NO. 2012

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HANDBOOK OF THE

1-TON TRUCK CHASSIS

MODEL 1918 (COMMERCE)

DEPOSIT
1969

WITH INSTRUCTIONS FOR ITS CARE,
OPERATION AND MAINTENANCE

(SEVENTY-NINE PLATES)

AUGUST 31, 1918



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WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, August 31st, 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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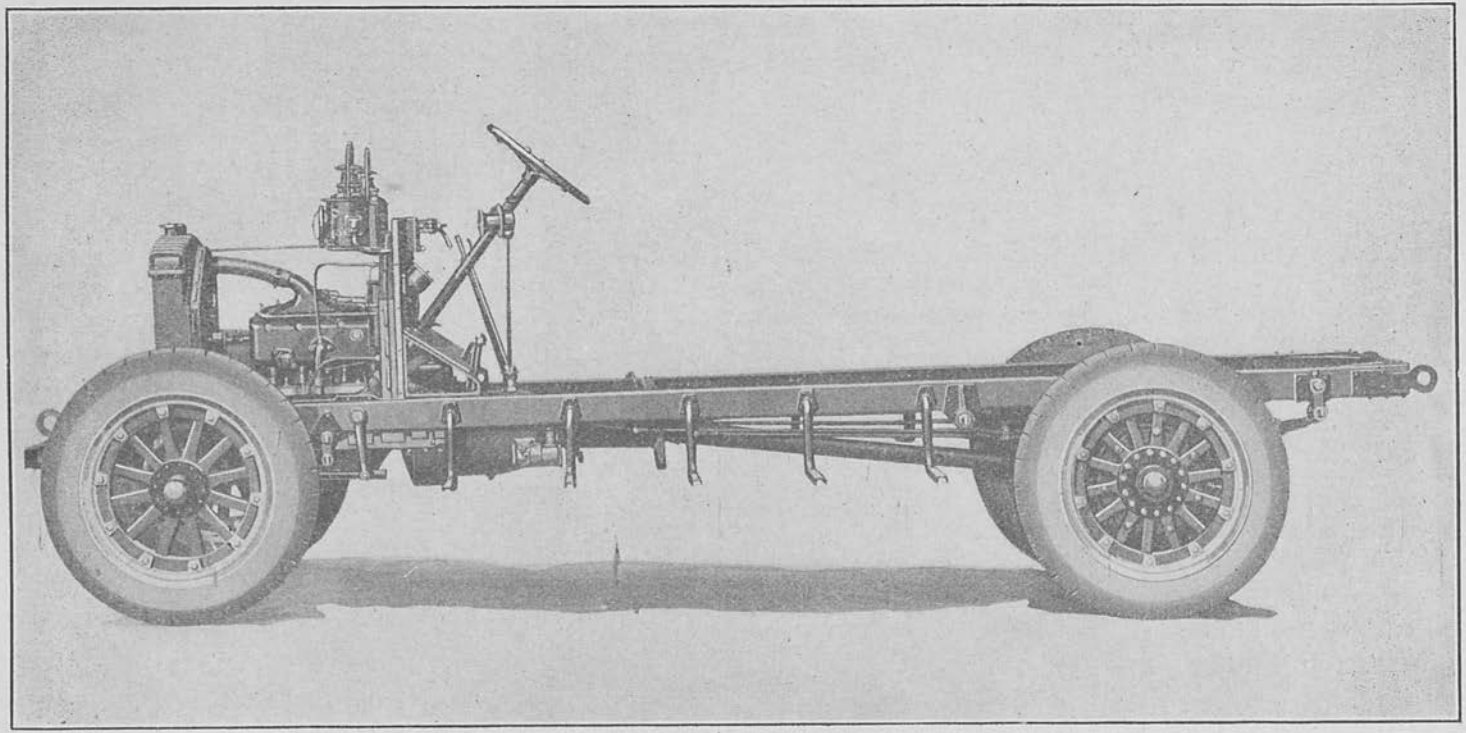
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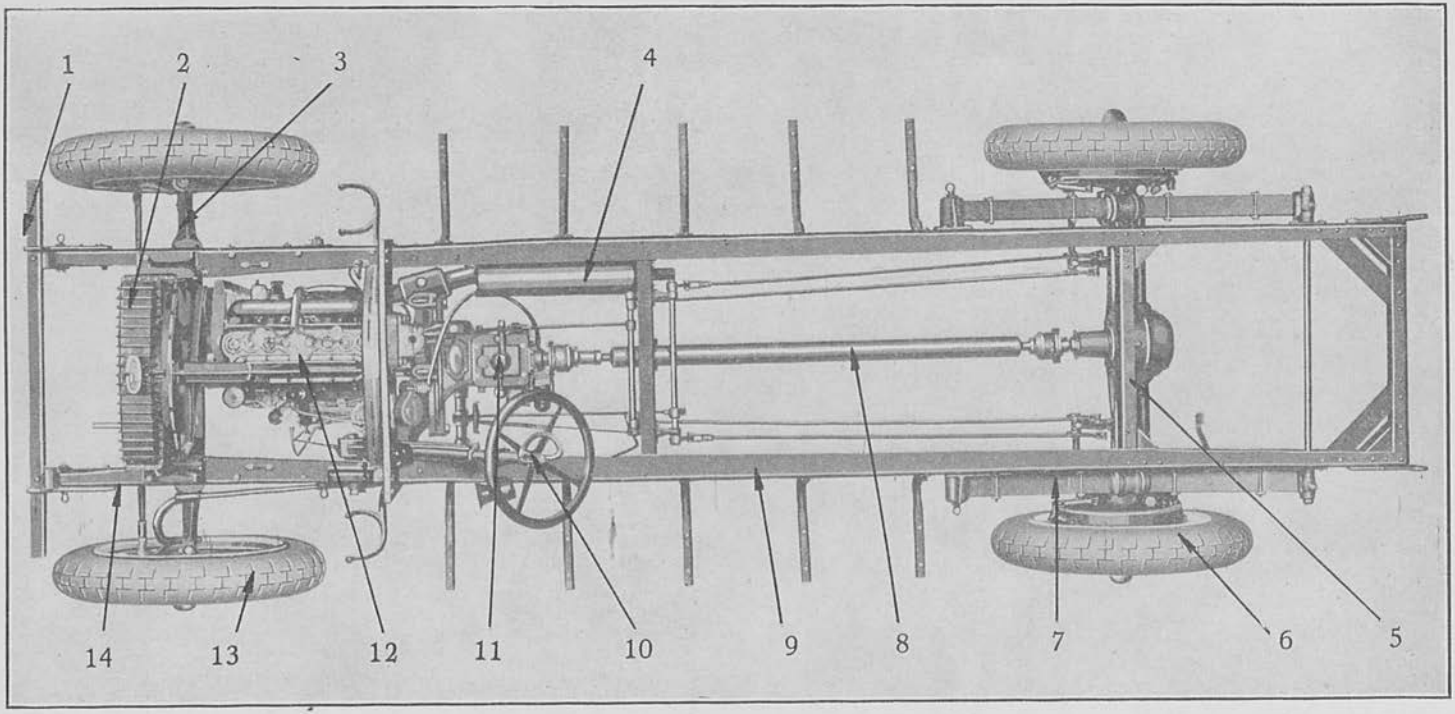
1-TON TRUCK CHASSIS, MODEL 1918 (COMMERCE)

HANDBOOK OF THE 1-TON TRUCK CHASSIS MODEL 1918 (COMMERCE)

CHAPTER I

WEIGHTS, OUTLINE SPECIFICATIONS, ETC.

Rated Load Capacity (Body allowance plus normal load)	pounds	3400	
Body Weight Allowance	do.	1200	
Weight of Chassis (with oil, water, gasoline, chains and tool kit)	do.	3300	
Chassis Weight on Front Tires (without load)	percentage	51.5	(51½)
Chassis Weight on Rear Tires (without load)	do.	48.5	(48½)
Gross Weight (capacity load)	pounds	6700	
Load Weight on Front Tires	percentage	0.73	
Load Weight on Rear Tires	do.	99.27	(99¼)
Gross Weight on Front Tires	do.	25	
Gross Weight on Rear Tires	do.	75	
Overall Length of Chassis (without body)	inches	198	
Overall Width of Chassis (at widest part)	do.	68.5	(68½)
Chassis Wheel Base	do.	133	
Permissible Loading Space back of Driver's Seat	do.	120	
Width of Frame (outside dimension widest part)	do.	34	
Height of Rear End of Frame from Ground (empty)	do.	34.5	(34½)
Diameter of Turning Circle	feet	50	
Tread of Wheels	inches	56	
Road Clearance under Front Axle (lowest point)	do.	11.75	(11¾)
Road Clearance under Rear Axle (lowest point)	do.	12	
Height to Center of Front Towing Rings from Ground (empty)	do.	26.5	(26½)
Height to Center of Rear Towing Rings from Ground (empty)	do.	32.5	(32½)



TOP OF CHASSIS SHOWING MAJOR ASSEMBLIES

PLATE 2

CHASSIS MAJOR ASSEMBLIES

Ref. No.	Part No.	Name
1	A1733	Bumper.
2	A1825	Radiator.
3	A1025	Front axle.
4	A2075	Muffler.
5	A1125	Rear axle.
6	A2220	Rear wheel.
7	A1620	Rear spring
8	A1550	Propeller shaft
9	A1725	Frame
10	A1400	Steering gear.
11	A550	Transmission
12	A225	Engine.
13	A2160	Front wheel.
14	A1610	Front spring.

BRIEF DESCRIPTION OF 1-TON CHASSIS, MODEL 1918 (COMMERCE)

The 1-Ton Truck Chassis, Model 1918, is of standard design. It is fitted with a four cylinder engine, cone clutch, sliding gear, three-speed transmission, a drive to the two rear wheels through a propeller shaft, and an internal gear drive axle. The engine is of L-head Continental design, using circulating splash lubrication. The cooling water is pump circulated. The radiator is of the tubular type having removable cast iron headers. The engine is fitted with a Zenith carbureter and an Eisemann magneto with an impulse starter. The truck has an acetylene searchlight. The frame is made up of channel section pressed steel, mounted on semi-elliptic springs. The front axle is the conventional Elliott type. The fuel tank, provided with a reserve compartment, is to be located under the front seat. The fuel is delivered to the carbureter by means of a vacuum tank, located on the dash under the hood. The control system includes a left hand steering gear, centrally located gear shift and emergency brake levers and clutch, service brake and accelerator pedals projecting through the toe boards on the left side. The tires are 36 x 6 inches, pneumatic, Goodyear cords with All-Weather Tread. One extra tire, inflated and mounted upon a spare rim, is furnished. A power driven Kellogg tire pump is mounted on the left side of the transmission. The drive and torque of the rear axle are through the two rear springs. A full set of hand tools, fire extinguisher, canvas paulin, 3-ton jack, speedometer, horn, searchlight and generator, two oil side lamps and oil tail lamp are supplied with the chassis.

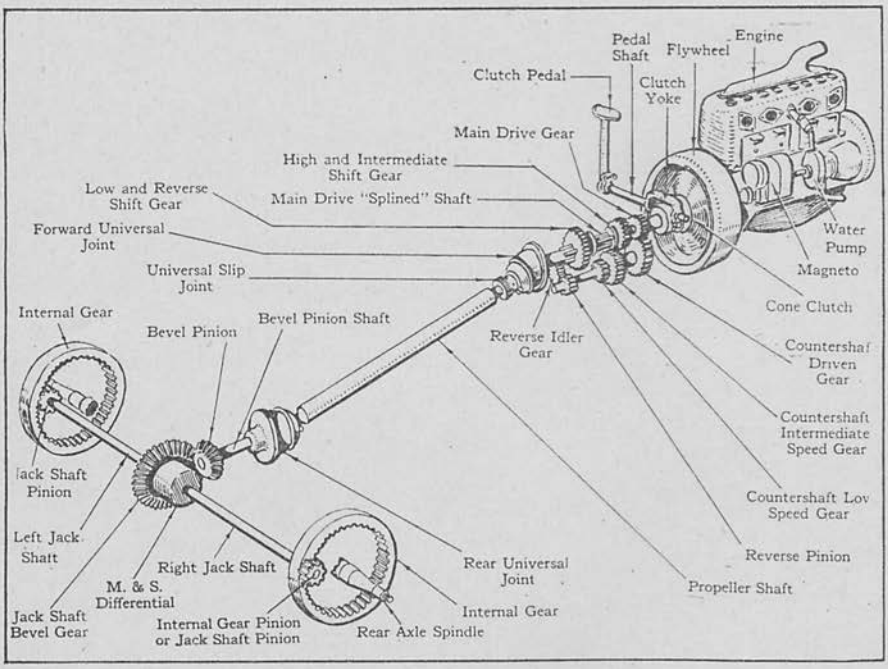


PLATE 3—POWER DIAGRAM

POWER DIAGRAM EXPLANATION

The power diagram shows the transition of power from the engine to the rear wheels. In the above sketch the engine is shown in the upper right hand corner and the internal gears, which are attached to each of the rear wheels, in the lower left hand corner of the sketch.

The power is transmitted from the engine through its flywheel to the cone clutch, which is operated by a clutch pedal. When the latter is depressed, the clutch is disconnected from the engine and this, in turn, disconnects the power from the rear wheels. From the clutch the power is transmitted through the gear box, in which there are various speed gears. Three speeds forward and one reverse are provided.

From the transmission the power is transmitted to the rear axle by a tubular propeller shaft and two universal joints, one at either end of the shaft. The power is transmitted from the rear universal joint through bevel gears and an M. & S. differential to the right and left jackshafts.

On the end of each jackshaft there are pinions which engage with the internal gears attached to each rear wheel.

BRIEF SPECIFICATIONS OF 1-TON TRUCK CHASSIS MODEL 1918 (COMMERCE)

ENGINE—Four cylinder, four cycle type; "L" head type of cylinders cast in block. Bore 3.75 (3¾) inches, stroke 5 inches, with a piston displacement of 221 cubic inches and rated horse power of 22.5 according to the S. A. E. formula.

COOLING—Centrifugal Water Pump Circulation.

RADIATOR—Tubular type with fins, and removable cast iron water headers top and bottom.

IGNITION—Eisemann Model G-4 II Edition with Automatic Impulse Starter, without variable advance.

CARBURETER—Model 04 Zenith Carbureter, 1 inch size, with Stewart Vacuum Feed System.

OILING—Pump circulation to Main Bearings and Timing Gears with splash to Connecting Rods and Cylinders.

FUEL FEED—From the Main Gasoline Tank of 20 U. S. gallons capacity, to be located under the Driver's seat in the body, to the Stewart Vacuum Tank located on the Dash and from the latter to the Carbureter by gravity.

MAIN CLUTCH—Cone type, inclosed by a bell housing which forms the connecting unit between the Transmission Case and the Engine.

TRANSMISSION—The Change Speed Transmission is joined to the Engine forming with it what is called a unit power plant. The Transmission provides in a selective manner three speeds forward and one reverse.

DRIVE—The power is transmitted from the Transmission to the Rear Axle through a tubular propeller shaft with universal joints located at either end. The torque and drive on the Rear Axle is absorbed through the rear springs; hence this drive is called the Full Hotchkiss Type.

FRAME—Channel section pressed steel with cross members, and provided with Towing Rings at all four corners and a channel steel bumper in front.

SPRINGS—Front and rear, semi-elliptic. The Rear Springs take the torque and drive from the Rear Axle.

FRONT AXLE—I-beam type with Elliott steering knuckles.

REAR AXLE—I-beam axle supporting weight of chassis. Drive through non-load-carrying axle. M.&S. self-locking type of differential used. Final drive through Internal Gears located inside of the brake housings.

WHEELS—Wood spoke, artillery type wheel, 1.75 (1¾) inches square, mounted upon Bower Roller Bearings and carrying pneumatic tires.

TIRES—Pneumatic, 36 inches diameter by 6 inches section, mounted on straight side demountable rims.

STEERING—Through both Front Wheels and an inclined Steering Column, having hardwood Steering Wheel. Steering Gear of screw and split nut type is located on left hand side of chassis.

CONTROLS—Change Gear and Emergency Brake Levers in front of the Driver's seat and at the center of the chassis. Throttle Lever operated from sector above the Steering Wheel; Ignition ground wire switch on the Dash Board; Clutch and Service Brake Pedals, left and right respectively; Accelerator Pedal on Toe Boards.

MAIN GASOLINE TANK—Seamless drawn steel tank, to be located under Driver's seat, 20 U. S. gallons capacity including reserve tank.

VACUUM FUEL FEED TANK—Stewart, under hood on left hand side of Dash.

EQUIPMENT—See "Equipment" in Chapter IX.

BRIEF OPERATING INSTRUCTIONS

PRELIMINARY TO STARTING ENGINE

See that gear shift lever is in neutral.
Set emergency brake.
Advance gas lever one-fifth travel.
Turn ignition switch handle to "on" position.
Crank engine by a quick upward lift of the starting crank.
Pull up air choker rod for rich mixture if necessary.
Prime engine through priming cups on cylinder if necessary.

AFTER ENGINE STARTS

Retard gas lever until engine runs slowly.
Open choke valve.

TO START TRUCK

Release hand brake.
Release clutch by depressing clutch pedal.
Engage low speed gear.
Increase engine speed slightly with accelerator pedal.
Slowly engage clutch.

GEAR CHANGES

As truck gains momentum, release clutch, close throttle, shift to intermediate speed, engage clutch and open throttle slightly. When momentum is gained repeat operation and engage high or top gear, after which truck speed can be controlled by accelerator pedal or hand throttle lever.

GEAR CHANGES TO LOWER SPEEDS

In changing to lower speed, necessitated by heavy loads or steep grades, disengage clutch, shift to neutral, accelerate engine slightly, slip clutch and instantly shift to lower gear, then engage clutch fully and open throttle to gain speed.

TO REVERSE TRUCK

Reduce engine speed, release clutch, apply foot brake. When truck has come to full stop, engage reverse gear, release brake and engage clutch. *Never engage reverse gear when truck is moving.*

TO STOP TRUCK

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

TO STOP ENGINE

Turn ignition switch to "OFF" position. Advance throttle lever about two inches to supply initial charge to assist for next start.

DETAIL OPERATING INSTRUCTIONS

PLACING TRUCK IN SERVICE

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

Inspection—Regardless of the condition under which the truck 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 Chapter IX 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 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 within two inches of the bottom of filler neck on

radiator. Care should be exercised in selecting water. Get soft water, if it is procurable. Use clean water. The radiator and cooling system holds about six U. S. gallons of water, and should be filled as directed.

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

Turn to the Lubrication Charts on pages 26, 27, and make certain that every point indicated on these charts has been supplied with lubricant specified for the particular point before the truck is put in operation. The lubricant specifications will be found on page 24.

SPECIAL INSTRUCTION WHEN FIRST PUTTING TRUCK IN COMMISSION

Engine Oiling—The crankcase of the engine should be examined and Specification No. 3502 medium cylinder oil put in so that the gauge on the left side of the engine indicates that it is full. The grease cup on the water pump gland should be turned down. Note if there is a water leak at that point. 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. While turning the engine over notice whether there are any compression leaks around the cylinder head pet cocks, and have them closed.

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. After the engine has been cranked freely by hand the gasoline tank lever should be turned to main supply. Fill gasoline tank with clean gasoline.

Filling Vacuum Tank—The Vacuum Tank has to be filled by hand preliminary to starting unless some one will turn the engine about 100 times. If some one cranks the engine be sure to close the throttle tight in order to give the maximum suction on the Vacuum Tank. Stop cranking and allow the gasoline to flow to the carbureter. When the Vacuum Tank has not been filled through the plug in the top, it may be ascertained whether there is gasoline in it or not by opening the try cock in the bottom of the Vacuum Tank.

Transmission Oiling—Open the plug on the side of the transmission case and note oil level. If oil does not flow, fill to proper height with half Specification No. 3504 Transmission Lubricant and half No. 3502-B. Note oil level of rear axle differential housing and fill, if necessary, with Specification No. 3504 Lubricant.

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.

Springs and Universals—After all spring bolts are oiled and grease cups have been turned down to the limit and refilled with fresh grease, every universal joint on the truck should be opened and, if necessary, packed with grease. The propeller shaft joints should be given the greatest attention.

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 truck. 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 truck 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 truck, and abuse early will surely result in poor efficiency later on, when the best will be required of the truck.

STARTING ENGINE

PRELIMINARY TO STARTING

Before attempting to start be certain you have enough fuel, oil and water for the run. See that the crankcase level is correct, and 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

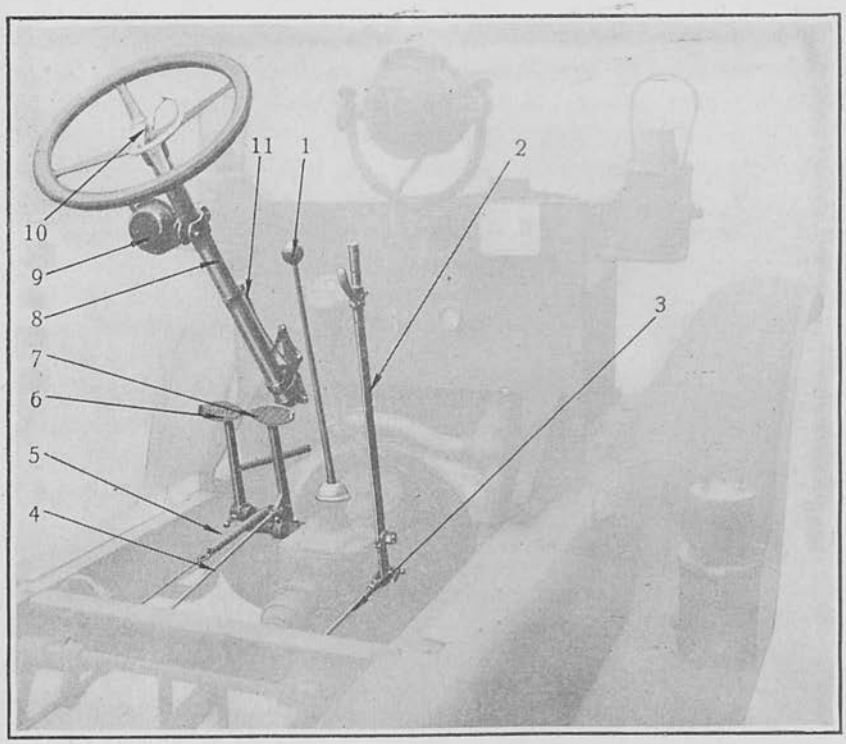


PLATE 4—CONTROLS

Ref. No.	Part No.	Name
1	A590	Gear shift lever assembly.
2	A552	Emergency brake lever.
3	A1712	Emergency brake lever to rocker shaft rod.
4	A1698	Service brake pedal to rocker shaft rod.
5	A652	Service brake release spring.
6	A665	Clutch pedal.
7	A661	Service brake pedal.
8	A1400	Steering gear assembly.
9	A2359	Horn.
10	A1454	Throttle control.
11	A2366	Carbureter air choke control.

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 truck 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-fifth open. This sets it for the next start. Get into the habit of doing these things automatically.

Turn ignition switch to "Mag" and then crank engine.

After the engine has started firing get a good idling position for the throttle lever on the steering wheel.

It is not necessary to spin the engine to get the needed spark, when starting, as an impulse starter is used. The impulse starter gives a very quick turn to the magneto armature, causing a good, hot spark to occur with only a single turn of the crank.

When Engine Does Not Start—If in cranking the engine it does not respond in a reasonable time, investigate instead of wasting energy 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, other things being equal. See page 37 for further information about failure to start.

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 the engine, shift the gears, accelerate and keep the truck 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 levers, throttle lever, accelerator pedal and ignition switch.

THE CONTROLS AND THEIR USE

STEERING WHEEL

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

PEDALS

CLUTCH PEDAL

In front of the driver are two pedals. The one on the left is the clutch pedal. The one on the right is the running 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.

BRAKES

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. The hand brake, or emergency brake lever, when forward all the way releases the emergency brakes which are also located one on each rear wheel. This hand brake, when pulled back all the way applies these brakes.

ACCELERATOR PEDAL

On the toe board the foot accelerator plunger is located which controls the throttle and speed of the truck.

GEARSHIFT LEVER

In the center of the foot board are mounted two hand levers. The one at the left is the change-gear lever. The one at the right is the brake lever. Be sure that the latter is in the most forward position before starting the truck. It is well to occasionally use your emergency brake lever in order to determine that it is in proper operating condition.

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.

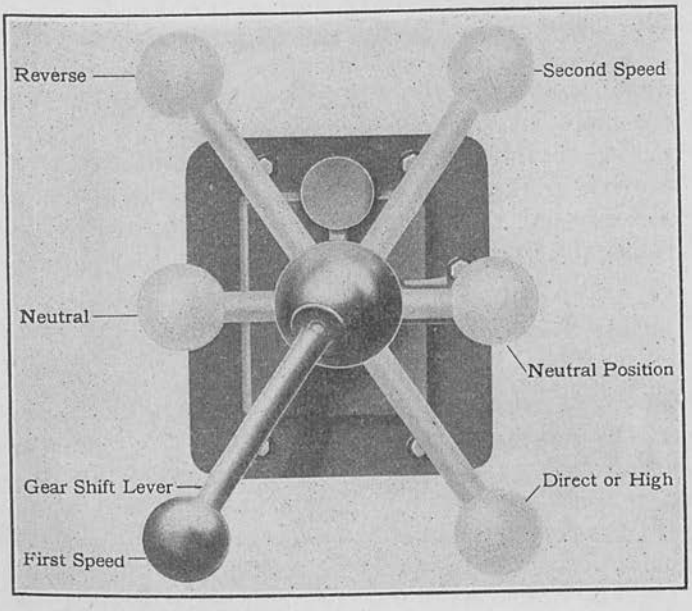


PLATE 5—GEAR SHIFT LEVER POSITIONS

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

Low or First Speed—Pull lever to left and backward towards you.

Second Speed—Push lever to neutral, then across to right side and forward away from you.

High or Third Speed—Pull lever backward but be sure to keep it well to right in shifting.

Reverse—Pull lever to left and shove forward into reverse position.

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

IGNITION SWITCH

The ignition switch has two positions—magneto ("Mag") and Off.

THROTTLE LEVER

The throttle lever is on the steering post quadrant. For starting advance about two inches. When engine starts, return to normal position. Best results will be obtained by using accelerator pedal entirely, thus giving you the use of both hands for the control of the truck.

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 truck. 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 and ignition cut off. 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 truck. 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. Then block the wheels before attempting to start the engine.

"RIDING" THE CLUTCH

In driving, 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.

STOPPING

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

SPECIFICATIONS OF LUBRICANTS

After each part mentioned in 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:

Ref. No.	Lubricant
2-A.	Engine oil, medium, E. M. Specification No. 3502.
2-B.	Engine oil, heavy, E. M. Specification No. 3502.
4.	Heavy, straight mineral gear compound, E. M. Specification No. 3504.
5.	Light cup grease, E. M. Specification No. 3505.
6.	Medium cup grease, E. M. Specification No. 3506.
8.	Heavy, straight mineral oil, E. M. Specification No. 3508.
9.	Steam cylinder oil, 600-W, E. M. Specification No. 3509.

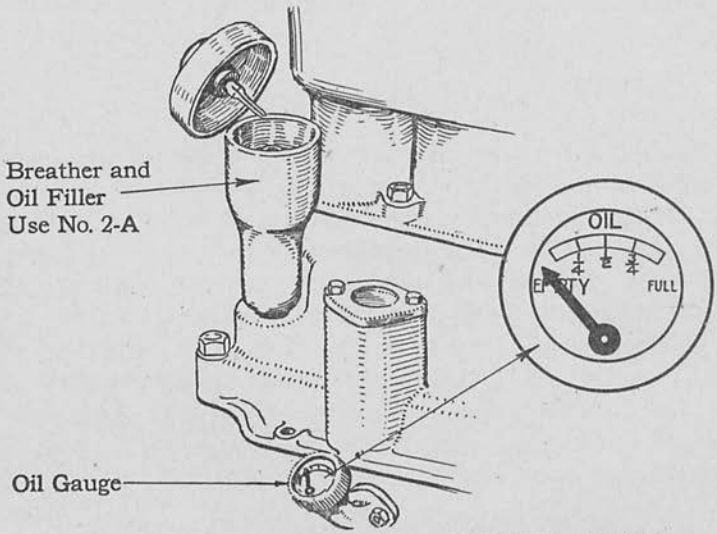


PLATE 6—CRANKCASE OIL FILLER AND GAUGE

LUBRICATING INSTRUCTIONS

PRELIMINARY ADVICE

Study the lubricating chart for parts that require attention. Perfect and continuous lubrication means less wear of parts, less trouble and a better running truck. Lubricant is of little value mixed with dirt, so before you oil or grease a part make sure there is no dirt on the surfaces, that not even the smallest speck of dirt gets to a moving part.

Use clean cloths to wipe these surfaces after they have been cleaned by means of gasoline or kerosene. Make periodic lubrication a habit. Attend to certain parts daily, as indicated on the Lubricating chart, pages 26, 27, to others weekly and others monthly. These are maximum periods. D, W and M indicate the respective periods.

ENGINE

2-B. Summer, Oil Reservoir capacity 5 quarts. Oil Level to be brought to "Full" DAILY.

2-A. Winter, DAILY.

CRANKCASE CAPACITY

Five quarts of lubricating oil are carried in the bottom of the crankcase. The amount of oil is indicated by the position of the indicator hand on an oil level gauge located on the left hand side of the engine oil pan.

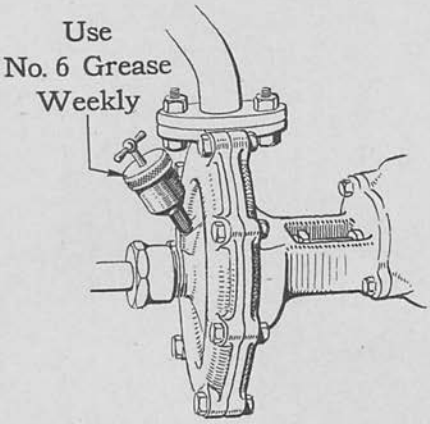


PLATE 7—WATER PUMP—SKETCH

MONTHLY CLEANING OF CRANKCASE

Every month or after about 1000 miles running, the engine crankcase should be cleaned and the oil supply entirely renewed. With the type of splash lubrication used on this engine *do not attempt to clean it with kerosene without removing the oil pan.*

For this monthly cleaning drain the oil from the oil pan through the plug in the bottom. Fill the crankcase with about a quart of kerosene and run the engine about one minute at half throttle. Then drain the kerosene from the oil pan.

Remove oil pan from engine and thoroughly clean it out, removing all traces of kerosene. Replace and fill crankcase with five quarts of fresh lubricating oil.

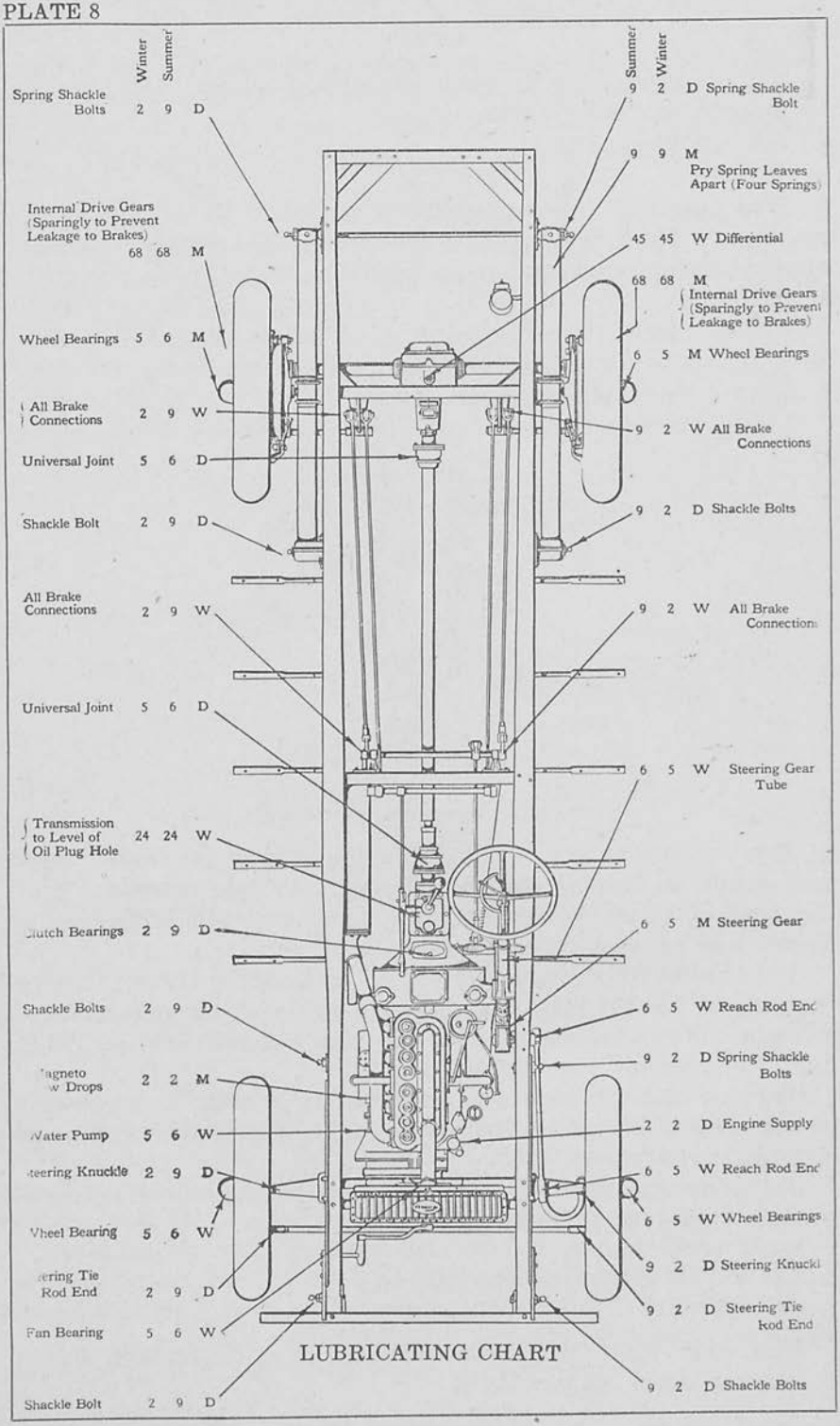
Do not use waste or linty rags for cleaning as they are liable to clog oil pump and cause the ruination of the engine.

WATER PUMP

No. 6 weekly

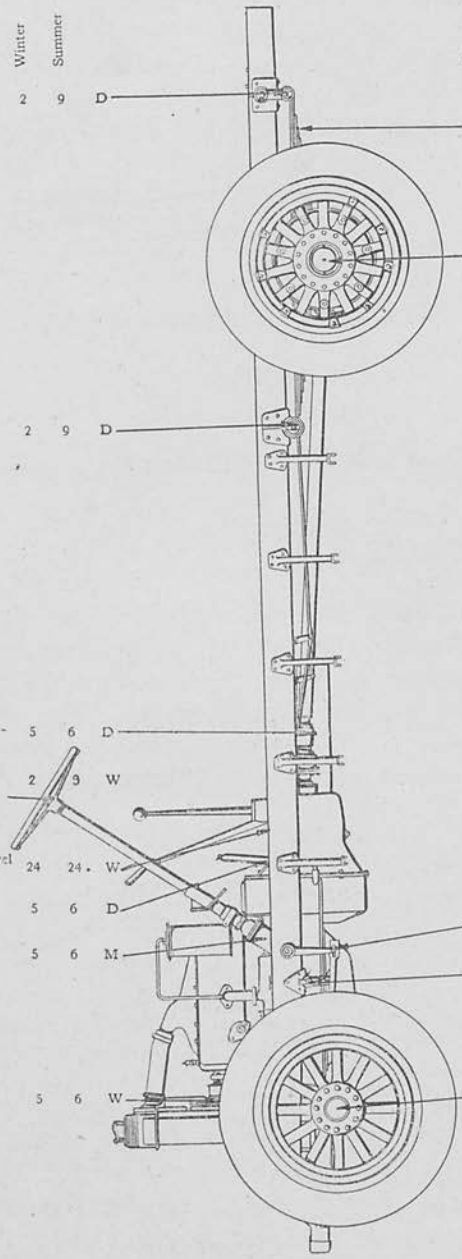
The water pump grease cup should be filled weekly and should be screwed down *one turn daily.*

PLATE 8



LUBRICATING CHART

PLATE 9



	Winter	Summer	
Spring Shackle Bolts	2	9	D
Shackle Bolt	2	9	D
Universal Joint	5	6	D
Steering Gear Tube	2	3	W
Transmission to Level of Oil Plug Hole	24	24	W
Clutch	5	6	D
Steering Gear	5	6	M
Fan Bearing	5	6	W

	Summer	Winter	
Pry Spring Leaves Apart (Four Springs)	9	9	M
Wheel Bearings	6	5	M
Reach Rod End	6	5	W
Spring Shackle Bolts	9	2	D
Wheel Bearing	6	5	M

LUBRICATING CHART

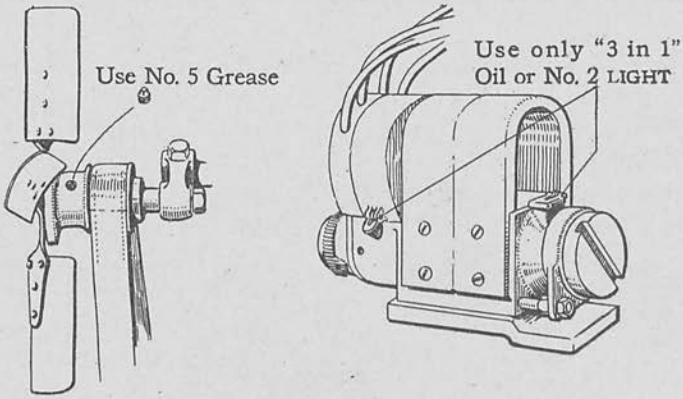


PLATE 10—FAN AND MAGNETO—SKETCH

FAN BEARING

No. 5 weekly

Remove plug in hub of fan pulley and inject No. 5 grease weekly.

MAGNETO

No. 2 light weekly

Two drops only of a light, clean oil injected into the oil wells every week or so will be sufficient. Two of these oil wells are located on the sides of the distributor housing, oiling the armature ball bearing, the distributor plain bearing, and the circuit breaker. The other oil well is located on the extension of the end plate above the impulse starter, and lubricates the ball bearing on the end of the magneto.

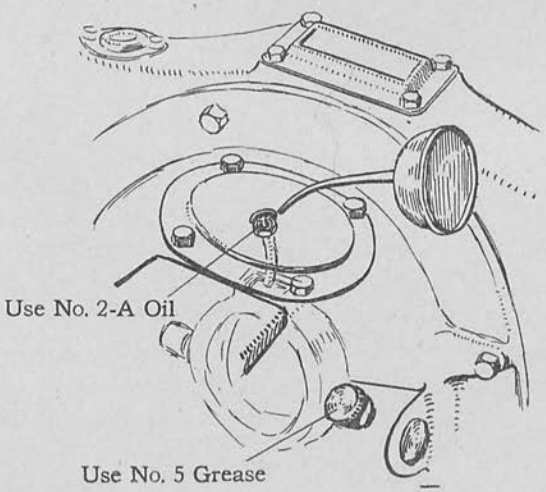


PLATE 11—CLUTCH OILING—SKETCH

CLUTCH

No. 2-A daily

The clutch itself, being of the cone type, needs no lubrication, but on the rear of the clutch housing there is a large clutch inspection plate through which lubricant may be put on the thrust yoke bearing of the clutch. A tube and self-closing oil cup are provided making it unnecessary to remove the plate to oil this bearing.

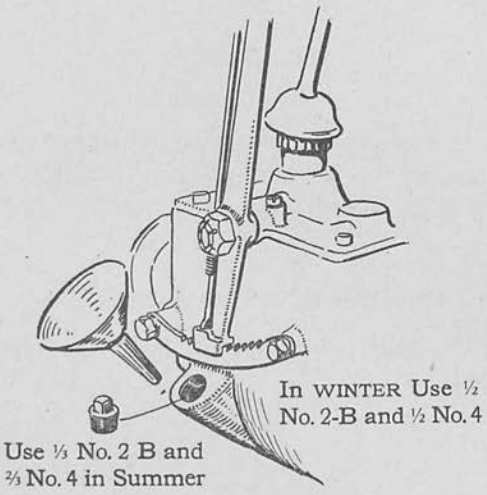


PLATE 12—TRANSMISSION OILING—SKETCH

TRANSMISSION

Summer, ⅓ of No. 2B and ⅔ of No. 4
Winter, ½ of No. 2B and ½ of No. 4
} every other week

To renew the lubricant in the transmission, remove the oil plug in the right side of the case. The level of oil should just reach to the hole and new lubricant should be added until this level is reached.

When a truck is new small steel chips are liable to be found in the transmission. Hence, after it has been run about 500 miles the transmission lubricant should be drained, the case washed out with kerosene and fresh lubricant supplied. Thereafter this should be done monthly.

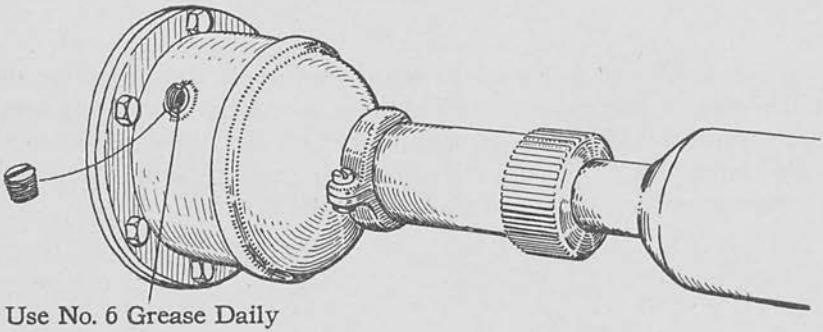


PLATE 13—UNIVERSAL JOINT OILING—SKETCH

FRONT AXLE

No. 2-A daily

There are six oil cups on the front axle to be filled daily with medium cylinder oil. One on top of each steering knuckle bolt, one on the bottom of each steering spindle and one on each end of the tie rod.

FRONT WHEEL SPINDLE BEARINGS

To lubricate the front wheel spindle bearings. Remove hub caps and fill with grease.

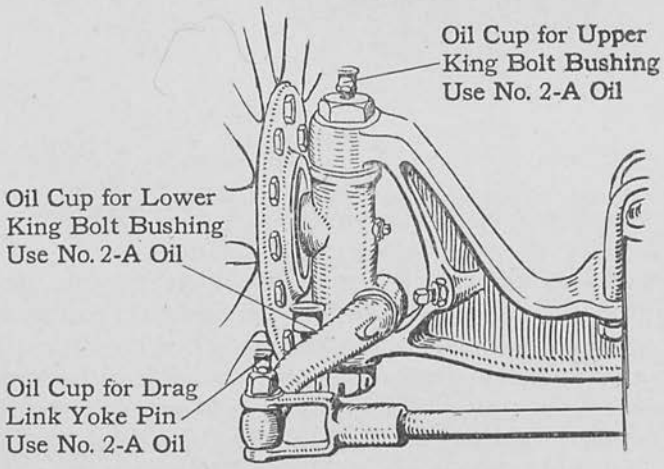


PLATE 14—FRONT AXLE OILING—SKETCH

PROPELLER SHAFT UNIVERSAL JOINTS

No. 6 daily

Since both the propeller shaft universal joints are of the same construction, they are lubricated in the same manner. To lubricate them, remove the plugs at the top of each. Remove the old grease monthly with a grease gun, clean with kerosene and repack with fresh No. 6 cup grease.

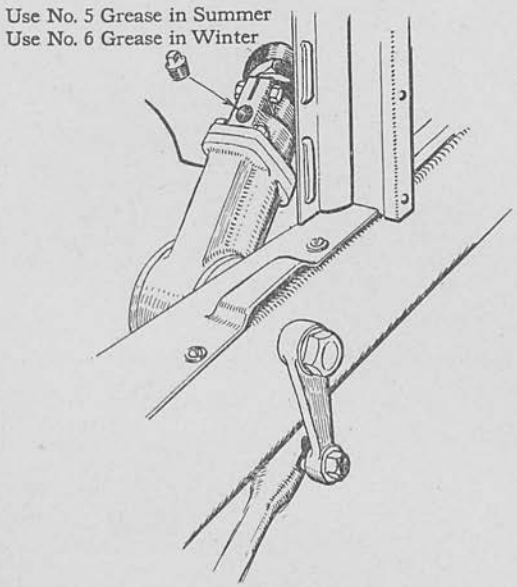


PLATE 15—STEERING GEAR AND DRAG LINK OILING—SKETCH

STEERING GEAR

No. 6 in summer
No. 5 in winter } weekly

To lubricate, remove a plug which is near the lower end of the steering column housing, and inject lubricant freely. Also inject No. 2 light oil into ball spring oiler at top of steering column.

DRAG LINK

No. 6 weekly

The drag link connects the steering gear arm and the steering arm on the front axle. The connections are in the form of ball and socket joints which should be packed with grease weekly.

REAR AXLE, INTERNAL DRIVE GEARS

50% of No. 6
50% of No. 8 } daily

To lubricate the internal gear pinion and gears of both wheels through grease cups provided between the brake carriers and the rear springs.

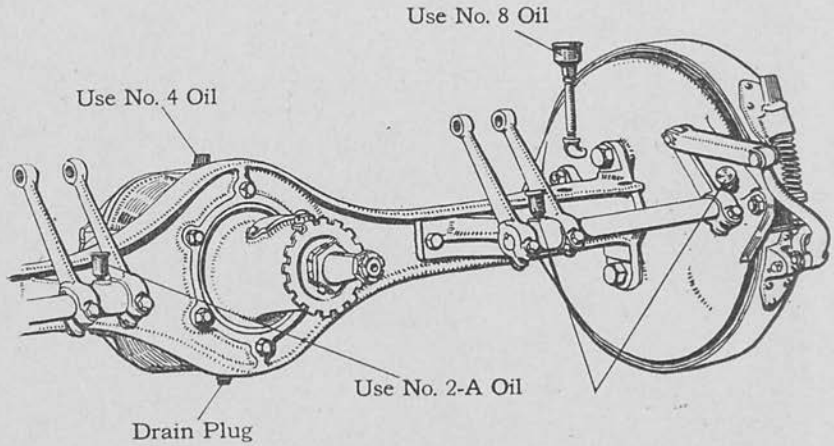


PLATE 16—REAR AXLE OILING—SKETCH

JACK SHAFT BEARINGS

No. 6 in summer
No. 5 in winter } daily

Fill and turn down each grease cup half way daily. These cups are at the flange connection between the brake carrier plate and jack-shaft housing tube.

REAR AXLE BRAKE SHAFTS

No. 6 in summer
No. 5 in winter } weekly

Fill grease cups located on rear axle brake shafts where they enter the brake carrier plate.

No. 2-A weekly

Oil cups are provided to oil brake shafts between brake levers on rear axle. Fill with cylinder oil weekly.

REAR WHEEL SPINDLE BEARINGS

No. 6 in summer
No. 5 in winter } weekly

To lubricate the rear wheel spindle bearings fill the hubs after the hub caps have been removed. Replace hub caps securely after inserting fresh lubricant.

REAR AXLE DIFFERENTIAL

3/5 of No. 4 and 2/5 of No. 5 in summer
1/4 of No. 4 and 3/4 of No. 5 in winter } every two weeks

Remove the plug on top of the differential housing of the rear axle to inspect, and insert new lubricant. In order to clean, which should be done monthly, remove the rear plate on the differential housing. Drain all old lubricant through plug in bottom of differential housing and thoroughly clean with kerosene through opening on rear of housing. Fill to level with new lubricant after replacing rear differential housing cover.

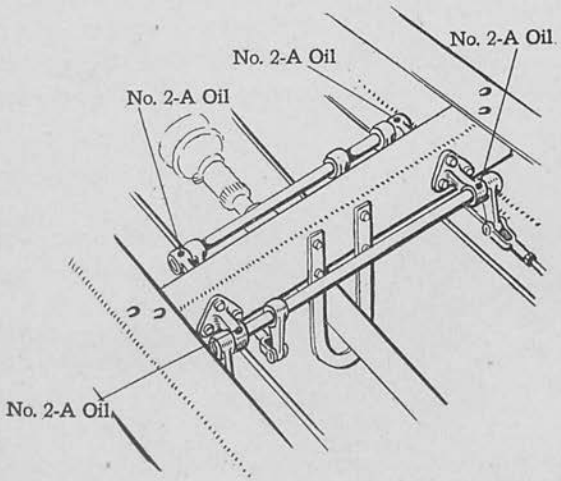


PLATE 17—BRAKE CROSS SHAFT OILING—SKETCH

BRAKE CROSS SHAFT BRACKETS

No. 2-A daily

The brake cross shaft brackets are located on either side of he third cross member, counting from the front, and should be lubricated with cylinder oil, No. 2-A, through oil holes provided. Clean the holes out before applying the oil.

CONTROL SET

No. 6 in summer
No. 5 in winter } weekly

The grease cups should be filled on the pedal shaft bearings.

No. 2-A weekly

Also all foot and hand brake rod clevises, steering gear and foot pedal connections, throttle control rods and connections and all other working joints not provided with oil or grease cups should be lubricated with an oil can using cylinder oil No. 2 light or 2-A medium.

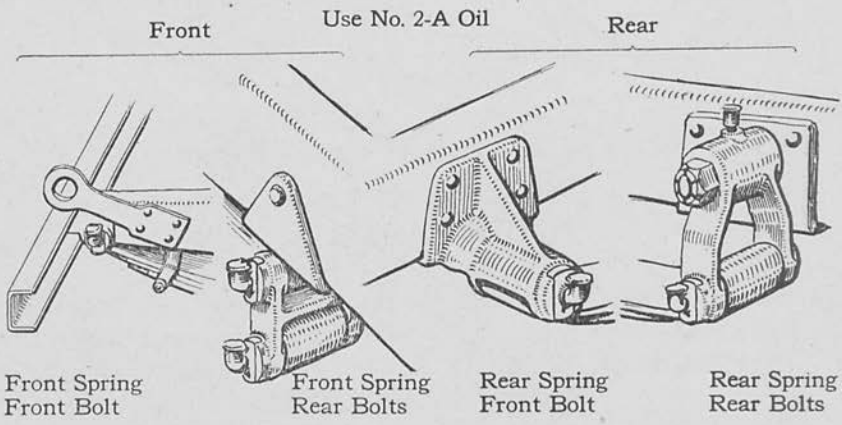


PLATE 18—SPRING OILING—SKETCH

SPRINGS

Once every six months jack up the frame, remove the spring clips and pry the spring leaves apart. Lubricate between the leaves with graphite. Should the leaves be excessively rusted, it is well to dismantle the spring, remove the rust, and paint the leaves with graphite paint or white lead.

MAINTENANCE ROUTINE

It is essential for the proper care and maintenance of the 1-Ton Chassis (Commerce) Model 1918, that the following maintenance routine schedule be rigidly adhered to. Preparedness for emergencies can only be obtained by keeping the truck 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 crankcase.
Inspect radiator water supply.
Inspect gasoline tanks for proper fuel supply.
Inspect oil pipe line and all connections for leaks.
Inspect fuel pipe line and all connections for leaks.

Clutch

Test for proper action.

Brakes

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

General

Inspect and thoroughly clean all lamps.
Fill and clean acetylene generator.
Inspect tires for air pressure, cuts or damage.

Lubrication

See charts on pages 26, 27 for parts needing daily attention. (D)

WEEKLY MAINTENANCE ROUTINE

Engine

Inspect all wires for proper support and freedom from damage.
Thoroughly clean engine externally.
Test for carbon and clean if necessary.
Inspect for oil leaks.
Inspect all water connections for leaks.
Drain water and dirt from water trap in gasoline line.
Clean strainer screen in fuel line connection to carbureter.
Inspect carbureter control connections.
Inspect oil lines and drain plugs for loss of oil.
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.

Brakes

Inspect and thoroughly clean and oil all brake connections.

Springs

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

Wheels

Inspect tires and wheels for undue damage and report if replacement is necessary.

Universal Joints

Inspect universal joints for undue looseness and wear.

Clean and refill universal joints with grease.

Rear Axle Drive Pinion Bearing

Inspect drive pinion bearings for excessive looseness. If considerable vertical movement is possible the proper adjustment of pinion bearings should be made.

Body and Equipment

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

Inspect tool equipment for completeness.

Lubrication

See charts on pages 26, 27 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.

Clean oil strainer.

Grind valves if necessary. See page 57 for instructions on doing this work.

Ignition

Clean magneto collector ring, polish and adjust breaker points.

Inspect magneto cam for correct advance.

Clutch

Thoroughly clean clutch and inspect all clutch pedal connections.

Inspect condition of clutch throw-out thrust bearing.

Inspect impulse starter for broken parts.

Transmission

Clean externally and inspect for leaks, particularly in bearing covers, at the front and rear ends in order to ascertain if undue leakage is occurring around shafts.

Springs

Thoroughly clean and inspect spring shackle connections.
Inspect springs to ascertain damaged or broken leaves.

Differential

Clean and inspect differential housing for oil leaks.
Inspect all bolts for apparent tightness.

Wheels

Remove hub cap and inspect for proper lubrication and bearing adjustment.

General

Inspect steering gear for lost motion and lubrication.
Inspect speedometer drive.

Lubrication

See charts on pages 26, 27 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 tanks are full and shut-off cocks are open. If fuel line is free, gasoline will run out of drain cock on the bottom of the vacuum tank.

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. Opening of the pet cocks will also show which cylinders are firing as the flame will show.

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 truck 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 the stoppage of the gasoline pipe, the engine will spit back through the carbureter when the throttle is opened.

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 petcock on carbureter.
Air leak in the intake passage or vacuum tank 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 and low pressure on Oil Gauge.

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.

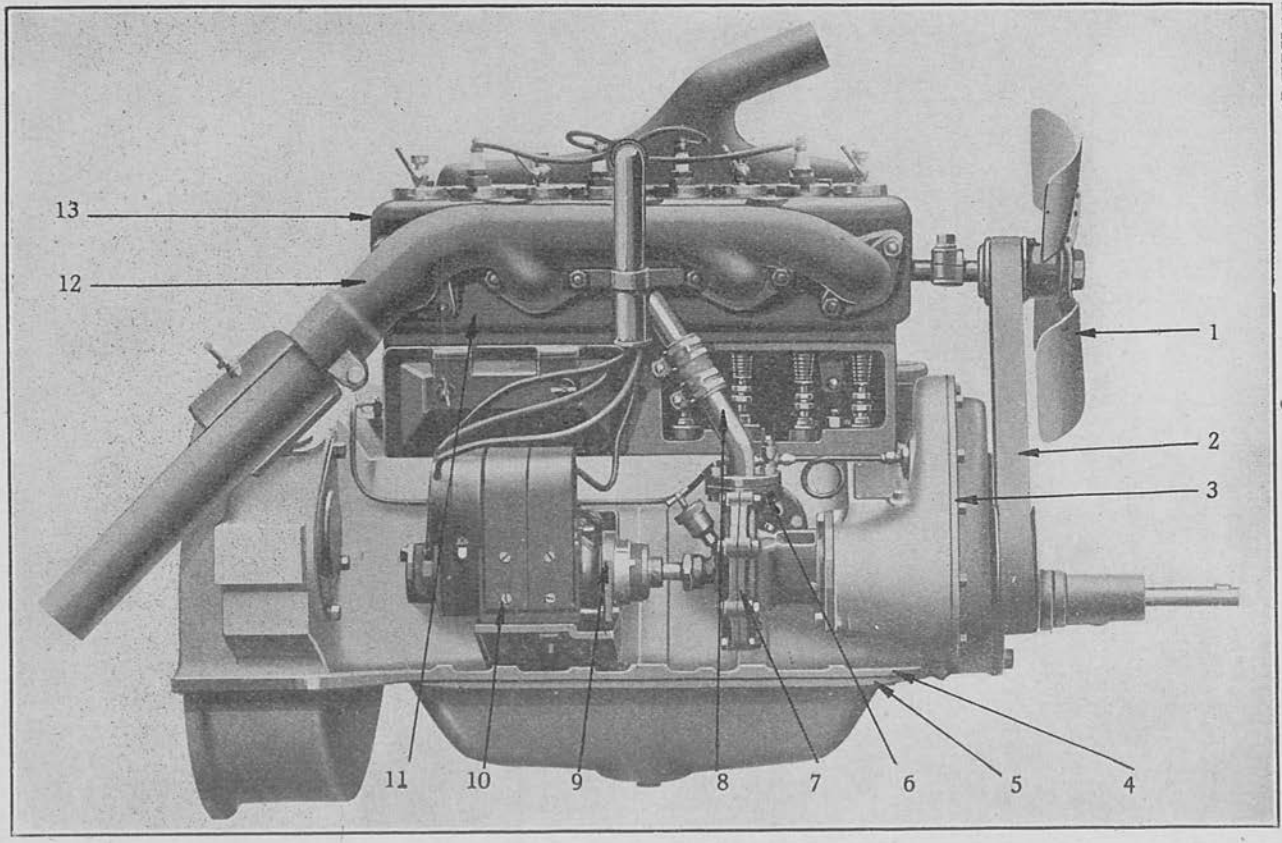
Crankshaft Bearing Loose—Heavy pound at slow engine speed under heavy load. The adjustment of this bearing should by all means be made as soon as possible.

Overheating Due to Lack of Water.

CLUTCH

Clutch Slipping—Improperly adjusted, weak spring, oily or facing worn.

Clutch Grabs—Facing worn, spring too tight, clutch facing rivets touching flywheel or end play in crank shaft.



RIGHT HAND SIDE OF ENGINE

PLATE 19

RIGHT HAND SIDE OF ENGINE

Ref. No.	Part No.	Name
1	A1880	Fan.
2	A1898	Fan belt.
3	A486	Timing gear cover plate.
4	A160	Crankcase, upper
5	A400	Oil pan.
6	A265	Oil pump.
7	A310	Water pump.
8	A479	Cylinder cover.
9	A985	Impulse starter.
10	A850	Magneto.
11	A225	Cylinders.
12	A741	Exhaust manifold.
13	A257	Cylinder side plate.

CHAPTER II

ENGINE AND ENGINE ATTACHMENTS

CHAPTER CONTENTS

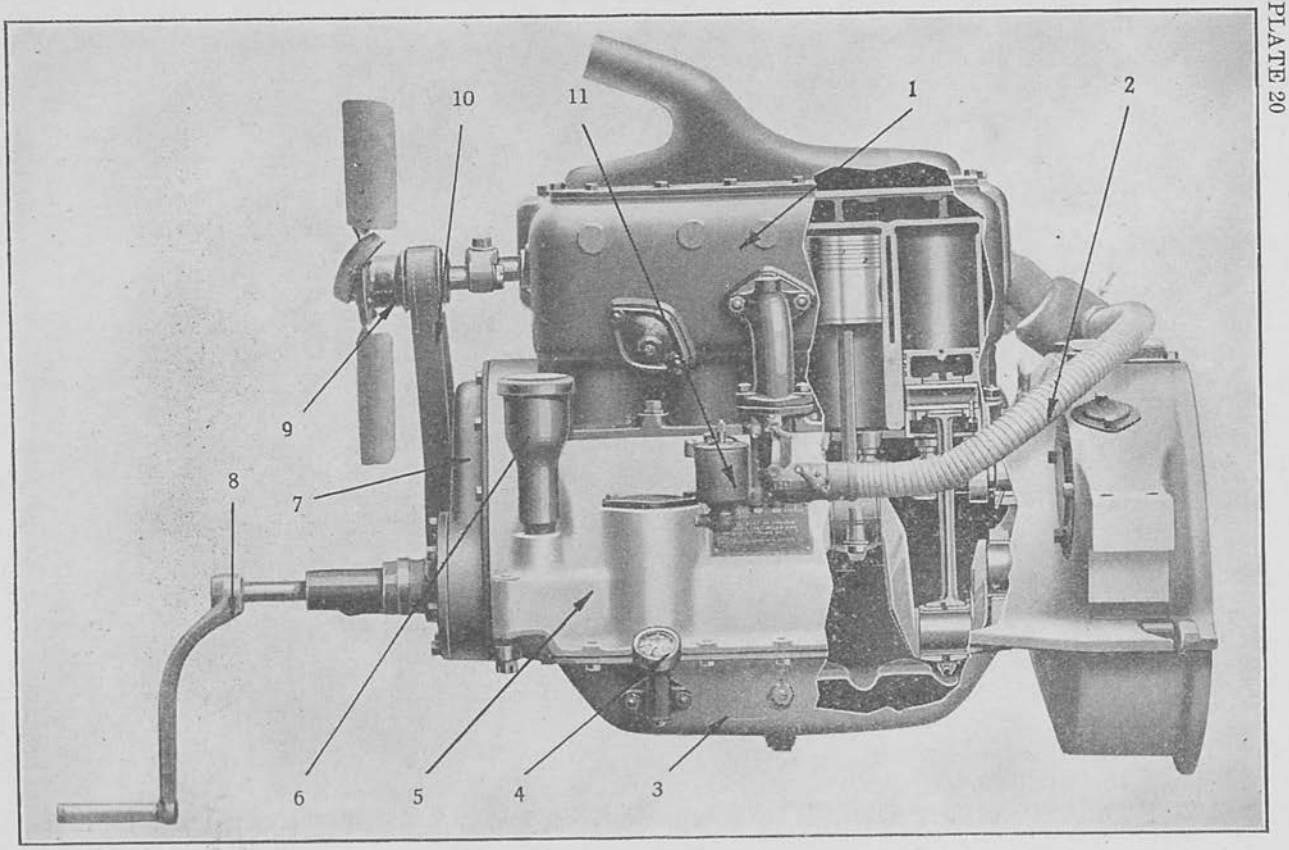
ENGINE
FUEL SUPPLY SYSTEM
IGNITION SYSTEM
COOLING SYSTEM
STARTING DEVICES

BRIEF DESCRIPTION

The engine is a standard design of Continental 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 3.75 (3¾) inches in diameter, bore, by 5 inches stroke, water cooled with centrifugal pump circulation, and lubricated by a constant level splash system. Ignition is by magneto with variable spark and carburetion by a vertical compensating type plain tube Zenith carbureter fed by gravity from a Vacuum Tank. The valves and valve operating mechanism are on the right together with the water pump and magneto. The latter is driven from an extension of the pump shaft.

ENGINE OPERATION

The engine operates on the four-stroke cycle which is the same as that of all truck and passenger car engines made in the United States.



LEFT HAND SIDE OF ENGINE

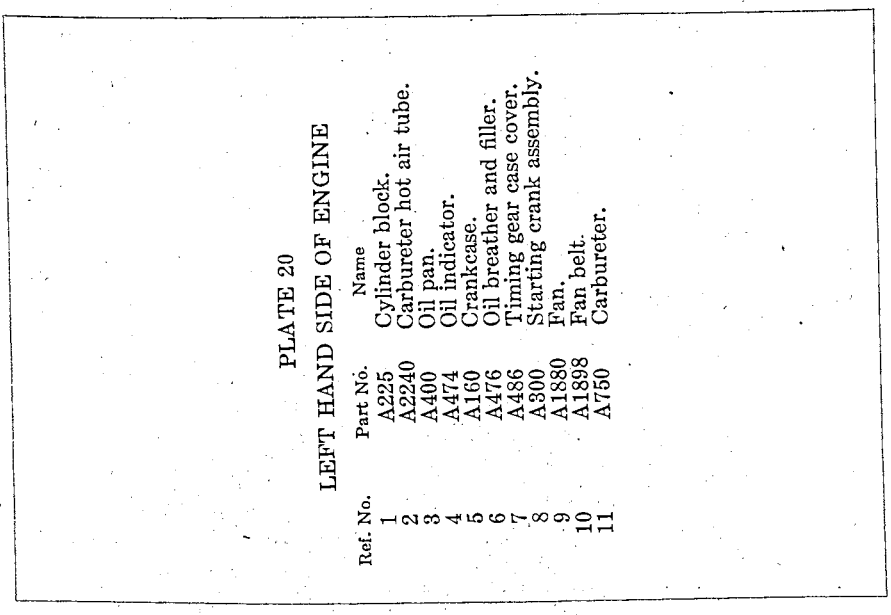


PLATE 20

LEFT HAND SIDE OF ENGINE

Ref. No.	Part No.	Name
1	A225	Cylinder block.
2	A2240	Carbureter hot air tube.
3	A400	Oil pan.
4	A474	Oil indicator.
5	A160	Crankcase.
6	A476	Oil breather and filler.
7	A486	Timing gear case cover.
8	A300	Starting crank assembly.
9	A1880	Fan.
10	A1898	Fan belt.
11	A750	Carbureter.

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 into the cylinder through the carbureter and the intake pipe a charge of gas. 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 the top of its stroke, the spark occurs and explodes the mixture which, due to its increase in pressure, drives the piston down with considerable force, thus storing up energy in the flywheel for the succeeding strokes.

When the 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.

DESIGN AND CONSTRUCTION OF CYLINDERS

The cylinders are of gray iron, cast in block, and bolted to an aluminum crankcase. The cylinder casting has the inlet passages cored out so that the carbureter attached to a short external elbow, or manifold, on the left, feeds across the block through the cored passages. The block has an integral head, but uses valve port plugs, which close openings through which the valves may be withdrawn when the plugs are

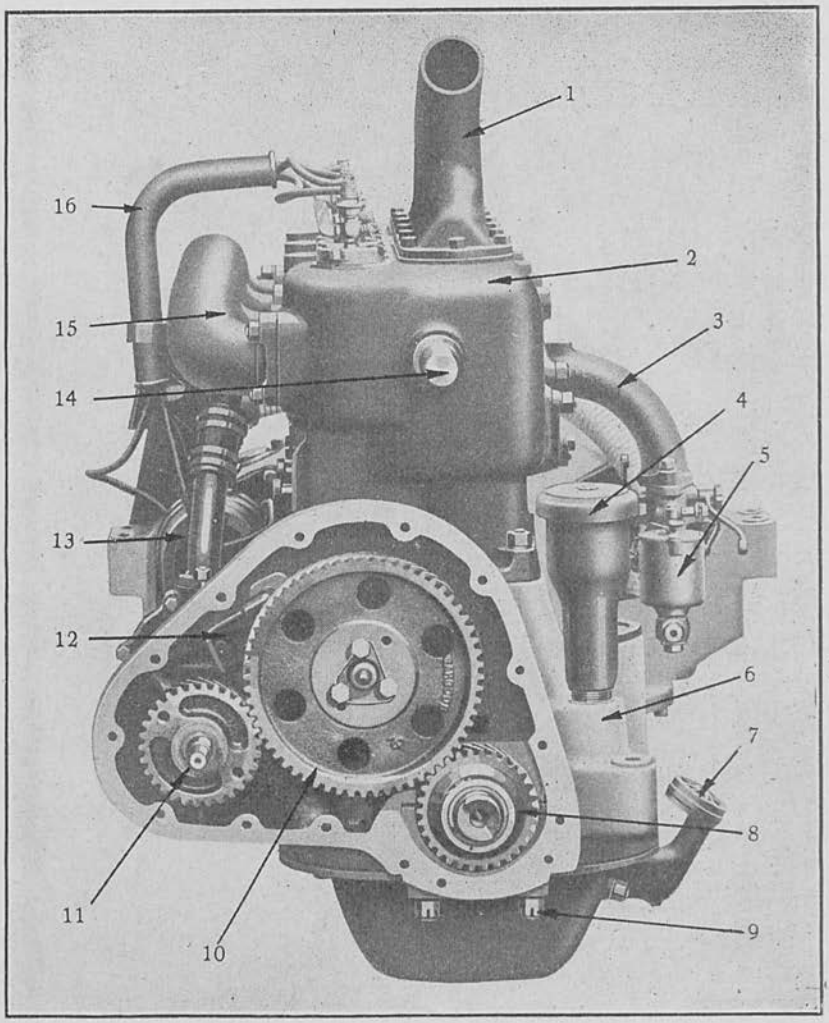


PLATE 21—FRONT VIEW OF ENGINE SHOWING TIMING GEARS

Ref. No.	Part No.	Name
1	A479	Cylinder cover.
2	A225	Cylinder block.
3	A366	Intake manifold.
4	A476	Oil breather and filler.
5	A750	Carbureter.
6	A160	Upper crank case.
7	A474	Oil intlicator.
8	A386	Crank shaft gear.
9	A400	Oil pan.
10	A385	Camshaft gear.
11	A387	Magneto and water pump gear.
12	A208	Gear oil tube.
13	A850	Magneto.
14	A235	Fan lever stud.
15	A471	Exhaust manifold.
16	A2350	Ignition cable tube assembly.

removed. The water jacket top cover with a portion of the water outlet pipe is a unit, bolted to the top of the casting.

PRIMING CUPS

There are four priming cups screwed into the valve plugs. These cups may be used for priming in winter or for testing the firing and compression.

IF JACKET IS 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 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, broken piston rings, connecting rod bearing tight (frozen), water or dirt in lubricating oil or burr on piston.

PISTONS

The pistons are of cast iron of the usual design with flat top and using three plain rings. The ring grooves are 0.1875 (3/16) inches wide; the piston diameter at the top is 3.734 (3 47/64) and 3.748 (3¾) inches at the bottom with a top clearance of 0.016 (1/64) inch and at the bottom 0.002 inch. The piston is 3.75 (3¾) inches long. The difference in clearance between the top and bottom of the piston is due to the difference in expansion at the top and bottom, the top getting much hotter, hence expanding more. Below the bottom ring are ten holes 0.187 (3/16) inch diameter equally spaced around the circumference. These holes are for draining back to the crankcase excess oil scraped off the cylinder wall by the bottom piston ring.

The piston bosses are reamed 1.0927 (1 3/32) inches diameter. Below the piston pin are three oil grooves 0.015 (1/64) inch deep.

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. This latter causes knocking. Both are brought about by lack of or insufficient lubrication. Piston and rod may be removed through the crankcase.

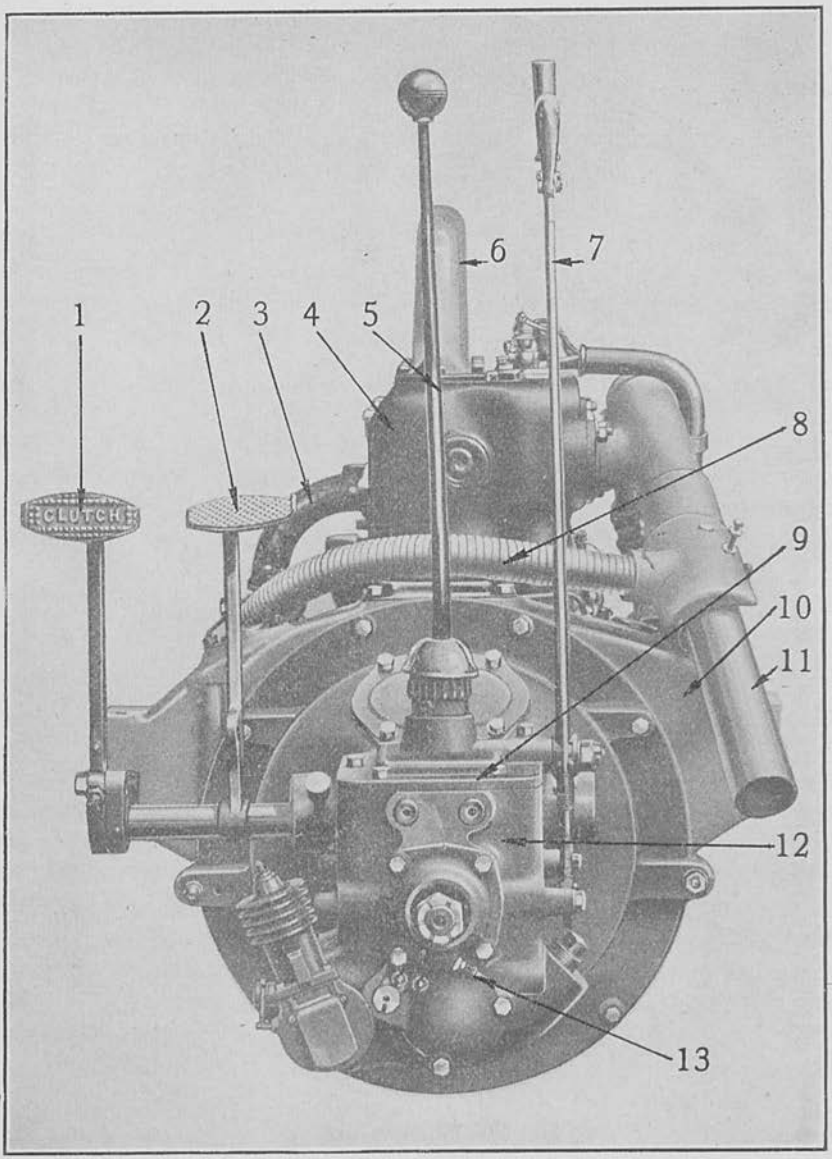


PLATE 22—REAR VIEW OF ENGINE AND TRANSMISSION

Ref. No.	Part No.	Name	Ref. No.	Part No.	Name
1	A665	Clutch pedal.	8	A2240	Hot air tube.
2	A651	Service brake pedal.	9	A656	Transmission cover.
3	A472	Intake manifold.	10	A160	Crankcase.
4	A225	Cylinder block.	11	A2090	Exhaust pipe.
5	A591	Control lever.	12	A655	Transmission case.
6	A479	Cylinder cover.	13	A1960	Speedometer drive clutch.
7	A555	Hand brake lever.			

PISTON PIN

The piston pin is the means of fastening the upper end of the connecting rod to the piston. The piston pin is held in place by a shoulder pin screwed into the piston boss, which supports the piston pin. The shoulder screw is 0.375 (3/8) inch in diameter. The piston pins are case hardened steel 3.437 (3 7/16) inches long and 1.093 (1 3/32) inches outside diameter. They are drilled hollow and their inside diameter is 0.75 (3/4) inch. A hole 0.281 (9/32) inch in diameter is drilled at one end of the piston pin to receive the end of the above shoulder screw.

TO LOCATE WEAR OF THE PISTON PIN BEARING

If the piston is in place in the engine and the lower half of the crankcase is down, remove a valve cap, turn engine over so that piston is on top dead center in such a position that a screw driver may be inserted in the valve cap pocket, then pry down on top of the piston, while with a bar push upward on the piston from under the side of case, then by alternately moving piston up and down, any play may be detected.

In case the piston and rod have been removed from the engine, place the connecting rod in a vise and hold the piston in the same position in which it has always worked on the pin, then by trying to rock the piston up and down, wear may be detected.

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 lines of the crankshaft. Or a pair of calipers may be used to determine uniformity of distance between the top of the crankcase and the under side of a piston ring on all sides of the piston. Or with a straight edge laid across the top of the piston lengthwise of the engine, the distance to the crankcase under scale may be measured at its ends.

PISTON RINGS

The piston rings are of cast iron, and being flexible, press against the cylinder wall and form a gas tight joint preventing the leakage of gas down and oil upward. There are three diagonally split eccentric machined rings per piston. When compressed in the cylinder, the rings have 0.012 inch clearance between the ends. Wear, resulting from service or abuse, increases this clearance. The ring dimensions are as follows: Width 0.186 (3/16) inch; thickness 0.145 (9/64) inch; eccentricity 0.02. There are six grooves 0.046 (3/64) inch deep milled vertically on the sides of the top ring and equally spaced. These prevent ring slap. The two lower rings on each piston are of the same dimensions as the upper ring, except for the grooves milled in the side.

LAPPING RINGS

In order to get a good piston ring fit it may be necessary to lap the ring on a level plate lightly sprinkled with emery dust, moistened with oil. The ring is carried over this abrasive by means of a block of wood. After lapping for a few seconds, clean the ring in gasoline and try for fit. Lap again, if necessary. In order to get a perfect fit of piston ring in the cylinder the pistons with rings ought to be lapped in, using a fine abrasive like ground glass or crocus powder.

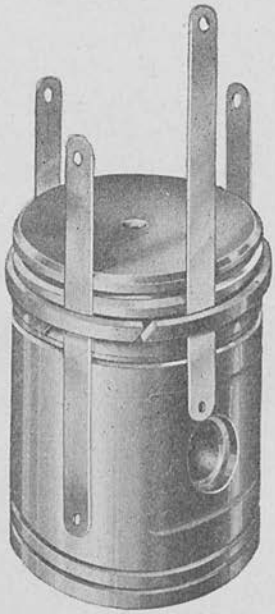


PLATE 23—REPLACING PISTON RINGS ON PISTON

PISTON RING TROUBLES

In fitting the piston rings into the cylinder, caution should be exercised not to push up the piston too high into the cylinder, for if this is done, the top ring will expand out into the combustion chamber, and the piston cannot be pulled down again.

If this happens, the valve caps should be removed and the piston ring compressed as much as possible with the aid of screw drivers or similar tools until the piston can be pulled down past. In case it is found impossible to compress the ring sufficiently to permit the removal of the piston down to its proper place again, the piston ring may be broken and the pieces removed.

If the rings are not stiff enough, or have insufficient wall pressure, the oil will work up past them into the combustion chamber. The bottom edge of the piston ring must in all cases be very sharp and square to scrape the oil off the cylinder wall as the piston comes down.

REMOVING PISTON RINGS

In removing piston rings they may be slid off on pieces of saw blade or similar skids, or a ring spreader may be used to spread the ring after which it may be lifted over the piston top.

FITTING PISTON RINGS

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

1st. *The fit of the piston ring in the cylinder to get proper ring "break."*

2d. *To get the proper ring, i. e. either the special top one or the others.*

3d. *The fit of the piston ring in the slot on the outside of the piston.*

4th. *The fit of the piston ring when placed on the piston.*

The average mechanic 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. With a fine file remove any wire edge or burrs from the top or bottom outside edge of piston ring. There are two methods of placing the piston ring square in the cylinder in order to get the proper ring "break."

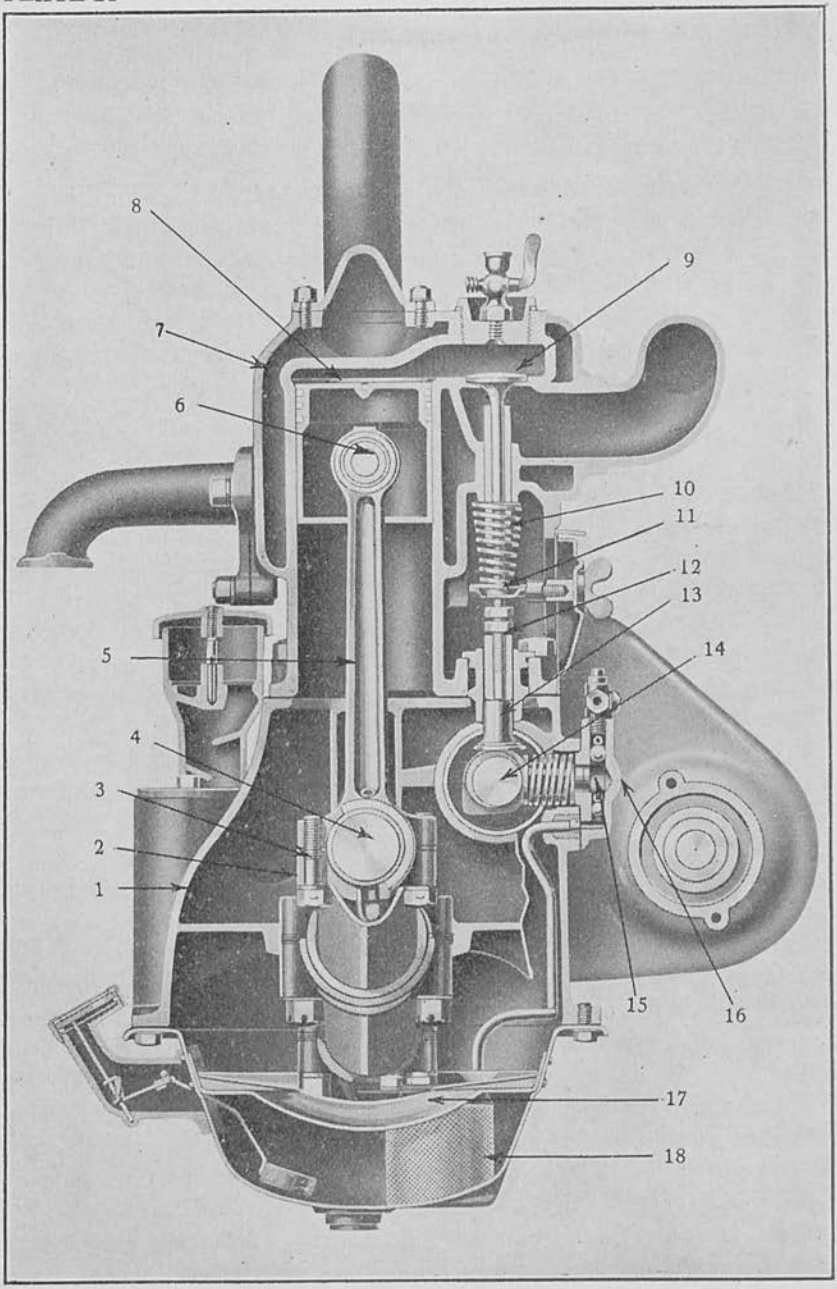
1st. If the cylinders are removed one of the pistons can be left in the cylinder and the piston ring placed squarely against the head of the piston and then the piston dropped away to afford an examination of the "break."

2d. In case it is not desired to remove the cylinders, the pistons can be removed through the crankcase and the piston ring inserted 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 the piston ring's 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 ring should have a "break" of 0.012 (twelve thousandths) of an inch, as this ring is close to the hottest part of the piston, and the second and third piston rings should have 0.008 to 0.010 (eight thousandths to ten thousandths) of an inch "break."

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.

PLATE 24



SECTIONAL END VIEW OF ENGINE

PLATE 24

SECTIONAL VIEW OF ENGINE

Ref. No.	Part No.	Name
1	A160	Crankcase, upper.
2	A140	Connecting rod cap.
3	A141	Connecting rod bolt.
4	A360	Crankshaft.
5	A140	Connecting rod.
6	A287	Piston pin.
7	A225	Cylinder block.
8	A288	Piston.
9	A253	Valve.
10	A249	Valve spring.
11	A257	Valve spring cover plate.
12	A395	Push rod adjusting screw.
13	A394	Push rods.
14	A348	Camshaft.
15	A265	Oil pump assembly.
16	A270	Oil pump body.
17	A400	Oil pan splash basin.
18	A400	Oil pan.

USE CARE IN HANDLING PISTON RINGS

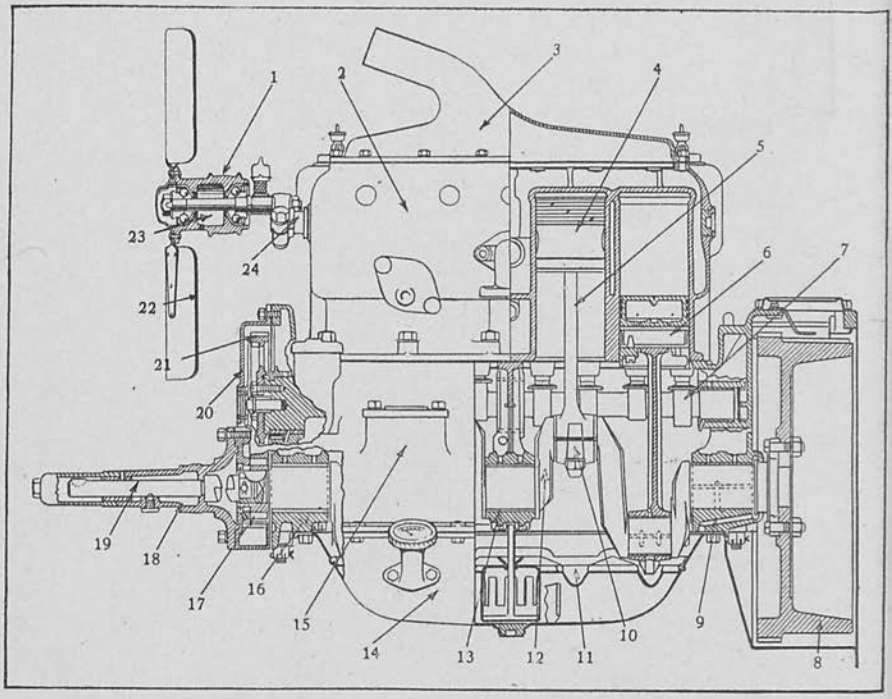
Piston rings should be handled carefully and when opened to put on the piston should not be sprung sideways. The piston ring can be easily sprung so that it will produce a rocking motion when laid on a flat board or bench. It is impossible to fit a rocking or warped piston ring. Piston rings should not 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 used, 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 a clearance of 0.001 (one thousandth) of an inch. If the piston ring does not have free movement in the slot some of the material will

PLATE 25



SECTIONAL VIEW OF ENGINE

Ref. No.	Part No.	Name
1	A1884	Fan hub.
2	A225	Cylinder block.
3	A479	Cylinder cover.
4	A288	Piston.
5	A140	Connecting rod.
6	A287	Piston pin.
7	A348	Camshaft.
8	A470	Flywheel.
9	A168	Main bearing cap—rear.
10	A140	Connecting rod cap.
11	A400	Oil pan splash basin.
12	A360	Crankshaft.
13	A167	Main bearing cap—center.
14	A400	Oil pan.
15	A160	Crankcase.
16	A166	Main bearing cap—front.
17	A386	Crankshaft gear.
18	A306	Starting crank housing.
19	A301	Starting crank
20	A486	Timing gear case cover.
21	A385	Camshaft gear.
22	A1882	Fan blades.
23	A1887	Fan ball bearings.
24	A235	Fan bracket stud.

have to be removed from the top or bottom edge of the ring. Obtain a flat board over which spread a quantity of fine carborundum powder and cup grease mixed into a paste, or use a reliable valve grinding compound; lay the ring flat in this mixture and rotate until the 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.

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, 0.031 (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.

INSERTING PISTON

Inserting the piston after cleaning or repairing is accomplished in the reverse directions given above. The bottom edge of the cylinder is beveled to aid in compressing the piston rings and make the insertion of the pistons an easier matter. After piston has been inserted in the cylinder and the lower half of the connecting rod replaced on the connecting rod be sure that all cotter keys are placed on the connecting rod bolts.

CONNECTING ROD

The connecting rod is an I-beam forging attached at its lower end to the crank pin of the crankshaft and at its upper end to the piston pin. The upper end of the connecting rod is bored out 1.343 (1 11/32) inches and a bushing of phosphor bronze, 1.086 (1 3/32) inches inside diameter and 1.5 (1½) inches long is pressed into it. The lower end of the connecting rod is bored out 2.125 (2⅛) inches to receive a bushing. This bushing is of phosphor bronze, lined with babbitt. Its bore is 1.870 (1⅞) inches. The connecting rod is 10.25 (10¼) inches long center to center.

The lower end of the connecting rod is split horizontally, the bottom piece, which holds the lower half of the connecting rod bushing, being called a cap; the other half is in the upper portion of the rod. The cap is bolted to the rod proper by means of two alloy-steel bolts and castellated nuts.

TO REMOVE CONNECTING ROD

To remove connecting rod and piston, drain off oil, and remove oil pan, turn engine over by hand until lower end of connecting rod to be

removed is half way down on side of motor opposite camshaft; remove connecting rod bearing nuts, take off cap and lower rod and piston down and out of crankcase.

TO REPLACE CONNECTING ROD BUSHING

To replace a connecting rod bushing, remove oil pan, disconnect connecting rod cap and pull out piston and rod; take out bushings by removing countersunk screws which hold them in place in connecting rod and cap; replace with new bushings and fit to shaft, leaving enough end play, but no looseness up and down.

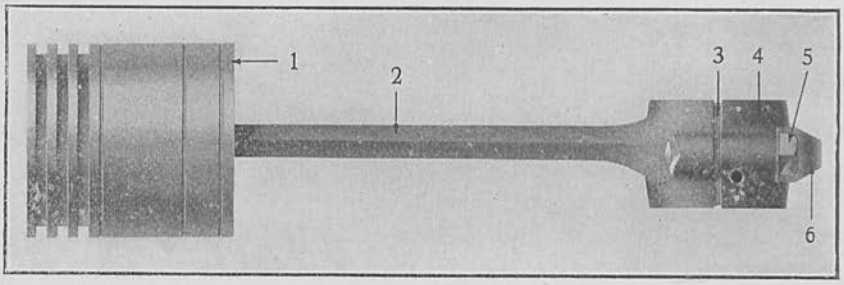


PLATE 26—PISTON AND CONNECTING ROD

Ref. No.	Part No.	Name
1	A288	Piston.
2	A144	Connecting rod.
3	A146	Shims.
4	A144	Connecting rod cap.
5	A141	Connecting rod bolt.
6	A145	Oil dipper.

In replacing connecting rod bushings (if the crankshaft is out of the crankcase) it is best to place the crankshaft in a vise and adjust the bearings to the shaft while in this position, as the work can be done more readily.

The ends and round corners of the connecting bushings may be sized before they are placed in the rod or cap. In case an end flange should be broken off the bushing liner, it may be soldered on with half and half solder, care being taken to prevent melting the bearing with the soldering iron.

The sides of the bushing (liner or bronze back) next to shaft should be filed or scraped down to prevent contact with crankshaft and prevent side pressure, also to aid lubrication.

After the connecting rod bushing has been so fitted, the piston should be lined up with the top of crankcase. When the bushing has been scraped in and bears well all over, it should be adjusted just so tight that the piston and rod (when same are at an angle of 45 degrees to the vertical) will just maintain their position and slight pressure down will cause them to fall (rotate).

CONNECTING ROD BEARING SHIMS

The tightness of the bearings is controlled by the thickness of the shims against which the caps are drawn up snug after a bushing has been properly scraped in and every nut must be tightened up, drawing the cap against the shims solidly, but never strained. If a castellated nut is tight when in such a position that cotter pin hole does not line up, the nut should be removed and a light cut taken off face of nut (with a file), permitting its being turned to a proper position, so that the cotter pin can be inserted when tight.

TO ADJUST CONNECTING ROD BEARINGS

The work of properly fitting a lower connecting rod bushing simply by dropping the lower half of the crankcase should be done carefully and only when the crankshaft cannot be removed. In this case, the piston and rod must be taken out and the piston removed from the rod. Then work with the rod alone. If the bushing is loose or worn, a shim must be removed from each side to tighten the bearing, but then the rod must be attached to the crank pin in order to determine if it fits the pin all over. It will be necessary to scrape off high spots which are indicated by dark marks on the bushing. These dark spots are formed after the crank pin is spread lightly with lamp black and oil, and the shaft rotated a few times while the rod is held in place. A good fit shows the bushing to touch all over and still not be too tight. A bearing too tight is as bad as one too loose. All bearings in a motor should have the same fit, or degree of tightness.

VALVE GEAR

The valve gear or valve system includes every part from the camshaft to the valve heads; thus the system consists of camshaft, valve tappets, valves, and valve springs.

CAMSHAFT

Since the valves are all on one side they are opened by the action of a single camshaft having eight cams integrally forged and case hardened. Its length is 23.875 (23 7/8) inches. There are three camshaft bearings. The front bearing is 2.592 (2 19/32) inches in diameter by 1.6875 (1 11/16) inches long; the center bearing is 2.557 (2 9/16) inches in diameter by 1.125 (1 1/8) inches long, and the rear is 1.499 (1 1/2) inches in diameter by 1.75 (1 3/4) inches long. The valve tappets have mushroom followers, which rest upon the eight cams of the camshaft, and so are actuated by them when the camshaft rotates. The camshaft is driven by means of a large cast iron helical gear on its forward end, meshing with a helical gear on the crankshaft. (See page 65 for description of gear.) The forward end of the camshaft is flanged to permit the attachment of the camshaft driving gear.

ADJUSTMENT FOR CAMSHAFT END PLAY

Since the teeth of the driving gear of the camshaft are helically cut, the whole shaft has a tendency to thrust forward when in motion. To offset the thrust the front end of the shaft is bored to receive a 0.5 (½) inch steel pivot pin which rests against a hardened steel plate riveted to the timing gear cover plate.

TO REMOVE CAMSHAFT

To remove camshaft the engine should be taken out of the chassis, if possible, then take off timing gear housing cover. Pull the camshaft out through the front by means of the timing gear, using a pry bar. As the rear bearings are made smaller than the front this is easily possible.

VALVES

There are two valves of the poppet type per cylinder—an intake and an exhaust valve. Their names are indicative of their functions. The valves, including their stems, are of tungsten steel with heads 1.875 (1⅞) inches in diameter. The valve stems are 0.372 (⅜) inch in diameter and 5.64 (5 41/64) inches long from underneath the valve heads to the bottom of the stem. The head is 0.265 (17/64) inch thick. At a distance of 0.3125 (5/16) inch from its lower end each valve stem has a groove cut, 0.253 (¼) inch wide and 0.276 (17/64) inch bottom diameter. Into the grooved space there is slipped a locking piece, over which the bottom end of the valve spring retainer fits. The stems move in cast iron guides pressed into the cylinder block.

VALVE SPRINGS

The valve springs are 4.0625 (4 1/16) inches long when free, and have an outside diameter of 1.375 (1⅜) inches. They are made of eleven coils, of 0.12 (⅛) inch diameter wire.

VALVE TAPPETS

Each valve is actuated by a case-hardened steel valve tappet (adjustable as to effective length) with a mushroom follower at its bottom, which bears against the cam. The overall length of the tappet is 3.062 (3 1/16) inches. The diameter of its head is 1.487 (1 31/64) inches and of its stem 0.749 (¾) inch.

The end of the tappet is drilled and tapped for a 0.375 (⅜) inch adjusting screw, by means of which the tappet-to-valve clearance may be varied.

VALVE TAPPET GUIDE

The tappet functions in a cast iron guide, which is pressed into place in the crankcase. The guide is 1.875 (1⅞) inches long. The outside diameter is 1.625 (1⅝) inches.

VALVE CLEARANCE

The proper clearance between valve stems and the tappet is 0.006 inch for the intake valves, and 0.008 inch for the exhaust. For practical purposes the clearance should be the thickness of two sheets of paper, the same as that used in this book.

It is important that the valve clearance be ample. An insufficient amount of clearance would prevent them closing freely, and cause loss of compression. Make tappet adjustment while engine is hot.

VALVE STICKING

A valve may stick because of a weak or broken spring, an overheated stem or guide caused by tightness, or a bent stem or worn guide.

GRINDING VALVES

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 take out all spark plugs. Take out all priming cups and with special wrench, which accompanies every tool kit, take out the eight valve post plugs. Lift up springs with spring compressor, and take out locking pieces at end of valve stems. Take out valves and remove springs and washers. Turn down push rod, adjusting screw to allow clearance between the stem and the push rod. Close the valve ports with a clean cloth. Mix a little oil with flour of emery or powdered carborundum. Place a little of this grinding compound on the valve face. Place the valve in its own position. Mark the valves, if necessary, so you can tell where each belongs. Insert a screw driver into the slot in the valve head; then turn with a semi-circular movement of the screw driver, exerting no pressure. This can be done easily by holding the handle between the palms of the hands. Occasionally remove the valve from the seat, turn half way round and continue. 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 ports. Oil the valve stem and guide. Readjust tappets to 0.008 inch on exhaust and 0.006 inch on intake.

Do not grind valves more frequently than necessary. 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 attention about every 2,000 miles.

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.

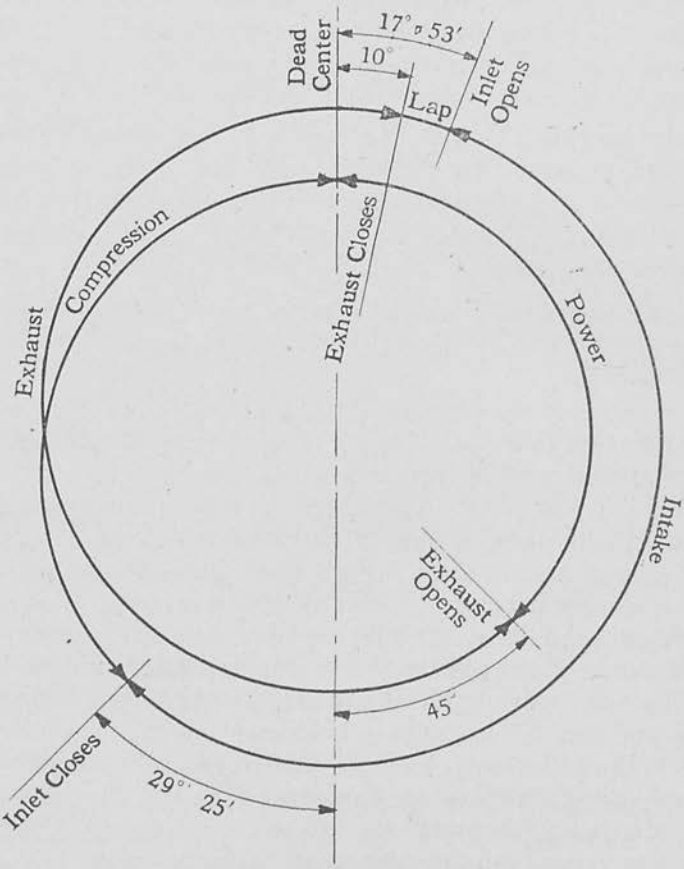


PLATE 27—VALVE TIMING DIAGRAM

If it is desired to check the valve timing it is necessary to make use of the marks on the rim of the flywheel. These flywheel marks may be observed through an opening in the top of the flywheel housing. A plate is removed from the opening and the flywheel rim may be seen underneath. The flywheel is marked as follows (each mark having a vertical line next to it):

DC-1 and 4—Meaning, dead center for pistons 1 and 4; that is, pistons 1 and 4 are at the top.

DC-2 and 3—Meaning dead center for pistons 2 and 3; that is, they are at the top of the stroke.
IO-1 and 4—Inlet valves 1 and 4 open.
IC-1 and 4—Inlet valves 1 and 4 close.
EO-1 and 4—Exhaust valves 1 and 4 open.
EC-1 and 4—Exhaust valves 1 and 4 close.
IO-2 and 3—Inlet valves 2 and 3 open.
IC-2 and 3—Inlet valves 2 and 3 close.
EO-2 and 3—Exhaust valves 2 and 3 open.
EC-2 and 3—Exhaust valves 2 and 3 close.

To check the timing, first see that the tappets are adjusted properly. Turn the flywheel until the mark IO-1 and 4 appears under the pointer. If the inlet valve on either cylinder 1 or 4 is not just starting to open, or if it is already slightly open, it will be necessary to remove the timing gear case cover. Next draw the cam gear out of mesh with the crank gear and rotate the camshaft and gear to the left or counter clockwise to such a position that after the two gears are again in mesh the valve tappet on either cylinder 1 or 4 is just starting to press against the inlet valve stem.

The valve timing figures, that is, the time of valve opening and closing with relation to the position of the piston, are as follows:

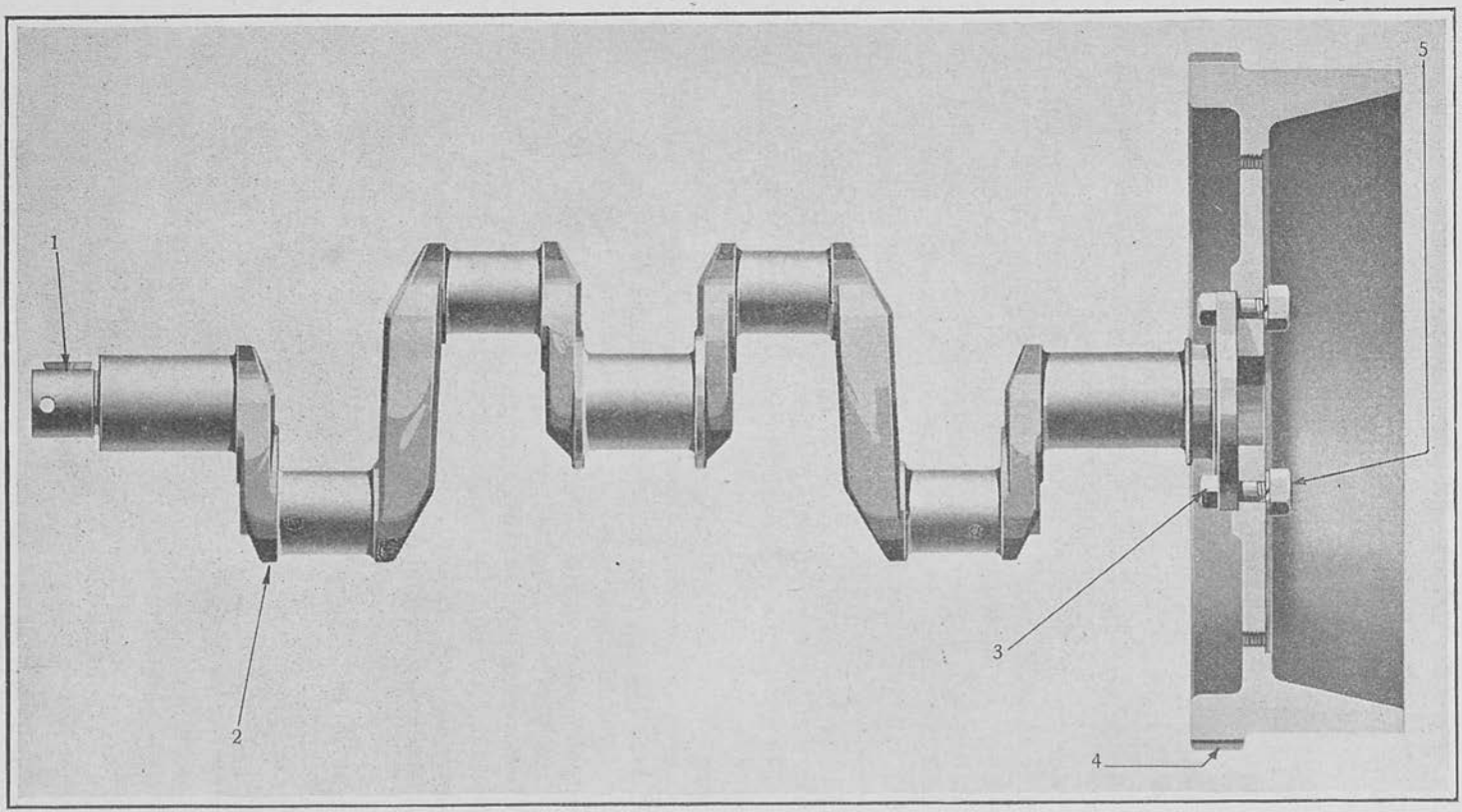
Inlet valve opens 17 degrees 53 minutes or 2.36 (2 23/64) inches measured on the flywheel rim after top dead center.
Inlet valve closes 29 degrees 25 minutes or 3.88 (3⅞) inches measured on the flywheel rim after bottom dead center.
Exhaust valve opens 42 degrees 36 minutes or 5.62 (5⅝) inches measured on flywheel rim before bottom dead center.
Exhaust valve closes 8 degrees 20 minutes or 1.1 (1 7/64) inches measured on flywheel rim after top dead center.

These points or distances before and after the dead centers are not stamped in figures on the flywheel, but instead the thing that happens at the point is marked. Thus, at 17 degrees 53 minutes after top center the mark IO-1 and 4 appears.

CRANKSHAFT

The crankshaft is the means of converting the reciprocating motion of the piston into rotary motion. The crankshaft rests in three bearings located in the upper half of the crankcase. To the crankshaft are attached the lower ends of the connecting rods.

The crankshaft is of drop-forged open hearth steel, and is 27.37 (27⅜) inches long, while its overall height is 7.25 (7¼) inches. The crankshaft is mounted on three bronze-back babbitt bushings. The front bearing is 2.186 (2 3/16) inches in diameter by 3.125 (3⅛) inches long and the rear bearing is 2.249 (2¼) inches in diameter by 3.281 (3 9/32) inches long. The center is 2.217 (2 7/32) inches in diameter



CRANKSHAFT AND FLYWHEEL ASSEMBLY

PLATE 28

CRANKSHAFT AND FLYWHEEL

Ref. No.	Part No.	Name
1	A518	Crankshaft gear key.
2	A360	Crankshaft.
3	A429	Flywheel bolt.
4	A740	Flywheel.
5	A439	Flywheel bolt nut.

by 2.5 (2½) inches long. The rear end of the crankshaft is flanged to receive the flywheel, which is bolted to it. The front end is drilled, and tapped to receive half the starting crank clutch. This end is also key seated for a Number 18 Woodruff key, which keys the crankshaft gear in place.

CRANKSHAFT BEARING CAPS

The crankshaft is held up in the main bearings by means of caps. These are of malleable iron, and each is held in place by two 0.5 (½) inch studs. The bearings are prevented from rotating by shoulders in the bearings themselves, and by flat head brass machine screws, which screw through the bearings and into the malleable iron caps. The connecting rod bearings are lubricated by dippers carried on the bottom of the connecting rod caps.

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. The bearing next most likely to show signs of wear is the front one, while the rear bearing shows longest life in service.

TIGHTENING CRANKSHAFT BEARINGS

Should the crankshaft bearings knock, usually the removal of a lamination of the shims placed between the bearing halves returns them to proper adjustment. In removing the laminations it is necessary that an equal number be taken from each side of the bushing

cap. If one or more layers are removed and it is found to be too much, substitute a thin shim of paper for one of the metal layers removed. If the above is not successful, it will be necessary to replace the bushing and scrape to a perfect bearing. A perfect bearing surface is important.

TO SCRAPE-IN CRANKSHAFT BUSHINGS

In "scraping in" the bushings, the first consideration is the proper meshing of the timing gears; the front bearing controls the position of the crankshaft and its gear, consequently, it should be fitted and scraped in first, the other end bearing being lined up with it at the same time. Then the middle bearing fitted in line.

In scraping in crankshaft or connecting rod bearings, the area of contact of bearing surface is the important factor. If the shaft does not bear well all over, the high spots are scraped and the cap will have to be tightened, but if the shaft bears well and evenly, the bearing need not be clamped so tightly. One bearing should be adjusted at a time, then loosened and another bearing adjusted. In this way any chance of one bearing being too tight and another too loose is avoided. Always relieve the bushings at the upper part of their sides to prevent binding. If a bushing must be raised up a thin shim or paper should be used. A thin paste made of lamp black and oil should be rubbed on the shaft to make its contact with the bearings so the high spots will be marked. When the three main crankshaft bearings have been adjusted and tightened, one should be able to revolve the shaft by grasping the flywheel firmly.

When the crankshaft bears evenly in its bearings, and a bearing cap becomes loose, the shaft will spring down and away under the impulse of the explosion, and on the return of the piston to the top dead center, the shaft will spring back, hammering away or pounding the bearing. The result of this is not only a wearing down or hammering out of the top bearing but the wearing away and the hammering out of the lower bearing as well. This condition can only be remedied by the removal of the engine from the chassis. The shaft should be removed from the engine, the bearings scraped in and readjusted. Should it be found that a bearing is out of line, being high or low, shims may be removed or added between the halves. The shaft should not be sprung, but in repose when it is finally fixed in its bearings.

It is necessary to keep an equal number of shims on each side of a crankshaft or connecting rod bearing to insure a perfect fit and prevent the bearing from wearing lopsided. All bearings must be fitted to low spots; this condition would affect all the other bearings, causing unnecessary wear. There also would be danger of causing knocks and springing crankshaft.

CRANKCASE

The crankcase is an aluminum unit forming the body of the engine. The cylinder rests upon the top of the crankcase, and the crankshaft and camshaft rotate inside. At the forward end of the crankcase are the timing gears. The crankcase is made in two parts bolted together. The upper part of aluminum is called the crankcase and the lower part made of pressed steel is called the oil pan.

The crankcase contains the crankshaft and camshaft bearings, so that by detaching the oil pan the bearings may be inspected or taken up.

The oil pan acts as an oil reservoir. The oil pump is bolted to the right hand side of the upper half of the crankcase. A screen is located in the bottom of the crankcase to strain the oil going into the oil pump supply pipe. A pipe plug in the bottom of this makes it possible to remove any sediment collected.

OIL INDICATOR

On the left hand side of the oil pan is bolted a Retlaw oil indicator for indicating the oil level in the oil pan. This indicator is so arranged that a float mechanism moves a needle across a dial.

VENT AND BREATHER TUBE

The vent and breather tube is of cast iron and is slightly tapered. It is 6.875 (6 7/8) inches long with a diameter of 2.375 (2 3/8) inches at its upper end and 0.875 (7/8) inch at its lower end. The tube is screwed into the left hand front side of the crankcase and serves to admit both air and oil into the crankcase and allows vapor to escape.

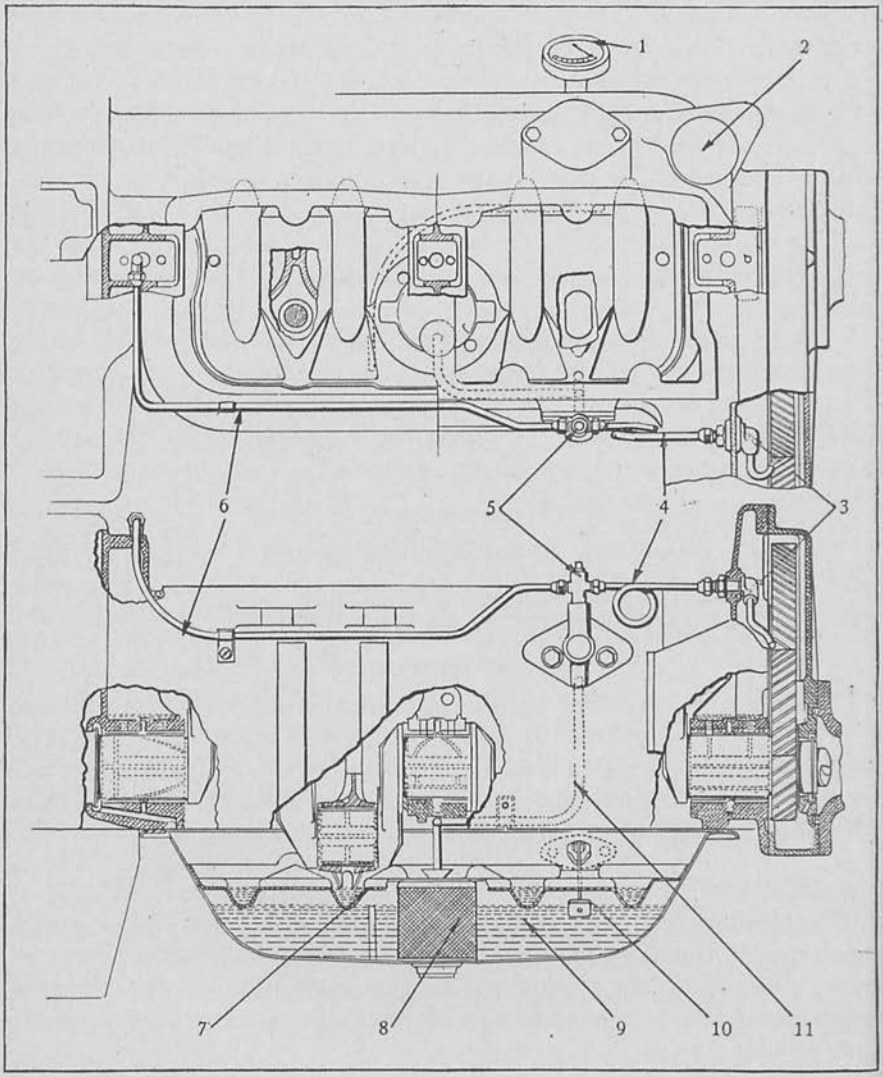
TIMING GEARS

The timing gears are mounted in the forward part of the crankcase and are there covered by means of a plate, called a timing gear cover. The timing gears are the means provided for connecting the crankshaft with the various other engine shafts, such as the camshaft and the magneto and pump shafts.

CAMSHAFT GEAR

The camshaft gear is located on the front end of the camshaft and meshes with the crankshaft gear. The gear is made of cast iron, and has 60 teeth (10 diametral pitch). These teeth are cut right hand helical at an angle of 34 degrees 56 minutes. The gear has a pitch diameter of 7.320 inches, an outside diameter of 7.520 (7 33/64) inches, and a face 0.875 (7/8) inch. It is bolted to a flange on the camshaft, the bolt holes being slotted to permit the adjustment of the gear. A hole is drilled through the face of the gear, and through the camshaft after adjustment. In this hole there is inserted a dowel pin for the purpose of maintaining the adjustment selected.

PLATE 29



OILING SYSTEM

Ref. No.	Part No.	Name
1	A474	Oil indicator.
2	A476	Oil filler.
3	A276	Oil tube—to elbow.
4	A195	Oil tube—pump to elbow.
5	A265	Oil pump assembly.
6	A418	Oil tube—pump to rear bearing
7	A400	Oil pan splash basin.
8	A275	Oil screen.
9	A400	Oil sump in oil pan.
10	A474	Oil indicator float.
11	A194	Oil feed tube—sump to pump.

CRANKSHAFT GEAR

The crankshaft gear is keyed to the front end of the crankshaft and actuates the camshaft gear. It is made of carbon steel and has 30 teeth cut left hand helical at an angle of 34 degrees 56 minutes. The pitch diameter of the gear is 3.66 (3 21/32) inches. Its outside diameter is 3.86 (3 55/64) inches and face 0.875 (7/8) inch wide. The gear is bored 1.557 (1 9/16) inches to admit the crankshaft and is key seated 0.250 (1/4) inch wide for a Number 18 Woodruff key.

MAGNETO AND PUMP GEAR

The water pump and magneto are driven by the same shaft, the pump being direct connected and the magneto driven by an extension of the pump shaft. The water pump and magneto helical gear meshes with the camshaft gear and so actuates both the water pump and the magneto. The gear is keyed to the front of the pump shaft. It is made of carbon steel and has 30 teeth cut left hand helical at an angle of 34 degrees 6 minutes. The pitch diameter of the gear is 3.66 inch, the outside diameter is 3.86 inch and has a key seat 0.125 (1/8) inch wide for a Number 7 Woodruff key.

LUBRICATING SYSTEM

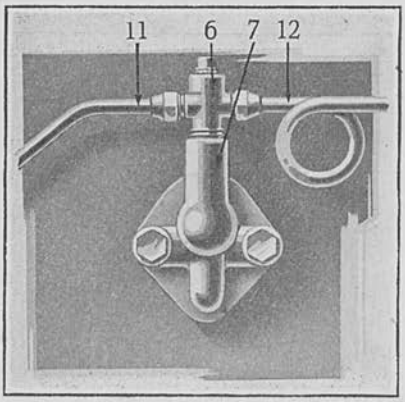
OPERATION OF OILING SYSTEM

The lubricating system is the pump circulated splash system operated by a plunger oil pump, drawing oil from the sump through a wire screen located in the sump and a vertical tube. The delivery is to a horizontal distributing tube outside of the crankcase. This tube feeds oil to ducts running to the front and rear crankshaft main bearings and gear case. The connecting rods are fitted with dippers, which in passing through the oil troughs in the oil pan, lubricate the connecting rod bearings and create an oil splash through the interior of the engine, lubricating the cylinder walls, pistons, piston pins, camshaft, and center main bearing. The surplus oil drains into the sump from which it is recirculated. The overflow through the pressure regulating valve in the front of the engine goes to the timing gear housing and from there by gravity back to the oil pan and the sump. Valve stems and push rods are lubricated by vapor, which enters the valve spring chamber through holes from the crankcase.

OIL PUMP

The oil is drawn from the lower half of the crankcase to the pump and forced by the plunger into the oil delivery line. The direction of oil flow is regulated by two ball check valves, one above and one below the pump.

The oil pump is of the plunger type and is bolted to the right hand side of the crankcase. It is driven from the camshaft by an eccentric pressing against the mushroom head of the plunger. The plunger is held against the eccentric on the camshaft by means of a helical spring. The stroke of the pump is 0.25 (¼) inch and the bore is 0.812 (13/16) inch. The diameter of the mushroom head is 1.359 (1 23/64) inches. The upper check valve ball is 0.375 (⅜) inch in diameter while the lower ball is 0.25 (¼) inch in diameter. The balls are retained in general position by means of steel pins 0.0625 (1/16) inch in diameter extending across the oil passage. The size of the union connections in the oil pipe line is 0.25 (¼) inch.



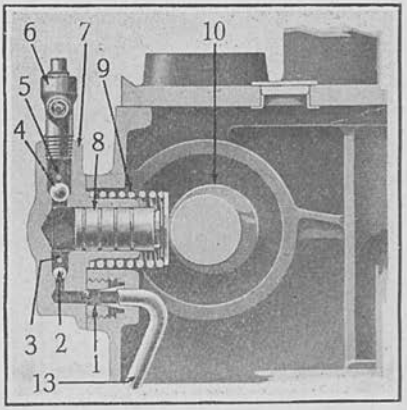


PLATE 30—OIL PUMP CONSTRUCTION

Ref. No.	Part No.	Name
1	A192	Oil tube packing retainer.
2	A271	Bronze ball, 0.25 (¼").
3	A267	Oil pump ball stop pin, lower.
4	A272	Bronze ball, 0.375 (⅜").
5	A266	Oil pump ball stop pin, upper.
6	A276	Oil tube to elbow assembly.
7	A270	Oil pump body.
8	A269	Oil pump plunger.
9	A268	Oil pump spring.
10	A348	Camshaft.
11	A418	Oil tube to rear bearing.
12	A280	Oil tube to gear case.
13	A194	Oil supply tube.

OIL FILTER

Below the level of the oil pump and bolted to the crankcase there is a cast-iron oil pan sediment filter, which consists essentially of a bowl, over the top of which is placed an inverted cylindrical screen. The pump suction draws the oil from the filter, thus allowing sediment to settle at the bottom. A 0.5 (½) inch iron pipe plug is provided to allow the sediment to be drained off periodically.

EXHAUST SYSTEM

The exhaust system is that which takes care of the burned gas after it leaves the combustion chamber. The system consists of an exhaust manifold bolted to the cylinder block and which first receives the gas after the gas has passed the exhaust valves; an exhaust pipe which takes the gas from the manifold and carries it back to a muffler which reduces the gas pressure so there will be no noise. In the exhaust pipe line is a cutout, or device for deflecting the gases from the muffler, so that if necessary the gases can be let out directly into the air, making a noise, of course, but permitting of a slight gain in power due to reduced gas back pressure.

EXHAUST MANIFOLD

The exhaust manifold is made of cast iron and connects the cylinder exhaust ports with the exhaust pipe and muffler. It is bolted to the cylinder casting and connects with all four cylinder exhaust ports. From center to center of the end cylinder openings it is 17.5 (17½) inches and has an inside diameter of 2.1875 (2 3/16) inches.

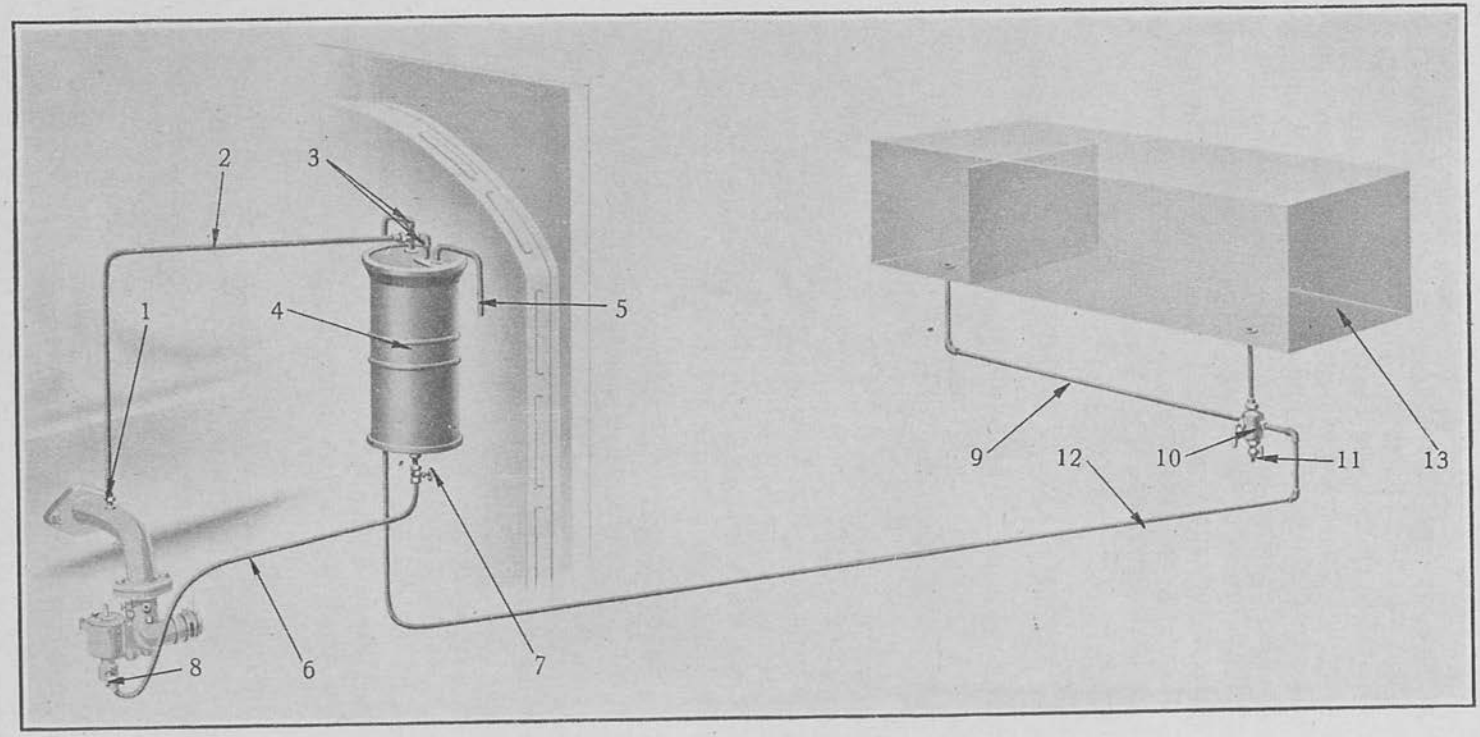
A stove or heat collecting device is clamped back of the engine to the exhaust manifold. By means of a flexible pipe this stove connects with the carbureter air inlet and so expedites gas vaporization. The rear end of the exhaust manifold connects with the exhaust pipe, which conveys the burned gas to the muffler.

MUFFLER CUT-OUT

At the end of the exhaust pipe near the muffler is a cut-out or device which lets the exhaust gas into the atmosphere, avoiding the muffler. This cut-out is hand-operated. It is simply a valve which when open lets the gas out into the air instead of permitting it to pass through the muffler. It reduces back-pressure in the exhaust line slightly by giving free egress to the gas and in this way there is a slight reduction in power loss. It also is used to give an indication of the explosions in the cylinders and prove out the uniformity of power.

FUEL SUPPLY SYSTEM

The fuel supply system consists of three units, the gasoline or fuel tank, the Stewart vacuum feed system and the Zenith Carbureter, together with the necessary tubing to connect them. The fuel tank is divided into a main and reserve gasoline supply controlled by a three way cock located beneath the fuel tank.



FUEL SUPPLY SYSTEM

PLATE 31

FUEL SYSTEM

Ref. No.	Part No.	Name
1	A3229	Connection in manifold.
2	A2325	Gasoline line—manifold to vacuum tank.
3	A2314	Elbow connectors on vacuum tank.
4	A2265	Vacuum tank.
5	A2306	Vacuum tank vent tube.
6	A2326	Gasoline line—tank to carbureter.
7	A2313	Shut off cock in gasoline line.
8	A826	Connector on carbureter.
9	A2328	Gasoline line—reserve to three way valve.
10	A2253	Three way valve.
11	A2256	Drain cock.
12	A2327	Gasoline line—main.
13	A2250	Gasoline tank.

CARBURETER

The truck is equipped with a 1 inch Zenith carbureter, Model 04. The carbureter is bolted to a flanged cast iron pipe, which connects it with the cylinder block. The carbureter converts the gasoline into vapor and mixes it with the proper amount of air to produce a mixture that will explode rapidly in the cylinders.

This carbureter is of the compound nozzle type. There are no moving parts, such as air valves, or cam operated needle valves. The carbureter has a conventional venturi, the diameter of which is predetermined, according to the size of the engine. Into the neck of this venturi opens the upper end of the gasoline nozzle. The gasoline enters the air stream at the end of the gasoline nozzle, coming from the bottom of the float chamber. The purpose of using the venturi in connection with the compound nozzle is to allow a cylindrical draft of air in the venturi to surround the spray of gasoline which passes from the nozzle and thus aids in the vaporizing process and in preventing gasoline from being accumulated on the sides of the carbureter by direct contact.

PRINCIPLE OF CARBURETION

The Zenith principle of carburetion may be explained in the following manner: The gasoline level is regulated by an adjustable needle valve at the point where it enters the float chamber. The elementary type of carbureter mixing valve consists of a single jet or spraying nozzle placed in the path of the incoming air and fed from the usual float

chamber. With this arrangement the flow of gasoline from the jet increases under suction faster than the flow of air, so that the mixture grows richer and richer. The Zenith combines with this jet, which grows richer as the suction increases, a jet which causes the mixture to grow leaner; in other words, acts as a balance, and the two work together to make a mixture of constant proportion. This carbureter, therefore, combines the two types of rich and poor mixture carbureters. The compound nozzle consists of the direct suction type nozzle, together with the constant flow nozzle, through which the former extends. One counteracts the action of the other so that at all speeds a constant ratio of air and gasoline is maintained.

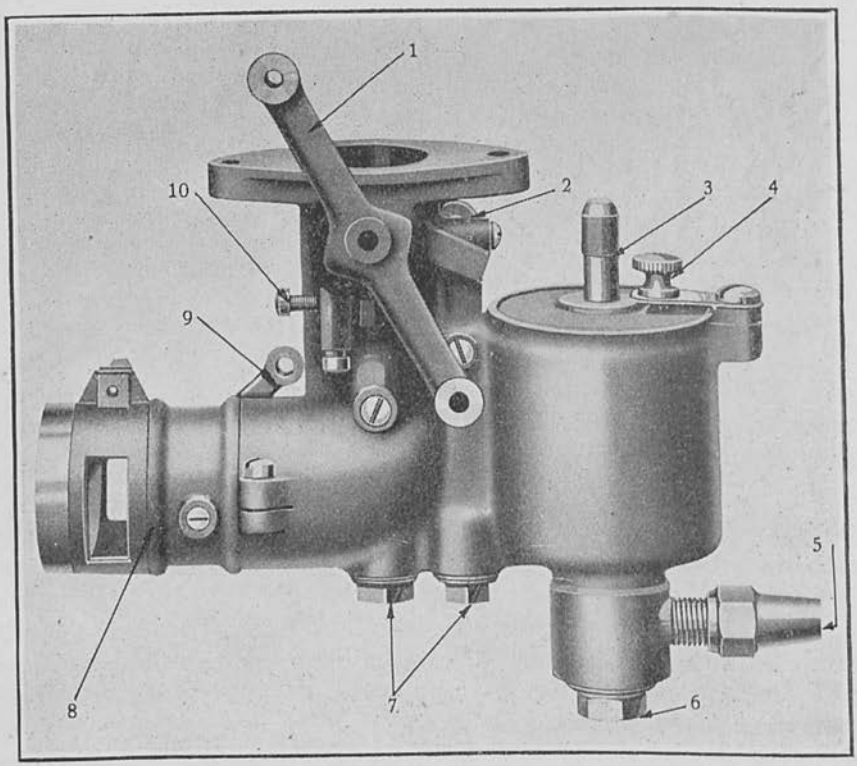


PLATE 32—CARBURETER

Ref. No.	Part No.	Name
1	A770	Butterfly throttle lever.
2	A795	Idling adjusting screw.
3	A787	Needle valve cap.
4	A808	Float chamber cover spring.
5	A826	Gasoline connection.
6	A814	Filter plug.
7	A817	Jet well plugs.
8	A752	Hot air adjusting sleeve.
9	A757	Air sleeve shutter.
10	A776	Butterfly lever stop screw.

In addition to the compound nozzle, the carbureter is equipped with a starting and idling device terminating in a priming hole at the edge of the butterfly valve, where the suction is greatest when the valve is slightly open. The gasoline is drawn up by the suction at the priming hole and mixed with the air rushing by the butterfly valve. This aids in the proper mixing of air and gasoline at slow speeds. At high speeds with the butterfly valve opened, the idling device ceases to operate because the gasoline from the compensator flows to the cap jet.

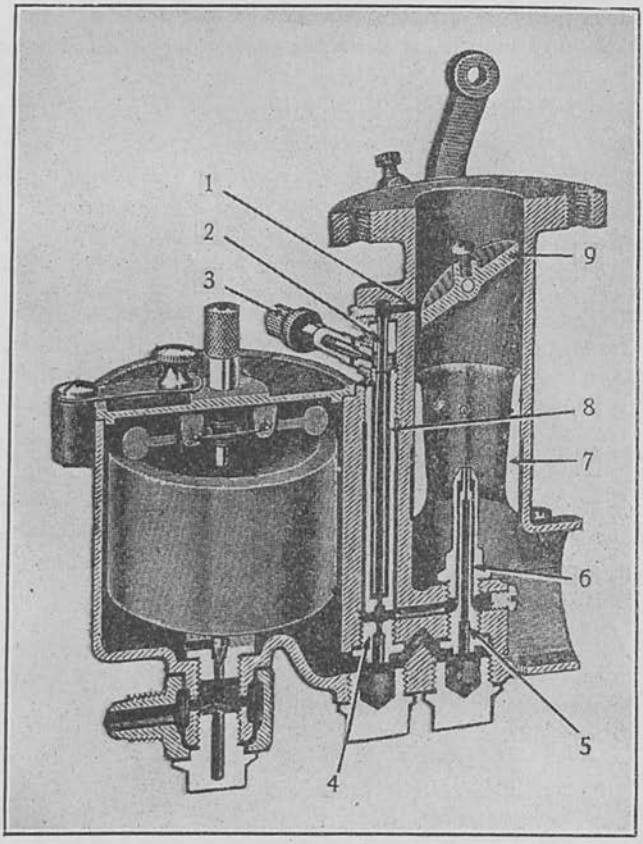


PLATE 33—CARBURETER SECTION

Ref. No.	Name
1	Priming hole.
2	Priming tube.
3	Regulating screw.
4	Compensator.
5	Main jet.
6	Cap jet.
7	Choke.
8	Secondary well.
9	Butterfly.

CARBURETER ADJUSTMENT

There is one adjustment on this new Zenith, shown in the illustration on page 70. This adjustment controls the gasoline supply from the float chamber and regulates the mixture for idling speeds. Refer to Plate 33. Gasoline from the compensator Number 4 flows into the open well. Above the idling tube is a small chamber which has an opening into the atmosphere and regulated by the regulating screw Number 3. Turning the screw clockwise or to the right closes the opening to the atmosphere and makes a richer mixture. This acts only when the butterfly valve is nearly closed.

For starting and warming up with the present-day fuel, it is absolutely necessary to use the air choke until proper operating temperature is attained. Ordinarily, the engine will start readily with the control closed one-half to three-fourths of the way. In very cold weather it may be necessary to pull the control up all the way, but this should be done only for an instant, as this cuts off all the air and delivers raw gasoline only. For cranking in cold weather the control should be almost completely closed, while the throttle should be one-fourth to one-third open.

After starting, the control should be adjusted, as necessary, and allowing the engine a moment to steady itself, should be set at a point where the engine will have full power and yet not too rich a mixture for smooth running. As the engine warms up the control may be lowered. Instead of setting the mixture permanently rich, it is much better to use a moderate setting and then to give intelligent attention to the operation of this control. For winter use it is advisable to partly cover the radiator, as a water temperature of 130 degrees Fahrenheit, or above, is absolutely necessary if an engine is to show its normal flexibility and power.

Under such conditions the full supply of hot air should, of course, be used. In the warm months the season adjustment shutter on the air horn may be opened to admit cold air.

TO DETECT AND REMEDY A LEAKY FLOAT

A leaky float will be detected by observing the low position of the float in the gasoline when the gasoline level is at a proper height and by poor running of the engine at low speeds especially. To remedy this, either a new float should be installed or the old float repaired. To repair, heat the float slightly by immersing in hot water until the gasoline therein is expanded to a point where the pressure will force the vapor out of the very small hole, through which the gasoline has leaked into the float, thus identifying its location by the air bubbles. As soon as this hole is found, enlarge same slightly so the gasoline may be drained out. After drying the float the hole should be soldered up and

the outside filed off smooth. Avoid unbalancing or change of weight. For a temporary repair, soft soap or shellac may be used in place of solder.

If the float valve leaks, the trouble will probably be caused by a small dent in the float valve seat, or dirt on the seat preventing the float valve making contact over the entire surface of seat.

HOT AIR BOX OR STOVE

The incoming air is heated by the hot air box, or stove, which receives hot air from around the outside of the exhaust pipe.

DETECTION OF WATER IN GASOLINE

If the container is clean, the water will appear like large bubbles in the bottom of the container, as water and gasoline will not mix. In the float chamber of the carbureter, water may be detected by the comparatively low gasoline level in the float chamber, and on the float, as the float rides higher in water than in gasoline, and closes the float valve quicker. Any exposed iron in the gasoline tank will rust after a short time and discolor any water coming in contact with it, aiding detection

TO PREVENT WATER IN CARBURETER

The drain cock in the bottom of the carbureter should be opened occasionally, and any accumulated water drained out, preventing any possibility of trouble.

PREVENTION OF GASOLINE WASTE

If it becomes necessary to leave the car standing on a steep grade or for some length of time, shut off the gasoline at the three-way valve under the tank so that there will be no chance of gasoline waste or loss should there be leakage in any of the fuel lines.

GASOLINE TANK AND LINE

The gasoline supply system consists of a main tank of 20 gallons capacity, mounted under the driver's seat.

The main tank is of terne plate and is divided by means of a wall extending part way up, near one end. This wall is high enough so that a column on one side of six gallons is retained forming an auxiliary tank. Each side has a 0.375 (3/8) inch brass pipe running to a three-way control valve. When the control valve arrow points toward the line running from the control to the auxiliary tank, the fuel from the main tank is shut off. The line from the main tank is of 0.375 (3/8) inch brass tubing. From the auxiliary tank there is a

0.375 (3/8) inch tube with a shut-off valve and strainer in the line. This strainer consists of a brass bowl and cap with fine mesh copper screen between them.

IF GASOLINE LINE IS BROKEN

If gas line is broken in two, it could be temporarily repaired by taping; by reaming out one end of broken tube and fitting other end in, or using potato, apple, etc., as a connection, slipping ends of tube into a hole bored through it.

REPAIRING SMALL TANK LEAK

A small hole leak in gasoline tank can be temporarily repaired with chewing gum, soap or with wooden plug.

TANK VENT MUST NOT BE CLOGGED

The gasoline tank is vented to allow air to force gasoline to the small supply tank on engine. If vent became plugged, a vacuum would occur in tank and gasoline would not flow.

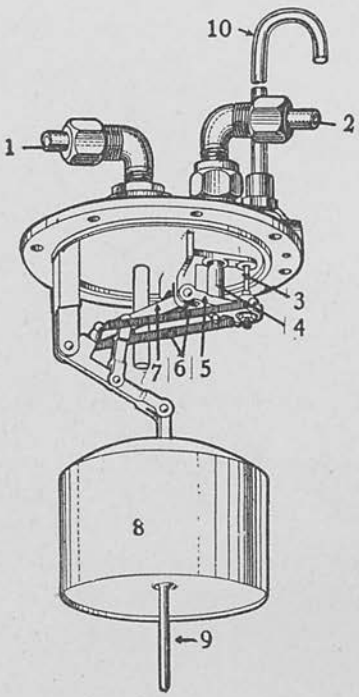
SOME DETAILS OF THE VACUUM TANK

The vacuum tank consists of two chambers. An upper or inner one and a lower one. Between the two chambers is a single flapper valve which allows the gasoline in the inner chamber to empty into the lower chamber. The float is hollow and made from sheet steel. Strainers are provided in the bottom of the tank to stop and catch any sediment that may accumulate in the lower chamber and at the fuel inlet to the upper chamber. A plug in the bottom of the vacuum tank permits sediment and water which may have been separated out in the lower chamber to be withdrawn when necessary. It should be cleaned out every week at the same time that the carbureter is drained and its strainer cleaned.

OPERATION OF VACUUM TANK

The operation of the vacuum tank is as follows: The gasoline is drawn into the inner chamber by connecting the inner chamber with the gasoline tank and the intake manifold of the engine at the same time. As soon as the inner chamber is filled with gasoline the float is raised enough to trip a valve connecting the inner chamber with the intake manifold and at the same time opening one which connects with the atmosphere. This allows the gasoline in the inner chamber to empty into the lower chamber and from there flow to the carbureter by gravity. The valve located between the lower chamber and the inner chamber prevents gasoline from being sucked back when a fresh supply is being drawn into the inner chamber from the main fuel tank.

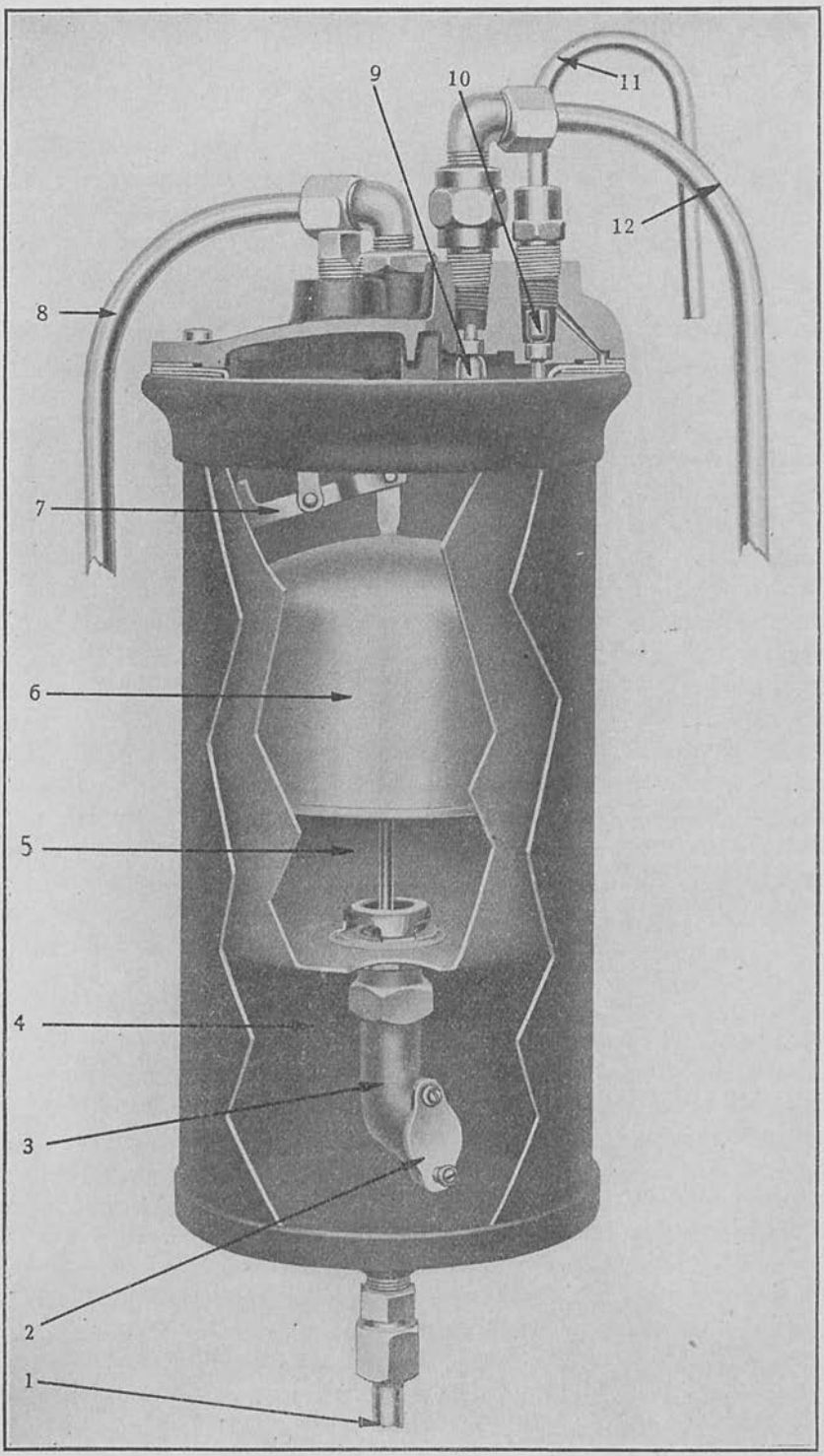
PLATE 34



VACUUM TANK COVER AND FLOAT

Ref. No.	Part. No.	Name
1	A2314	Elbow to gasoline supply.
2	A2314	Elbow to intake manifold.
3	A2283	Atmospheric valve stem.
4	A2285	Vacuum valve stem.
5	A2281	Valve stem lever.
6	A2286	Valve tension springs.
7	A2277	Lever connecting link.
8	A2288	Float.
9	A2288	Float stem.
10	A2306	Air vent tube.

PLATE 35



VACUUM TANK SECTION

PLATE 35

VACUUM TANK SECTION

Ref. No.	Name
1	To carbureter.
2	Flapper valve.
3	Outlet to lower chamber.
4	Lower fuel chamber.
5	Upper fuel chamber.
6	Float valve.
7	Float lever.
8	From gasoline tank.
9	Suction valve.
10	Atmospheric valve.
11	Air vent.
12	To engine intake.

IGNITION SYSTEM

The ignition system is the means of producing an electric current and causing that current, one of high-voltage and low amperage, to be sent at the exact instant across a gap in the spark plug so that the heat of the spark can ignite the mixture in the cylinders. The ignition system consists of a current generating machine, called a magneto, a switch for controlling the current flow from the magneto and spark plugs, one in each cylinder, for receiving the current, and the necessary wiring to and from each unit to the other.

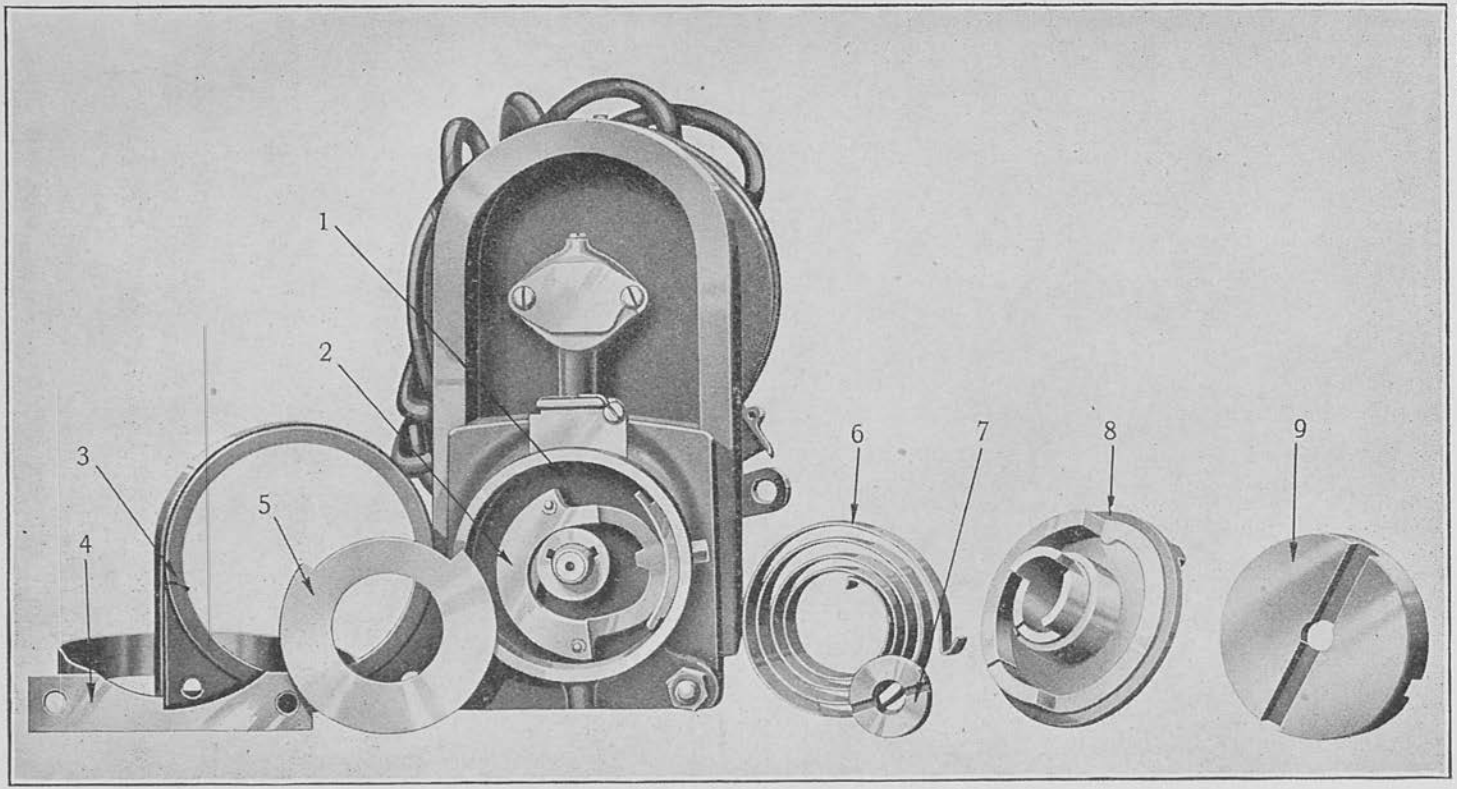
MAGNETO

BRIEF DESCRIPTION OF OPERATION

A 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 upon the right hand side of the engine upon a bracket attached to the crankcase. It is driven by the rear end of the water pump shaft. A coupling of the Oldham type is enclosed between the end of the water pump shaft and the magneto so as to take care of any disalignment between the two assemblies.

The magneto used in this truck is an Eisemann straight high-tension magneto, that is, one which 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



MAGNETO SHOWING IMPULSE STARTER DISASSEMBLED

PLATE 36

MAGNETO SHOWING IMPULSE STARTER DISASSEMBLED

Ref. No.	Part No.	Name
1	A992	Housing complete.
2	A986	Trigger complete.
3	A988	Protecting cover.
4	A987	Catch bar.
5	A869	Spacing disc, between spring and trigger.
6	A996	Spiral spring.
7	A994	Round nut for magneto shaft.
8	A991	Driving flange.
9	A990	Driving disc, 2¼" diam. stand.

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 the secondary is induced and this is the current which flows to the distributor and thence through cables to the spark plugs.

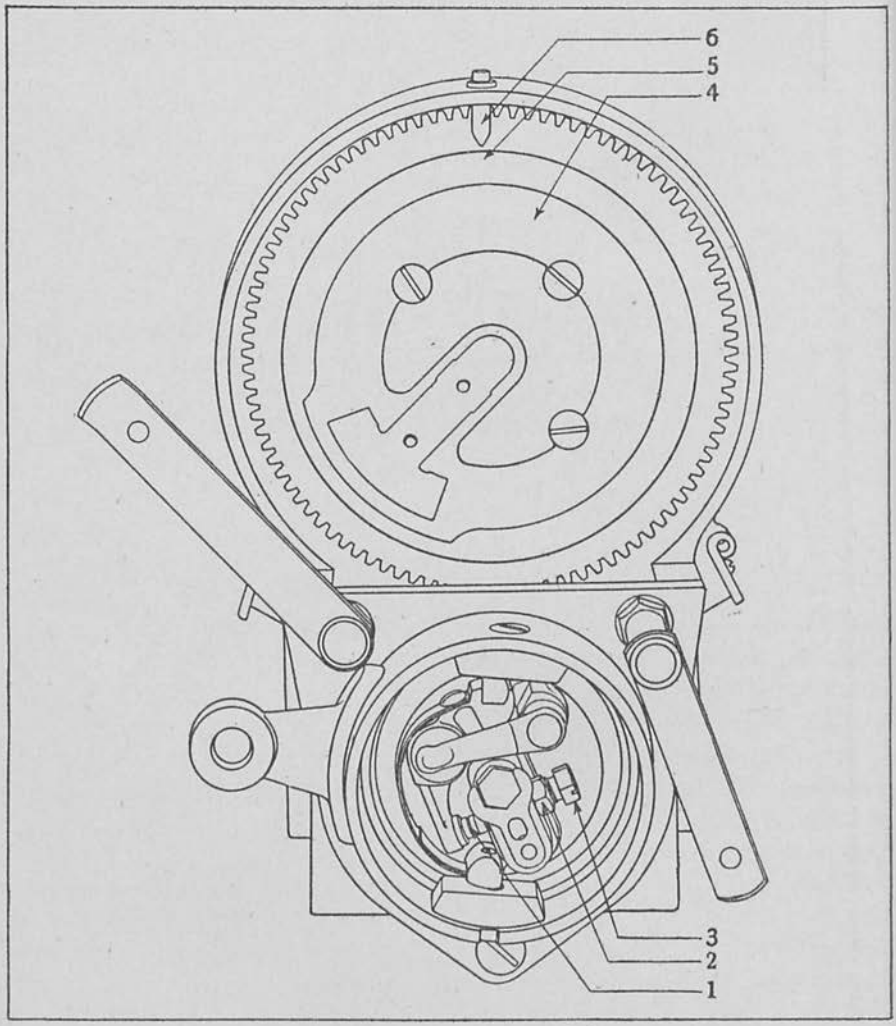
When you throw the switch to "on" position no current passes through the switch. The primary current path after generation is through the primary winding, through the interrupter, and to ground, thus returning to its source of generation, which every current does if there is a path for it.

The secondary winding also is grounded at one end. The induced high-voltage current flows through the secondary winding to the distributor to the spark plugs in order, thence to ground, and the secondary winding being grounded the circuit is completed through the metal parts of the engine.

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 will 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. Turn engine by hand until piston of No. 1 cylinder is on dead center (firing point), remove the distributor plate from the

PLATE 37



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.

magneto and turn the armature shaft until the setting mark on the distributor disc is in line with the setting screw, as shown in illustration on page 80. With the armature in this position, the platinum contacts are just opening and the metal insert of the distributor disc is in connection with carbon for No. 1 cylinder. The driving medium must now be fixed to the armature shaft without disturbing the position of the latter, and the cables connected to the spark plugs.

MAGNETO MAINTENANCE

Aside from lubrication, as mentioned in the following, 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 in the covered holes 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.

WHEN TO REPLACE IGNITION CABLES

In order to obtain the best results, the cables should be at once replaced if they show signs of cracking or wearing. After a year of normal service, it is advisable to carry in reserve a few carbons for the distributor plate, as well as a contact spring and an adjustable contact screw.

IMPULSE STARTER

This device mounted on the armature shaft outside of the magneto proper is simply a means of giving the armature a quick, fast turn. The impulse starter contains a spring whose stored up energy is released by tripping by means of a dog, a ratchet to which the spring is attached. The Eisemann impulse starter eliminates the necessity for an auxiliary ignition system, as this device causes the magneto to produce a hot, fat spark, regardless of how slow the magneto is cranked.

The device does not have to be set by hand and above 180 R. P. M. is automatically drawn out of action.

The impulse starter used on this model of magneto does not have to be set prior to starting, it is *entirely automatic* in action, being withdrawn at 180 revolutions per minute. In this respect it is distinctive from the impulse starters found on most of the truck and tractor engines used by the Ordnance Department.

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.

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 (.25 m/m) and in no case should it be more than 0.012 inch (.3 m/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 then 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 .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 .125-inch gap previously mentioned, the magneto is at fault. See page 84 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 thing 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.

CONDENSER

The condenser is constructed of two insulated series of layers of tinfoil, connected in parallel across the platinum breaker points; each series consists of about 250 sheets of tinfoil insulated from each other, and alternating with the layers of the other series, the whole acting as a reservoir for the primary current.

The action of the condenser results in intensifying the secondary current nearly 25 times by preventing an arc at the platinum breaker points when they are separated. An arc at the points acts as an electrical cushion to the interrupted flow of electricity, and thus the magneto would give a much weakened spark.

WHEN CONDENSER IS PUNCTURED

When a condenser becomes punctured (insulation between layers destroyed) the engine will only operate if the spark plug points are very close together, and will show very little strength.

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 cloth. 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 regardless 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 .010 inch to .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 will 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 can only be secured for replacement, they are usually supplied with a small, round teat .063 (1/16) inch diameter on the back of point. To mount point, drill a .063 (1/16) inch diameter hole, .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 .012 inch and the points must bear evenly all over on their face (i. e., 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.

TO MAKE A TEMPORARY MAGNETO BRUSH

A temporary magneto brush can be made from a piece of carbon taken from the positive terminal of an ordinary dry battery or an old electric light carbon, or may be made from any soft metal, or by rolling very tightly a small strip of brass wire cloth.

IGNITION TROUBLE DUE TO OVER-PRIMING.

Over-priming or choking with gasoline usually results in the excess gasoline condensing on the insulated terminal of the spark plug and draining down and forming a drop on one of the terminals. The presence of this liquid so near the spark so absorbs the heat of the spark that it may fail to ignite the charge. Or the drop may actually bridge across the gap, in which case the path of the spark would be along the surface of the drip and would lose all its heat to the drop.

EFFECT OF OIL IN CIRCUITS.

In the primary circuit of the magneto oil acts as an insulator. If oil works on to the platinum points, it will very materially weaken the spark given by the magneto, due to its interfering with the electrical operation of the points.

In the secondary circuit the oil itself will not act as a conductor, but inasmuch as dust and dirt always collect on the surface of the oil the current may flow over the dirt and dust held by the oil, thus effecting short circuit.

WHY MAGNETO HAS BRASS BASE PLATE

A brass base plate is used under the magneto for, if an iron base plate were used, it would act as a keeper or magnetic conductor of the lines of force from the North to the South poles of the magnets and no current would be generated in the magneto.

WATER COOLING SYSTEM

OPERATION OF SYSTEM

The cooling system is necessary primarily to prevent the oil in the engine from burning up completely and thus causing the moving parts to seize. By passing water around the hot parts and keeping that water always below the boiling point the heat from the moving parts and from the oil is carried off in the water.

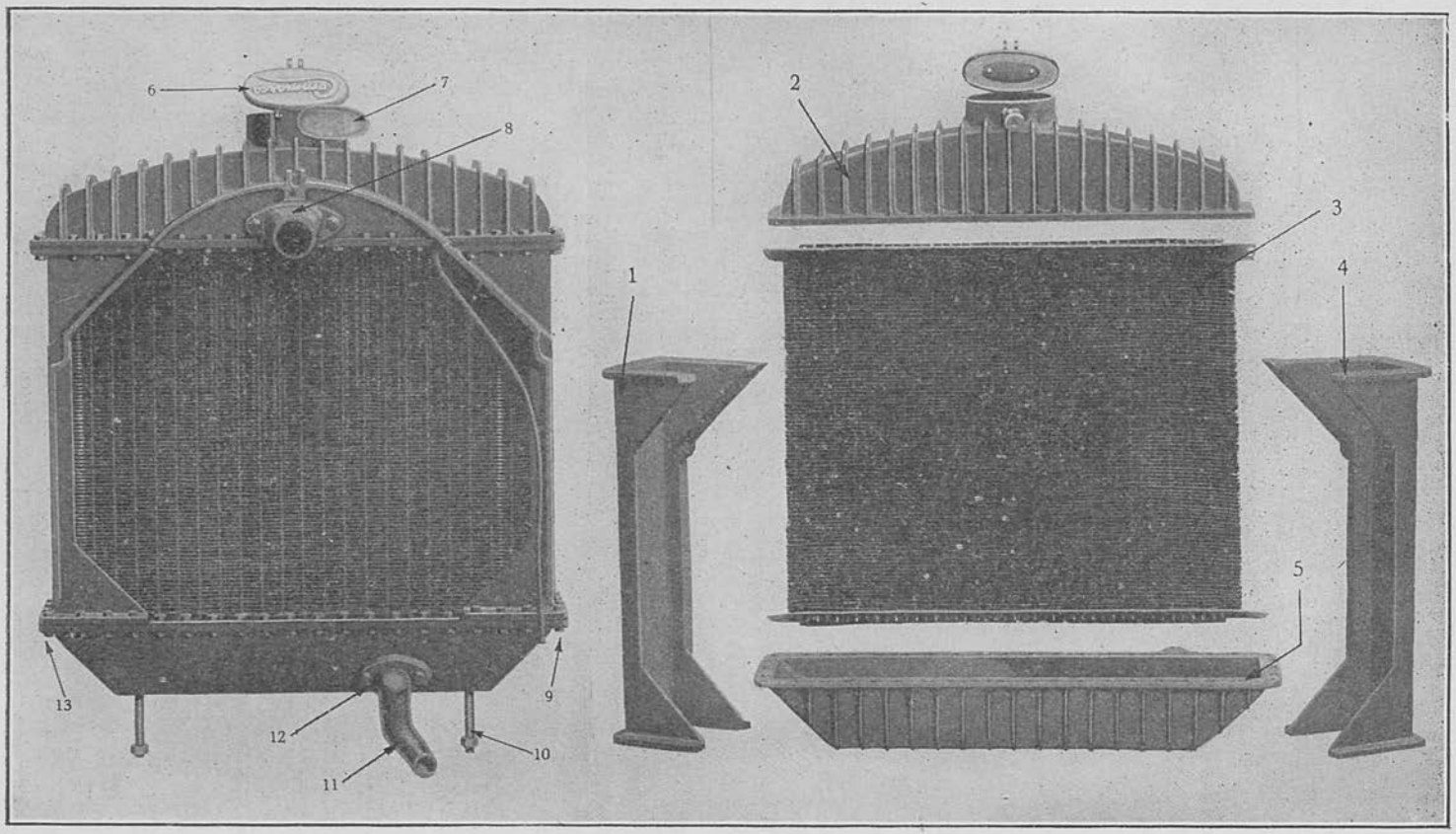
The cooling system consists of water jackets around the cylinders, a centrifugal pump for forcing the water through the system, a radiator for cooling the water and a fan for causing an air draft through the radiator so that the hot water in its tubes can impart heat to the passing air. There are, of course, the necessary connections between the radiator and the pump and engine, so that pump can force the cool water from the bottom of the radiator through the cylinders and to the top of the radiator.

WATER PUMP

The water pump is located on the right hand side of the engine and is bolted against the rear of the timing gear case housing. It is of the centrifugal type inclosed in a cast iron housing and has a bronze rotor.

The rotor is 4.244 (4 15/64) inches in diameter and is 0.5 (½) inch wide. It is keyed and pinned to its shaft by means of a Number 7 Woodruff key and a Number 3 taper pin 1.5 (1½) inches long. The shaft is 0.75 (¾) inch in diameter and 10.312 (10 5/16) inches long.

The pump is provided with two stuffing boxes. The pump body and cover are bronze bushed. These bushings support the pump shaft which is driven by the generator drive gear in the timing gear case.



RADIATOR ASSEMBLED AND DISASSEMBLED

PLATE 38—RADIATOR

Ref. No.	Part No.	Name
1	A1828	Radiator side member, left.
2	A1843	Radiator top tank.
3	A1826	Radiator core.
4	A1827	Radiator side member, right.
5	A1849	Bottom tank.
6	A1830	Filler cap.
7	A1839	Filler cap strainer.
8	A1853	Radiator outlet manifold.
9	A1859	Overflow tube.
10	A1851	Bottom tank stud.
11	A1840	Radiator inlet manifold.
12	A1842	Inlet cap screw.
13	A1860	Tank bolts.

There is pinned to the rear end of the shaft, by means of a Number 3 taper pin, the magneto impulse starter coupling.

WATER PUMP OR MAGNETO GEAR SHAFT

The water pump gear shaft is made of carbon steel. It is 14.906 (14 29/32) inches long and its outside diameter is 1.249 (1¼) inches. The extreme front end of the shaft is key seated and keyed to drive the lower fan pulley. This end is also threaded to receive a 0.687 (11/16) inch S. A. E. thin nut, which clamps the pulley in place. The rear end of the shaft is drilled and key seated for the attachment of one-half of an Oldham coupling. The other half of this coupling is keyed to the magneto shaft. The shaft is supported on a bushing fastened in the upper half of the crankcase. This bushing is lined with a die cast babbitt bushing.

The water pump glands (packing boxes on the shaft) should be filled with a good grade of waterproof asbestos, or compounded packing. If asbestos loose twisted rope packing is available, untwist one strand, soak it thoroughly with cylinder oil, and cover with as much fine graphite as it will retain. Always coil the packing around the shaft in the direction of rotation of the packing nut, so it will tend to unwind when the packing nut is screwed on. If only square or round braided packing of too large a size is available, cut off a piece of about the desired length, place it between the jaws of a bench vise, squeeze it out flat, and then cut off a strip of the desired width with a pair of thin snips or heavy scissors. The gland nuts should not be tightened any more than necessary to prevent leakage of water.

TO TEMPORARILY REMEDY DEFECTIVE WATER PUMP

In case of a damaged or inoperative pump the water pump rotor should be removed from the pump to prevent its obstructing the passage. The radiator must be full to insure circulation (by thermo-syphon) under these conditions, which are produced by the water boiling. Necessarily this is a temporary arrangement, as water is lost rapidly.

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 turned over with a crank 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.

WATER INLET MANIFOLD

The water pump draws the water from the bottom of the radiator through a hose connection, forcing it through the inlet water manifold into the water jackets of the cylinders. The water leaves the water jackets of the cylinders through a casting, bolted to the tops of the cylinders, and then goes back into the radiator through a hose connection at the top of the radiator.

RADIATOR

The radiator is a means of cooling the hot water which is sent from around the water jackets, and returning it at the lower temperature to the system. The actual medium, which does the cooling, is the circulation of air through the radiator openings by the fan. This circulation of air carries away the heat, which is transmitted from the water in the

radiator to copper tubes which are finned on the outside. The fins are used because the heat radiates to the sharp edges quickly. Thus, as the hot water enters the top of the radiator after being forced there by the centrifugal pump, the water drops through the tubes and on the way down the excess heat is carried away by the draft of air.

The radiator consists essentially of a core, which is the largest unit and is composed of finned copper tubes running vertically. On top of this core is the upper tank, a cast iron member having the filler opening and water inlet attached. Between the tank and the core is a gasket. At the bottom of the core is the lower tank, a cast iron member from which the water passes into the water inlet pipe. This bottom tank has the drain attached and also studs which run through the frame to hold the radiator in place. There is a similar gasket between the core and bottom tank. The sides of the core are fitted with cast iron pieces bolted in place.

COOLING FAN

The fan is bracketed in front of the engine and driven by flat belt from a pulley on the water pump shaft. The fan shaft is carried on adjustable cup and cone ball bearings. Adjustment of the fan belt tension is secured by a clamp bracket. The fan bearings are lubricated by removing pipe plug on top of the fan body housing and injecting lubricant. The fan assembly is clamped to a stud screwed into the cylinder block. The fan is an Oakes built-up type; four sheet-steel blades being riveted to a stamped-steel spider and then to a malleable iron hub.

FAN PULLEYS

Cast integral with the hub and located back of the blades is the driven pulley, 2.5 (2½) inches outside diameter and 1.375 (1⅜) inches wide between flanges.

FAN BELT

The fan is driven by a 1.25 (1¼) inch by 0.156 (5/32) inch endless flat leather belt. The developed length is 44.5 (44½) inches, and the length after the ends are sewed together is 40.5 (40½) inches. The pulley that drives this belt is keyed to the forward extension of the water pump gear shaft. It is 4.75 (4¾) inches in diameter and 1.375 (1⅜) inches wide between its two flanges.

FAN ASSEMBLY SUPPORT

The fan, with its bearings and pulleys, is carried by a threaded shaft that is screwed into the clamp bracket.

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.

CARE OF COOLING SYSTEM

When filling the radiator, use clean water as free from impurities as possible, and fill to a depth of about three inches above the top of the ribs. Do not pour cold water into the radiator when the system is nearly dry and the motor is hot. Empty the radiator occasionally through the drain cocks on the pump and radiator, flushing out to remove sediment. The fan draws air through the radiator. Keep the spaces between the radiator tubes free from mud and dirt.

CAUSES OF OVERHEATING

Overheating may be caused by insufficient water in the system, clogged passage in the radiator, water jackets, hose connections or other part of the system, running too long on retarded spark, slipping clutch, poor mixture, lack of oil or too much heavy oil, carbon deposits in cylinders, fan slipping or inoperative, dragging brakes, water pump inoperative due to sheared key, broken rotor, etc., frozen water line or portion of water in radiator frozen.

If the water is boiling run slowly, but not for any great distance. The overheating may cause severe knocking on the slightest grade and possibly on level road. If you have some distance to travel pour an excess of oil into the crankcase to make sure that the moving parts will not stick, due to rapid burning up of the oil.

IF RADIATOR TUBE BREAKS

If outside tubes are broken in radiator when operating they might be soldered. For quick repair pinch together both ends of break with pliers. To take out and plug holes it is necessary to remove upper and lower tanks.

SOLDERING

TO PREPARE RADIATOR PARTS FOR SOLDERING

If a tube 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 sputtering may throw acid.

SOLDERING TIN

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

SOLDERING IRONS AND STEELS

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.

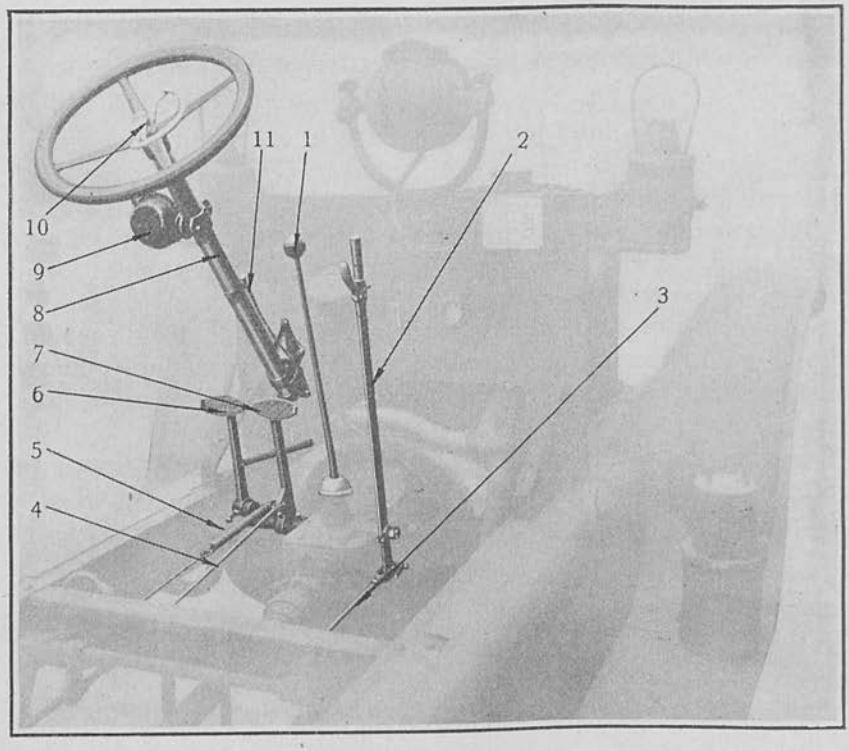


PLATE 39—CONTROLS

Ref. No.	Part No.	Name
1	A590	Gear shift lever assembly.
2	A552	Emergency brake lever.
3	A1712	Emergency brake lever to rocker shaft rod.
4	A1698	Service brake pedal to rocker shaft rod.
5	A652	Service brake release spring.
6	A665	Clutch pedal.
7	A661	Service brake pedal.
8	A1400	Steering gear assembly.
9	A2359	Horn.
10	A1454	Throttle control.
11	A2366	Carbureter air choke control.

CHAPTER III

CONTROL SYSTEM

CHAPTER CONTENTS

CONTROL LEVERS
BRAKES
CONTROL PEDALS
STEERING SYSTEM

CONTROL LEVERS AND STEERING SYSTEM

When sitting in the driver's seat all necessary controls are within easy reach. At the right of the driver's seat is the gearshifting and hand brake control set mounted on their respective supports. In front of the driver's seat is the vertical steering post with a throttle lever above the wheel on a quadrant and a carbureter air choke on the column below. On the dash is the ignition switch. On the floorboards just forward of the steering column are the pedals, the one on the left for the clutch operation and the other on the right for operating the running brakes.

CONTROL LEVERS

GEARSHIFT LEVER

Of the two levers to be found at the center of the front platform, the one on the left is the gearshift lever. It may be distinguished from the other because of the hard rubber ball top or handle. The gearshift lever is mounted in a ball and socket joint. The upper end of the gearshift lever is moved into the following positions to engage the various forward and reverse speeds.

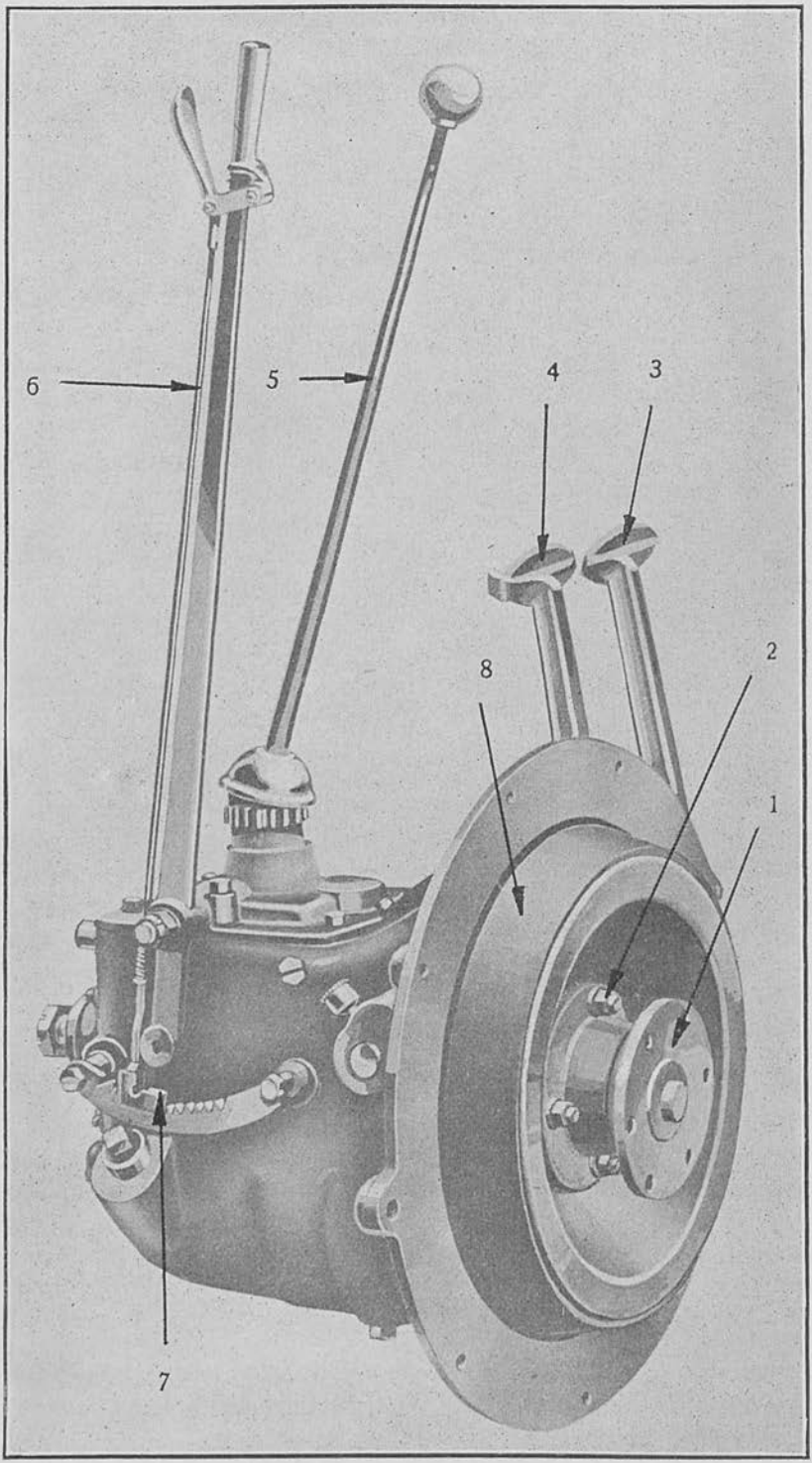
Neutral—Middle position.
First speed—Rear left hand position.
Second speed—Front right hand position.
High speed—Rear right hand position.
Reverse—Front left hand position.

There are no marks on the floor boards nor is there a gearshift lever quadrant to indicate the positions of the lever for the various speeds, so that it is important to find out in what position the lever must be put for each of the speeds before attempting to drive the truck. See page 21 also.

USE OF GEARSHIFT LEVER

When the gearshift lever is in neutral it may be rocked sideways. This is the only position in which the lever may be rocked sideways.

PLATE 40



TRANSMISSION WITH CLUTCH

PLATE 40

TRANSMISSION WITH CLUTCH

Ref. No.	Part No.	Name
1	A578	Clutch hub.
2	A666	Clutch spring.
3	A665	Clutch pedal.
4	A651	Brake pedal.
5	A591	Control lever.
6	A552	Brake lever.
7	A650	Brake ratchet.
8	A579	Clutch cone.

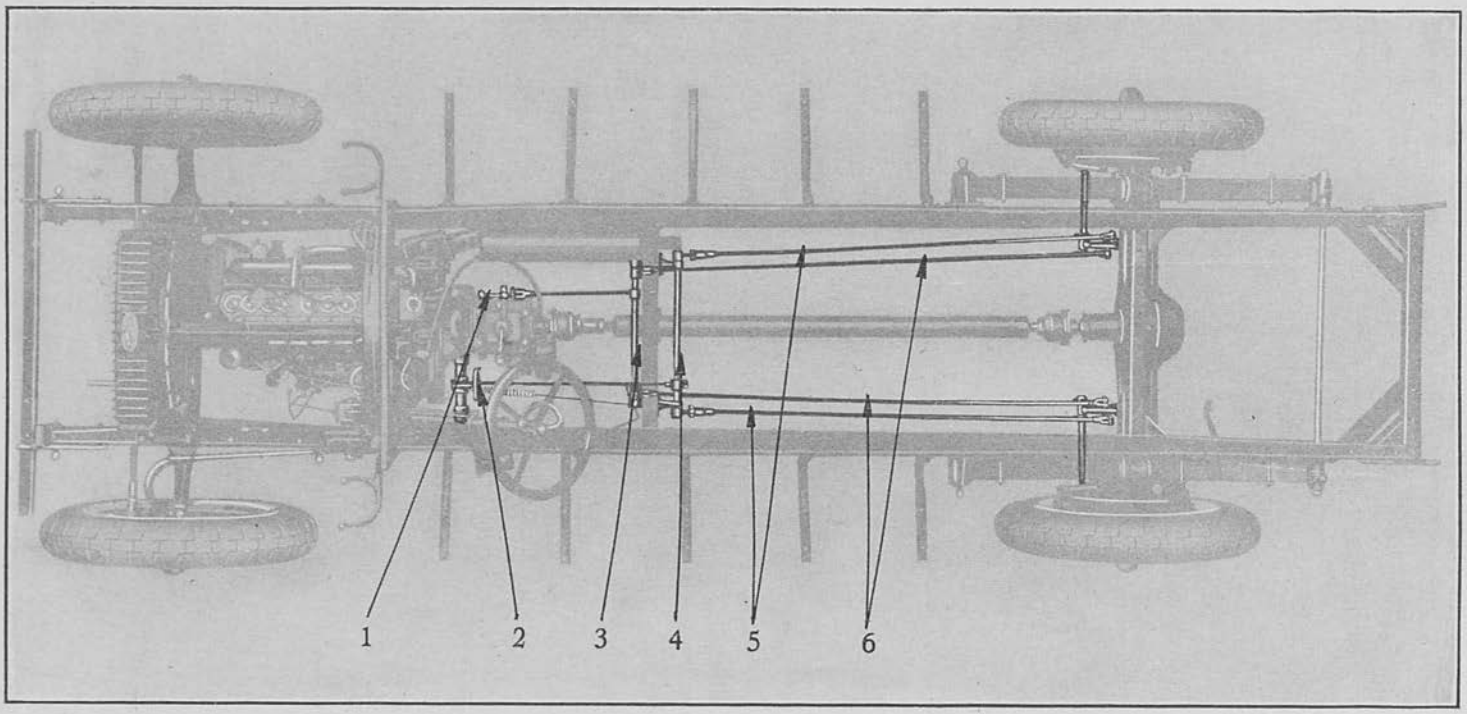
In starting, the clutch pedal is depressed and the gearshift lever rocked to the left and pulled backwards or toward the driver into the first speed position. The clutch is then engaged slowly and, when enough momentum has been gained by the truck, shifted to second speed. In doing this the clutch is again depressed, and the gearshift lever is pushed forward to the center or neutral position, from there across to the right and forward to the second speed position. Again the speed of the truck is increased until momentum enough has been gained to make it possible to shift to third speed.

To shift to third speed the clutch is operated as before, while the gearshift lever is brought through the middle or center position and pulled all the way back, however, being careful to always keep it to the left. This is the high speed position.

In order to place the lever in reverse it is necessary only to pull it to the left as far as it will go from the neutral position and then push it forward into the reverse gear.

GEARSHIFT RODS AND FORKS

The gearshift rods and forks are located in the upper portion of the transmission case or gear box and carry the shifter forks. The lower end of the gearshift lever engages with one or the other of these shifter levers and forks and through their medium engages the proper gear. An interlocking device located between the rods in the transmission case prevents moving of both gears at the same time and is called the interlocking device.



BRAKE ROD ASSEMBLIES

PLATE 41

BRAKE ROD ASSEMBLIES

Ref. No.	Part No.	Name
1	A552	Hand brake lever.
2	A651	Service brake pedal.
3	A1675	Hand brake rocker shaft.
4	A1665	Service brake rocker shaft.
5	A1690	Service brake rods.
6	A1705	Hand brake rods.

BRAKES

EMERGENCY BRAKE LEVER

There are two brakes on the 1-Ton Chassis. One of them is a hand brake and the other a pedal brake. The brake lever is located to the right of the change speed lever and the foot pedal to right of the clutch pedal. The emergency brake, as the lever operated on is called, is provided with a latch so that it may be locked in any position. This is to permit the holding of the truck upon a grade when the driver has to leave it. The brake is released when it is in its forward position and is applied by drawing it backwards. A rod connects the lower end of the emergency lever with another lever on the cross brake shaft, mounted on the fourth, or central, cross member of the frame. From this brake cross shaft two brake rods go to each of the brake arms located on the rear axle.

CONTROL PEDALS

FOOT BRAKE

The foot brake is the right one of the two mounted on the toe boards. It is connected to the rear brake rocker shaft, which is also attached to the fourth, or central, cross member of the frame, by means of a rod. From this brake cross shaft two other brake rods extend to each of the levers on the rear axle. The purpose of the brake cross shafts is to transmit the action of either the foot brake pedal or the emergency brake lever to their respective brakes which operate on

each of the rear wheels. The foot brakes are provided with a nut adjustment which may be reached readily while the emergency brakes must be adjusted 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 brake rod yokes further up on the rods.

THE DIMENSIONS OF BRAKE BANDS

The brake bands are completely described and their dimensions given under the chapter on "Wheels," page 144. Should the brake band lining become considerably worn, due to service, or become saturated with grease or other foreign substances which would impair its usefulness, it will be necessary to replace it. This can best be done by removing the entire brake band assembly, punching out the rivets and inserting new lining of proper thickness. The rivet ends should be deeply imbedded in the brake lining to prevent scoring of the brake drum. It will no doubt be necessary to lengthen brake rods to insure proper clearance between brake drum and the new band.

CLUTCH PEDAL

The clutch pedal is located on the left hand side of the brake pedal and mounted upon the clutch pedal support shaft, which extends out of the transmission housing on the left hand side. It is provided with an adjustable hub so that the position of the clutch pedal may be varied to suit the particular height of the driver who has to use it. Downward pressure on the pedal releases the clutch, but it is not necessary to press it down to its full extent in order to change the gears.

THE CLUTCH BRAKE

By completely depressing the clutch pedal all the way a clutch brake is applied. This brake is to facilitate changing from low to second or third speeds. When changing down from a high to lower speed, it is very desirable not to depress the clutch pedal so far as to apply the brake. In engaging the clutch pedal when starting the truck, care should be taken to allow the clutch to engage slowly so as not to cause jerking or the too sudden application of power.

ACCELERATOR PEDAL

The accelerator pedal is located beside the clutch and brake pedals on the toe boards. Its purpose is to provide a foot throttle for the regulation of the truck's speed without requiring the driver to remove his hands from the steering wheel. It is interconnected with the hand throttle linkage but operates independently of the hand throttle. The latter only serves to set the minimum throttle opening to which the foot throttle will return when the foot is taken off it.

HAND THROTTLE

A hand throttle is mounted upon a fixed quadrant placed above the steering wheel. There is but a single lever on the steering column quadrant, as the spark is not varied by hand on this truck. A choke lever from the carbureter is mounted half way up the steering column and provides a convenient means of regulating the mixture from the seat. It is raised to choke the carbureter and in partially raised position offers a ready means for assisting in starting and running when the engine is still cold in winter.

STARTING CRANK

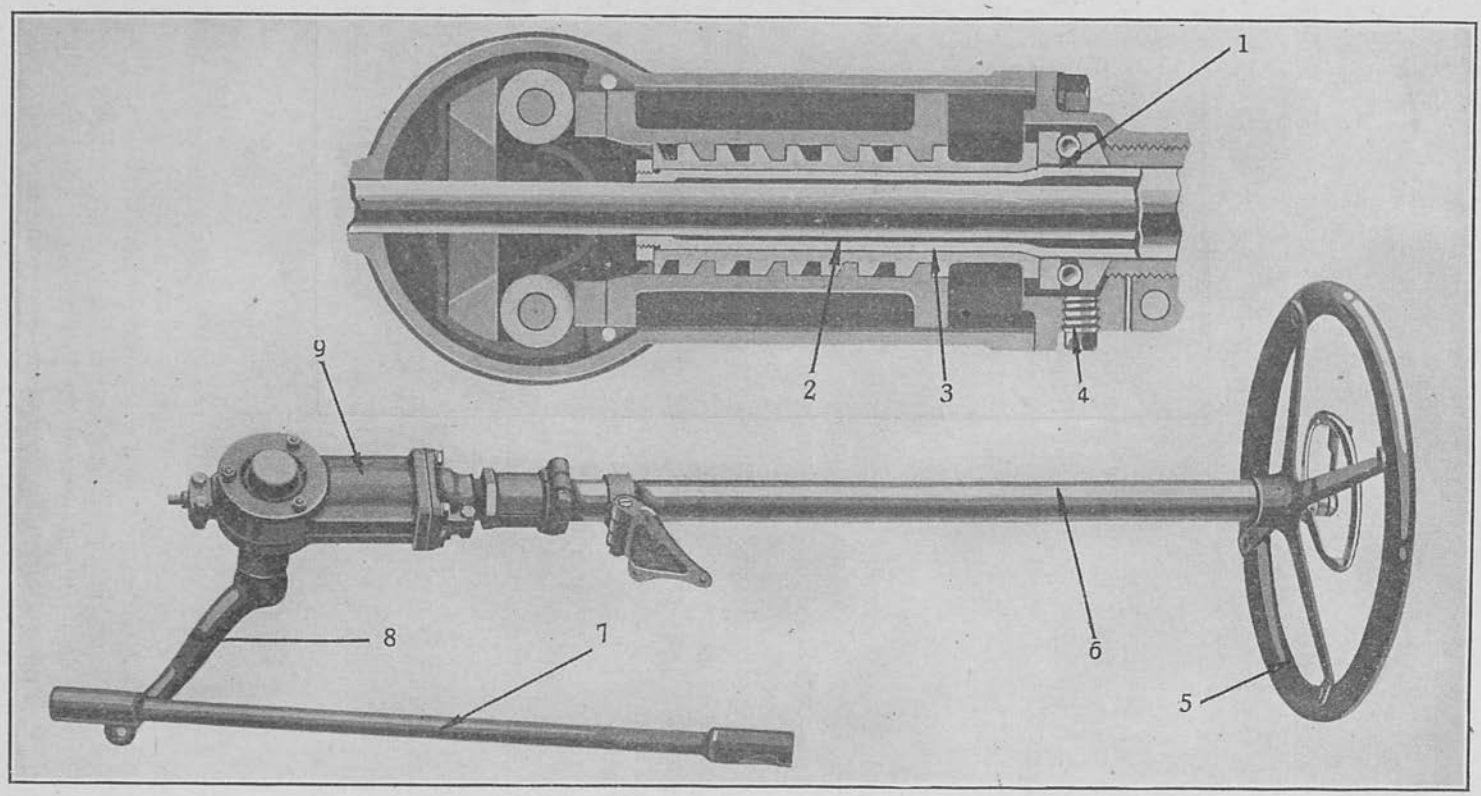
A starting crank is provided at the front end of the engine. It is the only means of starting this truck and, if removed from the front end, should be placed where it can not be lost.

STEERING SYSTEM

An inclined steering column is provided on the 1-Ton Truck Chassis. The column is supported both on the frame side rail and from a bracket mounted 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 carbureter choke lever or button upon it. The steering arm of the steering gear is on the outside of the frame, passing through a hole drilled in the side rail of the main frame for this purpose. The steering arm is operated by the steering wheel through the medium of a split nut type of steering gear. The steering arm of the steering gear is connected to the upper one of the double arms attached to the left steering knuckle on the front axle. This connecting link between the steering gear and the front axle is designated as the drag link and distinguishes it from the tie rod which connects the steering arms on the front axle. The drag link is mounted on a ball and socket joint at each end and these should be carefully examined every week and packed with grease.

STEERING GEAR ADJUSTMENT

The steering gear used on this truck has an adjustment nut just above the steering gear housing at the bottom. This nut is prevented from turning by a clamping cap screw located just below it. When looseness or lost motion arises in the steering gear, this should be corrected at once in order to prevent the lost motion increasing, which it will do if it is not taken out. To do this loosen the cap screw referred



STEERING GEAR

PLATE 42

STEERING GEAR

Ref. No.	Part No.	Name
1	A1410	Thrust bearing.
2	A1490	Screw.
3	A1480	Nut—right.
4		Grease plug.
5	A1515	Steering wheel.
6	A1520	Steering column.
7	A1920	Reach rod.
8	A1401	Steering arm.
9	A1465	Steering housing.

to above and rotate the nut right handedly, for it has a right hand thread, until the lost motion is taken out of the steering gear. Care should be taken to see 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 looseness in the drag link and the tie rod connection in the front axle. Be sure to lock the steering gear adjusting nut with the clamping cap screw when the proper adjustment has been obtained.

STEERING SYSTEM LUBRICATION

Follow the lubricating instructions for the steering gear on page 31 under "Lubricating Instructions."

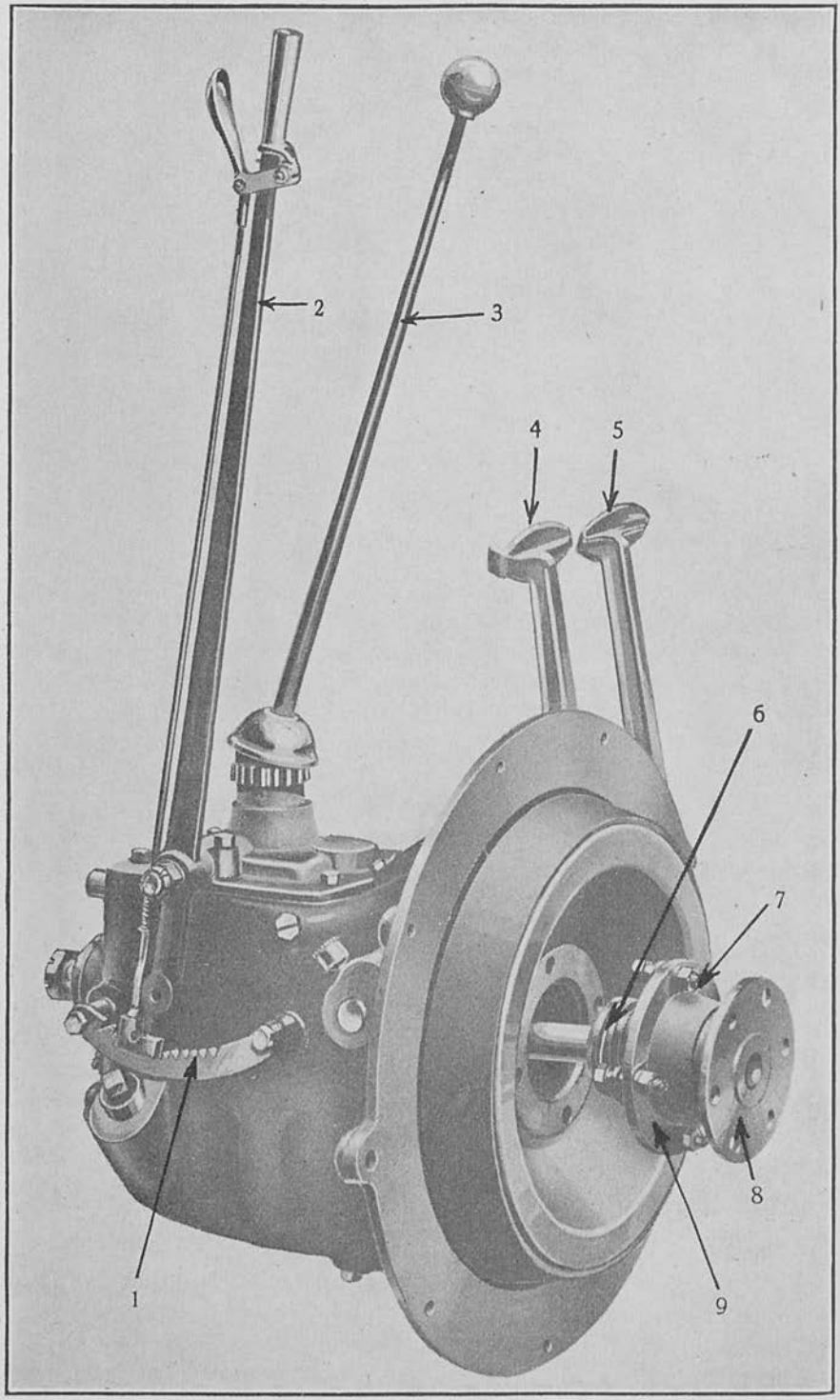
DIFFICULT STEERING

The steering may be difficult because of the wheels being out of alignment, the wheel bearings too tight or broken, the steering knuckle arms badly bent, tie rod or drag links bent, hard working, or an unlubricated nut at the bottom of the steering column.

ALTERING TURNING RADIUS

This truck is designed to turn in a 50 foot diameter circle and set screws are provided on the steering knuckles to prevent the wheels from interfering with the chassis, should the driver attempt to turn in a closer circle than this. If there is any interference noted when turning the wheels to the maximum in either direction, the adjustment of these stops should be investigated at once.

PLATE 43



ASSEMBLY OF TRANSMISSION SHOWING CLUTCH

PLATE 43

TRANSMISSION—SHOWING CLUTCH, HUB AND PARTS

Ref. No.	Part No.	Name
1	A650	Emergency brake ratchet.
2	A555	Emergency brake lever.
3	A591	Control lever.
4	A651	Brake pedal.
5	A665	Clutch pedal.
6	A668	Clutch spring thrust ball nut collar.
7	A664	Clutch hub bolt.
8	A709	Motor clutch spring support.
9	A661	Clutch front hub.

CHAPTER IV

MAIN CLUTCH

The main clutch is the unit inclosed by the bell housing which joins the engine and the change speed gear box. It consists of the clutch cone, clutch spring, and clutch throwout mechanism.

FUNCTION, OPERATION, INSTRUCTION AND CARE

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 truck without stopping his engine. The clutch is operated by means of a foot pedal, the left hand one of those located on 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 with the flywheel, into which it fits, by a coiled spring. In addition to disconnecting the engine from the road wheels when the driver desires to stop the truck, the clutch is also used to disconnect the engine from the transmission unit or change speed gear box while the gears are being shifted.

CLUTCH CONSTRUCTION

The type of clutch used on the 1-Ton Chassis is of the male cone type. It is leather faced and provided with springs located between the pressed steel cone and the leather facing which insures a more gradual engagement of the clutch. The clutch pressed steel cone is attached to a two piece malleable iron hub.

The drive from the engine to the male cone of the clutch is through the female cone which is turned inside of the flywheel rim. From the clutch cone the power is transmitted through the rear portion of the clutch hub to a splined shaft, which is forged integral with the main drive gear of the transmission.

The main drive gear shaft of the transmission is extended through the engine clutch spring support, which is a tubular shaped forging. The forward end of the drive gear shaft is supported by a ball bearing located in the center of the flywheel, which insures the proper alignment of the clutch cone with the flywheel, if the latter has been properly machined.

The engine clutch spring support is a flanged tubular steel forging bolted to the rear face of the flywheel and transmits the thrust of the clutch spring from the flywheel to the clutch cone through the medium of the front portion of the clutch hub which incloses the spring.

The thrust of the clutch spring when the clutch is released is taken by a ball thrust bearing. Another ball thrust bearing is also provided in the clutch throwout yoke to eliminate wear at this point when the clutch is disengaged.

THE CLUTCH CONE

The clutch cone is a pressed steel stamping of 12 gauge 0.109 inch hot rolled steel. The clutch is 13.375 (13⅜) inches outside diameter and has a 12.5 (12½) degree cone angle. It is riveted onto the clutch rear hub with four 0.375 (⅜) inch steel rivets and in addition, these are supported by four 0.4375 ($\frac{7}{16}$) inch bolts when the clutch front and rear hubs are assembled. Two 1.25 (1¼) inch holes are punched into the cone clutch body to allow the displacement of air as the clutch is engaged.

LEATHER FACING

The steel clutch cone is faced with leather, which is riveted onto it with twelve 0.156 ($\frac{5}{32}$) inch copper rivets. Beneath the leather clutch facing there are 6 steel springs which make 12 raised spots on the face of the clutch leather and which engage with the flywheel before the entire clutch face. This insures a more gradual picking up of the load than would be the case if these raised spots were not present. The clutch facing is 2 inches wide and ¼ inch thick, making the maximum outside diameter of the cone with the facing applied 13.75 (13¾) inches. The angle of the leather cone remains unchanged so that it is the same as that of the steel, 12.5 (12½) degrees.

CLUTCH HUB

The clutch is carried upon a two pieced hub, the clutch rear hub being slidably mounted upon the splined portion of the transmission main drive shaft and is the piece through which the power is transmitted from the clutch cone to the transmission system. The clutch front hub is bolted to the clutch rear hub by means of four 0.4375 ($\frac{7}{16}$) inch studs and nuts. The clutch front hub serves to transmit the thrust of the clutch spring to the clutch cone. The clutch rear hub is supported only upon the splined shaft. The clutch front hub is supported through the medium of the clutch front hub bushing upon the clutch spring support. The clutch front hub and the clutch rear hub are both malleable iron castings. The bushing in the clutch front hub is made from number 26 S. A. E. bronze, has 1.626 ($1\frac{5}{8}$) inches outside diameter, 1.4275 ($1\frac{7}{16}$) inches inside diameter and 1.625 ($1\frac{5}{8}$) inches length. The clutch front hub is piloted into the clutch rear hub so as to insure proper alignment of the clutch assembly whenever re-assembled.

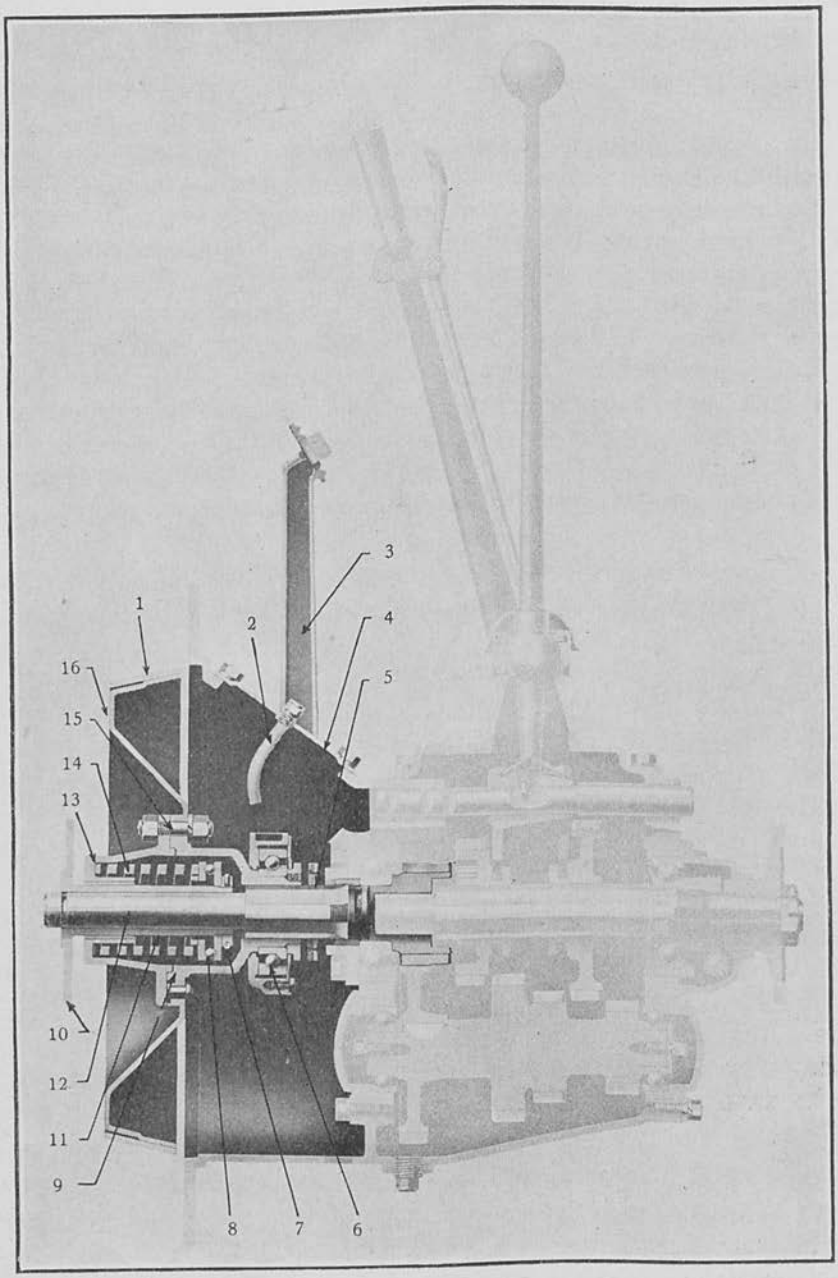
CLUTCH SPRING SUPPORT

The clutch spring support is a steel forging of tubular shape with a large flange at one end. The latter is 5.125 ($5\frac{1}{8}$) inches in diameter and is bolted onto the rear facing of the flywheel by six 0.5 ($\frac{1}{2}$) inch bolts equally spaced. This flange not only holds the clutch spring support piece on the flywheel but also retains the annular ball bearing, which supports the front end of the transmission main drive gear shaft. The outside diameter of the tubular portion of the clutch spring support is 1.405 ($1\frac{27}{64}$) inches ground within the limits of plus or minus 0.001 inch. Upon this the clutch front hub slides and also rotates when the clutch is disengaged. At the rear end of the clutch spring support there is a 1.3125 ($1\frac{5}{16}$) inch by 20 U. S. form thread, upon which the clutch spring supporting nut is screwed. This nut is of the spanner type provided with two slots, and is locked in place by means of a spring locking wire of number 11 (0.0907 inch) B. & S. gage spring wire. This nut clamps the rear ball thrust bearing race onto the clutch spring support, but does not permit of any change in the adjustment of the clutch spring tension.

THE CLUTCH SPRING

The clutch spring can not be adjusted for tension with the design of the clutch spring fastening provided here. Therefore, the spring must be designed for the proper tension before it is inserted in the clutch. The standard spring is made from 0.3125 ($\frac{5}{16}$) inch square steel with an inside diameter of 2 inches and an outside diameter of 2.625 ($2\frac{5}{8}$) inches. The overall length of the clutch spring when exerting its normal pressure of 350 pounds is 3 inches. The spring,

PLATE 44



SECTIONAL DRAWING OF CLUTCH

PLATE 44

CLUTCH—SECTION

Ref. No.	Part No.	Name
1	A580	Clutch facing.
2	A729	Thrust bearing oiler.
3	A665	Clutch pedal.
4	A662	Clutch hand hole cover.
5	A570	Clutch brake assembly.
6	A632	Clutch throwout bearing assembly.
7	A710	Clutch spring support nut.
8	A667	Clutch spring thrust bearing.
9	A583	Rear hub.
10	A709	Clutch spring support.
11	A660	Front hub bushing.
12	A615	Main drive gear assembly.
13	A661	Front hub.
14	A666	Clutch spring.
15	A664	Clutch bolt.
16	A579	Clutch cone.

however, must be made from such steel as will permit it, while giving 350 pounds compression at 3 inches, to be compressed to 2⅛ inches before it is closed. The ends of the spring are ground square in order to prevent putting an unequal thrust upon the ball thrust bearing and front clutch hub.

CLUTCH THROWOUT

The clutch throwout thrust bearing is mounted upon the rear end of the clutch rear hub to which it is clamped by the thrust hub nut, a ring nut of the spanner type with 1.9375 ($1\frac{15}{16}$) inches diameter by 16 U. S. form thread, which screws onto the rear end of the clutch rear hub. After the clutch throwout thrust bearing has been clamped in place with the thrust hub nut a 0.1875 ($\frac{3}{16}$) inch hole is drilled through the thrust hub nut and the threads on the rear clutch hub, and then the two tapped out with 0.25 (¼) inch U.S. tap. Then a 0.25 (¼) inch headless set screw is inserted which serves to positively lock the thrust hub nut and the clutch throwout thrust bearing onto the clutch rear hub. The clutch throwout thrust bearing is a standard New Departure Number 0210 Radax bearing which is carried in a malleable iron throwout thrust bearing container, on either side of which trunnion pins are integrally cast. The clutch throwout yoke has hooked ends, which engage with these trunnion pins when the clutch is assembled in the transmission unit. A pocket is cast on the upper side of the clutch throwout thrust bearing container into which oil is fed through the oil cup and tube provided on the clutch inspection plate and thus it finds its way to the clutch throwout ball thrust bearing. A

pressed steel retaining washer is fastened onto the rear side of the clutch throwout thrust bearing container to help retain the lubricant in this bearing and to keep dust and dirt out of it. The back of the clutch thrust hub nut is carefully finished because it presses against the clutch brake.

The clutch brake is fastened to the front bearing cover of the transmission and is pressed out by two spiral springs so as to engage the rear face of the clutch thrust nut when the clutch is disengaged. The clutch brake is faced with Raybestos fabric, which is held upon the clutch brake stamping by six 0.1875 ($\frac{3}{16}$) inch rivets. The clutch brake is 2.75 ($2\frac{3}{4}$) inches in diameter, has a 1.5625 ($1\frac{9}{16}$) inch hole through it and is 0.125 ($\frac{1}{8}$) inch thick.

NO ADJUSTMENT OF CLUTCH

The clutch can not be adjusted on account of the design of the spring fastening. Neither can the clutch face be cleaned or the leather treated with Neatsfoot oil at monthly periods without first removing the transmission unit. This is due to the peculiar construction of this unit power plant and hence the clutch leather should be carefully inspected and soaked in Neatsfoot oil whenever the occasion arises to remove the transmission from the engine and thus make it convenient to do so.

REMOVING TRANSMISSION

In order to remove the clutch it is first necessary to remove the transmission unit from the engine. To do this first disconnect the universal joint attached to the rear end of the transmission. Before removing the bolts holding the transmission unit onto the engine, the clutch throwout yoke must be removed. In order to do this the clutch inspection plate, which is held in place with four 0.375 ($\frac{3}{8}$) inch cap screws, is first taken off. Then, by means of an "S" wrench, the two clutch yoke lock screws, which are 0.375 ($\frac{3}{8}$) inch S. A. E. cap screws having 90 degree points and which are located on either side of the clutch throwout yoke, have to be backed off about six or eight turns, after which it is possible to withdraw the pedal shaft on the left hand side of the transmission and then the stub shaft on the right hand side of the transmission, both of which hold the yoke in place. The yoke will then remain in place on the clutch when the transmission unit is withdrawn from the engine.

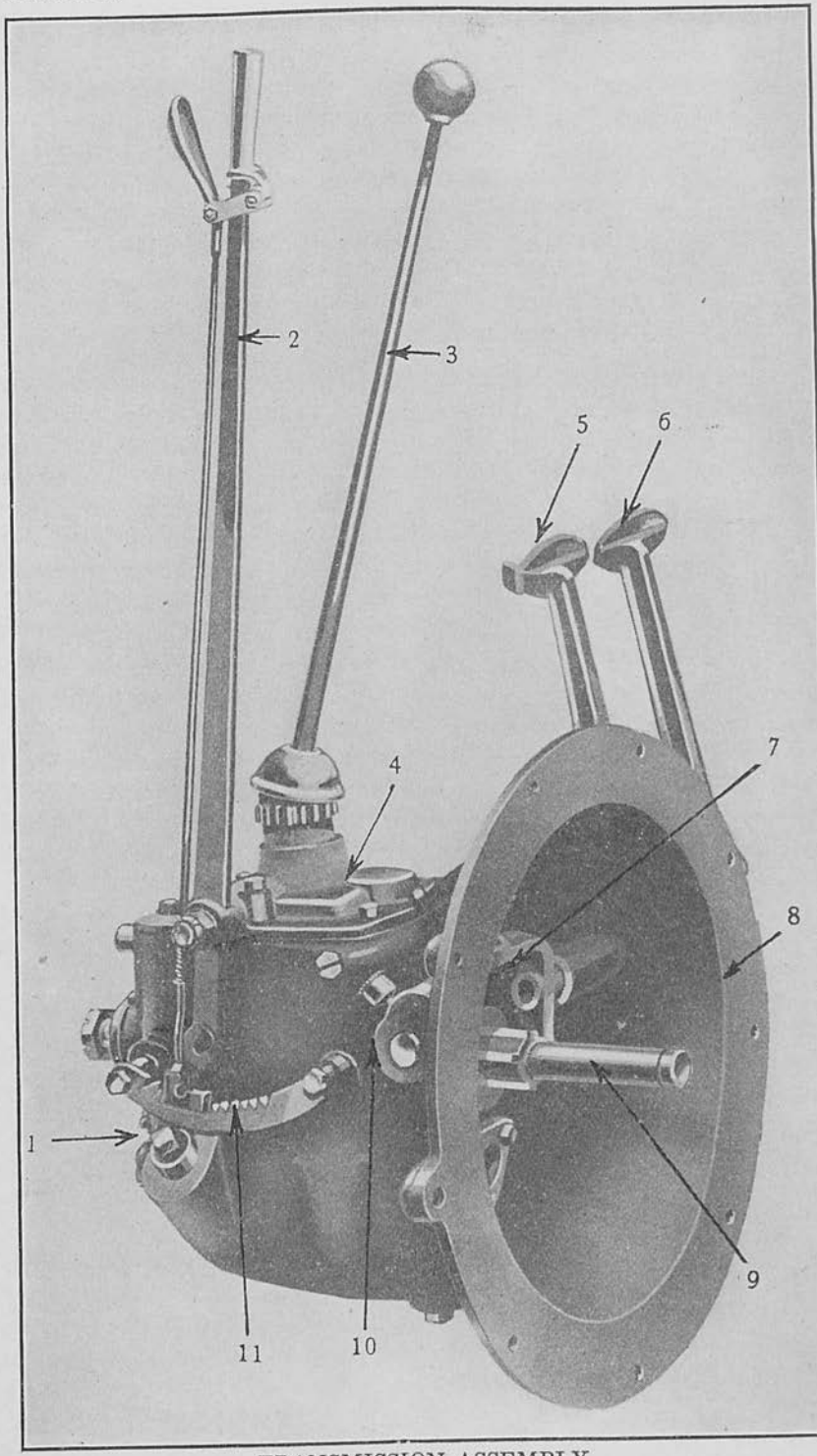
Next disconnect the universal joint at the rear of the transmission. To do this remove the 6 bolts holding the flange of the forward universal joint to that on the rear end of the transmission. The joint may then be slid back far enough to clear the nut on the rear end of the transmission main drive shaft and the propeller shaft lowered so that the transmission can be withdrawn. Next disconnect the brake rods from the emergency brake lever and the foot pedal.

When this has been done, the five 0.375 (3/8) inch and the two 0.5 (1/2) inch cap screws are removed from the flange holding the transmission to the rear end of the engine. Care must be taken not to allow the transmission weight to drop down upon the main drive gear shaft, which extends into the clutch when these bolts are removed. Always block up the transmission from beneath during this operation. Having removed all the bolts holding the transmission to the engine, the whole transmission unit will have to be backed up about 7 inches before it entirely clears the rear end of the clutch rear hub and can be lowered.

TO REMOVE CLUTCH FROM ENGINE

After the transmission unit has been removed, it is comparatively easy to get to the clutch. If it is desired to remove the clutch from the engine, proceed in the following manner. Loosen up the four nuts on the clutch rear hub, which serve to hold the two halves of the clutch hub together. In loosening up these nuts be sure to loosen them up uniformly, otherwise there will be a tendency to put excessive strain on the tightest one of the studs to which these nuts are fastened as the full spring pressure remains on them. Before the nuts are entirely off their studs, the inner clutch hub will have bottomed on the flange of the clutch spring retainer and the strain from the spring removed from these nuts. They may then be taken off easily and the entire rear clutch hub and cone clutch itself removed from the engine. With the clutch cone off, it is possible to get at the nuts which hold the clutch spring retainer in place on the flywheel when it is desired to remove this. It is only necessary to take out these nuts when wishing to withdraw both the clutch front hub and the clutch spring retainer together.

PLATE 45



TRANSMISSION ASSEMBLY

PLATE 45

TRANSMISSION—SHOWING CLUTCH SHIFTER YOKE AND SHIFT

Ref. No.	Part No.	Name
1	A720	Transmission filler plug.
2	A555	Emergency brake lever.
3	A591	Control lever.
4	A656	Transmission cover plate.
5	A651	Brake pedal.
6	A665	Clutch pedal.
7	A670	Clutch throwout yoke.
8	A655	Transmission housing.
9	A616	Transmission drive gear shaft.
10	A718	Clutch pedal shaft.
11	A650	Emergency brake ratchet.

CHAPTER V

TRANSMISSION UNITS

CHAPTER CONTENTS

TRANSMISSION GEAR SHIFT
PROPELLER SHAFT
UNIVERSAL JOINTS
TIRE PUMP

TRANSMISSION ASSEMBLY

The transmission units comprise the following assemblies: The 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 the rear axle, the two universal joints located one on either end of the propeller shaft, which transmit the power and at the same time allow for variation in the constant displacement of the shafts of the transmission and the rear axle relative to one another and the power tire pump.

TRANSMISSION PRINCIPLE

The transmission gear shift unit consists of a combination of gears mounted upon shafts, and the whole contained in a cast iron housing, the forward end of which is flared out so that it may be attached to the bell housing of the engine. The function of the transmission is to alter the tractive effort at the road wheels or the ratio between the engine and the wheel revolutions. The gears might be considered as levers, and in the transmission a variation in the leverage is obtainable by varying 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 gears in the rear axle and the internal gears in the rear wheels.

The transmission is of the selective sliding gear type and provides three forward speeds and one reverse. The different speeds are obtained by shifting either one of the two sliding gears, the high and intermediate or the low and reverse shift gear.

RELATION OF TRANSMISSION SHAFTS AND GEARS

There are essentially three shafts in the transmission unit although one of them, the main drive shaft, is divided into two parts, the first called the main drive gear shaft and the second the main drive shaft or "splined" shaft. These two shafts rotate about the same axis but are not connected together although the latter is supported at its front end by a roller bearing located in the rear end of the former. The other two shafts are the countershaft, which in this case is forged as an integral part with three of the countershaft gears, and the reverse idler shaft.

The power from the clutch is delivered to the transmission through the main drive gear shaft. The power transmitted through the transmission is delivered to the rear drive system through the main drive shaft, and the universal joint companion flange attached to it. The main drive shaft and the countershaft are both carried upon ball bearings, while the reverse idler shaft is stationary.

The cast iron transmission case is made up in two parts, of which the cast iron case proper houses the gears and supports the shafts, while the transmission case cover is in the form of a small cast iron plate located on the top of the transmission case and provides support for both the gear shift and emergency brake levers.

An opening is provided on the side of the transmission case to which the Kellogg tire pump is attached and which makes use of the reverse idler pinion as a means of driving the tire pump when required.

OPERATION OF TRANSMISSION

The operation of the transmission can not be clearly understood until one has clearly in mind the location of the various gears and their name. The main drive gear is located in the front end of the transmission and receives the power direct from the clutch. It drives the countershaft driven gear with which it is constantly in mesh, hence these two gears are sometimes called the "constant mesh" gears. On the countershaft there are three other gears beside this countershaft driven gear. They vary in size according to the number of teeth which they contain, the largest one being next to the countershaft driven gear and called the high speed countershaft gear. The others are the low speed gear and the reverse pinion which are correspondingly smaller in the order named. On the main or "splined" shaft there are two gears which are mounted so as to slide backward and forward

on the shaft, but compelled to rotate with the shaft on account of the four splines with which it is provided. These gears are called the high and intermediate shift and the low and reverse shift gear, the latter being the larger diameter one of the two. The former is the smaller of the two and also contains an internal gear that provides for the high speed drive.

HIGH SPEED GEAR

When the gears are engaged so as to give the high speed position, the drive is from the main drive gear shaft through the internal gears of the high and intermediate shift gear and thence through the main or "splined" shaft to the universal joint on the propeller shaft. In this position the countershaft is running idle without transmitting any power.

INTERMEDIATE OR SECOND SPEED

On intermediate, low and reverse speeds the power is not transmitted direct from the main drive pinion to the main drive shaft but passes from the main drive pinion through the countershaft driven gear to the countershaft and then to the main drive or "splined" shaft through the particular sliding gear selected. In this case the intermediate or second speed gear has been selected, and the drive is from the countershaft through the countershaft intermediate gear to the high and intermediate shift gear, thence to the main drive shaft and universal joints.

FIRST OR LOW SPEED

On the first or low speed the power is transmitted to the countershaft in the same manner as on second speed, but the high and intermediate shift gear is now in neutral and not engaged with any gears, while the low and reverse shift gear is engaged with the low speed gear on the countershaft.

REVERSE

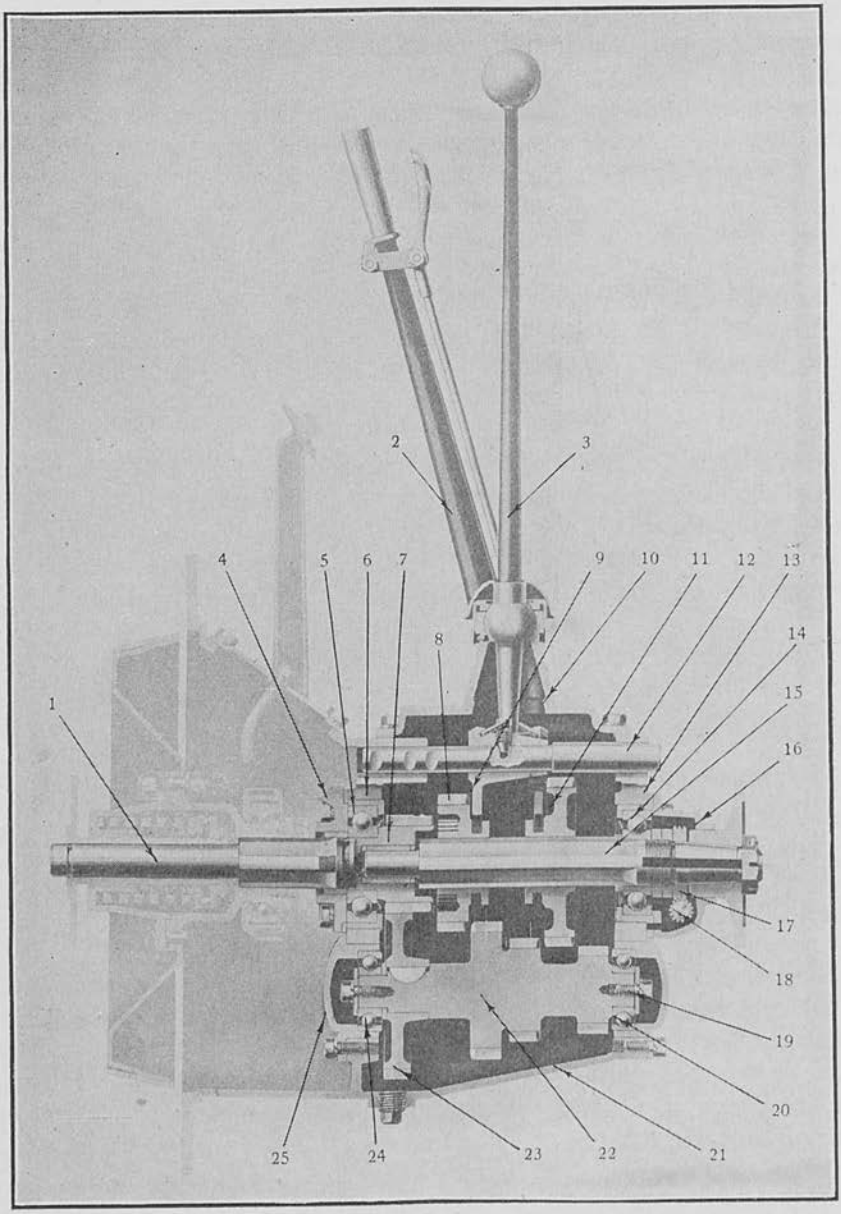
The reverse is obtained in the same way as the low speed save that an intermediate or reverse idler gear is introduced between the reverse pinion on the countershaft and the low and reverse shift gear on the main shaft. The additional gear in the transmission system reverses the direction of rotation of the main drive shaft and hence the direction of motion of the car.

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. With the gears used in the 1-Ton Chassis, the following reductions are obtained in the transmission:

Direct or high	1.000 to 1
Intermediate or second	1.875 to 1
Low or first	3.025 to 1
Reverse	3.885 to 1

PLATE 46



TRANSMISSION SECTIONAL DRAWING

PLATE 46—TRANSMISSION

Ref. No.	Part No.	Name
1	A615	Main drive gear assembly.
2	A552	Emergency brake lever.
3	A590	Control rod assembly.
4	A607	Main drive gear bearing cap.
5	A617	Main drive gear bearing, rear.
6	A686	Main drive gear rear bearing container.
7	A706	Main shaft bearing, front.
8	A692	High and second sliding gear.
9	A690	High and second shifter fork.
10	A655	Transmission case cover.
11	A700	Low and reverse sliding gear.
12	A691	High and second shifter shaft.
13	A705	Main shaft rear bearing container
14	A628	Main shaft bearing, rear.
15	A625	Main shaft assembly.
16	A703	Main shaft rear bearing cap.
17	A640	Speedometer drive gear.
18	A641	Speedometer driven gear.
19	A684	Countershaft thrust washer.
20	A682	Countershaft bearing.
21	A655	Transmission case.
22	A602	Countershaft.
23	A601	Countershaft driven gear.
24	A682	Countershaft bearing.
25	A678	Countershaft bearing cap.

With the standard rear axle reductions the following total reductions from the engine to the wheels are obtained:

Direct or high ..... 7.16 to 1
Intermediate or second ..... 13.40 to 1
Low or first ..... 21.65 to 1
Reverse ..... 27.80 to 1

With the engine running at 1200 revolutions per minute the following road speeds will be obtained with the gear ratios given below:

Direct or high ..... miles per hour 17.95
Intermediate or second ..... do do do 9.60
Low or first ..... do do do 5.95
Reverse ..... do do do 4.64

Note that in case of a bad hole being encountered 25 per cent more tractive effort can be obtained by using the reverse than the low speed.

TRANSMISSION SHAFTS

There are four separate transmission shafts, the main drive gear shaft, the main or "splined" shaft, the countershaft and the reverse idler gear shaft.

MAIN DRIVE GEAR SHAFT

The main drive gear shaft is made from nickel steel, is 11.125 (11 1/8) inches overall and is forged integral with the main drive gear of the transmission. The forward end of this shaft is carried on a ball bear-

TABLE OF GEAR DIMENSIONS

ORDNANCE 1-TON TRUCK CHASSIS (COMMERCE)
MODEL 1918

Name of Gear	No. of Teeth	Diameter of Gear		Width of Gear	Bore of Hub
		Pitch	Outside		
Main Drive Gear	16	2.666 ($2\frac{21}{32}$)	2.937 ($2\frac{15}{16}$)	0.750 ($\frac{3}{4}$)	Integral with main drive shaft
Countershaft Driven Gear.....	30	5.000	5.250 ($5\frac{1}{4}$)	0.750 ($\frac{3}{4}$)	1.255 ($1\frac{1}{4}$)
High and Second Speed Sliding Gear.....	23	3.833 ($3\frac{53}{64}$)	4.080 ($4\frac{1}{16}$)	0.875 ($\frac{7}{8}$)	1.25 ($1\frac{1}{4}$)
Low and Reverse Speed Sliding Gear.....	29	4.833 ($4\frac{53}{64}$)	5.065 ($5\frac{1}{16}$)	.0875 ($\frac{7}{8}$)	1.25 ($1\frac{1}{4}$)
Countershaft Intermediate Gear.....	23	3.833 ($3\frac{53}{64}$)	4.080 ($4\frac{1}{16}$)	0.875 ($\frac{7}{8}$)	Integral with countershaft.
Countershaft Low Gear.....	17	2.833 ($2\frac{53}{64}$)	2.080 ($3\frac{1}{16}$)	0.875 ($\frac{7}{8}$)	Integral with countershaft.
Countershaft Reverse Pinion.....	14	2.333 ($2\frac{21}{64}$)	2.562 ($2\frac{9}{16}$)	0.875 ($\frac{7}{8}$)	Integral with countershaft.
Reverse Idler Gear.....	15	2.500 ($2\frac{1}{2}$)	2.750 ($2\frac{3}{4}$)	0.875 ($\frac{7}{8}$)	1.25 ($1\frac{1}{4}$)

All gears have 6-8 pitch Fellows stub tooth gears with 20 degree involute form. The gear teeth are all beveled to give easy engagement on the side where they mesh. All gears are 3.5 ($3\frac{1}{2}$) per cent nickel steel with 40-50 point carbon content.

ing located in the center of the flywheel. The rear end, immediately ahead of the gear, is supported by a Number 1308 New Departure ball bearing. The shaft is held in place by means of a spanner nut which clamps the inner ball race of this bearing between the front side of the gear and the nut. The nut is of the spanner type and is 0.625 (5/8) inch long and is held on the main drive gear shaft by 1.575 (1 9/16) inches diameter by 20 left hand U. S. form threads. The outside of this nut is provided with a coarse thread which acts as an oil retainer and does not wear like a felt washer commonly used for this purpose. The shaft is provided with four splines just forward of this nut to receive the drive from the clutch rear hub, which is broached to fit over these splines. The outside diameter of the splines is 1.562 (1 9/16) inches and the inside diameter of the shaft between the splines is 1.237 (1 1/4) inches. The latter portion is ground to ± 0.001 inch. The splines are 0.370 (3/8) inch wide.

MAIN OR "SPLINED" SHAFT

The main shaft, like the main drive gear shaft, is carried upon a 1307 New Departure ball bearing located at the rear end of the transmission case. In this construction the main or "splined" shaft is designed so that the inner race of the rear ball bearing may be clamped, thus retaining the shaft accurately located relative to the transmission case. Two nuts 1.375 (1 3/8) inches diameter by 20 U. S. form threads are used at this point. The shaft is made from nickel steel and is 11.594 (11 19/32) inches long. There are four splines on the shaft 0.371 (3/8) inch wide and the shaft is 1.5 (1 1/2) inches outside diameter over the splines and 1.247 (1 1/4) inches between the splines. The shaft is ground between the splines. At the rear end a 0.3125 (5/16) inch square key is used to drive the universal joint companion flange and a 1 inch by 20 thread slotted nut to hold this flange in place.

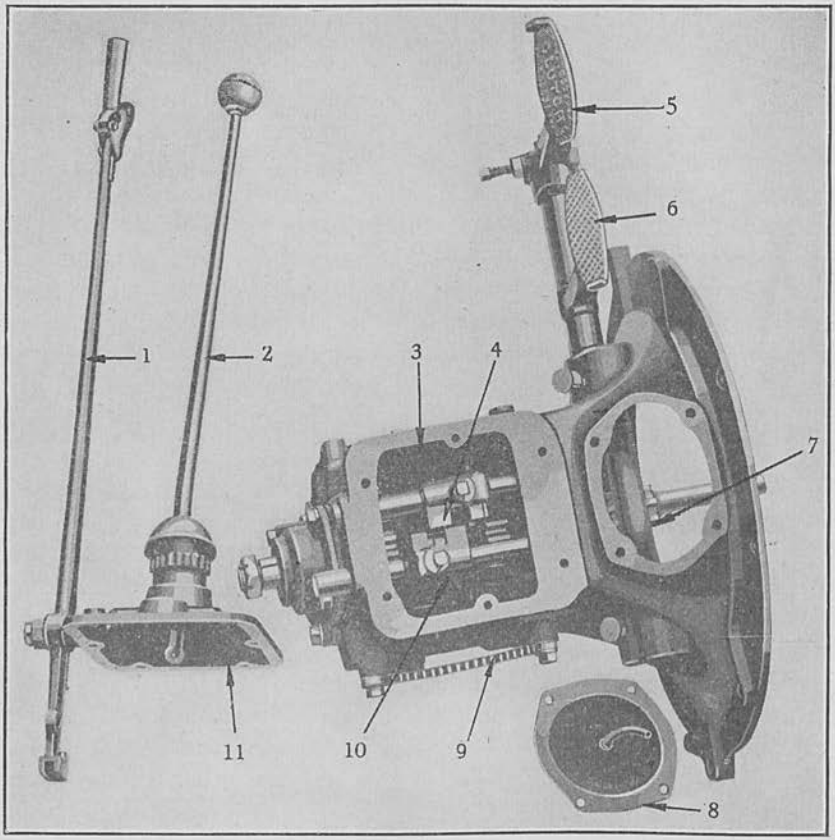
REVERSE IDLER GEAR SHAFT

The reverse idler gear shaft is located in the lower left hand side of the gear box and is 4.0625 (4 1/16) inches long and 0.9835 (1) inch in diameter. The shaft is hardened and ground and held in place in the gear box both as to location and to prevent rotation by means of a small 0.125 (1/8) inch thick punching of steel, located on the back of the gear box and held in place by means of a 0.375 (3/8) inch cap screw with lock washer. The flat piece of steel rests in a slot cut in the rear end of the reverse idler shaft. This slot provides a very convenient means of withdrawing the reverse idler shaft when that is necessary.

COUNTERSHAFT AND GEARS

The countershaft is forged integral with three gears, the intermediate, low speed gears and the reverse pinion. The countershaft driven gear is keyed and pressed onto the forward end of the counter-

PLATE 47



TRANSMISSION PARTIALLY DISASSEMBLED

Ref. No.	Part No.	Name
1	A555	Emergency brake lever.
2	A591	Control lever.
3	A655	Transmission case.
4	A690	High and Intermediate shifter rod fork.
5	A665	Clutch pedal.
6	A651	Brake pedal.
7	A670	Clutch shifter yoke.
8	A662	Clutch hand hole cover.
9	A650	Emergency brake ratchet.
10	A698	Low and reverse shifter rod fork.
11	A656	Transmission cover plate.

shaft forging. The countershaft is mounted upon two Number 1305 New Departure ball bearings, which are carried in retainers located in either end of the gear box. The inner races of the two countershaft bearings are clamped to the countershaft by means of cap screws and washers. The countershaft driven gear, which is pressed onto the countershaft forging, is further prevented from working off endwise by means of a washer placed between it and the front ball bearing inner race.

The reverse idler gear is carried upon plain bearings. Two bushings of bronze are pressed into either end of the reverse idler forging. These bushings are 0.6875 (11/16) inch long, 1.25 (1¼) inch outside diameter and 0.98 (63/64) inch inside diameter. Oil grooves are provided in these bushings to insure the lubrication of them.

CONTROL LEVERS

The control levers are located in the transmission cover plate, which is attached to the top of the transmission by six 0.375 (⅜) inch cap screws. There are two control levers mounted on the transmission cover plate, the gear shift and the emergency brake.

GEAR SHIFT LEVER

The gear shift lever is provided with a 1.497 (1½) inch diameter hardened steel ball, which is pinned to the lever by a 0.25 (¼) inch pin and serves as the center about which the lever may be moved. The lower end of the lever engages directly with the slots in the gear shifter forks located in the body of the transmission. The upper end of the lever is capped by a hard rubber ball. In order to prevent the gear shift lever from rotating about its axis, the pin provided to hold the ball in place is extended on either side and engages with a 0.2655 (7/64) inch slot in the cover plate. The upper end of the cover plate is made in the form of a socket into which the ball fits. The ball is held down in its socket by a gear shift lever cap washer of hardened steel. The latter is also held in place by the gear shift lever cap, a 14 gauge (0.078 inch) steel stamping which screws down over the outside of the gear shift lever support. It is prevented from rotating by a spring lock located on the inside of the cap. A shield is placed over the top of the gear shift lever cap to prevent dirt and water working down into the gear shift lever ball and socket joint.

GEAR SHIFTER RODS

The gear shifter rods are located in the top of the transmission case immediately beneath the gear shift lever. The rods slide in the transmission case. The gear shifter forks, which hold the sliding gears in place as well as move them in and out of engagement, are fastened to the gear shifter rods by means of special tapered set screws.

INTERLOCKING DEVICE

An interlocking device is provided in the transmission case between the two gear shifter rods so that it is impossible to shift both rods at the same time, thereby preventing the meshing of two or more gears at once and causing the stripping of the teeth on them. The shifter rods are also provided with spring actuated ball stops to hold the gears in mesh after the proper gear has been engaged.

EMERGENCY BRAKE LEVER

The emergency brake lever is mounted on a stud screwed into the transmission cover plate. The emergency brake lever is provided with a hand latch at the top and a ratchet at the bottom, by means of which it is possible to lock the emergency brakes in whatever position is desired, thereby providing a means of holding the truck on a grade.

SPEEDOMETER DRIVE

The cap over the rear bearing housing on the 1-Ton Chassis carries a speedometer drive shaft. The drive shaft is provided with a small gear which meshes with a worm gear pressed onto the rear end of the transmission main drive or "splined" shaft. This speedometer drive eliminates loose and exposed gears and is designed for the particular rear axle gear ratio provided on these trucks.

PEDAL ASSEMBLY

The pedals on this truck are mounted upon a 1 inch shaft which extends out on the left hand side of the transmission unit. The shaft is fastened to the clutch yoke by means of 0.375 (3/8) inch set screws. The right hand side of the clutch yoke is supported in the transmission case by a stub shaft of the same diameter as the clutch shaft but only as long as the bearing provided in the transmission case for it. Both clutch yoke shafts are held in the clutch yoke by 0.375 (3/8) inch 45 degree pointed set screws. On the outside end, or left hand end of the clutch pedal shaft is mounted a pedal adjustment hub which is prevented from rotating by a Number 9 Woodruff key and held in place by a 0.1875 (3/16) inch steel pin. The clutch pedal is mounted on this adjustment hub, which is provided with a stop screw 0.375 (3/8) inch diameter by 16 threads and is prevented from moving endwise by a 0.5 (1/2) inch diameter by 20 S. A. E. thread cap screw. The brake pedal is located on the clutch pedal shaft and kept in its proper position by means of tubular pieces located on either side of it. Both the pedals are the same length and are cast from malleable iron.

REPAIR OF TRANSMISSION

TO REMOVE TRANSMISSION

To remove transmission follow the instructions given on page 108 for the removal of the transmission in order to get at the clutch.

It is necessary to remove the entire transmission in order to get the countershaft out of it, but it is unnecessary to remove the entire transmission if only the two sliding gears have to be replaced.

TO DISASSEMBLE TRANSMISSION

When the transmission has been removed from the chassis, the following procedure is necessary in order to remove the gears from the transmission. First, remove the cover plate which gives access to the gear shifter rods immediately. Take out the set screws which are fastened in the gear shifter yokes and prevented from turning by wires. Then take out the interlock screws located on either side of the transmission case and withdraw the transmission interlock balls and springs. Then carefully block up the transmission gears so that the shifter rods may be driven out without moving the shifter forks. When in this position a 0.5 (½) inch rod may be inserted through the bell housing end against the shifter rods, and these driven out ONE AT A TIME. When they have been removed, the shifter forks may readily be withdrawn through the opening provided in the top of the transmission case. It should be noted that the shifter rods are provided with a shoulder so that they cannot be driven out from the rear end of the transmission *but must be driven from the front or bell housing end.* To remove the sliding gears, it is now only necessary to take off the cap screws holding the rear bearing housing in place and press the main drive or "splined" shaft out of the rear end of the transmission. The entire bearing housing and the ball bearing may come out. The bearing housing cover plate and the bearing only, need be removed.

The main drive gear shaft is removable in the same way except that nothing is to be gained by removing the bearing housing when taking out the shaft and its ball bearing.

Removing of the two bearing housings at the ends of the countershaft is necessary before the latter shaft can be withdrawn.

CARE AND INSPECTION OF TRANSMISSION

The transmission assembly should be treated like any enclosed gear train, getting a constant supply of clean lubricant at specific intervals. The transmission housing, or case, should be drained, flushed with kerosene and refilled with lubricant every 1,000 miles.

The transmission rarely gives any trouble, except when not lubricated, or when injured, due to poor driving. The usual troubles are due to wear of the shaft bearings, disalignment of shafts, chipped gears and jumping out of a speed position.

IF SHIFTER LEVER JUMPS OUT OF SPEED POSITION

Drivers may be careless in shifting gears, due to haste in getting away, or inexperience, and do not realize the enormous leverage between the upper end of the gear shift lever and the transmission. Forcing a gear in place may bend the shifter fork in the transmission, in which case the transmission has a tendency to jump out of speed, especially under load. When this jumping out of gear is noticed, and before opening transmission, look at the small shifter interlock balls which are held in place through springs by set-screws placed over each of the two shifter yoke rods. These set screws are located on each side of the transmission unit. Note whether the ball is correctly registering with the notches cut in shifter rod. It may be that the spring will gum and hold ball out of the notch, or that the notch may require additional filing, or the spring may be broken.

Filing is often necessary if the notch in the shifter rod has worn due to too little hardening. The lock ball may be worn in which case it should be replaced. If the shifter forks have been bent there will be a tendency for the interlock to bind. To correct this remove the transmission cover plate and with a crow bar straighten the bent shifter fork.

IF TRANSMISSION GETS TOO HOT

If heat is noticed in transmission the cause should be investigated at once as heat is an indication of improper lubrication. The lubricant level in the transmission should be noted by removing filler plug on the right side of the transmission case. Insufficient grease will cause wear between gears. The plug on side of case should be opened, and lubricant added until it runs out of hole. Too much lubricant will cause heating but this would only be in case the gear box was filled from the top instead of through the opening provided on the right hand side of the case.

TRANSMISSION GRINDS

Grinding noises coming from the transmission may be caused by lack of lubricant, insufficient lubricant, too thin a lubricant, shafts out of alignment, bearings worn or broken, chips in transmission case.

TRANSMISSION GEAR CHANGES DIFFICULT

Often one may find it difficult to go from one speed to another. On starting up this might be expected and is easily remedied by engaging and disengaging the clutch a few times. If it occurs in going from first to second or second to third, it may be caused by a worn clutch, or worn surface upon which clutch engages, dragging clutch caused by inoperative clutch brake or insufficient clutch release.

PROPELLER SHAFT AND UNIVERSAL JOINTS

LOCATION

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

FUNCTION OF UNIVERSALS

Universals are necessary in power transmitting lines to correct for relative motion of the two units connected. Thus, an axle moves up and down, due to inequalities in the road, altering its up-and-down relation to the transmission. If a propeller shaft were rigidly connected to both transmission and axle it would bend or break with movement of the axle. The universals allow the propeller shafts to move up and down or sideways, if necessary (universal movement or movement in any direction.)

PROPELLER SHAFTS

The propeller shaft extends from the transmission to the rear axle. This shaft is tubular between the universal joints to prevent any tendency for it to whip, which a long shaft like this would do if of small section and solid. This tubular shaft has 3 inches outside diameter with a 0.156 ($\frac{5}{32}$) inch thickness wall.

The overall length of the tube is 57.8125 ($57\frac{13}{16}$) inches and it is welded to stubs, which are upset on each of the universal joint ends. The front end is upset from 1.25 ($1\frac{1}{4}$) to 3 inches and the rear one from 1.375 ($1\frac{3}{8}$) to 3 inches.

CONSTRUCTION OF UNIVERSALS

The outside ends of the two joints are identical and consist of drop forged steel plates with lugs, or forks, formed on one side. These plates are bolted to the flanges, which are secured on the tapered ends of the transmission "spline" shaft and the rear axle bevel drive pinion. The inner parts of these joints are identical as to forked portions, but the rear one is forged integral with the propeller shaft stub, while the front one has a long hub which is key-seated to fit the splined end of the propeller shaft and on which it slides freely.

This type of universal joint consists mainly of two pairs of forks with open ends. A spider having four arms slips into these open ends. These arms fit loosely in the fork and a bushing, which fits each snugly, is slipped into the forks from the outside. These bushings fit the open forked ends so closely that they cannot come out through the open side. Thus, they hold the spider in place. A small wire spring fits in a groove cut into the bushing and into a groove in the fork in this manner, holding the bushing from sliding out of place.

PLATE 48

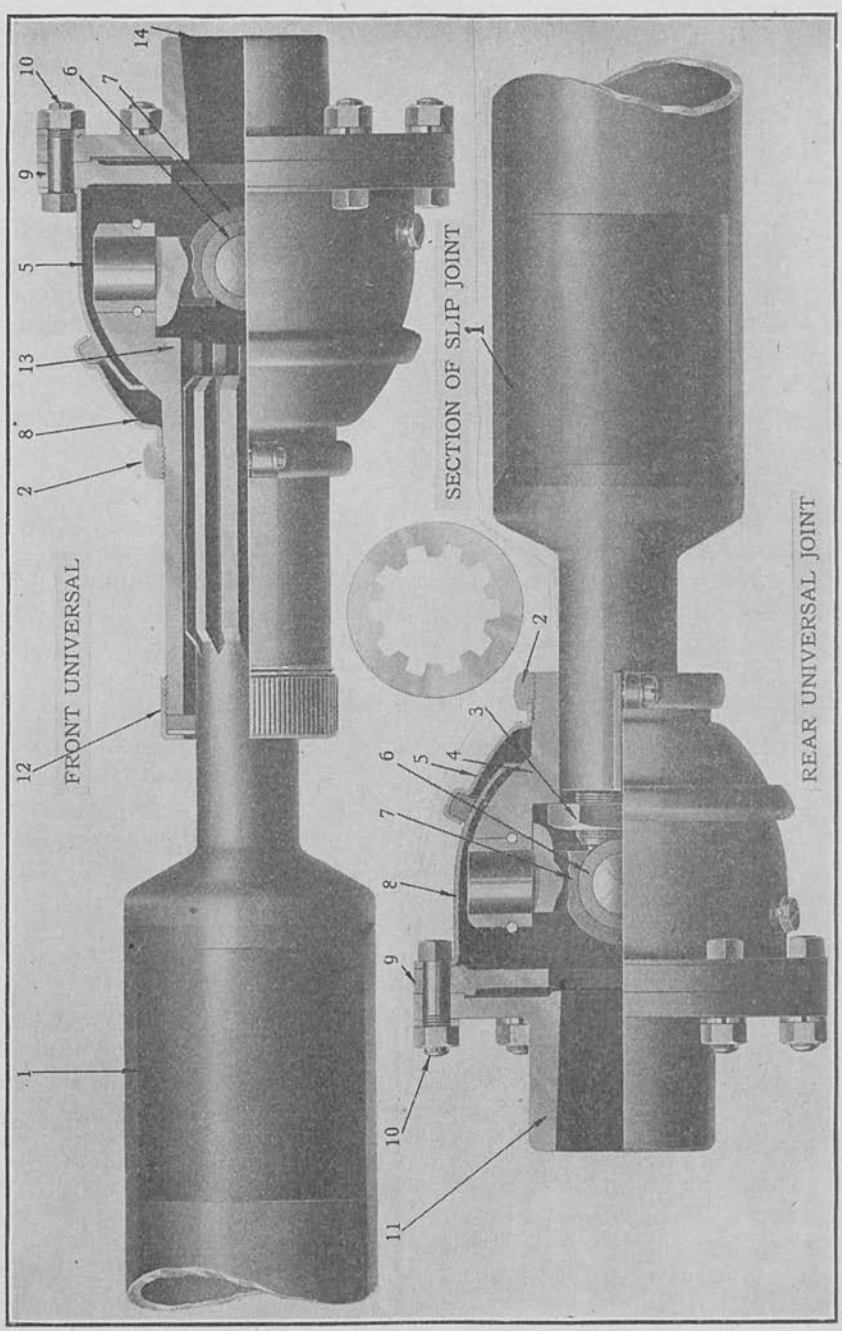

FRONT UNIVERSAL
SECTION OF SLIP JOINT
REAR UNIVERSAL JOINT
1
2
3
4
5
6
7
8
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11
12
13
14

PLATE 48

PROPELLER SHAFT AND UNIVERSAL JOINTS

Ref. No.	Part No.	Name
1	A1552	Tubular shaft assembly.
2	A1570	Lock nut.
3	A1597	Shaft nut, rear.
4	A1581	Ball yoke, rear.
5	A1559	Casing (outside).
6	A1556	Bushing.
7	A1557	Bushing retainers.
8	A1558	Casing (inside).
9	A1568	Flange yoke
10	A1565	Flange bolt.
11	A1599	Special companion flange, rear.
12	A1563	Dust cap.
13	A1573	Sleeve yoke, front.
14	A1574	Special companion flange, front.

The plate portions of the joints are of drop forged steel 5 inches outside diameter with six holes drilled for 0.3125 ($\frac{5}{16}$) inch bolts, which hold them onto the flanges attached to the transmission and rear axle shafts. The forked portions of the universal joints are drop forgings. The forward one is welded to the tubular propeller shaft, the rear one terminates in a hub which is broached to receive the ten splined forging that is welded to the forward or upper end of the tubular shaft. This hub is about 4 inches long. Its rear end is threaded on the outside onto which is screwed a cap containing felt packing. This prevents the grease from working out at this end.

UNIVERSAL HOUSING

A pressed steel housing encloses each of these joints for the retention of grease. It is made in two portions. The outside part has a groove formed in it containing a felt ring. A split ring threaded on the inside fits around the hub of the forked end and is designed to push this outside portion of the housing up onto the inner portion, thus keeping the felt washer always in close contact with the inner housing. The outside ends of these inner housings are bolted to the plate ends of the joints. The inner ends of outside housings fit around the hubs of the forked portion of the joints. The function of the propeller shaft is to carry the power from the clutch to the transmission through universal joints. The propeller shaft is 70.875 (70⅞) inches long, center to center of forked ends. The whole assembly from face of forward universal plate to face of rear universal plate is 73.375 (73⅜) inches.

POWER DRIVEN TIRE PUMP

PLATE 49

POWER TIRE PUMP

Ref. No.	Part No.	Name
1	A2492	Out valve.
2	A2486	Cylinder assembly.
3	A2504	Inlet valve.
4	A2507	Piston rings.
5	A2502	Piston.
6	A2508	Wrist pin.
7	A2488	Oil hole cover plate.
8	A2498	Connecting rod assembly.
9	A2470	Base assembly.
10	A2510	Air intake screen cover (name plate).
11	A2500	Connecting rod bushing.
12	A2482	Crankshaft assembly
13	A2474	Crankshaft thrust ring.
14	A2484	Sliding gear.
15	A2478	Shifter lever.
16	A2497	Oiling felt.

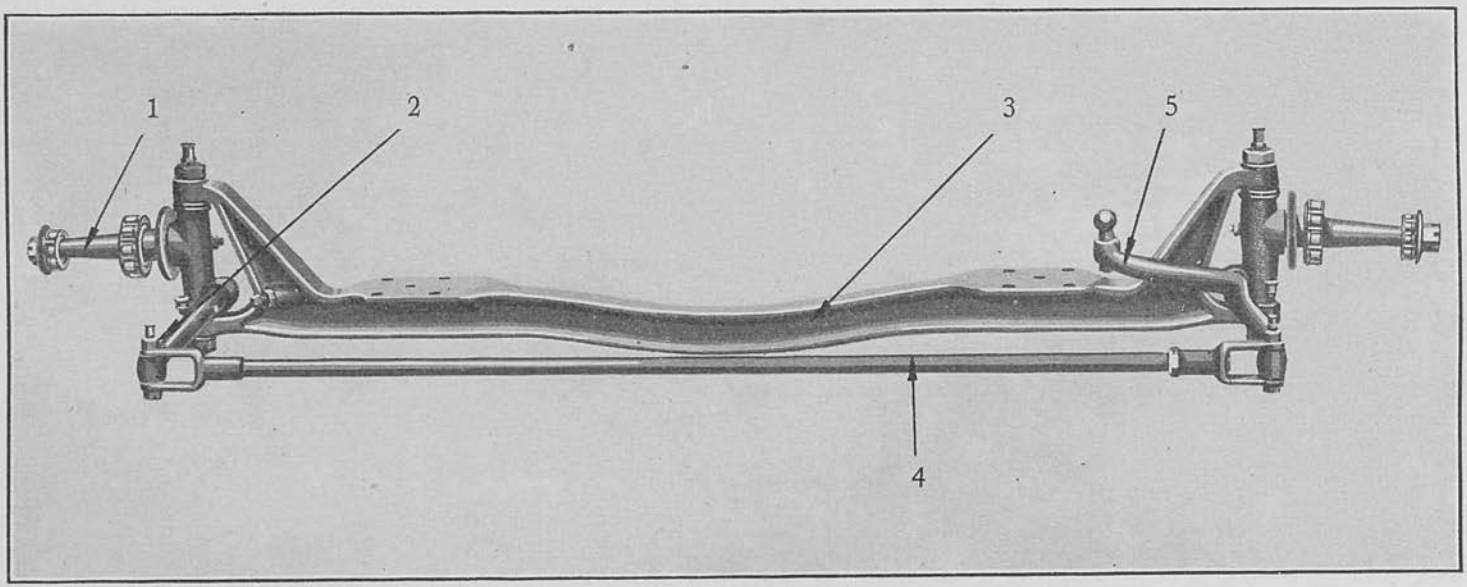
CARE OF UNIVERSALS

Too much cannot be said on lubrication in general, and of the universal joints in particular. There are only two joints, they are easily accessible and can be filled without trouble in a short time, when they need grease. By either unscrewing nut and drawing back dust cap, or removing plug and using a grease gun, lubricant can be introduced in them quickly. At least once a week, when operating, this should be done. Be careful to replace universal joint housings after they have been removed for the inspection of the joints.

Should a rattling sound occur when running it shows that one of the housings has slipped back and the grease may become lost while running, not to consider the damage which may be done to both housing and universal joint bushings.

TIRE PUMP

The engine driven tire pump is of the Kellogg make and is bolted on the left hand side of the transmission case. The pump gear is designed to slide on the main pump shaft and, when the pump is in operation, this gear meshes with the reverse idler gear in the transmission case. It is of the piston type, having a bore 1.75 (1¾) inches and a stroke of 1.75 (1¾) inches. The intake and exhaust valves are both of the poppet type and are 0.437 ($\frac{7}{16}$) inch in diameter. The piston is fitted with four special air-tight rings. The copper tubing leading from the pump is the 0.312 ($\frac{5}{16}$) inch size. In operation it takes 6½ minutes to inflate the 36 x 6 inches tire tubes with the engine running at a speed of 1200 revolutions per minute. The pump is thrown in and out of operation by a rod which projects up through the floor boards.



FRONT AXLE COMPLETE

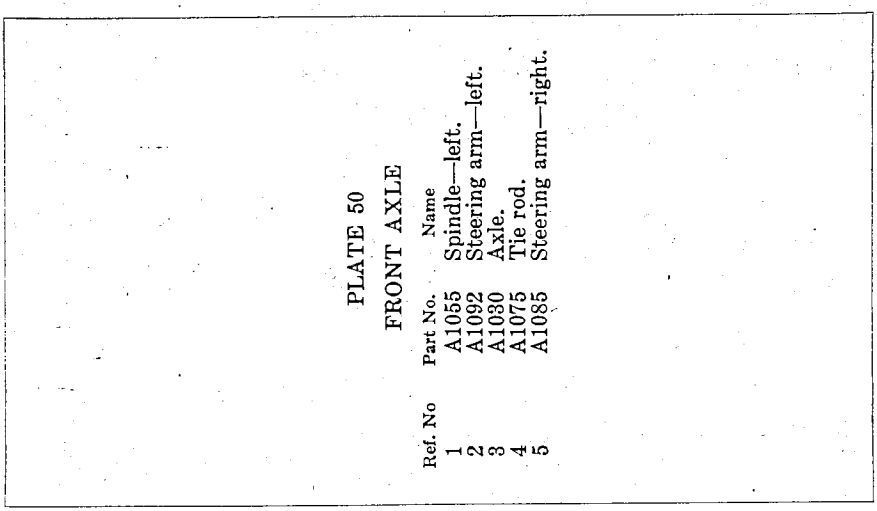


PLATE 50
FRONT AXLE

Ref. No	Part No.	Name
1	A1055	Spindle—left.
2	A1092	Steering arm—left.
3	A1030	Axle.
4	A1075	Tie rod.
5	A1085	Steering arm—right.

CHAPTER VI

CHAPTER CONTENTS

FRONT AXLE
REAR AXLE

AXLES

Two axles are used on the 1-Ton Chassis, both of which are of steel and "I" beam type. The front axle follows conventional truck design and provides the means for steering. The rear axle propels the truck and is of the so-called internal gear type. The latter is equipped with an M. & S. differential. These three units, front axle, internal drive rear axle and M. & S. differential, constitute the axle assemblies.

FRONT AXLE

The front axle is made from a single piece drop forging which forms the bed of the axle and upon which the chassis springs rest. To it are also attached the right and left hand steering spindles, the king bolts about which they turn, the single and double steering arms and the tie rod.

The bed of the axle is "I" section with the upper portion of the "I" section widened out to form the spring seats or pads. From the spring seats to the fork of the Elliott type steering knuckle there is an increase in the width of the top flange of the "I" section forging from 1.5625 (1 9/16) inches to 2.5 (2½) inches in order to get the additional strength at the point where it is subject to the most severe stresses. The cross section of the axle at the center where it has been dropped 1.5 (1½) inches is 2.375 (2⅜) inches height, 1.5625 (1 9/16) inches width and 0.3125 (5/16) inch thickness. In that section of the

front axle between the spring seat and the steering knuckle fork, the thickness of the metal has been increased from 0.3125 (5/16) to 0.375 (3/8) inch and, as mentioned above, although the upper portion of the "I" section has been increased in width, the lower has been maintained the same as before. On either side of the front axle there are set screws which act as stops to prevent clamping the steering wheels until they scrape the inside of the mud guards, the frame or injure the tires. These set screws are standard U. S. 0.4375 (7/16) inch by 4 thread U. S. form and are 1.75 (1¾) inches long.

STEERING SPINDLES

The steering spindles located on either side of the front axle are not interchangeable and, when they have to be replaced, should be designated as right or left. This difference in the steering spindles is due to the angle of the spindle with relation to the axis of the king bolts and also to the taper in the boss where the steering arm is attached. The king pins of the steering knuckle are vertical but the steering wheel spindles are dropped or inclined downward 2.5 (2½) degrees. This brings the point of contact with the wheel on the ground more nearly under that of the axis of the steering knuckle king pin, thus making for easier steering with a large tire, such as these vehicles are equipped with.

The steering knuckle spindles are ground so as to receive the Bower roller bearings upon which the front wheels are mounted. The inside roller bearing is a Number 308 AXL and the outside one Number 305 AXL Bower make. The diameter of the spindle for the inside and outside bearings is respectively 1.574 (1 9/16) inches and 0.9836 (63/64) inch. A 0.875 (7/8) inch by 14 U. S. castellated nut is used to hold the wheels in place on the axle. The steering arms which are inserted in the steering spindles are prevented from turning by a Number 9 Woodruff key. The steering arms are inserted in a taper hole of 1.0625 (1 1/16) inches maximum diameter and having a taper of 1.5625 (1 9/16) inches per foot. 0.75 (¾) inch by 16 S. A. E. castellated nuts are used to hold the steering arms in the steering spindles.

In the design of the axle used on the 1-Ton Chassis the king bolts, which connect the axle and the steering spindle, are fastened to the latter and turn in bronze bushings that have been pressed into the ends of the axle forks. A thrust collar is inserted between the upper fork arm and the steering spindle to carry the load. The king bolts are prevented from turning by introducing a 0.375 (3/8) inch by 16 U. S. set screw which engages with 0.3125 (5/16) inch slot cut with a Number "C" Woodruff key in the side of the king bolts. This screw is prevented from loosening up by a lock nut which may be

reached from the outside. The king bolts are 0.749 (¾) inch in diameter and are 8.9375 (8 15/16) inches long over the head of the bolt. The head is hexagonal in shape and measures 1.375 (1⅜) inches across the flats. On the side of the king bolts there is a 0.3125 (5/16) inch slot made with a Number "C" Woodruff key cutter for the purpose of locking the king bolt to the steering spindle. The center of the Woodruff key cutter is 3.375 (3⅜) inches below the bottom face of the king bolt head. At the bottom there is a 0.75 (¾) inch by 16 S. A. E. thread onto which a S. A. E. castellated nut is screwed. The top and bottom portions of the king pin bolts are grooved to permit the introduction of oil into the bushing in the fork ends of the axle. At the top the groove portion is 1.375 (1⅜) inches long and at the bottom 0.6875 (1 11/16) inches long.

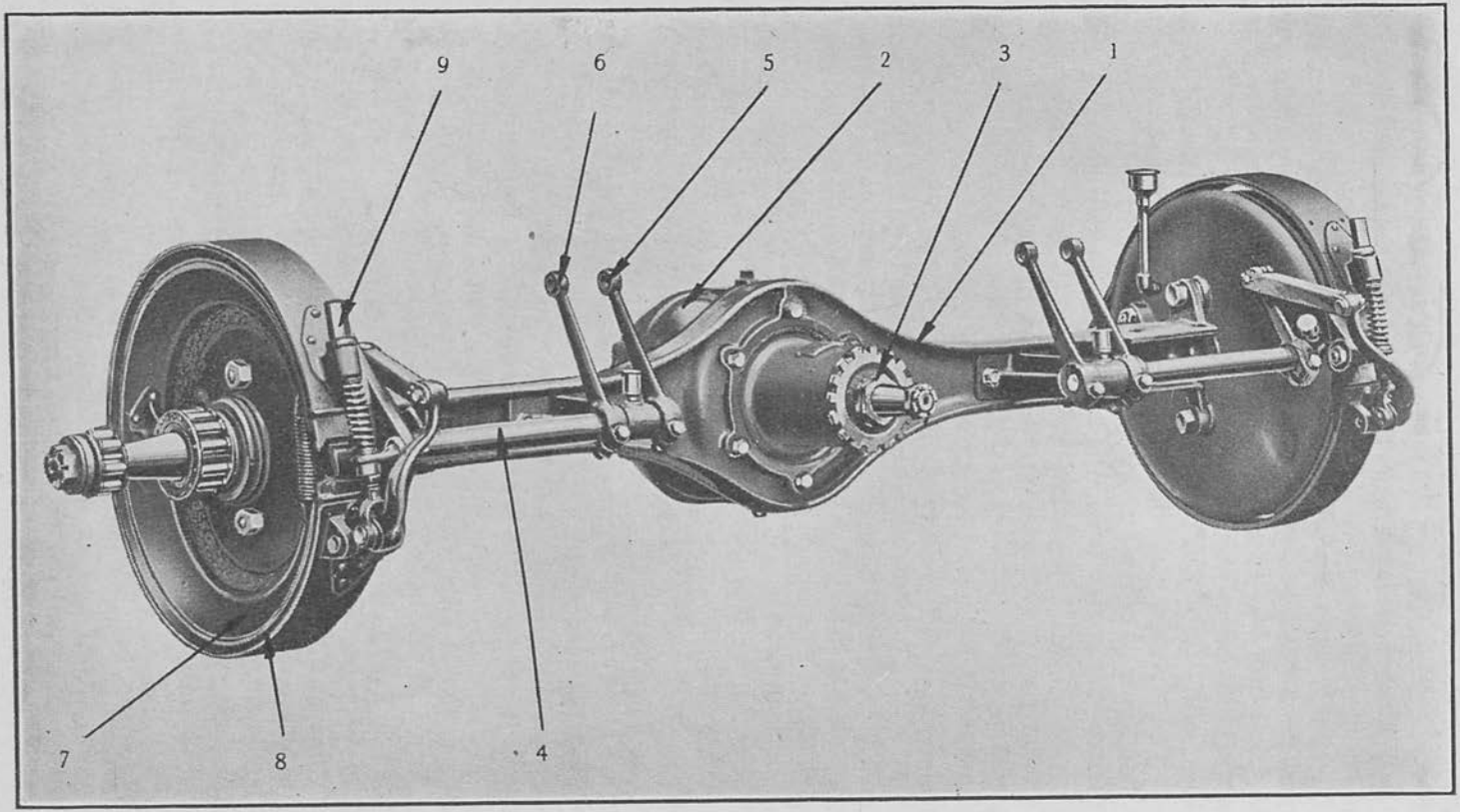
The single arm of the steering gear is on the right hand side of the axle and the double arm on the left hand side of the axle. The two lower arms are connected through yokes by the tie rod. The upper arm on the left hand side connects with the drag link through which the movement of the steering gear is transmitted to the front wheels. A 1.125 (1⅛) inch ball is inserted on the upper side of the double steering arm to which the drag link is attached. This ball is not integral with the steering arm but is attached to it with 0.75 (¾) inch diameter extension having a 1.25 (1¼) inches taper per foot. It is drawn down into the taper hole by a 0.5 (½) inch by 20 S. A. E. castellated nut.

The tie rod is provided with yokes at either end which are threaded onto the tie rod proper. The left hand tie rod yoke is loose on the tie rod while the right hand yoke is brazed onto the tie rod after it has been screwed in place. A check nut is provided to keep the left hand yoke tightly clamped, although there is little chance of its getting loose. The tie rod is a 0.875 (⅞) inch diameter tube with a 0.125 (⅛) inch wall. It measures 48.625 (48⅝) inch overall and its ends are plugged with 3.75 (3¾) inches long plugs which are brazed in place before the threads are cut on the ends of the tie rod. These threads are 0.875 (⅞) inch by 18 U. S. form.

The yokes are fastened to the steering arms by means of tie rod bolts which are 3.665 (3 1/16) inches long overall and 2.52 (2½) inches long under the head. They are ground to ± 0.001 and are 0.5 (½) inch in diameter. At their lower end they have a 0.5 (½) inch by 20 U. S. form thread onto which a U. S. slotted nut is screwed.

FRONT AXLE LUBRICATION

The front axle has six places besides the wheel bearings which have to be lubricated. Two of these are the steering yoke pins and the other four are the bushings in the forked ends of the axle bed.



REAR AXLE COMPLETE

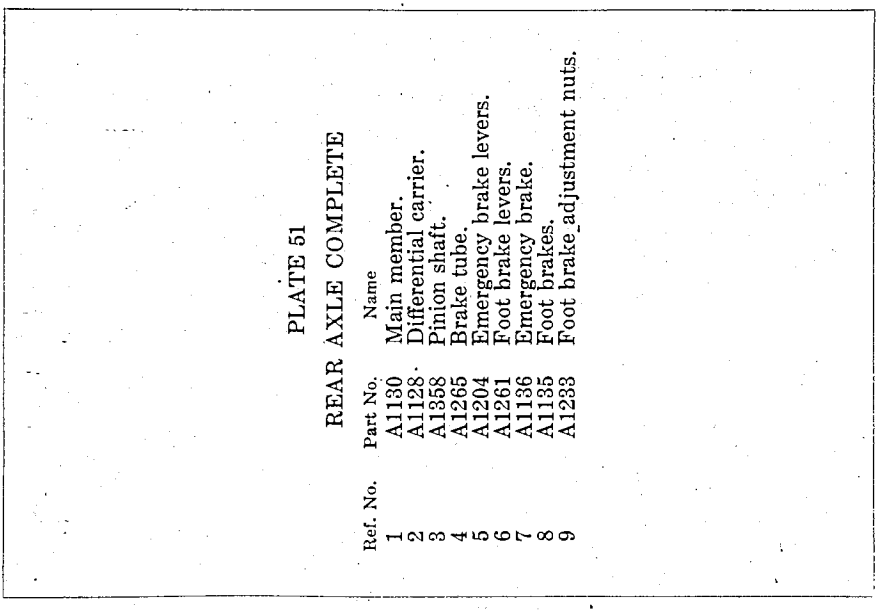


PLATE 51

REAR AXLE COMPLETE

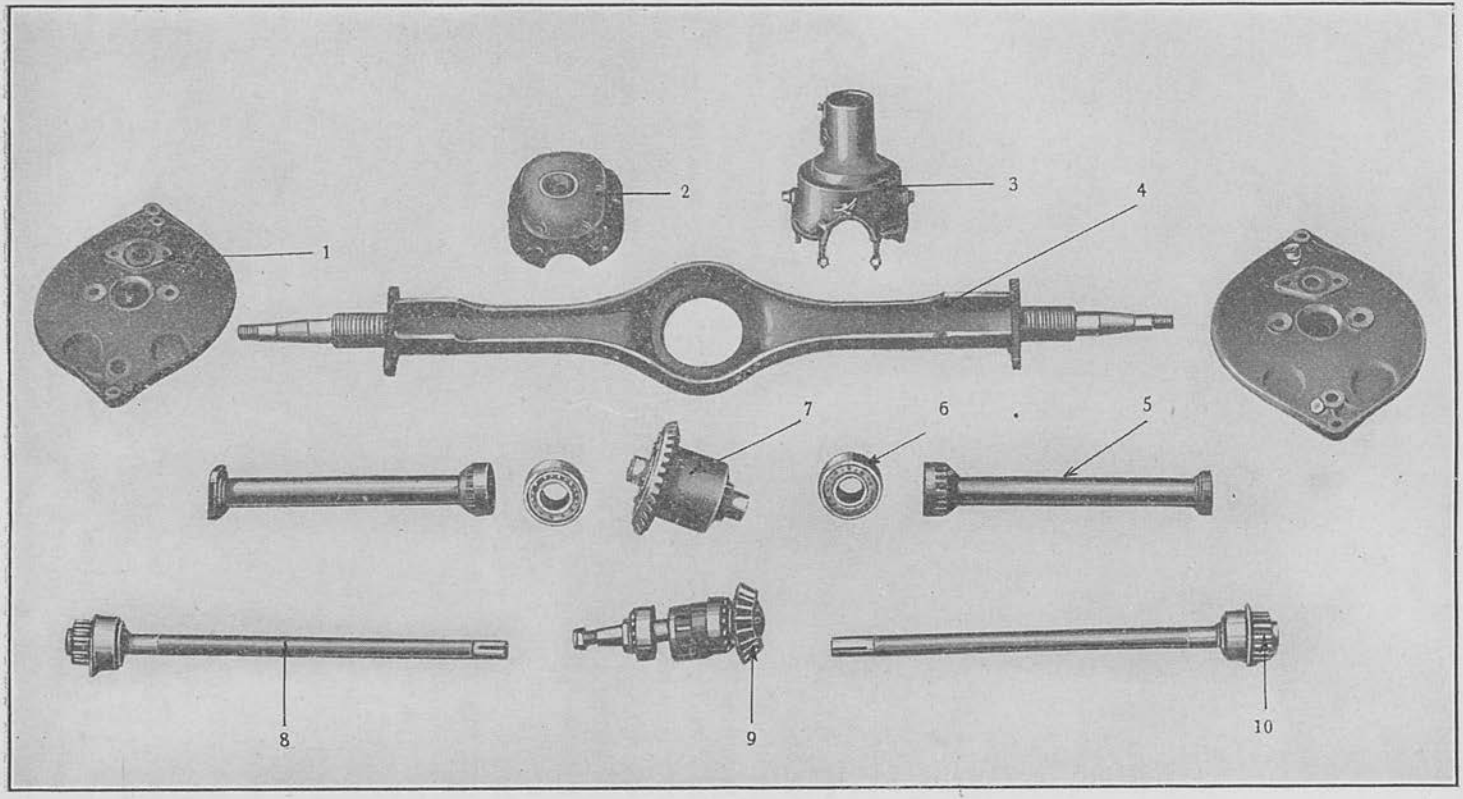
Ref. No.	Part No.	Name
1	A1130	Main member.
2	A1128	Differential carrier.
3	A1358	Pinion shaft.
4	A1265	Brake tube.
5	A1204	Emergency brake levers.
6	A1261	Foot brake levers.
7	A1136	Emergency brake.
8	A1135	Foot brakes.
9	A1233	Foot brake adjustment nuts.

Oil cups 0.125 (⅛) inch iron pipe size are provided to lubricate all these points. In the tie rod bolts a hole is drilled through the head of the bolt and the bolt is cross drilled opposite the bearing surface so that oil introduced into the cup screwed into the head of the bolt will find its way to the bearing surfaces. To further insure lubrication of this bearing between the tie rod bolt and the steering arm, a slot opposite the cross hole is provided on the side of the bolt. The upper bushing of the steering knuckle is lubricated by an oil cup screwed into the head of the king bolt. It feeds oil through a vertical hole and one drilled across the bolt for the purpose of distributing the oil to the bushings. On the lower portion of the steering spindle there is a lug cast into which another oil cup is screwed, through which oil is distributed to the lower steering fork bushing.

REAR AXLE

By eliminating the rear wheels it is comparatively easy to understand the construction of the internal gear rear axle used on the 1-Ton Truck Chassis. By referring to the parts which are shown disassembled in plate 52 on page 134, it will be seen how few the parts are which go to make up the complete axle.

The main body of the axle is a steel casting of "I" beam section, having a 5.25 (5¼) center hole through which the bevel pinion shaft projects forward. On the upper side and at the ends of the "I" beam section, the flange has been widened out to form the spring seats for the rear springs. Into each end of this casting there is inserted a chrome vanadium steel spindle upon which the rear wheel bearings are mounted.



REAR AXLE PARTS

PLATE 52

REAR AXLE PARTS

Ref. No.	Part No.	Name
1	A1254	Brake carrier—left.
2	A1165	Differential carrier cover.
3	A1128	Differential carrier assembly.
4	A1130	I beam assembly.
5	A1307	Jack shaft cover tube.
6	A1154	Differential bearing.
7	A1145	M. & S. differential assembly.
8	A1300	Jack shaft.
9	A1359	Pinion shaft assembly.
10	A1315	Jack shaft spur pinion.

These spindles are pressed into the steel casting and are pinned in place with number 8 taper pins that are driven into holes that have been drilled and reamed in place. There are two diameter seats for the rear wheel bearings on these spindles, the inside one being 1.77 (1¾) inches outside diameter and the outside one being 1.811 (1 13/16) inches outside diameter. On the outer end the hub spindle is threaded to take a 1 inch by 14 U. S. slotted nut and cotter pin. Just outside of the spring seats on either end of the casting there is a large flange to which the brake carriers are bolted.

BRAKE CARRIERS

The brake carriers are large malleable iron castings located on either end of the cast steel axle center or body. These brake carriers not only support the brakes but also the outer ends of the jackshaft tube, and protect the jackshaft and the internal drive gears. These carriers are bolted onto the axle body with two 0.625 (⅝) inch diameter bolts located 2.75 (2¾) inches out from the center of the axle spindle. Through them the torque from the rear wheels and the resistance of the brakes is transmitted to the rear springs. Hence it is very important that these bolts be always kept tight and inspected for tightness whenever the axle is taken down and reassembled or the rear wheels taken off and an examination of the gears made.

The jackshaft tube is provided with a double bolt flange and fastened onto the rear side of the brake carrier. Two 0.375 (⅜) inch bolts are used to fasten this in place. The inner ends of the jack-

shaft tubes are mounted in the differential bearing adjusters located on either side of the differential carrier housing.

THE JACKSHAFT

The jackshafts are made from nickel steel bar stock 27.75 (27¾) inches long and 1.125 (1⅛) inches in diameter. The outer end or the one on which the jackshaft pinion is mounted, is upset to 1.5 (1½) inches before it is machined. This leaves a collar against which the jackshaft bearing rides. The overall length of the finished shaft is 26.25 (26¼) inches. The portion of the shaft on which the bearing rides is 1.25 (1¼) inches long and 1.1816 (1 3/16) inches in diameter. This is slightly reduced to 1.176 (1 11/64) inches for the outside diameter of the six splines which drive the internal gear pinion. The inside diameter of this portion of the splined shaft is 0.917 (59/64) inch and the splines are 0.309 (5/16) inch wide. The splined portion of the shaft is 1.375 (1⅜) inches long and beyond the splined end there is a 0.875 (⅞) inch by 14 U. S. thread for the castellated nut which holds the internal gear drive pinion in place. At the other or inside end of the jackshaft there are six splines 1.5 (1½) inches long which slip into the differential. These splines are 0.310 (5/16) inch wide and measure 1.125 (1⅛) inches outside diameter, which is the same as the shaft at this point, and 0.917 (59/64) inch diameter between the splines.

The M. & S. differential is carried in a three-piece rear axle housing which is divided into the front and rear parts of the differential carrier and the differential cover plate which closes up an inspection opening in the rear of the differential carrier housing. All three of these castings are made from malleable iron. The differential carrier is held against the rear side of the rear axle bed by six 0.375 (⅜) inch by 16 U. S. cap screws and is located centrally with the axle body by a pilot 5.75 (5¾) inches in diameter. The front part of the differential carrier also supports the bevel pinion shaft. The differential carrier is closed by the rear part which is fastened onto the front part by six 0.4375 (7/16) inch by 14 U. S. cap screws. The plate which closes the opening in the rear part of the differential carrier is held in place by six 0.3125 (5/16) inch by 18 U. S. cap screws.

These housings should be very carefully put together and care should be taken that the same side of the casting is returned to the same position when reassembled because of the common threads which they have for the differential bearing adjusters. These differential bearing adjusters are screwed into the differential carrier on either side and have a 3.393 (3 25/64) inches by 16 U. S. form thread. The two Timken bearings number 355 which are located on either side and carry the differential are supported just inside the threads

on the differential carrier housings. The differential bearing adjusters are screwed in, from the outside, and against each one of these bearings. The differential bearing adjusters are provided with notches on the outside so that they may be prevented from turning by locks on each side of the differential carriers which fit into the notches. These locks are held in place by 0.25 (¼) inch by 20 fillister head screws and it is absolutely necessary for the safe and proper operation of the rear axle that these locks be replaced as soon as the axle has been adjusted.

ADJUSTMENT OF BEVEL GEARS

By turning the differential bearing adjusters, the mesh of the bevel gears in the rear axle can be readily adjusted. In order to mesh the differential bevel gear teeth closer, the right hand differential bearing adjuster should be backed off, that is, rotated counter-clockwise and the left hand differential bearing adjuster turned in clockwise direction until the gears have been brought to the proper depth of mesh. This can be readily observed by taking off the rear cover plate to the differential carrier housing.

BEVEL PINION SHAFT

The bevel pinion shaft is mounted upon two Bock bearings of the same diameter and size located in the forward extension of the differential carrier, front part. The bevel pinion shaft is 10.8125 (10 13/16) inches overall. It is provided with a 1.5 (1½) inch taper at both ends so as to take the bevel pinion at the rear end and the Spicer universal joint at the front end. At the front end 0.375 (⅜) inch square keyway is provided, while at the rear a 0.25 (¼) inch one. Both ends are threaded for 0.875 (⅞) inch by 14 U. S. threads. On the shaft just forward of the front bevel pinion shaft bearing there is a 1.375 (1⅜) inches by 20 thread for the bearing adjusting nuts, two of which are used and which have a lock washer placed between them to prevent their loosening up. A collar is screwed into the forward extension of the differential carrier housing and is adjusted through an opening provided in the top of this extension. The opening is closed by a small plate held in place by two 0.25 (¼) inch by 20 U. S. fillister head screws. This plate has an extension which drops into the slots in the adjustment collar to prevent it from rotating and thus getting the gears out of adjustment after the proper location has been obtained. Both the threads for the adjustment collar and for the packing collar, which screws into the end of this forward portion of differential carrier, are 3.238 (3 15/64) inches in diameter by 16 U. S. form thread. The forward Bock bearing is number 335 while the rear one is number 417. The lubricant carried in the differential carrier housing is prevented from escaping from around the bevel pinion shaft by a felt washer carried in the front end of the housing cap or packing piece.

BEVEL GEARS

The dimensions of the bevel gears used in this axle are as follows: The bevel pinion has 19 teeth, is mounted on the bevel pinion shaft which has a taper 1.5 (1½) inches per foot and a maximum diameter of 1.375(1⅜) inches. The face of both the bevel gears is 1 inch. The pitch diameter on the bevel pinion is 4.222 (4 7/32) inches and the outside diameter 4.75 (4¾) inches. The pressure angle of the teeth is 14.5 (14½) inches. The pitch cone angle on the pinion is 29 degrees 12 minutes and the outside diameter cone 33 degrees 13 minutes.

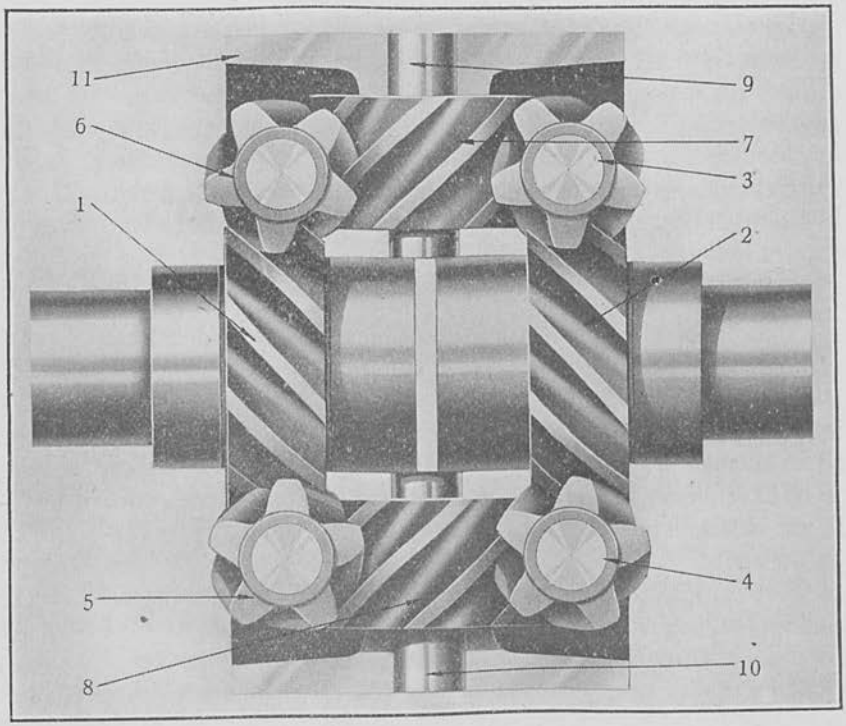


PLATE 53

M. & S. DIFFERENTIAL

Ref. No.	Part No.	Name
1, 2	A1187	Differential side gear.
3, 4, 5, 6	A1179	Compensating gear.
7, 8	A1185	Intermediate gear.
9, 10	A1186	Intermediate gear pin.
11	A1177	Differential body.

The bevel gear has 34 teeth of the same pitch and face as the pinion, but a pitch diameter of 7.555 (7 9/16) inches and an outside diameter of 7.6735 (7 43/64) inches. The pitch diameter cone angle is 60 degrees and 48 minutes. The bevel gear is riveted to the M. & S. differential by eight 0.3125 (5/16) inch steel rivets.

DIFFERENTIAL ACTION AND CONSTRUCTION

The M. & S. spiral gear differential is, with the exception of the gears used, much like the conventional bevel gear type. Forty-five degree spiral gears are used, because it is by the use of this type that nearly equal traction is gained through both rear wheels. In the bevel gear differential when one wheel is on slippery ground it gets the greatest amount of power to drive it; in other words, in a bevel differential drive the wheel with the least traction gets the most power. By means of the M. & S. spiral gear differential both wheels get equal traction, regardless of the road conditions. The action is caused by friction between the gears.

The differential is contained in the differential case, is made in two parts bolted together. A spider with two arms is secured in this case and on each of two arms is mounted a spiral pinion (7) and (8), shown on page 138. These engage with spiral pinions (3), (4), (5) and (6), four in number, which are mounted on shafts held in the case at right angles to the arms of the spider, on which the first pinion (7) is mounted. The second gears like (3) also mesh with large gears (1) and (2), known as crown gears. These crown gears have six-splines hole in them into which fit the splined ends of the jackshafts.

When road resistance is sufficient to give adhesion to each driving wheel, both wheels are equally driven, the crown wheels (1), to which they are attached, being carried bodily round by the worms (3), with which they are engaged, just as with an ordinary differential, and are carried around by the pinion 7. But when road resistance upon the wheel is reduced to a point where it loses adhesion, and would, with the ordinary differential, start spinning, nothing of this kind happens, because the angle of the worms (3) is such that, while the crown wheels (1) can drive the worms (3), the worms cannot drive the crown wheels, and, as a consequence, the differential is locked so far as any movement of the wheel in relation to the differential is concerned. The axle becomes for all practical purposes a solid one, and all the drive is taken up by the wheel, which is for the moment supported on firm ground and can take advantage of its grip.

When both wheels are on firm ground and the truck traveling freely, the differential is enabled to act in the usual manner when turning corners, by reason of the fact, already alluded to, that the crown wheels

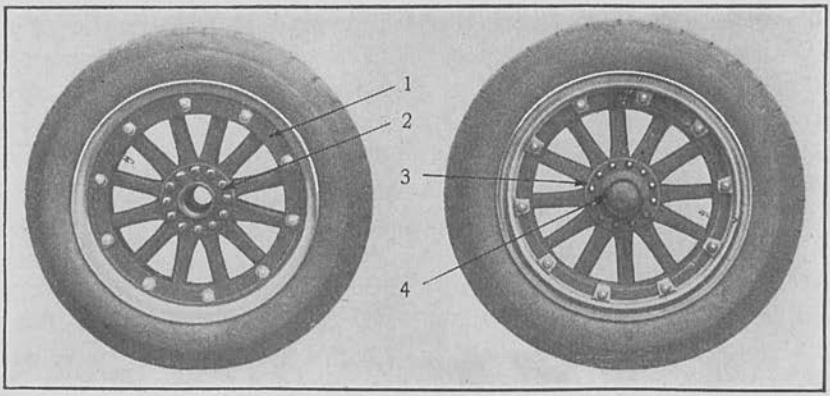


PLATE 54—FRONT WHEELS

Ref. No.	Part No.	Name	Ref. No.	Part No.	Name
1	A2101	Front wheel with felloe band.	3	A2102	Front hub bolt.
2	A1106	Front hub.	4	A1107	Front hub flange.

(1) can drive the worms (3). Each driving wheel is attached to its respective crown wheel, and when a curve in the road is followed, the outer wheel is forced by its contact with the road to travel a greater distance than the inner one. The outer wheel, therefore, revolving faster than the axle, turns the worm (3) in connection with it and so enables the central pinions (7) to act and react on the worms (3) with a differential action and to distribute the power proportionately to each wheel in the usual manner. It will be seen that the action is the same in either direction, so that the gear behaves equally well whether the truck is going forward, reversing, or is driving the engine.

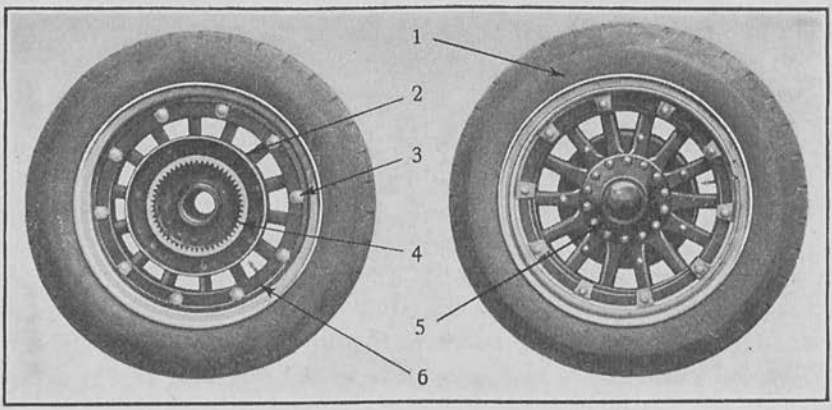


PLATE 55—REAR WHEELS

Ref. No.	Part No.	Name	Ref. No.	Part No.	Name
1		Tire	4	A1132	Internal gear.
2	A1260	Brake drum.	5	A2226	Hub flange.
3	A2103	Retainer bolt.	6	A2221	Rear wheel with felloe band.

CHAPTER VII

WHEELS, BRAKES AND TIRES

CONSTRUCTION AND CARE OF WHEELS

The front and rear wheels are not alike, but each front and rear wheel is interchangeable with its mate. They are equipped with 36 by 6 inch straight side Q. D. Demountable Firestone rims which are interchangeable on all four wheels. There is also a spare tire carried, fully inflated on the spare rim provided.

Square wood spokes are used in both front and rear wheels, their size being 1.75 (1¾) inches in both wheels, but twelve spokes are used in the front and fourteen in the rear.

The spokes are mounted upon malleable iron hubs and have twelve hub flange bolts in front and fourteen in the rear. In addition the rear wheels have seven brake drum bolts which relieve the hub from a large part of the braking and driving stresses.

The demountable tire rim are held upon the wheels by ten lugs on bolts which may readily be removed when it is desired to change a tire. Rounded hub caps protect the outside ends of the wheel hubs. The front one is screwed in place and the rear one held by four screws.

WHEEL BEARINGS

The wheels both front and rear are mounted upon Bower roller bearings. The sizes of those in the front wheel are for the inner and outer races, respectively Nos. 308 and 305 AXL, while for the rear wheels Nos. 309 and 306 NX.

Felt washers in retainers are employed to keep the grease in the wheel hubs and prevent the entrance of water and dirt.

REASON FOR REMOVING REAR WHEELS

After driving for a long time in the mud or in the sand the wheels should be removed and the dirt cleaned out of brake bands and internal gear mechanism and new grease used in wheels. While this may appear extravagant, bearings may grind out or the brakes fail when needed most if dirt and grit are permitted to accumulate.

TO REMOVE WHEELS

One of the most difficult operations in the removal of truck wheels is the actual removal of the wheel from the axle, after the hub cap, etc., have been removed. Wheel pullers should always be used if possible.

The removal of the wheel, *after loosening up on taper*, ordinarily requires the services of two men. After removing the hub cap, spindle nut and washer, two bars about seven-eighths of an inch in diameter should be inserted through the spokes of the wheel. These bars should

be at least two feet long. One man on either side of the wheel may lift the wheel from the spindle easily. The axle bed should be firmly mounted on suitable jacks or wooden blocks to safely sustain the weight of the truck during this operation.

TO REPLACE WHEELS

Before replacing the wheel, internal gear chamber should be thoroughly cleaned from all oil, grease and dirt, the bearings washed in kerosene and both bearings and ring gears liberally supplied with lubricant. If new felts have been inserted in the packing retainers, it may be necessary to place a piece of tin or strap iron around the felts to so

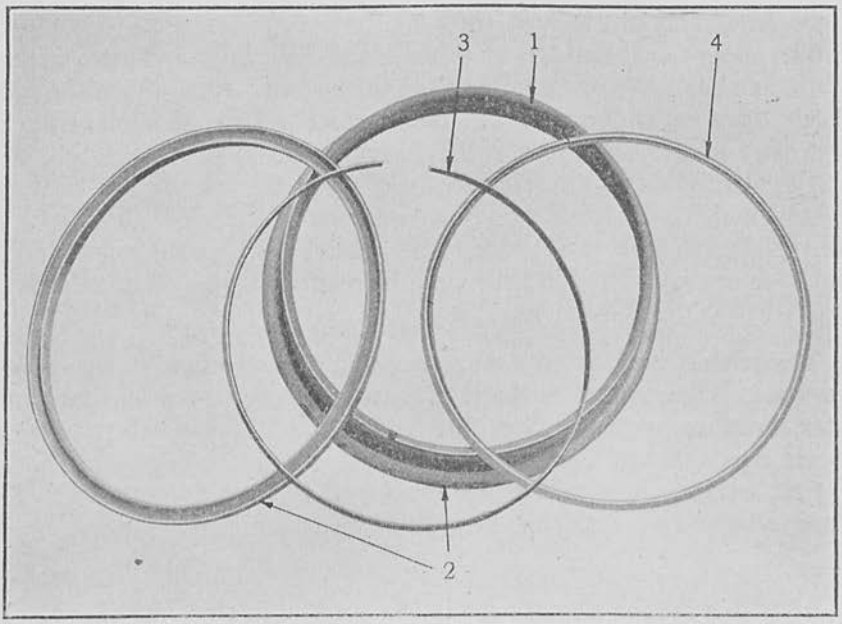


PLATE 56—WHEEL RIM CONSTRUCTION

Ref. No.	Part No.	Name
1	A2231	Rim base.
2	A2232	Side rings.
3	A2233	Clamping ring.
4	A2234	Locking rings.

decrease their diameter as to permit the brake drum of the wheel easily passing over them. The wheel bearings should be tightened firmly and then released one turn, thus giving the necessary freedom to the bearings and eliminating the possibility of their breakage.

If the following precautions are taken in the removal of wheels, very little difficulty will be experienced:

1. Don't use a pipe wrench for the removal of front hub caps. Use special wrench in tool equipment, furnished for this purpose.

2. Don't rock wheel to loosen bearing. Lift it up slowly and front bearing can be removed easily.

3. Don't place bearings and lock nuts on ground. Put them in a clean box or in a clean cloth.

4. Don't attempt to remove wheel by forcing with a crowbar or other leverage against some part of the axle or frame. Use wheel puller if not readily removed.

5. Don't put bearings back in place unless they are absolutely free of dirt or grit, and see they are thoroughly lubricated with No. 5 grease.

6. Don't put bearing in place without examining carefully to see that it is intact and no parts broken.

7. Don't depend on brake to hold a truck that is jacked up. Chock the wheels resting on the road.

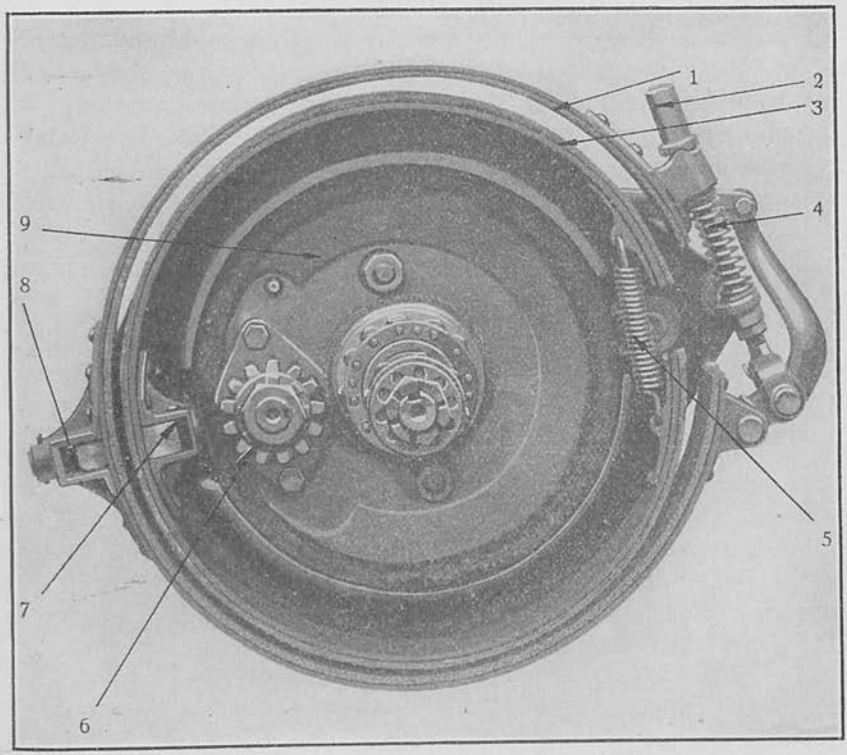


PLATE 57—REAR AXLE BRAKES

Ref. No.	Part No.	Name
1	A1211	External brake band lining.
2	A1191	Internal brake band lining.
3	A1233	External brake adjusting nut.
4	A1229	External brake release spring.
5	A1200	Internal brake band spring.
6	A1315	Rear axle drive pinion.
7	A1194	Internal brake anchor.
8	A1214	External brake anchor.
9	A1254	Brake carrier—left.

DO NOT TURN WHEELS WHEN STANDING

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

BRAKES

The brakes provided on the 1-Ton Truck chassis are both located on the rear axle and operate on common drums. The outside brake is of the contracting or constricting type and clamps the outside of the brake drum. The inside brake is also the band type but expands outward, clamping the inside of the brake drum. It is operated by means of a cam, while the outside brake is operated through a lever mechanism.

BRAKE DIMENSIONS

The outside brakes are operated by the foot pedal and therefore are commonly designated as the running brakes since they are the most used on account of their convenient pedal operation. The internal, or emergency brakes are operated by the brake lever, and as the name designates, are used for emergency stops, when the foot brakes are ineffective or when the truck has to be held on a grade in the absence of the driver.

The outside diameter of the brake drums is 15 inches and the outside brake band has a face width of 2.5 (2½) inches. The inside brake band is 2.25 (2¼) inches in width and expands against the 14.5 (14½) inches inside diameter brake drum.

ADJUSTMENT OF BRAKES

The internal brake can only be adjusted by changing the length of the rods connecting the emergency brake levers, and when the brake lining has worn down to a point where this adjustment is useless, the internal expanding bands will have to be refaced with asbestos fabric. The external contracting or running brakes are provided with a nut adjustment which will take up the wear on the brake lining up to the point where they have to be renewed.

RELINING BRAKES

Should the brake band lining become considerably worn, due to service, or become saturated with grease or other foreign substances which impair its usefulness, it will then be necessary to replace it. This can best be done by removing the entire brake band assembly by punching out the rivets and the insertion of new lining of proper thickness. The rivet ends should be deeply imbedded in the brake lining to prevent scoring of the brake drum. It will no doubt be necessary to lengthen brake rods to insure proper clearance between brake drum after inserting new lining.

The asbestos facing required for these brakes is 0.25 (1/4) inch thick and 2.5 (2 1/2) inches wide for the outside band and 2.25 (2 1/4) inches wide for the inside band. The total developed length of the pieces of asbestos fabric necessary for these brakes is 45.75 (45 3/4) inches for the outside brake and 42.0625 (42 5/8) inches for the internal brake. Each of the brake linings is held onto its particular band by 0.213 (7/32) inch tubular brass rivets of which 23 are required on the outside or contracting band and 20 on the internal contracting band.

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 truck is in motion.

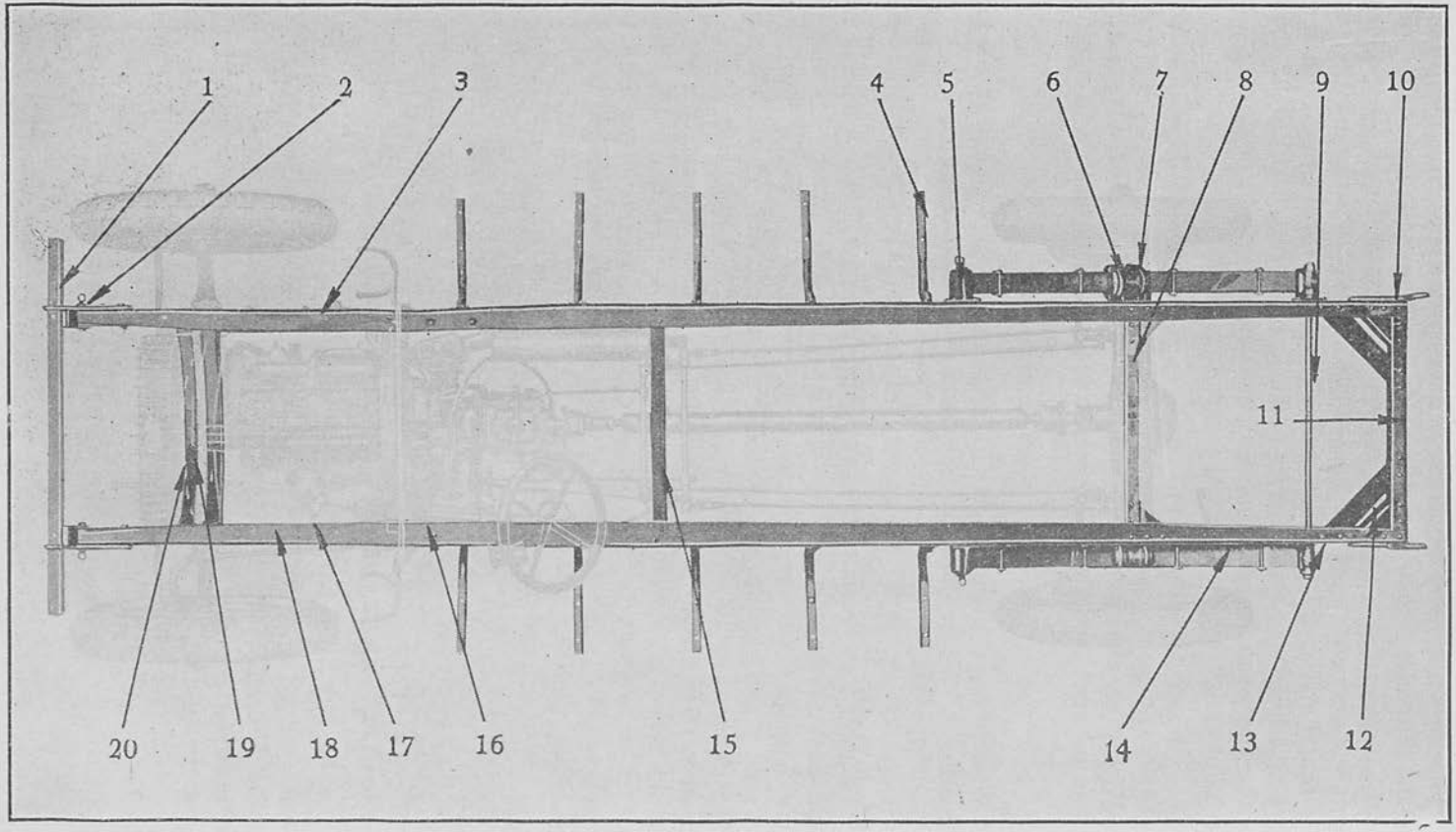
WHEELS OUT OF ALIGNMENT

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 truck.

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.



FRAME ASSEMBLY

PLATE 58

FRAME AND SPRINGS

Ref. No.	Part No.	Name
1	A1733	Bumper.
2	A1765	Towing hook—front.
3	A1728	Frame side rail—right.
4	A1763	Step hanger.
5	A1557	Rear spring front hanger.
6	A1649	Rear spring clip.
7	A1654	Rear spring seat.
8	A1744	Frame fourth cross member.
9	A1758	Rear spring hanger brace rod.
10	A1766	Towing hook—rear.
11	A1742	Frame fifth cross member.
12	A1738	Frame cross member gusset.
13	A1762	Rear spring rear hanger.
14	A1620	Rear spring.
15	A1748	Frame third cross member.
16	A1730	Frame side rail—left.
17	A1752	Front spring rear hanger—left.
18	A1610	Front spring.
19	A1745	Frame second cross member.
20	A1743	Frame third cross member.

CHAPTER VIII

FRAME ASSEMBLIES

CHAPTER CONTENTS

FRAME
DASH AND FENDERS
SPRINGS
LIGHTS

COMPONENTS OF FRAME GROUP

1-Ton Truck chassis is not equipped with a particular type of body and hence the superstructure, or upper parts usually listed with the body cannot be considered as a part separate from the chassis. For the convenience of classifying those used, the following have been included in the frame assemblies, due to their being mounted upon it and not having any direct connection with the other parts of the chassis. These parts are: the hood and dash; the side lamps; searchlight and its brackets; acetylene generator; the speedometer and speedometer cable; the fenders and running boards.

In addition to the above accessories and parts which are included with the frame assemblies, there are others which are an integral part of the chassis frame, such as the springs, the bumper and the tow rings. These are considered in detail also.

FRAME

The frame is the backbone of the truck. Directly or indirectly all the main units are attached to it. The frame on the 1-Ton Truck

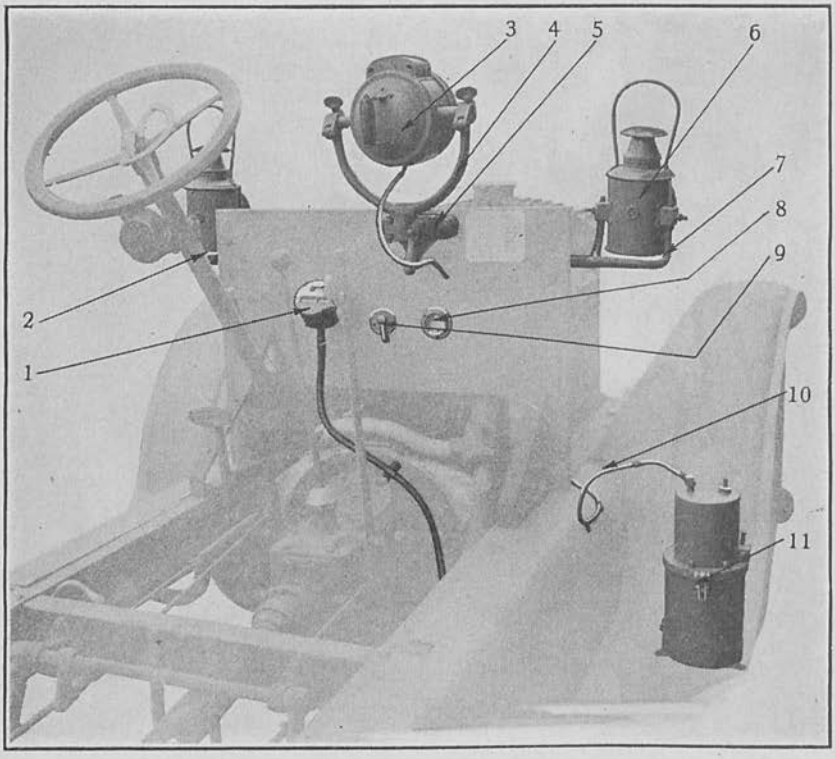


PLATE 59—DASH AND INSTRUMENTS

Ref. No.	Part No.	Name
1	A1958	Speedometer.
2	A1949	Oil lamp bracket—left.
3	A2775	Searchlight.
4	A2385	Searchlight fork bracket.
5	A2387	Searchlight swivel block.
6	A2364	Oil side lamp.
7	A1950	Oil lamp bracket—right.
8	A2000	Oil sight feed.
9	A1943	Magneto ground switch.
10	A2372	Gas line to searchlight.
11	A2371	Acetylene gas generator.

chassis is composed of two straight pressed steel channels tied together by five cross members, a channel section bumper and a 1.0625 (1 1/16) inches diameter bar connecting the rear spring shackles. The rear end of the frame has double gussets across the corners to prevent any distortion due to towing with the towing rings, which are attached to each of the rear corners of the frame. In addition there is a cross member immediately over the rear axle which, likewise, is provided with gusset plates at the corners where it joins the main frame side rails together in order to get the additional rigidity. The channels vary in width from 2 to 3½ inches, the greatest width being just back of the dash board, where the maximum bending strain

comes upon the frame. The frame is uniform in vertical section and measures 4.4375 (4 7/16) inches. The thickness of the metal used in the frame is 0.1875 (3/16) inch. From end to end of the frame the overall length is 193.25 (193¼) inches. The frame is narrowed in the front end to 32 inches in order to give a shorter turning radius. At the rear end the overall length of the frame is 34.0625 (34 1/16) inches. The height of the frame from the ground to its top edge is 32.25 (32¼) inches with the body in place.

FRAME CROSS MEMBERS

The frame cross members are located as follows: the bumper channel at the extreme front end of the frame; the two cross members immediately over the front axle, one of which forms the support for the engine; a fourth back of the transmission, and upon which the brake shafts are mounted and which also provides anchorage for the loop which goes over the propeller shaft to prevent its dropping on the ground in the event that either universal joint breaks; the fifth cross member just over the rear axle to stiffen the frame at this point; the last one at the rear end which is well gusseted in the corners to prevent distortion when towing. The towing hooks are located at all four corners of the frame assembly.

RUNNING BOARDS

Five pressed steel step hangers are attached to each of the side members of the frame. Upon these are mounted the running boards also of pressed steel. Front mud guards and running board shields of pressed steel are regular equipment with this chassis. The rear mud guards are not furnished with the chassis and have to be provided with the body equipment. The latter also carries the gasoline tank under the front seat. The fuel or gasoline tank is furnished with the chassis, but is not fastened to it.

BUMPER

The bumper is made from 2 by 3 inch channel with 0.1875 (3/16) inch wall and is 52 inches long. It is riveted directly onto the front spring hangers, which are also riveted onto the front ends of the side frame channels.

THE DASH

The dashboard and toeboards are mounted directly upon the chassis frame with angle brackets made from strap iron and placed at the back of the dashboard and beneath the toe boards. On the front side of the dashboard there is a hood ledge which supports the

rear end of the hood. Upon either side of the frame between the radiator and the dashboard there are located pressed steel hood sill plates. These are bolted to the frame and carry the two hood latches and the loop to which the hood strap is attached.

The dashboard carries the speedometer and the searchlight bracket on the rear side and two oil side lamps with brackets upon either side in front. The bracket for the tail lamp is mounted on the lower side of the left hand frame side rail just back of the rear axle.

SPRINGS

The spring suspension consists of four semi-elliptic springs bolted or clipped to the axle pads and attached through brackets and shackles to the frame. The front springs are made up of seven leaves of silico-manganese steel.

They are 2.25 (2¼) inches wide and 36 inches long from center to center of the spring eyes. The upper leaf is turned over at the ends to form the eyes which are bushed with steel. These are 0.625 (⅝) inch inside diameter and 0.8125 (13/16) outside diameter. The leaves are bound together at the center with a 0.375 (⅜) bolt. Two rebound clips are used on each end of the spring. The capacity of these springs is approximately 750 pounds with 450 pounds per inch of deflection. The front springs are offset, the front end being 17 and the rear 19 inches long. The distance from a line through the center of the eyes to the top of the spring is 1.15 (1⅛) inches under full chassis load.

The rear springs are 3 inches wide and have nine leaves. No. 1 and the master leaf are 0.375 (⅜) inch thick, 2, 0.344 (11/32) inch; 3, 4, 5, 6, 7 and 8 are 0.3125 (5/16) inch thick. The upper leaf is turned over at the ends and steel bushings are pressed in place and bored 1.005 (1 1/16) inches. The leaves are all bolted together at the center by a 0.5 inch center bolt. Rebound clips are riveted to the 3rd and 5th leaves. They are made of 0.25 by 1 inch steel with a bolt 0.375 (⅜) by 3.375 (3⅜) inches through them. The capacity of these springs is approximately 845 pounds per inch of deflection. Total length center to center of end loops is 48 inches. The height from bottom of spring to center of loop 8.25 (8¼) inches. The rear springs are similar to the front except that they are made with eight leaves and have a deflection of 1 inch for 1,150 pounds. The leaves are 0.5 inch for the master leaf, 0.4375 inch for the 1, 2, 3 and 4, and .375 inch for 5, 6 and 7.

SPRING PLATES

These plates fit over the tops of the springs and are secured to the axle pads by two "U" bolts. These hold the springs onto the axle.

Two sizes of "U" bolts are used for clamping the springs to the axle spring seats. The front springs have 0.5625 (9/16) inch diameter "U" bolts and the rear springs have 0.625 (⅝) inch bolts. The latter are designed to go over the 3 inch wide springs, while the former go over 2.25 (2¼) inch springs. The front spring bolts are threaded for a distance of 1.375 (1⅜) inches with 0.5625 (9/16) inch by 18 S. A. E. threads. The total developed length of the front spring clip is 12 inches, that is, a bar 0.5625 (9/16) inch in diameter and 12 inches long may be bent into one of these clips. The rear spring clips are made from 0.625 (⅝) inch round steel bars and have a developed length of 24 inches. The ends are threaded for a distance of 1.75 (1¾) inches with 0.625 (⅝) inch by 18 S. A. E. threads.

SPRING BOLTS (SHACKLE BOLTS)

The springs are secured to the frame by means of bolts passing through hangers riveted to the frame and also shackles at their rear ends. These bolts known as spring shackle bolts are made of case hardened steel.

Three different types or sizes are used on this truck. Three in each front spring all of which are alike. One at the front end of the rear spring and another type at the rear end. The second bolt of the rear spring shackle has been replaced by a 1.0625 (1 1/16) cross bar of the frame which projects out thru a bracket on each side of the frame.

The front spring shackle bolt is 4.25 (4¼) inches long over all and 3.406 (3 13/32) inches long under the head. It has a diameter of 0.625 (⅝) inch and is drilled for 0.125 (⅛) inch pipe tap oil cups.

The front rear spring bolt which take the drive and torque from the rear spring is 5.25 (5¼) inches long overall, 4.656 (4 21/32) inches long under the head and 0.75 (¾) inch in diameter.

It is likewise drilled for oil lubrication and has a 0.125 (⅛) inch pipe tap in the head for an oil cup.

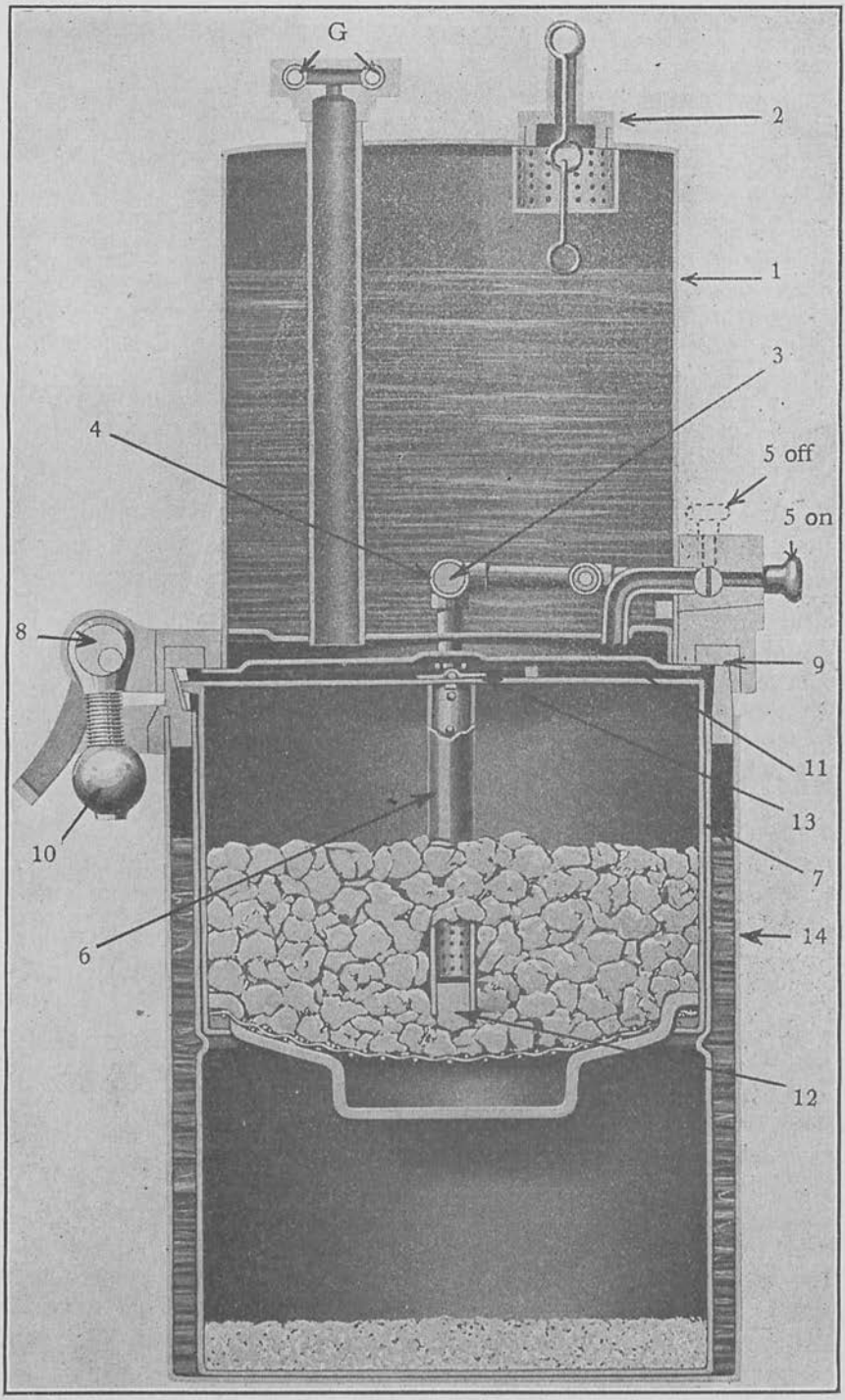
The rear spring rear shackle bolt is the same length as the front bolt in the rear spring and also provided with an oil cup but is 0.624 (⅝) inch in diameter instead of 0.75 (¾) inch.

SPRING SHACKLES

Two spring shackles are used on each side of the chassis and at the rear ends of each spring, front and rear. Both types of spring shackles are made from cast steel. The front one is on the form of an "H" and measures 2.75 (2¾) inches from center to center of the spring bolts. The bosses are 0.5 (½) inch thick.

The rear spring shackle is cast with a large boss at the top which rides on the 1.0625 (1 1/16) inch round bar which is carried across the

PLATE 60



ACETYLENE GENERATOR

PLATE 60

ACETYLENE GENERATOR

Ref. No.	Part No.	Name
	A2371	Generator assembly.
1		Water tank.
2		Water filler cap.
3		Wick.
4		Wick tube.
5		Water valve.
6		Screen tube.
7		Carbide cage.
8		Generator clamp.
9		Rubber washer.
10		Clamp nut.
11		Washer plate.
12		Screen tube plug.
13		Washer plate retainer nut.
14		Generator lower half.

rear end of the frame. It has an oil pocket in the upper boss 1.4375 (1 7/16) inches in diameter and 1.1875 (1 3/16) inches long. The length of this boss over all is 3 inches. The two outside forked bosses which straddle the rear end of the rear spring are each 0.625 (5/8) inch wide. The center to center length of the shackle is 3.875 (3 7/8) inches.

WORK OF SPRINGS—HOTCHKISS DRIVE

In the so-called Hotchkiss drive the vehicle uses no separate members for taking the axle torque and drive stresses, the springs being called upon to do this work in addition to supporting the load. It is important in a car using Hotchkiss drive to keep the spring clips or binders tight, and also to keep the bolts holding the spring to the axle tight. If there is freedom of movement up and down against the axle, the spring is likely to break. Loose holding down bolts also may cause irregular steering with the axle slipping forward slightly off the spring centers.

SPRING LEAF LUBRICATION

Whenever a spring is removed and dismantled do not replace it unless the leaves have been scraped free of rust and covered with graphite, white lead, grease or any stiff lubricant and rust preventative. The leaves ride over one another and the lubricant prevents wear and rusting. The greater the rust the stiffer the spring and the tardier the spring action.

CAUSES OF SPRING BREAKAGE

Spring may break because of overloading, badly rusted leaves, clips

too tight, spring not properly fastened to axle bed, shackle inoperative due to broken shackle bolt or stiff shackle.

IF A SPRING SHOULD BREAK

In case the front or rear springs were broken you could continue journey by blocking up over axle and under frame, and rigging up a temporary torque member. In case front of spring only was broken, reverse spring, take off shackle and connect up unbroken part at front.

TO REMOVE SPRING

Jack up frame, remove all bolts holding spring assembly, remove slotted plate under spring, and spring can then be easily pulled out.

LAMPS

The searchlight provided on the dashboard has a 6 inch projector and is mounted on trunnions in a swiveled bracket. The bracket provides for the directing of the beam in any direction horizontally and is clamped with a hand lever on the bracket attached to the dashboard. The beam from the searchlight may be elevated or depressed by loosening up on the clamping nuts located on either side of the lamp and holding the lamp trunnions. Wing nuts are used to clamp the trunnions of the lamp and also to provide convenient means of disconnecting the searchlight from the bracket and carrying it to a position where the beams from the light cannot be directed when it is mounted in a bracket. The gas hose from the acetylene generator is about a yard long and permits of this extra movement of the searchlight when dismounted from its bracket.

THE ACETYLENE LIGHTING SYSTEM

The two side and tail lamps, which use kerosene oil, do not give more than a signal light. In order to use the searchlight mounted on the dashboard, it is necessary to provide acetylene gas. This is obtained by using a Solar acetylene gas generator by means of which the acetylene gas is made directly from lump calcium carbide, due to the action of water which is carried in a tank above the acetylene gas chamber.

The construction and the operation of this system will become clear from the following description of the generator. The generator water tank is filled with water through a filler cap provided in the top of the tank and is fed to a two way valve located in the tube at the bottom of the water tank and from which the water drops into a screen located at the bottom of what is called the generator screen tube that projects into the carbide. The carbide is carried in a screen like cage

from which the used up carbide is shaken down to the bottom of the acetylene gas generator by the truck vibration. The unused carbide remains in the cage and the used carbide which is now in the form of a dust readily falls through this screen. Consequently the charge of carbide is always fresh while it lasts and is ready to light or extinguish at the lamps. A valve is located on the side of the acetylene tank by means of which the supply of water may be turned on or off. To prepare the generator and to keep it up all that is necessary is to clean out the dust which has accumulated in the bottom of the generator body, refill the carbide cage with fresh carbide and the generator water tank with water. To put out the lights turn off the generator water valve, which means to raise it to an upright position. The gas then contained in the generator passes out of this valve into the air, thus insuring perfect safety.

OPERATING ACETYLENE GAS GENERATOR

In order to clean the generator proceed in the following manner. Release the generator clamp nut levers located on the sides of the generator by pulling them up and then swinging the nuts sideways from the lugs. This will permit the removal of the upper half of the water tank from the lower half, or carbide and ash holder. The latter remains attached to the right hand running board of the truck. Lift out the carbide cage and fill same with a fresh supply of 0.25 (¼) of an inch carbide. *Never use candied carbide or any prepared carbide.* Take care that carbide does not spill into the screen tubes and always see that the holes in the bottom of the screen tube are cleaned out if there is any sign of its being clogged before the carbide cage is replaced. While the carbide cage is removed clean out the ash or residue in the bottom of the gas generator. Then replace the newly filled carbide cage, seeing that it fits into the slot provided at the rim in the lower half of the generator. Now fill the water tank, or the upper half of the generator, with clean water at the filler cap provided for this purpose in the top. Replace the top on the lower half, making sure that the generator water valve is closed before doing this.

CLOSING UP GENERATOR

To refasten bottom part of generator to upper or water tank: first set cam levers way up, with ball adjusting nuts hanging down, then grasp lower half or carbide and ash holder with both hands and lift to upper half, so that swinging ball adjusting nuts swing over and catch under the lugs holding upper to lower half. Next snap down cam levers, thus locking the two together.

Never change adjustment of ball nuts until coupling leaks gas at the washer. Generators have been carefully tested before shipment

and nuts are properly adjusted. If continual wear and use cause coupling to leak at washer, slightly tighten each nut evenly with wrench. The thread on bolt is oversize and on nut undersize to prevent any change in adjustment from use.

TO LIGHT AND EXTINGUISH LAMPS

See that generator is charged as above, then turn the key (two way valve) to "on" and to extinguish turn to "off." Bear in mind always that the key or valve lever turns on and off both water and gas.

Gas tubes should be made of 0.25 (¼) inch 22-gauge soft brass tubing connected to generator on one end and lamps on the other with a good grade of heavy rubber tubing. *Never use copper tubing,* as the chemical action of acetylene gas on copper, in time, will form an explosive dust.

When first lighting, the generation of gas can be accelerated by blowing in the filler cap tube; the pressure thus obtained forcing the water to drop faster into the carbide cage, increasing the gas generation.

CLEANING GENERATOR

Remove carbide cage and throw out used carbide dust in bottom of carbide holder or lower part. Keep the screen tube clean and free from dirt inside. Water drops through the screen tube and unites with the carbide at bottom of the cage, thus using the entire charge of carbide. You must, therefore, keep the screen tube clean. The water in the generator is fed to the carbide through a small tube filled with fibre wick of several strands. This wick can be removed by unscrewing the caps at the side of the generator and withdrawing by means of a wire or string threaded through the wick ring at one end only. This should be removed, cleaned and replaced once each month to insure the proper feed of water. If the flame burns too low and the truck is running, there is too much wicking, so remove a strand and replace the wick by threading a small piece of wire through the tube, attaching wick to same and draw in place. In freezing weather never fill the water tank until ready to light the lamp and then only with water, or water with a 20 per cent solution of alcohol. When the carbide is generating gas the water will be kept warm enough to prevent freezing. Water may be drained out of the tank by unscrewing the cap at the lower right-hand side of the tank near the front. This is only in case the truck is left where water will freeze. If the flame pulses there is water in the gas tube. To correct, remove the gas tube from the lamp and generator and blow out this water, which is caused from the condensation of the gas. To facilitate lighting remove one gas tube from the generator for about thirty seconds to allow the air in the generator to be forced out. Then replace and light. No. 1011-B

generators are supplied with 26 strands of wick and should never have more than 28 nor less than 22, and are only guaranteed to supply 0.75 (¾) of a foot of gas per hour and will therefore only supply two 0.375 (⅜) foot tips or one 0.75 (¾) foot tip. No. 1012-B generators are supplied with 26 strands of wick and should never have more than 30 nor less than 24, and are only guaranteed to supply 1.25 (1¼) feet of gas per hour, which means only two tips 0.675 (⅝) feet or less.

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.

CHAPTER IX

EQUIPMENT

EQUIPMENT FOR 1-TON TRUCK CHASSIS, MODEL 1918 (COMMERCE)

Part No.	ITEM	No. Per Truck
A1733	Bumper, front	1
	Book, Handbook of the 1-Ton Chassis (Commerce)	1
A1898	Belt, fan, extra	1
A2105	Bolts, for demountable rims, extra	2
	Calcium carbide (carried in generator), lbs.	3
	Calcium carbide, 2 lb. can	1
	Chain, towing, 15 ft.	1
	Chisel, cold, approximately $\frac{5}{8}$" edge	1
	Can, oil, copperized	1
	Chain, tire, 36" x 6", "Weed" or equal, set	2
	Drift, copper, $\frac{3}{8}$" x 4"	1
MC8A1	Extinguisher, fire, complete with bracket, "Pyrene," "Fyr-Fyter" or equal	1
	File, flat bastard, double cut, 10" long	1
	File, three cornered, $\frac{5}{8}$" taper, single cut, second cut	1
	Files, magneto, "Disston's" or equal	3
MC11E	Generator, acetylene, complete with bracket, Solar No. 1012B	1
	Gage, thickness or feeler	1
	Gun, grease and oil, with two nozzles	1
	Gasket, for spark plugs	12
	Hammer, ball pein, 2 lb	1
213A	Jack, Barth 3-ton	1
A2370	Kit, tire repair	1
A1944	Key, switch, extra	1
	Lifter, valve for Continental Motor	1
A2107	Lugs, for demountable rims, extra	4
A2364	Lamps, side, Adlake No. 4481	2
A2410	Lamp, tail, Adlake No. 4482	1
A2106	Nuts, for demountable rims, extra	4
	Paulin, 12 ft. x 12 ft	1
	Pump, hand	1
	Puller and spreader, cotter pin, $\frac{3}{8}$" x $6\frac{1}{2}$" long, "Bay State" or equal	1
	Pins, cotter, box of assorted	1
A2365	Plugs, spark	4
	Punch, approximately $\frac{5}{16}$" diameter shank	1
	Punch, center	1
	Pliers, gas, approximately 10" long	1
	Pliers and cutter, combination, approximately 8" long	1
A315	Packing, water pump (for Continental Motor)	16
A2230	Rim, demountable, "Firestone Kelsey," 36" x 6"	1
A2375	Searchlight, acetylene, complete with yoke and bracket, Solar No. 167, WTS	1
A1958	Speedometer, Stewart-Warner No. 131M or equal	1
A2359	Signal, hand, warning, "Klaxon," K-3, "Stewart" 114, "Long Horn" Model J, or equal	1
	Screwdriver, large	1
	Screwdriver, small	1
	Tool-Roll, canvas	1
	Tape, friction $\frac{3}{4}$", $\frac{1}{2}$ lb. rolls	2
	Tips, lava, $\frac{5}{8}$ cu. ft. per hour, for gas searchlight burner	2
	Tools, tire and rim, set complete	1
	Tire, 36" x 6" Pneumatic, Goodyear or equal	1
	Tubes, inner, 36" x 6"	
	Wrench, pipe, 10" long, steel handle, "Trimo," or equal	1

EQUIPMENT—Continued

EQUIPMENT FOR 1-TON TRUCK CHASSIS, MODEL 1918 (COMMERCE)

Part No.	ITEM	No. Per Truck
Q18LA	Washers, lock, S. A. E. heavy, 1/4"	10
Q18MA	Washers, lock, S. A. E. heavy, 5/16"	10
Q18NA	Washers, lock, S. A. E. heavy, 3/8"	10
Q18PA	Washers, lock, S. A. E. heavy, 7/16"	10
Q18QA	Washers, lock, S. A. E. heavy, 1/2"	10
Q18RA	Washers, lock, S. A. E. heavy, 9/16"	10
Q18SA	Washers, lock, S. A. E. heavy, 5/8"	10
	Waste, white cotton, lb	1
	Wire, copper, 16 gage B. & S., spool	1
	Wire, soft steel, 16 gage B. & S. spool	1
	Wrench, adjustable "S," 10", Wescott pattern	1
	Wrench, adjustable "S," 6", Wescott pattern	1
	Wrench, socket, with handle to fit main bearing nut	1
	Wrench, valve, for Continental Motor	2
	Wrench, double end (1" x 7/8")	1
	Wrench, double end (3/4" x 5/8")	1
	Wrench, double end (1/4" x 5/8")	1
	Wrench, double end (1/2" x 1/4")	1
	Wrench, socket with handle to fit oil pan cap screws	1
	Wrench, socket, with handle to fit connecting rod cap nuts	1
OEM603	Wrench, adjustable spanner	1
OEM604	Wrench, front hub cap spanner	1
OEM605	Wrench, port plug spanner	1

CHAPTER X

NOMENCLATURE

1-TON TRUCK, MODEL 1918 (COMMERCE)

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 the Chassis has been taken from this chapter and will be found in the Equipment List in Chapter IX.

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

For easier reference the following Index to the Nomenclature Chapter is given.

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		Name of Part	Location
		Engine—CYLINDER BLOCK	
		See illustrations on pages 166, 170, 178	
A225	1	Cylinder block	
A491	2	Cylinder breather screen wire	
A233	3	Cylinder core hole plug	In cylinder block
A234	3	Cylinder core hole plug	In cylinder block
A479	1	Cylinder cover	Top of cylinder block
A362	1	Cylinder cover gasket	Under cylinder cover
A372	14	Cylinder cover screw copper washer	Under cylinder cover cap screw
A435	2	Cylinder control rod hole plug	
A490	2	Cylinder drain hole screws	In cylinder block
A363	2	Cylinder gasket	Between block and crankcase
A255	2	Cylinder side plate assembly	Bolted to cylinder block
A257	2	Cylinder side plate	Bolted to cylinder block
A229	4	Cylinder side plate stud	Bolted to cylinder block
A259	4	Cylinder side plate lock rings	Under side plate wing nut
A260	4	Cylinder side plate wing nuts	Holds side plates
A256	2	Cylinder side plate gasket	Between side plate and cylinder
A202	10	Cylinder stud	On top of cylinder block
A460	10	Cylinder stud nuts	Holds cylinder cover
A258	12	Escutcheon pins No. 16 x 0.375 (3/8)	
A230	8	Exhaust manifold stud	On right side cylinder block
A235	1	Fan lever stud	Front end of cylinder block
A236	1	Fan lever stud copper asbestos gasket	Under lever stud

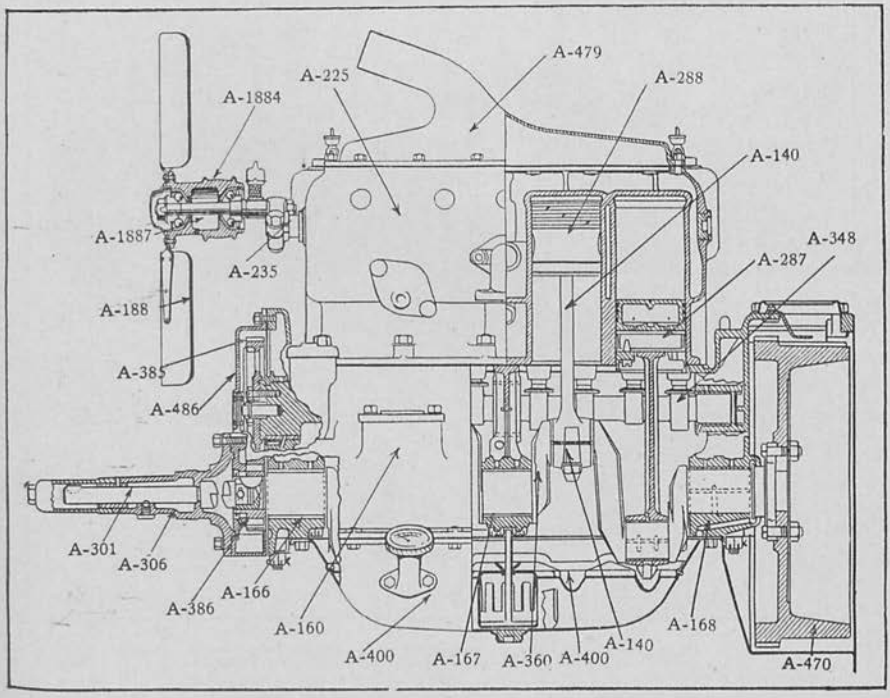
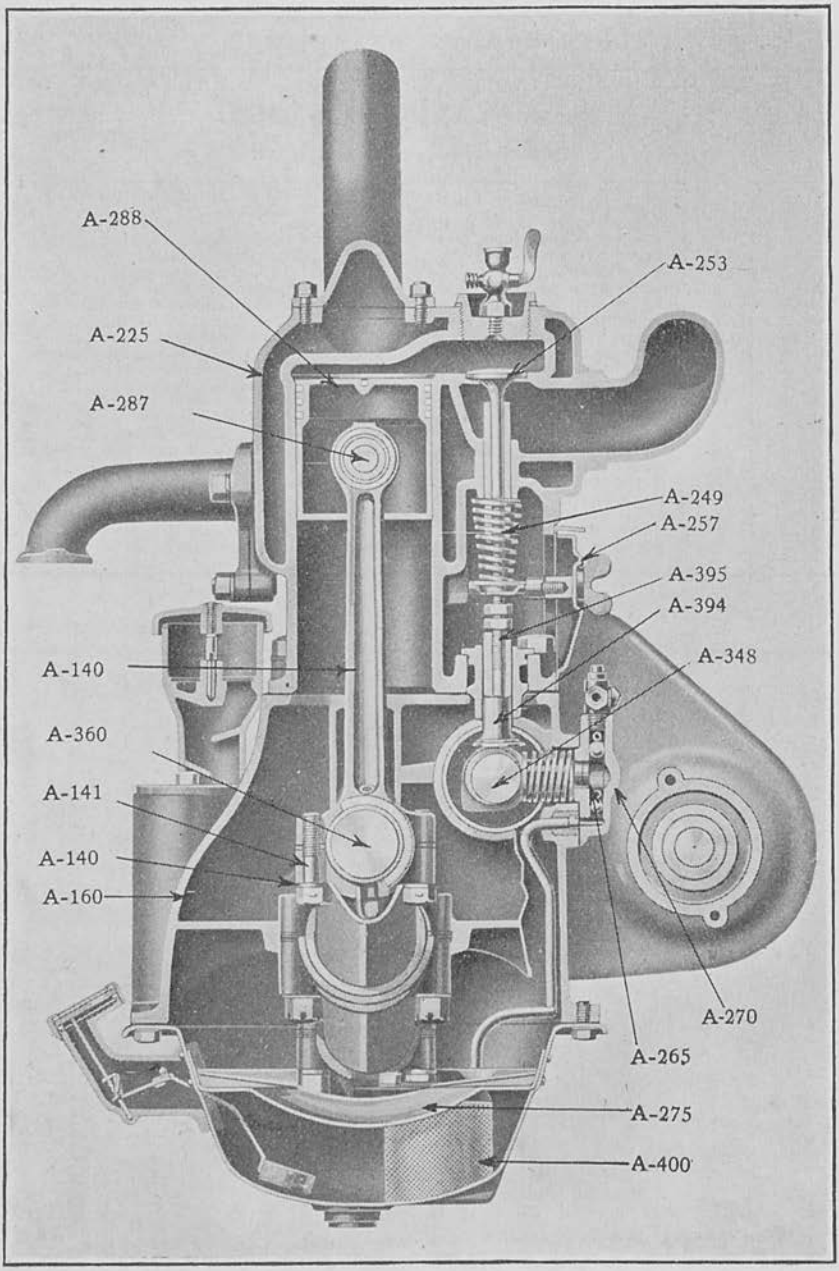


PLATE 61—SECTIONAL SIDE ELEVATION OF ENGINE

PLATE 62



SECTIONAL END ELEVATION OF ENGINE

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Engine—CYLINDER BLOCK—*Continued*

See illustrations on pages 165, 166, 170, 178

A377	1	Gasket, copper asbestos, .05 (1/20) x 0.75 (3/4) inch	
A378	2	Gaskets, copper asbestos, 0.625 (5/8) x 0.875 (7/8) inch	
A230	2	Intake manifold stud	Right side cylinder block
A391	4	Port plugs for priming cups	In top of cylinder block
A390	4	Port plugs for spark plugs	In top of cylinder block
A376	8	Port plug gaskets, copper asbestos	Under port plugs
A504	4	Priming cup	In port plugs
A271	1	Water inlet pipe gasket	Between inlet and cylinder block
A230	2	Water inlet pipe studs	In cylinder block
A373	2	Water pipe inlet gasket	Between inlet pipe and cylinders
A374	1	Water pipe inlet gasket	
A375	1	Water pipe crankcase gasket	

Engine—CRANKSHAFT

See illustrations on pages 50, 52, 60, 165, 166

A360	1	Crankshaft	In upper crankcase
A386	1	Crank gear	On front end of crankshaft
A453	1	Crank gear pin	Through crank gear
A492	2	Crankshaft thrust washers	Front end of crankshaft
A496	1	Crank gear oil ring	Between crankshaft and crank gear
A470	1	Flywheel	On rear end of crankshaft
A429	6	Flywheel bolt	Flywheel to crankshaft flange
A439	6	Flywheel bolt nut	
A110	1	Front bearing liner assembly	Between front main bearing cap and crankcase
A111	8	Front bearing liner .002 inch	
A112	8	Front bearing liner .004 inch	
A113	2	Front bearing liner .031 (1/32) inch	
A114	2	Front bearing liner .062 (1/16) inch	
A115	6	Front bearing liner .003 inch	
A177	1	Front crankshaft bushing, lower	In crankcase
A171	6	Main bearing retainer screws	Bushing to crankcase
A120	1	Middle bearing liner assembly	Between middle bearing cap and crankcase
A121	8	Middle bearing liner .002 inch	
A122	8	Middle bearing liner .004 inch	
A123	2	Middle bearing liner .031 (1/32) inch	
A124	2	Middle bearing liner .062 (1/16) inch	
A125	6	Middle bearing liner .003 inch	
A172	1	Middle crankshaft bushing, upper	In crankcase
A172	1	Middle crankshaft bushing, lower	In crankcase
A130	1	Rear bearing liner assembly	Between rear bearing cap and crankcase
A131	2	Rear bearing liner .062 (1/16) inch	
A132	8	Rear bearing liner .002 inch	
A133	8	Rear bearing liner .004 inch	
A134	2	Rear bearing liner .031 (1/32) inch	
A135	6	Rear bearing liner .003 inch	
A179	1	Rear crankshaft bushing, upper	In crankcase
A179	1	Rear crankshaft bushing, lower	In crankcase
A506	1	Starting crank jaw	Front end of crankshaft

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Engine—VALVES	
		See illustrations on pages 50, 52, 165, 166, 168	
A253	8	Valves	In cylinder block
A227	8	Valve spring cap	Between valve spring and valve guide
A228	8	Valve guides	In cylinder block
A398	8	Valve spring retainer	Lower end of valve stem
A248	8	Valve spring retainer lock	Lower end of valve stem
A249	8	Valve spring	Around valve stem

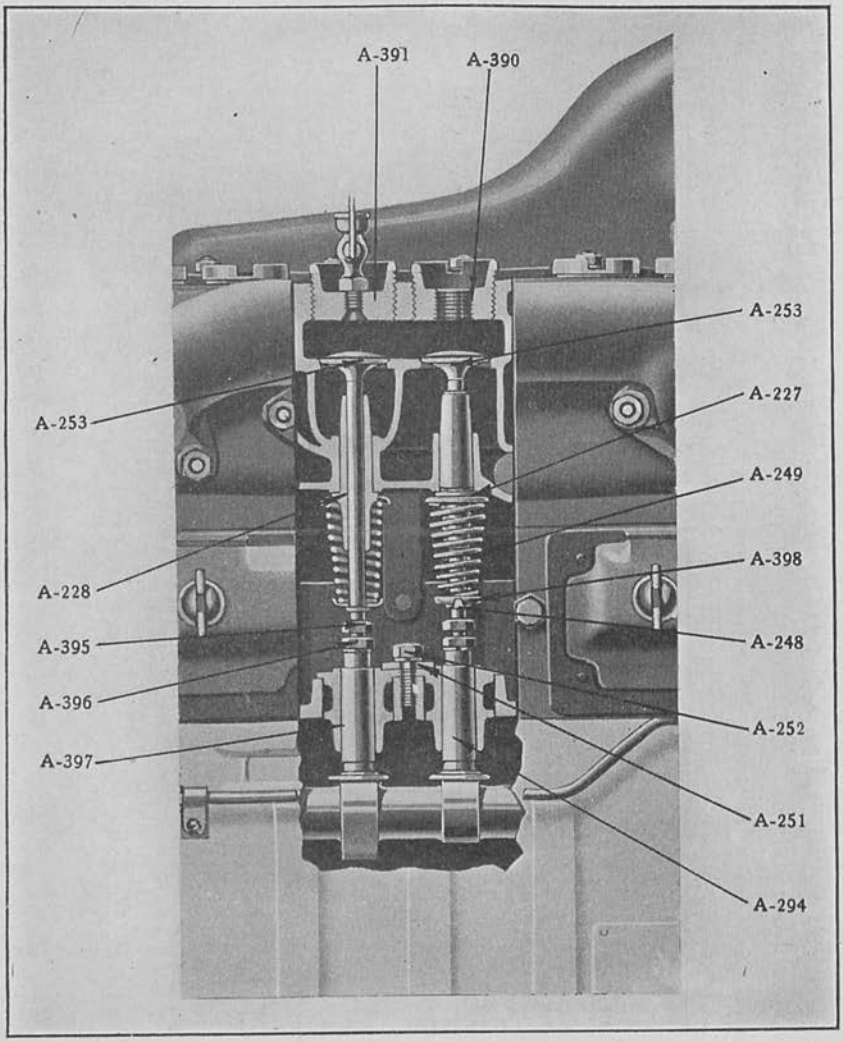


PLATE 63—VALVE PARTS

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Engine—TAPPETS	
		See illustrations on pages 50, 52, 165, 166, 168	
A247	8	Valve Tappet assembly	
A394	8	Valve Tappet	Inside of cylinder case
A395	8	Valve Tappet adjusting screws	Upper end of push rods
A396	8	Valve Tappet adjusting screw lock nuts	With push rod adjusting screw
A397	8	Valve Tappet guide	In cylinder block
A251	4	Valve Tappet guide crab	Holds push rod guide in position
A252	4	Valve Tappet guide crab bolts	Through trap into cylinder block
A254	4	Valve Tappet guide crab bolt lock washer	Locks nut on crab bolt
		Engine—CAMSHAFT	
		See illustrations on pages 50, 52, 165, 166, 168	
A348	1	Camshaft	Upper crankcase
A184	3	Camshaft bushing pins	Through bushings to crankcase
A385	1	Camshaft gear	Front end of camshaft
A459	3	Camshaft gear screws	Through camshaft gear to camshaft
A493	1	Camshaft gear screw lock wire	Through camshaft gear screws
A519	1	Camshaft rear bearing plug	At rear end of camshaft
A522	6	Camshaft shims	On camshaft
A349	1	Camshaft thrust button	Front end of camshaft
A497	1	Camshaft thrust plate	At front end of camshaft on gearcase cover
A350	1	Camshaft thrust spring	Front end of camshaft
A352	1	Camshaft thrust spring cap	Between spring and camshaft
A351	1	Camshaft thrust washer	Front end of camshaft
A175	1	Center camshaft bushing	In crankcase
A174	1	Front camshaft bushing	In crankcase
A184	1	Rear camshaft plug pins	Through rear camshaft bushing to crankcase
A203	1	Rear camshaft bearing plug	Through rear camshaft bearing on crankcase
A215	1	Rear camshaft bearing plug gasket	Between plug and camshaft
A176	1	Rear camshaft bushing	In crankcase
		Engine—PISTON AND CONNECTING ROD	
		See illustrations on pages 42, 50, 52, 54, 165, 166	
A140	4	Connecting rod assembly	
A147	16	Connecting rod bearing retainer screws	Through connecting rod bushings
A151	8	Connecting rod bolt lock washer	Locks connecting rod bolt nut
A143	4	Connecting rod bolt lock wire	Through connecting rod bolts
A141	8	Connecting rod bolts	Connecting rod to connecting rod cap
A145	4	Connecting rod dipper	In connecting rod bearing cap
A144	4	Connecting rods	Crankshaft to piston
A150	4	Connecting rod bushing	Piston pin end
A148	4	Connecting rod bushing, lower	In connecting rod bearing cap
A148	4	Connecting rod bushing, upper	Lower end of connecting rod
A146	4	Connecting rod liner assembly	Between cap and end of connecting rod
A142	16	Connecting rod liner dowel pin	
A154	32	Connecting rod liners .002 inch	Between connecting rod and cap
A155	24	Connecting rod liners .003 inch	Between connecting rod and cap
A156	32	Connecting rod liners .004 inch	Between connecting rod and cap
A157	8	Connecting rod liner .031 ($\frac{1}{32}$) inch	Between connecting rod and cap
A158	8	Connecting rod liner .062 ($\frac{1}{16}$) inch	Between connecting rod and cap
A242	4	Piston assembly	
A288	4	Piston	
A287	4	Piston pin	Connects piston and connecting rod
A290	4	Piston pin lock screw cotter pin	Locks piston pin lock screw
A289	4	Piston pin lock screw nut	On piston pin lock screw
A284	4	Piston pin lock screws	Pins piston pin to piston
A440	4	Piston pin lock screws	Pins piston pin to piston
A286	8	Piston ring, lower	
A285	4	Piston ring, upper	

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Engine—TIMING GEAR CASE

See illustrations on pages 44, 170

A486	1	Gear case cover	Front end of gear case
A364	1	Gear case cover gasket	Between gear case cover and gear case
A457	26	Gear case cover screw	Through gear case cover to gear case
A495	1	Gear case oil retainer ring	Front end of crankshaft
A436	2	Gear case oil retainer ring lock screw	Through retainer ring to crankcase

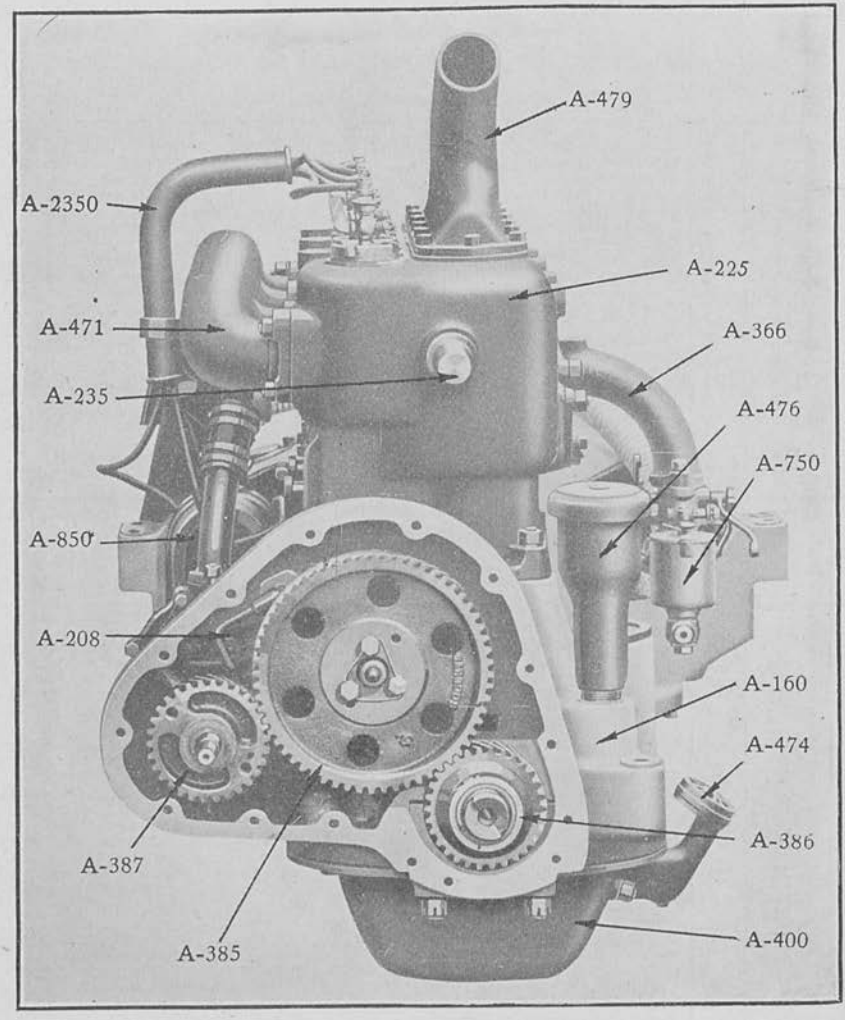
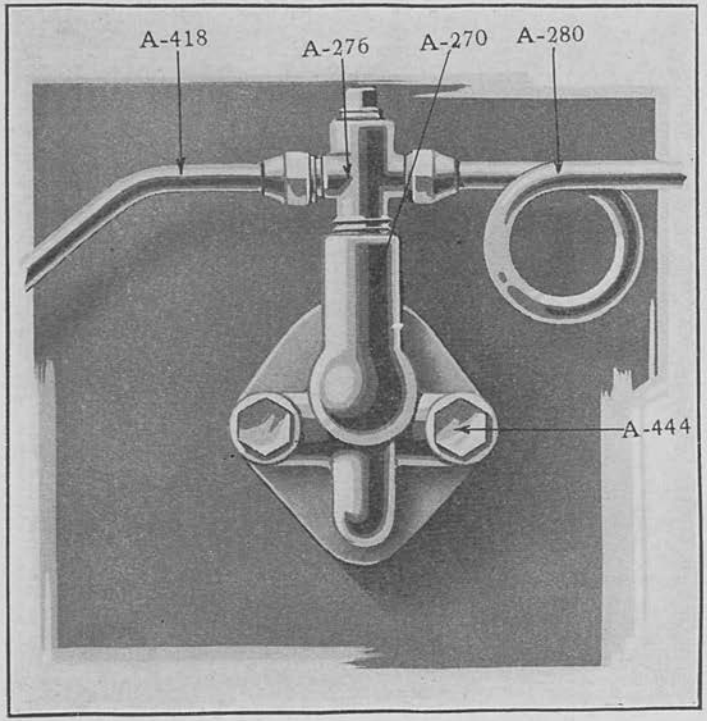
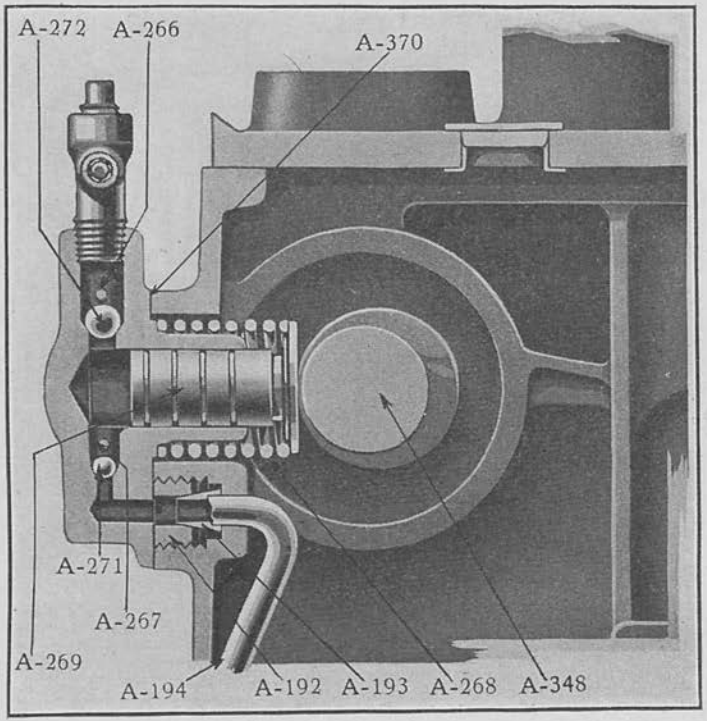


PLATE 64—FRONT VIEW OF ENGINE

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Engine—CRANKCASE	
		See illustrations on pages 42, 44, 50, 52, 165, 166	
A160	1	Crankcase assembly	
A201	1	Crankcase oil hole plug	In bottom of oil pan
A210	1	Crankcase oil plug screw	Right hand side front end ofcrankcase
A480	1	Flywheel cover	At rear crankcase
A433	8	Flywheel cover screw	In flywheel housing
A507	2	Flywheel peep hole cover	Rear crankcase in flywheel housing
A441	4	Flywheel peep hole cover screw	Through peep hole cover screw
A509	1	Flywheel pointer	At rear crankcase over flywheel
A432	2	Flywheel pointer screw	In flywheel housing
A166	1	Front bearing cap	Front end of crankcase
A162	2	Front main bearing studs	Through front main bearings to crankcase
A442	4	Hexagon nut	
A443	2	Hexagon nut 0.375 ($\frac{3}{8}$) inch x 16	
A444	2	Hexagon nut screw 0.312 ($\frac{5}{16}$) inch x 18	
A445	2	Hexagon nut bolt 0.312 ($\frac{5}{16}$) inch x 18	
A446	1	Hexagon nut bolt	
A449	2	Magneto base screw	Through base into magneto
A510	2	Magneto base screw washer	On cap screws holding magnetobrackct
A485	1	Magneto bracket	Right hand side of crankcase
A448	4	Magneto bracket bolt	Through magneto bracket into crankcase
A450	2	Magneto locating stud	In magneto bracket
A161	8	Main bearing studs, short	Through main bearing to crankcase
A217	12	Main bearing stud cotter pins	Lock for main bearing stud nuts
A164	12	Main bearing stud nuts	
A163	12	Main bearing stud washers	On main bearing studs
A167	1	Middle bearing cap	In middle of crankcase
A168	1	Rear bearing cap	Rear end of crankcase
A165	2	Rear bearing cap studs—long	Through rear bearing cap to crankcase
A199	1	Rear bearing oil hole plug	In rear bearing cap
A431	6	Self starter core hole plate screw	In flywheel housing
A447	2	Standard nut 0.375 ($\frac{3}{8}$) inch x 16	
A483	1	Starter core hole plate, left hand	In crankcase
A484	1	Starter core hole plate, right hand	In crankcase
A508	1	Timing hole cover	In flywheel housing
A434	2	Timing hole screws	
		Engine—OIL PAN	
		See illustrations on pages 42, 44, 50, 52, 64, 165, 166	
A400	1	Oil pan assembly	Bottom of engine
A365	1	Oil pan gasket	Between pan and crankcase
A437	26	Oil pan bolt	Pan to crankcase
A494	4	Oil pan bolt washer	On pan bolts
A456	1	Oil pan trycock boss	On left side oil pan
A455	2	Oil screen cover screws	In oil pan dipper trough
A454	1	Oil pan trycock	On left side oil pan
		Engine—BREATHER	
		See illustrations on pages 24, 42, 44, 50, 64, 166	
A476	1	Breather body	On left side crankcase
A477	1	Breather cover	On breather
A478	1	Breather lower screen pin	In breather body
A482	1	Breather stud	Breather to crankcase
A345	1	Breather upper screen assembly	In breather body
A342	1	Oil filler	In breather





OIL PUMP ASSEMBLY

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9 Name of Part	Location

Engine—OILING SYSTEM

See illustrations on pages 24, 26, 27, 28, 50, 52, 64, 66, 165, 166, 172

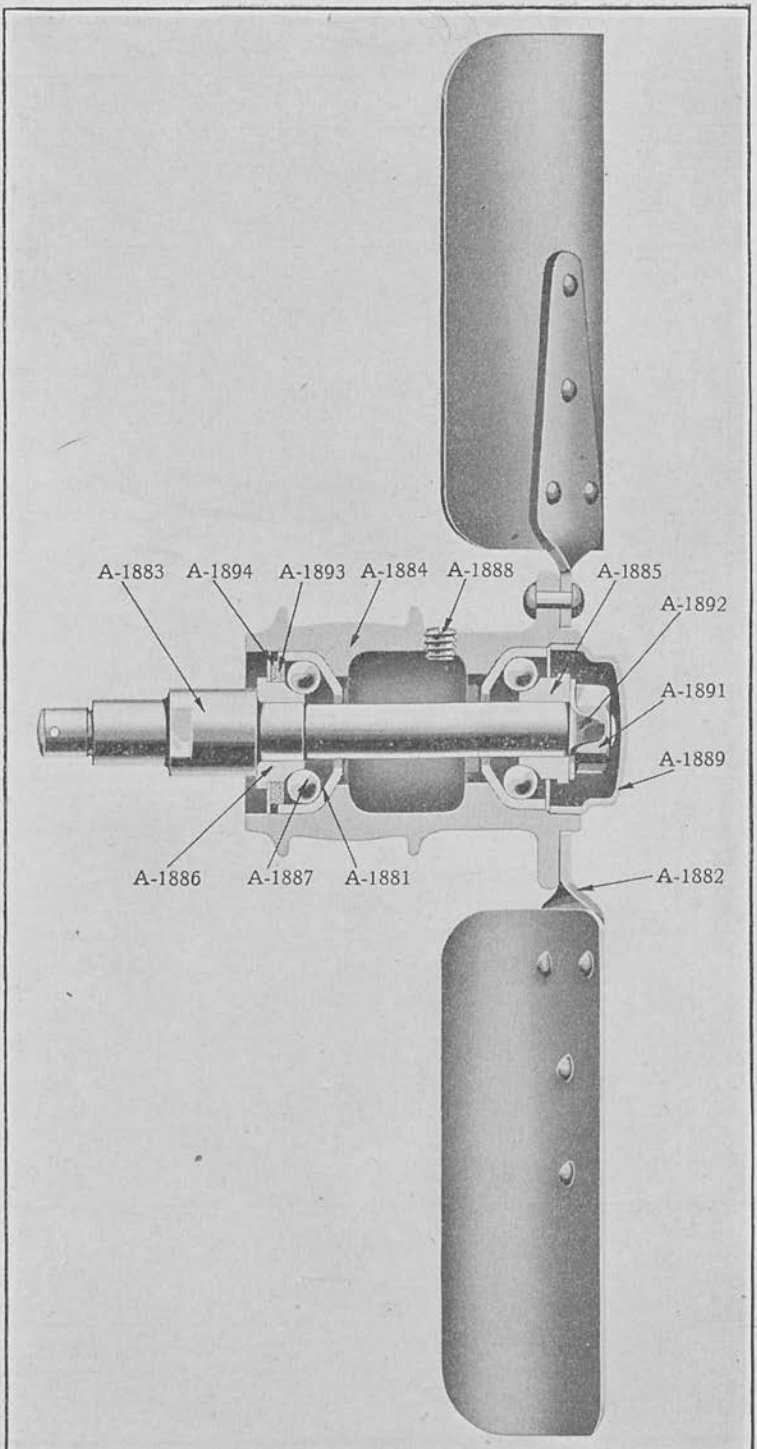
A271	1	Bronze ball 0.25 (¼) inch	In oil pump
A272	1	Bronze ball 0.375 (⅜) inch	In oil pump
A263	1	Female tube connector 0.25 (¼) inch	
A512	1	Lubrication instruction plate	On crankcase
A474	1	Oil indicator	On left side oil pan
A368	2	Oil indicator body gasket	Under glass guard and glass
A206	1	Oil indicator boss cover	Covers original hole in crankcase
A204	1	Oil indicator boss cover gasket	Under boss cover
A205	2	Oil indicator boss cover screws	Boss to crankcase
A475	1	Oil indicator glass guard	On indicator
A214	2	Oil indicator lock washer	Under indicator cap screw
A426	2	Oil indicator plate stud	In crankcase
A427	2	Oil indicator stud nut	On indicator stud
A265	1	Oil pump assembly	On right hand side crankcase
A267	1	Oil pump ball stop pin, lower	In oil pump
A266	1	Oil pump ball stop pin, upper	In oil pump
A270	1	Oil pump body	
A444	1	Oil pump bolt	Pump to crankcase
A194	1	Oil pump feed tube	In crankcase to oil pump
A370	2	Oil pump gasket	Under oil pump
A269	1	Oil pump plunger	In oil pump
A268	1	Oil pump spring	Around plunger
A500	1	Oil reinforcing plate	In oil pan
A275	1	Oil screen cover assembly	In oil pan
A2000	1	Oil sight feed assembly	On dash
A2002	1	Oil sight feed body cap	On sight feed body
A2003	1	Oil sight feed body cap gasket	Under body cap
A2004	1	Oil sight feed glass	In sight feed body
A276	1	Oil tube assembly	In crankcase to elbow
A280	1	Oil tube assembly	Pump to gear case
A418	1	Oil tube assembly	Pump to rear bearing
A195	1	Oil tube assembly	Pump to elbow
A213	1	Oil tube assembly	Pump to rear of case
A261	1	Oil tube assembly	To main bearing
A2008	1	Oil tube assembly	Pump to sight feed
A2009	1	Oil tube assembly	Sight feed to engine
A208	1	Oil tube assembly	Pump to gear case
A189	1	Oil tube assembly	To main bearing
A191	1	Oil tube clamp nut	In crankcase under oil pump
A198	2	Oil tube clip 0.375 (⅜) inch	
A501	1	Oil tube clip	On crankcase
A190	1	Oil tube clip	To main bearing in crankcase
A196	1	Oil tube clip	To pump in crankcase
A421	1	Oil tube clip	On crankcase to rear bearing
A197	5	Oil tube clip screws	
A212	5	Oil tube clip screw lock washer	
A2005	1	Oil tube connector, lower	Sight feed to oil line
A2006	1	Oil tube connector, upper	Sight feed to oil line
A219	1	Oil tube connector	In tube to rear bearing
A184	1	Oil tube elbow pin	
A216	1	Oil tube elbow gasket	
A207	1	Oil tube elbow nut	
A193	1	Oil tube packing	In crankcase under oil pump
A192	1	Oil tube packing retainer	In crankcase under oil pump
A184	2	Pump shaft bushing pin	In pump body
A2001	1	Sight feed body	On dash
A218	1	Tee for oil tube 0.25 (¼) inch	

Engine—COOLING SYSTEM

See illustrations on pages 40, 44, 86, 165, 176, 178

A1849	1	Bottom tank	Beneath radiator core
A1844	1	Bottom tank cork gasket	Between tank and floor
A1851	2	Bottom tank stud	Tank to frame
A1852	2	Bottom tank stud nut	On bottom tank stud
A1830	1	Filler cap	On radiator top tank

PLATE 66



OAKES FAN ASSEMBLY

Engine—COOLING SYSTEM—*Continued*

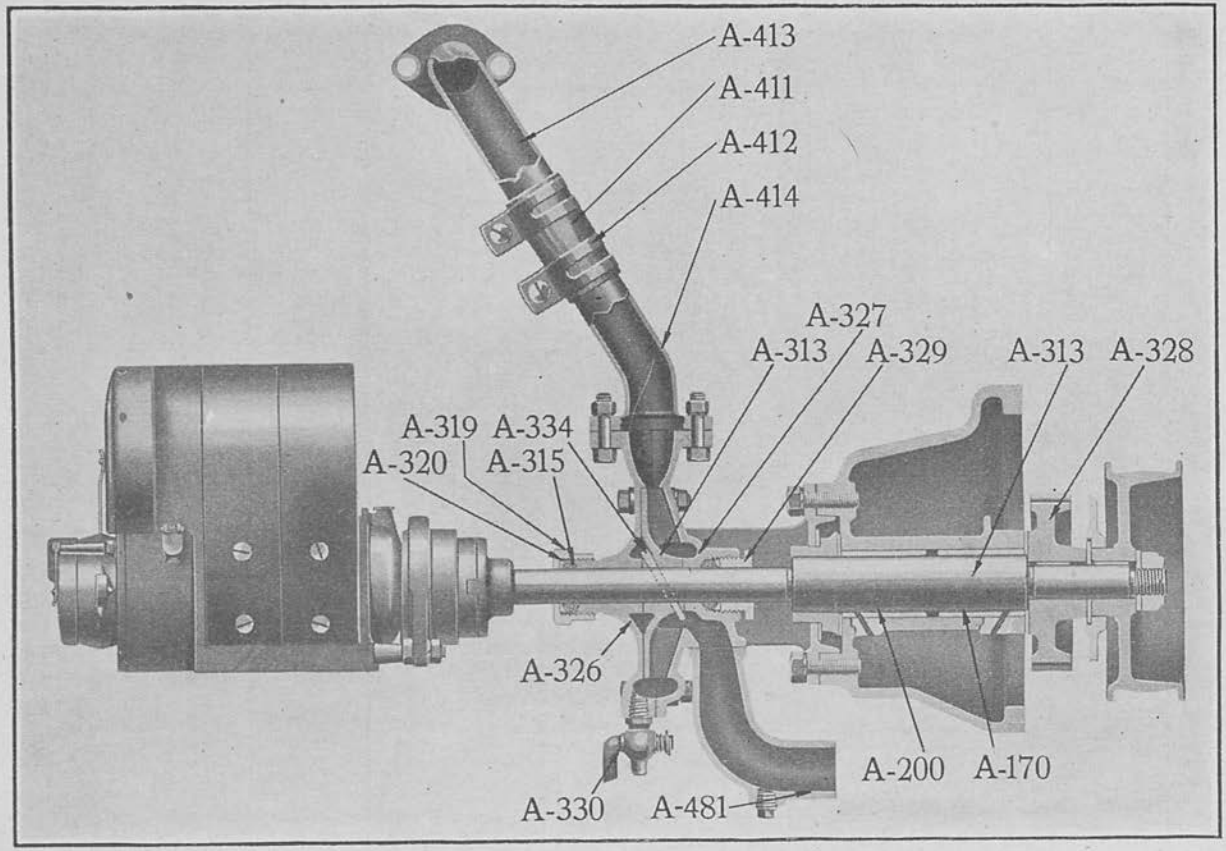
See illustrations on pages 40, 44, 86, 165, 176, 178

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
A1832	1	Filler cap brass plate	Over filler cap gasket
A1833	2	Filler cap brass plate screws	In filler cap plate
A1835	1	Filler cap hinged rivet	In filler cap
A1836	1	Filler cap lock bar	Locks filler cap
A1837	1	Filler cap lock bar nut	Locks filler cap
A1838	1	Filler cap lock bar pin	Locks filler cap
A1831	1	Filler cap rubber gasket	Under filler cap
A1839	1	Filler cap screen	Under filler cap
A1834	1	Filler cap steel plate	Under filler cap gasket
A1840	1	Inlet manifold	On radiator top tank
A1842	2	Inlet manifold cap screw	Inlet manifold to radiator
A1841	1	Inlet manifold cork gasket	Under inlet manifold
A1865	1	Lower radiator hose	On outlet manifold
A1858	4	Metal clamp strip for holding core to tank	
A1853	1	Outlet manifold	On bottom tank
A1854	2	Outlet manifold cap screw	Outlet manifold to bottom tank
A1855	1	Outlet manifold cork gasket	Under outlet manifold
A1825	1	Radiator, complete	
A1848	1	Radiator bottom tank assembly	Below radiator core
A1826	1	Radiator core with headers and overflow tube	
A1863	2	Radiator cushion washers	
A1856	1	Radiator drain cock	In bottom tank
A1867	2	Radiator hose clamp	On lower hose
A1868	2	Radiator hose clamp	On upper hose
A1862	2	Radiator lacing	
A1859	1	Radiator overflow tube	
A1828	1	Radiator side member, left	Radiator to frame
A1827	1	Radiator side member, right	Radiator to frame
A1861	88	Radiator tank core bolt nuts	
A1860	88	Radiator tank cover bolts	
A1871	1	Radiator tie rod	From cylinder block to radiator
A1870	1	Radiator tie rod assembly	From cylinder block to radiator
A1683	2	Radiator tie rod lock nuts	
A1684	2	Radiator tie rod lock washers	
A1829	1	Radiator top tank assembly	Above radiator core
A1843	1	Top tank	Above radiator core
A1844	1	Top tank cork gasket	Under top tank
A1845	4	Top tank to core stud	
A1846	4	Top tank to core stud nut	
A1866	1	Upper radiator hose	On inlet manifold

Engine—OAKES FAN

See illustrations on pages 26, 27, 28, 40, 42, 52, 165, 174, 178

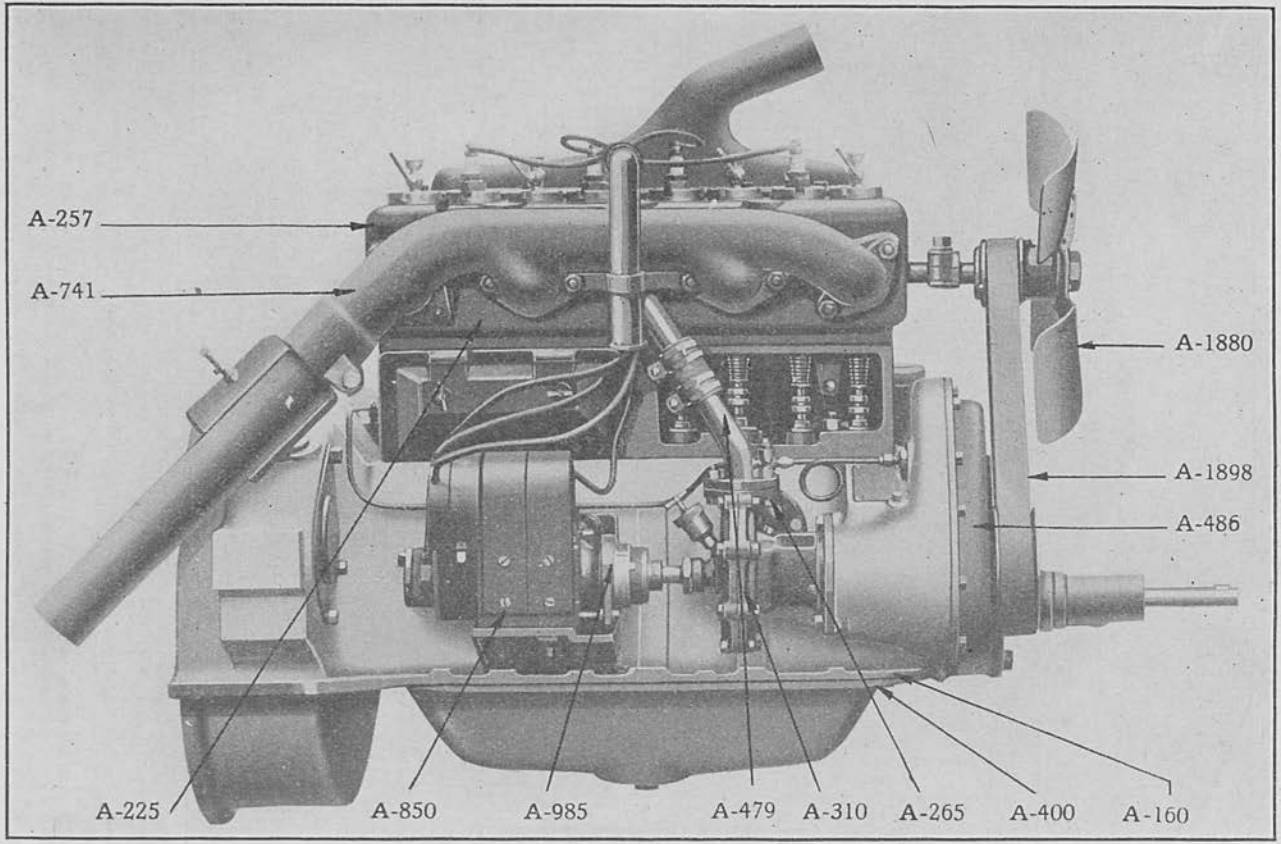
A1880	1	Fan assembly complete	
A1889	1	Dust cap	On fan hub
A1881	2	Fan bearing ball cup	On fan spindle
A1894	2	Fan bearing cone washer	On fan spindle near rear ball bearing
A1892	1	Fan bearing cone lock washer	Between ball bearing and lock nut
A1898	1	Fan belt	
A1882	1	Fan blade assembly	On fan spindle
A1884	1	Fan hub	On fan spindle
A505	1	Fan lever	Connects fan spindle to bracket stud
A430	1	Fan lever bolt	Through fan lever
A473	1	Fan pulley	Attaches to fan hub on fan spindle
A499	1	Fan pulley washer	Between ball bearing and pulley
A1893	2	Felt washer	Between packing nut and bearing
A1885	1	Front fan bearing cone	On fan spindle
A1891	1	Left hand nut .375 (⅜)—20	On end of fan spindle
A1896	1	Lock washer	Locks plain hex. nut
A1888	1	Oil plug	In fan hub
A1890	2	Paper gasket	Between fan hub and dust cap
A1895	1	Plain hex. nut	Holds spindle to fan bracket
A1886	1	Rear press fit cone	On fan spindle
A1887	2	Retainer loaded with balls	On fan spindle
A1883	1	Spindle	Fan shaft



MAGNETO AND WATER PUMP ASSEMBLY

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Engine—WATER PUMP	
		See illustrations on pages 25, 26, 27, 40, 176	
A330	1	Drain cock	In pump cover
A318	1	Governor drive hole cover	Side of crankcase
A311	4	Governor drive hole cover screws	At side of crankcase
A332	4	Governor housing screw lock washers	
A412	2	Hose clamp	On hose connection
A338	1	No. 00 ratchet grease cup	In pump body
A324	2	Pump bushing pin	Through bushings on drive shaft
A322	1	Pump cover bushing	On drive shaft in cover
A336	1	Pump paddle Woodruff key No. 7	Holds paddle to shaft
A411	1	Pump to cylinder hose	
A328	1	Spiral gear driver	On front end of pump shaft
A335	1	Spiral gear driver taper pin No. 3 x 1.25 (1¼) inch	Through spiral gear and drive shaft
A332	8	Washers, lock	
A481	1	Water inlet elbow	Inlet to pump body
A414	1	Water inlet pipe elbow, lower	
A413	1	Water inlet pipe elbow, upper	
A410	1	Water inlet cover plate	On pump body
A310	1	Water pump assembly	On right hand side of engine
A327	1	Water pump body	Bolted to crankcase
A317	1	Water pump body plug	In pump body
A312	8	Water pump bolts	Through water pump body and cover
A321	8	Water pump bolt nuts	On bolts cover to body
A326	1	Water pump cover	Bolted to pump body
A314	1	Water pump gasket	Between cover and body
A320	2	Water pump glands	On pump shaft
A316	1	Water pump and magneto shaft	Side of crankcase
A331	1	Water pump extension head pipe plug 0.125 (⅛) inch	In inlet elbow
A313	1	Water pump paddle	Mounted on water pump shaft
A337	1	Water pump paddle cotter pin	Through paddle
A334	1	Water pump paddle taper pin No. 3 x 1.5 (1½) inch	Through paddle and drive shaft
A325	2	Water pump pipe bolts	Through body and cover and pump outlet elbow
A329	1	Water pump stuffing box, front	In pump body
A319	1	Water pump stuffing box, rear	Screwed on pump cover
		Engine—MAGNETO DRIVE SHAFT	
		See illustrations on pages 44, 170, 176, 178	
A170	1	Magneto drive shaft bushing	On drive shaft
A200	1	Magneto drive shaft bushing, rear	On drive shaft
A425	1	Magneto drive shaft gear nut	Front end of water pump shaft
A209	2	Magneto drive shaft thrust washers	On magneto drive shaft between pump bracket and pump thrust collar
A387	1	Magneto gear	Front end of pump shaft
A502	1	Magneto gear oil retainer washer	Between fan drive pulley and magneto gear
A220	2	Magneto gear oil retainer button head copper rivet	
A211	1	Magneto shaft oil retainer ring	On magneto shaft
A184	2	Magneto thrust washer pin	In end of magneto shaft



RIGHT HAND SIDE OF ENGINE

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Engine—IGNITION SYSTEM

See illustrations on pages 28, 40, 44, 78, 80, 148, 170, 178

A943	1	Adjusting shim 0.004 inch thick	Under cam
A945	1	Adjusting shim 0.002 inch thick	Under cam
A852	1	Armature assembly with bearings	In magneto
A862	1	Armature core	On armature axle
A364	1	Armature end plate and shaft	Breaker end
A863	1	Armature end plate with axle	
A865	1	Ball bearing	In housing
A950	1	Breaker, clockwise, complete	On rear end armature axle
A967	1	Breaker disc with bearing bushing	In breaker
A964	1	Breaker lever with platinum point	In breaker
A971	1	Breaker without platinum contact	On rear end armature axle
A942	2	Cams	In timing lever body
A2350	1	Cable conduit assembly	Bolted to cylinder block
A2351	1	Cable conduit	Bolted to cylinder block
A2352	1	Cable conduit bracket	On exhaust manifold
A986	1	Catch, complete	In coupling
A988	2	Catch cover, complete	On coupling
A987	1	Catch plate	In coupling
A930	1	Clamp plate	In housing
A865	2	Complete ball bearing	On armature axle
A866	1	Condenser	In magneto base
A867	1	Condenser casing	In magneto base
A877	1	Connection bracket	
A886	1	Connection screw	In end cap
A887	1	Connection spring with carbon	In end cap
A954	1	Contact block	In breaker
A961	1	Contact screw with platinum point	Through breaker contact
A990	1	Coupling cross	In starter coupling
A861	1	Disc for slip ring	On armature axle
A1008	1	Distributor disc	In magneto housing
A894	1	Distributor gear with axle	In magneto
A910	1	Distributor plate assembly	On magneto above breaker
A911	1	Distributor plate	On magneto above breaker
A1006	1	Dust washer	For driving axle
A927	1	Eccentric bushing	In housing
A885	1	End cap with short circuiting brush	Breaker box cover
A889	1	End cap	Breaker box cover
A888	1	Fastening nut with end cap	
A871	1	Fastening plate for condenser	
A1000	3	Fastening screws	In distributor disc
A1002	8	Fastening screws	For magnets
A1003	2	Fastening screws	In breaker mechanism
A1004	1	Fastening screw	In peep hole cover
A853	8	Fastening screws for end plate	
A870	2	Fastening screws for condenser	
A873	1	Fastening screw for connection bracket	
A854	2	Fastening screws for pinion	
A928	2	Fastening screws for side of housing	
A955	1	Fastening screw in breaker contact block	
A1007	1	File for smoothing contact points	
A991	1	Flange, clockwise	In coupling
A965	1	Flat spring, long	On breaker lever
A935	1	Ground carbon	In base of housing
A963	1	Ground carbon with spring	In breaker end cap
A913	4	Hexagon nut	On distributor plate
A900	1	Holding stud for distributor plate	
A905	1	Holding stud for end cap	
A919	1	Housing with inserts	
A992	1	Housing, complete	Around starter coupling
A975	1	Ignition cable assembly	Magneto to spark plugs
A976	1	Ignition cable	To number 1 cylinder
A977	1	Ignition cable	To number 2 cylinder
A978	1	Ignition cable	To number 3 cylinder
A979	1	Ignition cable	To number 4 cylinder
A985	1	Impulse starter coupling, complete	Drive armature axle
A969	1	Insulating bearing bushing	In breaker disc
A876	1	Insulating bushing	For connection bracket
A876	1	Insulating bushing	On bracket screw
A874	1	Insulating plate	For connection bracket
A872	2	Insulating plate for condenser	
A881	1	Insulating strip	In triangular plate
A880	1	Insulating washer	In triangular plate

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Engine—IGNITION SYSTEM—*Continued*

See illustrations on pages 28, 40, 44, 78, 80, 148, 170, 178

A922	1	Insulating washer	In housing
A957	1	Insulation bushing	In breaker contact block
A958	1	Insulation bushing	Under breaker contact block screw
A966	1	Insulation plate	Under breaker contact block
A2353	2	Insulation plugs	In ends of cable conduit
A923	1	Insulation strip	In housing
A952	1	Lock nut	On breaker end armature axle
A953	1	Lock nut lock fork	In breaker
A956	1	Lock washer	Under lock nut lock spring
A993	1	Lock washer	On catch plate stud
A929	2	Lock washer	Under fastening screw
A915	1	Lower carbon	In bottom of distributor plate
A850	1	Magneto, complete with cables	
A918	1	Magneto housing	
A1005	2	Magnets	
A989	1	Metal disc	In starter coupling
A994	1	Nut	On driving shaft
A995	1	Nut	On catch plate stud
A1011	1	Nut	On drive axle
A932	2	Oil cover	Cam end of housing
A924	1	Oil hole cover	In driving end of housing
A926	1	Oil hole cover screw	Through oil hole cover
A925	1	Oil hole cover spring	On oil hole cover
A925	2	Oil hole cover springs	On oil hole cover
A941	2	Oil wicks	In oil holes
A1014	1	Oil wick	In eccentric bearing bushing
A1016	1	Oil wick with spring	In oil hole
A1012	1	Peep hole cover	On base of housing
A859	1	Pinion	On armature axle
A920	2	Plugs	In housing
A973	1	Platinum contact	On breaker lever
A960	2	Reinforcing springs	Under ends of flat spring
A968	1	Retaining spring	On breaker lever
A951	1	Rivet	In retaining spring
A944	2	Screws for cam	Through timing lever body
A936	1	Setting screw	In top of housing
A860	1	Slip ring	On armature axle
A869	1	Spacing disc	
A856	1	Spacing washer for armature axle, 0.1 mm	
A857	1	Spacing washer for armature axle, 0.02 mm	
A858	1	Spacing washer for armature axle, 0.03 mm	
A868	2	Split washers	Under condensing screw
A912	4	Split washers	On distributor plate
A996	1	Spring	In starter coupling
A855	1	Spring washer for slip ring	
A882	1	Stop screw	In triangular plate
A931	1	Stop screw	In housing
A2060	1	Stove bolt and nuts	In cable conduit clamp
A997	1	Stud	For catch plate
A940	1	Timing lever, complete	Around breaker assembly
A946	1	Timing lever body	Around breaker assembly
A878	1	Triangular plate with ball bearing	On breaker end magneto
A883	1	Triangular plate	On breaker end magneto.
A914	5	Upper carbons with spring	In distributor plate
A1011	1	Washer	On drive axle
A998	1	Washer, plain	On drive shaft
A999	1	Washer, split	On drive shaft
A1010	1	Wrench for adjusting breaker	

NOMENCLATURE OF PARTS—Coninued

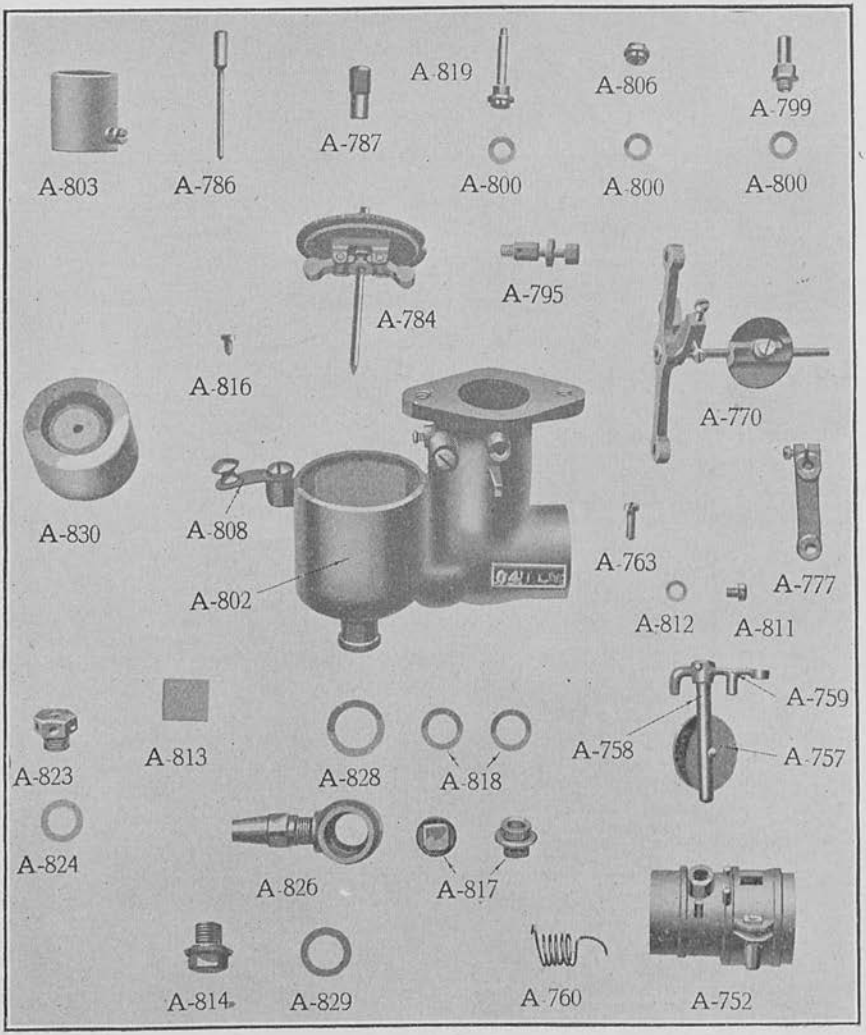
Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Engine—FUEL SYSTEM

See illustrations on pages 68, 75, 76

A2272	1	Atmospheric valve bushing	In vacuum tank
A2283	1	Atmospheric valve stem	In vacuum tank
A2268	1	Bottom end	On vacuum tank
A2299	1	Compression collar	In vent tube nipple
A2278	3	Connecting link pin	In vacuum tank
A2254	2	Connector 0.375 (3/8) inch S. A. E	On sediment trap
A2329	1	Connector 0.375 (3/8) inch S. A. E	On vacuum line
A2295	2	Cover gasket	Under vacuum tank cover
A2266	1	Crown ring	In vacuum tank
A2312	1	Drain cock for vacuum tank	On vacuum line
A2256	1	Elbow and connector for reserve	On gasoline tank
A2314	2	Elbows on vacuum tank	On gasoline tank
A2296	8	Fillister head machine screws	Through vacuum tank cover
A2303	2	Fillister head cap screws	Through mounting bracket
A2292	1	Flap	In vacuum tank
A2294	1	Flap hinge screw	In vacuum tank
A2293	1	Flap stop screw	In vacuum tank
A2291	1	Flapper valve	In vacuum tank
A2289	1	Flapper valve bushing	In vacuum tank
A2287	1	Float	In vacuum tank
A2288	1	Float chamber	In vacuum tank
A2275	1	Float lever	In vacuum tank
A2279	1	Float lever pin	In vacuum tank
A2290	1	Float stem guide	In vacuum tank
A2308	1	Gasoline inlet bushing	In vacuum tank
A2297	1	Gasoline inlet strainer	In vacuum tank
A2327	1	Gasoline line	Main
A2328	1	Gasoline line	Reserve tank to strainer
A2325	1	Gasoline line	Vacuum tank to intake manifold
A2326	1	Gasoline line	Vacuum tank to carbureter
A2251	1	Gasoline tank	Under seat
A2250	1	Gasoline tank assembly	Under seat
A2252	1	Gasoline tank filler cap	On gasoline tank
A2304	2	Hexagon nut No. 14—20	On mounting cap screw
A2300	1	Hexagon union nut	On vent tube nipple
A2277	1	Lever connecting link	In vacuum tank
A2305	2	Lock washer 0.078 (5/64) inch	On mounting cap screw
A2302	1	Mounting bracket	On dash under hood
A2269	1	Outlet bushing	In vacuum tank
A2271	1	Outside shell	Body of vacuum tank
A2301	2	Pipe plug 0.125 (1/8) inch	In vacuum tank
A2307	1	Plug	On vacuum tank
A2310	1	Reservoir outlet bushing	In vacuum tank cover
A2270	1	Retaining nut (bottom bushing)	In vacuum tank
A2253	1	Sediment trap, 3 way	On gasoline tank
A2313	1	Shut-off cock for vacuum tank	In gasoline line
A2276	1	Spring lever	In vacuum tank
A2274	1	Tank cover	Top of vacuum tank
A2311	1	Tee union	On vacuum tank
A2309	1	Vacuum connection nipple	On vacuum tank
A2265	1	Vacuum tank assembly	On dash under hood
A2273	1	Vacuum valve bushing	In vacuum tank
A2285	1	Vacuum valve stem	In vacuum tank
A2284	2	Valve stem collar	In vacuum tank
A2280	1	Valve stem lever pin	In vacuum tank
A2281	1	Valve stem lever	In vacuum tank
A2282	1	Valve stem sleeve	In vacuum tank
A2286	2	Valve tension spring	In vacuum tank
A2306	1	Vent tube	On vacuum tank
A2298	1	Vent tube extension nipple	On vacuum tank
A2267	1	Vent tube—short	On vacuum tank

PLATE 69



CARBURETER PARTS

Engine—CARBURETER ASSEMBLY

See illustrations on pages 42, 44, 70, 71, 170, 182

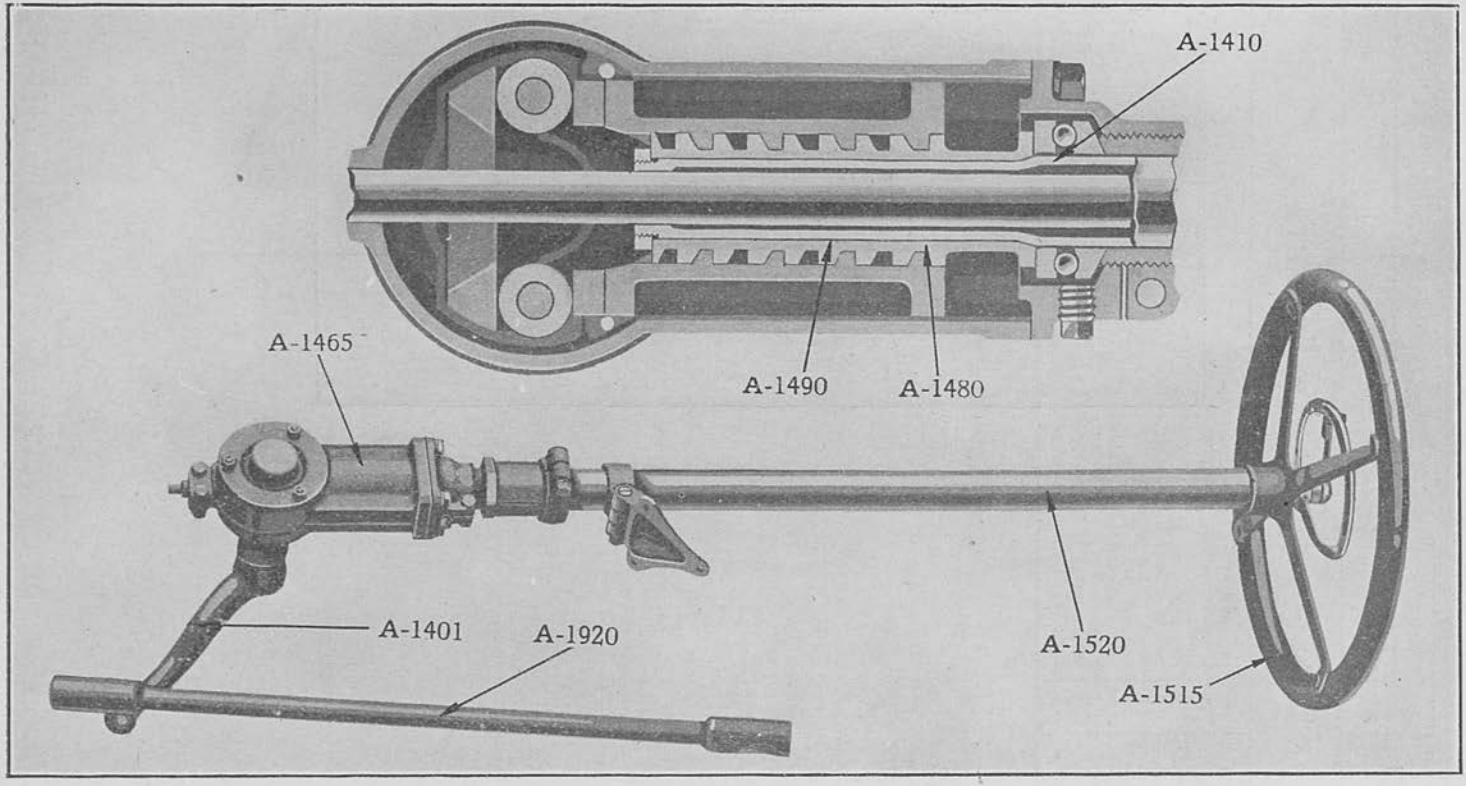
Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
A750	1	Vertical carbureter, complete with all parts	Bolted to intake manifold
A763	1	Air intake clamp screw	Outside of intake passage
A752	1	Air sleeve assembly	In air intake
A754	1	Air sleeve band	In air sleeve body
A755	1	Air sleeve band screw	Through band into body
A756	1	Air sleeve band nut No. 6 x 32	On air sleeve band screw
A753	1	Air sleeve body	In air intake
A759	1	Air sleeve lever	On air sleeve shaft
A761	1	Air sleeve lever taper pin	Through lever and shaft
A760	1	Air sleeve lever spring	On air sleeve lever
A758	1	Air sleeve shaft 0.25 (¼) x 2.5 (2½) inch long	Through air sleeve
A757	1	Air sleeve shutter	In air sleeve body
A762	1	Air sleeve shutter cotter pin	Through air sleeve shaft
A770	1	Butterfly and throttle assembly	In intake passage
A776	1	Butterfly lever stop screw	In carbureter body
A771	1	Butterfly set screw	Through butterfly valve and shaft
A773	1	Butterfly throttle lever	Outside carbureter body on butterfly shaft
A775	1	Butterfly throttle lever clamp screw	Through butterfly throttle lever
A774	1	Butterfly throttle lever	On butterfly shaft
A777	1	Butterfly throttle lever stop clamp	In carbureter body
A778	1	Butterfly throttle lever stop clamp screw	Through clamp
A779	1	Butterfly throttle lever shaft	Holds butterfly valve
A780	2	Butterfly throttle lever taper pin	Through throttle lever and shaft
A772	1	Butterfly throttle valve	In intake passage
A799	1	Cap jet	In carbureter body
A800	1	Cap jet washer	In carbureter body
A802	1	Carbureter body	
A811	1	Channel hole screw	In carbureter body
A812	1	Channel hole screw washer	On channel screw
A803	1	Choke tube, Standard No. 19	In carbureter body
A804	1	Choke tube screw	Through body to choke tube
A805	1	Choke tube screw lock washer	On choke tube screw
A806	1	Compensating jet, Standard No. 100	In air intake
A800	1	Compensating jet washer	Under compensating jet
A2245	2	Cotter pin	
A808	1	Cover spring button	Holds float chamber cover
A810	1	Cover spring screw	Through cover spring
A814	1	Filter plug	Under filter screen
A813	1	Filter screen	Under float chamber
A827	1	Flared nut 0.375 (⅜) inch S. A. E.	
A830	1	Float	In float chamber
A784	1	Float cover and needle valve assembly	Covers float chamber
A785	1	Float cover	Covers float chamber
A826	1	Gasoline connection for 0.375 (⅜) inch tube	On carbureter
A2241	1	Hot air flexible tube	From air muff to air intake
A2240	1	Hot air flexible tube assembly	From air muff to air intake
A2242	1	Hot air muff	Around exhaust manifold
A2243	1	Hot air muff set screw	Holds muff to manifold
A2244	1	Hot air muff set screw lock washer	
A795	1	Idling screw assembly	Between float chamber and intake passage
A796	1	Idling screw	In carbureter body
A797	1	Idling screw seat	At end of idling screw
A798	1	Idling screw lock nut	On idling screw
A816	1	Idling tube set screw	Retainer for idling tube
A815	1	Idling tube, Standard No. 45	Between float and intake
A817	2	Lower plugs	In carbureter body
A818	2	Lower plug washers	On plugs
A819	1	Main jet	In intake passage
A800	1	Main jet washer	On main jet
A822	1	McKim gasket	Carbureter to intake manifold
A786	1	Needle valve	In float chamber
A789	2	Needle valve axle	On float chamber cover
A790	1	Needle valve axle lock wire	Through axles
A797	1	Needle valve cap	On float chamber cover
A788	1	Needle valve collar	On upper end of needle valve
A791	2	Needle valve lever weight	On float chamber cover
A823	1	Needle valve seat	In bottom of float chamber
A824	1	Needle valve seat washer	On needle valve seat plug
A825	1	Priming hole screw	In carbureter body
A829	1	Union body washer, lower	In carbureter body
A828	1	Union body washer, upper	In carbureter body

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Engine—MANIFOLDS	
		See illustrations on pages 40, 44, 46, 170, 178	
A471	1	Exhaust manifold	On right side cylinder block
A366	4	Exhaust manifold gasket	Under exhaust manifold
A428	8	Exhaust manifold stud nuts	
A472	1	Intake manifold	On right side cylinder block
A367	1	Intake manifold gasket	Under intake manifold
A438	4	Intake manifold stud nuts	
		Engine—STARTING CRANK	
		See illustrations on pages 52, 165	
A1915	1	Leather boot	For starting crank
A300	1	Starting crank assembly	Front of engine
A301	1	Starting crank bushing	In crank housing
A302	1	Starting crank bushing pin	Through crank housing to bushing
A306	1	Starting crank housing	Bolts to gear case cover
A458	5	Starting crank housing bolt	Housing to gear case cover
A451	2	Starting crank housing bolt, short	Housing to gear case cover
A369	1	Starting crank housing gasket	Under crank housing
A1911	1	Starting crank lever	On starting crank shaft
A1912	1	Starting crank lever pin	On starting crank shaft
A1913	1	Starting crank lever tube	On starting crank handle
A303	1	Starting crank lock spring	On starting crank
A305	1	Starting crank shaft	In crank housing
A304	1	Starting crank spring screw	In crank housing
A1910	1	Starting hand crank assembly	In crank housing
A307	1	Steel locking ball .375 inch	In crank housing
A1914	1	Woodruff key	In starting crank shaft
		Engine—MUFFLER	
A2084	2	Cap screws	Rear supports to frame
A2047	2	Cap screw nuts	On supporting cap screws
A2090	1	Exhaust tube	Between engine and muffler
A1684	2	Lock washers	On supporting cap screws
A2075	1	Muffler assembly	Under car
A2077	1	Muffler	
A2080	1	Muffler support	Rear left hand
A2078	1	Muffler support	Rear right hand
		Engine—ACCELERATOR	
A2235	1	Accelerator foot rest	On floor board
A2336	1	Accelerator pedal assembly	On floor board
A337	1	Accelerator rod	From pedal to carbureter
A338	1	Accelerator spring	On accelerator rod
A2341	1	Ball and socket joint	On accelerator rod
A2343	1	Cotter pin	
A1976	1	Lock washer	For ball and socket joint
A2342	1	Nut	For ball and socket joint
A2340	1	Throttle rod	Carbureter to steering post
A339	1	Throttle rod assembly	Carbureter to steering post

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		***Engine*—STANDARD PARTS**	
A521	2	Button head iron rivets .125 x .5 inches	
A515	1	Countersunk head pipe plug .75 inches	
A526	1	Drain cock	
A523	8	Escutcheon pin No. 11 x .625 inches	
A525	1	Extension head pipe plug .25 inches	
A524	6	Rivets .187 x .093 inches	
A520	2	Split pin .062 x .75 inches	
A516	10	Spring lock washers .171 inches	
A527	2	Taper pin No. 3 x .75 inches	
A517	1	Wick packing 24 inches long	
A518	1	Woodruff key No. 18	



STEERING GEAR

NOMENCLATURE OF PARTS—Continued

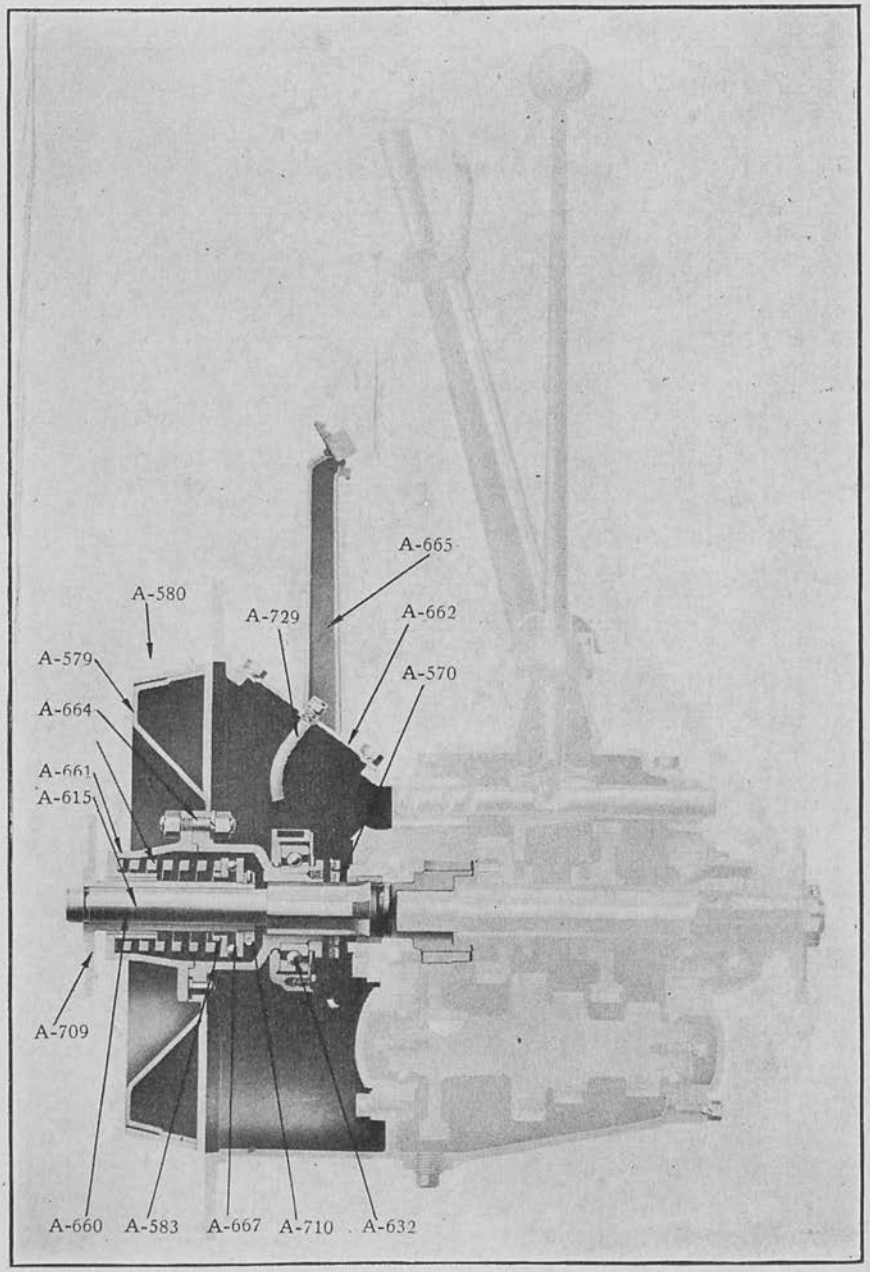
Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Control Devices—STEERING GEAR

See illustrations on pages 26, 27, 31, 100, 186

A1490	1	Adjusting screw assembly	On steering shaft
A1401	1	Arm, Pitman assembly	Connects with reach rod
A1402	1	Arm, Pitman with ball	On reach rod
A1403	1	Ball, Pitman arm	On Pitman end
A1410	1	Bearing assembly	In steering housing
A1427	1	Bolt	Anchored bracket
A1434	1	Bolt	Dash bracket
A1427	1	Bolt	On adjusting screw clamp
A1416	2	Bolts	Housing cap clamp
A1442	2	Bolts	In sector bracket
A1471	3	Bolts	In side plate
A1415	2	Bolts	In lower housing
A1420	4	Bolts	Housing cap
A1442	2	Bolts	In sector bracket
A1432	1	Bracket assembly	On dash
A1440	1	Bracket assembly	In steering gear housing
A1433	1	Bracket	On dash
A1426	1	Bracket anchor	Lower end of steering tube
A1425	1	Bracket anchor assembly	Lower end of steering tube
A1445	1	Bracket sector	In steering gear housing
A1469	1	Bushing	In side plate
A1468	1	Bushing	Outer housing
A1522	1	Bushing	In column jacket
A1467	1	Bushing	Inner housing
A1507	2	Bushings	In stationary tube
A1445	1	Cap assemhly	In housing
A1446	1	Cap	In housing
A1470	1	Cap, oil	Side plate
A1492	1	Clamp adjusting screw	On steering shaft
A1520	1	Column assembly jacket	Outer portion of column
A1450	1	Control assembly	On top of steering tube
A1458	1	Gas lever friction shoe	Under gas lever
A1474	1	Gasket	Under side plate
A1525	1	Gasket	Under housing cap
A1515	1	Hand wheel assembly	
A1465	1	Housing assembly	Lower end of steering column
A1466	1	Housing	Lower end of steering column
A1475	1	Housing sub assembly	Below main housing
A1456	1	Key	In hand wheel
A1454	1	Lever, gas	Above steering wheel
A1462	1	Lever, gas, upper sub assembly	Upper steering tube
A1404	1	Lock washer	On pitman arm
A1436	1	Lock washer	On dash bracket bolt
A1418	1	Lock washer	Housing cap clamp bolt
A1422	1	Lock washer	Adjusting screw clamp bolt
A1418	2	Lock washers	Steering gear housing bolts
A1422	4	Lock washers	On housing cap bolt
A1405	1	Nut	On pitman arm
A1428	1	Nut	Anchor bracket bolt
A1428	1	Nut	On dash bracket bolt
A1417	1	Nut	Housing cap clamp bolt
A1457	1	Nut	In wheel
A1428	1	Nut	Adjusting screw clamp bolt
A1417	1	Nut	Housing cap clamp bolt
A1417	2	Nuts	On housing bolts
A1443	2	Nuts	On sector bracket bolt
A1443	2	Nuts	On sector bracket bolt
A1484	1	Nut, half assembly, left	In steering housing
A1480	1	Nut, half assembly, right	In steering housing
A1485	1	Nut, half left	At left hand side of screw in housing
A1481	1	Nut, half right	At right hand side of screw in housing.
A1511	2	Pin	Through roller in yoke
A1483	2	Pin, thrust block dowel	Through steering shaft and thrust block
A1483	2	Pin, thrust block dowel	Through thrust block into shaft
A1526	1	Pipe plug	In steering housing
A1437	1	Plate	On dash bracket
A1472	1	Plate	Housing side
A1478	1	Plate	Housing side

PLATE 71



SECTIONAL DRAWING OF CLUTCH

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Control Devices—STEERING GEAR—*Continued*

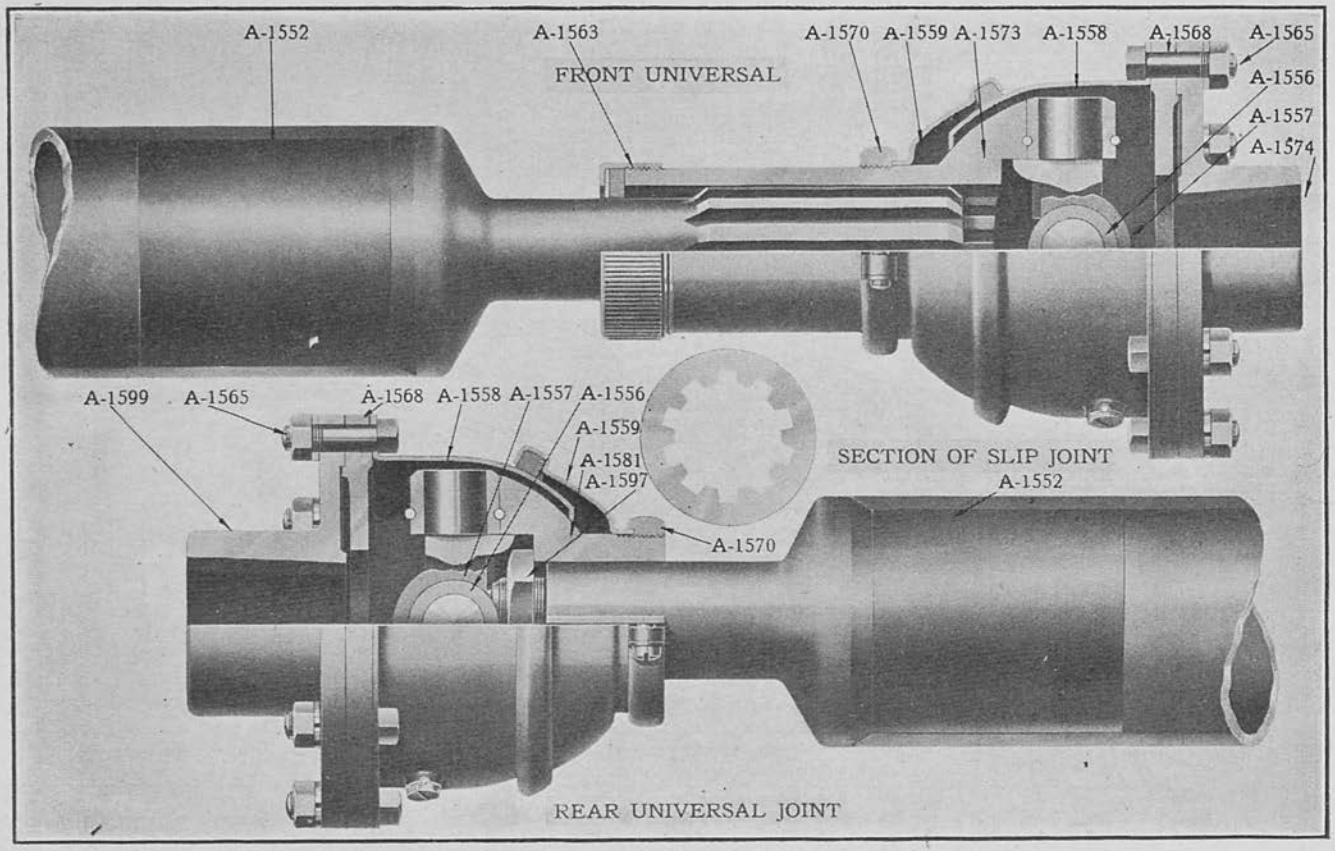
See illustrations on pages 26, 27, 31, 100, 186

A1527	1	Rod, column spark	In steering column
A1510	2	Roller	In yoke
A1455	1	Screw	In gas lever
A1500	1	Screw	In steering tube
A1518	4	Screws	In steering spider
A1460	1	Spacer, control	At top of steering tube
A1517	1	Spider	In steering wheel
A1459	1	Spring	On friction shoe
A1505	1	Stationary assembly tube	At lower end of tube
A1400	1	Steering gear, complete	
A1498	1	Steering tube assembly	From wheel to housing
A1499	1	Steering tube	From wheel to housing
A1502	1	Steering tube bushing	In steering tube
A1501	1	Steering tube lock nut	Lower end of steering tube
A1482	2	Thrust block	At lower end of screw
A1506	1	Tube	At lower end of steering tube
A1516	1	Wood rim	Steering wheel
A1508	1	Yoke assembly	In steering housing
A1509	1	Yoke	In steering housing

CLUTCH

See illustrations on pages 26, 27, 28, 94, 102, 106, 110, 118, 188

A570	1	Clutch brake assembly	On main drive gear shaft
A572	1	Clutch brake facing	On main drive gear shaft
A571	1	Clutch brake	On main drive gear shaft
A608	4	Clutch brake spring	On main drive gear shaft
A609	2	Clutch brake stud	In main drive gear bearing cap
A579	1	Clutch cone	In engine flywheel
A580	1	Clutch cone facing	On clutch cone
A581	6	Clutch cone facing springs	Under clutch cone facing
A582	6	Clutch cone facing spring studs	In clutch cone
A586	12	Clutch cone rivets	Facing to cone
A660	1	Clutch front hub bushing	On main drive gear shaft
A662	1	Clutch hand hole cover	On transmission case
A663	1	Clutch hand hole cover gasket	Under hand hole cover plate
A578	1	Clutch hub assembly	On main drive gear shaft
A664	4	Clutch hub bolts	Through front and rear hubs
A661	1	Clutch hub, front	On main drive gear shaft
A583	1	Clutch hub, rear	On main drive gear shaft
A665	1	Clutch pedal	On end transmission clutch shaft
A584	4	Clutch rear hub to cone rivets	On main drive gear shaft
A666	1	Clutch spring	On forward end main drive gear shaft
A667	1	Clutch spring thrust ball cage	On clutch spring support
A668	1	Clutch spring thrust ball collar	On clutch spring support
A669	1	Clutch spring thrust ball spring collar	On clutch spring support
A632	1	Clutch thrust bearing assembly	On rear clutch hub
A633	1	Clutch thrust bearing container	On rear clutch hub
A670	1	Clutch yoke	On inner end transmission clutch shaft
A671	2	Clutch yoke lock screws	In clutch yoke
A585	1	Nut	Clutch cone
A573	6	Rivet	Clutch brake facing to clutch
A504	4	Rivets	Rear hub to cone
A634	1	Throwout thrust bearing N. D. No. 2010	On rear clutch hub
A635	1	Thrust bearing shell	On rear clutch hub
A636	4	Thrust bearing cap screws	



PROPELLER SHAFT AND UNIVERSAL JOINTS

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Transmission—PROPELLER SHAFT AND UNIVERSAL JOINTS

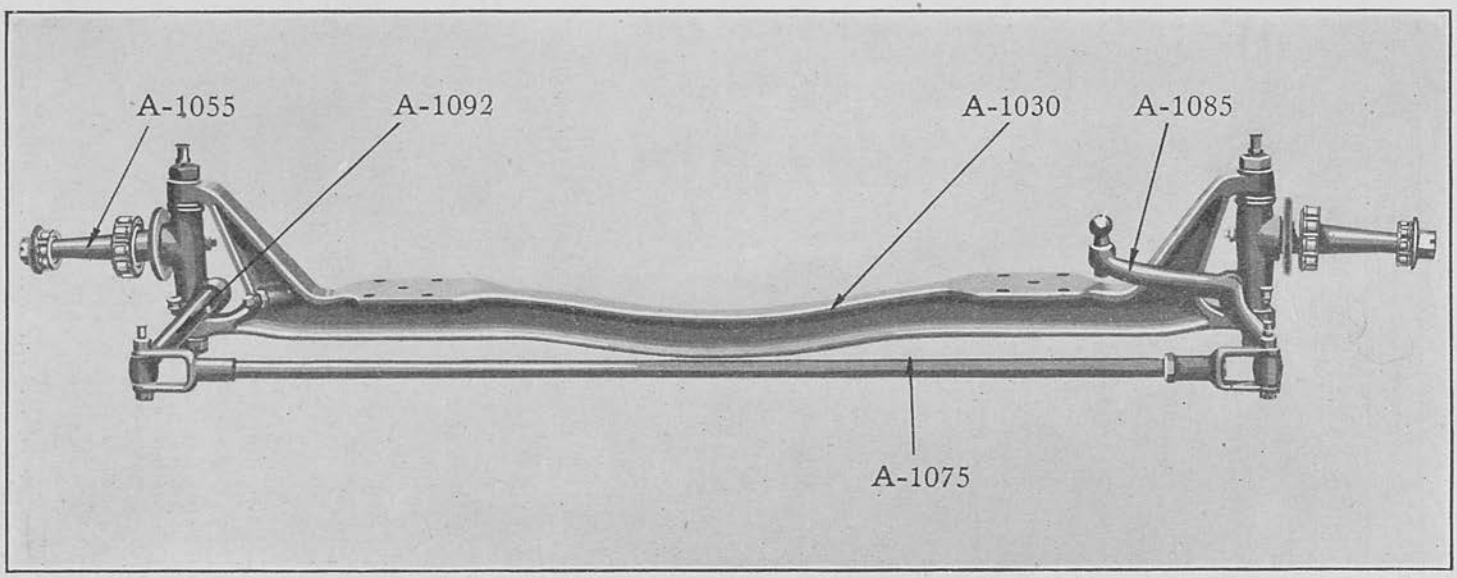
See illustrations on pages 26, 27, 124, 192

A1550	1	Propeller shaft assembly	Between transmission and rear axle
A1581	1	Ball yoke	In rear universal
A1556	8	Bushing	In universal joints
A1557	4	Bushing retainers	In universal joints
A1558	2	Casing, inside	Covers universals
A1560	2	Casing oil plug	In casings
A1559	2	Casing, outside	Covers universals
A1562	2	Casing packing	In casings
A1561	2	Casing plug cotter	Through casing oil plug
A1563	1	Dust cap	On front universal
A1564	1	Felt washer	On front universal
A1565	12	Flange bolt	Through universal flanges
A1567	12	Flange lock washer	On flange bolt
A1566	12	Flange nut	On flange bolts
A1568	2	Flange yoke	In universals
A1569	2	Journal	In universals
A1570	2	Lock nut	On universal stub shafts
A1572	2	Lock nut lock washer	Under lock nuts
A1571	2	Lock nut screw	Locks lock nut
A1598	1	Shaft cotter	In rear shaft nut
A1597	1	Shaft nut	In rear universal
A1573	1	Sleeve yoke	In front universal
A1599	1	Special companion flange	In rear universal
A1574	1	Special companion flange	In front universal
A1575	1	Steel washer	In front universal
A1576	1	Stub shaft	In front universal
A1600	1	Stub shaft (ball end)	In rear universal
A1552	1	Tubular shaft	
A1555	1	Universal joint assembly	Front end propeller shaft
A1580	1	Universal joint assembly	Rear end propeller shaft

Transmission—KELLOGG TIRE PUMP

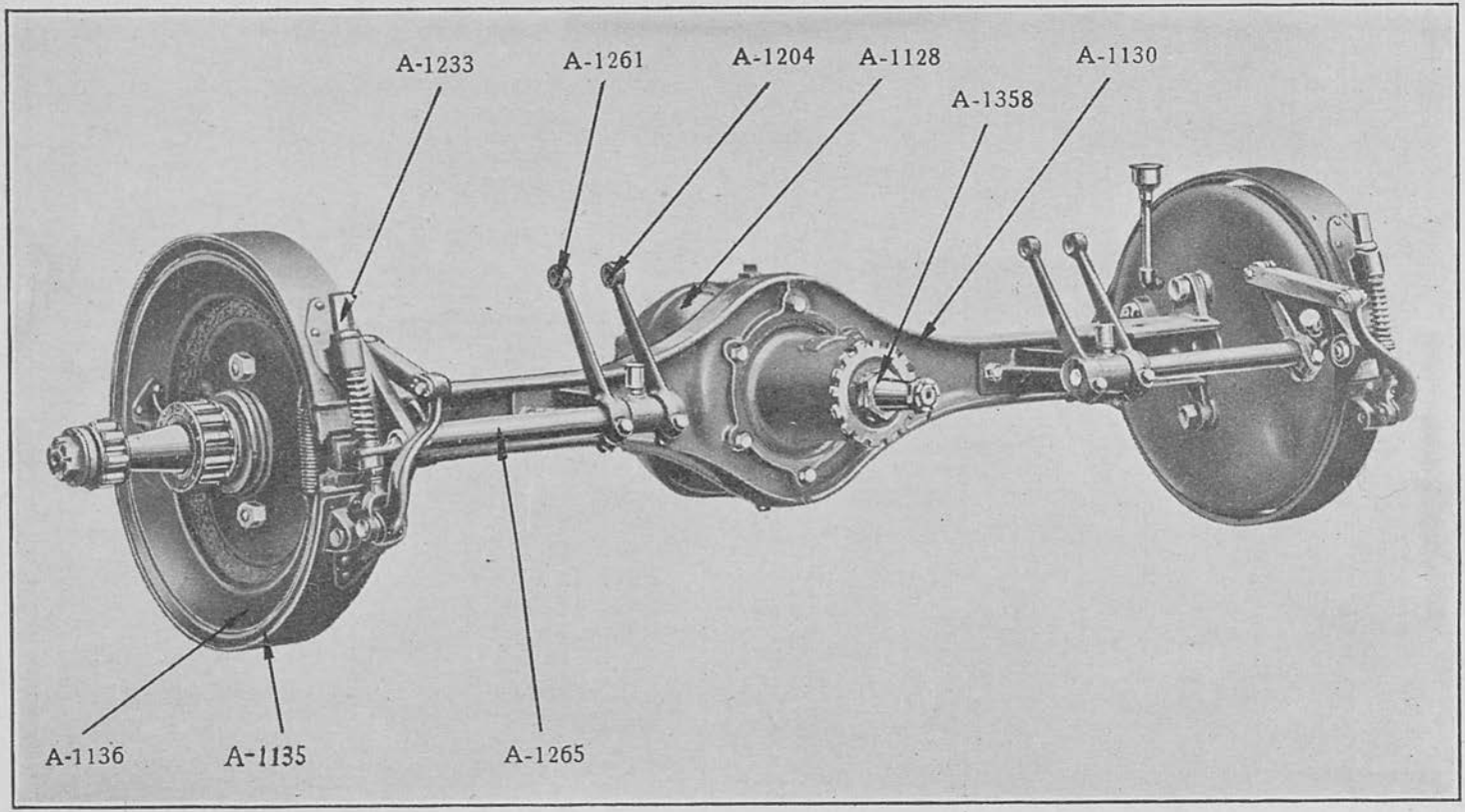
See illustration on page 126

A2450	1	Tire pump, complete	On transmission case
A2451	1	Pump less all fittings	
A2452	1	Air tube assembly	
A2490	1	Air nozzle	In cylinder head
A2470	1	Base assembly	Bolts to transmission
A2471	1	Base	Bolts to transmission
A2495	2	Baffle plate assembly	Under cylinder assembly
A2496	2	Baffle plates	Under cylinder
A2497	2	Baffle plate felts	On baffle plates
A2468	1	Button	On floor boards
A2498	1	Connecting rod assembly	Piston to crankshaft
A2499	1	Connecting rod	Piston to crankshaft
A2500	1	Connecting rod bushing	Lower end connecting rod
A2453	1	Copper tubing 0.312 ($\frac{5}{16}$) inch	
A2509	1	Cotter pin	
A2482	1	Crankshaft assembly	In base
A2483	1	Crankshaft	In base
A2472	2	Crankshaft bearings	In base
A2473	1	Crankshaft thrust washer	On crankshaft
A2474	1	Crankshaft thrust ring	On crankshaft
A2486	1	Cylinder assembly	
A2487	1	Cylinder	On base
A2494	2	Cylinder felts	In base of cylinder
A2512	4	Cylinder screws	From cylinder to crankcase
A2513	4	Cylinder screw lock washers	
A2465	4	Escutcheon pins No. 12 by 0.5 ($\frac{1}{2}$) inch	
A2462	4	Ferrules	On air holes
A2456	1	Floor plate	On floor boards



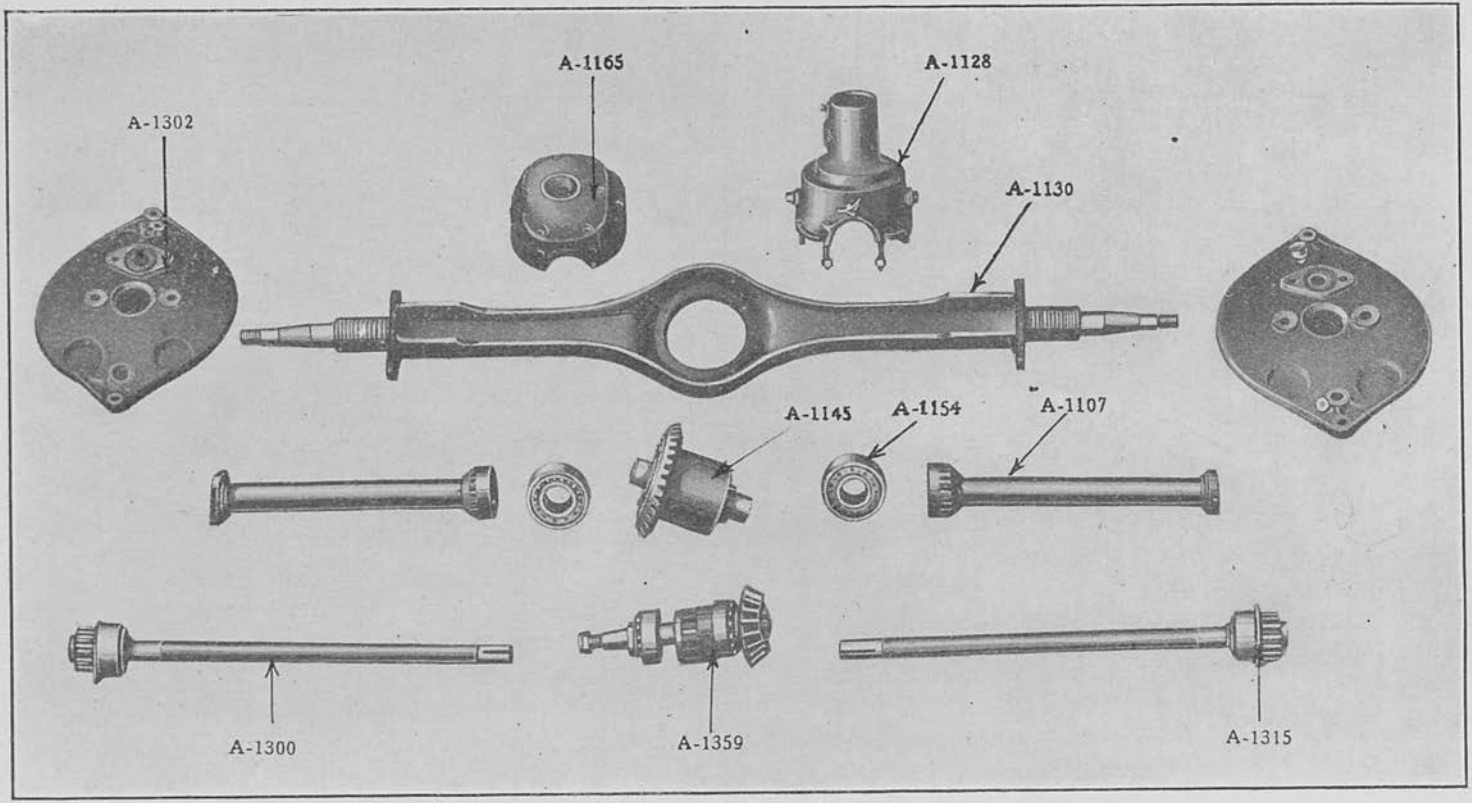
FRONT AXLE COMPLETE

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
Transmission—KELLOGG TIRE PUMP—_Continued_			
		See illustration on page 126	
A2458	1	Hose assembly	
A2504	1	Inlet valve	In piston head
A2503	1	Inlet valve guide	In piston head
A2505	1	Inlet valve spring	In piston head
A2506	1	Inlet valve washer	On inlet valve stem
A2510	1	Name plate	Covers intake air screen
A2488	2	Oil hole cover plate	In cylinder
A2492	1	Outlet valve	In cylinder head
A2491	1	Outlet valve guide	In air nozzle
A2493	1	Outlet valve spring	Under air nozzle
A2502	1	Piston	In cylinder
A2507	4	Piston rings	On piston
A2501	1	Piston assembly	
A2464	1	Plain coupling	
A2489	2	Plate rivet pins	In cylinder
A2461	1	Pressure gage, 200 pounds with tee connection	
A2478	1	Shifter lever	On base
A2466	1	Shifter rod	To air pump
A2481	1	Shifter spring	On stop pin
A2475	1	Shifter yoke	On base
A2477	1	Shifter yoke shim	In base
A2484	1	Slide gear	In crankshaft
A2485	1	Slide gear key	In slide gear
A2467	2	Special jam nut	
A2480	1	Stop pin	In base
A2479	1	Taper pin	Through shifter lever
A2454	1	Tubing nut 0.312 ($\frac{5}{16}$) inch	
A2459	1	Tubing, 4-ply 0.25 ($\frac{1}{4}$) inch x 12 feet	
A2460	1	Tubing, 4-ply 0.25 ($\frac{1}{4}$) inch x 2 feet	
A2463	1	Valve raising coupling	In air hose
A2466	1	Wing nut	On floor board
A2508	1	Wrist pin	Through piston and connecting rod
Chassis—FRONT AXLE			
		See illustrations on pages 26, 27, 30, 128, 194	
A1025	1	Front axle, complete	
A1028	1	Front axle less hubs and bearings	
A1034	2	Adjusting screws	In I beam
A1077	1	Adjusting yoke	On end of tie rod
A1078	1	Adjusting yoke lock nut	On tie rod tube
A1098	1	Ball stud	In left spindle
A1080	1	Ball stud nut	On ball stud
A1087	2	Bushing, steering arm	In steering arm
A1111	2	Felt washers	In hub
A1112	2	Felt washer retainers	In hub
A1105	2	Front hub assembly	On spindle
A1106	2	Front hub	On spindle
A1107	2	Front hub flange	On hub
A1108	2	Hub cap	On hub
A1030	1	I-beam assembly	
A1031	1	I-beam center	
A1109	2	Inner roller bearings	On spindles
A1065	2	King bolt assembly	Through I beam yoke end
A1066	2	King bolts	Through I beam yoke end
A1069	2	King bolt cotters	Through ends of king bolts
A1068	2	King bolt nuts	On king bolt
A1049	2	King bolt oilers (elbow)	In spindle body
A1071	2	King bolt oilers (straight)	Upper end of king bolt
A1045	2	King bolt set screws	In spindle body
A1067	2	King bolt thrust washers	Under king bolt head
A1070	2	King bolt thrust washers	Under king bolt nut
A1929	2	Leather boots	On ends of reach rods
A1035	2	Lock nuts	On adjusting screw
A1046	2	Lock nuts	On king bolt set screw
A1036	2	Lock pins	For king bolt washers
A1036	2	Lock pins	For spindle thrust washer
A1047	2	Lock washers	On king bolt set screw
A1110	2	Outer roller bearings	On spindle



REAR AXLE COMPLETE

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Chassis*—FRONT AXLE—*Continued	
		See illustrations on pages 26, 27, 30, 128, 194	
A1922	1	Plug, threaded	Forward end of reach rod
A1923	1	Plug, threaded	Rear end of reach rod
A1924	1	Plug, throat	Forward end of reach rod
A1920	1	Reach rod, complete	From steering gear to left spindle
A1927	1	Reach rod shell	From steering gear to left spindle
A1926	1	Seat, spring	Rear end of reach rod
A1927	1	Shell assembly	Reach rod extension
A1040	1	Spindle assembly, right	
A1055	1	Spindle assembly, left	
A1041	1	Spindle, right	
A1056	1	Spindle, left	
A1043	2	Spindle nuts	On ends of spindle
A1044	2	Spindle nut cotters	
A1114	2	Spindle thrust washer, top half	On top of spindle body
A1115	2	Spindle thrust washer, bottom half	On top of spindle body
A1042	2	Spindle washers	Under spindle nut
A1928	2	Springs	In ends of reach rod
A1085	1	Steering arm assembly, right	In right spindle
A1092	1	Steering arm assembly, left	In left spindle
A1088	2	Steering arm keys	In steering arms
A1089	2	Steering arm nuts	On steering arms
A1090	2	Steering arm nut cotters	
A1075	1	Tie rod assembly	
A1079	2	Tie rod bolts	Through tie rod yoke ends
A1081	2	Tie rod bolt cotters	
A1082	2	Tie rod bolt oilers	In upper end tie rod bolts
A1076	1	Tie rod tube	Between steering arms
A1032	2	Yoke bushings, upper	In I beam ends
A1032	2	Yoke bushings, lower	In I beam ends
		***Chassis*—REAR AXLE**	
		See illustrations on pages 26, 27, 32, 132, 134, 138, 196, 198	
A1125	1	Rear axle, complete	
A1145	1	M. & S. differential assembly complete with 34:19 bevel drive gear	In differential carrier
A1148	1	M. & S. differential assembly less bevel drive gear	In differential carrier
A1176	1	Bevel drive gear—34 teeth	Riveted to differential case
A1359	1	Bevel drive pinion—19 teeth	On rear end of pinion shaft
A1177	1	Case	Differential carrier
A1178	6	Case rivets	In case
A1179	6	Compensating gears	In differential case
A1181	6	Compensating gear pins	Through case
A1180	12	Compensating gear washers	On compensating gear pins
A1150	2	Differential bearing adjusters	On hubs of gear case
A1151	2	Differential bearing adjuster locks	On case hubs
A1152	2	Differential bearing adjuster lock screws	On case hub
A1153	2	Differential bearing adjuster lock screw washers	On case hubs
A1154	2	Differential bearing Timken No. 355	On case hubs
A1155	2	Differential bearing cup Timken No. 3520	In differential carrier
A1128	1	Differential carrier	Bolted to axle I beam
A1165	1	Differential carrier cover	On carrier
A1166	2	Differential carrier cover gasket	Under cover
A1167	2	Differential carrier cover filler and drain plugs	In carrier cover
A1168	6	Differential carrier front to rear stud nut	Holds carrier to I beam
A1169	1	Differential carrier gasket	Between carrier and I beam
A1170	6	Differential carrier stud	In rear of carrier case
A1171	6	Differential carrier stud lock washer	
A1172	6	Differential carrier to I beam screw lock washer	
A1173	6	Differential cover cap screw	
A1174	6	Differential cover cap screw lock washer	
A1186	6	Dowel pins	In case
A1183	1	Flange	Left hand half of case
A1184	1	Flange	Right hand half of case
A1325	1	Front pinion bearing clamp lock	On differential carrier
A1326	1	Front pinion bearing spacer	On pinion shaft
A1362	6	Housing to I beam screw	



REAR AXLE PARTS

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Chassis—REAR AXLE—*Continued*

See illustrations on pages 26, 27, 32, 132, 134, 138, 196, 198

A2225	28	Hub bolt	Through hub flanges
A2103	28	Hub bolt nut	On hub bolts
A1283	2	Hub caps	On rear hubs
A1284	8	Hub cap screw	Through hub cap
A1285	8	Hub cap screw lock washers	Under hub cap screws
A1286	2	Hub felt retainer	In hub
A1287	2	Hub felt washer	In hub
A1288	2	Hub flange	On rear hub
A2226	2	Hub flange	On rear hub
A1275	2	Hub inner bearing, Bower No. 309-NX	In rear hub
A1276	2	Hub inner bearing inner race and rolls	On I beam
A1277	2	Hub inner bearing outer race	In rear wheels
A1280	2	Hub outer bearing, Bower No. 306-NX	In rear hub
A1281	2	Hub outer bearing inner race and rolls	On I beam
A1282	2	Hub outer bearing outer race	In rear hub
A1289	2	Hub spindle cotter pin	
A1290	2	Hub spindle lock nut with dowel	
A1292	2	Hub spindle lock nut	
A1291	2	Hub spindle lock washer	
A1293	2	Hub spindle nut dowel	In spindle nut
A1294	2	Hub spindle taper pin	
A1133	2	Hub with internal gear and bearing races	In rear wheel
A1132	2	Hub with internal gear assembly	In rear wheels
A1185	3	Intermediate gear	Between compensating gears
A1186	3	Intermediate gear pins	Between side gears
A1130	1	I beam assembly	
A1137	2	Jackshaft assembly	Differential to rear wheels
A1300	2	Jackshafts	Differential to rear wheels
A1280	2	Jackshaft bearings Bower No. 306 NX	In brake carrier
A1302	2	Jackshaft bearing clamp flange	In brake carrier
A1303	4	Jackshaft bearing flange bolt	In brake carrier
A1305	4	Jackshaft bearing flange bolt nut	On flange bolt
A1307	2	Jackshaft cover tube	On jackshafts
A1308	2	Jackshaft cover tube flange	Outside of brake carrier
A1309	8	Jackshaft cover tube flat washer	On jackshaft
A1310	2	Jackshaft felt retainers	On wheel ends of jackshaft tube
A1311	2	Jackshaft felt washers	On wheel ends of jackshaft tube
A1312	2	Jackshaft fiber washer	On jackshaft
A1313	2	Jackshaft nut	Outer end of jackshaft
A1314	2	Jackshaft nut lock	Outer end of jackshaft
A1315	2	Jackshaft pinion	Outer end of jackshaft
A1316	2	Jackshaft thrust washers	Outer end of jackshaft
A1327	1	Pinion bearing adjuster hole cover plate	On differential carrier
A1328	1	Pinion bearing adjuster hole cover plate felt gasket	
A1329	2	Pinion bearing adjuster hole cover plate screw	
A1330	2	Pinion bearing adjuster hole cover plate screw lock	
A1331	1	Pinion shaft bearing adjuster	In differential carrier
A1333	1	Pinion shaft bearing cup, Timken No. 3320	In differential carrier
A1346	2	Pinion shaft clamp nut	On pinion shaft
A1347	1	Pinion shaft collar	On pinion shaft
A1348	1	Pinion shaft felt retainer	On forward end pinion shaft
A1349	1	Pinion shaft felt retainer lock	On forward end pinion shaft
A1350	1	Pinion shaft felt retainer lock screw lock washer	On forward end pinion shaft
A1351	1	Pinion shaft felt retaining washer	On forward end pinion shaft
A1352	1	Pinion shaft felt washer	
A1353	1	Pinion shaft felt washer	
A1335	1	Pinion shaft inner bearing, Timken No. 417	On pinion shaft
A1336	1	Pinion shaft inner bearing cup Timken No.412	In differential carrier
A1354	1	Pinion shaft key	Rear end of shaft
A1355	1	Pinion shaft nut	Rear end of shaft
A1357	1	Pinion shaft nut	Forward end of shaft
A1356	1	Pinion shaft nut inner lock	Rear end of shaft
A1332	1	Pinion shaft outer bearing, Timken No. 355	On pinion shaft
A1175	8	Rivets	Bevel gear to differential case

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Chassis—FRONT SPRINGS

See illustrations on pages 34, 204

A1610	2	Front spring, complete	
A1612	2	Center bolt	Through spring leaves
A1613	2	Center bolt nut	
A1614	4	Eye bushings	In ends of springs
A1615	8	Rebound clip	Near ends of spring
A1616	4	Rebound clip bolt	Through rebound clip
A1617	4	Rebound clip bolt nut	
A1618	4	Rivets	Rebound clips to leaves
A1635	6	Shackle bolt	Through spring ends
A1637	6	Shackle bolt cotter	
A1636	6	Shackle bolt oilers (elbow)	In ends of bolts
A1638	4	Spring clips	Clips spring to axle
A1639	8	Spring clip nut	
A1640	8	Spring clip washer	
A1641	2	Spring plate	Under spring clip
A1643	2	Spring shackle	Rear end front spring to frame
A1642	2	Spring seat	Under front spring

Chassis—FRONT WHEELS

See illustrations on pages 140, 142, 200

A2100	2	Front wheel assembly	
A2110	2	Front wheel assembly less bearings	
A2101	2	Front wheel with felloe band	
A2102	24	Hub bolts	Through hub flanges
A2103	24	Hub bolt nuts	
A2107	20	Rim bolt lugs	Press against clamping rings
A2105	20	Tire rim bolts	Through felloes
A2106	20	Tire rim bolt nut	
A2108	20	Tire rim bolt plates	Under rim bolt head

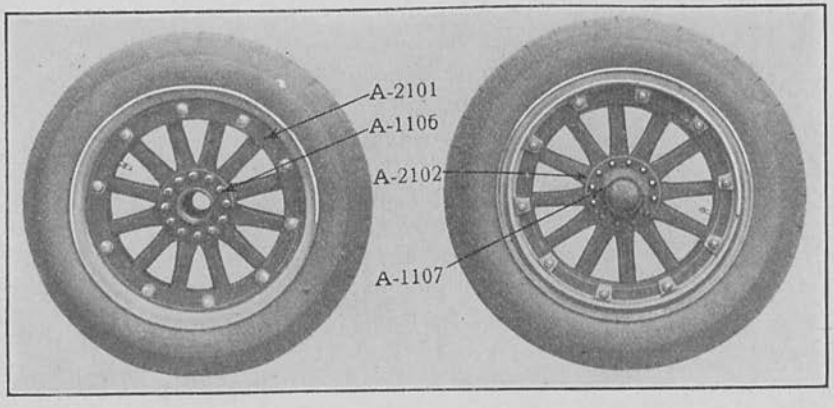


PLATE 77—FRONT WHEELS

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
Chassis—REAR SPRINGS			
		See illustrations on pages 34, 146, 204	
A1620	2	Rear springs, complete	
A1622	2	Center bolt	Clamps spring leaves
A1623	2	Center bolt nut	
A1626	4	Rebound clip	Near ends of spring
A1627	4	Rebound clip	Near center of spring
A1628	8	Rebound clip bolt	Through rebound clip
A1629	8	Rebound clip bolt nut	
A1630	16	Rebound clip rivet	Clip to spring leaves
A1655	2	Shackles	At rear ends of spring
A1645	2	Shackle bolts	Through forward ends of spring
A1646	2	Shackle bolts	Through rear ends of spring
A1637	4	Shackle bolt cotters	
A1648	4	Shackle bolt oilers (elbow)	In shackle bolts
A1656	2	Shackle bolt oilers (Straight)	In shackle bolts
A1657	4	Shackle bushing	In shackles
A1649	4	Spring clip	Clips spring to axle
A1652	2	Spring clip bottom plate	Cross ends of clip
A1650	8	Spring clip nuts	
A1651	8	Spring clip nut lock washers	
A1653	2	Spring clip top plate	
A1624	2	Spring eye bushing	Forward end of spring
A1625	2	Spring eye bushing	Rear end of spring
A1654	2	Spring seats	Between springs and axle
Chassis—REAR WHEELS			
		See illustrations on pages 140, 142, 201	
A2220	2	Rear wheel complete assembly	
A2227	2	Rear wheel with rear hub assembly	
A2221	2	Rear wheel with felloe band	
A1364	2	Internal gear grease cup	
A1363	24	Internal gear rivets	Internal gear to hub
A2230	4	Tire rim assembly	
A2231	4	Tire rim base	
A2103	20	Tire rim bolts	Through felloes
A2107	20	Tire rim bolt lugs	Press against clamping rings
A2106	20	Tire rim bolt nuts	On rim bolts
A2108	20	Tire rim bolt plates	Under rim bolt head
A2233	4	Tire rim clamping rings	Between base and felloe band
A2234	4	Tire rim locking ring	Under outer side rings
A2232	8	Tire rim side rings	On rim base

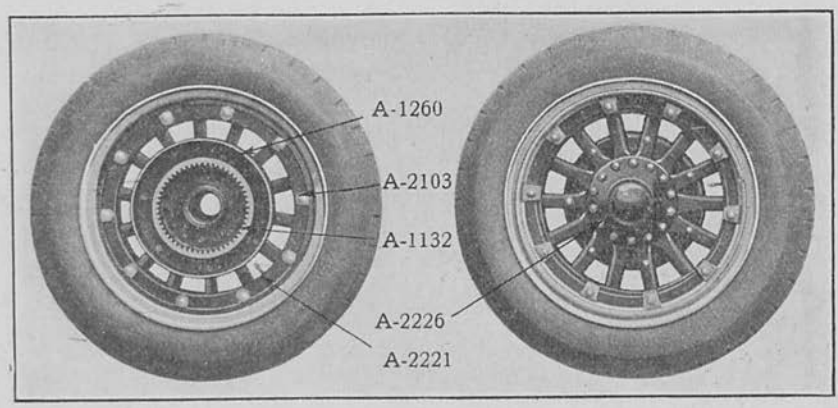


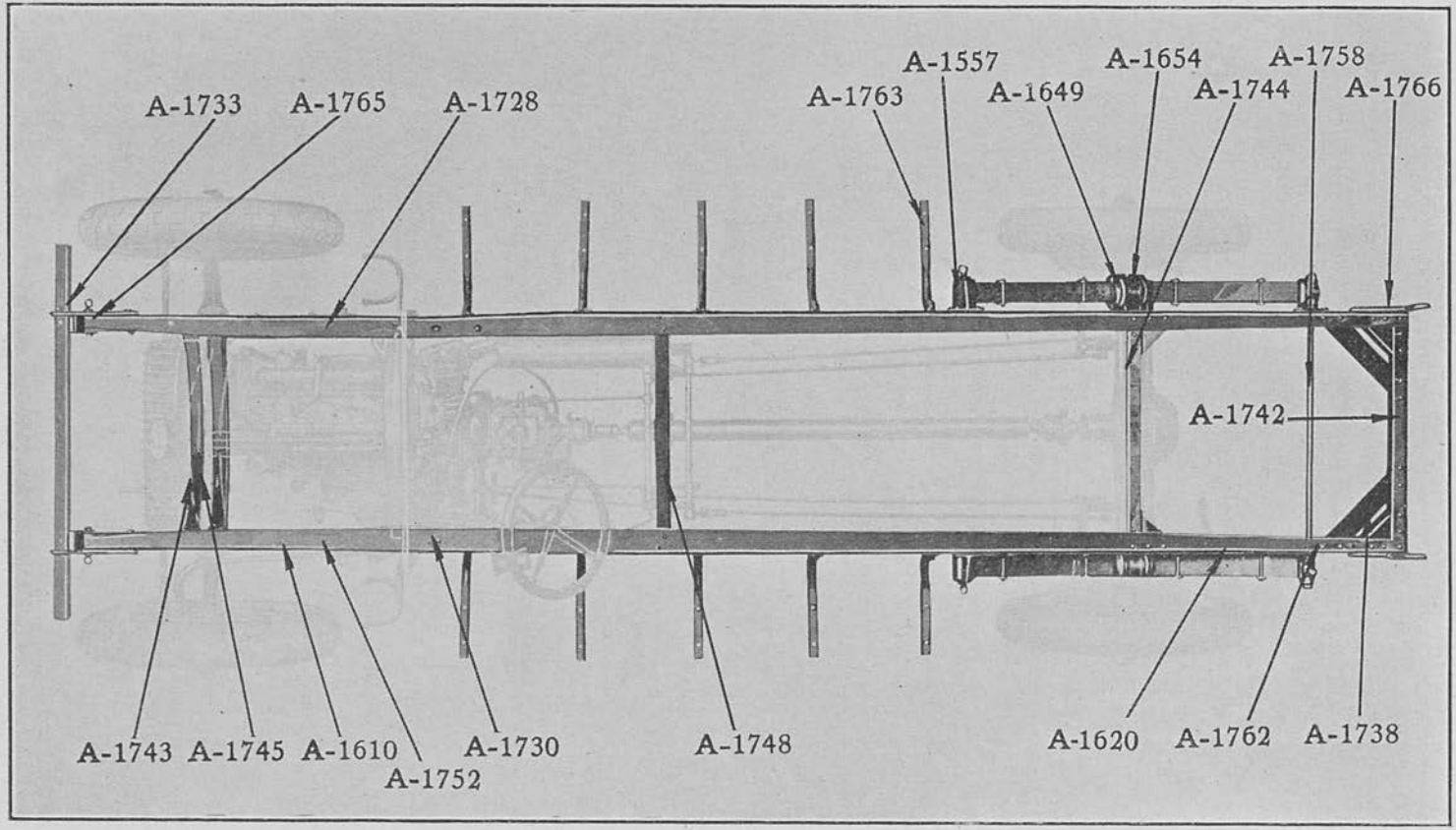
PLATE 78—REAR WHEELS

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Chassis—BRAKES	
		See illustrations on pages 33, 143, 196	
A1692	2	Adjusting clevis	At forward end of brake rod
A1693	2	Adjusting clevis lock nut	
A1700	1	Adjusting clevis	Forward end of service brake rod
A1701	1	Adjusting clevis lock nut	
A1692	2	Adjusting clevis	At forward end of brake rod
A1693	2	Adjusting clevis lock nuts	At forward end of brake rod
A1700	1	Adjusting clevis	Forward end of brake rod
A1701	1	Adjusting clevis lock nut	Forward end of brake rod
A645	2	Balls 0.437 ($\frac{7}{16}$) inch steel	
A656	8	Bearing cap screws	Bearing cap retainers
A1250	4	Brake anchor steady pin spring	On steady spring
A1251	4	Brake anchor pin nut	
A1252	2	Brake bracket	On I beam
A1253	4	Brake camshaft oiler	On brake bracket
A1254	1	Brake carrier, left hand	On end of I beam
A1255	1	Brake carrier, right hand	On end of I beam
A1256	4	Brake carrier to I beam bolt	
A1257	4	Brake carrier to I beam bolt washer	
A1258	4	Brake carrier I beam bolt nut	
A1259	8	Brake connecting link cotter pin	
A1260	2	Brake drum	On rear wheels
A2047	14	Brake drum bolt nuts	
A1988	14	Brake drum bolt washers	
A2222	14	Brake drum machine screw	In brake drum
A647	2	Brake latch cap screw	Through brake latch to brake lever
A552	1	Brake lever assembly	On transmission case cover
A1261	2	Brake lever	Between wheels and frame
A555	1	Brake lever, black	On side of transmission case cover
A559	1	Brake lever grip	At top of lever
A563	1	Brake lever grip lock screw	On top of lever
A1262	6	Brake lever key	Holds brake lever to shaft
A560	1	Brake lever latch rod end	At top of lever
A648	1	Brake lever pivot pin	At end of brake lever
A649	1	Brake lever pivot pin washer	
A557	1	Brake lever latch spring	At upper part of lever
A650	1	Brake lever ratchet	Bolts on side of transmission case
A561	1	Brake lever spring washer	
A556	1	Brake lever spoon	At brake lever hand grip
A562	2	Brake lever spoon hinge nut	At top of brake lever
A558	1	Brake lever spoon hinge pin	Through spoon and lever
A651	1	Brake pedal	On side of transmission case
A652	1	Brake pedal spring	On brake pedal
A653	1	Brake pedal spring hook	Through spring and pedal
A1263	4	Brake shaft bracket bolt	Bracket to frame
A1265	4	Brake shaft bracket bolt nut	
A1264	4	Brake shaft bracket bolt lock washer	
A1138	2	Brake tube assembly	On rear axle
A1266	2	Brake tubes	On rear axle
A1267	4	Brake tube bushings	At ends of brake tubes
A1268	2	Brake tube lever	At hub
A1269	4	Brake tube lever clamp bolt	In clamp around tube
A2270	4	Brake tube lever clamp bolt lock washer	
A1271	4	Brake tube lever clamp bolt nut	
A1682	6	Cap screws	Attaching brake rocker shaft brackets to third cross member
A1694	4	Clevis pins	Through clevis at forward end of brake rod
A1694	4	Clevis pins	Through clevises at ends of brake rod
A1702	2	Clevis pins	Through clevises
A590	1	Control lever assembly	Extending upward from transmission case
A591	1	Control lever, black	Extending up from transmission case
A672	1	Control lever cap	Above ball on control lever
A673	1	Control lever cap washer	Between ball and cap
A592	1	Control lever pivot pin	Through control lever and ball
A593	1	Control lever pivot pin	On lever in transmission case cover
A674	1	Control lever pivot lock spring	At side and below ball
A1695	4	Cotters for clevis pins	
A564	1	Cotter pin	
A676	1	Cotter pin 0.125 ($\frac{3}{32}$) inch x 1.25 (1$\frac{1}{4}$) inches	

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Chassis*—BRAKES—*Continued	
		See illustrations on pages 33, 143, 196	
A676	1	Cotter pin 0.171 ($\frac{11}{64}$) x 2 inches	
A675	2	Cotter pins 0.25 ($\frac{1}{4}$) inch x 2 inches	
A1703	2	Cotters for clevis pins	
A1675	1	Emergency brake rocker shaft assembly	In front of middle frame cross member
A1676	1	Emergency brake rocker shaft	In front of middle frame cross member
A1667	2	Emergency brake rocker shaft brackets	Bolted to cross member frame
A1668	1	Emergency brake rocket shaft lever, short	Between ends of rocker shaft
A1679	2	Emergency brake rocker shaft lever, long	On ends of rocker shaft
A1712	1	Emergency brake rod to hand lever	At forward end of brake rod
A1713	1	Emergency brake rod to hand lever, with stationary clevis only	Forward end of brake rod
A1705	2	Emergency brake rod to axle assembly	Extending from brake lever backward to axle assembly
A1706	2	Emergency brake rods, with stat'n'y clevis only	Extending from brake to axle
A1217	2	External brake anchor steady pin	On top of brake band
A1218	2	External brake anchor steady pin collar	
A1135	2	External brake band assemblies, right and left	On rear axle
A1210	2	External brake bands	On rear axle
A1214	2	External brake band anchors	
A1215	2	External brake band anchor pin	In brake anchor
A1222	2	External brake band evener	At side of brake band
A1223	2	External brake band evener nut	On end of brake band evener
A1224	2	External brake band hinge, lower	Hinged on outside of frame band
A1225	2	External brake band hinge, upper	Outer edge of brake band
A1211	2	External brake band linings	In brake band
A1235	2	External brake band steady pin collar	
A1219	1	External brake connecting link, left hand	At ends of brake bands
A1220	1	External brake connecting link, right hand	At ends of brake bands
A1221	4	External brake connecting link pins	Through connecting link and brake bands
A1234	2	External brake contracting adjusting lock nut	On contracting links
A1233	2	External brake contracting link adjusting nut	On link pins
A1226	1	External brake contracting lever, left hand	Between brake band ends
A1227	1	External brake contracting lever, right hand	Between brake band ends
A1229	2	External brake contracting lever releasing spring	Holds brake band ends apart
A1230	2	External brake contracting link	Beside brake band ends
A1232	2	External brake contracting link nuts	On link pins
A1231	2	External brake contracting link pins	Through links
A1236	2	External brake contracting link spring	On contracting link
A1237	2	External brake contracting link spring washer, lower	
A1238	2	External brake contracting link spring washer, upper	
A1228	2	External brake contracting pins	Through brake lever and brake band ends
A1239	2	External brake lever	Between springs and wheel
A1240	2	External brake tube lever stop plug	Beside brake housing
A1194	2	Internal brake band anchor	At brake band ends
A1195	2	Internal brake band anchor pin	
A1196	2	Internal brake band anchor pin cotter	
A1197	12	Internal brake band anchor rivets	Through anchor
A1136	2	Internal brake band assembly	On rear axle
A1190	2	Internal brake band	On rear wheels
A1198	4	Internal brake band end screws	
A1199	16	Internal brake band end shoe rivets	Through end shoes
A1191	2	Internal brake band lining	
A1192	8	Internal brake band lining rivets, long	Through lining and band
A1193	36	Internal brake band lining rivets, short	Through lining and band
A1200	2	Internal brake band spring	At brake band ends
A1201	2	Internal brake band steady pin	At end of brake bands
A1203	2	Internal brake band steady cotter	
A1204	2	Internal brake cam lever	
A1205	2	Internal brake cam lever bolt	
A1207	2	Internal brake cam lever clamp bolt nut	
A1206	2	Internal brake cam lever clamp bolt lock washer	
A1139	1	Internal brake camshaft, right hand	On ends of rear axle I beam
A1140	1	Internal brake camshaft, left hand	On ends of rear axle I beam
A1208	2	Internal brake camshaft washers	
A1670	3	Lever to shaft pins	Through lever and shaft



FRAME AND SPRINGS

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Chassis—BRAKES—*Continued*

See illustrations on pages 33, 143, 196

A565	2	Lock washers	
A1684	6	Lock washers for cap screws	
A1683	6	Nuts for cap screws	
A1212	44	Rivets	Lining to external brake band
A1213	36	Rivets	External brake band anchor and hinge
A1665	1	Service brake rocker shaft assembly	Back of middle frame cross piece
A1666	1	Service brake rocker shaft	Extending across between frame side members
A1667	2	Service brake rocker shaft brackets	Fastened to frame cross piece
A1668	1	Service brake rocker shaft lever, short	On rocker shaft
A1669	2	Service brake rocker shaft lever, long	At ends of rocker shaft
A1691	2	Service brake rod to axle with stationary clevis only	
A1696	1	Service brake rod to foot pedal assembly	
A1699	1	Service brake rod to foot pedal with stationary clevis only	

Chassis—MISCELLANEOUS PARTS

See illustration on page 148

A2031	4	Anti-squeak strips	
A1733	1	Bumper	Front end of truck
A1787	2	Button head rivets	Through front engine support and second cross member
A1788	40	Button head rivets	Step hangers to side rail
A1787	2	Button head rivets	Front spring front hanger to side rail
A1787	2	Button head rivets	Fourth cross member to side rail
A1887	4	Button head rivets	Fifth cross member to side rail
A1796	8	Button head rivets	Third cross member to side rail
A1796	10	Button head rivets	Fourth cross member gusset
A1796	8	Button head rivets	Rear braces and fifth cross member to side rail
A1787	2	Button head rivets	Front spring front hanger to side rail
A1796	16	Button head rivets	Rear gussets
A1800	8	Button head rivets	Rear towing hooks
A1792	2	Button spring hanger rivets	Front spring hanger to sight rail
A1773	2	Cap screws	Front engine support
A1775	2	Cap screws	Bumper to frame
A1776	2	Nuts	
A1770	2	Cap screws	Propeller shaft guard
A1683	4	Nuts	
A1781	6	Cap screws	First and second cross members to side rail
A1776	6	Nuts	
A1784	2	Cap screws	Tail lamp bracket to frame
A1784	2	Cap screws	Tail lamp bracket
A1785	2	Nuts	
A2046	12	Cap screws	Front fenders
A2047	12	Nuts	
A1775	3	Cap screws	On searchlight bracket
A1770	2	Cap screws	In engine front support
A1683	2	Nuts	
A1988	4	Carriage bolt	In dash bracket
A1941	1	Clock	On dash
A2032	8	Copper split rivets	Anti-squeak strip
A1940	1	Dash assembly	
A1942	1	Dash board	
A1734	2	Dash bracket	Connecting frame and dash
A2023	1	Drip pan, lower	Under engine
A2024	1	Drip pan, upper	Under engine

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
		Chassis—FRAME	
		See illustrations on pages 146, 204	
A1725	1	Frame, complete, less all castings except front spring, front hanger, and tow rings	
A1728	1	Frame side rail, right hand with front spring, front hanger and tow ring	
A1730	1	Frame side rail, left hand with front spring, front hanger and tow ring	
A1732	1	Frame assembly, complete	
A1742	1	Frame fifth cross member	Rear cross member
A1743	1	Frame first cross member	Front cross member
A1744	1	Frame fourth cross member	Fourth from front
A1745	1	Frame second cross member	Second from front
A1746	1	Frame side rail, left hand, bare	
A1747	1	Frame side rail, right hand, bare	
A1748	1	Frame third cross member	Third from front
A1735	2	Fifth cross member brace	Braces on rear cross member
A1738	1	Fifth cross member gusset	Top left hand
A1739	1	Fifth cross member gusset	Top right hand
A1736	1	Fifth cross member gusset	Bottom left hand
A1737	1	Fifth cross member gusset	Bottom right hand
A1737	1	Fourth cross member gusset	Left hand side
A1736	1	Fourth cross member gusset	Right hand side
A1767	1	Front engine support complete	On frame second cross member
A2016	1	Front fender, left hand	
A2015	1	Front fender, right hand	
A1749	1	Front spring front hanger, left hand	
A1750	1	Front spring front hanger, right hand	
A1751	2	Front spring rear hanger bushing	In rear hanger
A1752	1	Front spring rear hanger, left hand	
A1753	1	Front spring rear hanger, right hand	
A1945	1	Ground wire	Magneto to switch
A1946	1	Ground wire	Switch to engine
A1981	4	Ground wire clips	
A2041	4	Hood catches	
A1947	1	Hood ledge	On dash
A1862	2	Hood ledge lacing	On dash
A2030	4	Hood locks	
A2035	1	Hood sill assembly, left hand	
A2028	1	Hood sill assembly, right hand	
A2036	1	Hood sill, left hand	
A2029	1	Hood sill, right hand	
A2042	2	Hood strap fasteners	
A2025	1	Hood with four catches	
A1949	1	Lamp bracket, left	On dash
A1950	1	Lamp bracket, right	On dash
A2051	6	Machine screws	In lower drip pan
A1966	3	Machine screws	Steering gear to dash
A1943	1	Magneto kick switch and key	On dash
A1754	1	Propeller shaft guard	On third frame cross member
A1952	1	Radiator tie rod bracket	On engine
A1755	1	Rear engine support, left hand	On left hand side rail
A1756	1	Rear engine support, right hand	On right hand side rail
A1757	2	Rear spring front hanger	On front end of rear spring
A1758	2	Rear spring hanger brace rod	Tie rod across frame
A1695	1	Rear spring hanger brace rod cotter	
A1760	2	Rear spring hanger brace rod nut	
A1761	2	Rear spring hanger brace rod washer	
A1762	2	Rear spring rear hanger	Rear end of rear spring
A2033	8	Rivets	Hood sill locks
A2402	2	Round felt wicks 4.5 (4½) inches long	In side lamps
A2402	1	Round wick	In tail lamp
A2013	1	Running board, left hand	
A2014	1	Running board, right hand	
A2020	1	Running board and splash guard, left hand	
A2017	1	Running board and splash guard, right hand	
A1965	4	Screws for clock	
A1972	4	Screws for ground wire clip	
A1966	6	Screws for lamp brackets	
A1956	2	Screws for magneto switch	
A1972	3	Screws for oil sight feed	
A1972	15	Screws for wood ledge	
A2026	1	Splash guard, left hand	

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location

Chassis—FRAME—*Continued*

See illustrations on pages 146, 204

A2027	1	Splash guard, right hand	
A1763	10	Step hangers	Riveted to side rails
A2048	4	Stove bolts for front fender	
A1983	2	Stove bolts for hood ledge clips	
A2048	8	Stove bolts for hood sills	
A1975	4	Stove bolts for speedometer	
A2060	8	Stove bolts for splash guard	
A1975	2	Stove bolts for radiator tie rod	
A2055	20	Stove bolts for running board	
A2048	4	Stove bolts for upper drip pan	
A1975	4	Stove bolts for vacuum tank	
A1765	2	Tow rings, front	On side rails
A1766	2	Tow rings, rear	Rear end of side rail
A2052	6	Wing nuts for drip pan machine screws	

Chassis—LAMPS

See illustration on page 148

A2371	1	Acetylene gas generator	On right running board
A2363	1	Acetylene searchlight with bracket	On dash
A2373	2	Rubber connections	On searchlight gas line
A2375	1	Searchlight assembly	On dash
A2386	1	Searchlight bracket and swivel block assembly	
A2389	2	Searchlight bracket thumb screws	
A2381	1	Searchlight door assembly	
A2383	1	Searchlight door glass	
A2384	1	Searchlight door glass retainer	
A2382	1	Searchlight door lock wheel	
A1954	1	Searchlight filler block	On dash
A2385	1	Searchlight forked bracket	
A2388	2	Searchlight forked bracket bearing cap	
A2379	1	Searchlight gas burner tip	
A2380	1	Searchlight gas tube	
A2390	1	Searchlight handle	
A2391	1	Searchlight handle bolt	
A2392	1	Searchlight handle bolt nut	
A2376	1	Searchlight lens mirror	
A2377	4	Searchlight mirror wedge	
A2378	4	Searchlight mirror wedge screws	
A2387	1	Searchlight swivel block assembly	
A2395	2	Side lamp, 5 inch white lens	
A2397	2	Side lamp glass clamping rings	
A2398	2	Side lamp glass clamping ring set screw	
A2399	2	Side lamp glass rubber gasket	
A2364	2	Side lamp, oil, complete	On dash
A2400	2	Side lamp oil fount	
A2401	2	Side lamp oil burner	
A2396	2	Side lamp peep hole glass	
A2404	4	Side lamp set screw check nut	
A2403	4	Side lamp to bracket set screw	
A1787	34	Spring hanger button head rivet	Through rear spring hanger and engine support to side rail
A1790	4	Spring hanger button head rivet	Through front spring hanger and side rail
A2410	1	Tail lamp 3.125 (3⅛) inches Ruby lens	
A1764	2	Tail lamp bracket	Rear end of frame
A2416	1	Tail lamp bracket set screw	
A2415	1	Tail lamp burner	
A2412	1	Tail lamp flat rubber gasket	
A2411	1	Tail lamp glass retaining ring	
A2367	1	Tail lamp, oil, complete	
A2414	1	Tail lamp oil fount	
A2396	1	Tail lamp peep hole glass	
A2417	1	Tail lamp set screw check nut	

NOMENCLATURE OF PARTS—Continued

Part No.	No. Per Truck	Property Classification—Part I, Class IV, Division 9	
		Name of Part	Location
Chassis—MISCELLANEOUS EQUIPMENT			
		See illustrations on pages 148, 152	
A2356	1	Caution plate	On dash
A2357	1	Commerce name plate	
A2358	1	Commerce scroll plate	On radiator
A2372	1	Copper gas line	Generator to searchlight
A1960	1	Flexible tube and chain with ends attached	From transmission to speedometer
A2360	1	Horn	On steering column
A2359	1	Horn assembly	On steering column
A2361	1	Horn bracket with cap screws	
A2362	1	Jack	
A511	1	Port plug wrench	
A2355	1	Rim wrench	
A642	1	Sleeve	For speedometer driven gear
A2365	4	Spark plugs with gaskets	
A1959	1	Speedometer	On dash
A1958	1	Speedometer, complete	
A640	1	Speedometer drive gear	In transmission
A641	1	Speedometer driven gear with connector	In transmission
A2366	1	Steering gear air control assembly	On steering column
A1975	3	Stove bolts 0.25 (¼) x 1.5 (1½) inches	Generator to running board
A2368	1	Tire pump	
A2370	1	Tire repair kit	
A2369	1	Tool kit	
A1365	1	Wheel puller	
MACHINE GUN BODY			
		See illustration on page 208	
K71631	3	Arm rail—left	At left hand side of seat
K71632	3	Arm rail—right	At right hand side of seats
K71633	1	Arm rail—front left	At left hand side of front seat
K71634	1	Arm rail—front right	At right hand side of front seat
F71732	8	Arm rail filler—upper	At top of arm rail
F71733	8	Arm rail filler—lower	At bottom of arm rail
K900	6	Atwood door bumper	On inner door opening
F72633	1	Body cross member	Underneath body on top of side rails
F72634	1	Body cross member	Underneath body on top of side rails
F72549	1	Body cross member	Underneath body on top of side rails
F72551	1	Body cross member	Underneath body on top of side rails
F72552	1	Body cross member	Underneath body on top of side rails
F72553	1	Body cross member	Underneath body on top of side rails
F72555	1	Body cross member	Underneath body on top of side rails
F71954	1	Body cross member	Underneath body on top of side rails
F71595	1	Body cross member	Underneath body on top of side rails
F71720	6	Bow slats	On roof under canvas
F72400	1	Center compartment floor board—center	In floor center compartment
F72513	1	Center compartment floor board—left	In floor center compartment
F72514	1	Center compartment floor board—right	In floor center compartment
F72515	1	Center compartment floor board—left	In floor center compartment
F72516	1	Center compartment floor board—right	In floor center compartment
F72517	1	Center compartment floor board—center	In floor center compartment
F72518	1	Center compartment floor board—right	In floor center compartment
F72519	1	Center compartment floor board—left	In floor center compartment
F71714	1	Center post	Supports top
F71715	1	Center post	Supports top
F72556	9	Compartment door fastener	In body side
F72567	9	Compartment door fastener inside plate	In inner side of body side
F72542	17	Compartment door hinge plate	Under hinge on compartment doors
F82542	8	Compartment door hinge plate	Under hinge on compartment door
D72554	1	Compartment door handle—right	On compartment door
D72555	2	Compartment door panel—left	Side plates of compartment door
D71737	1	Cross division panel	Side sheet for cross division
K71722	8	Cross member fillers	Between cross member and supporting member
K78001	6	Curtain clip fastener	On curtains
K71683	11	Curtain fastener rings	On body sides
K78002	6	Curtain staple fastener	On curtains
F71673	1	Dash brace	Between dash and front compartment panel

GENERAL INDEX

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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