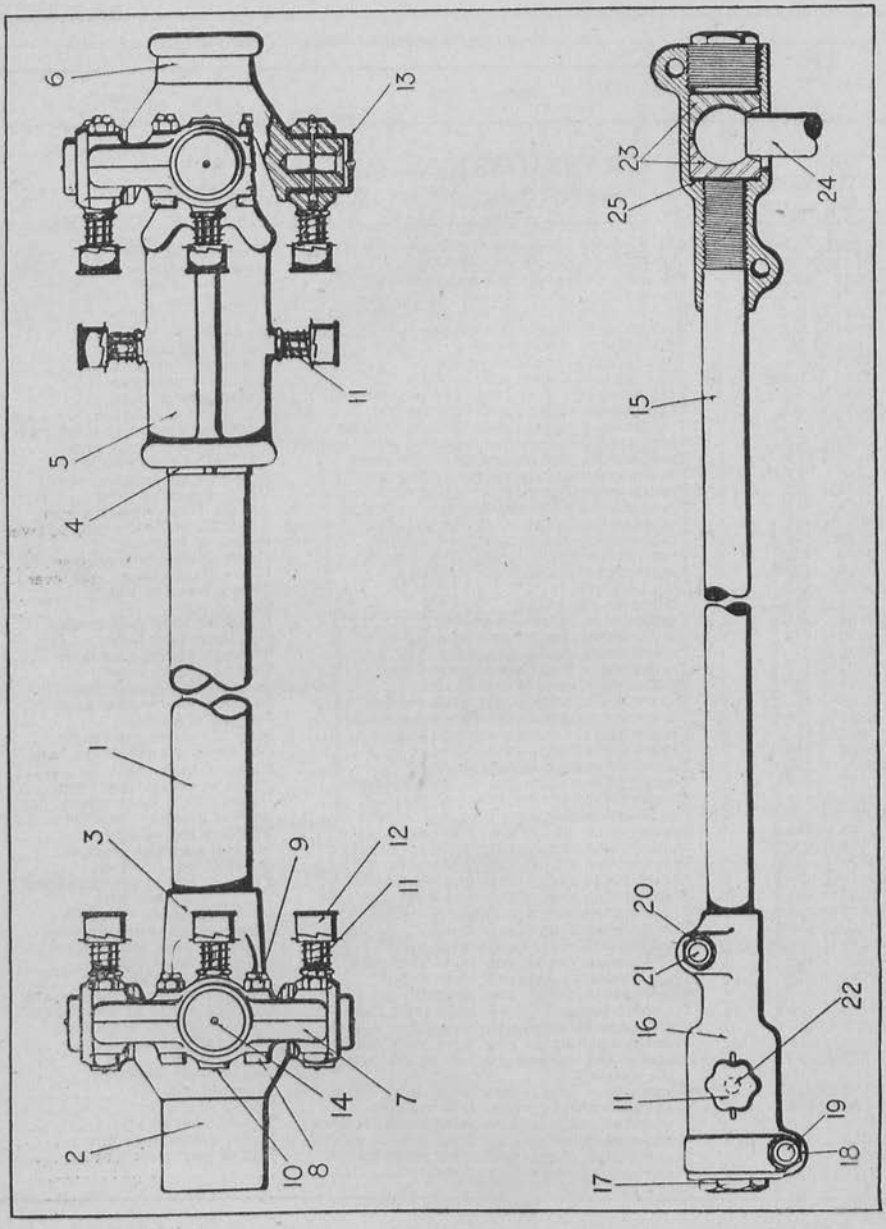
TRANSMISSION ASSEMBLY

TRANSMISSION—*Continued*

See illustrations on pages 110, 112, 114, 115, 116, 222

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
45	S0573½ GF	4	Transmission case bolts (½"—18)	Front end of case
46	S0574½ GF	2	Transmission case bolts (½"—18)	Rear end of case
47	S0913 GA	6	Transmission case bolt nuts (½"—18)	Rear end of case
48	S0574 GA	10	Transmission case bolts ($\frac{5}{16}$"—20)	Sides of case
49	S0574¼ GA	10	Transmission case bolt nuts ($\frac{5}{16}$"—20)	
50	0574¾ GA	6	Transmission case bolt washers, $\frac{5}{16}$"	Under nut
	054¼ M	2	Transmission case washer	On edge of cage
51	S0573 GA	2	Transmission case bolts, $\frac{1}{16}$"	Through edge of case
52	0184 GAH	1	Transmission change gear fulcrum	Rear of change gear
53	0586¼ GA	1	Transmission change gear fulcrum washer	Under fulcrum nut
54	S0913 GA	1	Transmission change gear fulcrum nut	Front end of fulcrum
55	0012½ GAD	2	Transmission change gear fulcrum bushing	Enclosing change gear fulcrum
56	0180¾ GA	1	Transmission change gear engaging lever (outside)	Rear end of change gear
57	0180 TE	1	Transmission change gear engaging lever	In front change gear lever
	0179 TEB	1	Transmission change gear engaging lever	Adjacent to engaging lever
	0573¾ GA	1	Transmission change gear engaging lever washer	Under engaging lever
58	00576½ GE	1	Transmission high speed change gear shaft bush.	Around front engaging lever
59	00576¾ GE	1	Transmission low speed change gear shaft bushing	Around front end engaging lever
60	0582 GE	1	Transmission change gear lever (short)	Center of fulcrum
61	0583 GF	1	Transmission change gear lever (long)	Front of change gear lever
62	0585 GF	1	Transmission change gear lever link	Below front change gear lever
	S0586 GA	1	Link lever pin	Through end of link
	586¾ GA	1	Link lever pin washer	End of pin
63	S0901 GA	1	Transmission reverse shaft nut	In center back gear shaft
64	0582¼ GA	2	Transmission change gear lever keys	In change gear lever
65	S030½ C	1	Transmission change gear lever pin	Through end of gear lever
66	0584½ GF	1	Transmission change gear lever dog	On end of gear lever
67	0913½ GF	1	Transmission reverse gear shaft	In center back gear shaft
	0113½ G	2	Transmission reverse gear shaft washer	In front reverse gear shaft
68	0973½ GA	3	Transmission change gear lever dog washer	On gear lever dog
69	064½ O	2	Transmission reverse gear shaft washer	Rear of reverse gear shaft
70	0584 GF	1	Transmission change gear lever	On upper transmission case
71	00914 GF	1	Transmission reverse gear bushing	Front of back gear
72	178 GE	1	Transmission change gear quadrant bracket	Front of change gear lever
73	0913¼ GF	1	Transmission reverse gear shaft washer	Under nut in back gear
74	00327½ GE	1	Transmission filler hole plug	Base of quadrant bracket
75	0183 GA	1	Transmission change gear latch axle	Through end of lever
76	178¼ TE		Transmission change gear latch	Within quadrant bracket
77	0178¾ GA	2	Transmission change gear quadrants	On quadrant bracket
78	S0178¾ GF	2	Transmission change gear quadrant bolts	Through end of gear quadrant
	S0585 GA	2	Transmission change gear quadrant bolt nuts	End of quadrant bolt
79	S0573¼ GA	2	Transmission case bolt nuts ($\frac{1}{16}$"—18)	On transmission case bolt
80	0180½ GFB	1	Transmission change gear lever	On upper transmission case
81	S0181¼ GAH	1	Transmission change gear lever bolt	Through lower end of lever
82	S0181 GE	1	Transmission change gear lever bolt nut	In end of lever bolt
83	0181 GF	1	Transmission change gear lever dog	On center of gear lever
84	S0147 C	1	Transmission change gear lever dog pivot pin	Through center of lever guard
85	0182 GF	1	Transmission change gear lever latch rod	Through center of lever latch
86	S052 C	1	Transmission change gear lever latch rod pin	Through end of lever dog
	0181¾ GF	1	Transmission change gear lever latch pin washer	On end of rod pin
	052¼ OO	2	Transmission change gear lever latch rod end pin washer	End of lever latch rod
87	0181¼ GA	1	Transmission change gear lever latch rod spring	In lever latch rod
88	50½ GA	1	Transmission change gear lever handle	End of gear lever
89	S0180½ GA	1	Transmission change gear lever handle lock nut	Top of lever handle
90	0312 E	1	Transmission change gear lever handle washer	Under handle lock nut
91	S00180 GA	1	Transmission change gear lever latch button	End of gear lever handle
92	0110½ G	14	Transmission case bolt washers	

PLATE 75



PROPELLER SHAFT AND TORSION ROD ASSEMBLIES

NOMENCLATURE OF PARTS—Continued

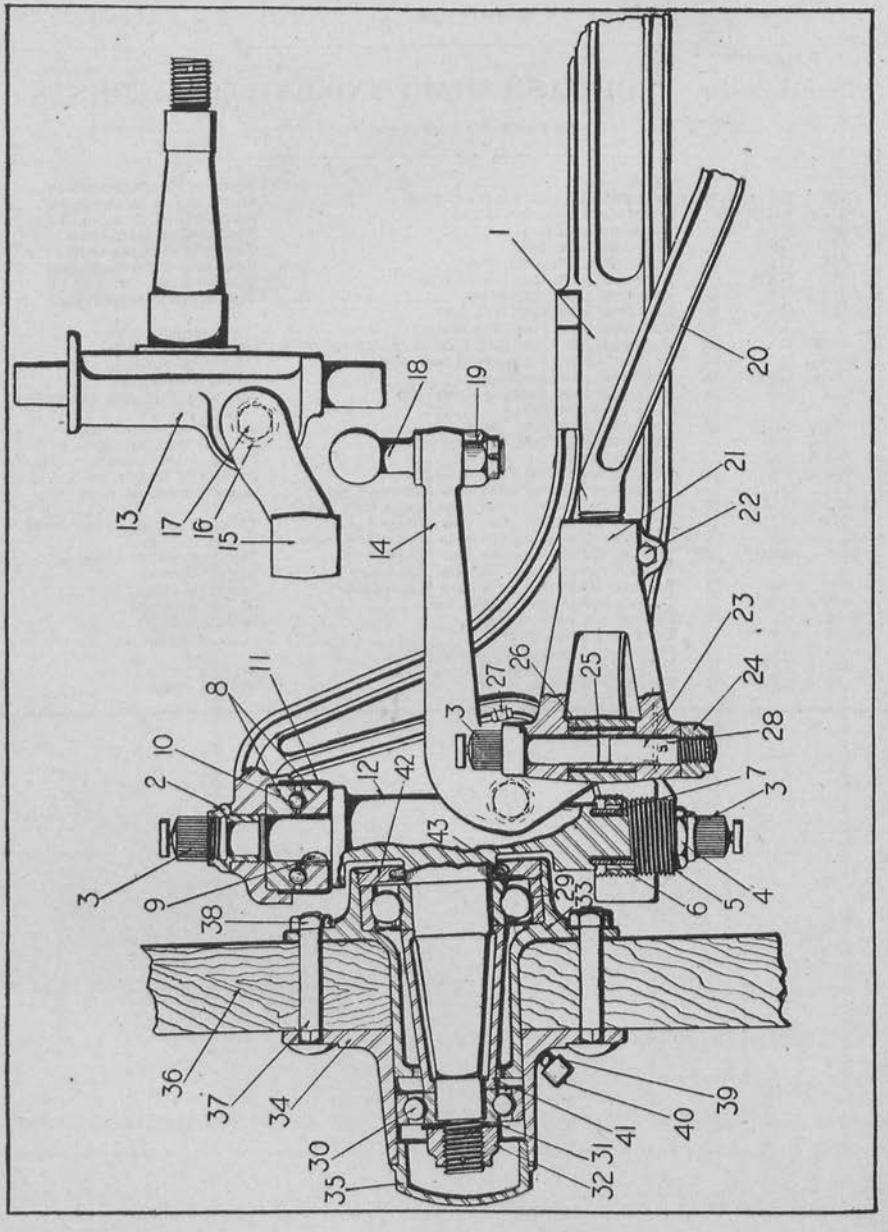
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Transmission—PROPELLER SHAFT AND UNIVERSAL JOINTS

See illustrations on pages 10, 224

1	C51½"	1	Drive shaft	Between transmission and axle
2	073½ GF	1	Transmission gear shaft trunnion	Front end of drive shaft
3	073½ TBC	1	Drive shaft trunnion (front)	Front end of drive shaft
4	S069 TBC	1	Drive shaft square	Rear end of drive shaft
5	072 GE	1	Universal joint box	Rear end of drive shaft
6	068 GE	1	Drive shaft trunnion (rear)	Rear end of drive shaft
7	071 GED	2	Universal joint ring (two halves)	Around front rear forks
8	S072½ GE	16	Universal joint ring bolts	Through universal rings
9	S0585 GA	16	Universal joint ring bolt nuts	
10		8	Universal joint ring pipe plugs ⅛", brass	On universal rings
11	0099 O	12	Universal joint ring and torsion rod grease cups	On universal rings
12	0099½ O	10	Universal joint ring grease cup caps	On grease cups
13	068¼ GED	8	Universal joint bushings	In universal rings
	S0071 GE	8	Universal joint bushing dowel pin	Through universal bushings
14			(This part not used.)	
	68½ GED	2	Universal joint ring boots	Around universal joints
	68¾ GG	1	Universal joint ring square boot	Around rear universal joint
15	049¼ GEC	2	Torsion rods	Frame to rear axle sleeves
16	030¼ GEC	4	Torsion rod swivel joint cases	On end of torsion rods
17	033 GEC	4	Torsion rod swivel joint case adjusting plugs	In end of swivel cases
18	S0573¼ GA	4	Torsion rod swivel joint case binder bolt nuts	
19	S041 GA	4	Torsion rod swivel joint case binder bolts	Through end of swivel cases
20	S0573¼ GA	4	Torsion rod swivel joint case binder bolt nuts	
21	S030¼ GEC	4	Torsion rod swivel joint case binder bolts	Through end of cases
22		4	Torsion rod swivel joint case pipe plugs ⅛"	In swivel cases
23	032 GEC	8	Torsion rod swivel joint case ball sockets	In swivel cases
24	030¾ GEC	2	Torsion rod frame bracket ball	In ball sockets
	S030½ GEC	2	Torsion rod balls (front)	In ball sockets
	S0901 GA	2	Torsion rod ball nuts	
25	031¾ GEC	4	Torsion rod swivel joint case washer	
	049⅛ GEC	2	Torsion rod boots, R. H	Around cases
	49⅜ GEC	2	Torsion rod boots, L. H	Around cases

PLATE 76

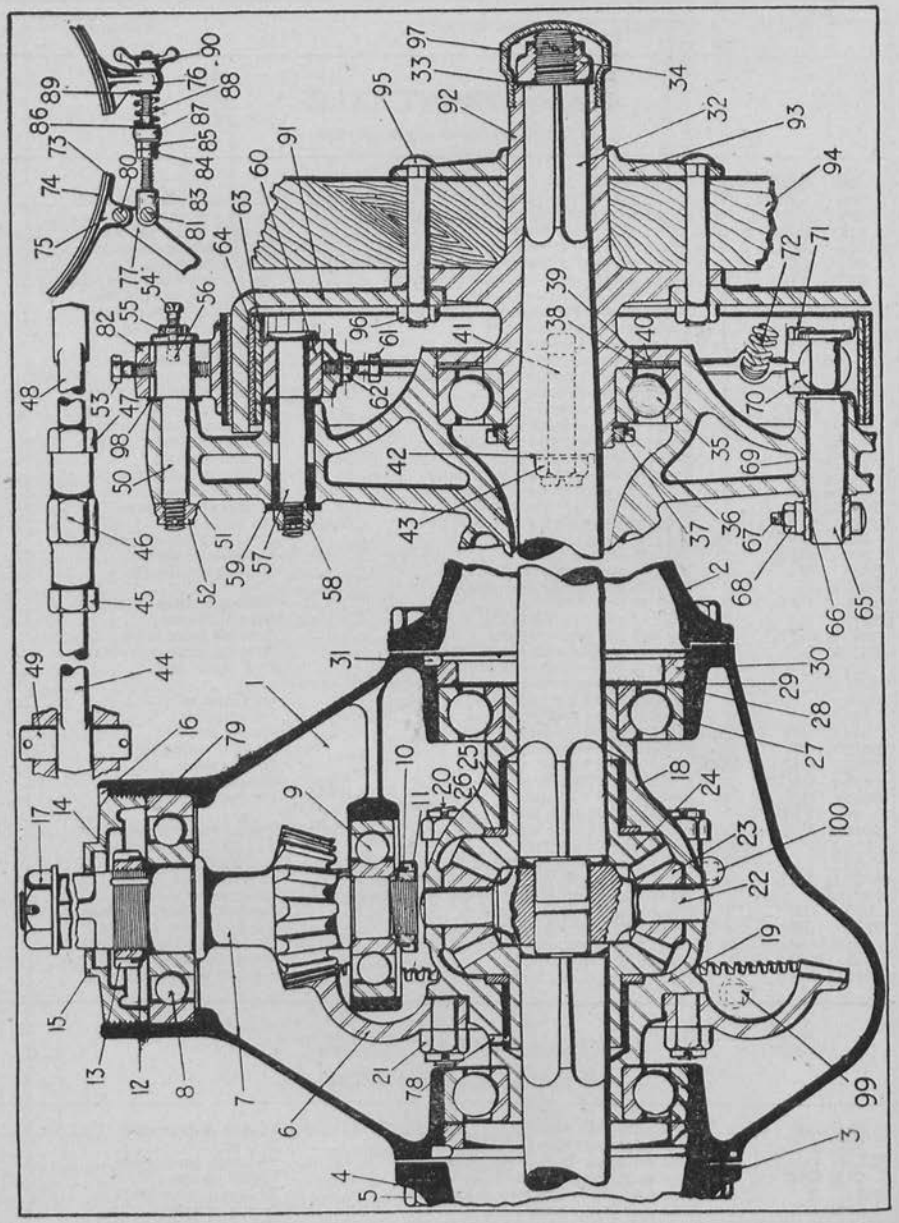


FRONT AXLE, WITH WHEELS AND TIE ROD ASSEMBLY

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Chassis—FRONT AXLE	
			See illustrations on pages 130, 226	
1	06 GBB	1	Front axle	
2	S06 GBB	2	Front axle upper bushings	In upper axle yoke end
3	0099 GB	6	Front axle bushing and tie rod grease cups	In tie rod yokes
4	012 GBC	2	Front axle lower bushings	In axle lower yoke end
	S01702 ATC	2	Front axle lower bushing binder bolts	Through spindle body
	054¼ GG	2	Front axle lower bushing binder bolt washers	On binder bolts
5	012½ TBC	2	Front axle lower bushing lock washer	Under lower spindle bushing
6	012¼ GB	2	Front wheel spindle sleeves	Lower end of spindle
7	0012¾ GB	2	Front axle lower bushing bushings	Around spindle sleeve
8	011¼ GB	4	Front wheel spindle cone	Above spindle body
9	010¼ GB	2	Front wheel spindle cone key	Above spindle body
10	½" Std.	22	Front wheel spindle cone balls	In spindle cone
11	011¾ GB	2	Front wheel spindle cone dust cap	Under bearing cone
12	011 GF	1	Front wheel spindle	In axle yoke ends (left)
13	010 GF	1	Front wheel spindle	In axle yoke end (right)
14	011½ GFB	1	Front wheel spindle arm	In spindle body (left)
15	010½ GFB	1	Front wheel spindle arm	In spindle body (right)
	01128¾ GA	2	Front wheel spindle arm key (No. 25 Woodruff)	In spindle arm
16	010¾ GB	2	Front wheel spindle arm washer	Under spindle arms
17	S010½ GB	2	Front wheel spindle arm nut	On spindle arms
18	S030¾ GF	1	Front wheel spindle arm ball	In left spindle arm
19	S0901 GA	1	Front wheel spindle arm ball nut	On ball stud
20	029 GFB	1	Tie rod only	Connects spindle arms
21	030 GFC	2	Tie rod ends	On ends of tie rod
22	S044 O	2	Tie rod end binder bolts	Through rod ends
	S057½ G	2	Tie rod end binder bolt nuts	
23	S030½ GFB	2	Tie rod end pins	Through ends of yokes
24	S0972 GA	2	Tie rod end pin nuts	On yoke bolts
25	030¼ GFB	2	Tie rod end pin sleeves	Around yoke bolts
26	00103¾ GF	2	Front wheel spindle arm bushing	Around yoke bolt sleeve
27	S06½ GED	2	Front axle steering arm stop screws	In I-beam ends
28	S0107¼ GA	2	Front axle lower bushing lock washer lock screws	
29	309	2	Front wheel bearing (inner)	On spindles
30	306	2	Front wheel bearing (outer)	On spindles
31	010¾ GB	2	Front wheel spindle washers	Under nut
32	S010½ GB	2	Front wheel spindle nuts	Ends of spindles
33	085 TED	2	Front wheel hubs	In wheels
34	085½ TED	2	Front wheel hub flanges	On outer end hub
35	0086 GB	2	Front wheel hub caps	On outer end hub
36	85 TEB-O	2	Front wheels with felloe band	
	0086¾ TBC	2	Front wheel felloe bushings	Under felloe band
37	½" x 2½"	20	Front wheel hub bolts	Through hub flanges
38	½"	20	Front wheel hub bolt nuts	
39	00562¼ GTB	2	Front wheel hub flange grease tubes	In outer hub flange
40	0097½ C	2	Front wheel hub flange grease tube caps	On grease tubes
41	095 GB	2	Front wheel bearing spacers	Between wheel bearings
42	S086 GB	2	Front wheel bearing retainers	Back of inner bearing
43	86⅜ GB	2	Front wheel bearing retainer felts	Under bearing retainers
	899 GBB	1	Tie rod end boot, R. H	Around ends of tie rod
	899½ GBB	1	Tie rod end boot, L. H	Around ends of tie rod
			Chassis—REAR AXLE	
			See illustrations on pages 134, 228	
1	54 GB	1	Rear axle gear case	Center of rear axle
	54½ GB	1	Rear axle gear case cover	Top of case
	S0543¼ O	7	Rear axle gear case cover bolts	Through case cover
	53⅞ GB	1	Rear axle gear case ratio plate	Inside of case
	S0405 A	2	Rear axle gear case ratio plate screws	Through ratio plate
	54⅝ GE	1	Rear axle gear case gasket	Inside of case
	S0447 G	7	Rear axle gear case cover screws	Through edge of case cover
	054¼ O	7	Rear axle gear case cover screw lock washers	Under case cover screw
	S017 GB	4	Rear axle gear case cover dowels	Rear edge of case cover
	00327½ G	1	Rear axle gear case filler hole plug	Through hole in case
2	047 GF	1	Rear axle sleeve	Right side differential housing
	0099 GK	2	Rear axle bracket grease cups	Front side brake bracket
3	047¼ GF	1	Rear axle sleeve	Left side differential case
4	047⅜ GB	8	Rear axle sleeve bolt lock washers	

PLATE 77



REAR AXLE, GEAR CASE AND BRAKE ASSEMBLY

NOMENCLATURE OF PARTS—Continued

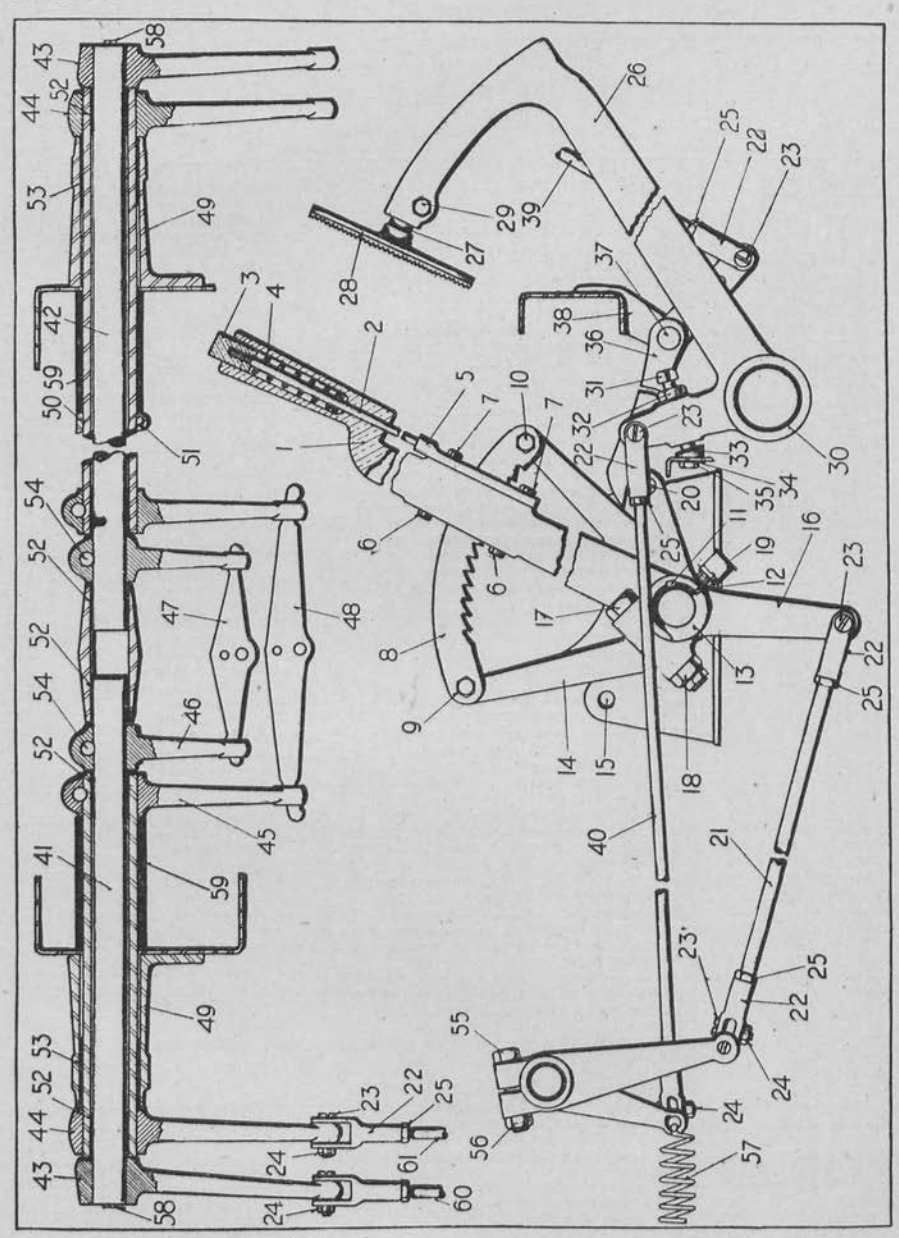
Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

Chassis—REAR AXLE—*Continued*

See illustrations on pages 134, 228

5	S0543/4	GG	16	Rear axle sleeve bolts	Sleeves to housing
6	0553/4	GBD	1	Rear axle drive gear	On differential carrier
7	0663/4	GBD	1	Rear axle pinion gear	In differential case
8	310		1	Rear axle pinion shaft bearing	Front end pinion shaft
9	407		1	Rear axle pinion shaft bearing	Rear of pinion
10	0671/2	O	1	Rear axle pinion shaft nut	Rear end pinion shaft
11	0671/4	O	1	Rear axle pinion shaft nut washer	
12	0671/4	GB	1	Rear axle pinion shaft nut washer	
13	0671/2	GBB	1	Rear axle pinion shaft nut, L. H.	Forward end pinion shaft
14	0651/4	GB	1	Axle ball bearing adjusting washer	Forward end pinion shaft
15	067	GB	1	Axle ball bearing ring and dust cap	Forward end pinion shaft
	671/8	GB	1	Axle ball bearing ring felt	Forward end pinion shaft
16	0673/4	GB	1	Axle ball bearing ring and dust cap lock	Forward end pinion shaft
17	S065	GG	1	Rear axle pinion shaft nut	On forward end pinion shaft
18	056	GBB	1	Rear axle differential case, R. H. half	In axle gear case
19	057	GBB	1	Rear axle differential case, L. H. half	In axle gear case
20	S057	GB	4	Rear axle differential case studs	Through differential case
21	S01321/2	GA	8	Rear axle differential case stud nut	
22	0601/2	GB	1	Rear axle differential spider	In differential case
23	060	GB	4	Rear axle differential compensating gear pinion	On differential spider
24	058	GB	2	Rear axle differential compensating gears	On axle shafts
25	00583/4	GBB	2	Rear axle differential compensating case bushings	On compensating gears
	S0018	TA	2	Compensating case bushing dowel pins	In differential case
26	00581/2	GB	2	Compensating case thrust washer	On compensating gears
	0581/4	GB	2	Compensating case thrust washer shim	On compensating gears
27	313	B	2	Rear axle differential case bearings	In axle gear case
29	0701/4	GB	2	Oil retainer washer	Under axle sleeve
30	070	GB	2	Rear axle gear case bearing lock nuts	Under axle sleeve
31	0701/2	O	2	Rear axle gear case bearing lock nut lock	Under axle sleeve
32	061	GB	2	Rear axle shaft	In axle sleeves
33	0103/4	GB	2	Rear axle shaft washers	Outer end axle shaft
34	S0101/2	GB	2	Rear axle shaft nuts	Outer end axle shaft
35	313		2	Rear axle sleeve outer bearings	On wheel hubs
36	0871/4	M	2	Rear axle hub bearing lock washer	On wheel hubs
37	S087	M	1	Rear axle hub bearing lock nut, R. H.	On wheel hub
	S0863/4	GB	1	Rear axle hub bearing lock nut, L. H.	On wheel hub
38	0481/2	GB	2	Rear axle outer bearing retainer	In sleeve ends
39	0481/4	GB	2	Rear axle outer bearing felt washers	In sleeve end
40	048	GB	2	Rear axle outer bearing retainer plate	In sleeve ends
41	0491/2	GEC	4	Rear axle bearing retainer hook bolts	Through brake brackets
42	S0753/4	O	4	Rear axle bearing retainer hook bolt washers	On hook bolts
43	S01321/2	GA	4	Rear axle bearing retainer hook bolt nuts	On hook bolts
44	0561/4	GEC	1	Rear axle truss rod end (L. H. thread)	Under axle
45	S0561/4	GEC	1	Rear axle truss rod turnbuckle jam nut, L. H.	On truss rod
46	S0561/2	GEC	1	Rear axle truss rod turnbuckle	On truss rod
47	S01053/4	GE	1	Rear axle truss rod turnbuckle jam nut, R. H.	On truss rod
48	0561/2	GEC	1	Rear axle truss rod end (R. H. thread)	On truss rod
49	S0563/4	GEC	2	Rear axle truss rod end pins	In brake brackets
50	S0761/4	GB	2	Foot brake band lifting guide stud	Forward end brake bracket
51	S0753/4	GB	2	Foot brake band lifting guide stud washers	
52	S0913	GA	2	Foot brake band lifting guide stud nuts	
	0761/4	GB	4	Foot brake band lifting guide stud washers	
53	S0761/2	GTB	2	Foot brake band stud screw	Center brake band
54	S0106	GA	2	Foot brake band stud screw	In lifting guide stud
56	S0071	GE	2	Foot brake band stud dowel pin	
57	S0751/4	GB	2	Hand brake ring studs	Forward end brake bracket
58	S0913	GA	2	Hand brake ring stud nuts	
59	S0751/2	GB	4	Hand brake ring stud bushings	Forward end brake bracket
60	S0751/2	GTB	2	Hand brake ring stud bushings	On brake ring stud
61	S0128	GK	2	Hand brake ring stud set screws	On brake ring stud
62	S0151/4	GE	2	Hand brake ring stud set nut	
63	751/2	GC	2	Hand brake ring	Inside brake drum
64	0074	GC	6	Hand brake ring shoes	Facing on brake ring
65	076	O	1	Hand brake ring wing, R. H.	Rear end brake bracket
	0763/4	O	1	Hand brake ring wing, L. H.	Rear end brake bracket
	0771/4	GA	2	Rear axle brake wing shims	On brake ring wing
66	0403/4	TBC	2	Hand brake ring wing levers	On brake ring wing
67	S0129	F	2	Hand brake ring wing lever wedge pins	Through ring wing levers
68	S055	C	2	Hand brake ring wing lever wedge pin nut	
69	00471/2	G	2	Hand brake ring wing bushings	Rear end brake bracket
70	S075	GTB	4	Hand brake ring adjusting screws	Ends of brake ring

PLATE 78



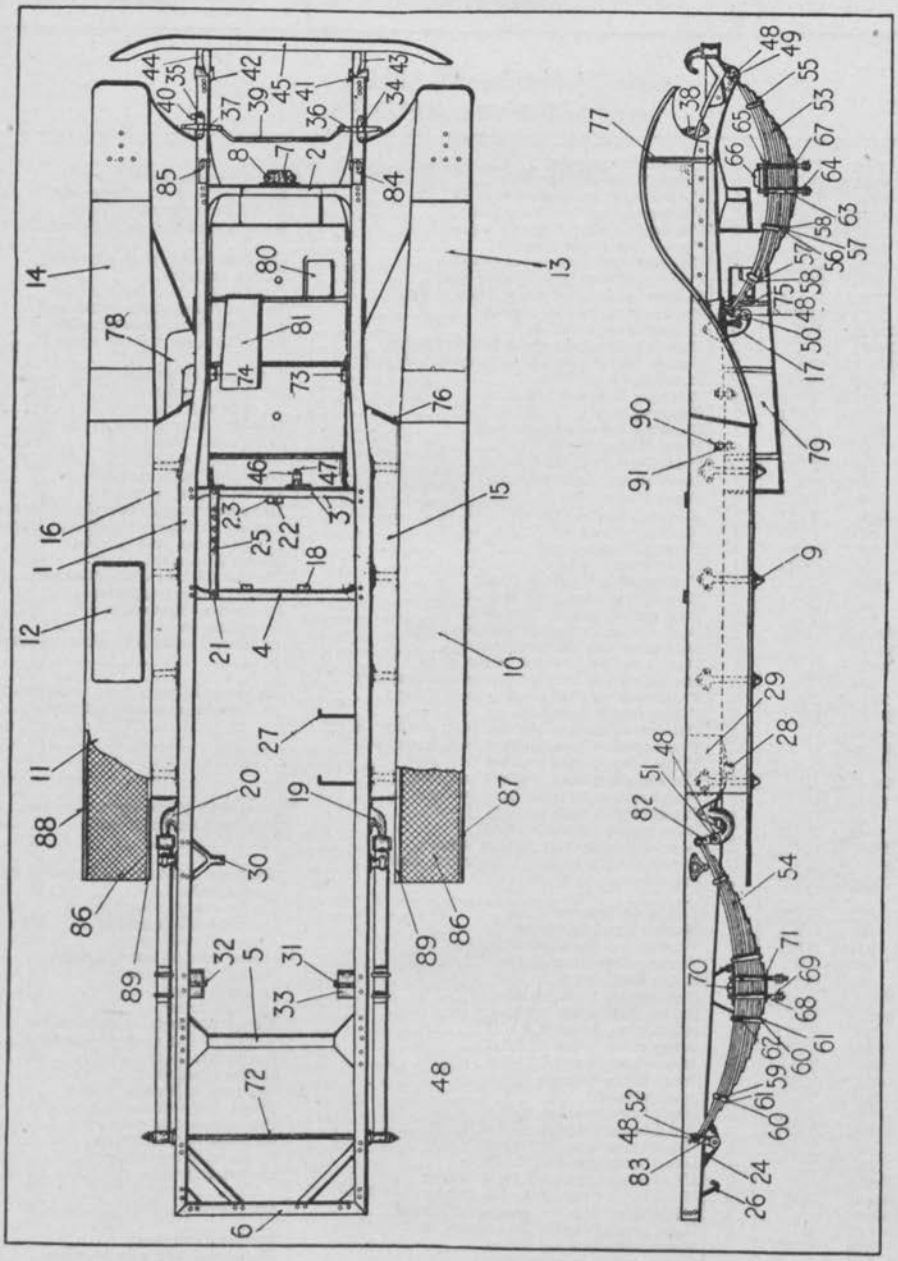
BRAKE SYSTEM ASSEMBLY

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
	Chassis—REAR AXLE—_Continued_			
	See illustrations on pages 134, 228			
	S0101 GA	2	Rear axle brake ring adjusting screw binder bolts	Ends of brake ring
71	S0680¼ GED	4	Hand brake ring adjusting screw binder bolt	Ends of brake ring
	S0143 G	4	Rear axle brake ring adjusting screw binder bolt nut	
	045¼ GA	4	Rear axle brake ring adjusting screw binder bolt nut washer	
72	075¾ GB	2	Hand brake ring springs	Cross ends of brake ring
73	075 GF	2	Foot brake bands	On brake drums
74	075¼ GF	2	Foot brake band shoes	Lining in brake bands
75	096 GF	1	Foot brake band end, R. H.	Upper end brake band
4	096½ GF	1	Foot brake band end, L. H.	Upper end brake band
76	096¼ TED	2	Foot brake band ends	Lower end brake bands
77	040 GB	1	Foot brake band lever, R. H.	On brake band
	040¼ GB	1	Foot brake band lever, L. H.	On brake band
78	S0058¾ GBB	4	Rear axle compensating case bushing dowels	In differential case
79	067⅜ GB	1	Rear axle bearing felt retainer	Forward end pinion shaft
80	S094½ GE	2	Foot brake band end pins	In brake band
81	S094¾ GE	2	Foot brake band adjusting screw pins	On brake band levers
82	096¾ GF	2	Foot brake band lifting guides	Center of brake band
	0099 O	2	Brake band grease cups	On band lifting guide
83	094½ TDB	2	Foot brake band adjusting screws	On brake band levers
84	S0192½ GA	2	Foot brake band adjusting screw nuts	On band adjusting screw
85	S094¼ TDB	2	Foot brake band adjusting screw collars	On band adjusting screws
86	S075¾ O	2	Foot brake band adjusting screw washers	On band adjusting screws
87	094¼ TED	2	Foot brake band adjusting screw guide	On band adjusting screws
	S0913 GA	2	Foot brake band adjusting screw guide nuts	On band adjusting screws
88	098 TDB	2	Foot brake band adjusting screw spring	On band adjusting screws
89	S098 TDB	2	Foot brake band adjusting screw spring collar	On band adjusting screws
90	094¾ TDC	2	Foot brake band adjusting screw wing nut	On band adjusting screws
91	087½ TED	2	Rear wheel brake drum	Bolted to hubs
92	087 TED	1	Rear wheel hub, R. H.	In wheel
	086¾ TED	1	Rear wheel hub, L. H.	In wheel
93	087¾ TED	2	Rear wheel hub flange	On wheel hubs
94	87 TEB-O	2	Rear wheel with felloe band	
95	½" x 3¼"	24	Rear wheel hub bolts	Through hub flanges
96	½"	24	Rear wheel hub bolt nuts	
97	0086½ GB	2	Rear wheel hub caps	On hubs
	S0573¼ GA		Foot brake hand pin nuts	
	S0075¼ FF	30	Foot brake shoe rivets	Through brake band lining
	S0075¼ G	20	Foot brake shoe rivets	Through brake ring facing
		40	Foot brake shoe band end rivets ⅜" x ¾" iron	Through brake band ends
	S0040 GED	2	Foot brake shoe band lever bushing (small)	In brake band lever
	S0040½ GED	2	Foot brake band lever bushing (large)	In brake band lever
98	S075¾ O	4	Foot brake band stud washer	On foot brake guide stud
99	0054¼ GB	1	Rear axle gear case drain plug	Bottom of axle gear case
100	00386 A	1	Rear axle gear case overflow plug	Side of axle gear case
	00386½ A	1	Drain plug washer	Under drain plug
	Chassis—BRAKES			
	See illustrations on pages 142, 230			
1	050 TB	1	Hand brake lever	On frame left side member
	038¼ GE	1	Hand brake lever stud	On brake lever
2	053 TB	1	Hand brake lever latch rod	On brake lever
3	S053½ GM	1	Hand brake lever release plunger	In end of brake lever
4	053½ GM	1	Hand brake lever release plunger spring	On end of brake lever
5	052 GA	1	Hand brake lever release dog	On hand brake lever
6	S052½ GA	2	Hand brake lever release dog bolts	Through release dog
7	S0302¾ GA	2	Hand brake lever release dog bolt nuts	
8	0178½ GE	1	Hand brake lever quadrant	On quadrant bracket
9	S0178½ GE	2	Hand brake lever quadrant bolts	Through quadrant
10	045¼ GA	2	Hand brake lever quadrant bolt lock washers	
11	041¾ GAB	1	Hand brake clutch lever key	In clutch lever
12	038 GE	1	Hand brake lever shaft	In clutch lever
13	035¼ OR	1	Hand brake lever stud washer	
14	178 GE	1	Hand brake quadrant bracket	On left frame member
15	S014 O	2	Hand brake quadrant bracket bolts	On bracket
	S0143 G	2	Hand brake quadrant bracket bolt nuts	

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Chassis*—BRAKES—*Continued	
			See illustrations on pages 142, 230	
	045¼ GA	2	Hand brake quadrant bolt lock washers	
16	041 GTA	1	Hand brake clutch lever	Lower end brake lever
	0582¼ GA	1	Hand brake lever key	On clutch lever
17	S041 GA	1	Hand brake clutch lever bolt	Through clutch lever
18	S0573¼ GA	1	Hand brake clutch lever bolt nut	
19	0099 O	1	Grease cup	On clutch lever
20	S0943/4 GE	1	Hand brake clutch release rod pin	Through clutch release
	S0573¼ GA	1	Hand brake clutch release rod pin nut	On rod pin
	S041½ GA	1	Hand brake clutch release rod pin roll	On release rod pin
21	082½ TEB	1	Hand brake rod (front) 5/16" x 42"	Brake to rocker shaft
22	084 CC	14	Brake rod ends	On end of brake rod
	81¼ GAF	4	Brake rod end boots	On brake rod
	813/4 GAF	4	Brake rod end boots	On brake rod
23	S031½ CC	14	Brake rod end pins	Through brake clevis
24	S031¾ GB	14	Brake rod end pin nuts	
25	S081 A	14	Brake rod end jam nuts	
26	35 GE	1	Foot brake lever	Right of clutch pedal
	191¾ GE	1	Clutch foot lever key	On brake lever
27	S0191½ GE	1	Foot brake lever pad stem	On brake lever
28	35½ GEC	1	Foot brake lever pad	On brake lever
29	S0191 GE	1	Foot brake lever pad binder screw	On lever stem
30	S0035 GE	2	Foot brake lever bushings	Lower end brake lever
31	S035 GA	1	Foot brake lever adjusting screw	
32	S0143 G	1	Foot brake lever adjusting screw nut	
33	S035¼ GA	1	Foot brake lever adjusting screw stop	Lower end brake lever
34	045¼ GA	1	Foot brake lever adjusting screw stop washer	Lower end brake lever
35	S0143 G	1	Foot brake lever adjusting screw stop nut	Lower end brake lever
36	0189 GE	1	Clutch release lever	Left of brake lever
37	S0187½ GA	1	Clutch release lever pin	Through release lever
38	187 GF	1	Clutch release lever bracket	On release lever
39	S0189 GE	1	Clutch release lever rod	Left of release lever
40	081½ GTB	1	Foot brake rod (front) 5/16" x 55¼"	On brake lever
41	0385/8 TEB	1	Foot brake shaft with lever, L. H	Back of transmission
42	038½ TEB	1	Foot brake shaft with lever, R. H	Back of transmission
43	41 TDB	2	Foot brake shaft levers	On ends of foot brake shaft
44	41¼ TDB	2	Hand brake shaft levers	On ends of foot brake shaft
	037 TEB	1	Hand brake shaft	On brake shaft lever
	S027 GAH	1	Brake shaft lever key	On brake shaft lever
	037½ TEB	1	Hand brake shaft	In foot brake shaft
45	26½ GED	2	Hand brake equalizing levers	Between inner brake levers
46	27 GED	2	Foot brake equalizing levers	Between inner brake levers
47	27½ GED	1	Foot brake equalizing link (small)	On equalizing lever
48	26 GA	1	Hand brake equalizing link (large)	On equalizing lever
49	39¼ GAH	2	Brake shaft brackets	On frame side member
	0099 OO	2	Brake shaft bracket grease cups	On shaft bracket
50	0363/4 GED	1	Brake shaft collar	Between shaft brackets
51	S0129½ GK	1	Brake shaft collar bolt	Through shaft collar
	S0574¼ GA	1	Brake shaft collar bolt nut	
52	S0037¼ GAH	6	Brake shaft bushings	Around brake shaft
53	0015¼ O	2	Brake shaft bracket bushings	Around end of brake shaft
54	S0180¼ GA	2	Equalizing lever binder bolts	On equalizer lever
	S0574¼ GA	2	Equalizing lever binder bolt nuts	
	0181¾ GF	2	Equalizing lever binder bolt washers	
55	S0129½ GK	2	Equalizing lever binder bolts	Through rocker shaft
56	S0574¼ GA	2	Equalizing lever binder bolt nuts	
	0181¾ GF	2	Equalizing lever binder bolt washers	
57	098¼ GAE	1	Foot brake tension spring	On end of rocker shaft
	0983/4 GAH	1	Foot brake tension spring loop	On tension spring
	098½ TEB	1	Foot brake tension spring extension	On tension spring
	0725¾ GBCT	1	Foot brake tension spring hook washer	On spring extension
58	S00325 C	2	Brake shaft plugs	In ends of brake shaft
59	S0363/4 GED	2	Brake shaft spacers	Around brake shaft
60	082½ TEB	2	Foot brake rods (rear) 5/16" x 42"	On brake levers
61	081½ TE	2	Hand brake rods (rear) 5/16" x 40¼"	On brake levers

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			***Chassis*—FRAME**	
			See illustrations on pages 10, 234	
1	0266 TED	1	Chassis frame only	
2	0261¾ GED	1	Frame front engine girth	First frame cross member
3	0264 TED	1	Frame front transmission girth	Second frame cross member
4	0264½ TED	1	Frame rear transmission girth	Third frame cross member
5	0265½ TED	1	Frame reinforcing cross member	Fourth frame cross member
6	0265 GB	1	Frame rear cross member	
7	0261 GAB	1	Engine frame gear cover bracket	On first frame cross member
	0099 OO	1	Front motor support grease cup	Under radiator
	0261½ GAB	1	Engine frame gear cover bracket cap	On first frame cross member
	0261⅞ GAB	1	Engine girth reinforcement	In first frame cross member
	S0272 TC	2	Engine bracket bolts	In first frame cross member
8	S0261 GA	2	Engine frame gear cover bracket bolts	In first frame cross member
	S0573¼ GA	2	Engine frame gear cover bracket bolt nuts	
9	240 GAH	8	Running board irons	On frame side members
10	240¼ TED	1	Running board, R. H	At side of frame
11	240½ TED	1	Running board, L. H	At side of frame
12	1631 TED	1	Running board battery box	On left running board
13	278 TED	1	Front fender, R. H	Over front wheel
14	279 TED	1	Front fender, L. H	Over front wheel
	623¼ OR	1	Speedometer tube casting	On right frame member
	0284¾ TBC	1	Front fender door	In left fender apron
15	281 TED	1	Running board filler strip, R. H	Between running board and frame
16	281½ TED	1	Running board filler strip, L. H	Between running board and frame
17	045 GED	1	Front spring hanger (rear) R. H	Under frame side member
	045¼ GED	1	Front spring hanger (rear) L. H	Under frame side member
18	0608 GF	1	Transmission bracket (rear)	On third frame cross member
19	045½ GEC	1	Rear spring hanger (front) R. H	On frame side member
20	045¾ GEC	1	Rear spring hanger (front) L. H	On frame side member
	S0045¾ GEC	2	Rear spring hanger (front) bushings	In spring hangers
21	S0447 O	2	Starter switch bracket screws	In second and third cross members
	S0551½ C	2	Starter switch bracket screw nuts	
	045¼ GA	2	Starter switch bracket screw lock washers	
22	S0131¼ TA	1	Transmission case bracket bolt (front)	On second frame cross member
	S0608 GF	2	Transmission case bracket bolt (rear)	In third frame cross member
	0573¼ GF	1	Transmission case bracket bolt washer (front)	
	S0289¾ G	3	Transmission case bracket bolt washers	
	S0132½ GA	2	Transmission case bracket bolt nuts	
	S0105¾ GE	1	Transmission case bracket bolt nut	
	0608¾ GF	2	Transmission bracket bolt washers	
23	610 GF	1	Transmission case bracket (front)	In second frame cross member
24	043½ TED	2	Rear spring brackets (rear)	Rear end side members
	S0301¼ GEC	2	Rear spring bracket binder screws	
	S0573¼ GA	2	Rear spring bracket binder screw nuts	
25	1603¼ TED	1	Starting switch bracket	Between second and third cross members
26	271 GTB	1	Tail lamp bracket	On rear cross member
27	108⅛ GTA	2	Muffler band brackets	On right side member
28	030½ GEC	2	Torsion bar brackets (front)	Ahead of rear spring
29	266¾ GF	2	Frame reinforcing plates	Under torsion bar brackets
30	39¾ GAH	1	Brake shaft truss	On left side member
	S0037¼ GAH	2	Brake shaft truss bushings	In shaft truss
	S0071 GE	2	Brake shaft truss bushing dowel pins	In shaft truss
31	267 TED	1	Jump strap bracket, R. H	Ahead of fourth cross member
32	267 TED	1	Jump strap bracket, L. H	Ahead of fourth cross member
	0267⅛ TEF	2	Jump strap bracket shims, ¼"	Under brackets
	0267⅛ TEF	2	Jump strap bracket shims, $\frac{1}{32}$"	Under brackets
33	267¾ TEF	2	Jump straps	Between axles and frame
34	259 TED	1	Head lamp bracket socket, R. H	Front end side member
35	259½ TED	1	Head lamp bracket socket, L. H	Front end side member
36	257 TEF	1	Head lamp bracket, R. H	At front end of frame
37	257½ TEF	1	Head lamp bracket, L. H	At front end of frame
38	S0259 GA	2	Head lamp bracket socket binder bolts	Socket to frame
	S0585 GA	2	Head lamp bracket socket binder bolt nuts	
	S00296 C	4	Head lamp bracket ornamental nuts	On bracket ends
	054¼ E	4	Head lamp bracket ornamental nut washers	
39	258 TED	1	Head lamp bracket brace	Between brackets
40	164 GAC	1	Compression release lever	Front end left side member
	0164¼ GEB	1	Compression release lever shaft	Through side member
	S0164¾ GE	1	Compression release lever sleeve	On lever shaft

PLATE 79



CHASSIS FRAME AND FITTINGS ASSEMBLY

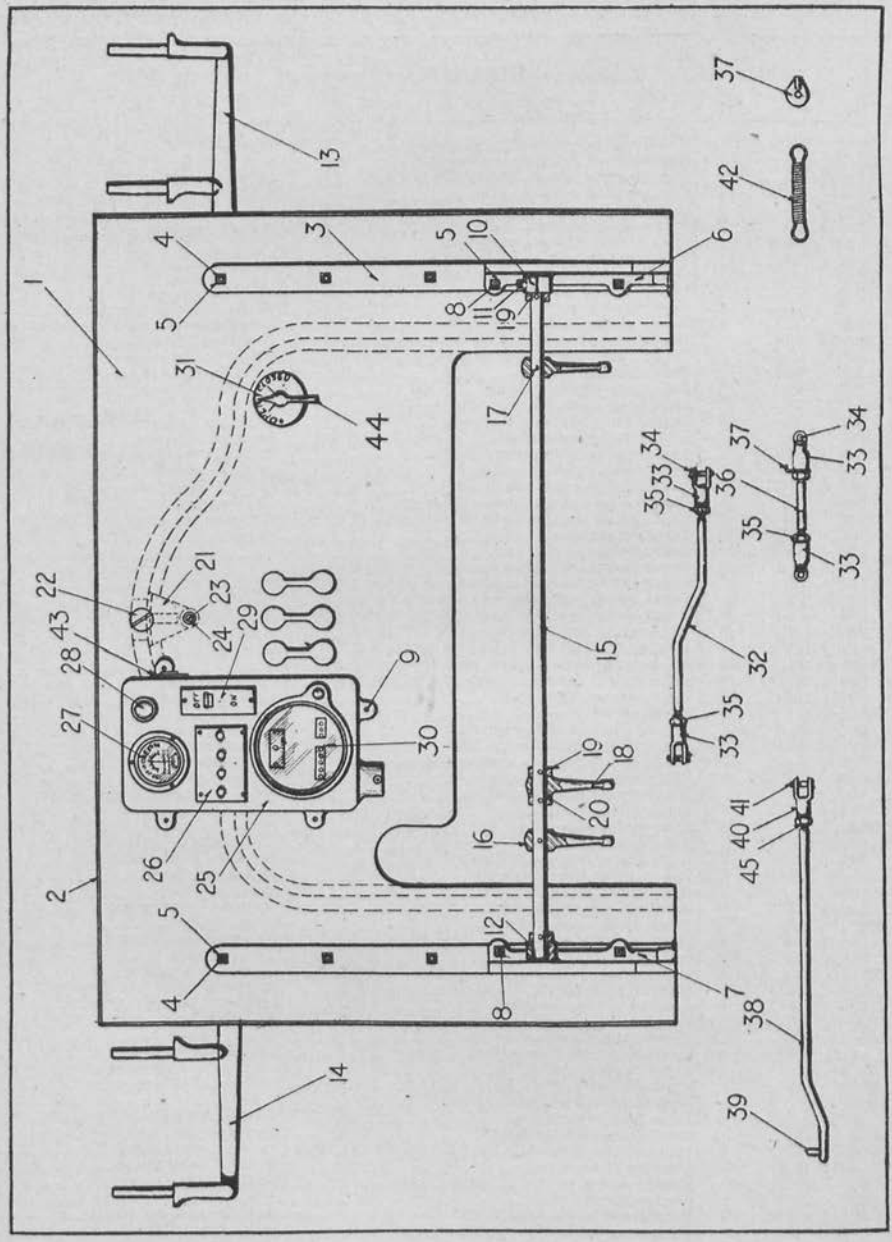
Chassis—FRAME—*Continued*

See illustrations on pages 10, 234

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
	00164 TEB-O	1	Compression release foot plunger	Not used
	00164¾ GAC	1	Compression release lever toggle	Not used
	S0192½ GA	1	Compression release lever shaft nut	On lever shaft
	164½ GAG	1	Compression release cable	Lever to rear of engine
	0220½ O	2	Compression release cable clamps	On ends of cable
	0220½ GA	2	Compression release cable spools	On release lever
	S0163 GAB	1	Compression release cable end	
	S0302¾ GA	1	Compression release cable end nut	
	S0219 O	1	Compression release cable end pin	
	0504 C	1	Compression release cable end washer	
41	08 GED	1	Front spring horn, R. H	Front end side member
42	09 GED	1	Front spring horn, L. H	Front end side member
43	0266½ TED	1	Front bumper and towing hook bracket, R. H	Front end side member
44	0266⅝ TED	1	Front bumper and towing hook bracket, L. H	Front end side member
45	266⅞ TED	1	Front bumper channel	Across end of frame
46	039 GA	2	Foot lever shaft brackets	On second frame cross member
47	S0107¼ GE	2	Foot lever shaft bracket binder screws	
48	S0972 GA	14	Spring horn bolt and rod nuts	Through front end front spring
	0099 GE	12	Spring bolt grease cups	In shackle bolts
49	S046¼ GBD	2	Front spring horn bolts (front)	Through front end side members
50	046 GBD	1	Front spring yoke (rear R. H.)	On side member
	046¼ GBD	1	Front spring yoke (rear L. H.)	On side member
51	S046 GE	4	Rear spring shackle bolts (front end)	Through rear spring ends
52	S046 GBC	2	Rear spring shackle bolts (rear end)	Through rear end front springs
53	05 TEB	2	Front springs	
54	034 GBX	2	Rear springs	
55	05¼ TEB	2	Front spring leaf clips, small (for spring 1098J)	
56	05¼ TEB	2	Front spring leaf clips, large (for spring 1098J)	
57	S05¼ TEB	4	Front spring leaf clip bolts (for spring 1098J)	
58	S05¾ TEB	4	Front spring leaf clip bolt nuts (for spring 1098J)	
59	034¼ GBX	2	Rear spring leaf clip, small (for spring 842)	
60	S034¼ GBX	4	Rear spring leaf clip bolts (for spring 842)	
61	S034¾ GBX	4	Rear spring leaf clip bolt nuts (for spring 842)	
62	034¼ GBX	2	Rear spring leaf clips, large (for spring 842)	
63	05½ GEC	4	Front spring clips	Clip spring to axle
64	S0127½ G	8	Front spring clip nuts	
	054¼ E	8	Spring clip nut lock washers	
65	03½ GEC	2	Front spring bumper castings	Under spring clips
66	3¾ GAD	2	Front spring bumper casting bumpers	Under spring clips
	S0045 GEE	6	Front spring and hanger bushings	In hangers
67	04 GB		Front spring shim (lower)	Between spring and axle
68	034½ GEC	4	Rear spring clips	Clips spring to rear axle
69	S034 G	8	Rear spring clip nuts	
70	034⅝ GEC	2	Rear axle spring seats (upper)	Under spring clips
71	034⅛ GEC	2	Rear axle spring seats (lower)	Between spring and axle
	S08½ GEC	2	Rear spring dowel pins	In rear spring seat
	S0143 G	2	Rear spring dowel pin nuts	
	S08½ GF	2	Front spring dowel pins	In front spring seat
	S0721 GA	2	Front spring dowel pin nuts	
72	044⅛ GBE	1	Rear spring hanger rod	Across rear of frame
	044¾ GBB	2	Rear spring rod washers	
	0113½ G	2	Rear spring rod washers	On ends of hanger rod
73	211 GEC	1	Engine leg bracket	Inside of right side member
74	210 GEC	1	Steering column bracket	Inside of left side member
75	S046¼ GEC	3	Front spring yoke bolts (rear)	Through front spring hangers
	S046¼ GBD	1	Front spring yoke bolt (rear)	In left hanger
76	15¾ TED	2	Running board filler strip end pieces	On fender aprons
77	0279½ GB	1	Front fender iron, R. H	On side of side members
	0280 GB	1	Front fender iron, L. H	On side of side member
	S0280 G	4	Front fender iron nuts	
	281⅝ TED	2	Front fender brackets	On frame side members
	239 O	2	Mud guard iron brackets	On frame side members
	0280¼ TED	4	Front fender iron clip	On fender brackets
78	623¾ TED		Steering lever cover	In left fender apron
79	620 TED		Engine apron	Under engine
*79	620 TEB-O	1	Engine apron	
80	621½ GAB	1	Engine apron door	In bottom of apron
81	623⅛ TED	1	Engine apron door (complete, large)	In bottom of apron
82	046 GEB	2	Rear spring shackle plates (front)	On spring hangers
	046¼ GEB	2	Rear spring shackle plates (front)	On spring hangers
83	046 GBC	2	Rear spring shackle (rear end)	On spring hangers
	0099 K	2	Rear spring shackle grease cups	In shackle bolts

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 80

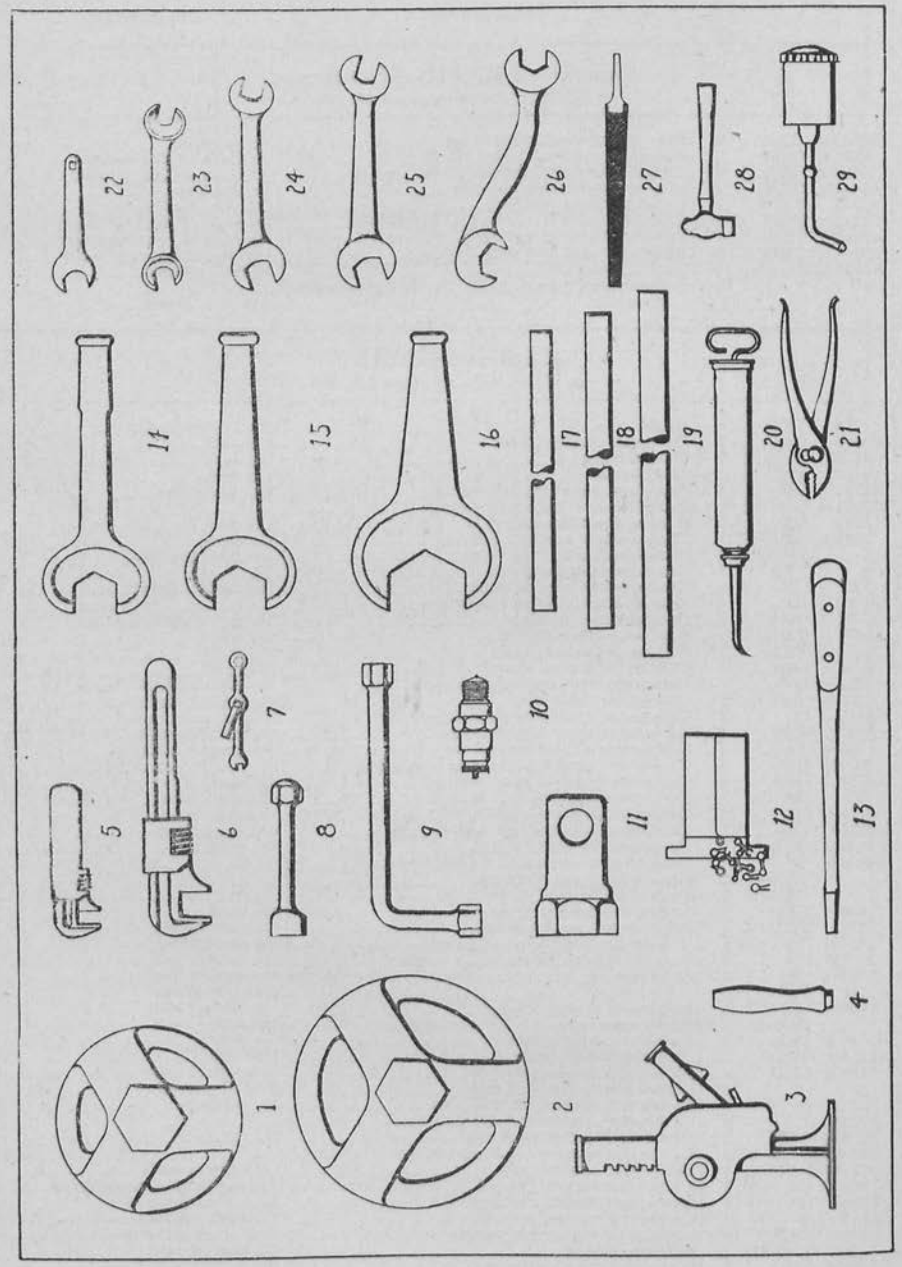


DASH AND CONTROL ASSEMBLIES

Ref. No.	Part No.		No. Per Car	Property Classification—Part I, Class IV, Section 9	
				Name of Part	Location
				Chassis*—FRAME—*Continued	
				See illustrations on pages 10, 234	
	S0043½	GBB	2	Rear spring shackle bushings	In shackles
84	604¾	GTB	1	Radiator support bracket, R. H.	At front of side member
85	605¾	GTB	1	Radiator support bracket, L. H.	At front of side member
	S0045¾	GBB	2	Rear spring shackle bushings	In shackles
86	245	TED	2	Running board mattings	On running boards
87	00245¾	TED	1	Running board moulding (R. H.) outside	On edge of running board
88	00245⅝	TED	1	Running board moulding (L. H.) outside	On edge of running board
89	00245½	TED	2	Running board moulding (inside)	On edge of running board
90	S0495¼	OO	14	Engine apron studs	Apron to frame
91			28	Engine apron stud nuts (⅜" x 16") square head machine	Apron to frame
				***Chassis*—DASH**	
				See illustrations on pages 158, 236	
1	274	TED	1	Dash	Back of engine
	00872	GAG	1	Car serial number plate	On dash
2	0274⅛	TED	1	Dash binding	On dash
3	272	TED	2	Dash irons	On dash
4	S0274¼	GF	6	Dash iron bolts (⅜x⅞" step)	On dash irons
5	S00274½	GF	10	Dash iron bolt nuts (⅜" square)	
6	722	GF	1	Control shaft bracket, R.H.	On dash
7	722½	GF	1	Control shaft bracket, L.H.	On dash
8		TEB-O	4	Dash iron bolts (⅜x1" step)	On shaft bracket
9		TEB-O	4	Control box dash screws	
10	722¼	GF	2	Control shaft bracket caps	On shaft bracket
11	S0722¼	GF	4	Control shaft bracket cap screws	
12	00722¾	GF	2	Control shaft bushings	On end of control shaft
13	0270	TED	1	Side lamp bracket, R.H.	On dash
14	0270½	TED	1	Side lamp bracket, L.H.	On dash
15	0724	GEC	1	Carbureter control shaft	On dash
16	725	GF	1	Carbureter foot control lever	On control shaft
	723½	TA	1	Carbureter shaft lever	On control shaft
17	S0167	O	1	Carbureter control shaft lever pin (No. 0)	End of shaft lever
18	723	TA	1	Carbureter control shaft lever	On control shaft
	723½	TA	1	Carbureter control shaft lever	On control shaft
	0573¾	GA	4	Carbureter control shaft lever washer	
19	S0724	GE	3	Carbureter control shaft collars	On shaft lever
	S0724	GA	1	Carbureter control shaft collar	On shaft lever
20	00723¼	GA	1	Control shaft lever bushing	On shaft lever
	S00723¼	GA	1	Carbureter control shaft bushing pin	On shaft lever
21	00604½	GAB	1	Dash hood bracket	On dash
22	S0604½	GA	1	Dash hood bracket and tie rod screw	
23		TEB-O	2	Dash hood bracket screws	
24		TEB-O	2	Dash hood bracket screw nuts	
25	1600	TED	1	Switch control box	On dash
*25	612	TED	1	Speedometer head bracket	On control box
26	1613	GA	1	C. &.H. battery switch (4 gang)	On control box
	1613½	GA	1	C. & H. battery switch plate (4 gang)	On control box
27	1601½	GM	1	Ammeter	On control box
28	1616	TED	1	Dash lamp	On control box
29	1608⅝	GM	1	Automatic circuit breaker	On control box
30		TEB-O	1	Speedometer (No. 67-A)	On control box
31	00718	TED	1	Carbureter index plate	On dash
	00718⅛	GED	1	Carbureter dash plate	On dash
32	0725½	GED	1	Carbureter hand control rod	On control shaft lever
33	084	O	4	Carbureter control rod ends	End of control rod
34	S084	O	4	Carbureter control rod end pins	In rod ends
35	S081	A	4	Carbureter control rod end jam nuts	
36	0725¼	GF	1	Carbureter foot control rod	On rod ends
37	0725¾	GAB	2	Carbureter control rod hook washers	
38	0716	TED	1	Carbureter control rod	On control shaft
39	0182½	GA	1	Carbureter control rod pin	Through end of control rod
40	0219	GA	1	Carbureter control rod end	End of control rod
41	S0219	O	1	Carbureter control rod end pin	Through rod end
42	0724¼	GAF	1	Carbureter control rod spring	End of control rod
43		TEB-O	1	Magneto switch	On control box
	00294⅝	TBC	1	Magneto switch ground strap	On control box
44	00718½	TED	1	Carbureter index plate lever	On index plate
	S00718½	GED	2	Carbureter index stops	On index plate
	0718¾	GED	1	Carbureter index finger spring	On index plate
	00718¼	GED	1	Carbureter index finger lever	On index plate
45	S0394	A	1	Carbureter control rod nut (¼"—20)	

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 81



TOOL_KIT

Chassis—TOOL EQUIPMENT

See illustration on page 238

Ref. No.	Part No.		No. Per Car	Property Classification—Part I, Class IV, Section 9 — Name of Part	Location
1				(This part not used.)	
2				(This part not used.)	
3	873	GE	1	Jack	
4	893	C	1	File handle	
5	0890	E	1	Bicycle wrench	
6	0891	A	1	Auto wrench (11")	
7	0869	GA	1	Magneto wrench	
8	0895¼	GA	1	Socket wrench (earbureter plug socket wrench)	
9				(This part not used.)	
10			1	Spark plug (⅞" S. A. E. thread)	
11	0894½	GE	1	Valve cap wrench	
12			1	Package assorted cotter pins	
	0881	GF	1	Cotter pin puller	
13	0896	C	1	Screw driver	
	895	C	1	Small screw driver	
14				(This part not used.)	
15				(This part not used.)	
16	0886	GE	1	Dust cap wrench	
			1	Tire rim bolt brace	
	874	O	1	Hand tire air pump	
			1	Tire repair kit	
17	0894¼	GE	1	Valve cap wrench handle	
18				(This part not used.)	
19	0873½	GBE	1	Jack handle	
20	00887	GA	1	Oil gun	
21	0894	C	1	Pliers	
22	0894¾	GA	2	Valve lifter adjusting wrench	
23	0897	GAB	1	Engine bolt wrench (small)	
24	0895½	GAB	1	Engine bolt wrench (large)	
25	0893½	GAB	1	Spark plug wrench	
26				(This part not used.)	
27	0892	C	1	File	
28	896½	G	1	Hammer	
29	00887	C	1	Grease injector	

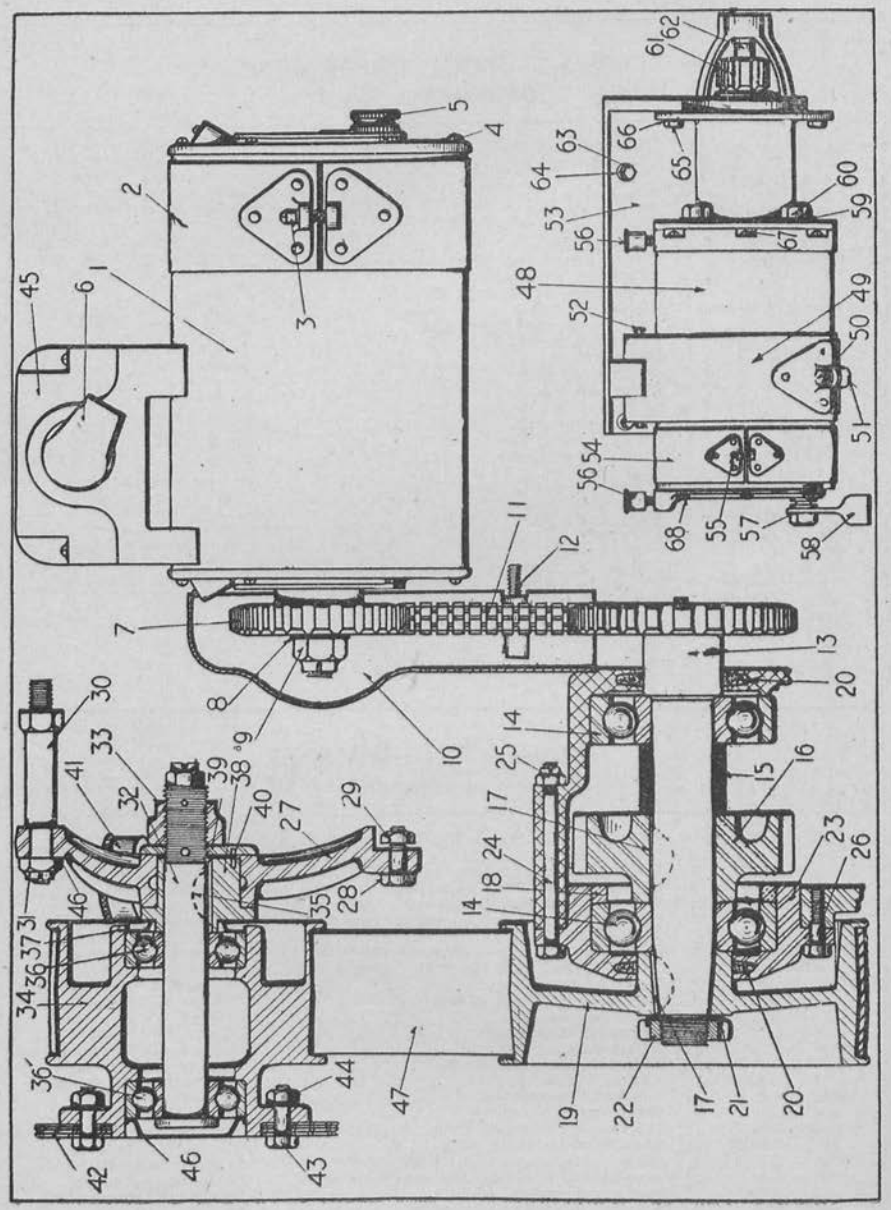
Electrical—EQUIPMENT

See illustrations on pages 158, 240, 244

1	1645	TED	1	Generator (LN Model No. 240 G, 6-volt) (LN No. 8100 G)	Above magneto
2		TEB-O	1	Generator brush opening band (LN No. 8116 G)	Around rear end of generator
3		TEB-O	1	Generator band screw (LN No. 8115 G)	In brush opening band
4		TEB-O	12	Generator end housing screws No. 8125 G	In rear end of generator
5		TEB-O	1	Generator third brush adjusting wheel (LN No. 8119 G)	In rear end housing
6	1620	TED	1	Generator connection plug complete (LN No. 8131 C shell) (LN No. 8109 C plug)	Mounted above generator
7	01560	GEF	1	Generator driven sprocket	On forward end of generator
8	054¼	E	1	Generator shaft lock washer	In front of driven gear
9	S0118	A	1	Generator shaft nut	In front of driven gear
10	1550½	GEC	1	Generator chain guard	Covers drive chain
11	01561½	TED	1	Generator chain (76 links)	Magneto shaft to generator
12	S0174¼	GF	2	Generator chain guard screws	Through chain housing
13	0290	GEF	1	Magneto shaft	Front left side crankcase
*13	0290	GEG	1	Fan and magneto shaft	Not used
14	405		2	Magneto shaft bearings	Front left side crankcase
15	S0290¼	GFC	1	Magneto shaft bearing spacer	Between gear and rear bearing
16	293	GEC	1	Magneto shaft timing gear	On magneto shaft
17	0294½	GA	2	Magneto shaft keys (No. 11 Woodruff)	In pulley and gear
18	0292¼	GK	1	Magneto shaft bearing cage bearing retainer	In timing gear cover
19	114	GEE	1	Fan driving pulley	Front end magneto shaft
20	292¾	GK	2	Magneto shaft bearing cage felts	At ends of magneto shaft

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 82



STARTER, GENERATOR AND FAN ASSEMBLIES
(Electrical Equipment used on Staff Observation Car only)

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location

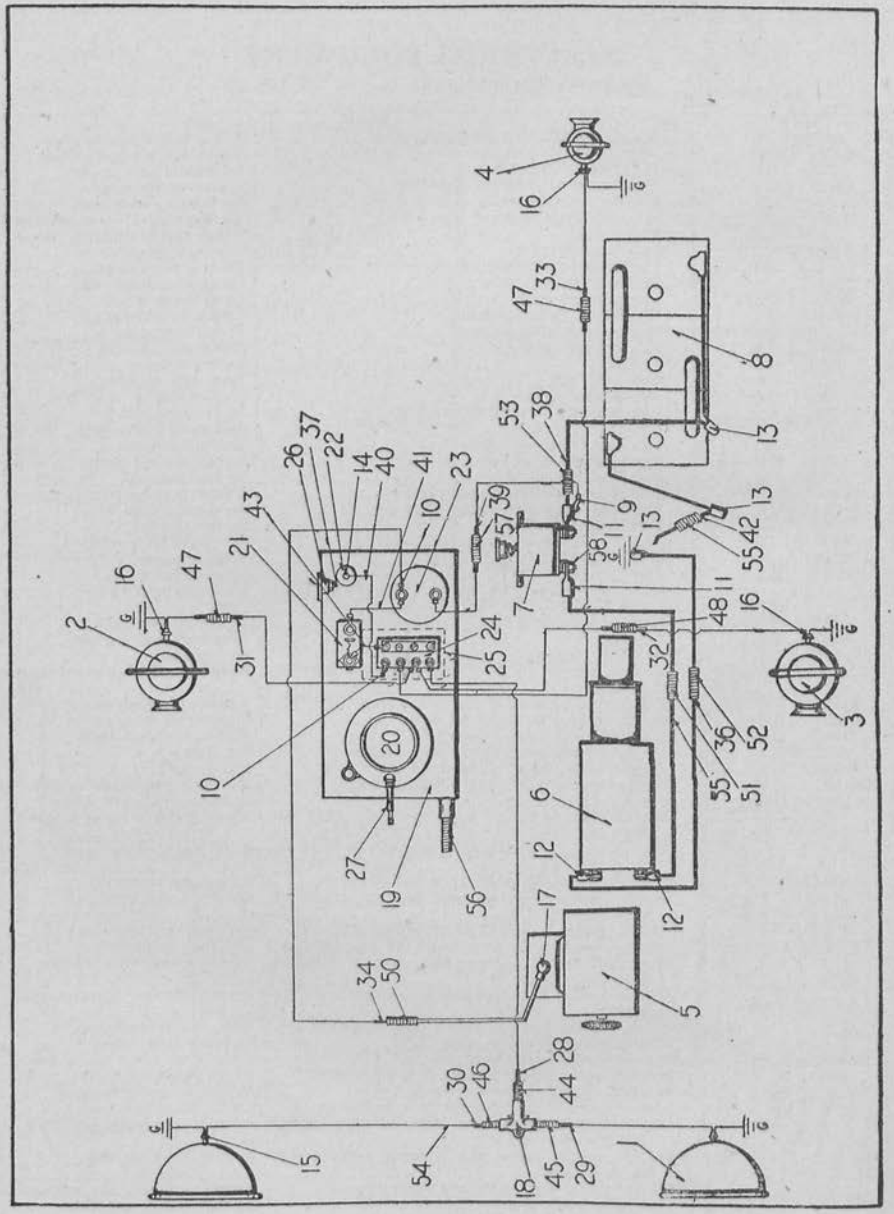
ELECTRICAL EQUIPMENT

See illustrations on pages 42, 44, 156, 162, 240, 246

21	0290¼ GE	1	Magneto shaft lock washer	Front end magneto shaft
22	S0290 GE	1	Magneto shaft lock nut	Front end magneto shaft
23	292 GK	1	Magneto shaft bearing	In timing gear cover
24	S0292¼ GA	1	Magneto shaft bearing cage bolt	Cover to crankcase
25	S0574¼ GA	1	Magneto shaft bearing cage bolt nut	On bearing cage bolt
26	S0106 GA	3	Magneto shaft bearing cage bolts	Through cover to crankcase
27	390½ GEE	1	Fan bracket	Front end of cylinder block
28	S0180¼ GA	2	Fan bracket bolts	Through fan bracket
	0574¼ GA	2	Fan bracket bolt washers	On fan bracket bolt
29	S0574¼ GA	2	Fan bracket bolt nuts	On fan bracket bolt
30	S0390½ GED	1	Fan bracket stud	In cylinder block
	00390¾ GE	1	Fan bracket stud gasket	Under bracket stud
	0127¼ GA	1	Fan bracket stud washer	Front end of stud
31	S0573¼ GA	1	Fan bracket stud nut	Front end of stud
32	0289½ GE	1	Fan shaft	In fan bracket
33	S0901 GA	1	Fan shaft nut	Rear end of shaft
34	114½ GEE	1	Fan driven pulley	On fan shaft
35	0294½ K	1	Fan shaft key (No. 9 Woodruff)	In fan bracket
36	304 2	2	Fan shaft bearings	In fan driven pulley
	0289¼ GE	1	Fan shaft bearing spacer	On fan shaft
37	0289 GE	1	Fan shaft bearing dust cap (rear)	In fan driven pulley
38	0290½ GE	1	Fan shaft eccentric	In fan bracket
39	S0290 GA	1	Fan shaft eccentric clamp plate	Under fan shaft nut
40	S0289¼ GA	1	Fan shaft eccentric clamp plate pin	In clamp plate
41	0099 GK	1	Fan shaft grease cup	In fan bracket
42	0291 GE	1	Fan	On fan driven pulley
43	S0106 GA	6	Fan hub bolts	Fan to pulley
44	S0721 GA	6	Fan hub bolt nuts	On hub bolts
45		1	Generator circuit breaker complete (Type 115 C, LN No. 8100C)	On top of generator
46	0289¾ GE	1	Fan shaft bearing dust cap (front)	In fan driven pulley
47	367½ TED	1	Fan belt	Magneto shaft to fan
*	367¼ TED	1	Fan belt connecting pin	In fan belt
48	1650 TED	1	Starter motor (LN 6-volt 240-M) (LN No. 8100-M)	Rear left side lower crankcase
49	01527½ GEC	1	Starter motor band (long end)	Around starting motor
*	01527 GEC	1	Starter motor band (short end)	Around starting motor
50	S0457½ GAD	1	Starter motor band clamp bolt	Through clamp band
*	0112¼ O	1	Starter motor band clamp bolt washer	On clamp bolt
51	S0585 GA	1	Starter motor band clamp bolt nut	On clamp bolt
52	S01527 GM	1	Starter motor band clamp bracket pin	Through end of clamp band
53	1530½ GEE	1	Starter motor bracket	Bolts to lower crankcase
54		1	Starter motor brush opening band (LN No. 8101-M)	Around front end of starter
55		1	Starter motor commutator band screw (LN No. 8124-M)	In brush opening band
56		3	Starter motor cap oilers (LN No. 8121-M)	Along top of starter
57		2	Starter motor terminal stud top nuts (LN No. 8114-M)	On front end housing
*		2	Starter motor terminal post washers (LN)	On front end housing
58	001555½ GM	2	Starter motor cable terminals (LN No. 8125-M.)	On front end housing
59		4	Starter motor B housing cap screws (LN No. 8145-M)	Through rear end housing
60		4	Starter motor B housing lock washers (LN No. 8118-M)	Under rear end housing bolt
61		1	Starter motor B drive pinion (LN No. 8104-M).	Rear end of starter shaft
62		1	Starter motor B screw shaft (LN)	Starting motor shaft
63	S01553¼ GAH	4	Starter motor bracket screws (½"–18)	Bracket to lower crankcase
64	054¼ E	4	Starter motor bracket screw lock washers, ½"	Under bracket screws
65	S0107¼ GF	2	Starter motor bracket screws (⅝"–18)	Motor flange to bracket
66	054¼ O	2	Starter motor bracket screw lock washers (⅝")	Under bracket screws
67		6	Starter motor commutator end housing screws (LN No. 8141-M)	In front end housing
68		6	Starter motor drive end housing screws (LN No. 8143-M)	In front end housing
*		1	Starter motor eclipse Bendix drive complete	On rear end starting motor
*		2	Generator main brushes (LN No. 8112-G)	At rear end of generator
*		1	Generator third brush (LN No. 8113-G)	At rear end of generator
*		4	Starter motor brushes (LN No. 8126-M)	In front end starting motor

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.

PLATE 83

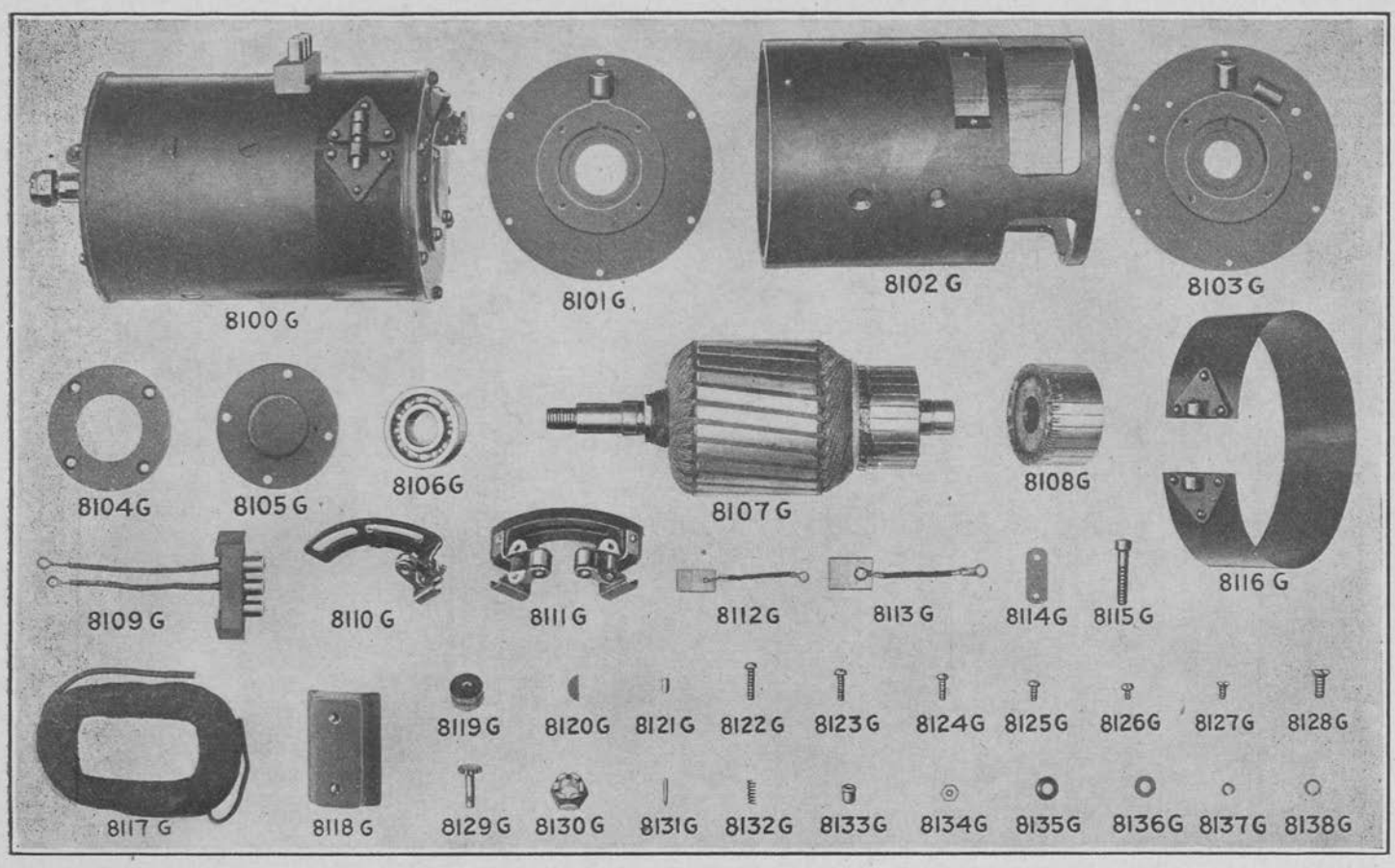


COMPLETE WIRING DIAGRAM

NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Electrical Equipment—WIRING AND LAMPS	
			See illustration on page 242	
1		2	Electric head lamps (single bulb) (H No. 479)	On frame members
2		1	Combination side lamp (R.H.) (A. & W. No. 4480)	On dash
*2		1	Oil side lamp R. H. (A. & W. No. 4480)	
3		1	Combination side lamp (L. H.) (A. & W. No. 4480)	On dash
*3		1	Oil side lamp, L. H. (A. & W. No. 4480)	
4		1	Combination tail lamp (A. & W. No. 4482)	On rear of frame
*	00984¼ GBBE	6	Presto line clip	
*			Long piel hand horn	
*	00984½ GBBE	1	Prestolite line	
*4		1	Oil tail lamp (A. & W. No. 4482)	
5	1645 TED	1	Generator (LN Model No. 240-G 6-Volt) (LN No. 8100-G)	Above magneto
6	1650 TED	1	Starting motor (LN Model No. 240-M 6-volt) (LN No. 8100-M)	Left side lower crankcase
7	1646 TED	1	Starting motor switch (LN Model No. 102-S) (LN No. 8100-S)	In driver's compartment
8	1630 TED	1	Starting battery (W No. STR-4 6-volt)	On left running board
9	001602 GAG	1	Starting battery charging wire terminals	
10	001611 GM	11	No. 6 S terminals	
11	001555 GM	2	Starting switch terminals (LN No. 8111-S)	
12	001555½ GM	2	Starting motor terminals	
13	001555 TED	4	Starting battery terminals	
14		1	Dash light plug (single contact C. & S. No. 32)	In control box
15		2	Head light plugs (single contact H No. 41)	
16		3	Side and tail light plugs (single contact A. & W. No. 77)	
17	1620 TED	1	Generator contact ell plug (LN No. 8131 C) and (No. 8109-C plug)	On circuit breaker
18	00986½ GA	1	Head light conduit tee	In left frame member
19	1600 TED	1	Controller box	On dash
20		1	W speedometer (Model 67-A)	In control box
21	1608⅝ GM	1	Automatic circuit breaker	On control box
22	1616 TED	1	Dash light	On control box
23		1	Ammeter (W) (Type 100-A) (LN No. 8100-A)	On control box
24	1613 GA	1	Lighting switch (4-gang C. & H.)	On control box
25	001613½ GA	1	Lighting switch plate (4-gang C. & H.)	On control box
26		1	Magneto switch	Right side control box
27		1	W speedometer adapter	On speedometer coupling
28		1	Headlight wire (No. 10 wire, 64½")	
29		1	Headlight wire (L. H. No. 10 wire, 16½")	
30		1	Headlight wire (R. H. No. 10 wire, 40")	
31	W1619¼ TED	1	Sidelight wire (R. H. No. 10 wire, 38½")	
32	W1619½ TED	1	Sidelight wire (L. H. No. 10 wire, 27½")	
33	W1619 TED	1	Taillight wire (No. 10 wire, 178")	
34	WA1642½ TED	1	Positive charging wire (generator to ammeter) (No. 10 wire, 67")	
35	WA1615 TED	1	Positive wire (starter to starter switch) (No. 00 wire, 44")	
36	WB1615 TED	1	Negative wire (starter to ground) (No. 00 wire, 52")	
37		1	Magneto ground wire (No. 3 wire, 54") complete	
38	WC1615 TED	1	Positive wire (starter switch to battery) (No. 00 wire, 47")	
39	WA1642 TED	1	Positive charging wire (ammeter to switch) (No. 10 wire, 52½")	
40	WG1617½ TED	1	Dash light switch leg (No. 14 wire, 5½")	
41	WF1619¼ TED	1	Automatic cut-out feed wire (No. 10 wire, 3½")	
42	WD1615 TED	1	Starter motor wire (battery to ground) (No. 00 wire, 30¼")	
43	WF1617½ TED	1	Lighting switch feed wire (No. 10 wire, 1¼")	
44		1	Headlight conduit (switch to tee) (¼" flexible, 57½")	
45		1	Headlight conduit, L. H. (¼" flexible, 14½")	
46		1	Headlight conduit, R. H. (¼" flexible, 39")	
47	C1619¼ TED	1	Sidelight conduit, R. H. (¼" flexible, 29¼")	
48	C1619½ TED	1	Sidelight conduit, L. H. (¼" flexible, 18")	
49	C1619 TED	1	Taillight conduit (¼" flexible, 169")	
50	CA1642½ TED	1	Battery charging wire conduit (generator to ammeter) (¼" flexible, 54")	
51	CA1615 TED	1	Positive wire conduit (starter to starter switch) (⅝" flexible, 41½")	

*These parts only used on White, Model TEB-O, Chassis not having electrical equipment.



ELECTRIC GENERATOR PARTS

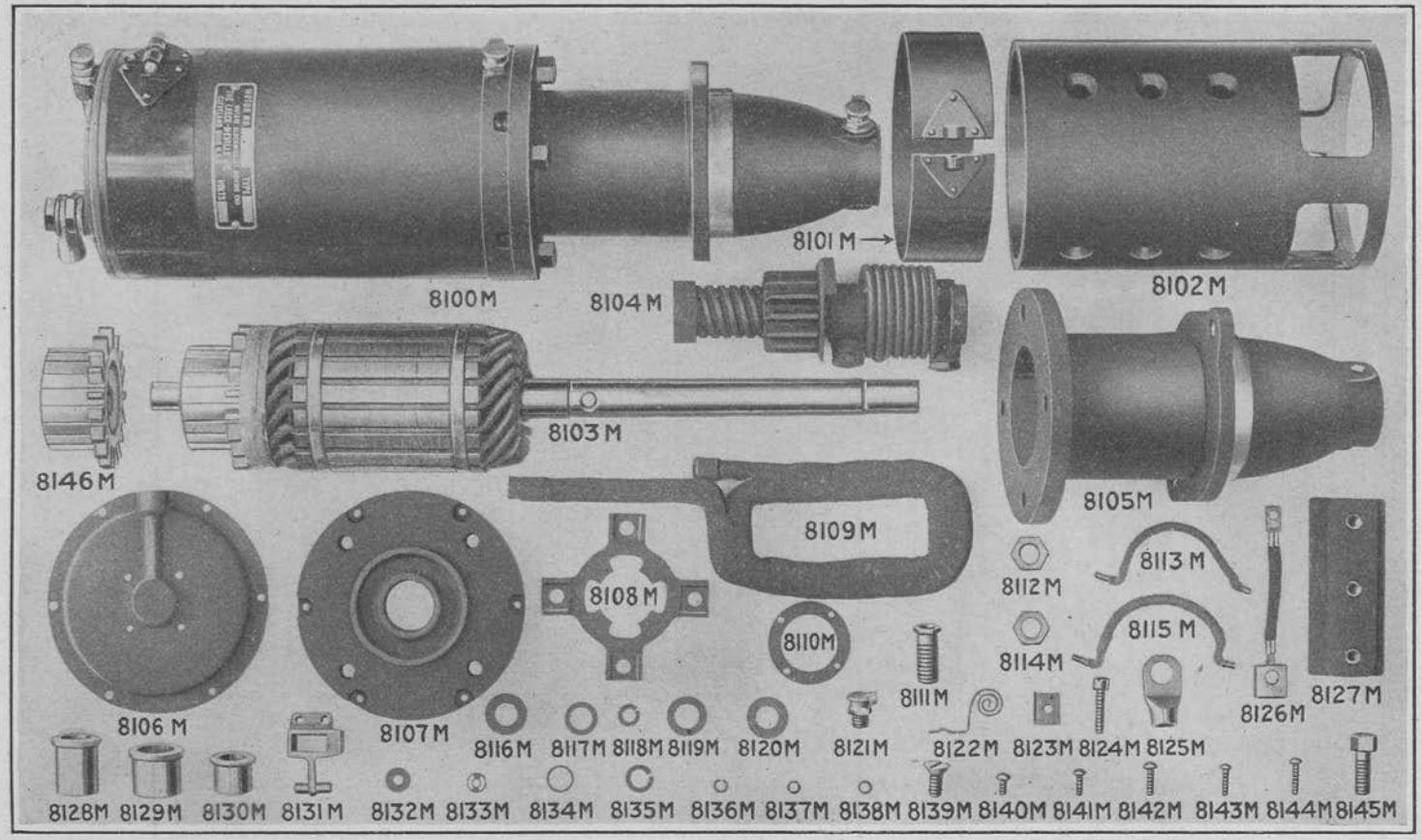
NOMENCLATURE OF PARTS—Continued

Ref. No.	Part No.	No. Per Car	Property Classification—Part I, Class IV, Section 9	
			Name of Part	Location
			Electrical Equipment—WIRING AND LAMPS	
			See illustration on page 242	
52	CB1615 TED	1	Negative wire conduit (starter to ground) (⅝" flexible, 49")	
53	CC1615 TED	1	Positive wire conduit (starter switch to battery) (⅝" flexible, 35")	
54	1618½ TED	1	Headlight conduit complete, consisting of Reference Nos. 15, 28, 29, 30, 44, 45, 46	
55	CD1615 TED	1	Negative wire conduit (battery to ground) (⅝ flexible, 18½")	
56	C1570½ TED	1	Controller box trunk conduit (1" flexible, 15")	
57	CA1642 TED	1	Positive charging wire conduit (ammeter to battery) (¼" flexible, 38")	
58		2	Motor switch terminal nut (LN No. 8115-S)	

Starting and Lighting—GENERATOR

See illustrations on pages 156, 244

Part No.	No. Per Car	Name
8100G	1	Generator complete—Type 240-G, 6-7.5 volts
8101G	1	Generator drive end housing
8102G	1	Generator field ring
8103G	1	Generator commutator end housing
8104G	1	Generator drive end bearing retainer
8105G	1	Generator commutator end bearing retainer
8106G	2	Generator ball bearing for 8101G and 8103G
8107G	1	Generator armature complete
8108G	1	Generator commutator complete
8109G	1	Generator terminal block complete
8110G	1	Generator third brush holder and bracket assembled
8111G	1	Generator main brush holder and bracket assembled
8112G	2	Generator main brush for 8111G
8113G	1	Generator third brush for 8110G
8114G	1	Generator tapped retaining plate for 8111G
8115G	1	Generator band screw for 8116G
8116G	1	Generator brush opening band
8117G	4	Generator field coil
8118G	4	Generator field pole
8119G	1	Generator third brush adjustment wheel for 8131G
8120G	1	Generator Woodruff key for 8107G
8121G	1	Generator third brush adjustment ratchet pin
8122G	2	Generator brush holder bracket screw for 8114G
8123G	2	Generator terminal block screw for 8109G
8124G	2	Generator third brush holder bracket screw for 8110G
8125G	16	Generator housing and retainer screw for 8101G, 8103G and 8105G
8126G	6	Generator brass brush holder screw for 8110G and 8111G
8127G	4	Generator ball bearing retainer screw for 8104G
8128G	8	Generator pole piece screw for 8118G
8129G	1	Generator third brush adjustment pinion
8130G	1	Generator shaft castle nut for 8107G
8131G	1	Generator drive pin for assembly of 8119G to 8129G
8132G	1	Generator third brush adjustment ratchet spring for 8121G
8133G	2	Generator Type C ball oiler for 8101G and 8103G
8134G	2	Generator nut for 8124G
8135G	1	Generator spring washer for 8129G
8136G	2	Generator washer for 8124G
8137G	28	Generator lock washer for 8122G, 8123G, 8124G, 8125G and 8126G
8138G	1	Generator lock washer for 8115G



ELECTRIC STARTING MOTOR PARTS

Starting and Lighting—STARTER

See illustration on page 246

Part No.	No. Per Car	Name
8100M	1	Motor complete—Type 240-M, 6 volts
8101M	1	Motor brush opening band
8102M	1	Motor field ring
8103M	1	Motor armature complete
8104M	1	Motor eclipse Bendix drive complete
8105M	1	Motor Bendix housing
8106M	1	Motor commutator end housing
8107M	1	Motor drive end housing
8108M	1	Motor brush holder bracket
8109M	4	Motor field coil
8110M	1	Motor brush holder bracket retainer
8111M	2	Motor terminal stud
8112M	2	Motor terminal stud jamb nut
8113M	1	Motor brush holder jumper—short
8114M	2	Motor terminal stud top nut
8115M	1	Motor brush holder jumper—long
8116M	2	Motor outer stud insulator washer
8117M	2	Motor inner stud insulator washer
8118M	1	Motor lock washer for 8124M
8119M	2	Motor lock washer for 8112M
8120M	2	Motor guard washer for 8116M
8121M	3	Motor cap oiler for 8105M, 8106M and 8107M
8122M	4	Motor brush holder spring for 8131M
8123M	4	Motor brush holder insulator for 8131M
8124M	1	Motor band screw for 8101M
8125M	2	Motor cable terminal for 8111M
8126M	1	Motor brush for 8131M
8127M	4	Motor pole piece
8128M	1	Motor Bendix housing bushing for 8105M
8129M	1	Motor drive end housing bushing for 8107M
8130M	1	Motor commutator end housing bushing for 8106M
8131M	4	Motor brush holder
8132M	8	Motor insulator washer for 8142M
8133M	8	Motor guard washer for 8132M
8134M	2	Motor insulator bushing for 8111M
8135M	4	Motor lock washer for 8145M
8136M	24	Motor lock washer for 8140M and 8142M
8137M	16	Motor lock washer for 8141M, 8143M and 8144M
8138M	8	Motor insulator bushing for 8142M
8139M	12	Motor pole piece screws for 8127M
8140M	16	Motor brass brush holder screw for 8131M
8141M	6	Motor commutator end housing screw for 8106M
8142M	8	Motor brush holder assembly screw for 8131M
8143M	6	Motor drive end housing screw for 8107M
8144M	8	Motor brush holder bracket screw for 8108M
8145M	4	Motor Bendix housing cap screws for 8105M
8146M	1	Motor commutator complete

Starting and Lighting—SWITCH

See illustration below

Part No.	No. Per Car	Name
8100S	1	Motor switch complete—Type 102S
8101S	1	Motor switch cover
8102S	1	Motor switch base
8103S	4	Motor switch screw for assembly of 8102S to 8101S
8104S	4	Motor switch lock washer for 8103S
8105S	1	Motor switch inner stud insulation
8106S	1	Motor switch yoke and push rod assembled
8107S	1	Motor switch push button
8108S	1	Motor switch contactor
8109S	1	Motor switch spring
8110S	1	Motor switch yoke pin
8111S	2	Motor switch cable terminal
8112S	2	Motor switch terminal stud
8113S	2	Motor switch contact
8114S	1	Motor switch insulation sleeve for 8108S
8115S	2	Motor switch top nut for 8112S
8116S	1	Motor switch jamb nut for 8112S
8117S	2	Motor switch outer insulation washer for 8112S
8118S	2	Motor switch guard washer for 8117S
8119S	2	Motor switch end insulation washer for 8108S
8120S	2	Motor switch insulation bushing for 8112S
8121S	2	Motor switch guard washer for 8119S

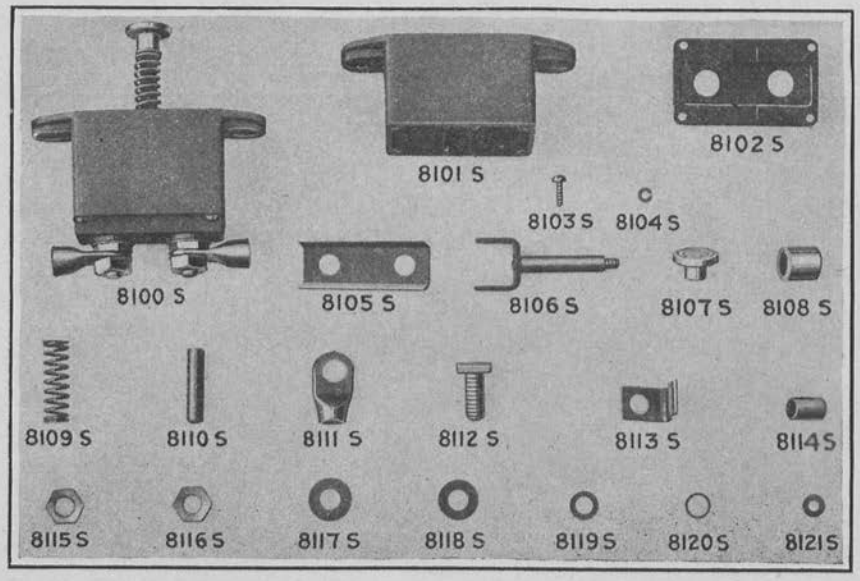
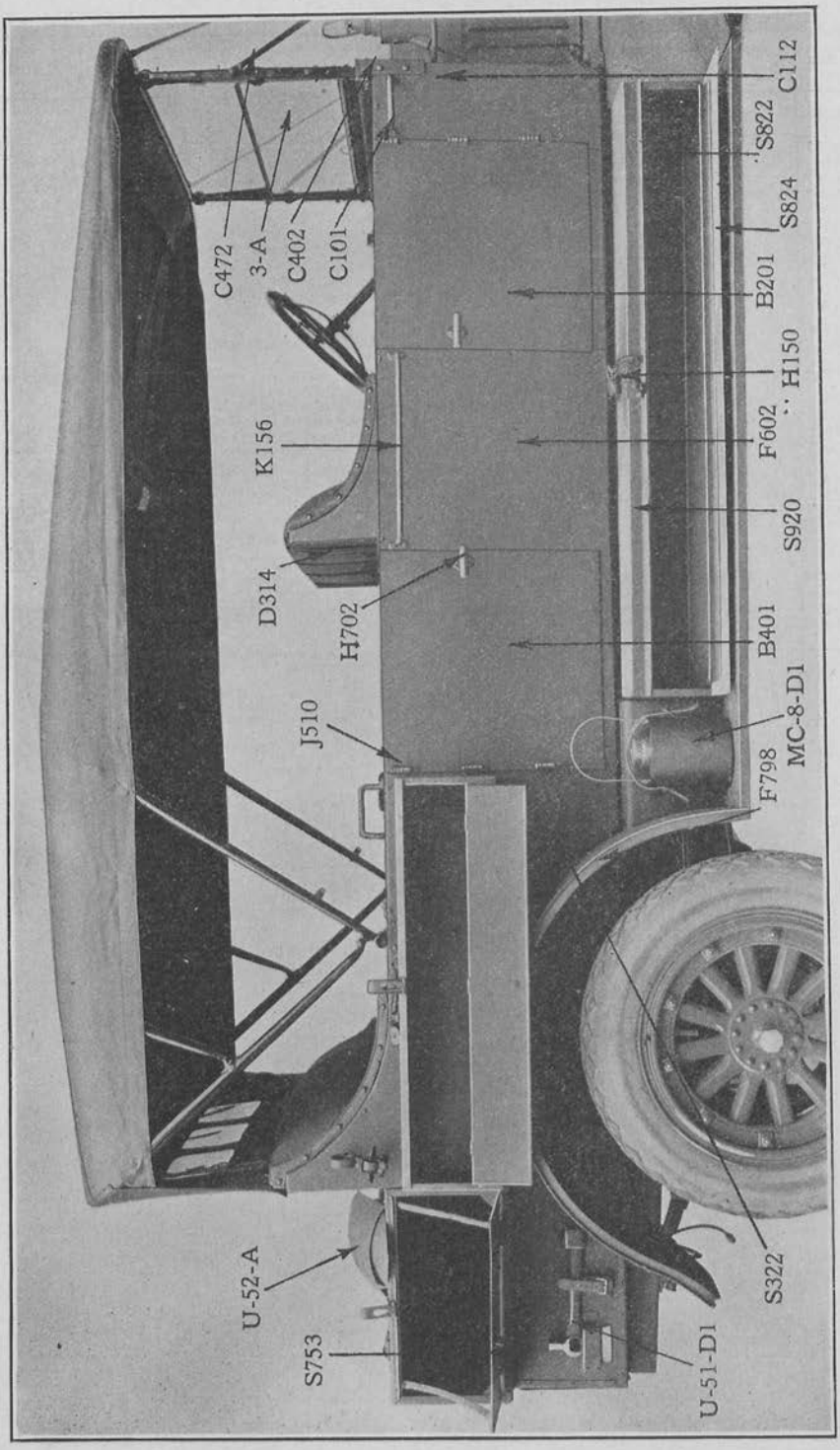


PLATE 86—ELECTRIC STARTING SWITCH PARTS

Starting and Lighting—CIRCUIT BREAKER

Part No.	No. Per Car	Name
8100C	1	Circuit breaker complete—Type 115C, 6-7½ volts
8101C	1	Circuit breaker base
8102C	1	Circuit breaker cover
8103C	1	Circuit breaker fuse clip lead
8104C	1	Circuit breaker magnet pole and armature
8105C	1	Circuit breaker magnet pole, contact block and plunger lead
8106C	1	Circuit breaker plunger to terminal lead
8107C	1	Circuit breaker magnet coil with core
8108C	1	Circuit breaker sub-base with terminal solder clips and fuse clips
8109C	1	Circuit breaker plug terminal block
8110C	1	Circuit breaker contact plunger
8111C	1	Circuit breaker contact plunger spring
8112C	1	Circuit breaker fuse
8113C	1	Circuit breaker adjustment screw
8114C	1	Circuit breaker screw for assembly of 8101C to generator frame
8115C	1	Circuit breaker cover screw for 8102C
8116C	4	Circuit breaker terminal screw for assembly of circuit breaker terminals to generator terminal block 8109G
8117C	4	Circuit breaker sub-base screw for assembly of 8108C to 8101C
8118C	4	Circuit breaker plunger case screw for assembly of 8120C to 8101C
8119C	1	Circuit breaker screw for assembly of 8104C and 8105C to 8108C
8120C	1	Circuit breaker contact plunger case
8121C	1	Circuit breaker contact for 8109C
8122C	1	Circuit breaker adjustment spring for 8113C
8123C	1	Circuit breaker cotter pin for 8122C
8124C	1	Circuit breaker nut for 8113C
8125C	1	Circuit breaker lock washer for 8114C
8126C	4	Circuit breaker lock washer for 8117C
8127C	4	Circuit breaker terminal spring lock washer for 8116C
8128C	4	Circuit breaker magnet pole screw for assembly of 8104C and 8105C to 8107C
8129C	4	Circuit breaker lock washer for 8118C and 8119C
8130C	8	Circuit breaker brass screw for fuse clip jumpers on 8108C and coil ends on 8107C
8131C	1	Circuit breaker connector plug shell

PLATE 87



BODY ASSEMBLY

BODY PARTS

See illustration on page 250

Part No.	No. Per Body	Name
S756	4	Accessory chest angle connection
S766	1	Accessory chest back panel
S935	1	Accessory chest bolt reinforcing
S761	2	Accessory chest bottom angle
S984	1	Accessory chest bottom door stop
S753	2	Accessory chest door panel, small
S751	8	Accessory chest door stiffener
S851	8	Accessory chest door stiffener, long right
S752	8	Accessory chest door stiffener, short
S852	8	Accessory chest door stiffener, short
S755	2	Accessory chest end angle, lower
S854	2	Accessory chest end angle, upper
S754	2	Accessory chest end angle, upper
S769	2	Accessory chest end, lower
S763	6	Accessory chest gusset plate
S762	1	Accessory chest large door panel
S760	2	Accessory chest large door stiffener, long
S759	2	Accessory chest large door stiffener, small
S768	1	Accessory chest metal bottom
S764	1	Accessory chest partition
S765	2	Accessory chest small door stop
S758	1	Accessory chest top and front panel
S757	1	Accessory chest top angle
S936	1	Accessory chest weather strip
S101	2	Auxiliary seat bottom
S603	1	Auxiliary seat bottom, center
F983	1	Auxiliary seat cross bar center, left
F984	1	Auxiliary seat cross bar center, right
F980	1	Auxiliary seat cross bar, front
F982	1	Auxiliary cross bar, rear
S430	2	Auxiliary seat floor board
S431	2	Auxiliary seat floor board cleat
S576	1	Auxiliary seat frame support, center
S555	2	Auxiliary seat lazy back
S520	2	Auxiliary seat lazy back foot
S512	2	Auxiliary seat lazy back top
S553	1	Auxiliary seat strap handle, left
S552	1	Auxiliary seat strap handle, right
S271	1	Back frame bottom rail
S151	1	Bottom frame bracket, center
S241	1	Back frame corner top rail, left
S242	1	Back frame corner top rail, right
S301	1	Back frame spring slat
S302	1	Back frame spring slat
S291	2	Back frame strainer
S231	1	Back frame top rail
S311	1	Back panel
J313	2	Butt hinge, 3 inch x 3 inch
J314	2	Butt hinge, 4 inch x 4 inch
K111	1	Center top iron, left
K112	1	Center top iron, right
D131	1	Cross partition under front seat
D132	1	Cross partition under front seat, right
C213	1	Cowl molding, top
C214	2	Cowl molding, right
C111	1	Cowl side panel, left
C112	1	Cowl side panel, right
C101	1	Cowl top handle
C503	1	Cowl side top rail, left
C504	1	Cowl side top rail, right
F223	1	Dash cross bar, top
C525	1	Dash pillar finish panel, left
C526	1	Dash pillar finish panel, right
F221	1	Dash pillar, left
F222	1	Dash pillar, right
F305	1	Dash pillar glueon
F306	2	Dash pillar glueon, right
K907	8	Door bumper and retainer
K908	8	Door bumper and retainer
K909	8	Door bumper and retainer
K985	8	Door bumper, female
K984	8	Door bumper, male
K986	8	Door bumper, rubber
F651	1	End sill
F651	1	End sill
F991	1	Filler piece on chassis, left
F992	1	Filler piece on chassis, right
F401	1	Filler, pillar to front seat panel
F402	1	Filler, pillar to front seat panel, right
F211	1	Floor board support, rear
F212	1	Floor board support, rear right

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See illustration on page 250

Part No.	No. Per Body	Name
H161	2	Flush ring catch, male
H162	2	Flush ring catch, female
K944	4	Footman loops
F251	1	Front body lock pillar, left
F252	1	Front body lock pillar, right
F241	1	Front body pillar, left
F242	1	Front body pillar, right
S855	1	Front corner angle, lower left
S856	1	Front corner angle, lower right
B136	1	Front door bottom rail, left
B236	1	Front door bottom rail, right
B126	2	Front door center rail, left
B241	1	Front door front pillar, right
B181	2	Front door lock block, left
B101	1	Front door outside panel, left
B201	1	Front door outside panel, right
B115	1	Front door outside panel plate
B110	1	Front door outside panel plate, lower
B111	2	Front door outside panel plate, front
B210	1	Front door outside panel plate, right
B211	2	Front door outside panel plate, right
B215	1	Front door outside panel plate, right
B141	1	Front door pillar, left
B151	1	Front door rear pillar, left
B251	1	Front door rear pillar, right
B121	1	Front door top rail, left
B221	1	Front door top rail, right
F930	1	Front floor board, No. 1
F931	1	Front floor board, No. 2
F533	1	Front one quarter top rail, left
F534	1	Front one quarter top rail, right
D271	1	Front seat back frame bottom rail
D251	1	Front seat back frame center rail
D304	2	Front seat back frame lining board
D292	1	Front seat back frame strainer, right
D293	1	Front seat back frame strainer, left
D231	1	Front seat back frame top rail
D314	1	Front seat back panel, center
D126	1	Front seat bottom cushion retainer
D111	1	Front seat bottom frame angle
D171	2	Front seat bottom frame cleat
D121	1	Front seat bottom frame, front
D141	1	Front seat bottom frame, rear
D101	2	Front seat bottom frame, side
D166	1	Front seat bottom frame trap
D112	1	Front seat bottom frame trimming piece, right
D393	1	Front seat center
D388	1	Front seat corner reinforcing
D383	1	Front seat heel board
D389	1	Front seat heel board corner reinforcing angle
K151	1	Front seat pillar brace, left
K152	1	Front seat pillar brace, right
F105	1	Front sill reinforcing angle
F106	1	Front sill reinforcing, right
H150	7	Government standard padlock
S388	1	Heel board corner reinforcing, right
S389	1	Heel board corner reinforcing, left
H782	4	Lock handle knobs, Smith No. 5069
S866	1	Long side box door stiffener
H939	4	Lock striker
F111	1	Main sill, left
F112	1	Main sill, right
K580	1	Model "O" Waltham clock
H702	4	Outside door handle, Smith No. 4892
F261	1	Rear body hinge pillar, left
F262	1	Rear body hinge pillar, right
F271	1	Rear body lock pillar, left
F272	1	Rear body lock pillar, right
F990	1	Rear chassis cross strip
F993	1	Rear chassis cross strip, left
F994	1	Rear chassis cross strip, right
S857	1	Rear corner angle, lower left
S858	1	Rear corner angle, lower right
B236	2	Rear door bottom rail, left
B326	2	Rear door center rail, left
B341	1	Rear door front pillar, left
B441	1	Rear door front pillar, right
B381	2	Rear door lock block
B301	1	Rear door outside panel, left
B310	1	Rear door outside panel plate, left
B311	2	Rear door outside panel plate, left

BODY PARTS—Continued

See illustration on page 250

Part No.	No. Per Body	Name
B315	1	Rear door outside panel plate, left
B410	1	Rear door outside panel plate, right
B411	2	Rear door outside panel plate, right
B415	1	Rear door outside panel plate, right
B401	1	Rear door outside panel, right
B351	1	Rear door rear pillar, left
B451	1	Rear door rear pillar, right
B321	1	Rear door top rail, left
B421	1	Rear door top rail, right
K240	12	Rear fender bolt retainer
F799	1	Rear fender, left
F798	1	Rear fender, right
F940	1	Rear floor board, No. 1
F941	1	Rear floor board, No. 2
F942	1	Rear floor board, No. 3
F943	1	Rear floor board, No. 4
F972	2	Rear floor board spline
S448	1	Rear floor pan bottom
S446	2	Rear floor pan, end
S445	1	Rear floor pan, front
S447	2	Rear floor pan, rear
S441	1	Rear floor pan rear support
S101	1	Rear frame side (seat)
S383	1	Rear heel board
S385	1	Rear heel board reinforcing, left
S384	1	Rear heel board reinforcing, right
S390	2	Rear heel board spline
S395	1	Rear heel board top
K156	2	Rear outside grab handle
S345	1	Rear seat corner pillar, left
S346	1	Rear seat corner pillar, right
S282	1	Rear seat corner post
S283	1	Rear seat corner post reinforcing
S126	1	Rear seat cushion retainer
S141	1	Rear seat frame back
S145	1	Rear seat frame back support
S121	1	Rear seat frame, front
S147	1	Rear seat frame side support, left
S148	1	Rear seat frame side support, right
S166	1	Rear seat frame trap
S171	2	Rear seat frame trap cleats
K171	1	Rear seat pillar brace, left
K172	1	Rear seat pillar brace, right
S347	1	Rear seat side strainer, left
S348	1	Rear seat side strainer, right
F796	1	Rear splasher, right
F797	1	Rear splasher, left
S365	1	Rear table, left
S366	1	Rear table, right
S363	2	Rear top iron block
K121	1	Rear top iron, left
K122	1	Rear top iron, right
K157	3	Rear top rail grab handle
S775	1	Running board reinforcing center iron
S470	2	Seat moulding
J104	4	Seat trap hinge
D181	1	Side frame arm rail, left
S181	1	Side frame arm rail, left
S182	1	Side frame arm rail, right
D182	1	Side frame arm rail, right
D197	1	Side frame arm rail trimming piece, lower
D198	1	Side frame arm rail trimming piece, upper
F601	1	Side panel, left
S321	1	Side panel, left
S322	1	Side panel, right
F602	1	Side panel, right
H992	4	Side plates, Smith No. 5050
F603	1	Side sill panel, left front
F609	1	Side sill panel, left rear
F604	1	Side sill panel, right front
F608	1	Side sill panel, right rear
F690	2	Skip block on sill
K969	2	Smith dowel No. 4923, female
K968	2	Smith dowel No. 4923, male
H104	1	Smith No. 5119, right
H105	1	Smith No. 5119, left
J503	1	Steel door hinge, center left
J504	1	Steel door hinge, center right
J505	1	Steel door hinge, lower left
J506	1	Steel door hinge, lower right
J501	1	Steel door hinge, upper left

BODY PARTS—Continued

See illustration on page 250

Part No.	No. Per Body	Name
J502	1	Steel door hinge, upper right
J513	1	Steel rear door hinge, center left
J512	1	Steel rear door hinge, center right
J515	1	Steel rear door hinge, lower left
J514	1	Steel rear door hinge, lower right
J510	1	Steel rear door hinge, rear right
J511	1	Steel rear door hinge, upper left
K591	2	Table hold down plate
K590	2	Table hold down socket
K150	1	Tire iron, lower
K149	1	Tire iron, upper
F920	1	Toe board, No. 1
F921	1	Toe board, No. 2
F453	1	Toe board riser
F251	1	Toe board riser, left
S822	2	Tool box (below door)
S923	1	Tool box bottom, left
S922	1	Tool box bottom, right
S823	2	Tool box door
S824	2	Tool box door
S931	2	Tool box door
S932	4	Tool box door stop
S933	1	Tool box door stop, long
S941	1	Tool box door stop, long
S940	1	Tool box door stop, short
S929	1	Tool box end
S926	1	Tool box end
S927	1	Tool box end
S928	1	Tool box end
S862	1	Tool box on running board, door
S861	2	Tool box on running board, end
S863	1	Tool box on running board, short
S860	1	Tool box on running board, top
S864	1	Tool box on running board, top and bottom
S925	1	Tool box side, left
S924	1	Tool box side, right
S930	2	Tool box side (under door)
S921	1	Tool box top, left
S920	1	Tool box top, right
S821	1	Tool box top panel, left
S820	1	Tool box top panel, right
F452	1	Tow board riser, right
F454	1	Tow board riser, right
S190	1	Trim rail at top
S209	2	Trim rail at top
S197	1	Trim rail at top, left
S207	2	Trim rail at top, left
S198	1	Trim rail at top, right
S208	2	Trim rail at top, right
S225	1	Trim rail fender reinforcing
S211	1	Trim rail, front left
S212	1	Trim rail, front right
K523	7	U. S. Standard wing nuts
K524	7	U. S. Standard wing nut pins
K525	7	U. S. Standard wing nut pin washers
S361	1	Wheelhouse panel, left
S360	1	Wheelhouse panel, right
S280	1	Wheelhouse pillar corner
S281	1	Wheelhouse pillar, corner left
A3	1	Windshield
C403	1	Windshield bracket bushing, left
C404	1	Windshield bracket bushing, right
C401	1	Windshield bracket, left
C402	1	Windshield bracket, right
C472	2	Windshield stay rod

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DECIMAL EQUIVALENTS OF AN *INCH* FOR EACH 1/64 INCH

1/32ds.	1/64ths.	Decimal	Fraction.	1/32ds.	1/64ths.	Decimal.	Fraction.
	1	.015625			33	.515625	
1	2	.03125		17	34	.53125	
	3	.046875			35	.546875	
2	4	.0625	1-16	18	36	.5625	9-16
	5	.078125			37	.578125	
3	6	.09375		19	38	.59375	
	7	.109375			39	.609375	
4	8	.125	1-8	20	40	.625	5-8
	9	.140625			41	.640625	
5	10	.15625		21	42	.65625	
	11	.171875			43	.671875	
6	12	.1875	3-16	22	44	.6875	11-16
	13	.203125			45	.703125	
7	14	.21875		23	46	.71875	
	15	.234375			47	.734375	
8	16	.25	1-4	24	48	.75	3-4
	17	.265625			49	.765625	
9	18	.28125		25	50	.78125	
	19	.296875			51	.796875	
10	20	.3125	5-16	26	52	.8125	13-16
	21	.328125			53	.828125	
11	22	.34375		27	54	.84375	
	23	.359375			55	.859375	
12	24	.375	3-8	28	56	.875	7-8
	25	.390625			57	.890625	
13	26	.40625		29	58	.90625	
	27	.421875			59	.921875	
14	28	.4375	7-16	30	60	.9375	15-16
	29	.453125			61	.953125	
15	30	.46875		31	62	.96875	
	31	.484375			63	.984375	
16	32	.5	1-2	32	64	1.	1