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ARMY FOOT MEASURING AND SHOE FITTING SYSTEM.

Prefaced by a Discussion of the Theory and Importance of Correct Shoe-fit for Enlisted Men.

A MANUAL FOR COMMISSIONED OFFICERS.

OFFICE OF THE QUARTERMASTER GENERAL

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WAR PLANS DIVISION
October, 1918.

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WAR DEPARTMENT,

WASHINGTON, *October* 25, 1918.

The following pamphlet, entitled "Army Foot Measuring and Shoe Fitting System," is published for the information and guidance of all concerned.

(062.1 A. G. O.)

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
General, Chief of Staff.

OFFICIAL:

P. C. HARRIS,
The Adjutant General.



The Army Foot Measuring and Fitting Kit complete, as issued to the camps and cantonments

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SECTION I.

The Revised Regulations Authorizing an Automatic System of Fitting the Army Shoe—Handling the Problem of Recruits' Ignorance of Correct Fit.

The proper fitting of soldiers' footwear, previously covered with normal thoroughness by government regulations, has been made a matter of additional study, and has now led to the adoption by the War Department of new regulations authorizing a special system of automatic foot-fitting. It is the purpose of this publication to show the necessity for and the details of its use.

Under normal conditions, a company commander could, with little diffculty, see that every member of his command was fitted with as nearly correct size of shoe as was necessary. The few evils of misfit could be rectified within the company, and might be considered negligible.

When the fact is considered that he must now depend at times upon men unused to making such fits to select from the 138 standard combination sizes the proper size for each man, and do this without a loss of time, the need of a simple machine is evident.

Upon a compilation of the tariff of sizes used by the many organizations the Quartermaster Corps must depend also for its final tariff for ordering from manufacturers. This machine, in addition to saving time, insures accuracy of fit to each man and a correct tariff for subsequent ordering.

Supplying the Measuring and Fitting Machines

Special Regulations No. 28, under date of September 20, 1918 (given in its entirety in Appendix, p. 62), provide:

"With the view of increasing the marching capacity of troops, company, troop, battery, and detachment commanders will personally satisfy themselves that the men of their commands have been properly measured and fitted with shoes

and socks and will be held responsible that the instructions herein contained as to care of feet are strictly followed. . . .

"Foot-measuring machines and shoe-fitting devices will be supplied by the Quartermaster Corps in such numbers as may be needed at each camp and garrison post in the United States, the Philippines, Panama Canal and Hawaiian Departments for use in fitting shoes. The use of the measuring machines and the fitting devices is to be under the supervision of the unit supply officers and supply officers of depot brigades, to whose offices will be attached personnel properly instructed in measuring and shoe fitting. A record of the proper size and width of shoes as determined by use of the foot-measuring machine and shoe-fitting devices . . . will be kept by company, troop, battery and detachment commanders. . . .

"A place will be provided where unit supply officers may have shoes fitted for the purpose of determining or verifying the record. For the purpose of fitting, they will draw from the Camp Quartermaster, on memorandum receipt, a try-on set consisting of a complete series of each size and width of shoes furnished for issue. Shoes of this series will be put in stock and issued before they become unserviceable and will be replaced by new shoes, keeping the series always complete. Company, troop, battery and detachment commanders will report in writing to the post or regimental commander every instance of failure to secure proper shoes for their command. Post or regimental commanders will investigate the reasons for and be held responsible as far as lies in their power for the rectification of such deficiencies.

"A brief record of the number of such reports from company, troop, battery and detachment commanders and the reason for such deficiencies will be furnished to inspectors at each inspection of the Post.

"At every camp or other place where more than one regiment is serving, commanding officer thereof will prepare a schedule showing the dates on which the various organizations of the command may use the try-on set for the purpose of fitting shoes, thus making it unnecessary to provide more than one set to each camp.

"Inspections conducted under the provisions of paragraph 889, Army Regulations, will embrace an inquiry into the manner in which this order has been complied with, and the report of inspections will include a statement of all instances of failure on the part of company, troop, battery and detach-

ment commanders to secure proper shoes for their commands and the cause of such failure."

How Misfits May Occur

In a desire to make haste in supplying the recruits with their service shoes, upon their arrival at the training camps, commissary officers and their assistants found it necessary, under former conditions, to allow the recruits, in many cases, to specify the sizes they should wear and, in some instances, the new soldiers were permitted actually to pick out of stock the shoes in which they received their initial training. This careless practice is no longer allowed, because recruits from civil life do not know the sizes of army-last shoes which they should wear in preparing for and participating in actual warfare. Investigations made at a number of the concentration camps disclosed the following characteristics of recruits:

1. Ignorance of their correct foot-sizes, even in civilian shoes.
2. Ignorance of the difference between their size in civilian footwear and the corresponding size in army shoes.
3. Ignorance of the matter of making proper allowance for foot-expansion in the army shoe, produced by hard marching and the carrying of the soldier's fighting equipment.
4. Personal vanity, as shown in a desire to wear as small a size as possible.

Misfitting Under Former Conditions

It was also shown by investigations made at a number of the military posts and training camps that the percentage of misfitted shoes among the enlisted men, resulting from former methods of fitting, was very high.

The results of some of these investigations were as follows:

At Fort Leavenworth, Kansas, in 1912, the feet and shoes of 716 enlisted men were examined and measured. The old fitting plan was used. The results are significant as showing the necessity of repeated trials to secure accuracy of fit. One trial was required to obtain an accurate fit for 269 of the men; two trials were needed for 246 men; three trials for

130 men; four trials for 35 men; five trials for 20 men; six trials for eight men; seven trials for four men, and eight trials for three men.

The investigation made at one camp in October, 1916, showed that 70.49 per cent. of the men examined were wearing too-short shoes; 11.62 per cent. were wearing too-long shoes, and 17.89 per cent. were wearing correct-size shoes.

In all the tests made in 1917 and 1918, summarized as follows, the fitting system herein made official was employed.

In August, 1917, a survey of the enlisted men's feet at a camp showed that 81.77 per cent. of them were in shoes from one-half to three and one-half sizes too short; 3.07 per cent. were wearing too-long shoes, and 15.16 per cent. were wearing correct-size shoes.

In November, 1917, a survey of the enlisted men's feet at another camp showed 94.28 per cent. were wearing shoes from one-half to three and one-half sizes too short; .79 per cent. were wearing shoes too long, and 4.93 per cent. were wearing correct size.

At another camp, in December, 1917, it was found that 82.58 per cent. of the men were wearing shoes from one-half to three and one-half sizes too short; 2.57 per cent. were wearing too-long shoes, and 14.85 per cent. were wearing shoes of correct size.

An examination of the men at another camp, made in February, 1918, disclosed that 65.09 per cent. were wearing shoes from one-half to three and one-half sizes too short; 10.91 per cent. were in too-long shoes, and 24 per cent. were in shoes of the proper size.

A survey made in April, 1918, at another camp showed 87.38 per cent. wearing shoes from one-half to three and one-half sizes short; 1.59 per cent. were wearing too long shoes, and 11.13 per cent. were wearing shoes of the proper size.

In July, 1918, the survey at a camp produced the following result: 75.53 per cent. of the men were in shoes from one-half

to three and one-half sizes too short; 6.74 per cent. wore too long shoes, and 17.73 per cent. were wearing too short shoes.

At another camp, in August, 1918, 88.6 per cent. of the men were found to be wearing shoes from one-half to three and one-half sizes too short; 1.4 per cent. were wearing too long shoes, and 10 per cent. of the men were wearing shoes of correct size.

Summarized collectively, the examinations at these several camps showed the following: Total number of men examined, 58,706; total number found to be wearing too short shoes, 41,852 (71.29 per cent.); total number found to be wearing too long shoes, 5,778 (9.84 per cent.); total number found to be wearing shoes of the correct sizes, 11,076 (18.87 per cent.).

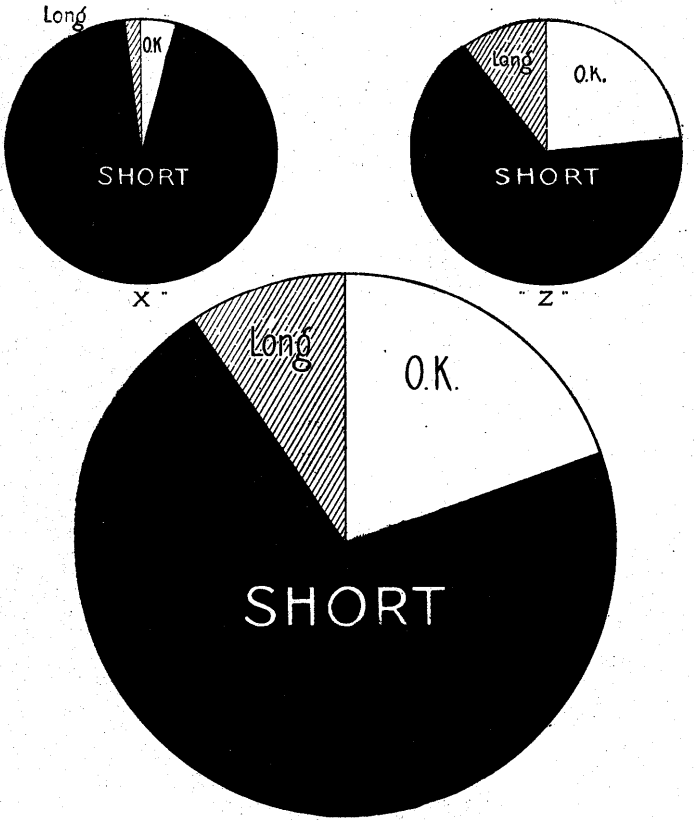
The foregoing facts are sufficient to demonstrate to officers responsible for the accurate fitting of enlisted men's service shoes the necessity for authorizing the employment of improved system and extraordinary personal care in the conduct of the work of fitting.

Difference Between Army and Civilian Lasts

Does a man who has worn a 7B shoe in civilian life wear a 7B army shoe? Granted that a 7B civilian shoe fits him, does it follow that a 7B army shoe is his proper size? This involves two vital points:

First, there is a decided difference between the civilian-shoe last and the army-shoe last. As a matter of fact, comparing it with some shapes of civilian shoes, a 7B army shoe may be as much as approximately two sizes shorter than a 7B civilian shoe, using the civilian last as a standard. The army last has only a 7-16 extension beyond the so-called "Standard" measurement scale; whereas the extensions of civilian lasts very from $7/16$ of a size to three full sizes.

Second, it is a fact that a good proportion of present-day recruits to the United States Army for active service is made



SURVEYS MADE IN EIGHT CAMPS
41,852 OUT OF 58,706
FITTED ½ TO 3½ SIZES SHORT

up of men accustomed to leading fairly sedentary lives as private citizens; whose civilian activities called for no very vigorous walking; who perhaps walked to and from their places of business and occupied desk-chairs most of their working hours; who took little if any systematic gymnasium or other athletic exercises.

Such men constitute a class whose feet, when introduced to the stout and somewhat stiff army-regulation shoes and then required to carry their owners on brisk hikes over considerable distances, will be very likely to develop formidable troubles—unless those feet are fitted with the proper sizes of shoes as soon as they come into army training.

If a recruit of this class of civilians comes in with his draft, and through mistake or carelessness is given short shoes, then started upon the intensive physical exercises that go with breaking him into the service, it is almost possible to forecast with considerable certainty his rapidly acquired soreness or lameness of feet, his failure somehow to recover from it, his arrival at the front with an acquired collection of foot-troubles that will render him partly, if not wholly, valueless for heavy marching and other emergency service.

Exceptions to this liability will, of course, be found in the cases where draftees come to the service from occupations that tend to develop and harden the feet, such as out-door labor or other civil pursuits that keep men on their feet much of the day. The feet of such recruits are fairly well prepared for army training. They are what army surgeons sometimes call "good feet." To these men the actual marching, climbing and running incident to military exercise perhaps may not of themselves give foot-soreness.

But if those "good feet" are allowed to be improperly fitted with army shoes, their efficiency quickly departs. In other words, the most muscular, best-shaped, best-exercised, best-developed feet possible to be found on a recruit can instantly be started on the downward track to serious and per-

manent impairment if through ignorance or carelessness those feet are given wrong-size shoes.

Making and Verifying Records of Fit

Special Regulations No. 28 further provide that "Measurements will be taken and shoes will be fitted as soon as practicable after the enlistment or induction of the soldier into the service and the record will be changed from time to time if subsequent fittings render a change necessary.

"Sizes called for in requisitions will conform to the record, and the fact of fit of shoes and socks, issued on such requisition, will be personally verified in every instance by a company, troop, battery or detachment officer."

It is vitally important that the shoes of a soldier should not be improperly fitted.

Consider what happens when his feet are forced into shoes that are too short. If it is possible to give any priority to the harmful things that will occur, the first is the very obvious effect of restricting the freedom of the toes and perhaps jamming them back upon themselves. This, of itself, produces several harmful results. It tends to force open and upwards the joints or points of articulation of the bones that run from the instep out into the toes.

If persisted in, this defect eventually causes a growth to come into the spaces between the contact ends of the bones forming the joints, restricting their normal action. The constant contact or pressure against the little flesh-pads that cushion the ends of the toes gradually forces the flesh back, permitting the nail to come too near the end of the toe, causing soreness from abrasion and producing a very harmful action upon the nerve tissue and blood vessels surrounding the end of the toe bone.

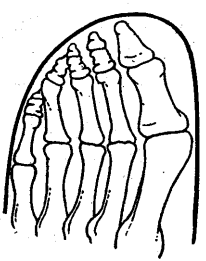
Bad Effect of Back-Pressure on the Bones

The short shoe, by backward pressure, causes a spreading at the point where the toes join the foot; such an abnormal

widening of the foot results in irritation over the great and little toe joints and a tendency to bunion formation.

Furthermore, the short shoe—in either the army or civilian type—tends to pinch or crimp the region of the little toe with a lateral pressure, and this also may produce several troubles. It may gradually crumple up the toes by forcing them inward into an overlapping condition. Or, it may turn the little toe under its neighbor. Or, it may produce one or more painful callouses.

The short toe tends to destroy the natural efficiency of the "tripod" (the three principal contact-points in the foot that maintain the body in equilibrium), because crumpled-up or turned-under toes not only mean very sore spots near the



1



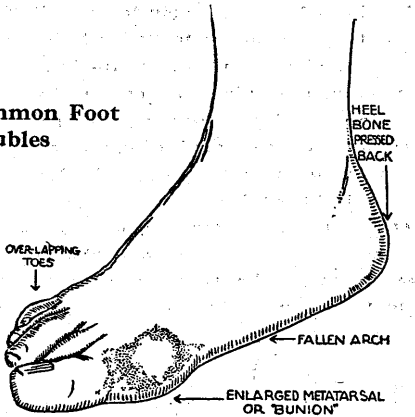
2

Evil of the Short and Narrow Army Shoe

In No. 1 (reproduction of X-ray), the bending of the bones by a too-short and too-narrow shoe is clearly shown. No. 2 shows the shape the foot should maintain.

tripod's contact-points, but also mean a narrowing of the treading area encompassed by the tripod. Back-pressing the metatarsals is of itself enough to accomplish this; but the damage which the short shoe does to the toes materially

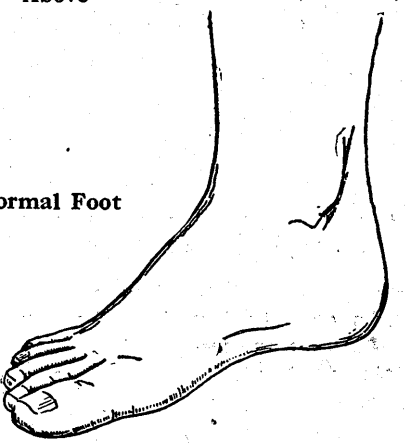
Three Common Foot Troubles





Under Side of Foot Shown Above

The Normal Foot



weakens the grip with which, in the healthy foot, they reinforce the stability of the tripod.

In a short shoe the soldier's foot gets no opportunity to expand naturally and properly under the weight of his body and his equipment. Thus, the short shoe is of all things the one thing the soldier does not want and should never have.

The arch of the soldier's foot is also susceptible to serious injury from short shoes. Back-pressure on the forepart of the foot is transmitted straight back to the nicely adjusted arch, the bones of which, although held quite firmly together by ligaments, can nevertheless be gradually pushed asunder. The moment they are jammed out of normal position, be it ever so little, the arch is impaired. The heavy weight of the body and extra load of equipment may now cause the arch to fall.

Foot Deficiencies May Cause Leg Troubles

Any disturbances in the region of the arch and the other hinder parts of the foot structure frequently extend upward into the leg, particularly its muscular equipment. In fact, leg troubles that are directly traceable to their origin in foot troubles sometimes manifest themselves in the leg before they give the pain signals in the foot. Occasionally they never cause pain in the foot. It has even been found that certain afflictions of the spine have their commencement in disorders of the feet.

One of the features of the normal foot that Nature probably intended not to be interfered with is that the inner metatarsal and the two other connecting shafts of bone that form the structure of the great toe are a practically perfect extension of the line running from the center of the heel to the point where that metatarsal joins with the instep. Therefore, the inner side of the normal foot is said to be "straight."

Undoubtedly, Nature's intent in this was to give added security to the tripod formation and added "spread" to that





Feet of Adult Philippine Natives

These photcgraphic illustrations are made from plaster casts taken from the actual feet.

side of the foot's treading-surface. Improper shapes of civilian shoes have done more to bend the bones out of that straight line, pushing them inward toward the other toes, than all other causes put together. Some degree of deviation from the straight inside line exists in the feet of almost every adult.

The narrow-toe shoe, like the short shoe, is likely to pinch the little toe and adjoining toes and, in some cases, force them to overlap one another.

Another serious danger in the narrow shoe is that the flesh of the bottom of the foot may extend laterally over the edge of the innersole of the shoe, gradually pressing a groove into the flesh that at first is merely sore, then calloused and very painful.

SECTION II

The Human Foot in Its Relation to the Present Army Shoe—Regulations for Proper Care of the Soldier's Feet and Official Inspection Thereof

The present type of army service shoe was devised with certain important and fundamental foot-features in mind and the Resco method of fitting takes account, also, of some general characteristics of the human foot that relate to its structural make-up. Therefore, a general knowledge of the structural compositions of the foot is essential to an understanding of the advantage and necessity of fitting shoes properly to enlisted men.

The intrinsic feature of the human feet that makes it vitally important to cover them always with correct-fitting shoes is not merely that they, as the extremities, carry the full weight of the body, but that they balance and propel and guide that weight. If the feet were only a motionless foundation for the body and had no function of locomotion, they would doubtless be mere masses of solid bone, without muscles or ligaments and partly if not wholly devoid of the network

of blood vessels and nerves that give them their extraordinary sensitiveness and virility.

But the motion-producing or motion-assisting function of the feet necessitated their having some really marvelous and perfect machinery inside.

Structure of the Foot and Its Fragility

Considering the comparatively small space they occupy, it is scarcely necessary to point out that the twenty-six bones of the foot are small bones, most of them and that herein lies their fragility.

Seven of them are grouped in the back part of the foot, forming the heel and instep. These are of irregular shapes, are larger than the others and form a sort of substantial base from which the other nineteen radiate forward in a sort of fan-like shape to form the forepart of the foot.

It is important to note that the place from which these nineteen other bones extend forward is high, so that in spreading forward they also incline downward to the end of the foot. Thus, they form, with the seven rear bones, a genuine *arch*. It is in this arch that a large part of the tremendous strength of the foot lies.

As a general proposition, these nineteen bones are long in formation; that is, they are merely lengths or sections composing the five structures that end in the toes. The section having the big toe at its front end is made up of three of these "long" bones. The sections terminating in the four other toes have, each, four of the long bones.

The rear row of five long bones or shafts that stretch forward from the region of the instep is called the metatarsal. In other words, a metatarsal is the first bone in each of the five lines or joined sections of bones that stretch forward and downward from the instep and come finally to an end in the toes.

The so-called "ball points" of the foot are the points at which the first metatarsal (on the inner side of the foot) and

the fifth metatarsal (on the outer side) are joined to the higher and larger bones of the instep. As is generally known, these "ball points" are the two more prominently protruding points or joints at the sides of the foot back of the big toe and little toe.

It is a very vital feature of the fit of a shoe, whether army style or civilian, that the two ball points of the foot itself should be exactly in the corresponding ball points of the shoe. Scientific shoemaking provides that this meeting of the ball points of both foot and shoe shall take place. Failure to do so is one of the characteristics of poorly-fitted army shoes.

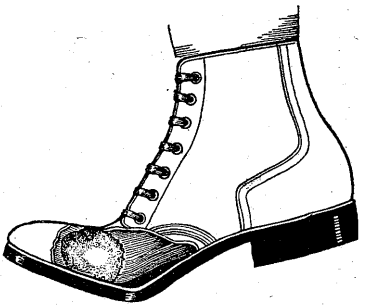
Considering this general arrangement of the bones of the foot, it is obvious that the effect of weight upon the foot is to cause those nineteen shaft-like bones to stretch forward and also sidewise. This fact will be easily grasped if one remembers the arch construction and the partially fan-like spread of the metatarsals and all the other smaller sections that run forward to form the toes.

Lying close to all these bones, above and below them, are several layers formed of ligaments and muscles. Ligaments are virtually mere non-flexible cables which prevent too much spread or separation of the bony elements. Muscles are of course the sources of motive power to cause action of the bones in the process of locomotion. Fleshy tissue, varying in thickness and hardness, is placed at various points and this, together with the system of nerves, arteries and veins covered with the internal and external skins, composes the human foot.

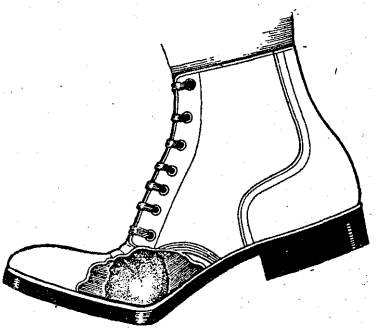
Variation Between Left Foot and Right

Two pairs of entirely normal feet, even of the same length and width, may vary considerably in shape. One pair may have toes that slope back quite evenly from the great toe and thus present a somewhat pointed front. In the other pair the four smaller toes may be more nearly the length of the great toe, so that in the forepart the feet are relatively wider

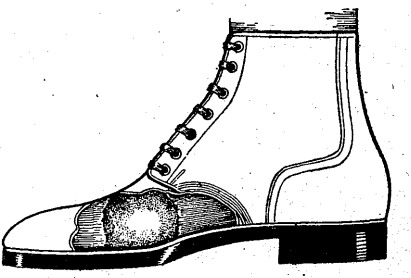
Illustrating how, in a short shoe, the ball point of the foot is too far forward and leaves vacant space behind it.



When the ball point of the foot coincides with the ball point of the shoe, the fit is correct and there is no vacant space.

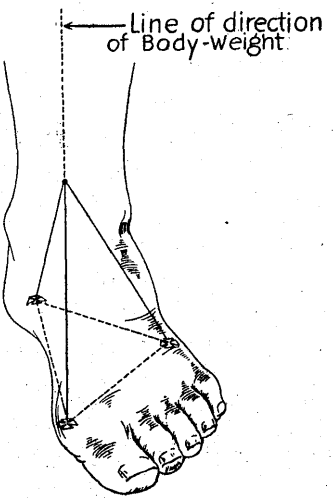


In the correctly fitted shoe the ball points of foot and shoe remain together, whether the foot is at rest or in motion.



and more squarely shaped at the extreme front. One pair may be thin and bony, while the other may be fat, thickly padded under and around the toe joints and appreciably thicker through any given part than the other pair.

Or, one man's feet may be measurably higher in the instep or lower in the arch than the other's. Or, there may be quite a difference between the distance from the back of the heel bone to the metatarsals in one man's feet and the distance between precisely the same points in the other's. This last-



THE "TRIPOD" OF THE FOOT

named dimension is a very important one to be considered in fitting a foot properly, because it fixes the location of the ball points.

And then there is the well-known difference between the lengths of individual men's feet. A recent investigation of

this matter at some of the Army concentration establishments showed that in the cases of 60 per cent. of the enlisted men's feet the left foot is larger than the right. In extreme cases this difference between a man's feet equals two full shoe-sizes. But this natural variation cannot be permitted to result in either foot being fitted short; therefore, it is necessary, and is required by the Resco system of fitting, that each foot shall be measured and shoes suitable for the larger foot selected.

An interesting feature of the arrangement of the bones of the foot is the so-called tripod, which relates to or designates certain contact-points in the bottom of the foot. That is to say, the structure of the foot forms a tripod, the apex of which is the highest point of the heel bone and the three "feet" or contact-points of which are the bottom of the heel, the inner ball-point and the outer ball-point. Upon these three points falls the chief responsibility for maintaining the equilibrium of the body. The "grip" of the fleshy part of the big toe and of the little toe also add to the stability of the tripod.

From the nature and co-relation of all three of the following elements—namely, the *arch* formation, the spread tendency and the tripod distribution of important treading-points—it will be seen that among the vital things that a correctly fitting army shoe must accomplish are the following:

1. Preserve the shape and natural resiliency of the arch.
2. Afford sufficient room for the spread or expansion of the foot lengthwise and sidewise when it is sustaining all of the pressure that the weight of the soldier and of his equipment load can impose on it.
3. Keep the principal treading-points of the foot—that is, the "tripod" sufficiently spread apart and in proper position, so that they will form the maximum area of base or foundation for assisting in maintaining the gravity-balance of the body-weight and body-load above; in other words, the equilibrium of the soldier.

Regulations for Care of the Soldier's Feet

The frail formation of the feet requires that they be well cared for. Even if the soldier's shoes fit him perfectly, it is still necessary that he should constantly look after his feet to keep them in condition to stand the strain that comes from burdensome equipment and long marching. On the care of the shoes and feet, Special Regulations No. 28 provide that:

"If it is desired to waterproof the shoes at any time, a considerable amount of dubbin should be rubbed into the leather.

"Shoes issued to enlisted men will be regularly inspected by company, troop, battery and detachment commanders to see that water-proofing substance is applied often and that they are not injured by being placed too near heating apparatus. Heat ruins leather and causes wet leather to rapidly decompose.

"Light woolen or heavy woolen socks will habitually be worn for marching; the socks will be large enough to permit free movement of the toes, but not so loose as to permit of wrinkling. Darned socks or socks with holes, will not be worn in marching. (This is not to be construed, however, as prohibiting soldiers from wearing properly darned socks while on ordinary duty, at drill, etc. If on marches, two pairs of socks are worn, the outer pair may be darned socks.)

"Company, troop, battery and detachment commanders, by frequent inspections and care throughout the year, will maintain the feet of their men in condition for proper marching. They will cause the proper trimming of nails, removal or paring of corns and callouses, relief of painful bunions, treatment of ingrowing nails and other defects, sending serious cases to the surgeon.

"Before a march is undertaken by foot troops, company, troop, battery and detachment commanders will personally inspect the bare feet of their men. While on the march they will personally see each day that their men wash their feet as soon as possible after reaching camp, prick and evacuate blisters and cover such blisters or excoriations with zinc oxide plaster, supplied by the Medical Department, applied hot, dust the feet with a foot powder supplied by the Medical Department and put on clean socks. Hereafter, an undue amount of foot injury and disability from shoes will be regarded as evidence of inefficiency on the part of officers concerned and as causes for investigation."

SECTION III

Resco Army Shoe Fitting System, With Details of Its Operation—Official Fitting Regulations and Their Observance—Size-Scale for Socks

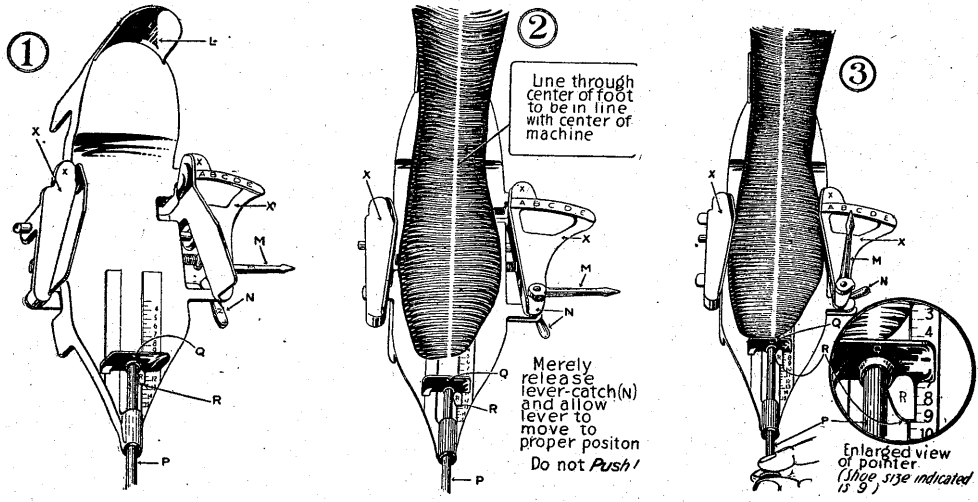
The principal aim in devising the Resco system was to eliminate, so far as possible, the likelihood of mistakes being made in selecting shoe-sizes for the soldiers. It was believed that, having gotten each new soldier right on the spot, at the time of his entrance into the Army and having disabused him of the idea that he himself was to exercise any jurisdiction over the selection of the size of his service shoes, the new system of fitting would have opportunity to operate so accurately that there could and would be no possible question about the soldiers being given the right sizes of shoes.

It was also necessary to create a system that would correctly provide for the one hundred and thirty-eight different combinations of sizes and widths required by the complete size-range for enlisted men—and yet be simple enough in its details so that it would be easily understandable and usable by army officers and their subordinates who would conduct the measuring and fitting.

The devices employed in this shoe-fitting system are two in number—a single machine, somewhat larger than the bottom of an adult human foot, which is the foot-measuring device and a set of thin metal blades, each fitted with a metal knob on one end, which is the shoe-fitting device.

The accompanying illustrations, showing the devices in various positions and with letters identifying the working parts, should be consulted while studying this explanation of the system.

The larger or measuring machine translates the foot length and width into the shoe length and width. The set of blades composing the shoe-fitting device is employed to prove the



The Automatic Foot-Measuring Machine

accuracy of the size as disclosed by measuring the soldier's feet in the larger machine.

The measuring machine is constructed for the great army of average feet—that is, feet that present no marked abnormalities. The elevation of the heel portion is of scientifically correct height for positioning the human heel when the foot is being measured for the Army shoe. The angle at which the side wings are set was determined from a composite of the angles of the innersoles and lasts of all the various sizes of the Army shoe in the army size-range. The adjustment of the mechanism governing the operation of the pointer on the width-scale by the spreading action of the side wings was also worked out upon a scientific basis.

Any man of sufficient intelligence to be selected to conduct shoe fitting by means of this system will at once grasp the details of the devices and, after perhaps a trial or two, will accomplish the measuring with complete accuracy.

Actual Operations in Measuring the Foot

The procedure of measuring is as follows:

The measurer requires the soldier to remove his old shoes, put on his army pack, hold his rifle, then set his stockinged foot onto the base of the foot-measuring machine, with the heel back snugly against the curved block at the back. It is essential that the foot be in the center of the machine; that is, the imaginary line through the center of the foot from heel to toe should be over a similar line in the bottom of the machine.

The operator then releases the wings at the sides and allows them to press in against the sides of the soldier's foot. He also slides the plunger, at the front of the machine, along until its flat end rests lightly against the end of the soldier's foot.

Then the soldier, keeping his balance by holding onto some sort of a brace above, rises twice or three times on the ball

of his foot. This act of rising closely duplicates the act of walking and, since the soldier is carrying his regulation service load, the weight thus put into the spread of the foot when elevated upon the ball is the weight he will be carrying when he is actually wearing his shoes. In rising, he will lift his heel only about half an inch off the device.

The resulting spread of his foot, forward as well as sidewise, thrusts the sliding plunger forward so that its little marker-point automatically registers the correct shoe *length* and the two side wings are thrust apart so as to cause the arm-pointer on the lettered scale to record automatically the correct shoe *width*.

In his act of rising several times onto the ball of his foot, the soldier's foot will cause the side-scale pointer to waver back and forth. The measurer will observe this closely and he will take the *middle* mark, between the extreme points touched by the pointer, as the correct width.

Thus, if the pointer wavers between Width B and Width D, the correct width for the shoes is C. If there should occasionally be indecision on the part of the operator as to the exact points of length and width recorded by the machine, the safe policy is to select the greater length and the narrower width.

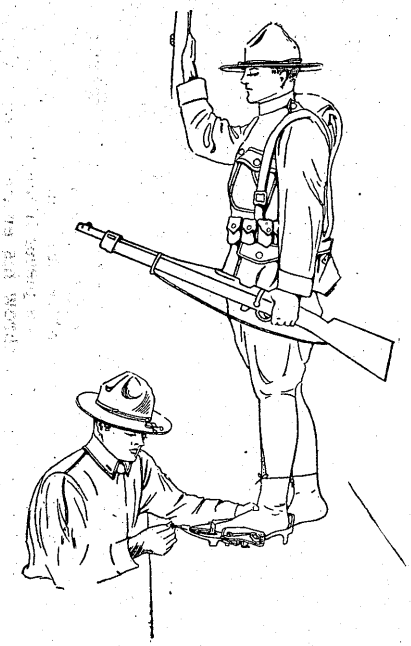
The complete instruction for using the foot-measuring machine given in Special Regulations No. 28, is as follows:

(*a*) After taking the machine from its box, open it wide by moving the lever as far front as possible and pulling out the plunger as far as it will go. The machine is now ready for use.

(*b*) Let the man put his foot in the machine and stand with all his weight. The heel should rest firmly against the heel block. It is important that the foot should rest in the exact center of the machine.

(*c*) Release lever which operates the width indicator and push the plunger until the plate touches the toe. Do not touch the plunger again while the foot is in the machine. Make sure that the metal side pieces touch the toe joints.

(*d*) Then let the man throw his entire weight on the ball of his foot, raising the heel slightly.



A Soldier Being Measured for Shoes



Final Inspection on Testing Platform

(*e*) The width is automatically registered by the arrow. As the arrow wavers, following the action of the heel up and down, take the average of the extremes. (Example: If the arrow wavers from width "b" to width "d" use width "c.") The correct size of the shoe is indicated by the pointer on the plunger on the right hand scale.

(*f*) Measure the other foot in the same manner and if there should be a difference select size to fit the longer foot and the narrower width.

(*g*) Oil the slide under the device occasionally.

NOTE.—Verify the length selected by testing with shoe-fitting device.

Actual Operations in Proving the Shoe Size

Having determined the size of shoes for the soldier to try on, the measurer proceeds to the second part of the fitting operation, which is to prove the correctness of the size by testing it with the shoe-fitting device—the set of metal blades. In reality, this operation is employed in order to render it doubly certain that each man shall receive correctly-fitted shoes.

Each of these small metal blades is marked with a shoe size—5½, 6, 6½ and so on. When a pair of shoes has been selected for the soldier, of the size indicated by the measuring device, the operator inserts in them a pair of the blades, of corresponding size, placing a blade in each shoe. The knob end goes forward into the toe of the shoe and the other end is sprung back into the heel.

The soldier then puts on the shoes and laces them up snugly. The blade in each shoe will lie flat and smooth in the bottom of the shoe under the stocking and it will follow perfectly the conformation of the arch.

The little knob in the toe end of the shoe occupies the exact space which should be free space between the soldier's toes and the leather at the end of a correctly-fitted army service shoe. Even when the foot has expanded, by the act of the soldier's walking and carrying his load, there should still be a certain space between the toes and the inside end of the

shoe, because it is fundamental in the science of army shoe fit that under no circumstances should the ends of the toes be in contact with an obstruction of any sort.

Presence of free space ahead of the toes does not mean that the shoe is too long, nor that in the acts of walking, running or jumping the foot is likely to slump forward too far. If the shoe fits correctly and is laced properly, the ball points of the foot will automatically be held in their places in the shoe and the restraint of the lacing and the "throat" of the shoe will serve further to hold the foot in its rightful place.

The test by the shoe-fitting blades consists in the soldier's determining whether or not he can with comfort wear the new pair when these blades are in them and when he walks briskly about, climbs upon a platform, descends a steep ramp fitted with cross-cleats and otherwise gives the shoes a try-out approximating some of the severe exercising involved in field work and marching. If in performing these experiments —which take place at the time of fitting—the soldier's toes press against the knob of the Resco blade, a longer shoe is required.

The soldier himself will be the first to suggest the change, for it is impossible for him to be indifferent to the discomfort or actual pain that inevitably results when the toes bump into the knobs on the fitting-blades. The knobs are so small that practically every soldier realizes there should be at least as much free space in the toes of his shoes as the knobs occupy during the test. It should be remembered that the difference between full sizes in the army shoe is only four-twelfths of an inch. But this small difference may often represent the wide margin between comfort and discomfort to the enlisted man.

In the majority of cases the test with the blades should show that the size of shoes determined by the foot-measuring device is correct. The frequency of agreement between the

two processes depends chiefly upon the accuracy with which the operator does the measuring. With only a little practice he will become proficient in determining quickly what allowances to make for lean feet and fat, flabby feet; for feet new to army shoes and feet that have become toughened by rigorous military service.

The language of Special Regulations No. 28 in giving instruction for use of the shoe-measuring blades follows:

(*a*) Select from the several measuring devices in the set the one marked with the size or half-size corresponding with the shoes to be tried on.

(*b*) Insert the knob end of the device into the toe of the shoe, springing the other end of device down to the inner sole, against the counter.

(*c*) The middle of the flat spring piece will lie flat with slight pressure of the foot.

(*d*) If the soldier, with pack and rifle on his back can, *without discomfort*, pace back and forth in shoes with device inserted, the shoes will be sufficiently long to allow for foot-expansion when device is withdrawn.

NOTE.—The shoes must *in every case* pass satisfactorily the above-described test.

During or after the making of the test with the Resco blades, the fitter will further satisfy himself as to the fact of fit by feeling of the soldier's shoes, while on his feet, in the precise manner prescribed in Special Orders No. 28 of the War Department, which is given in full in the Appendix (page 62).

Correct Fit of Socks

The importance of the selection of the right kind and proper size of socks to be worn with army shoes by enlisted men is clearly indicated by the language of Special Regulations No. 28. The responsibility of officers for enforcement of the rules in this matter is also clearly specified.

It is obvious that properly fitted socks are essential to the comfortable clothing of the soldier's feet and, conversely, it may be stated that too-short or too-long socks can at least partly nullify the effect of correctly-fitted army shoes.

Although the flexibility of the texture and shrinkability of woolen socks of different weights and the variations in the relative lengths, widths and shapes of soldiers' feet make it impossible to determine a fixed system of size-fittings for socks corresponding with the fixed sizes and widths of army shoes, there is, nevertheless, a general plan of selecting socks by their sizes that can be used with satisfactory results.

Shoe Size.	Corresponding Sock Size.
5, 5½	10
6, 6½, 7	10½
7½, 8, 8½	11
9, 9½, 10	11½
10½, 11, 11½	12
12, 12½, 13	12½
13½, 14, 14½	13
15	13½

Size Scale for Socks

This scale of Sock Sizes, showing the size to be worn with each of the different shoe lengths (or sizes), appears on page 32. Socks fitted in accordance therewith will comply with the regulations and will insure the efficiency of the shoe fit.

SECTION IV

Fitting Bodies of Men at the Post and the Training Camp—Suggestions for Arrangement of Fitting Quarters—Duties of Fitters and Stock Clerks—Official Regulations

With the work of measuring and fitting the feet of the individual soldiers, capably performed by means of the automatic system described, the only remaining procedure in mak-

ing the Government's fitting regulations complete and effective is to:

(*a*) Employ a convenient and adequate method of taking the measurements of large bodies of enlisted men.

(*b*) Carefully record the individual measurements so that they may be properly assembled, classified for quick reference and made to render valuable information and guidance in matters connected with the ordering of army shoes from factories, maintenance of central stock departments and distribution of shoe stocks among the Army concentration points.

Placing the Nation's armies upon an active war footing has shown that the ordering of army shoes is a large and very important matter. The production cost of the shoes themselves represents many millions of dollars. Accuracy in determining the tariffs or schedules of sizes to be used in placing orders with factories therefore becomes a vital necessity. This, in turn, implies great accuracy in recording the actual foot- and shoe-measurements of the individual enlisted men.

Arrangement of the Fitting Quarters

Army officers who have charge of the fitting of soldiers' shoes will become familiar with the following general plan of quarters in which the measuring and fitting of the men should be handled and they will take the proper steps to obtain and equip with benches, platforms and shelves, rooms of suitable size and location at the camps where the fitting is to be conducted.

The suggested ground-plan of such rooms, as shown on page 37, represents an ideal arrangement. It is, of course, subject to variation in accordance with the physical conditions of space and buildings as they exist at each concentration point and adaptations of the ground plan may be liberally made. The essential units, such as systematic locations for benches, tables and shelves, must be preserved,

so that the facility and speed of the fitting shall under all conditions be maintained.

Preliminary Arrangements

Careful attention to the following matters relating to the preparation of suitable quarters and physical equipment of the measuring and fitting establishment at the post or camp will facilitate the work of handling the men. Experience has shown that procedure similar to that described below, carried out with a general detail of quarters as shown in the floor plan and working diagrams given on Page 37, admits of measuring and fitting about one hundred men per hour. The speed is of course dependent upon the efficiency of the officers performing the work.

1. Select a central location for the measuring and fitting quarters—preferably the lower floor of a barracks or half of an infirmary.

2. Make arrangements with the post or camp Quartermaster for the necessary carpenter work, as shown in the plan and drawings on Page 37.

3. Place in the stock section of the fitting room 200 pairs of shoes, obtained from the Quartermaster and of the exact sizes and widths shown in the table of sizes on Page 32. This subordinate stock, if replenished with sizes as needed, will admit of the maximum speed in fitting large bodies of men.

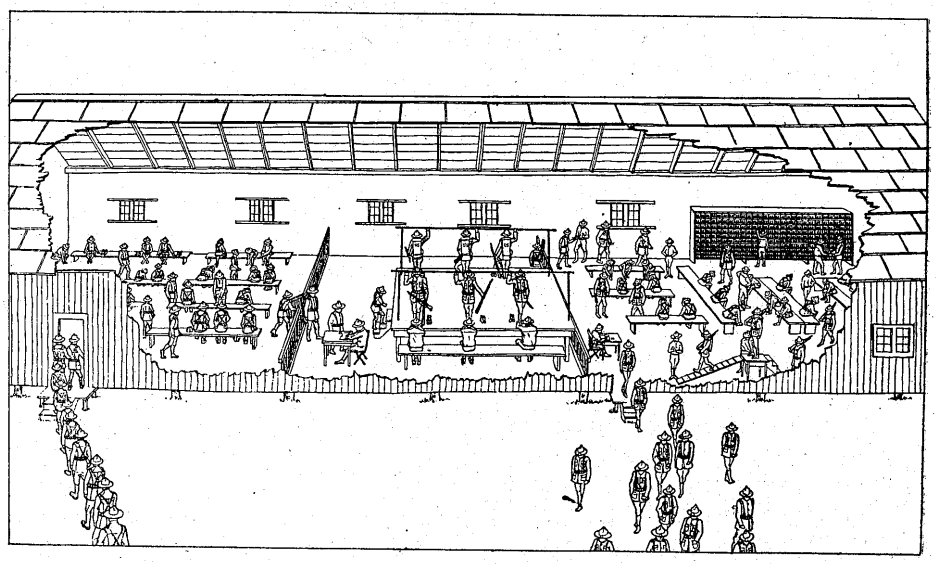
4. Arrange systematically, by issuance of orders, for the presence of the men who are to be fitted, assigning hours for their arrival in relays at the fitting quarters. The men are to have clean feet and clean socks.

The assignment of duties to measurers, recorders and stock handlers and the complete procedure of handling the men who are to be measured and fitted are as follows:

Order of Fitting Procedure

A company or relay of men enter the waiting room, remove their shoes and leggings and, in line, carrying shoes and leggings, enter the measuring room.

Each man, in order, receives a slip at the registrar (A), table (10) containing his name, number and regiment. He



A Bird's-eye View of the Method of Procedure of Fitting Shoes at a Cantonment

then proceeds to the measuring platform, ascends the steps (13) to one of the measurers (B).

Each foot is measured and the measurer records the estimated size of each; thus, "Left, 9B, Right, 8 1-2 C." These entries are made on the slip in the space marked "Estimated Size." The measurer records his initials on the "O. K." line in the same space.

The man takes the recording slip and leaves the platform by way of steps (14); he enters the fitting room, where his slip is examined by the fitter, who then fits him to the best of his ability, recording in the space marked "Fitted Size" the size and width of shoes as fitted. The fitter records his initials on the "O. K." line in the same space and gives the slip to the man, who proceeds to the fit-testing platform (29). Here the fit is examined by the assistant head fitter (F) and the man walks down the incline to the head fitter "G."

When the fit of the man's shoes has received final O. K. he delivers his slip to the recorder (H) at table (31). He then removes the new shoes, gives them to the stock man (D) and leaves the building by the exit.

Duties of Registrar

The registrar records each man's name, company, and regiment on the individual record slip (Page 40) and each man retains his slip until he passes it in to the recorder (H) just before he leaves the building.

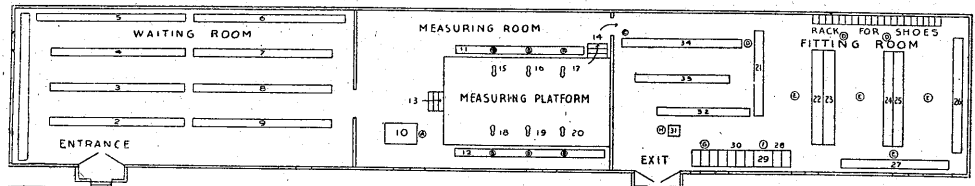
Duties of Measurers

The measurers test the foot-measuring machines every morning with the gauge test which is furnished with each machine, to make sure that the machines check up with the size 9 C marked on the gauge.

An upright or horizontal stationary pole or piece of joist should be provided beside each machine to enable the man being measured to balance himself while standing on one foot on the machine. The pole should be so placed that the man will use it simply to maintain his balance and not to lean any weight on it.

They follow in every detail the instructions that are attached to each case containing the foot-measuring machines and which also appear on page 5 of this Manual.

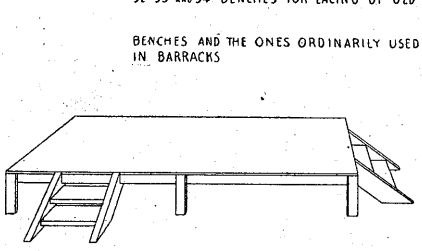
Measurers will see to it that rifles and packs are provided on the platform and that each man is equipped with both before stepping onto the measuring machine.

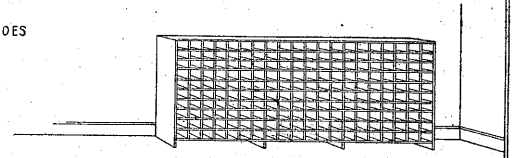


A REGISTRAR
B MEASURERS
C ORDERLY
D STOCK MEN
E FITTERS
F ASSISTANT TO HEAD FITTER
G HEAD FITTER
H RECORDER

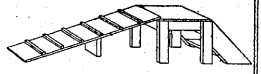
1·2·3·4·5·6·7·8 AND 9
10 TABLE FOR REGISTRAR
11 AND 12 BENCHES FOR MEASURERS
13 STEPS TO MEASURING PLATFORM
14 STEPS FROM MEASURING PLATFORM
15·16·17·18·19 AND 20 MEASURING DEVICES
21·22·23·24·25·26 AND 27 BENCHES FOR FITTING
28 STEPS TO TESTING PLATFORM
29 TESTING PLATFORM
30 CLEATED RAMP FROM TESTING PLATFORM
31 RECORDERS TABLE
32·33 AND 34 BENCHES FOR LACING UP OLD SHOES

BENCHES AND THE ONES ORDINARILY USED IN BARRACKS









Floor Plan and Working Diagram

They measure both feet carefully and accurately and record the size of shoe required for each foot on the slip in space marked "Estimated size." For instance, R 8½ C; L 9 B. The measurer must record his initials in space marked "O. K." in same column.

Duties of Fitting Room Staff

Orderlies (C) at door to see that fitters are not crowded and to keep men from entering room before they can be properly cared for by fitters.

Stock men (D) to pass to fitters the shoes as called for by size and width and to put the shoes back in the proper place in the rack when not in use.

They put the shoes in the racks and attach a small card describing size and width over each pigeon-hole in the rack. In arranging the order of sizes and widths, follow this ruling: BOTTOM TO TOP; LEFT TO RIGHT. Start at lower left-hand pigeon-hole with the shortest size in the narrowest width—say 6A (see tariff). Put 6½A in the pigeon-hole above 6A, and so on up until all the pigeon-holes in this first row have been filled. Then start in the second pigeon-hole on the bottom tier to the right of the 6A with the next following size and width. When all sizes of any width have been assigned to a place, put the shortest size of the next following width immediately above the longest size in the next preceding width.

The fitters (E) will find seats for the men as they come in and read carefully the estimated sizes and widths as given on the recording slip. The feet will usually vary in measurement. Try on first the longer of the two sizes given and the narrower of the two widths. Never fit shoes shorter than the estimated size for the shortest foot.

Examine the fit of the shoes carefully, paying special attention to the length and width. Examine the forepart of the shoe to make sure there is room enough for the toes to spread. Examine the position of the ball and great toe joint to make sure that they are in their proper position in the shoe.

Make sure that the foot does not project over the innersole. Great care should be given to guard against this, because the edge of the innersole forms a ridge which will cause trouble if under the foot.

Have the man lace his shoes and stand up. Note carefully the fit over the instep and under the arch; make sure there

is not too much fullness. If evidence of fullness exists, give a half-size longer and a width narrower.

The foot must be held snugly in the heel, and well supported under the inside arch, with ample room for the toes to expand.

Final test: Have the man rise upon the ball of each foot and test the position of the great toe joint (see page 26). Test width and length while the foot is in this position. If the man's toes press upon the RESCO device in the end of the shoe, he should be given a shoe a half-size longer and a width narrower.

When in the fitter's best judgment a man has been correctly fitted, record the fitted size and width on the slip, with fitter's initials and have the man proceed to the platform (29) for the final test, leaving the pack and rifle on the measuring platform.

Duties of Assistant Head Fitter

Packs and rifles will again be provided at this point, and the assistant head fitter makes sure that each man is equipped with pack and rifle before going up the steps and on to the platform (29).

The assistant head fitter then takes the slip from the men and notes carefully the estimated size, fitted size and actual fit of the shoes. If for any reason the assistant head fitter feels that the shoes are not correctly fitted, he will send the man back for another pair.

He then requires the man, with pack and rifle on his back, to walk down the incline, striking the heels hard against the cleats.

Duties of the Head Fitter

The Head Fitter stands at the bottom of the incline, notes carefully the results of the measuring and fitting tests, examines the fit of the shoes, records his approval of the fit, if the shoes are properly fitted, or sends the man back, if necessary to have his feet re-measured and shoes fitted. If the fit is approved, the slip is returned to the man.

Caution to the Officer in Charge

Make sure that the registrars, measurers, fitters and recorders are accurate.

See that men do not exchange shoes among themselves without permission.

NAME	REGIMENT	COMPANY
Chester Perkins	QMC	12
ESTIMATED SIZE SHOE	**FITTED SIZE**	**O K REMARKS**
RIGHT SHOE 10½ C	11 B	H.C.L.
LEFT SHOE 11 B		
O.K'D W.L.M.	O.K'D P.J.C.	

Soldier's Fit-Record Blank
Miniature Size. Original is —— by ——

	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	10½	11	11½	12	12½	13	13½	
A					1	1	1	2	2	2	2	2	1	1	1	1	1				18
B			1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	1	1	26
C			1	2	2	3	4	5	5	5	4	3	2	2	2	2	2	1	1	1	48
D			1	2	3	3	4	4	4	4	4	3	3	2	2	2	2	1	1	1	47
E			1	1	2	3	3	3	3	3	3	2	2	1	1	1	1	1	1	1	34
EE			1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	27
																					200

This sheet shows the number of pairs on each size and width to be kept on hand at all times at the Fitting Quarters

Make sure that men are not crowded on the measuring stand or in the fitting room.

Be sure that every man is properly fitted.

A correct fit and proper record of size and width will save material waste, man-power efficiency and unnecessary expense to the Government.

Be sure that the men who are being fitted do not wear the new shoes when leaving the building.

APPENDIX

1. Theory and Importance of Correct Fit in Soldiers' Footwear. The Present Army Shoe and Its Purpose

There is no other single act in the equipping of the individual soldier for actual war that can do more to lift him above the physical handicaps that have hampered the fighting men in all previous wars than that of seeing to it that he goes to the front in exactly the size of shoes his feet should wear.

No one disputes that the soldier's shoes are the most vital part of his service wearing apparel; but difficulty is frequently encountered in having the enlisted man, and even his superiors, realize how much more important the shoes are.

The underwear, the blouse, the coat, the trousers, the leggins and even the hat or helmet may be a little too small or too large and usually nothing more than slight discomfort results. But if the shoes be too small, by ever so little, a direct and very marked decrease in the *physical efficiency* of the soldier almost instantly takes place.

Responsibility for Correct Fit

Observation of this whole subject of the fit of the enlisted man's footwear leads unmistakably to the following conclusions:

1. Every United States soldier who is allowed to go to war in wrong-size shoes undergoes a strong and dangerous chance of being crippled and out of action when he is needed in the battle line.

2. It is easy to permit soldiers to be wrongly fitted with shoes, but it is equally easy to fit them correctly by intelligent use of the regulation fitting system, if only reasonable care and genuine interest are employed.

3. The entire responsibility for fitting every soldier's feet correctly must rest upon the man or men who fit him and approve the fit. None of the responsibility whatever must be permitted to fall upon the soldier himself.

4. Those commissioned and non-commissioned officers of the Army upon whom, by the War Department's regulations, falls the responsibility for determining the fact of correct fit of the enlisted men's shoes must at all times and under all circumstances perform this duty precisely as contemplated in the official regulations.

The ability of troops to move quickly and, often for long periods, is one of the keys to successful warfare. Victory has with significant frequency perched upon the banners of the armies that could march fast and far.

At one time early in the Franco-Prussian war, some thirty thousand German soldiers were incapacitated for fighting, solely on account of the bad condition of their feet. At times during the Civil War in this country, whole brigades of soldiers were prevented from marching, on account of the foot troubles they acquired from inadequate footwear.

The soldier of today who cannot march and march enduringly, unfortunately becomes at once an incumbrance. It is important to remember that fact when considering any subject related to military footwear.

The foot-sore soldier has to be quartered and fed; often he has to be given medical attention and, if he is disabled by the condition of his feet, he has to be given assistance if the camp is moved. More than that, the time, the care and the expense that have been put into training him for battle are for the time nullified in the exact degree that he is prevented by his sore or crippled feet from performing the perhaps vitally important duties that would otherwise be assigned him.

Army commanders have stated that the absence from the battle line of soldiers suffering from sore feet may weaken the line even more than it might be weakened by injuries inflicted in the actual fighting operations.

On the other hand, official records of United States Army manoeuvers show cases in which newly-recruited troops at training camps have been equipped with proper shoes, correctly fitted and have marched under field-service conditions for long distances without the slightest loss from foot troubles.

It is this degree of accomplishment which Army officers who are assigned the duty of fitting soldiers' feet must seek with all their intelligence and energy to make a permanent condition among the troops with which they are connected.

Mental Harm of Painful Feet

Scarcely less harmful than the physical disabilities resulting from improperly-fitted service shoes is the mental distress that almost invariably besets the soldier who suffers from seriously painful feet. It is as harmful to his morale as the irritability produced by the toothache or griping stomach pains. It may be even more harmful, because a man with a toothache can walk; he can get somewhere; he can sometimes even run—if only to the nearest dentist's office.

But not so with the soldier whose feet pain him badly while on a march during which he carries a shoulder load of seventy pounds or more. In this case his suffering differs materially from the toothache or the abdominal pain, in that it is located in and directly impairs the *machinery of his locomotion*. He cannot walk with comfort any more than a man having the toothache can chew meat with comfort, or than a man whose stomach or intestines are choked full of gas can participate in a wrestling match with comfort.

Here is where the very harmful mental condition arises. The soldier with sore or lame feet suffers both physically and mentally at every step. Whatever courage or other helpful

emotion the expedition he is engaged in may have aroused in him is seriously cut down, if not wholly destroyed. His normal optimism is weakened. He is worried. He cannot see himself taking his expected part in the objective that lies at the end of the march. He anticipates the annoyance which his dilemma is likely to give to his superior officers. He undoubtedly experiences a growing embarrassment at the fact that at the first possible opportunity—perhaps even before the next halt—he may have to drop out of the column.

When it is realized that the War Department has spared no pains or expense in providing for its armies the best-quality and best-shaped service shoes obtainable and has issued specific directions for fitting them properly, one may naturally wonder why there should have been any question as to the shoes being correctly fitted to their wearers and why the application of a special system of foot-measuring and shoe-fitting should have become advisable.

Why a Special Fitting System Was Needed

Briefly, the answer is involved in several natural, human conditions surrounding the putting of a great and peaceful nation onto an active war basis—and having to do this with comparative haste. This matter of army shoe fitting is only one of numerous details which preparing the United States for immediate participation in war has clearly shown must be handled in ways differing somewhat from the regulation procedure and practice that are entirely adequate for a military organization in times of peace.

It was found impossible to call hundreds of thousands of intelligent, independent men out of civilian life and into the somewhat strange surroundings of active military life and induct them quickly into a course of vigorous, complicated training, without there arising many little conflicts between the personal freedom of action prevailing in private life and the more restricted and more mechanical action required by military routine.

Or, stating it in another way, it was one thing to apply a set of shoe-fitting regulations to the operations of a comparatively small standing army on a peace footing and quite another and more difficult thing to attempt to apply those same regulations when the nation was hastening to mobilize a group of armies that should get to the battle fronts in the shortest time consistent with adequate preparation—especially so when the total army strength being created was approximately seventy-five times the strength of the nation's normal standing army.

Creating armies by citizen drafts necessitated the quick equipping of thousands of recruits where in peace times it was only one or a dozen. Thus, to insure absolutely accurate procedure in so vitally important a detail as fitting the recruits' feet correctly with service footwear, the personal work of directing and inspecting the fitting has had to be taken in charge by officers less familiar with its importance than unit commanders.

Special instruction of junior officers in the use of the newly adopted method of fitting therefore became necessary.

Recruits Unable to Determine Their Shoe Sizes

Moreover, another acute situation has been encountered in the taking-in of large numbers of men from private life. In the commendable desire to make haste in supplying the recruits with their service shoes upon their arrival at the training camps, commissary officers and their assistants found it desirable to allow the recruits, in many cases, to specify the sizes they should wear and in some instances the new soldiers were permitted actually to pick out of stock the shoes in which they received their initial training.

This, of course, was allowed upon the supposition that the recruits knew what sizes of shoes they ought to wear, would have the *comfort* feature in mind and, if they got wrong sizes, would at once exchange them for the proper sizes. Under

ordinary conditions and in peace times when military matters proceed more leisurely, a short-cut of this kind would perhaps be productive of no considerable trouble. But in actual practice, at the commencement of the nation's preparation for war, it brought dire results. It instantly demonstrated this important fact:

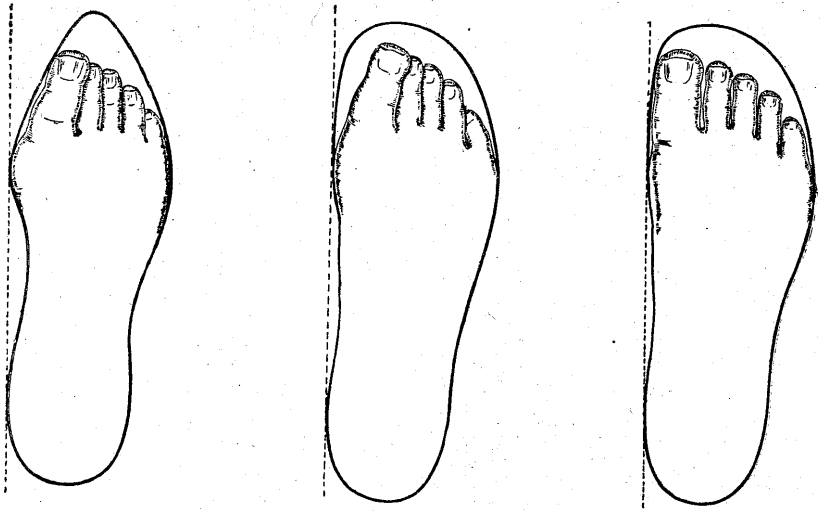
Recruits from civil life do not know the sizes of army-last service shoes which they should wear in preparing for and participating in actual warfare.

It is not an exaggeration to state that to permit an army recruit to have very much to do with determining the size of his service shoes is several times more dangerous and more likely to have seriously harmful results, than to allow him to decide the detail of any other part of his uniform or of his weapons.

Nor is it any exaggeration to say that if any Army officer responsible for the correct fit of the shoes of the enlisted men in his command does, through pressure of other duties, permit his men to wear shoes *not* fitted properly and in complete accordance with the Government regulations, that officer will not only be disobeying orders in an important matter but will also be contributing more to the future discomfort if not actual disability of those improperly-shod men than by almost any other act he could possibly perform.

Vanity of Civilians a Menace to Correct Fit

Take the case of an average citizen drafted into the Army service—a man who held a modest, moderate station in business and social life and was accustomed, as many men are, to take private pride and satisfaction in the trimness of his footwear; one of the millions of men who are able to crowd their feet into shoes a little too small and endure them without constant, actual suffering. Suppose, now, that man comes to training camp and, in the rush of supplying hundreds or thousands of other recruits with their necessary



1 2 3

The Civilian Foot in the Army Shoe

No. 1 illustrates the warping effect of the pointed style of civilian shoe upon the foot. No. 2 shows the warped foot when first introduced to the Army shoe. No. 3 shows the same foot after its conformance to the Army shoe.

equipment, is hurriedly asked by a commissary officer what size of shoes he wants. If he receives shoes that are too short, it is almost a certainty what will happen.

When he first puts them on he may not fully realize his predicament. He will probably sit down on a bench and crowd his feet into them, fully anticipating that they will feel strange and awkward. He will not be likely to lace them properly. He will then stand up and perhaps take two or three steps in them, not carrying his army pack and rifle. If the shoes do not at that moment actually hurt his feet, as they may not do, he will decide that they fit. He will not know or be able to anticipate that if he were carrying his marching load his feet might easily spread one-quarter or one-half an inch.

When he gets into his first hike his troubles will commence. The prominent surfaces of his feet will begin to burn, then blister. It is a comparatively short step from those irritants to the bruised toe-ends or turned-under toes that make each of the approximately 2,400 steps per mile that each foot takes in marching an act of semi-torture. Even if the recruit discovers the unfitness of his short shoes before entering upon his first practice march, the bottoms will likely be soiled and there is the possibility that his pride or his embarrassment or his fear of reprimand will cause him to refrain from returning the shoes to the commissary in exchange for the proper size.

Fresh recruits are bound to acquire certain minor foot soreness and temporary lameness, now and then, when they start the vigorous field training. They are as inevitable as soreness and lameness in other parts of their bodies resulting from unusual exercises. Wearing new shoes, heavier perhaps than the civilian styles they have been accustomed to and pounding along over rough ground and uneven roads are often productive of red and swollen feet, even in properly fitting shoes. The impact of the feet in marching acts upon some

men's feet much the same as a sharp slap on any other part of the body; it brings the blood close to the surface—from a perfectly natural cause.

But in correct-fitting Army shoes the feet soon harden to the new demands made upon them and thenceforth the little troubles disappear, because the feet will have "set."

Significance of the Surgeon's O. K.

Army officers responsible for the shoe-fit of enlisted men must not forget that all civilians accepted for active service have had to pass satisfactorily at least one and sometimes two rather rigid physical examinations and that in making these examinations the surgeons give especial attention to the structure and general condition of the feet. Many draftees and volunteers have been rejected temporarily and sometimes permanently, on account of faulty feet—feet that would be likely to develop further deficiencies in active war work that might entirely incapacitate the candidates if they were accepted.

Therefore, it must be assumed that every enlisted man who presents himself for his first pair of service shoes has been adjudged to have satisfactory feet. This fact imposes upon his superior officers a grave responsibility for not permitting him to be fitted with shoes that will run the slightest risk of producing the very foot troubles for which he would have been rejected by the surgeons at the time of his acceptance for service.

Army officers will do well to remember that the normal wearing qualities of a pair of shoes, Army or civilian, are estimated to be lessened between 25 per cent. and 50 per cent., if they are improperly fitted as to length and width. But this consideration, in the case of Army shoes, is infinitesimal by comparison with the physical and mental impairment produced upon their wearers by mis-fitting.

The Army Shoe

In their important work of seeing to it that the enlisted men are properly shod, Army officers have two first-class ele-

ments to work with—good feet and good shoes. The essential thing is to bring these two factors together properly.

That the two elements are of superior quality imposes an extra responsibility for combining them skillfully. It has already been pointed out, in the foregoing, that the feet of the recruits can be assumed to be structurally good because they have been closely inspected and O. K.'d by as competent a staff of Army surgeons as the medical profession anywhere in the world produces. That the latest improved types of shoes for enlisted men of the United States Army are the best for their purposes used anywhere in the world is generally conceded. More explicit reference to them herein will presently be made.

So, viewed in one way, the Army officers responsible for getting the men of their commands correctly fitted with footwear can be considered as skilled executives in a high-class manufacturing establishment: That is, they are given highest-grade materials to be fabricated into a highest-grade finished product—which, in this case, means properly-covered, thoroughly efficient marching feet.

Therefore, these executives should be and must be held responsible for producing satisfactory results. If through carelessness or indifference or ignorance or pressure of other matters the manager of a manufacturing plant neglects any part of his duties, the inevitable result is poor quality of finished product. That always means trouble.

There must not be any poor workmanship or poor supervision in the business of manufacturing good fighting-feet for United States soldiers. Sooner or later, every case of giving short shoes to a soldier is bound to come to light. Superior officers are as certain to discover it, if it occurs, as they are to find and put their accusing fingers on any other important deficiency in the enlisted man's physical make-up.

It is well to examine now and see just how good and efficient a piece of material the U. S. Army regulation service

shoe really is. Most commissioned officers have more than a superficial knowledge of it. If not, they should lose no time in becoming well acquainted with all of its important features and its differences from other types of shoes for fighting men—also, particularly, its differences from civilian types of footwear.

How the Present Army Last Was Created

The present Army shoes—constructed on the Munson last—are the result of a long, continuous period of the most painstaking study of soldiers' feet and of the best ways to cover and protect them during actual service. This study was carried on by a special board of Army officers, expert in orthopedics and in the general physiology of the soldier and this Board was headed by the officer whose name the shoe bears.

The research work carried on by this special Board went very much further than the work of any previous commission appointed to perform a similar work. Mere theories were not accepted, because sometimes they were conflicting. The Board conducted a long series of actual investigations not only for the feet of soldiers, but also of private citizens of the general class who would likely to be called into service in time of war.

The Board studied the feet of soldiers before they went on marches and afterwards; also the feet of civilians wearing short, pointed shoes and civilians suddenly put into various shapes of wider and longer shoes fashioned on foot-form lasts. X-Ray photography was called into play, to get the results down in black and white, so that honest differences of opinion among these experts would be straightened out and the fundamental facts determined with accuracy.

Nothing has been taken for granted. Every final conclusion has had to withstand the acid test of proof and practicability. Every material determined upon for use in the

shoe had to undergo the strain of actual wear under every condition of military service possible to arise.

Following are the important features of the new army shoe:

First-class construction, embodying the best principles of scientific shoemaking and the best obtainable materials.

Comfort, of the high degree absolutely necessary in a shoe to be worn under the trying conditions incident to the daily life and work of the soldier.

Durability, as required in a shoe that should adequately withstand the wear-and-tear of active field service.

Shape, of the anatomical excellence that should be healthful for the foot, should hold it snugly at all the contact-points where it ought to be held, should give it sufficient room for flexibility and for expansion under the weight of the soldier's load of equipment and, at the same time, be of neat and sightly appearance.

Well-supporting heel—that is, a low, broad construction that should furnish a good treading surface and be adequate as a primary striking-point for the impact in the act of walking.

Resistant to moisture from the outside and, at the same time, facilitating the evaporation of moisture from the inside.

Non-irritating on the inside, which requires having the smooth or grain side of the upper leather on the inside of the shoe.

Easy to put on and off, which means a shoe that can be laced easily and opens up quickly when being taken off.

This Army shoe is undoubtedly the best for its purpose that has yet been devised and it unquestionably fits properly a greater proportion of the feet of the soldiers who are called upon to wear it than any other type of army service shoe produced up to the present time. It is not to be expected that it will fit every foot 100 per cent. perfectly. No one type of shoe, probably, will ever do this. Even normal feet are occasionally found that require special fitting.

But for every purpose with which Army officers need to be concerned today's service shoe for enlisted men in the United States Army is the right kind and the best kind of foot-covering. The important thing is to be fully acquainted with the shoe and to study and learn the few simple acts involved in making absolutely certain that every pair of these

shoes goes onto the size of feet that the experts who so carefully developed and perfected the type intended it should go onto.

SPECIAL REGULATIONS NO. 28

2. Text of Revised Regulations Applying to the Fit of Enlisted Men's Shoes

CHANGES No. 3.

WAR DEPARTMENT,
WASHINGTON, *September 20, 1918.*

Paragraph 14, Special Regulations No. 28, Sanitary Regulations and Control of Communicable Diseases, is changed, as follows:

14. (Changed by S. R. No. 28, C. No. 3, W. D., 1918.)—Fitting of shoes and care of feet.—With the view of increasing the marching capacity of troops, company, troop, battery, and detachment commanders will personally satisfy themselves that the men of their commands have been properly measured and fitted with shoes and socks and will be held responsible that the instructions herein contained as to care of feet are strictly followed and that their men are required to wear shoes and socks properly fitted.

Foot-measuring machines and shoe-fitting devices will be supplied by the Quartermaster Corps in such numbers as may be needed at each camp and garrison post in the United States, the Philippine, Panama Canal and Hawaiian Departments, for use in fitting shoes. The use of the measuring machines and the fitting devices is to be under the supervision of the unit supply officers and supply officers of depot brigades, to whose offices will be attached personnel properly instructed in measuring and shoe fitting. A record of the proper size and width of shoes as determined by use of the foot-measuring machine and shoe-fitting devices will be kept by company, troop, battery and detachment commanders.

Directions for operating "Resco" foot-measuring machine:

(*a*) After taking the machine from its box, open it wide by moving the lever as far front as possible and pulling out the plunger as far as it will go. The machine is now ready for use.

(*b*) Let the man put his foot in the machine and stand with all his weight. The heel should rest firmly against the heel block. It is important that the foot should rest in the exact center of the machine.

(*c*) Release lever which operates the width indicator and push the plunger until the plate touches the toe. Do not touch the plunger again while the foot is in the machine. Make sure that the metal side pieces touch the toe joints.

(*d*) Then let the man throw his entire weight on the ball of his foot, raising the heel slightly.

(*e*) The width is automatically registered by the arrow. As the arrow wavers, following the action of the heel up and down, take the average of the extremes. (Example: If the arrow wavers from width "b" to width "d" use width "c.") The correct size of the shoe is indicated by the pointer on the plunger on the right hand scale.

(*f*) Measure the other foot in the same manner and if there should be a difference select size to fit the longer foot and the narrower width.

(*g*) Oil the slide under the device occasionally.

NOTE.—Verify the length selected by testing with shoe-fitting device.

(*a*) Select from the several measuring devices in the set the one marked with the size or half-size corresponding with the shoes to be tried on.

(*b*) Insert the knob end of the device into the toe of the shoe, springing the other end of device down to the inner sole, against the counter.

(*c*) The middle of the flat spring piece will lie flat with slight pressure of the foot.

(*d*) If the soldier, with pack and rifle on his back, can *without discomfort* pace back and forth in shoes with device inserted, the shoes will be sufficiently long to allow for foot-expansion when device is withdrawn.

NOTE.—The shoes must *in every case* pass satisfactorily the above-described test.

Shoes of the size indicated by the measuring machine, fitted with the proper shoe-fitting device, will be laced snugly and the soldier with a 40-pound burden on his back will throw his entire weight upon one foot. The officer or enlisted man will grasp with his hand the leather of the shoe over the ball. As his fingers and thumb are brought slowly together over the leather the shoe should feel snugly filled without apparent tension, while the leather should lie smoothly under the hand. If the leather wrinkles under the grasp of the hand the shoe is too wide and a narrower width is needed; if the leather seems tense and bulgy and the hand tends to slip over easily, the shoe is too narrow and a greater width is necessary. Usually

it will be necessary to try on several pairs of shoes in this manner before an entirely satisfactory shoe is secured. No shoes will be issued or worn by enlisted men which are not fitted in accordance with this order.

When foot-measuring machines and shoe-fitting devices are not available, the procedure in determining the fact of fit of the shoes will be the same as contained in the preceding paragraph. The officer or enlisted man fitting the shoe will also press in the leather of the shoes in front of the toes to determine the existence of sufficient vacant space in that region to prevent toe injury. Under no circumstances should this vacant space in front of the great toe be less than two-thirds of an inch, or the width of a man's thumb, nor should there be pressure on top of the toes.

Measurements will be taken and shoes will be fitted as soon as practicable after the enlistment or induction of the soldier into the service and the record will be changed from time to time if subsequent fittings render a change necessary.

Sizes called for in requisitions will conform to the record and the fact of fit shoes and socks issued on such requisition will be personally verified in every instance by a company, troop, battalion and detachment officer.

New shoes should be adapted to the contours of the feet as soon as possible. Shoe stretchers, with adjustable knobs, to take pressure off painful corns and bunions, are issued by the Quartermaster Corps.

All shoes and socks must be properly broken in before beginning to march. The following is suggested but not required: The soldier stands in his new shoes in about 2½ inches of water for about five minutes until the leather is thoroughly pliable and moist; he should then walk for about an hour on the level surface, letting the shoes dry on his feet, to the irregularities of which the leather is thus molded in the same way as it was previously molded over the shoe last. On taking the shoes off a very little neat's-foot oil should be rubbed into the leather to prevent its hardening and cracking.

If it is desired to waterproof the shoes at any time, a considerable amount of dubbin should be rubbed into the leather.

Shoes issued to enlisted men will be regularly inspected by company, troop, battery and detachment commanders to see that water-proofing substance is applied often and that they are not injured by being placed too near heating apparatus. Heat ruins leather and causes wet leather to decompose rapidly.

Light woolen or heavy woolen socks will habitually be worn for marching; the socks will be large enough to permit free movement of the toes, but not so loose as to permit of wrinkling. Darned socks or socks with holes will not be worn in marching. (This is not to be construed, however, as prohibiting soldiers from wearing properly darned socks while on ordinary duty, at drill, etc. If on marches two pairs of socks are worn, the outer pair may be darned socks.) Woolen socks will shrink about one size after being washed a few times. Proper fitting of socks must be secured under personal supervision of a company, troop or battery officer.

Company, troop, battery and detachment commanders, by frequent inspections and care throughout the year, will maintain the feet of their men in condition for proper marching. They will cause the proper trimming of nails, removal or paring of corns and callouses, relief of painful bunions, treatment of ingrowing nails and other defects, sending serious cases to the surgeon.

Before a march is undertaken by foot troops, company, troop, battery and detachment commanders will personally inspect the bare feet of their men. While on the march they will personally see each day that their men wash their feet as soon as possible after reaching camp, prick and evacuate blisters and cover such blisters or excoriations with zinc oxide plaster supplied by the medical department, applied hot, dust the feet with a foot powder supplied by the medical department, and put on clean socks. Hereafter, an undue amount of foot injury and disability from shoes will be regarded as evidence of inefficiency on the part of officers concerned and as causes for investigation.

A place will be provided where officers may have shoes fitted for the purpose of determining or verifying the record. For the purpose of fitting unit supply officer they will draw from the camp quartermaster, on memorandum receipt, a try-on set consisting of a complete series of each size and width of shoes furnished for issue. Shoes of this series will be put in stock and issued before they become unserviceable and will be replaced by new shoes, keeping the series always complete. Company, troop, battery and detachment commanders will report in writing to the post or regimental commander every instance of failure to secure proper shoes for their command. Post or regimental commanders will investigate the reason for and be held responsible as far as lies in their power for the rectification of such deficiencies.

A brief record of the number of such reports from company, troop, battery and detachment commanders and the reason for such deficiencies, will be furnished to inspectors at each inspection of the post.

Inspections conducted under the provisions of paragraph 889, Army Regulations, will embrace an inquiry into the manner in which this order has been complied with and the report of inspectors will include a statement of all instances of failure on the part of company, troop, battery and detachment commanders to secure proper shoes for their commands and the cause of such failure. (S. R. No. 28, C. No. 3, Sept. 20, 1918.)

BY ORDER OF THE SECRETARY OF WAR:

PEYTON C. MARCH,
General, Chief of Staff.

OFFICIAL:
P. C. HARRIS,
The Adjutant General.