

THE
ARMY HORSESHOER
—
1912

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THE ARMY HORSESHOER

1912

A MANUAL PREPARED FOR THE USE OF
STUDENTS OF THE TRAINING SCHOOL
FOR FARRIERS AND HORSESHOERS BY
THE TRAINING SCHOOL INSTRUCTORS

MOUNTED SERVICE SCHOOL
FORT RILEY, KANS.



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WAR DEPARTMENT,
OFFICE OF THE CHIEF OF STAFF,
Washington, September 18, 1912.

The Army Horseshoer, 1912, prepared at the Mounted Service School, Fort Riley, Kans., for the use of students of the Training School for Farriers and Horseshoers, as well as for the Army at large and the Organized Militia, is issued for the information and guidance of all concerned.

By order of the Secretary of War:

LEONARD WOOD,
Major General, Chief of Staff.

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

PREFACE.

Each graduate horseshoer of the Training School for Farriers and Horseshoers takes back with him to his organization the copy of this manual which he has studied during the four months attendance.

The supply of the first edition is now exhausted. Since its publication, nearly four years ago, classroom and shop methods have been systematized and have undergone numerous changes, the majority originating from the experience of instructors and of graduates returning as assistant instructors, but several resulting from suggestions of attentive organization commanders throughout the service.

The second edition has accordingly been thoroughly revised by the present officer in charge, First Lieut. Duncan Elliot, Eighth Cavalry, with the collaboration of the instructor of horseshoers, Frank G. Churchill, and Capt. George H. Cameron, Fourth Cavalry, formerly officer in charge, now assistant commandant of the Mounted Service School.

Probably the most important innovation, tending to the rapid progress of students, is the present system of teaching shaping, introduced during the past year. This will be found fully described and technically illustrated in Chapter III. During the portion of the course covered by this chapter, the student is required to explain in the classroom how he can most readily accomplish a desired result and to demonstrate his understanding by the use of shop tools and a bar of lead. It is no exaggeration to say that by this ingenious plan (Lieut. Elliot's) students now learn in two weeks what formerly required two months.

Chapter IV (Anatomy and physiology of the horse's foot) has been much simplified in accordance with the expressed wish

Special shoes, as described in Chapters VI and VII, were formerly made of bar steel, but as graduates complained that they were rarely able to obtain similar material at their stations, all shoes, except the plate, are now fashioned from the issue shoe. Incidentally, it may be stated that less time is devoted to special shoes, as inquiry developed the fact that they were seldom called for.

The satisfactory photographs reproduced in the text were made by Master Signal Electrician E. W. Suddarth, and the throwing harness shown in Plate XVIII is a pattern perfected by Sergt. Charles Mayer. Both noncommissioned officers are members of the Mounted Service School Detachment.

Opportunity is taken to express appreciation of outside suggestions. Inasmuch as the object of the school is to furnish shoers that will satisfy the demands of the service, opinions of mounted officers are as necessary as they are welcome.

MOUNTED SERVICE SCHOOL.

Fort Riley, Kans., July 31, 1909.

Interior of the shoeing shop, Training School for Farriers and Horseshoers	Frontispiece.
Plate I.—Tools	13
II.—Anvil and tool boxes	14
III.—Section of forge	16
IV.—Section of the hoof and pastern	Face 35
V and VI.—Raising the foot	43, 44
Three positions forefoot (third raised for clinchng),	
Three positions hind foot.	
VII.—The foot axis and the pastern axis	46
VIII.—Level of the foot	51
IX.—Preparation of the foot	52
X.—Normal shoes	55
XI.—Foot improperly shod and neglected	65
XII.—Special shoes for correcting faults in gaits	71
XIII.—Weighted shoes	74
Pathological shoes	74
XIV.—Extension toe	75
XV.—Quarter crack (before and after treatment and shoeing)	83
XVI.—Raising foot of refractory horse	101
XVII.—Horse in stocks	103
XVIII.—Harness for horse throwing	104
XIX.—Throwing the horse for shoeing	105

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

CHAPTER I.—Horseshoers' tools and their uses—The forge	11
II.—The fire—Heats	18
III.—Working and shaping iron—The plate shoe	21
IV.—Anatomy and physiology of the horse's foot	35
V.—Normal shoeing	42
VI.—Gaits—Shoeing to conform or alter same— Faults in gaits—Shoeing to correct same— The making of shoes for special gaits	47
VII.—Diseases—The making of pathological shoes	78
VIII.—Shoeing refractory horses	98

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

THE ARMY HORSESHOER.

CHAPTER I.

HORSESHOEERS' TOOLS AND THEIR USES—THE FORGE.

(Plate I.)

1. The *clinch cutter* (fig. 1) consists of two parts—the blade and the point. The blade is used to cut or to raise the clinches, being placed under the edge of the clinch and struck with the driving hammer. The point is used to punch nails and stubs out of the hoof. It is often placed in the crease of the shoe, under the head of the nail to be withdrawn, and struck smartly with the hammer. The blow raises the nail sufficiently to enable the pinchers to grasp the nail head.

The *pinchers* (fig. 2) are used to remove shoes and to draw nail stubs and improperly driven nails.

The *driving hammer* (shoeing hammer) (fig. 9) should be used only to drive horseshoe nails, to wring off nails after they have been properly driven, and to make clinches.

The *nippers* (fig. 4) are used to remove the surplus growth of wall.

The *shoeing knife* (fig. 3) is used to pare away the dead horn near the white line; to make a seat for clips; to remove loose particles from the hoof; to relieve pressure on corns and cracks; and to open the sole and wall for the escape of pus or for the removal of foreign bodies.

The *horseshoers' rasp* (fig. 5) is used to prepare a level bearing surface of the foot; to remove extra length of toe; to smooth the edges of the wall; to even clinches; to make a slight groove under each clinch; and to run lightly over the clinches in order to smooth them.

The *fitting hammers* (figs. 10 and 11) are used in fitting and in turning shoes.

The *hoof tester* (fig. 7) is used to locate injuries or soreness of the sole. Place one point on the sole and the other on the wall; press by closing the handles; shift the points and continue until the horse clinches. The pinchers may be used for the same purpose, but are not as satisfactory.

The *clinching tongs* (fig. 6) are used to draw down the clinches.

The *clinching block* (fig. 15) is used to turn the clinches.

The *tongs* (fig. 8) are used in handling hot metals.

The *pritchel* (fig. 16) is made by hand from round or octagonal steel, and is used for opening the nail holes in horseshoes. The point is drawn the same size and shape as the shank of a nail halfway between head and point, so that the hole punched in the shoe will fit the nail snugly and not allow much motion. Examine the nail carefully and learn the exact size for the pritchel. To draw out the point of the pritchel, heat it to a cherry red and, placing the pointed end flat on the face of the anvil near the far edge, strike with the hammer held at an angle to properly change the upper face, turning it as necessary so that the finished point will be of the shape desired. Never heat the pritchel beyond a cherry red; cool it gradually by placing it in the coal at the edge of the forge and never in the water. The face of the horseshoers' anvil should have a round edge near the base of the horn on the far side. This edge is used for sharpening tools.

Hardies, the straight (fig. 12) and the half-round (fig. 13), are used to cut hot metals. Their principal use for horseshoers is in cutting off the heels of shoes, and for this purpose a sharp cutting edge is required. When the hardy becomes dull the edge is drawn out on the face of the anvil in the same manner as the pritchel. A sharp edge is then put on by hot rasping, using the smooth side of the rasp. After sharpening, the *cutting edge* should be tempered as follows: Heat the blade of the hardy slowly to a cherry red; hold the cutting edge under water so that about one-half inch of the blade is immersed, and, when

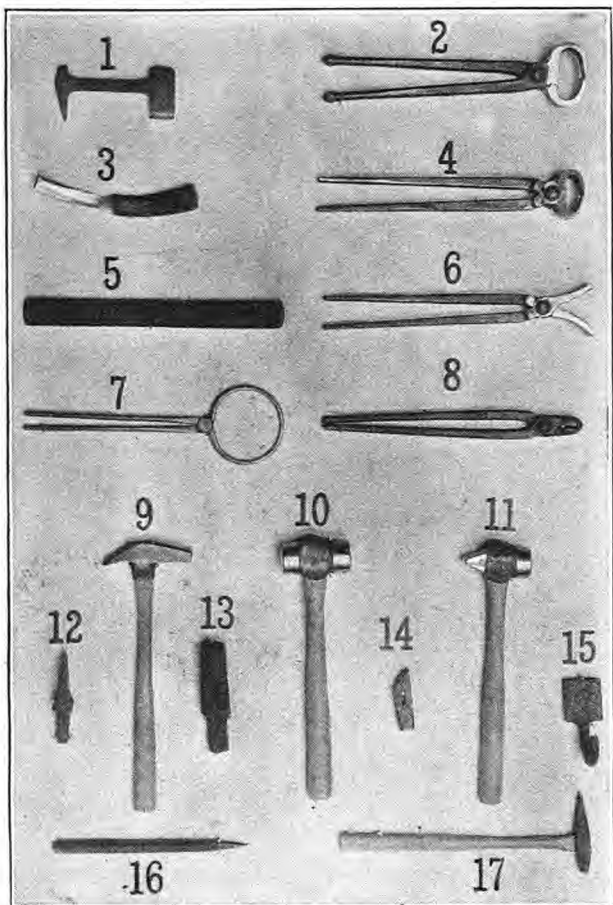
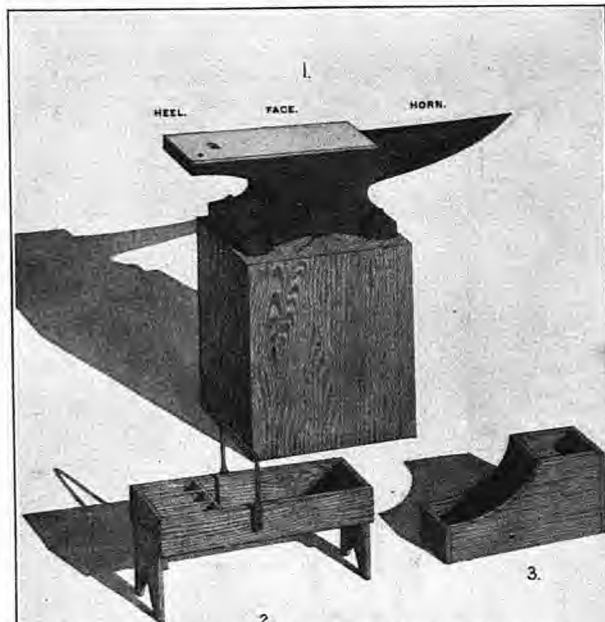


PLATE I.—TOOLS.

there is no longer any sizzling, plunge the whole hardy u
water and remove it at once; rub the blade on the floor to
move loose flakes of metal and to give it a slight polish:
carefully observe the change in color as the remaining hea



The *creasinger* (fig. 14) is used to crease the shoes and to repair damaged creases.

The *countersink* (fig. 17) is used in hand-made shoes to punch holes of sufficient size to receive the heads of the nails; these holes are completed by the use of the *pritchel* (fig. 16).

Horseshoe nails retain the shoe on the foot. These nails (furnished in several sizes) are machine made and pointed; they are slightly concave on one side and flat on the other; there is a short bevel at the point on the concave side. In driving the nail into the hoof the *flat side is held faced outward*.

2. The anvil.—The working parts of the anvil (Pl. II, fig. 1) are the *horn*, the *face*, and the *heel*.

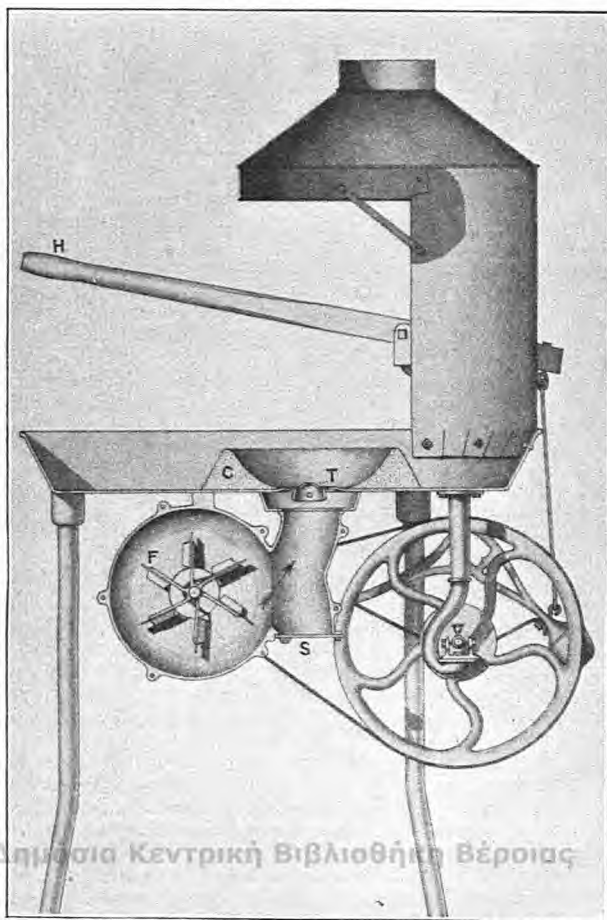
The *face*, or the upper plane surface, is of steel, and is welded to the iron body. The anvil is firmly fastened to a wooden block, which is sunk into the ground to a depth that will bring the surface of the face at a convenient working height above the ground—from 30 to 36 inches.

The *horn* is used to open and to shape shoes; the *face* to level the web and for welding; and the *heel* to straighten heels of shoes and to turn calks. Clips are ordinarily drawn on the edge of the face, but in the anvil shown there is an attachment near the base of the horn which is used for this purpose. The square hole in the face (*hardy hole*) is a socket for hardies; the round hole (*pritchel hole*) permits the passage of the *pritchel* through the nail hole of the shoe.

The anvil weighs from 125 to 150 pounds.

Figure 2 shows the tool box issued by the Quartermaster's Department. Its use is readily understood, and the only instruction required is that all tools should be placed in the box, handles out. An objection to this box is that it is easily tipped over. On this account many shoers prefer the pattern shown in figure 3, although the tools are not as near to the hand.

3. Plate III shows a section of a portable forge. In every forge air is forced through the fire by a bellows or a fan (F); the latter is made to revolve by a drive wheel or by a handle (H). The *twyer ball* (T) corresponds to the grate of a stove. Firmly attached to it and extending toward the worker is an iron rod by which the ball may be rocked. The end of this rod is shown by the small circle in the center of the *twyer ball*. A *crater* (C) should be made around the *twyer ball* in order to confine the fire. Clay may be used for this purpose, but cement is better.



4. The field outfit issued by the Ordnance Department is designed especially for portability, and is packed in two chests.

Chest No. 1 (22 by 18 by 13 inches) contains a small knock-down forge with fan and drive wheel and a complete set of forge and shoeing tools. Weight of chest, packed, 122 pounds.

Chest No. 2 (21 by 17 by 10 inches) contains a small anvil and block, water bucket, leather shoeing box, and apron. Weight of chest, packed, 68 pounds.

The field anvil weighs 17 pounds.

CHAPTER II.

THE FIRE—HEATS.

THE FIRE.

5. Coal, charcoal, coke, or even wood, may be used as fuel to create the necessary heat in the forge.

Before building the fire the crater of the forge must be thoroughly cleaned, removing all dirt, ashes, and unconsumed fuel. The twyer ball should be rocked vigorously, and the slide (S) opened. A few blasts will aid in removing the accumulated dust. The ball is often so heated as to fuse, and melted metal and clinkers may close the openings around the ball, preventing the passage of the blast. The obstructions must be removed by the use of the poker.

Coal is banked around the twyer ball in the form of a crater, in the center of which dry particles of any inflammable material are placed and ignited. When these particles are burning, coke or wet coal (if no coke is available) is gradually placed on the fire and the fan is revolved slowly, care being taken not to cover so closely that the flames are smothered.

When the fire is burning brightly, it should be built up around the edges with wet coal, which will in time become coke. (See Heats.) This coke is next burned and is replaced by wet coal, thus keeping up the supply of coke. Green coal is of little use in heating iron or steel for the reason that it does not give a high degree of heat, that it sticks to the metal, and that it emits a smoke which interferes with the work.

A clear fire without smoke is essential for good work, and the higher degrees of heat can only be obtained from such a fire.

The depth of the fire should be about 9 inches; the metal is then supported at the place of greatest heat, about 6 inches above the twyer ball.

If the metal is too near the twyer ball the heel is affected by the cold blast.

To bank a fire, cover thoroughly with the fuel and *open the slide below*; this will keep the fire alive for several hours.

CLINKERS.

6. Heated steel or iron gives off particles or scales which remain in the fire. These melting particles bind together particles of burned coal, gradually becoming larger and finally forming what is called a clinker. Clinkers give off but little heat and obstruct and spoil the fire; they must therefore be removed as fast as they form. Their presence will be shown by a tendency of the fire to spread and an unusual throwing out of sparks. If indications of clinkers appear, open up the fire with a poker, and as soon as the air touches the clinker it will turn black and become a solid mass which can be lifted out entire. Trying to drag out the clinker without opening up the fire only results in breaking up the clinker and making the fire worse than it was before.

HEATS.

7. There are four degrees of heat that are to be considered by the horseshoer, and they are generally designated as the *black*, the *cherry red*, the *white*, and the *welding* or *sparking heat*.

The *black heat* is when the shoe is hot but shows no color, and is used in making minor changes in shaping, levelling, and in opening nail holes.

The *cherry red heat* is when the steel or iron shows a bright cherry-colored glow. It is used in the general shaping of the shoe, in pointing the pritchel, and in sharpening tools.

The next degree of heat is called the *white heat* because the steel or iron then shows almost that color. This heat is used when it is necessary that the metal should be very pliable and easily worked, as in drawing toe clips, cutting off the heels, in drawing the heels of the shoe, in hot rasping, and in turning heel calks.

The *welding heat* is sometimes called *sparking heat* for the reason that the metal then gives off small particles which explode or spark above the fire. As soon as the sparks appear

watch the metal closely, and when the part to be welded has a bubbling (fluxing) appearance it must be withdrawn from the fire and worked immediately. The success of a weld depends entirely upon the proper heat of the parts at the exact moment the weld is attempted.

A newly made coal fire can be used for ordinary heating, but for a welding heat coke is required. Coke is ordinary coal from which the gases have been driven off by gradual heating. It will be found ready at hand around the edge of the fire. As coke does not smoke, there is no trouble in observing when the metal has reached exact welding heat.

CHAPTER III.

WORKING AND SHAPING IRON.

THE PLATE SHOE.

8. As a preliminary to instruction in shaping and preparing a shoe *for the foot*, it is best for beginners to learn the method of making and shaping a plate shoe, using an *old shoe* as a model.

The various parts of a shoe are commonly spoken of as follows: The toe is that portion between the first nail hole on one side and the first nail hole on the other side. The quarters are the portions in which the nail holes are punched. The heels are the remaining parts of the shoe. A side is one-half of a shoe, and includes one heel, one quarter, and one-half of the toe.

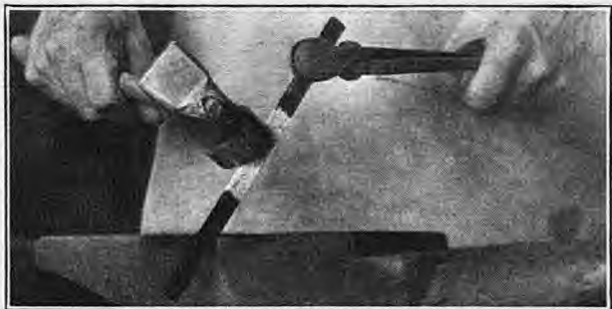
The plate shoe is made of $\frac{1}{2}$ by $\frac{1}{4}$ inch steel which is much more easily worked than the heavier service shoe.

Take a bar of metal about 11 or 12 inches in length.¹

9. **To bend the bar, where the center of the toe will be.**—Place the bar in the fire so that the center is directly over the draft. The coals of a properly-made fire should hold the bar about 6 inches above the twyer ball. When cherry red, remove from the fire, holding the nearest end with the tongs and lean

¹ The length of bar required to make a shoe *for a foot* will be found by measuring in a straight line on the sole of the foot from the edge of the wall at the center of the toe to the extremity of either bulb of the frog. A little more than twice this distance will be the length of the bar required to make the shoe.

the other end on the edge of the anvil farthest from you. The bar is held on edge and at an angle of about 45° with the face of the anvil.



Strike lightly with the hammer at the center of the upper edge of the bar, and gradually bend the bar until it is right angled or L shaped.



, after bending, the L is not flat, but twisted, it must be
ed on the face of the anvil.



remember to use only light blows on red metal. Heavy blows
e irregularities that are difficult or impossible to remove.

D. To shape one side.—Place one-half of the L in the fire
when heated seize the cold half with the tongs and hold



Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

heated side diagonally over the horn of the anvil, the left
d near the base and held low, the heated end projecting

Begin striking at the end of the heated portion and, keeping the right hand steadily in position, shape the steel by gradually moving it beneath the hammer. Move the steel over the



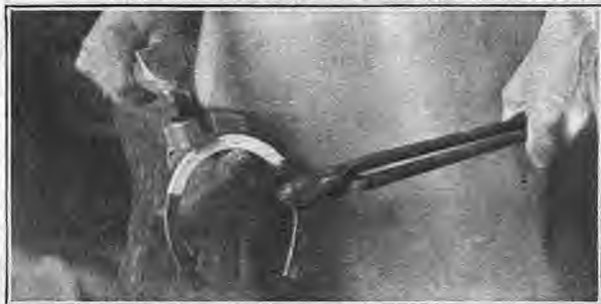
horn by raising the left hand and carrying it toward the point of the horn; that is, as the toe is approached, shift the work toward the point of the horn.



The horn of the anvil is so constructed that the diagonal curve across the center conforms to the shape of the heels and quarters of the average sized foot and the curve near the point is shaped like the toe. For a very large shoe begin near the base of the horn.

To shape the opposite side, proceed in the same manner.

11. To center the toe.—After both sides have been turned, see if they are of equal length; that is, see if the toe is in the center. If not, then heat the toe, and grasping the longer side with the tongs, hold the shoe over the point of the horn so that it is correctly centered and strike just beyond the horn.



12. To draw out the heels.—Heat the heels to a white heat. Hold the shoe on the horn in the same position as for shaping and upon a diagonal that will insure close contact. The blows,



however, are struck on the part resting on the horn and the heel is brought toward the hammer by lowering the left hand.

In drawing out the heels the lower (or ground) surface of the shoe should be made slightly narrower than the upper (or bearing) surface.



Notice that to draw out one heel the ground surface is on the left side when the heel rests on the horn.

To draw out the other heel the ground surface is on the right side, and the shoe is changed to the opposite diagonal of the horn.



In both cases strike on the edge of the ground surface, and as a result this surface will be the narrower.

For a left-handed man these positions will be reversed.

This drawing out narrows and at the same time thickens the heel. To restore it to its original thickness, work on the face of the anvil. Hold the ground surface down so as to preserve the bevel.

13. To cut off the heels.—Apply the shoe to the model and note how much must be cut from the heels. Care must be used,



however, not to cut them too short. It is better to have them too long and to cut them off again if necessary.

After heating to a white heat, place the ground surface on the hardy so as to cut the heel off squarely, but hold the toe slightly lower so that the cut will also be beveled; that is, so



that the upper surface will be slightly longer than the ground surface. The cutting will widen the steel near the end.

To bring it back to the original width hold the inside edge of the heel of the anvil and strike on the outer edge.

This will also point the heel slightly and diminish the work of hot rasping (par. 14).

In fitting a plate shoe for a foot the nail holes should be punched *before* cutting off the heels so that if necessary the toe can be centered to correspond to the nail holes.

14. Hot rasping.—The heels are now finished by hot rasping. The shoe is placed in the vise with the ground surface toward you, and the heels are rounded, carefully preserving the



slight bevel (the upper surface being longer and wider than the ground surface).

Care must be used to leave no sharp edges on the heels that will cut the horse.

A pointed heel may cause a "shoe boil" (a bruise at the point of the elbow).

15. To punch out the nail holes.—Apply the shoe to the model; if the heels are of proper length and the shoe is an approximate fit, the nail holes are punched out.

The nail holes are started on the ground surface with the countersink because the point of this tool conforms to the shape of the head of the nail. The point should not be driven more than three-fourths through or the shoe will be bulged and ruined. The tool is held slanted outward to conform to the

direction which the nail should follow and the hole is started a little outside of the center of the web.

Heat one side and first start the hole nearest the toe. Its proper position can be learned by examining a service shoe of the same size. The hole at the bend of the quarter is next started, and finally the hole midway between the two. The plate shoe, on account of its light weight, requires but six nails, three on each side.

Heat the other side and proceed as before.

The nail holes must not be placed too far back. A shoe nailed back of the turn of the quarter will impede the expansion of the hoof and eventually cause contraction of the heels.



If, in punching the nail holes, bulges appear near them on the edges of the bar or shoe, they must be removed by working over the horn. (Same position and means as for drawing heels.)

Examine the pritchel, and if it is not of the proper shape, point it before using. (See Tools, par. 1.)

Punch out the nail holes on the ground surface, holding the pritchel slanted outward; then punch out the holes on the upper surface, holding the pritchel slanted inward.

In pritcheling out a nail hole, to avoid blunting or breaking the point of the pritchel, that part of the shoe where the nail hole is to be, is held over the pritchel or hardy hole.

16. Fitting.—The shoe is now ready for its final trial and is applied to the model.

If it does not exactly conform to the model, it will have at least one of the following faults, which must be corrected according to the explanation given in each case.



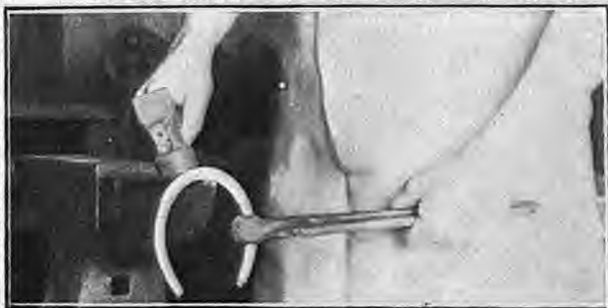
17. Not level.—To level the shoe, take it with the tongs near the toe on the far side and examine it by sighting over the upper surface. If it appears to be crooked, lay it on the face of the anvil in a position allowing the highest surface to be



struck (par. 9). If, after remedying this defect, a similar one appears, it must be treated in the same manner. A crooked shoe will not stay on the foot and is apt to cause lameness.

When leveling the sevice shoe, if it be found necessary to strike on the ground surface of the shoe, let the blows fall over

the crease in order to avoid spoiling the concave of the upper surface. Special care, however, must be used to strike a square blow. If the face of the hammer does not fall evenly, it will dent and close the crease.



18. Too wide at the toe.—Heat the toe and hold it on the extreme point of the horn, the center of the shoe resting on the horn of the anvil. Strike lightly near the toe on the side farthest from you, then reverse the toe and strike as before.



19. Too narrow at the toe.—Heat the toe and hold it on the horn of the anvil so that there will be a small space between the shoe and the horn. Strike lightly along the toe, not confining the blows to any one spot.

20. One heel and quarter too narrow.—To throw out a heel and quarter from a given point. Heat the quarter and, holding the heel on the horn, strike on the spot from which it is desired to spread or throw out the heel and quarter.



21. One heel and quarter too full.—(a) To throw in a heel and quarter from a given point. Heat the quarter and hold it over the point of the horn of the anvil so that the shoe



will rest upon the inside edge *at the point* from which the change is to be made. Strike near the heel on the part projecting over the horn.

(b) To throw in one side without changing its general shape. Heat the whole shoe and place the quarter that is correct in water until cool.

Close the shoe bodily (par. 24), which operation will affect the hot side only.

(c) If neither of these methods accomplishes the desired result the quarter must be reshaped over the diagonal of the horn.

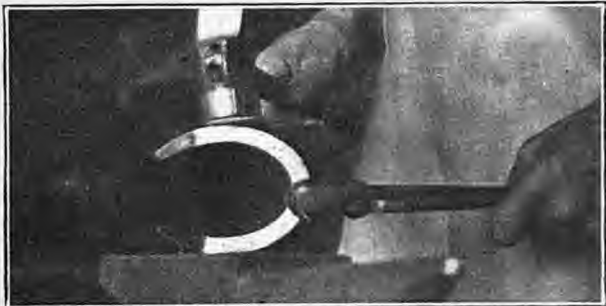
22. A bulge in the quarter.—Heat the quarter and hold over the heel of the anvil. Strike directly over the bulge.



This will remove the bulge, but will also slightly straighten the quarter, which must later be reshaped.

23. A short straight place in a quarter.—Heat the quarter and hold the straight place on the point of the horn, as shown in paragraph 21, but strike alternate blows on each side of and close to the point to be rounded.

24. Both quarters too full (with the general shape rect).—Heat the whole shoe and, holding it on edge on the of the anvil, strike down on the elevated quarter. This will row or close the shoe, but will not change its general shape.



25. Both quarters too narrow (with the general shape rect).—Heat the whole shoe and, holding one heel on the of the anvil and one on the side, strike on the toe. This open or spread the shoe without changing its general shape.



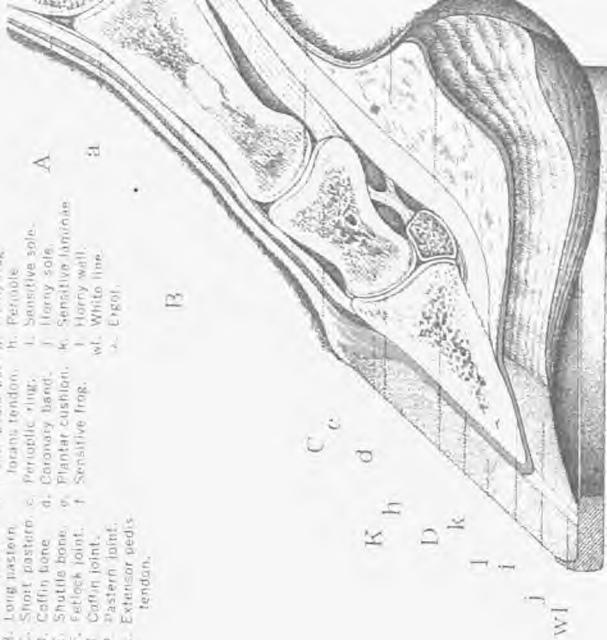
A perfect fit having been obtained the nail holes are punched, if necessary, and the whole shoe neatly finished.

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

A. Cannon bone.
 B. Long pastern.
 C. Short pastern.
 D. Coffin bone.
 E. Shuttle bone.
 F. Fetlock joint.
 K. Coffin joint.
 P. Pastern joint.
 n. Extensor pedis tendon.

b. Flexor pedis profundus tendon.
 c. Periploic ring.
 d. Coronary band.
 e. Plantar cushion.
 f. Sensitive frog.

g. Horny frog.
 h. Periole.
 i. Sensitive sole.
 j. Horny sole.
 k. Sensitive laminae.
 l. Horny wall.
 wl. White line.
 A. Ergol.



CHAPTER IV.

ANATOMY AND PHYSIOLOGY OF THE HORSE'S FOOT.

26. By *anatomy* of the foot is meant a description of the various parts entering into its formation; and by *physiology* is meant the functions or uses of these parts.

27. The horse's foot is composed of four parts: (1) The bones; (2) certain elastic structures of cartilage (gristle) and fat; (3) the layer of highly sensitive flesh (quick) which covers this bony framework; (4) the box, or case of horn, called the hoof, which incloses and protects the sensitive parts.

BONES OF THE PASTERNS AND FOOT.

28. The bones of the pastern region and foot form a column extending downward from the fetlock into the hoof, and are named as follows: The long pastern bone (*Ox suffraginis*), the short pastern bone (*Ox carni*), the coffin bone (*Ox pedis*), the navicular or shuttle bone (*Ox navicularis*). (See Plate IV.)

The *long pastern bone* reaches from the fetlock joint above to the pastern joint below. Its upper surface has a shallow cavity on each side, separated in the middle by a deep groove, and into this surface fits the lower end of the cannon bone, forming the fetlock joint. The lower surface is much smaller and narrower than the upper. On each side is a small ridge, the two ridges separated in the middle by a shallow groove to fit the upper surface of the short pastern bone, forming the pastern joint.

The *short pastern bone* follows the direction of the long pastern bone downward and forward, and lies between the pastern and coffin joint, its lower end being within the hoof.

Its upper surface has a shallow cavity on each side, with a ridge between them to fit the lower end of the long pastern bone.

The lower surface of this bone has a ridge on each side, the two ridges separated by a groove to fit the upper surface of the

The *coffin bone* is of irregular shape; it is situated within the hoof and is similar to the latter in outline and form.

The front surface is known as the *wall surface*; it shows a number of small openings for the passage of blood vessels and nerves, and is roughened to give attachment to the soft parts (sensitive laminae) covering it. At the top of this surface, in front, is a ridge called the *peak* (pyramidal process), to which is attached the extensor tendon of the foot.

The lower surface, called the *sole surface*, is half-moon shaped, dished and smooth, and is covered by the sensitive sole. The upper surface helps to form the coffin joint, and is called the *joint surface*; it has two shallow cavities, separated by a ridge to fit the lower surface of the short pastern bone.

Just back of the joint surface is a small groove to fit the navicular bone which lies behind.

Just back of the sole is a rough surface, to which is attached the flexor tendon of the foot; it is called the *tendinous surface*.

On each side of this surface is a groove running forward to an opening; an artery and a nerve enter the bone, and a vein leaves it through this opening.

On each side, the coffin bone extends backward, forming what is called the *wing*. Each wing has a notch and a groove, the latter running forward on the outside of the bone; an artery lies in the notch and groove.

The *navicular bone* is of irregular shape, situated behind and below the short pastern bone and behind the coffin bone, forming a joint with both. The extremities of the bone are attached to the wings of the coffin bone; the lower surface is covered with cartilage, which forms a smooth surface for the movement of the flexor tendon, which bends the joint; for this reason the bone is usually called the "shuttle bone."

ELASTIC PARTS OF THE FOOT.

29. All of the parts of the foot, except the bones, are more or less elastic or "springy" and yield when pressure is applied; but certain parts have a very high degree of elasticity, their special use being to overcome the effects of concussion or jar when the foot strikes the ground and to prevent injury, and these parts are referred to as the elastic parts of the foot. These are the *lateral cartilages* and the *plantar cushion*, or fatty

The *lateral cartilages* are two thin plates of cartilage (gristle), one attached to the top of each wing of the coffin bone, and extending backward and upward so far that their upper borders may be felt under the skin above the coronet at the heels.

The *plantar cushion* is a very elastic wedge-shaped pad, which fills up the space between the two lateral cartilages on the sides, the sensitive frog below, and the flexor tendon above.

The point or front part of the plantar cushion extends forward to the ridge which separates the sole surface from the tendinous surface of the coffin bone. The base or back part is covered by the skin above the heels.

SENSITIVE PARTS OF THE FOOT.

30. Over the bones and elastic parts of the foot is found a complete covering of very sensitive flesh. From each part of this layer of flesh some portion of the hoof is secreted or grown. The sensitive parts are: The coronary band, the perioplic ring, the sensitive laminae, the sensitive sole, and the sensitive frog.

The *coronary band* is a thick band of tough flesh, about four-fifths of an inch wide, extending entirely around the top of the hoof from one bulb of the heel to the other, and lying in a groove (coronary groove) on the inner upper surface of the wall. The surface of the coronary band is covered with small pointed projections, called *villi*, from which is secreted or grown the horny wall of the hoof.

The *perioplic ring* is a narrow band of flesh running around just above the coronary band and separated from it by a faint groove in the wall. From the fine villi on the surface of this ring the delicate fibers grow which form the *periople* or hoof varnish.

The *sensitive laminae* (fleshy leaves) cover and are firmly attached to the wall surface of the coffin bone and to the lower part of the outer surface of the lateral cartilages. From these delicate leaves of the flesh grow the *hoary laminae*, the inside lining of the horny wall.

The *sensitive sole* covers the sole surface of the coffin bone, is covered with villi, and secretes the horny sole.

The *sensitive frog* covers the lower surface of the plantar cushion, and from its villi the horny frog is secreted.

THE HOOF.

31. The box or case of horn, called the *hoof*, which incloses and protects the other structures of the foot, is divided into three parts—*wall*, *sole*, and *frog*. In a healthy foot these parts are solidly united.

32. The *wall* (except the bar) extends from the edge of the hair to the ground, and is divided into the *toe*, *quarters*, and *buttress* (or *heels*). (See Pl. IX.)

The *toe* is the front part of the wall. It is steeper in the hind foot than in the fore. The *quarter* extends backward on each side from the toe to the buttress or heel. The *buttress* is that part of the wall where it bends inward and forward. The *bar* is a part of the wall and runs from the buttress to within about 1 inch of the point or apex of the frog. The buttress, therefore, is the junction of the quarter and the bar. (See Pl. IX.)

The outside of the wall is covered by a thin varnish-like coat of fine horn, called the *perioptic*.

The inside of the wall is covered with thin plates or leaves of horn, called the *horny laminae*. Between the horny laminae, which run parallel to each other and in a direction downward and forward, there are fissures into which dovetail the sensitive laminae, and this union (*a*) binds the wall of the hoof to the coffin bone and lateral cartilages; (*b*) suspends the weight of the horse as in a sling; and (*c*) thus prevents the bones from descending on the sole.

The upper border of the wall shows a deep groove (coronary groove) into which fits the coronary band.

The lower border of the wall is called the "bearing surface" (or "spread" in the unshod foot), and is the part to which the shoe is fitted.

33. The *horny sole* is a thick plate of horn, somewhat half-moon shaped.

The upper surface is arched upward, and is in union with the sensitive sole from which the horny sole grows. The lower surface is hollowed and is covered with scales or crusts of dead horn, which gradually loosen and fall off.

The outer border of the sole is joined to the inner part of the lower border of the wall by a ring of soft horn called the *white line*. This line is sometimes called the *guide line*, as it shows where the nail should be started in shoeing.

The inner border is a Y-shaped notch, which is in union with the bars, except at its narrow part, where it joins the frog.

The horny sole protects the sensitive sole and must not bear upon the shoe, except a very narrow strip near the white line, an eighth or tenth of an inch in width.

34. The *horny frog* is a wedge-shaped mass filling up the triangular space between the bars. The lower surface has two prominent ridges, separated behind by a cavity called the *cleft*, and joining in front at the point of the frog; these ridges terminate behind in the *bulbs* of the frog.

Between the sides of the frog and the bars are two cavities called the *commissures*. Deep commissures indicate a thick sole and shallow ones the reverse. The upper surface of the horny frog is the exact reverse of the lower; it has in the middle a ridge of horn called the *frog strip*, which assists in forming a firm union between the horny frog and the sensitive frog. The horny frog assists the plantar cushion in breaking the jar or concussion, protects the sensitive frog, and prevents the foot from slipping.

STRUCTURE OF HORN.

35. The horn of the hoof presents a fibrous appearance, and consists of very fine horn fibers or tubes, similar to hairs, running downward and forward and held together by a cementing substance. The horn fibers of wall, sole and frog all run in the same direction, downward and forward, the only difference being that those of the frog are much finer, softer, and more elastic. They also run in wavy lines, whereas the fibers of wall and sole are straight.

They grow, as previously explained, from the small finger-like projections or points called *pilli*, which cover the surfaces of the coronary band, sensitive sole, and sensitive frog.

EXPANSION AND CONTRACTION.

36. When weight comes upon the leg, the plantar cushion and horny frog are compressed between the ground below and the structures above; this compression causes them to spread out sideways, carrying outward the lateral cartilages and bars

The foot structures, however, are so held together that the coffin bone (*os pedis*) can not descend and could not come through even were the entire horny sole removed, as is sometimes necessary in a diseased foot. This being so, proper expansion without frog pressure is not possible, the force expanding the plantar cushion being exerted from below by pressure of the ground on the horny frog, and but little coming from the bony structures above, they acting more in the capacity of buffers. The result of absence of frog pressure may be noted in horses shod with heel calks and used on city pavements. The expansion being reduced to a minimum, contracted heels must result.

When weight is removed from the leg, the plantar cushion returns to its normal size, allowing the lateral cartilages and quarters to move inward to where they were before expanding. This is called *contraction*. The elastic lateral cartilage is merely a flexible extension of the wing of the coffin bone and would appear to have been specially designed for expansion and contraction at the quarters. It is also to be noted that the bars are a provision for this same purpose, since expansion and contraction could not take place if the wall formed a solid unbroken ring around the hoof.

In addition to breaking the jar when the foot comes to the ground, the plantar cushion has another important use. It assists in the circulation of the blood through the veins of the foot. When weight is placed upon the foot the pressure on the plantar cushion forces the blood upward through the veins; then, when the foot is lifted and the pressure is removed from the horny frog and plantar cushion, the veins of the frog again fill with blood, and this pumping action is repeated with each step. Proof of this statement is seen when a vein of the lower leg is cut. If the horse is walked, a jet of blood spurts out each time he puts the foot to the ground; but if he is allowed to stand, the blood flows in a steady stream from the vein. Great injury to the foot results from starting the horse off suddenly at a fast gait on a hard road after he has been standing for some time, or when he first comes out of the stable. The circulation of the blood and the structures of the foot should have time to gradually adapt themselves to the change from rest

37. The wall of the healthy hoof is, by weight, about one-fourth water, the sole more than one-third, and the frog almost one-half. This water is supplied by the blood, and preserves the horn in a tough and elastic condition. The periople, which covers the wall, prevents the evaporation of water, and therefore should *never* be rasped. As there is no similar covering for the sole and the frog, the layers of horn on their exposed surfaces dry out and die. The dead layers are hard and brittle and gradually fall or flake off; but, as they preserve the moisture in the layers of live horn beneath, as little as possible should be removed in preparing the hoof for shoeing.

CHAPTER V.

NORMAL SHOEING.

By normal shoeing is meant the shoeing of a sound foot of a horse with proper gaits.

RAISING THE FOOT.

38. In preparing to raise a horse's foot, never approach the animal suddenly, for he will not only be startled, but a sudden pull at his foot will probably disturb his balance, and the lifting will be more difficult for both man and horse.

To raise the forefoot, the shoer stands with his back to the horse's head and places his inside hand on the horse's shoulder. Then, bending over, he runs his hand gently down the back of the leg until the fingers, with the thumb on the outside, are just above the fetlock. The shoer's shoulder is pressed against the shoulder of the horse, forcing the weight upon the other forefoot. (Pl. V, fig. 1.) A slight grasp of the hand on the tendons is usually sufficient to induce the horse to raise the foot.

The shoer next straddles the horse's leg and holds the foot upon his knees, standing so that his body is about opposite the horse's shoulder, and in close to him, so that the horse's leg is not pulled outward in a strained position. The shoer's toes should be turned in to give strength to the position. (Pl. V, fig. 2.)

39. Raising the hind foot is performed in two different ways. In the first method the shoer, standing at the horse's flank and with his back to the animal's head, bends until his shoulder presses the horse's thigh, runs his hand gradually down the tendons and grasps them as in raising the forefoot. In the second method, the one generally employed, the shoer stands as in the first method, but with his outside foot advanced (Pl. VI, fig. 1): the hand nearest the horse is placed upon the animal's hip, gently pushing him over and forcing the weight upon the opposite hind foot; meanwhile the other hand is run slowly



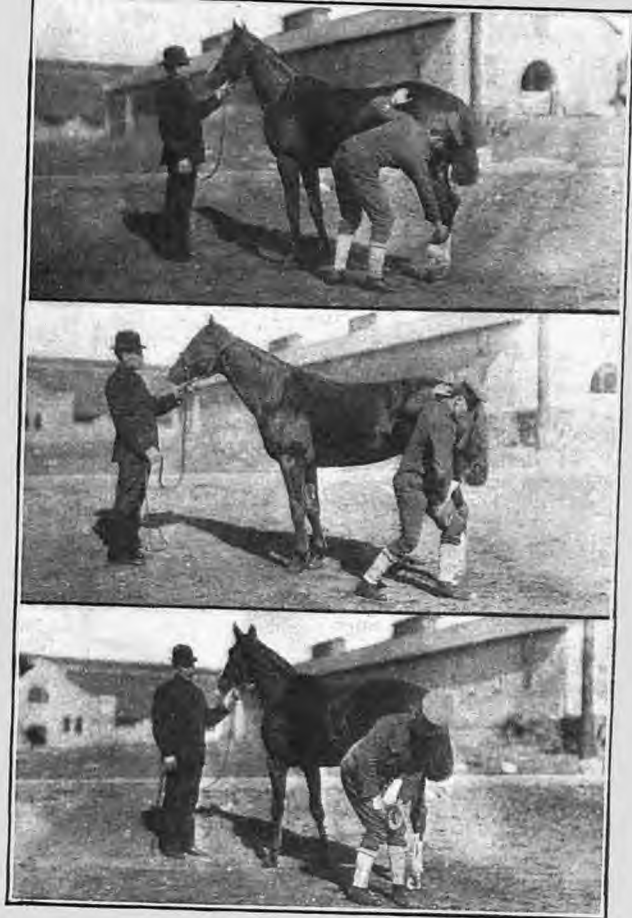


PLATE VI.—RAISING THE FOOT.

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

down the back tendons from below the hock. The leg is grasped under the fetlock and is slightly raised forward. The shoer may swing his inside leg under the horse's leg (Pl. VI, fig. 2), presses it with his knee and extends it to the rear to the position shown in Plate VI, figure 3. Care must be exercised that the foot is not held too high nor carried too far to the rear or outward, for the discomforts of these strained positions will induce the horse to pull his leg away.

PRELIMINARY EXAMINATIONS.

40. Three careful examinations should be made before old shoes are removed from the horse:

1. Of the action of the feet when the horse is in motion.
2. Of the shape and position of the feet at rest.
3. Of the evidence of wear on the old shoe.

For the first examination, the horse having free use of his head, should be led at a walk and at a slow trot upon *level* ground. Uneven ground will produce modifications of the natural gait, and a tight rein or a short hold on the halter shank will also alter the free, natural motion. The shoer assumes a squatting position and observes the feet as the horse is led past him, away from him, and toward him. The manner in which a foot leaves the ground, its path in the air, and the manner in which it is planted should be closely watched in order to detect any of the defects of gait which can be remedied by intelligent shoeing. (See Chapter VI.)

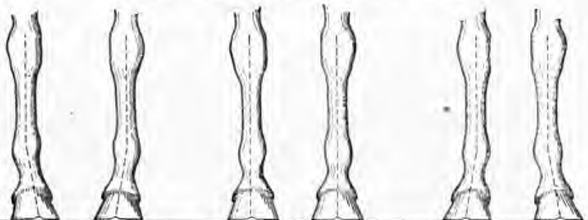
41. For the second examination, the horse should stand at ease on the floor; the shape of each foot and leg should be observed from the front, from each side, and from the rear, care being exercised that the leg, at the time, is bearing its proper share of the animal's weight.

The shoer first studies the natural pastern conformation. Is the pastern slanting inward (toe in), is it vertical (straight), or is it sloping outward (toe out)? (Pl. VII, figs. 1, 2, and 3.)

Having decided this point, he then studies the position of the "pastern axis" and the "foot axis."

As seen from the front we may consider that the "pastern axis" is the imaginary line exactly splitting the long pastern in two, and that the "foot axis" is the line exactly splitting the foot in two; that is, the line from the center of the toe to the center of the coronet. (The foot axis may be drawn on the

PASTER CONFORMATION.



1. TOE IN

2. STRAIGHT

3. TOE OUT

PREPARATION OF THE HOOF.



4. BROKEN OUT

5. CORRECT

6. BROKEN IN

PASTER CONFORMATION.



7. SLOPING

8. REGULAR

9. STUMPY

PREPARATION OF THE HOOF.



10. BROKEN BACK

11. CORRECT

12. BROKEN FORWARD

These two axes should be in prolongation or appear to be one straight line *no matter what the natural pastern conformation* (figs. 1, 2, 3, and 5), and if the shoer finds this condition satisfactory he will simply need to prepare the foot evenly for shoeing, as explained later. But if the two axes do not appear as one straight line there will be a break at the coronet. This is a proof that the foot is not level and that the horse is not standing correctly. If the line is "broken out" (fig. 4) the prolongation of the pastern axis falls to the outside of the foot axis and the inner wall is too high, and the fault is remedied by nipping off more of the inside wall than of the outside. If the line is "broken in" (fig. 6) the prolongation of the pastern axis falls to the inside of the foot axis and the outside wall is too high and should be trimmed down more than the inside. The dotted lines in the figures show the amount to be trimmed off.

It will be noticed that the "broken out" foot *looks like* the "toe in" and the "broken in" foot *looks like* the "toe out," but in the natural conformations there is no break at the coronet.

42. Standing at the side, the shoer should notice the height of the foot, the length of the toe, and the slope of the line of the toe; that is, the front line of the hoof as seen from the side.

Here, again, we have three cases of natural pastern conformation: The "sloping," the "regular," and the "stumpy" (figs. 7, 8, and 9); but the line of the toe should, nevertheless, be parallel in each case to the pastern axis as seen from the side.

By careful sighting from the side, draw a chalk line between the second and third clinches, with exactly the same slope as the line of the toe. This mark will generally have the same direction as the horn fibers. Now stand back and determine if this mark and the "pastern axis" as seen from the side are one and the same line. If so, trim off the surplus growth evenly. If not, the line will be broken at the coronet. In "broken back" (fig. 10) the prolongation of the pastern axis falls to the rear of the foot axis and the toe is too high and should be trimmed more than the heel; in "broken forward" the prolongation of the pastern axis falls in front of the foot axis and the heels are too high and should be trimmed more than the toe.

The "broken back" *looks like* the sloping pastern and the "broken forward" *looks like* the stumpy pastern. The breakest the coronet, however, is the sure guide.

For the third examination the foot must be raised,

43. The wear of the old shoe should be carefully noted as a check on the preceding two examinations. If the shoe has worn evenly, its position on the foot was undoubtedly correct. If one side of the shoe shows more wear, (a) that side may have been fitted too closely; (b) there may be some fault in gait which should have been noted in the first examination; (c) the foot may not have been properly leveled in the last shoeing; (d) the quarters, as frequently happens, may have grown unevenly since the last shoeing. Horses with long, sloping pasterns wear the shoe more at the heel, while those with short, upright pasterns wear the shoe more at the toe. There is a slight scuff at the moment of breaking over, which produces a normal wear at the toe, but overworked horses and those suffering from disease show more than this normal wear.

REMOVAL OF THE OLD SHOE.

44. The clinches are cut off or straightened with the clinch cutter and hammer. The sharp edge of the clinch cutter is placed under the edge of the clinch and struck with the hammer until the clinch turns up flat against the wall or is broken off. If even one clinch is left holding it may break off the portion of the wall to which it is fastened.

Beginning at the heel, each side of the shoe is loosened with the plinchers and, gradually working toward the toe, is separated from the hoof until all the nails are free except those at the toe. The shoe is firmly grasped at the toe with the plinchers and is pulled toward the center of the foot. If pried over the toe toward the outside of the foot, part of the hoof may be broken off. Any stubs of nails remaining in the foot must be removed.

TO PREPARE THE FOOT.

45. With the horse standing evenly on its feet examine the foot and pastern axes to determine the necessary changes, if any, to be made besides the removal of the surplus growth of horn. Then taking the knife in the right hand, back of the hand down, the blade coming out at the little finger, palm of the left hand supporting the wall of the hoof and the left thumb on the blade to assist in cutting and to prevent slipping, pare away the dead horn *near the white line* until live horn is reached, being careful *not to go farther back than the last nail hole*. This is done to ascertain the amount of horn that may be removed and to facilitate the use of the nippers. The knife must never be

used on the bars or the frog. The bars strengthen the hoof and assist in its expansion. Cutting therefore weakens them and prevents them from performing their function. *Never* use a knife on the hoof of a horse that has been running barefoot, nor on flat feet, either natural or diseased.

Ragged parts of the frog may be cut away by careful use of the nippers.

In removing surplus growth of horn it is safer to lower the toe first, for, if the heels be lowered and, later, it is found that a corresponding amount of horn can not be cut from the toe, it will be impossible to put the foot at the proper angle without the use of heel calks or a thickened web at the heels.

Taking the nippers in both hands so that the handles are perpendicular to the plane of the bearing surface, begin at the last nail hole and cut until the white line shows plainly and live horn has almost been reached; start with a thin cut or bite and gradually increase the depth of bite to the point of the toe; continue along the opposite wall to the last nail hole on that side, gradually diminishing the bite.

46. Heavy horses with wide feet and horses raised on soft, marshy pastures usually have flat feet. The *natural* flat foot, although particularly liable to bruises of the sole, must be classed as a sound foot and must be distinguished from one that is flat as a result of disease.

On account of its shape, the natural flat foot is sometimes called "flare foot." The wall in such a foot wears away (or is trimmed away) at a more oblique angle than in the ordinary upright foot, and it is therefore frequently necessary, in the preparation, to remove a part of the outer edge of the wall in order that the nails may be driven in the white line where they belong.



The preceding figures clearly explain this case, which must be remembered as the only one where it is permitted to remove the

47. In general.—The foot should be prepared so that it will approximate as nearly as possible to a state of nature, and only such trimming is allowed as is absolutely necessary for the purpose of fitting and securing the shoe.

TO LEVEL THE FOOT.

48. Grasp the rasp with the right hand, the left hand near the far end, left palm resting on the upper surface to act as a guide. Place the coarse side of the rasp against the ground surface of the wall on the right half of the foot, and with long, even strokes, smooth off the foot where it has been cut with the nippers. Then work on the buttress and bring it to the same level as the quarter and toe, removing such horn as may be necessary and no more. Beginners usually bear too strongly with the right hand and remove more with the hind part of the rasp than with the front part. Avoid this fault. Frequent tests should be made to avoid removing too much of the horn. For this purpose, take the foot in both hands and press with the thumbs near the white line; if the sole yields, ever so slightly, no more horn should be rasped away or lameness will result. Work carefully and slowly on the flat foot, which has a thinner sole than the cup-shaped foot.

For the left half of the foot reverse the hands on the rasp and proceed as above. This half will be found more difficult at first on account of the awkward position, and as a result the work will often be slighted. Experience with beginners shows that the right-handed man leaves the left half too high four times out of five.

To determine the level of the foot, the shoer raises the foot to a position for sighting over the bearing or ground surface; sight over each side separately, from the buttress to the toe, and note any irregularities which may appear in these two surfaces; now continue the plane of the quarter and heel on one side across or through the horny frog to the opposite side of the foot for the purpose of determining whether or not the two sides are in the same plane. This may be done with the eye by drawing an imaginary line, or by placing the smooth surface of the rasp on a level with the bearing surface of the foot, as indicated by the line *e-f*. To determine the level of this plane, draw an imaginary vertical line through the cleft of the frog, as shown

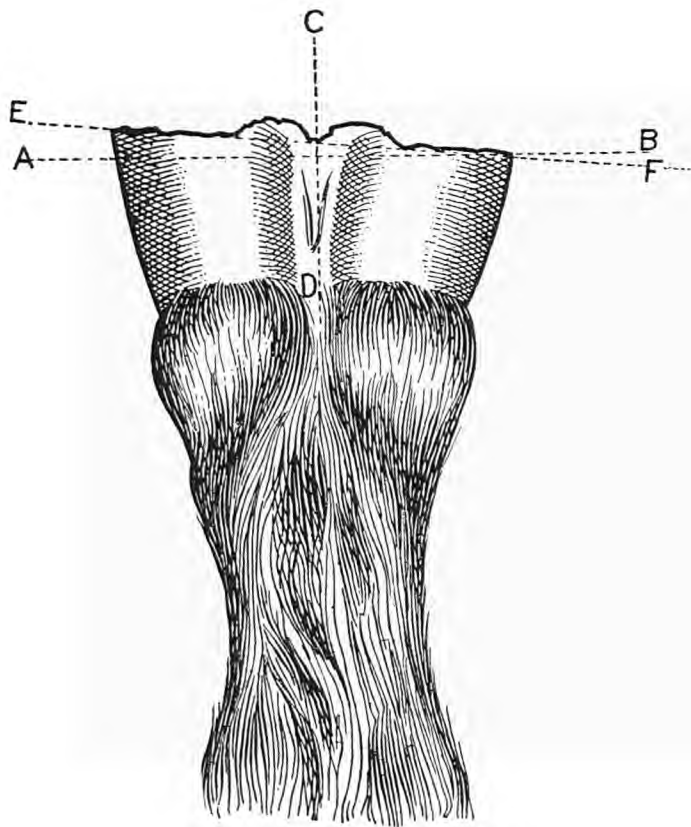
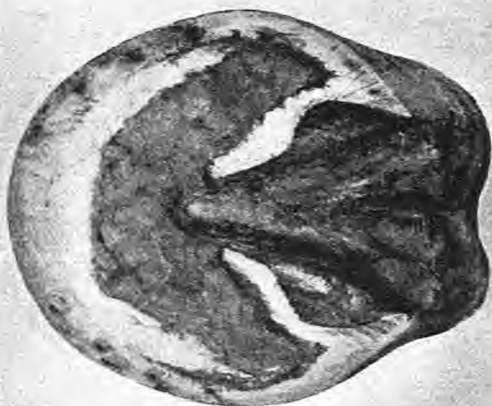


PLATE VIII.—LEVEL OF THE FOOT.



Δημόσια Κέντρα Επιστήμης - Πύλη Βέρροιας

(forming right angles) to the line $c-f$, the plane of the foot is level. Both sides may be in the same plane and the foot not level. In such a case the plane is canted. The line $c-f$ represents a canted plane, and it will be noted that it does not form right angles with the vertical line $c-d$. The true or level plane will be found at the line $a-b$, which line forms a perfect right angle with the line $c-d$. (Pl. VIII.)

49. Place the foot on the ground and examine it from all sides and note carefully the following: Does the foot stand at the prescribed angle: are the quarters equal in height: is the foot either broken out or broken in? If any of these conditions is not correct, the necessary changes should now be made.

Plate IX shows the appearance of a foot before and after preparation. This is the near forefoot of a field artillery wheel horse, and was selected on account of the clearly defined bars. It is to be observed that in leveling the bottom of this foot, it being a case of flat foot, the rasp trims off the sole inside of the proper weight-bearing surface. The shoe should *bear* upon the latter surface only.

THE SHOE.

50. When horses are in constant use it is necessary to prevent the too rapid wear of the hoof. The modern shoe, beyond all question, is the best means to accomplish this result, although it seriously interferes with the natural contraction and expansion of the foot. When shoes are left on the feet for too great a length of time, corns and other ailments result. Ordinarily a shoe should be renewed once a month. The heavier the shoe, the greater the labor of the horse. Hence, except in special cases, the lightest shoe that will last about four weeks is the best shoe. The shoe should carefully follow the form of the foot. If the foot is broken, the shoe follows the original shape of the foot. The upper and lower surfaces of the shoe should be wider at the toe than at the heels. At the toe the width should be about twice the thickness of the wall of the hoof at that point. The length of the shoe is regulated by the bulb of the frog, and the thickness of metal is made sufficient to wear

The ground surface of the shoe should be level and smooth. That portion of the upper surface which presses against the bearing surface of the foot must be level, smooth, and accurately shaped to support it, and when the upper shoe surface is wider than the bearing surface the inner edge must be *concaved to avoid excessive sole pressure*. This is one of the most important requisites of correct horseshoeing. Care must be taken only to concave enough to remove sole pressure. Do not leave too much space between the shoe and sole, for this allows small pebbles, grit, and dirt to collect, which allows sole pressure at small points, which is very harmful. Concussion of the sole against the inner edge of the upper shoe surface invariably produces soreness. The outer edge of the upper surface should be slightly rounded. This adds to the appearance, produces a better-fitting shoe, and to a marked degree prevents cutting if the horse travels close. The width of the crease of the shoe should be uniform, and its depth about two-thirds the thickness of the shoe. The crease makes the shoe lighter in proportion to its width and is an aid to prevent slipping. Nail holes should be punched to fall over the white line.

Clips are semicircular ears drawn upward from the outer edge of the shoe to prevent its slipping. A clip extends above the upper surface a distance equal to the thickness of the shoe, or sometimes farther on hind shoes. When leather is interposed between the shoe and the bearing surface, the clip must be correspondingly raised. Toe and side clips assist the nails in hold-

THE ARMY HORSESHOER.

NORMAL SHOES.

A normal shoe is meant a shoe for a sound foot with proper gaits. The service shoe (Pl. X, fig. 1) is a normal shoe.



1. The service shoe.
3. Plate.

2. Calked shoe.
4. Snow shoe.

PLATE X.—NORMAL SHOES.

The mounted service four sizes of machine-made shoe. It will be noted that the heels are much longer than ordinary, but they are manufactured in this manner.

the extra length can be used in turning heel calks or in making a bar shoe. It often happens that a larger size is required for the front than for the hind foot of the same horse.

Three other shoes belong to this class:

The *calked shoe* (fig. 2) is used to enable the horse to secure firm footing on slippery or ice-covered roads. Its use must be confined to actual necessities, for the calks raise the frog from the ground and prevent natural expansion and contraction. Permanent contraction of the heels, and even sidebones, result from the *constant* use of this shoe.

Sharpened calks, for use on ice, are even more to be avoided on account of injuries caused by interfering and by kicking.

The *plate* (fig. 3) is merely a light-weight shoe turned from bar steel.

The *snow shoe* (fig. 4) has a smooth, concave ground web, which, to a great extent, prevents the accumulation of snow and mud, and also gives firmer footing. The figure shows a shoe turned from the *issue shoe*.

THE SERVICE SHOE.

52. Selecting the shoe.—The foot having been prepared, leveled, and made ready for the shoe, estimate the size of the shoe required. To do this it is necessary for the beginner to place it on the foot and note the position of the nail holes, being careful not to take a shoe in which the last nail hole will be in the rear of the bend of the quarter. Take the lightest shoe of the desired size that may be available.

Now examine the pitehel, and if it is not of the proper shape point it. (*See Tools.*)

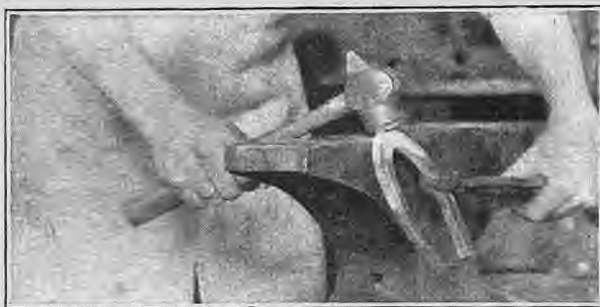
53. The successive steps in fitting the service shoe should always be taken up in the following order:

1. Draw the toe clip.
2. Make the necessary changes in the toe.
3. Open the nail holes.
4. Shape the quarters.
5. Cool and make the first trial for fit: at this time make the

Drawing in the cap. Having produced a heel of the desired size and having noted the general changes to be made in its shape, especially at the toe, place the toe of the shoe in the



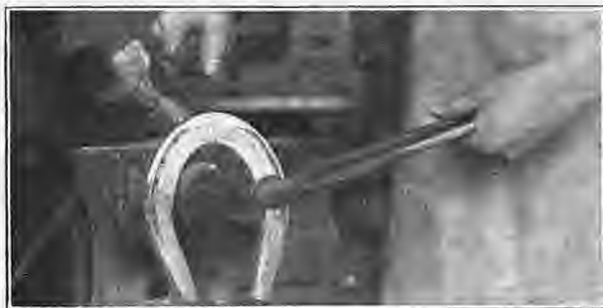
fire, ground web down. When the toe is white hot take the tongs in the left hand, seize the shoe near the heel on the side nearest you, remove it from the fire and place it on the face of the anvil ground web up, center of toe projecting over the anvil



about an eighth of an inch, heels held at an angle of about 30° . With smart strokes with the pein of the hammer drive down the center of the toe until a small shoulder appears underneath: place this shoulder against the far edge of the anvil. Holding

the shoe so that the heels form an angle of about 45° below face. Hold the right hand low and with strokes toward along the face of the anvil, using the back edge of the face of the hammer, draw out the toe clip, bringing the heels close to the anvil as the clip is drawn. Be careful that the clip is in the center of the shoe. The clip, when finished, should be a little higher than the thickness of the shoe.

54. Fitting.—The toe is then opened as may be necessary (par. 19), being careful not to injure the clip. To open the



of a large shoe where the horn of the anvil is too small for the usual method, hold the shoe as shown in paragraph 19, pull the quarter on the side opposite you firmly against the horn. Then strike on that quarter near the toe, bringing the hammer toward you and keeping up the pull on the tongs. The other side is opened in a similar manner after reversing the shoe. This method is frequently used in fitting the very thick shoes required for horses of siege-gun batteries, etc.

In the service shoes it will not be necessary to use the countersink for nail holes, because the crease is wide enough to take the nail head. Use the pritchel to open the hole as in paragraph 15, but pritchel the upper surface *first* in order to give the nail holes the proper slope and to remove the burr left on the machine-punched shoe, and the lower surface *last*, so that the hole will be finished in the shape of the countersink. For the first work the shoe may be placed anywhere on the face of the anvil, because the service shoe is thick enough

prevent any chance of spoiling the point of the pritchel; but for the last work the pritchel or hardy hole must be utilized, as previously explained. The toe clip generally makes it difficult or impossible to place the nail hole nearest the toe over the pritchel or hardy hole. For these nail holes shift the shoe to the nearest end of the face of the anvil and hold the nail hole slightly outside of the edge.

It will generally be found that the work up to this stage can be done with the heat remaining from that required for the toe clip. Beginners, however, may find it necessary to reheat the shoe in order to open the toe. In this case, place the shoe in the fire with the clip up, to avoid burning it.

Cool the shoe and apply it to the foot. In order to secure a neat fit at the toe it is necessary to make a seat for the clip, which otherwise will stand out its full thickness. Now is the time to prepare this seat. Place the shoe in position with the clip accurately centered and, using the knife, scratch a small mark on the edge of the wall at each end of the clip. Put the shoe aside and *carefully* whittle away the edge of the wall between the two marks. Work slowly and rest frequently by replacing the shoe, so that you will cut away just what is necessary and no more. (See Seedy toe, par. 85.)

Now make the first trial of the fit. If the toe is correct, note where either of the sides needs reshaping. The quarters will usually be found too full, and if so must be heated and shaped over the horn by the method explained in the plate shoe, except that the shoe is slightly turned so that blows will fall on the *edge* of the upper surface in order to avoid closing the crease.

The outline of the finished shoe must exactly follow the outer edge of the hoof to the last nail hole, and gradually widen from that point so that about an eighth of an inch of the upper surface will show at the heel. If, however, a foot is found to have a portion of the wall broken off when the animal is brought to the shop, the shoe must be fitted so as to follow the original outline of the wall. Fitting the shoe so that the nail holes will fall on the white line is a good guide for outline in the case of a bad break. If the toe has been broken, the shoe is fitted as just explained, but, of course, there are no nail holes to act as a guide. The toe clip is omitted and side clips are used if necessary.

The bearing surface of the shoe, upon which rest the wall, the white line, and not more than an eighth of an inch of the

sole, must be level, fit exactly to the hoof (without any air space), and extend back even with the bulb of the frog. The part of the upper surface inside of this bearing surface must be concaved (hammered down while the shoe is hot) in order to avoid *any possibility* of sole pressure which would produce lameness. At the heels there should be no concaving, but the sharp inside edge should be *slightly* rounded. (Par. 86.)

The width of the heels of all finished shoes must conform to the width of the buttress. In shoeing a foot with a very wide buttress it is often unnecessary to draw the heels at all, but in most cases they must be drawn as explained in the plate shoe. (Par. 12.) Remember that the bearing surface of the shoe *must cover the buttress* and you then have a guide for the width of the drawn heels.

In the issue shoe, the outer edge is beveled as far back as the end of the crease, but is square from that point to the end of the heels. In *finishing* the shoe, bevel the square part also.

THE CALKED SHOE.

55. The service shoe, as previously explained, is issued with heels sufficiently long to permit its conversion into a calked shoe.

To turn in a heel calk.—Heat the heel to a white heat. Remove the shoe from the fire with the tongs holding it near the toe; place the shoe at any convenient part of the face of the anvil with the ground surface down, a half to three-quarters of an inch of the heel projecting over the edge of the face. Strike on the part of the heel projecting over the edge and turn it at a right angle to the shoe. The height of the heel calk should correspond to that of the toe calk. The calk is squared by working on the *face* of the anvil; place one side on the face and strike on the upper side.

To weld on the toe calk.—The issue toe calk has a sharp nib or point on that surface which is applied to the ground surface of the shoe. Heat the toe of the shoe to a cherry red, and placing it on the face of the anvil with the ground surface up, hold the calk with the tongs across the toe and far enough back so as to allow for turning the toe clip. Strike a few light blows to drive the nib into the shoe until the calk and shoe are *nearly* touching.

Return the shoe to the fire, calk up, and tilt or rock the shoe forward and back to insure equal heating of both shoe and

obtained, place the shoe on the face of the anvil as before and strike a few light blows on the calk.

Reheat to the welding heat and place the calk on the face of the anvil. Strike a few heavier blows on the upper surface of the shoe directly over the calk.

Fitting.—The calked shoe is fitted in the same manner as the service shoe, with the exception that the heels are made a little longer and are slightly turned out from the end of the buttress in order to give a wider support to the foot and to thus prevent as far as possible the rocking of the shoe. For use on ice the calks are sharpened, but a horse so shod must never be turned loose with other horses.

NAIL DRIVING.

56. The nails issued in the mounted service are machine made, and the sizes in general use are Nos. 4, 5, 6, and 7. No. 4 nail is used for plate shoes; No. 5 nail for a No. 1 and 2 shoe; No. 6 nail for a No. 3 and 4 shoe; No. 7 nail for the large feet of some artillery horses.

One side of the shank of the nail is flat; the other side is concave and also has a bevel near the point. This bevel, as it enters into the horn, forces the point of the nail in the direction of the other side (flat side). Therefore always hold the nail with the *flat side toward the outside edge of the shoe*.

By driving nails into the wall of the foot some of the horn tubes are destroyed, and the higher the nails are driven the greater the injury to the wall. Nails should, therefore, come out at a height just sufficient to hold the shoe—not exceeding one inch—and in order to damage the wall as little as possible, both the size and the number of the nails should be as small as will accomplish this object.

The outside of the white line is the correct place to start the nails, and shoes should be fitted with this end in view. Nails thus started come out evenly on the wall, are low, and at a strong angle.

To the experienced shoer the feel and the sound of the nail and the amount of force required in driving are important guides.

The nail is held between the thumb and fingers to steady it in starting, and, if going properly, it imparts to the fingers a characteristic sensation called the "feel of the nail." A nail

driven into healthy horn gives off a distinct sound which the shoer soon learns to recognize. All nails going properly must be driven with considerable force. A nail driven with slight resistance, i. e., "going easy," is either in an old nail hole or *serious damage* is being done because the nail is entering the soft sensitive structures of the foot (pricking).

Nail heads must be sunk in the crease until they are flush with the ground surface of the shoe. If this is not done, the heads may project unevenly and throw the foot off the level. They will also wear quickly and cause a loose shoe.

SECURING THE SHOE.

57. The shoe is placed upon the bearing surface of the foot and held firmly in position with the left hand, back up. A nail is placed between the thumb and forefinger of the left hand, *the flat side faced outward*, and the thumb and the fingers are then extended along the right side of the shoe until the nail is held squarely in the center of the most convenient nail hole, usually the third (the third hole on the left side for a left-handed man); with a toe clip on the shoe the second nail hole is generally used. The nail head is tapped lightly with the driving hammer. The nail should be held firmly to determine the feel, and the thumb and forefinger should not be removed until the nail, going soundly, needs no further guidance. The shoe is then grasped more firmly and the nail is driven with slightly increased force. The fingers, placed on the wall of the foot, determine the exact location at which the nail emerges.

With the claw of the hammer the point of the nail is then bent upward until it stands at a right angle to the wall. Next, the head of the hammer is grasped in the hand and the claw is pushed firmly downward, clutching the nail point. A half turn downward and a slight pull wrings the point off close to the wall, leaving enough nail to form the clinch. In wringing off nails the hammer is held in the hand nearest the nail point.

As the first nail when driven may cause the shoe to shift, it is essential to place it exactly in the center of the nail hole. If the shoe has altered its position on the foot a pressure on the opposite side of the shoe by the palm of the hand and a few light blows of the hammer on the lower border of the wall where the first nail is driven will move the shoe back to

The second nail should be driven on the side opposite to the first nail. When these two nails have been driven the foot should be allowed to rest upon the floor, and the foot and shoe should be carefully examined from all sides. Is the position of the nails correct? Is the foot axis correct? Does the shoe fit properly? Is its length correct? Does the horse stand evenly upon the ground surface of the shoe? The shoer should not resume his task until he is satisfied in all particulars. If any irregularities exist this is the time for correction. When the shoe has been properly set drive the remaining nails, the fourth nails on either side being driven first. As each is driven *the point is promptly wrung off*. When all the nails have been driven the heads are forcibly hammered well into the crease, securing the shoe evenly upon the foot, being in length about the width of the nail at this point.



The clinching block is then placed under a nail point. When the driving hammer strikes the nail on the head the nail point is turned upward and the clinch is formed.

After all the clinches have been formed the foot is brought forward upon the knees. (See Pl. V, fig. 3, for front foot, and accompanying figure for hind foot.) With the rasp the clinches are made of equal length, and a *slight* groove is made in the wall under each clinch. With the clinching block held firmly under each nail head in turn, the clinch is bent down and hammered in with the driving hammer. It is well to clinch the inside of the foot first, then proceeding to each of the outer ones.

the rasp is run lightly over each clinch to take off the rough edges that would pick up bedding or other material. Much filing of the clinches weakens them and results in a cast shoe. When finished the clinch should be a trifle longer than the width of the nail at the point where it comes out of the wall.

The outside wall of the foot is *never rasped* (par. 46).

The toe clip should be hammered back against the wall of the toe after the inside has been clinched on the off feet and the outside on the near feet. In other words, hammer back the toe clip when the right arm is free.

After the shoeing has been completed the foot is again allowed to rest upon the ground, and again carefully examined from all sides.

When all four feet have been shod the animal is taken out and again examined on level ground at a walk, trot, and gallop.

Plate XI shows the near forefoot of a newly purchased Cavalry horse. The shoe, as may be seen, has been on for about three months, and the foot is broken back. The lack of symmetry at the heels shows that the shoe was probably not correctly fitted, and that it certainly was not in proper position when nailed on.

The shoer, having learned to fit normal shoes, is prepared to take up the study of shoeing to correct faults in gaits and shoeing as an aid in the treatment of diseased feet.

INSPECTION OF SHOEING.

58. The horses shod during the day should be ready for inspection at afternoon stables, or other convenient time, in the shop or stable, with their feet cleaned.

The horse should be examined on a level floor, as otherwise it is impossible to determine whether he is standing correctly or not.

The following examination should be made while the foot is



Λιουθήκη Βέρσιος

(d) *The nails*.—Are they evenly driven, the proper height and distance apart? Have any old nail stubs been left in the wall? (Pars. 56 and 57.)

(e) *The clinches*.—Are they of proper size? Are they well turned and set in? Are they smoothed off and not rasped sufficiently to weaken them? (Par. 57.)

The foot should then be raised and the examination continued in the following manner:

(a) *The shoe*.—Is it the proper size and weight? The last nail hole not farther back than the head of the quarter? (Par. 52.)

(b) *The preparation of the foot*.—Has enough horn been removed? Has too much been removed? (Par. 45.) Is the foot level? (Par. 48.)

(c) *Bearing surface of the foot*.—Does the shoe rest evenly on the wall, covering the buttress and showing no air spaces at any point? (Par. 54.)

(d) *Concaving of the shoe*.—Is the shoe properly concaved? No sole pressure at any point? (Par. 54.)

(e) *Use of the knife*.—Has the knife been used on the bars, sole, or frog? (Par. 45.)

(f) *The nails*.—Are they well seated in the crease? Are they the correct size? Are they all of the same size? (Pars. 56 and 57.)

(g) *The heels of the shoe*.—Are they the correct width and thickness, properly rounded, without sharp edges or points? Is their length even with the bulb of the frog? (Pars. 14 and 54.)

In cases where animals have been shod with calk shoes the following should also be noted:

(a) *The calk*.—Is it properly secured and of proper height and length?

(b) *Heel calks*.—Are they of the same height as the toe calks? Are they properly turned and finished?

After becoming accustomed to making the daily inspection, the time necessary should not exceed five minutes for each

FAULTS IN GAITS—SHOEING TO CORRECT SAME— THE MAKING OF SPECIAL SHOES FOR GAITS.

59. In shoeing horses for the purpose of confirming or altering gaits, it must be remembered that there are almost as many variations in gaits as there are horses, and that methods which are suitable in one case may be unsatisfactory in another. There are certain important principles which, properly applied, will be of material assistance in gaiting the majority of horses. Shoeing alone will not always accomplish the desired end, but it always helps. To shoe a horse so that he will be properly balanced and will travel squarely requires skill, patience, and careful use of special shoes. Where weight is used it is always best to start with a small amount of weight and gradually increase it until the desired result is accomplished; otherwise injuries may result from overtaxed, strained, or ruptured ligaments.

The hoeshoer must bear in mind that seldom will shoeing alone produce the desired gait or action, but that much depends on proper riding and on the physical condition of the horse.

In all cases of shoeing to prevent injury to a leg or foot by another, if, with careful riding, moderate correction methods in shoeing do not accomplish the desired results, shoe normally and use boots to protect parts liable to injury.

The use of boots or bandages will render blows of one foot against another foot or leg painless, give the horse confidence, and if the blows are mild, with the use of boots they will only slightly affect his gait.

60. The gaits in the Army are the walk, the trot, and the gallop.

THE WALK.

61. At the walk, the horse lifts one foot at a time, in diagonal sequence, as, left front foot followed by right hind foot, and plants them in the same order.

THE TROT.

62. The trot is a diagonal movement, in which two feet leave the ground and again strike the ground at the same time, as, the left front foot and the right hind foot. If the horse shows a tendency to single foot, the toe-weight shoe in front (Pl. XIII, fig. 2) is often of benefit. The toe weight increases the length of the stride and gives a long, reaching swing to the front feet. After the horse trots steadily the toe weight may be gradually decreased and finally abandoned.

THE GALLOP.

63. The gallop is a gait in which the horse springs into the air from one front foot and has all four feet off the ground at once. The diagonal hind foot is the first to strike the ground, then the other hind foot, next the front foot opposite the one from which the spring was made, and last the foot used for the spring.

Animals that are so frequently used at the gallop as Army horses should carry as light a shoe as practicable.

THE PACE.

64. The pace is a lateral movement: that is to say, a movement in which two feet on the same side leave and strike the ground at the same time. If a horse shows a tendency to pace, it is often of benefit to shoe the front feet with a medium-weight shoe, well rolled at the toe, or a roller-motion shoe. (Pl. XII, fig. 3.) A confirmed pacer can very rarely be converted to the trot by shoeing alone, it being generally necessary to use hobbles, uniting diagonally a front leg and a hind leg. The pacer should have no place in the service, but, if present, should be shod with a normal shoe.

THE SINGLE-FOOT.

65. The single-foot is an irregular gait, in which the front feet move in the order of a slow trot and the hind feet at a fast walk. Each foot strikes the ground singly. The action of the front feet is high, and there is a lateral swing to the hind feet.

To convert a single-footer into a trotter, use heavy toe-weight shoes in front and ride the horse with a loose rein and an easy bit up a gentle slope. Just as the horse increases the gait from the walk, the rider should seize one of his ears. It is found in practice that this plan distracts his attention and allows the weighted shoes to produce the effect intended. Whenever the horse returns to the single-foot, he should be brought down to the walk and started again with the grasp on the ear. This method may sometimes be found of use, but, like the pacer, the single-foot horse should have no place in the service.

66. When a horse has been shod to improve his gait, he should be ridden with the snaffle bit, which admits of greater freedom of movement. The reins should be held with a light hand, and the horse should be forced up against the bit by the use of the legs.

CORRECTING FAULTY ACTION.

67. It is a well-established rule in shoeing that, in order to correct faults in gaits, the shoer should proceed gradually from one extreme to the other.

FORGING.

68. Forging, or clicking, is a fault in gait at the trot, the toe of the hind foot overtaking and striking the bottom of the fore foot.

Causes.—Faulty conformation; horses with short bodies and relatively long legs; horses with the front or hind feet set too far under the body. Leg weariness, a condition caused by debility or overexertion. Improper preparation or shoeing that tends to slow the action of the front feet, as feet with toe too long or heels too low; shoes too long or too heavy. Preparation or shoeing that tends to increase the action of the hind feet, as feet with toes too short or heels too high; shoes with heel calks and no toe calk. Rough ground and poor horsemanship; the reins held too loosely, the horse not being kept up to the bit.

Remedies.—To correct this defect by shoeing, the object of the shoer is to quicken the action of the front feet and to slow the action of the hind feet.

Three methods for the correction of forging are given. The first method is a mild corrective treatment, while the third is adopted only as a last resort.

First or mild method.—For the front feet, lower the toes and leave the heels a trifle high. The heels of the hind feet should be lowered and the toes left a trifle long. The front shoes should be light in weight; the heels of the shoe fitted short so as to just cover the buttress; the toe of the shoe rolled to its full extent (Pl. XII, fig. 5), to increase the rapidity with which the foot breaks over. The hind shoes should be a trifle heavier than the front shoes, and the heels left a trifle long. In order to prevent the noise made by the striking of shoe on shoe, should the feet occasionally meet in action, the hind shoe should be squared at the toe and fitted so that about three-quarters of the wall at the toe projects over the shoe.

Second or medium method.—Normal preparation of the feet. Use a fairly heavy toe-weight shoe (Pl. XIII, fig. 2) in front and heavy side-weight shoes (Pl. XIII, fig. 1) on the hind feet, the weight and trailer being on the outside. The effect of the toe weight is to increase the forward extension of the feet with low action; the side weight and trailer on the hind feet induce an outward swing of the foot and leg, thus giving the front feet more time for breaking over and getting out of the way.

Third or extreme method.—Prepare the feet as explained for the first method. The front shoe (Pl. XII, fig. 2) should be light in weight, fitted short at the heels, and with short-beel calks inclined well to the front; toe of the shoe thoroughly rolled. The hind shoe (Pl. XII, fig. 1) should be heavy in weight, with a small toe calk set well back from the front edge of the shoe; toe of the shoe squared; heels long and side clips between the first and second nail holes.

The calks on the front shoe raise the heels, thus diminishing the distance which they must be lifted by the flexor tendons, and consequently cause more rapid breaking over. The toe calk on the hind shoe raises the toe, thus increasing the distance the heels must be lifted by the flexor tendons, and consequently delays the breaking over of the foot. The long heels also increase the labor of the tendons by their extra weight. By using this method the feet are thrown so far out of their natural position that the ligaments and tendons are apt to be seriously affected in time by the heavy strain placed upon them.

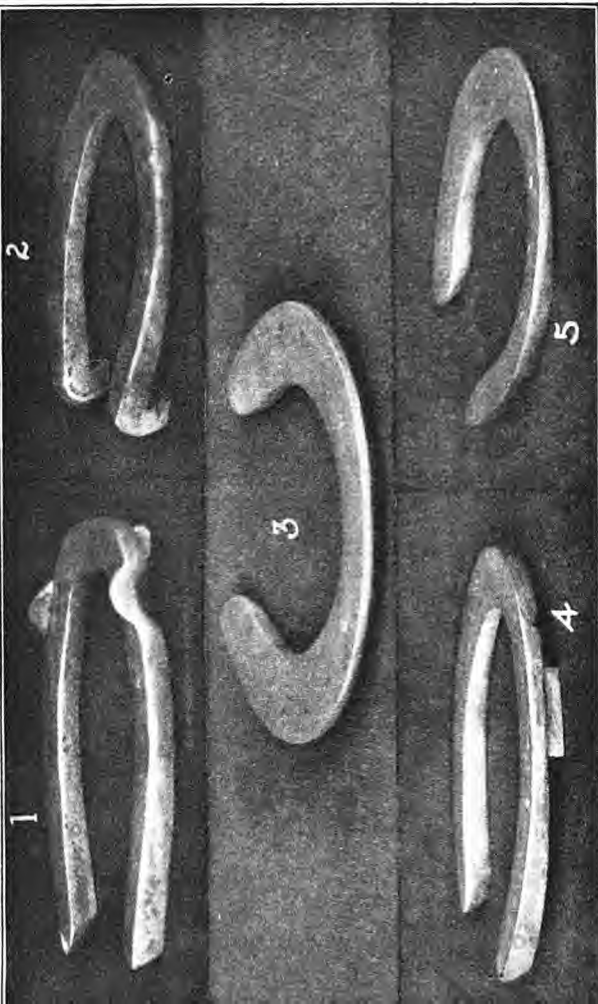


PLATE XII.—SPECIAL SHOES FOR CORRECTION OF FAULTS IN GAITS.

69. The horse stumbles in breaking over, or just after breaking over, as a result of not raising and carrying a foot high enough to clear the ground. Horses stumble more frequently with the front than with the hind feet.

Causes.—Poor conformation; horses with light fore quarters and heavy hind quarters. Weakness; During convalescence from severe sickness or as the result of a strain of a leg muscle. Fatigue; Induced by long marches or by drawing or carrying heavy loads. Improper preparation; Toe left too long. Improper shoeing; Shoes too heavy or fitted too full at the toe. Laziness, particularly when going down hill, rough ground, and poor horsemanship.

Remedies.—The bearing surface of the foot must be leveled, the toe shortened, the shoe made light in weight and thoroughly rolled at the toe, and the thickness of the heels of the shoe slightly increased. This shoe induces more rapid breaking over. The full roller-motion shoe (Pl. XII, fig. 3) is frequently of value in the prevention of stumbling, because it not only causes a rapid breaking over of the feet but produces higher action.

In cases of stumbling where calks are necessary to prevent slipping, use heel calks and short quarter calks welded on web of shoe between first and second nail holes.

INTERFERING.

70. A horse interferes (strikes) when he is in motion by striking any part of a limb with the opposite corresponding foot. Since this fault leaves evidence by rubbing off the hair and even breaking the skin, it is an easy matter to determine whether one or both feet need correction.

Causes.—Poor conformation; fatigue; faulty or neglected shoeing.

Horses with good conformation and straight, upright limbs will not interfere if properly shod. Those that toe out generally strike, because the clearance space between the limbs is reduced, while those that toe in usually travel wide. Straight-limbed horses with narrow chests also have a tendency to interfere. In order to correct interfering, the shoer should study carefully the shoeing, the conformation, and the gait of the horse. The first step is to determine the exact part of the hoof that strikes.

This may be readily learned by chalking the inside of the wall and trotting the animal slowly. The chalk will be rubbed off from the exact point of contact with the opposite leg.

Inspect the shoeing for projecting clutches or ragged edges of the hoof, due to neglect. If the shoeing is of recent date, note if the shoe is too full. Then inspect the foot and see if the inside is too low or the outside is too high (broken in). This fault bends the leg inward at the fetlock joint, starts the foot on a curve instead of a straight path, and thus lessens the clearance space between the legs.

Remedies.—If the fault is in the shoeing, or in the preparation of the foot, the remedy in either case is apparent. If the horse continues to interfere after the bearing surface has been leveled and the foot properly shod, different careful experiments must be made, because tests show that there is no fixed rule. A shoe that will be of benefit in one case may be just the reverse in another.

In general, prepare and shoe the foot in such a way that the breaking over will be at the center of the toe. As much, if not more, is accomplished by skillful preparation of the feet than by the use of extraordinary shoes.

If the foot breaks over on the inside of the toe an angular extension (about $\frac{1}{2}$ inch; see Pl. XIV) on the inside toe will be beneficial. When the shoe is in place, the part projecting beyond the wall should not exceed that outside the white line on shoe in plate. The extension is made by thinning and widening the web of the shoe at the desired point. Fit the shoe close on outside from center of toe to quarter, and roll outside toe with the rasp, full on the inside from toe to second nail hole, and close from there back, sharp edges on the inside being not rasped to avoid cutting.

Ordinarily the lightest part of the foot, especially of the front foot, is lifted first. For this reason a side weight (Pl. XIII, fig. 3) on the inside of the fore foot will often aid in correcting interfering. As previously stated, this will not always produce the desired result. On account of differences in pastern action, the result may even be obtained by just the opposite—the weight on the outside.

The foot may be prepared with the inside high (broken out) in order to cause the foot to break over outside the toe and to increase the clearance space.

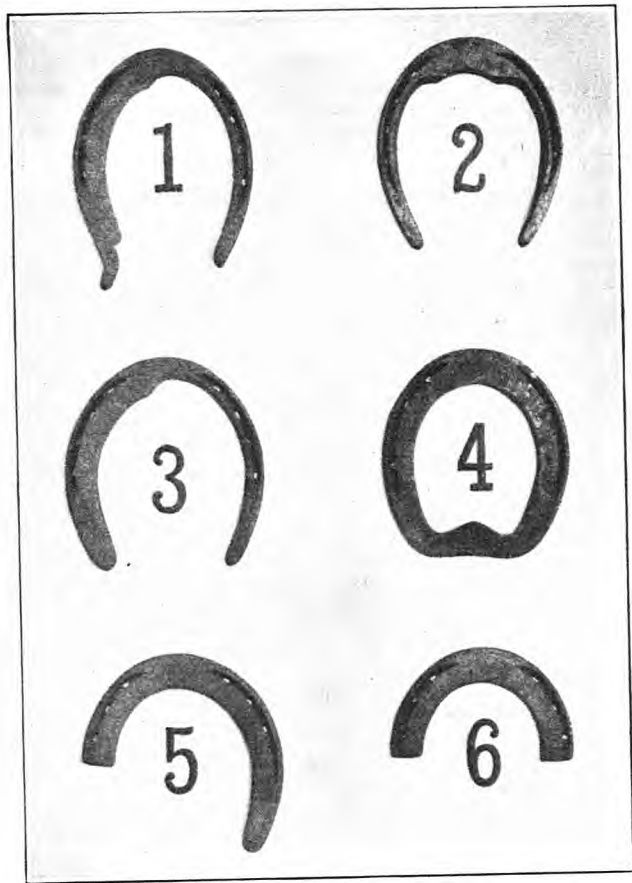


PLATE XIII.—WEIGHTED SHOES.

1. Side weight (outside hind). 2. Toe weight.
3. Side weight (inside front).

PATHOLOGICAL SHOES.

4. Bar shoe. 5. Three-quarter. 6. Tip.

Δημόσια Κεντρική Βιβλιοθήκη Βέροιας



Δημόσια Κεντρική Βιβλιοθήκη Βέροιας

A small side calk may be placed on the inside of the inner half of the shoe immediately under the part of the hoof that strikes. The calk should conform to the curve of the shoe. (Pl. XII, fig. 4.) The heel of the shoe should be thickened to correspond to the height of the calk.

It must be understood that improper preparation of the foot and the use of a side calk are extreme measures. They throw the foot into an unnatural and strained position, and therefore should not be used unless this discomfort is to be preferred to severe cutting of the legs. As the fault of interfering disappears a return to normal conditions must be accomplished.

If the hind feet strike, the bearing surfaces should be leveled or corrected as in the case of the front feet. A side weight on the outside of the shoe (Pl. XIII, fig. 1) swings the foot outward sufficiently to correct the defect in ordinary cases.

THE MAKING OF SPECIAL SHOES FOR GAIT.

71. THE ROLLER-MOTION SHOE.—The full roller-motion shoe can be made from heavy bar steel only, and as this is usually not obtainable at Army posts the shoe is seldom used. It is made in the same manner as the plate shoe and the ground surface is then rounded with the hammer from the last nail hole on one side to the last nail hole on the other; the outside edge is made very thin and the inside edge is left unchanged. The shoe is then finished with the rasp.

The service shoe, on account of the crease, can be rounded only at the toe. The rounded toe, however, will generally be found to accomplish the result desired.

72. THE FRONT FORGING SHOE.—The heel calks of this shoe are turned as explained for the calked shoe (par. 55) and then bent well forward. Hold the shoe on the face of the anvil, the tongs grasping it at the toe, the ground surface up. Strike directly on the calk, bringing the hammer toward the toe. After bending the calk forward, be careful to level its ground surface so that it will rest evenly when the shoe is placed on a flat surface.

The toe is rolled as explained for the roller-motion shoe. (Par. 71.)

THE HIND FORGING SHOE.—This shoe is fitted in the same manner as the normal shoe, with the following exceptions: The toe is squared and the heels are cut off so as to be longer than

in the normal shoe; the toe clip is omitted and two side clips are drawn.

73. THE TOE-WEIGHT SHOE.—This shoe is made from the issue front shoe. Heat the shoe to a white heat and with the hammer and a cold chisel cut a line on each half of the ground surface of the shoe halfway between the crease and the inside edge. Each line extends from the heel to a point between the first and second nail holes, thence is carried obliquely to the inside edge. Begin the work of cutting, however, near the toe; never at the heels. The cut should begin obliquely because a right-angled cut weakens the shoe at this place and causes it to break after much wear.

Reheat and cut until the part inside of the lines is entirely removed. The rough edges are finished with the rasp, and the shoe is fitted in the same manner as a normal shoe.

The cold chisel is tempered as explained for the hardy. (See Tools.)

74. THE SIDE-WEIGHT SHOE.—This shoe is made from the issue front shoe. The process is the same as in the toe-weight shoe, except that the weight is removed from one-half only and that the cut begins at the center of the toe.

In the front shoe the heels are of normal length and finished as in the service shoe.

The weight may be on the inside or outside of a front shoe. No fixed rule can be laid down as to which should be used; the conformation of the horse will decide.

The weight in the hind shoe, however, is always placed on the outside, and extends back toward the buttress as far as possible without covering the frog. The outside heel is drawn about three-quarters of an inch longer than the inside heel, and *from the end of the buttress* is turned outward.

This extension is called a trailer and serves to increase the rotary motion given by the weight.

75. The making of a three-quarter shoe needs no special description. It is simply a plate or service shoe with one heel cut off at any desired point by the use of the hardy.

CHAPTER VII.

DISEASES OF THE FOOT—CAUSES, SYMPTOMS, TREATMENT—PATHOLOGICAL SHOEING—THE MAKING OF PATHOLOGICAL SHOES.

76. Information in this chapter is for the guidance of the Army horseshoer in his capacity as an assistant to his regimental veterinarian. No treatment herein prescribed should be attempted except when directed by the veterinarian or organization commander.

77. *Pathological shoeing* is shoeing for the relief of diseased feet. The bar shoe (Pl. XIII, fig. 4) is most commonly used because it produces frog pressure, which increases blood circulation and thus assists nature's method of building up diseased tissue. *Removing pressure* means trimming the bearing surface of the foot in such a way that the shoe can not cause pressure upon diseased parts. (Pl. XV.)

CORNS.

A corn is the result of bruising the sensitive sole or sensitive laminae of the quarters or bars, and appears as a reddish spot in the angle formed by the wall and the bar, usually on the inside of the front feet, seldom if ever in the hind feet.

Causes.—A rapid gait on hard roads; lowering one quarter more than the other; shoes so fitted that they press on the sole at the heel, and shoes left on so long that the wall overgrows the heels of the shoe and causes the shoe to press on the sole; long feet, which remove the frog too far from the ground, thus preventing the proper expansion of the foot.

Treatment.—Remove the shoe and correct any faults that may have existed in the preparation of the foot. If no pus or heat is apparent, carefully cut away the discolored part until live, healthy horn is reached.

and the foot placed in a hot flaxseed poultice for several days. The poultice is changed when it becomes cold, and the parts are washed out with a solution of creoline—creoline, 1 part; water, 25 parts. When all suppuration has stopped, plug the corn with oakum and tar, and reshoe, exercising special care in the fitting of the diseased quarter to avoid pressure. A bar shoe should be used when the corn is accompanied by contracted heels, except in cases where the lateral cartilages are diseased. The bar shoe is also useful in retaining large plugs.

The three-quarter shoe may also be used for the purpose of avoiding pressure over the diseased parts.

THRUSH.

78. Thrush is a diseased condition of the frog, characterized by a dark-colored discharge which has an offensive odor.

Causes.—Uncleanliness; horses standing in stalls saturated with urine, or in wet earth filled with decomposing vegetable matter.

Symptoms.—At first there is simply an increased moisture in the cleft of the frog, accompanied by an offensive smell. After a time the discharge is more profuse, then watery and

Causes.—Canker is generally believed to be caused by a vegetable parasite, the development of which is assisted by filthy stables or low wet ground.

Treatment.—That part of the frog or sole that has been under-run must be removed with the knife, and the canker exposed; the unhealthy growth is then touched with a red-hot iron, burning it off level with the surrounding healthy structures, care being exercised not to injure the sensitive portions of the foot. Next, wash clean, then dry, and apply the following powder: Equal parts of sulphate of zinc, sulphate of iron, and sulphate of copper. Place over this a pad of oakum, and over all a leather boot. This dressing must be changed once a day—twice a day in bad cases; treatment is continued until a healthy growth of horn covers the whole foot. The horse can now be shod. Pack the foot with oakum and tar, and cover with a leather sole, which is held in place by the shoe.

If it is desirable to change dressings on the shod foot, a more convenient appliance to keep them in place is made in the following manner: Cut a piece of sheet zinc to cover about two-thirds of the sole and frog, the outer edge of the piece fitting under the shoe; cut another piece to cover the remaining third, and wide enough to lap over the first piece, the lap to run parallel to the cleft of the frog; then cut a strip about 1 inch wide to act as a keeper; the ends of this strip are pressed under the shoe, the strip passing across the foot from quarter to quarter.

QUITTOR.

80. A quittor is a running sore, situated on the coronet of the foot, with one or more tubes (sinuses) leading in a downward direction and discharging pus.

Causes.—Pricks in shoeing; punctures of the sole and frog; bruises, or suppurating corns.

Symptoms.—A swelling on the coronet, presenting a peculiarly unhealthy appearance, and in the center of which are one or more sinuses communicating with the diseased structures inside of the foot. In nearly all cases the horse is very lame.

Treatment.—Find out, if possible, what has caused the quittor. If it is the result of a nail prick or a festered corn, open it up on the underside of the foot, allow the pus to run out, and then treat as directed in paragraph 77. If no nail prick or corn can be found, treat the quittor from above, by injecting

Take the mass of the following ingredients: Carbolic acid 1 part, water 20 parts; creoline 1 part, water 25 parts; bichloride of mercury 1 part, water 500 parts. This treatment should be continued for several days, at the end of which period, if the parts do not appear in a healthier condition, inject into the tubes 1 dram of bichloride of mercury well shaken up in 1 ounce of water. This will cause a separation of the diseased walls of the tube from the healthy parts of the foot. Poultices of flaxseed meal assist this separation. Keep the parts clean, and wash out with carbolic acid or creoline as at first. If the sore does not heal under this treatment, a surgical operation by the veterinarian will be necessary.

SIDEBONES.

SI. Sidebone is an ossification (turning into bone) of the lateral cartilage, frequently resulting from improper leveling of the foot. Horses with flat feet and weak quarters are predisposed to this disease.

Symptoms.—A hard, unyielding condition of the lateral cartilage, with or without lameness.

Treatment.—If the horse is lame, the first step is to remove the shoe and level the foot; then let the horse stand in a tub of cold water for several hours a day, or apply around the coronet swabs kept wet with cold water. As soon as the fever has disappeared clip off the hair over the sidebones and blister with this ointment: Biniodide of mercury 1 part, cosmoline 5 parts; mix thoroughly and rub in well. Tie up the horse's head so that he can not reach the blistered parts with his lips and keep him in this position for 24 to 48 hours. Then wash off the blister, using warm water and caustic soap. The washing must be repeated every day until all the scabs formed by the blister have been removed. During this time keep the horse standing quietly in a clean and level stall. If after 10 days he has not improved, firing, followed by a long period of rest, may prove beneficial.

In shoeing a horse afflicted with sidebones level the foot carefully. If the foot is affected on one side only, the affected side is liable to be contracted, because proper expansion has been prevented on that side. In this case the web of the shoe should be widened sufficiently to extend out to where the normal foot would be. A plain shoe with a rolled toe is recommended. Frog pressure produces soreness and must be carefully avoided.

QUARTER CRACKS AND TOE CRACKS

82. A toe or quarter crack is a split in the horn of the wall; the position of the crack determines the name applied to it. Horses with thin, weak quarters are predisposed to quarter crack.

Causes.—Excessive dryness of the hoof, heavy shoes, large nails, and nails set too far back toward the heels.

Symptoms.—The crack generally starts at the coronary band and gradually extends downward to the lower border of the wall. The most common form of quarter crack is a deep fissure extending through the wall and causing a pinching of the sensitive structures. When, however, the crack is not deep, there is seldom any lameness.

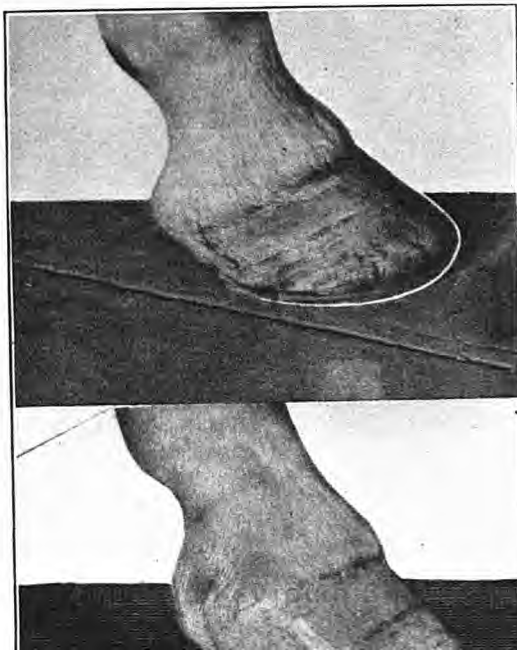
Treatment.—The first step is to remove the shoe and soften the horn by poultices or by standing in water for a few days. Then cut away the hard overlapping edges of the fissure and thin the wall on each side so that there will be no friction between the edges of the crack. As the wall grows down from the coronet, the upper end of the crack must be carefully observed to see that the new horn grows down strong and smooth. In time the crack will disappear at the lower edge of the wall. If the sensitive laminae have been exposed by this operation, the parts should be washed with a solution of creoline, 1 to 50, and the wound should be dusted with acetanillid and covered with a pad of oakum held in place by a boot or bandage. In a few days a thin layer of horn will be thrown out, covering the sensitive laminae. The horse can then generally be put to work.

After a quarter crack has been trimmed out the horse should be shod with a bar shoe, the wall beneath the quarter being cut away so that it will not come in contact with the shoe. (Pl. XV.)

In case of toe crack the operation is the same. In shoeing, the wall is cut away at the toe to prevent pressure. A bar shoe, rolled at the toe and with a clip on each side of the crack, is recommended. The bar shoe serves two purposes:

1. Ordinarily it is not possible to drive the proper number of nails on the side of the affected quarter, but the bar keeps the shoe in place on account of the firm nailing on the other side.

2. The bar gives frog pressure and expansion, which are desirable because quarter cracks usually result from a weak and drawn-in quarter.



PUNCTURE OF THE SOLE AND FROG—PRICKS IN SHOEING.

83. A puncture of the sole or frog is usually caused by a horse stepping on a nail, a piece of broken glass, or other sharp object. If the wound enters the soft structures of the foot, it results in lameness and the formation of pus.

Pricks in shoeing are of two kinds: First, when the nail is driven into the sensitive structures; and, second, when it is driven too close to these structures, causing a bulging of the inner layer of horn, which is forced in upon the sensitive laminae. In the first case, the horse goes lame immediately; in the second case, lameness may not appear for several days or weeks.

To detect a nail prick, remove the shoe, examining each nail as it is withdrawn for traces of moisture. Then use the hoof tester. When the sore spot is pressed the horse will flinch.

Treatment.—Open the wound and let out any pus that may have formed. Wash out with a solution of creoline, 1 to 25, or of carbolic acid, 1 to 20. Unless the pus has a good outlet it will burrow into the surrounding tissues, and quittor or canker may follow. Moreover, there is always danger of lockjaw (tetanus) in all cases of punctured wounds, especially in the feet. The germ of this disease is present in nearly all soils, and is very liable to be carried into the wound by the nail or other object. After the wound has been opened up and washed out, the foot should be placed in a hot flaxseed poultice, a fresh one being applied three or four times a day, and the parts washed out after each poultice, as in the first instance. The treatment should be continued until inflammation is reduced and the formation of pus has ceased. The hole can then be plugged with oakum and tar, the shoe reset, and the horse put to work.

FOUNDER OR LAMINITIS.

84. Laminitis is an inflammation of the sensitive laminae (generally of the front feet) and may involve the adjoining structures. There are two forms of the disease, acute and chronic.

Ordinarily, in a case of inflammation, the blood vessels become enlarged and a surface swelling appears; but when the sensitive laminae are inflamed, the local veins, confined between the horny wall and the coffin bone, have no room to expand; in consequence the pain of acute laminitis is very sharp and

Causes.—The most common are concussion, overexertion, exhaustion, drinking cold water when the animal is heated, over-eating, and the eating of various improper foods, such as musty grain, hay, etc.

Symptoms.—In laminitis of both front feet the animal is excessively lame, moves with great difficulty, especially when starting, and appears as if the entire body were in a state of cramp; he stands with the hind legs drawn under the belly and the forefeet advanced, in order to relieve the painful feet of as much weight as possible. Occasionally he may be seen to sway backward, raising the toes and throwing the weight for a moment upon the heels of the front feet, and then resuming the original position. If compelled to move, he raises the feet laboriously, not because the muscles are sore, as is sometimes supposed, but because if all four feet are not on the ground at the same time to bear the weight of the body his suffering is increased. He will often groan with pain, and sweat will break out over the body. To diagnose a case quickly the best method is to push the horse backward, when, if affected, he will elevate the toes and throw his weight upon the heels.

In some instances the animal will lie down upon his side, with legs stretched out, for hours at a time, evidently feeling great relief in this position; in other cases, particularly during the early period of the disease, he will stand persistently.

Treatment.—Remove the shoes from the affected feet; stand the horse in hot water for several hours each day, or what is equally good and perhaps safer, apply hot flaxseed poultices, changing them every hour as they become cold. After two or three days of this treatment change to cold water, which can be applied either in the form of a footbath or by standing the animal in a running stream for five or six hours at a time. As soon as the pain has diminished moderate exercise is beneficial. This may be gradually increased until the animal shows no further sign of trouble. If after five or six days pronounced symptoms of recovery are not apparent, apply a stiff blister of cantharides around the coronet, repeating the blister if necessary. In addition to the local treatment nitrate of potash (saltpeter), in doses of 2 to 4 ounces, may be given three times a day. If the horse is constipated give 1 quart of raw linseed oil.

Chronic laminitis is permanent laminitis resulting from one or more attacks of the acute form of the disease. In the chronic form there is always inflammation, sometimes more, sometimes less, but never as severe as in the acute form. This varying inflammation affects the adjoining sensitive structures and interferes with their continuous regular secretions. The coronary band becomes affected and consequently the growth of horn is not steady. This is shown by the growth rings on the outer surface of the wall.

The interruption of the natural secretions of the sensitive lamina results in irregular growth of the horny laminae. In bad cases there is a rapid (false) growth near the toe that has not the ordinary amount of vitality and seedy toe frequently results. This extra false growth also forces the coffin bone back from its proper station, and as the dovetail attachment is not as strong as in natural growth the weight of the animal forces the coffin bone down upon the sensitive sole, causing the ailment known as *drop sole*. In very bad cases, the bone actually pierces the sole and the animal is, of course, absolutely useless.

In a case of chronic laminitis, pay special care to the concaving and use a bar shoe rolled both at the toe and at the heel; this is a modified form of the *rocker-motion* shoe. This shoe produces a uniformly smooth breaking over, without much jar.

SEEDY TOE.

85. Seedy toe is a menly condition of the inner wall of the hoof, the white line, and sometimes the sole. It is most frequently seen in the front feet.

Causes.—Undue pressure, heavy, *deep-seated* clips on shoes, deep hoof branding, or the result of chronic laminitis.

Treatment.—Pare the wall of the cavity until healthy horn is reached, and pack with tar and oakum. Stimulate healthy growth of horn by the application of cantharides blister at the coronet.

Use a bar shoe, well rolled at the toe; no nails should be driven in the diseased part, but, instead, side clips should be used, care being exercised that they bear only on the healthy horn.

CONTRACTED FEET.

86. Contracted feet is an unnatural shrinking or narrowing

Causes.—Lack of exercise; lack of moisture; thrush; the continued use of heel calks. As previously explained, only the sharp inside edge of the upper surface of a shoe should be rounded *at the heels*. The beginner is apt to hammer this surface until it is inclined inward and downward. As a result, when weight is brought upon the foot, the heels are unable to spread against this slope, and become contracted. The practice of using the knife to trim the bars, or to cut a notch at the junction of the frog and bar at the heel (called "opening the heels" in civilian shops) always produces this trouble.

Treatment.—Ascertain the cause and remove it if possible. The remedy is to get pressure on the frog. If the feet are extremely dry and hard, they may be softened by standing the animal in moist clay or in water. If the animal is to be used on soft ground, let him go barefoot, or shoe with the tip (Pl. XIII, fig. 6); otherwise use the bar shoe.

Good results are sometimes obtained by using a shoe which just reverses the fault mentioned above as causing contracted heels. If the upper surface of the shoes at the heels is beveled outward and downward, it is difficult for the foot to contract against this slope, and it is gradually forced back to normal shape. This shoe must be made with the greatest care and results must be watched daily: carelessly made, or carelessly used, it is apt to produce corns.

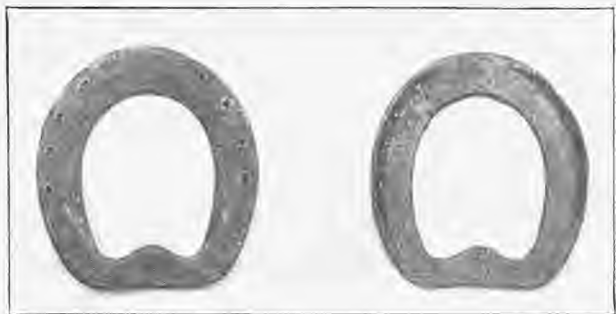
DRY FEET.

87. Dry feet frequently result from rasping the periople. Soften the hoofs by soaking in water and then apply cosmoline or linseed oil, which will retain the moisture as the normal periople should do. This should be applied daily for a week or two. A thick paste of ground flaxseed and water packed into the cavity of the foot between the branches of the shoe or a packing of moist clay will keep the foot soft. Such packings will generally remain in place overnight.

In this chapter have been treated the common foot ailments of the Army horse. Pathological shoeing for drop sole resulting from laminitis, for bowed tendons, and for other troubles that can not be permanently cured has been omitted from this text-book. The Army horse must be ready for hard service. When his feet are incurably bad he should not be nursed, but should be placed on the inspection report.

88. This shoe, as previously stated, is more frequently required in Army shoeing than any other special shoe. It is made from the issue shoe, and the general fit and shape when finished are the same with the exception of the bar across the frog.

Select an issue shoe that is a size larger than the one which would ordinarily be used, and preferably a front shoe. A larger shoe in order that the heels shall be long enough to admit of turning the bar and a front shoe on account of its width of stock.

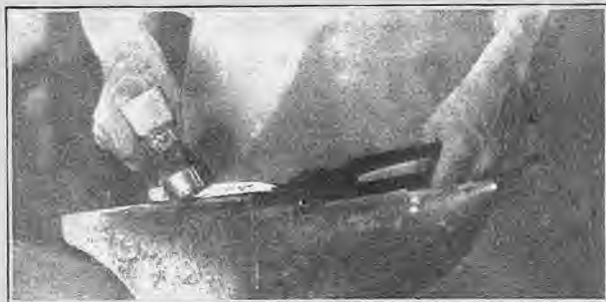


It is advisable for the beginner to fit the shoe to the outline of the foot before turning the heels for preparing the bar. The shoe is more easily fitted before welding the bar and the shoer can estimate the amount of stock required for making the bar.

89. To prepare the heels of the shoe before turning in the bar.

(a) **Scarfing.**—This is accomplished by holding the shoe on the face of the anvil (either surface on the face) and striking on the upper edge of the extremity of the heel, the hammer at an angle of about 45° with the plane of the upper surface. This will result in a bevel between the upper and lower surfaces of the heel about a half inch in length. Scarf the other heel the same way, except that the scarf is made on the opposite surface.

(8) Pointing the horn. To make a smooth horn is done by holding each heel in turn so that it will rest at an angle upon the face of the anvil near the heel, and striking on



the upper edge at the end. This is the same position and accomplishes the same result as pointing the heels of the plate and service shoes after drawing (par. 13).

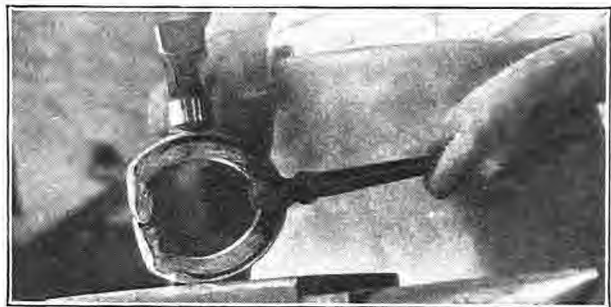
90. To turn in the bar.—Hold the shoe with the tongs at or above the toe; place the inside edge of the heel to be turned, on



the point of the horn, the quarter nearly horizontal, with 1 inch or an inch and a half projecting over the horn, depending upon



The length of the bend should be a little more than one-half the length of the finished bar, as the ends must overlap for welding. Turn the other heel in the same manner.



91. To prepare the bar for welding.—Close the shoe bodily until the scarfed points overlap and then hammer the points down until they fit closely, leaving no space for coal dust to accumulate.

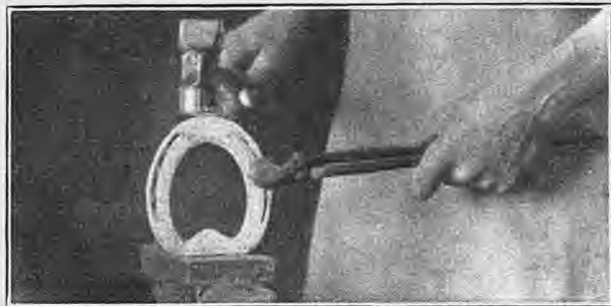
welding heat (*see* Heats), tilting or rocking the shoe forward and back to insure an equal heat on both sides. When the proper heat has been obtained (fluxing), place the bar on the face of the anvil and strike a few light blows on one point, then reverse the shoe and strike on the opposite point. This will bind the points together.



Reheat the bar to the welding heat and, taking the same position, complete the weld by heavier blows, reversing the shoe so that both sides will be flattened. After the weld is completed the bar is shaped by holding one corner on the point of the anvil and striking on the center of the bar and then reversing. This will set the center of the bar forward, give it the correct shape at the heels, and prepare it for beveling. The front half of the upper surface of the bar must be hammered down (beveled) to the point, thus forming a cradle for the frog.

93. Fitting.—The bar shoe is fitted as is the service shoe, and the same heats are used. A little more allowance, however, is made for expansion on account of the added frog pres-

94. To open the toe. The shoe is heated throughout to an even heat and held upright with the bar on the face of the anvil.



The blows are struck along the toe, thus opening the toe and quarters without changing the bar.

The toe may be opened as in the service shoe.

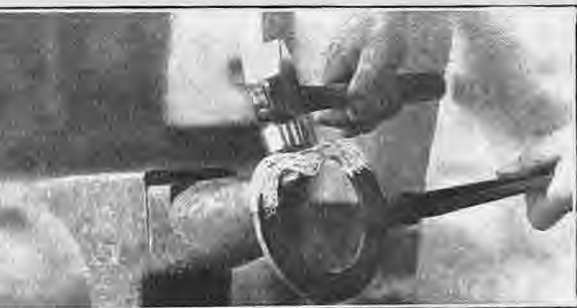
95. To widen the heels.—By lengthening the bar.



(a) **When the quarters are too long.**—Heat the bar and the heels to a cherry heat. Hold the shoe in the tongs at the toe and place inside edge of the heel on the point of the horn, resting at the point from which it is desired to turn the heel into

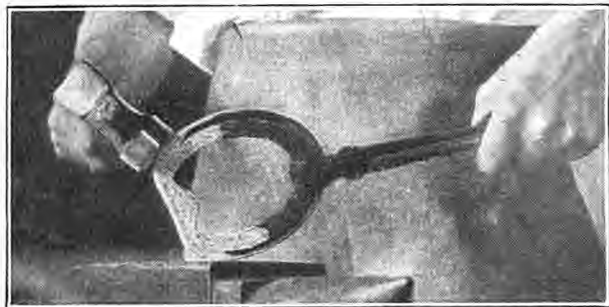
Strike on the end of the heel projecting over the horn. Reverse the shoe and proceed in the same manner with the heel.

When quarters are of the correct length.—Heat the bar at white heat and draw it out by working on the face of the anvil. This will lengthen the bar and at the same time

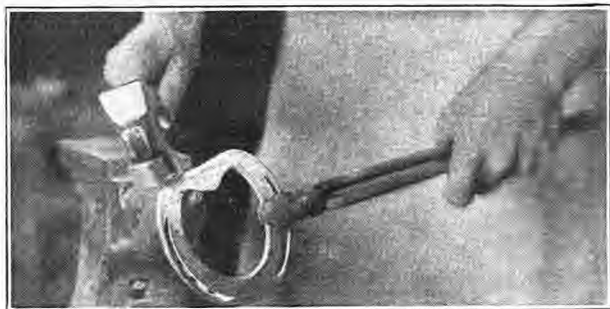


its thickness. After drawing out in this manner, the bar must be leveled with the upper surface unless the frog is such that it will produce the desired pressure. The bar may be drawn on the point of the horn, working on one half when reversing; this method thickens the bar and should

the bar and heel and placing the heel on the face of the anvil, shoe perpendicular, strike on the elevated heel. This will shorten the bar, also narrowing and straightening the quarters.



(b) **When the quarters are too short.**—Place an inside edge of the triangular part of the bar on the point of the horn and strike on the part projecting over it. This will turn part of the bar into the heel.



(c) **When the quarters are too long.**—Hold the shoe upright, the center of the bar on the point of the anvil, and strike on the toe. This will push the bar toward the toe and shorten the shoe, bringing the heels closer together.



97. To lengthen the quarters without changing the bar.—Draw out the heels on the horn of the anvil as in the service shoe.



98. When one quarter is longer than the other, to bring the shoe back to its proper shape. Heat the shoe throughout, and, holding it upright with the point of the heel of the longer quarter on the face of the anvil, strike on the upper edge of the shoe directly over the point resting on the anvil.



99. Thinning the bar is often necessary in the case of a large frog. To accomplish this, the bar is welded at about one-half the required length and then drawn out on the face of the anvil, its lower surface being leveled with the ground surface of the shoe.

100. In the case of an exceptionally large frog, it is necessary to curve the bar below the ground surface to allow sufficient room and to prevent too much pressure. Toe and heel calks must be used with this shoe to insure a level ground surface.

To curve the bar.—Hold the shoe so that one end of the bar rests on the edge of the face and the other on the horn of the anvil and strike on the center of the upper surface.

101. The use of the tip for contracted heels leaves the foot in more nearly a state of nature than any other shoe, it is sufficient for ordinary work, and is easily applied. It should be thin, only thick enough to hold the nails, and not be flexible.



102. Most horses that can be classed as refractory in shoeing have been brought to this condition by improper handling when green and unaccustomed to the sights and sounds of a shoeing shop.

When a young horse has been assigned to an organization, a common practice is to send him at once to the shop with instructions that he be shod by quiet means if possible, but by force if necessary.

No greater evil exists in the mounted service. It is as much our duty to gradually train a young horse to submit to shoeing as it is to patiently drill him to surrender to the bit and to work in the saddle or harness.

Summary methods not only ruin the horse's disposition, but subject the shoer to constant danger of injury.

103. Shoeing young horses.—The first step should be to teach the young animal that raising his feet will do him no harm, and this lesson should be given at the first grooming. The method of raising the fore foot and the hind foot, as explained in this manual, should be thoroughly understood by all enlisted men and be a part of the instruction of every recruit.

When the young horse surrenders his foot, lower it again quietly and pat him; later, use the brush on the soles of his feet; next tap the soles lightly with the currycomb; finally, take the shoer's position and go through the same steps. This complete instruction may be a matter of a day or of many days, depending upon the animal's disposition, but it should not be slighted nor hurried.

In the department of equitation at the Mounted Service School the following method is used with young horses that are disposed to kick when their hind legs are first handled. The horse is equipped with a cavesson, which is held by the animal's trainer. A surcingle is placed around the girth. The man that grooms the horse takes hold of the surcingle with the inside hand, in order to move with the horse and be secure against injury. With the outside hand he strokes the haunches and legs, gradually working downward. In the meantime the trainer pats the horse on the neck, but corrects him sharply with the cavesson whenever he displays temper. This method is almost invariably successful.

The second step is to let the young horse grow accustomed to the shop. While the horseshoer is at work on a *quiet horse* the young horse should be led into the shop and held by the man who has been grooming him and raising his feet.

The animal *should not be tied*, nor should he be held by any other man than the one he knows and trusts.

When the animal shows neither timidity nor excitement the shoer begins work on the feet. Frequently the removal of the surplus growth of horn is all that can be accomplished without excitement or resistance. At the first sign of either, work for that day should be abandoned and the horse removed from the shop.

The shock of the hammer is conveyed to the joints of the pastern bones, and the green horse, startled thereby, will struggle to free his foot. The shoer can usually handle a fore foot easily unassisted. If a good helper holds the hind leg in a comfortable position on his thigh and holds the hoof firmly with both hands, the shoer can work with more certainty, the shocks of nail driving will be taken up, to a great extent, in the helper's wrists and arms, and the horse will stand quietly.

Patient, quiet work will eventually succeed and thereafter each shoeing is more easily completed.

104. There are, however, certain highly nervous horses in nearly every organization that are refractory as a result of previous bad handling, and in the emergencies of active service there may be insufficient time to quietly prepare new mounts

In these cases some form of restraint is required, but in each instance no more force should be employed than is absolutely necessary—the gentlest method should be tried first.

The cavesson, as a means of correction, will usually make a horse stand still and is to be preferred to the twitch. The latter, although effective, is a brutal instrument, and should never be used except upon an outlaw; moreover, after repeated use of the twitch the horse dreads any approach of the hands to his muzzle, and can be bridled only with the greatest difficulty. Severe use of the twitch will also permanently disfigure the animal's appearance.

105. If the cavesson is insufficient, the rigging described below should be used.

The cuff.—A strap of double thickness of leather, 18 inches long and $1\frac{1}{2}$ inches wide, is sewed to a D ring 3 inches long and made of $\frac{3}{8}$ -inch round iron. A piece of thin leather 9 inches long and 3 inches wide is sewed on the inside of the strap next to the D ring; a buckle and keeper are sewed on the outside of the strap as shown.



The surcingle.—Two 3-inch rings are sewed on the outside of the issue surcingle and are so placed that when the surcingle is adjusted the rings will hang down in the position of the quarterstrap rings of a saddle.

A rope $\frac{3}{4}$ inch in diameter and about 20 feet long; an eye splice should be made at one end.

This rigging can be easily made in any organization. For use in the field, the rope is replaced by a lariat. The cuff and surcingle together weigh only 2 pounds 5 ounces, and can readily be packed in a saddle bag.

TO RAISE A FORE FOOT.

106. Strap the cuff around the pastern, the ring above the heels. Pass an end of the rope through the ring and band both



Ανδρέας Βέροις

The horse's head, as usual, should be held by the man that grooms and trains the animal.

This man should stand on the side of the foot to be raised in order to avoid injury if the horse strikes.

The shoer gently but forcibly flexes the knee and raises the foot, while the helper takes in the slack of the doubled rope. If the horse is fractious, the helper passes both ends through the ring on his side. Grasping the rope close under the surcingle ring with the hand nearest the horse's head, and holding the ends securely against the hip in the other hand, the helper is secure against injury, can move with the horse and control the slack to the best advantage.

If a helper is not available, the shoer secures one end of the rope to the D ring (by the eye or by a knot), passes the other end through the surcingle ring on his own side and, after raising the foot, ties a half hitch.

TO RAISE A HIND FOOT.

107. Strap the cuff around the pastern, the ring above the heels. Draw the horse's tail to one side and make a loop in it; fasten one end of the rope in the loop by a "single sheet bend." Pass the other end through the D ring and draw it to the rear, where it is held by helpers. The horse is tied, but the head is held as usual. When the shoer raises the foot, the helpers draw in the slack of the rope and the foot is supported (by the animal himself) in a good position for work. If he kicks he can do no harm, as his foot must move along the rope. After one or two such efforts he will ordinarily stand quiet.

If helpers are not available, the end of the rope may be secured to a post or tree, but must be fastened in a manner to permit of prompt release in case of a protracted struggle, during which the horse might throw himself and be injured.

Mr. Churchill, instructor in shoeing, used this device for 14 years in civilian practice with unfailing success.

108. When it is found that a horse is so vicious that it is dangerous to shoe him unless he is rendered helpless, two courses are open. One is to put him in the stocks; the other is to throw him and tie him down.

The latter method is a *last resort*, to be used only when quieter methods have been tried and proved unsatisfactory.

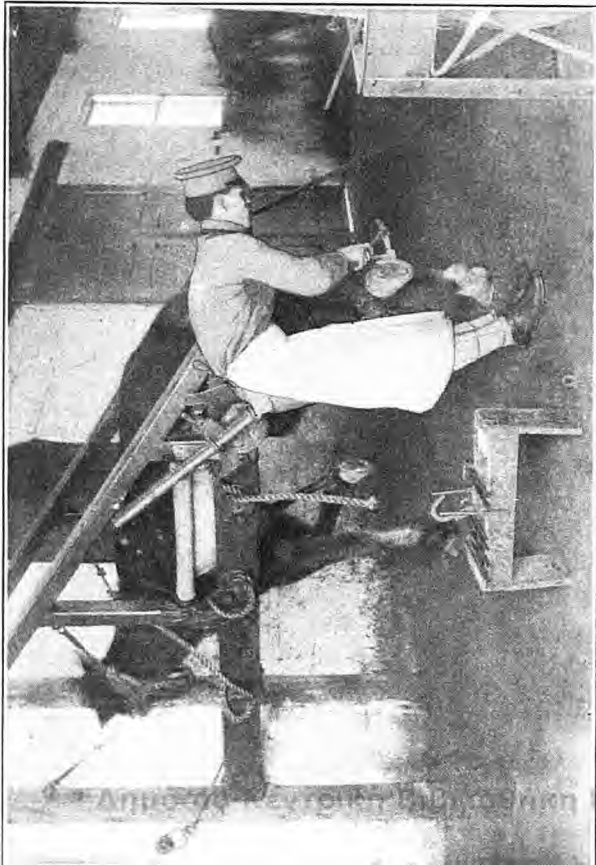


PLATE XVII.—HORSE IN STOCKS.

The harness used in the harness school to throw horses for minor operations has been found to answer the purpose and does not harm the horse. Throwing and "hog tying" a horse without other appliances than a rope should be

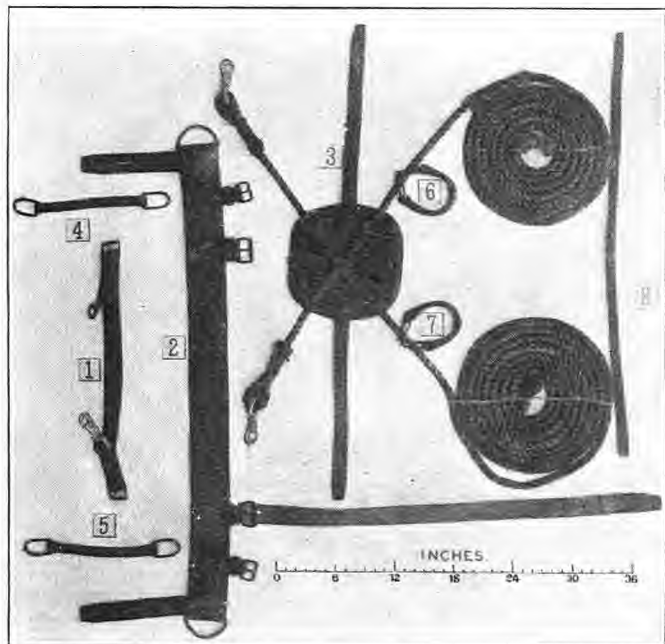


PLATE XVIII.—HARNESS FOR HORSE THROWING.

avoided, as this method usually burns the horse badly and has been known to result in permanent injury.

The throwing harness (Pl. XVIII) consists of:

1. Bellyband with snap hooks for front hobbles.
2. Breast strap with suspending neck strap.



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3. Saddle pad with crossed ropes, each 20 feet long.

4 and 5. Front hobbles.

6 and 7. Hind hobbles.

8. Check strap, used to connect the saddle pad with halter crown strap.

The harness is shown in detail in the illustration. The scale of inches will enable any good saddler to manufacture it accurately, and Plate XIX also shows clearly the manner in which it should be adjusted and used.

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16