(No Model.) 2 Sheets—Sheet 1.

M. L. CHAMBERLAIN.

COMPOUND HORSESHOE.

No. 510,403. Patented Dec. 12, 1893.

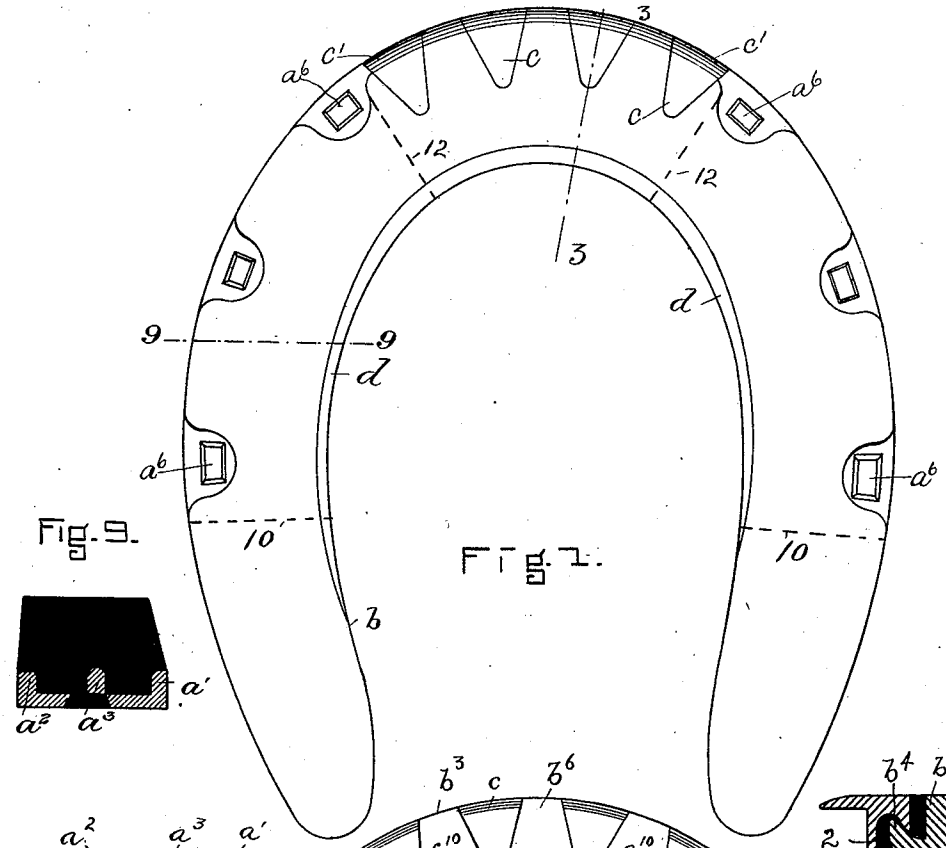

Fig. 7.

Fig. 9.

Fig. 4.

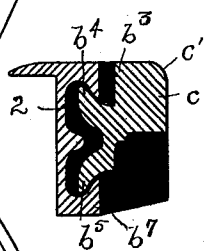

Fig. 5.

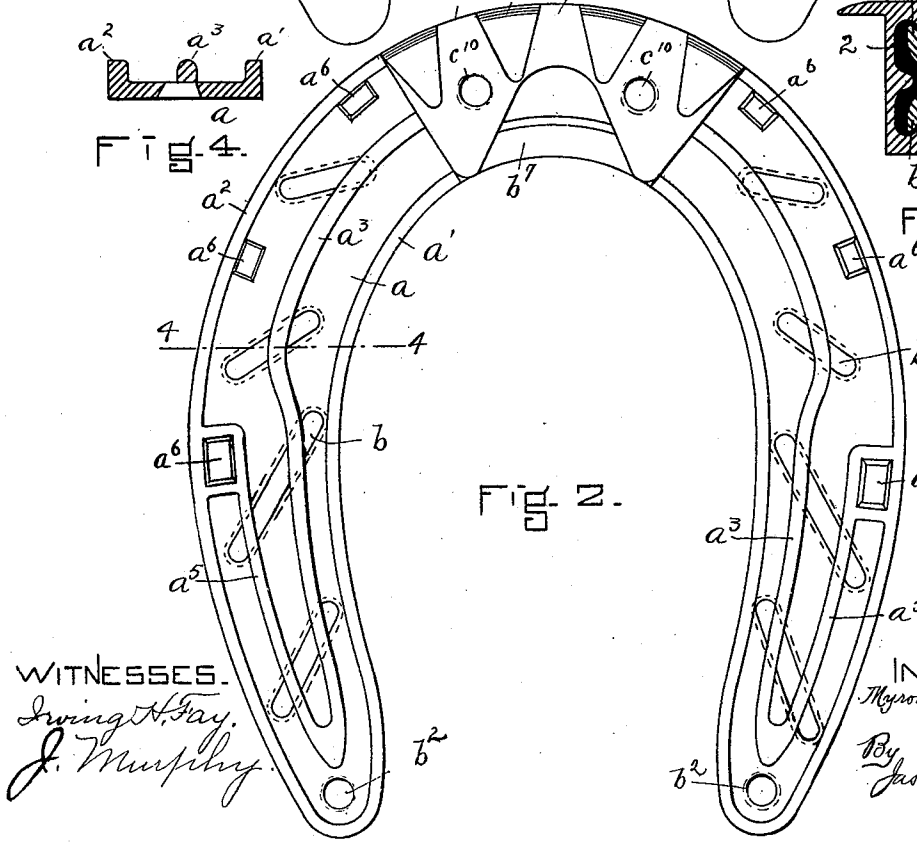

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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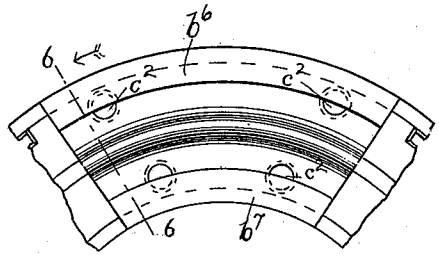

Fig. 5.

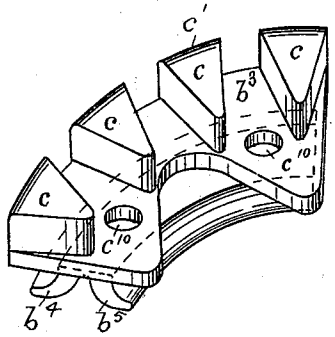

Fig. 7.

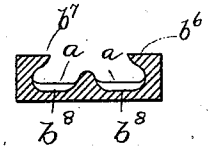

Fig. 6.

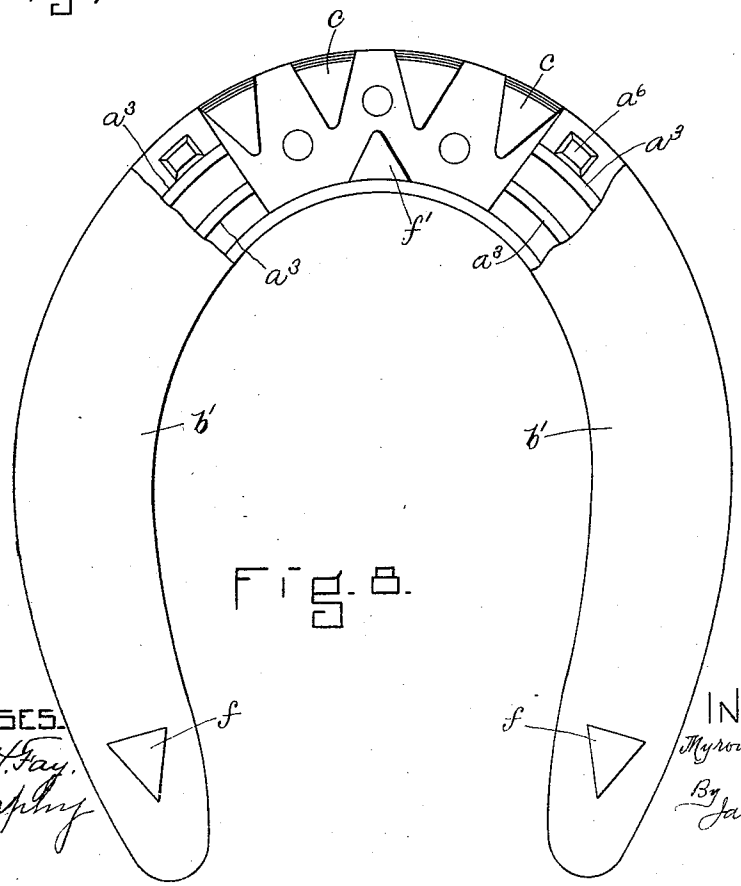

Fig. 8.

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COMPOUND HORSESHOE.

SPECIFICATION forming part of Letters Patent No. 510,403, dated December 12, 1893.

Application filed February 16, 1893. Serial No. 462,566. (No model.)

To all whom it may concern:

Be it known that I, MYRON L. CHAMBERLAIN, residing in Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Horseshoes, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a compound horse-shoe, having its wearing surface composed of india rubber or its compounds, or like elastic substances vulcanized onto a metal frame or shoe, and has for its object to provide an efficient compound horse-shoe possessing novel features of construction, as will be described.

In accordance with my invention, the metal frame or portion of the shoe, is cast, rolled or otherwise formed into the general shape of a horse-shoe, and is constructed, as will be described, to obtain a maximum strength with a minimum amount of metal, and also to obtain increased adhering surface for the rubber or like elastic material. The metal frame or portion of the shoe is copperized or treated after the process described in United States Patent No. 215,034, dated May 6, 1879, and the rubber or like elastic material is vulcanized onto the treated metal frame to obtain a rubber wearing surface, firmly attached to the said metal frame and of any desired thickness.

The compound shoe is provided with a metal guard for the rubber, preferably made separate from the main metal portion of the shoe, but which is locked thereto and is embedded in the rubber vulcanized onto the metal frame of the compound shoe, the said guard being, for the best results, cushioned by the rubber, as will be described. The inner edge or surface of the rubber portion may be beveled to avoid balling of the shoe from snow or mud, and to lessen the friction when used on clayey roads. These and other features of my invention will be pointed out in the claims at the end of this specification.

Figure 1, is an under side view of a compound horse-shoe embodying my invention; Fig. 2, an under side view of the metal frame or portion of the shoe with the rubber wearing surface removed; Fig. 3, a sectional detail on the line 3—3 of Fig. 1, the rubber being shown black in this figure and not shown in Fig. 1, to enable the construction to be more clearly illustrated; Fig. 4, a sectional detail on the line 4—4, Fig. 2; Fig. 5, a detail in plan of the central or toe portion of the metal frame of the shoe, with the metal guard shown in Fig. 2 removed; Fig. 6, a sectional detail on the line 6—6, Fig. 5, looking in the direction of the arrow thereon; Fig. 7, a detail in perspective of the guard shown in Fig. 1; Fig. 8, an under side view of a modified form of compound shoe to be referred to, and Fig. 9, a sectional detail on the line 9—9, Fig. 1, to be referred to.

The metal frame or portion of the shoe is preferably made as shown in Fig. 2, it consisting of a web or plate a, provided on its inner and outer edges with rims or flanges a' a^2 substantially at right angles to the said web, and between the said flanges, the web or plate a has secured to or forming part of it one or more ribs a^3, which extend to near the heel portions of the plate or web a, and as shown in Fig. 2, a single rib a^3 is extended about the shoe and has secured to or forming part of its ends, ribs a^5 extended from the heel portion backward for a portion of the length of the web or plate a. The metal web or plate a is provided on each half of the shoe with suitable nail receiving holes a^6, there being three such holes herein shown on each half of the shoe. The web or plate a is provided, as herein shown, with a series of holes or apertures, which co-operate with and preferably extend across the ribs a^3 a^5 to form locking apertures b for the rubber or other elastic wearing surface b', as will be described, the said locking apertures being preferably made as countersunk holes having their greater area on the upper surface of the web, as indicated by dotted lines, that is, on the surface of the web, which is next to the hoof when the shoe is applied. The metal web or plate a is preferably provided at the extreme end or heel of the shoe with a single countersunk hole or opening b^3 for the reception of the wearing surface.

The metal portion or frame of the shoe is provided with a guard for the rubber, which is shown in Fig. 1 as located at the toe of the shoe and which is preferably of a construction, such as shown in Fig. 7, it consisting of a plate b^3 provided on its under side with curved locking flanges b^4 b^5, adapted to engage flanges b^6 b^7 projecting inward from the outer and inner edges a' a^2 of the metal frame to lock the guard to the said metal frame, the body or central portion of the frame below the flanges b^6 b^7 being made deeper, as represented by b^8 in Fig. 6, than the remaining portions of the metal web a, to obtain a substantially wide space between the flanges b^4 b^5 of the guard and the portion b^8 of the web or plate a, as represented in Fig. 3, for a purpose as will be described. The guard may be provided on its outer surface with wearing portions or projections c, herein shown as substantially triangular in shape and separated from each other, each wearing portion being provided at its outer face substantially flush with the flange a^2, with a rounded surface or corner c', to prevent the horse tripping.

The metal portion or frame of the shoe is copperized or treated after the process described in the patent above referred to, and is then placed in a suitable mold, and the guard shown in Fig. 7, having been affixed to the metal frame, is forced away from the metal web a into the position shown in Fig. 3, by suitable pins, not herein shown, but which may be extended through the holes or openings c^2 in the web a (see Fig. 5) and the mold is then filled with the rubber to cover the whole or any desired part of the treated metal frame, preferably to the depth of about one-half inch, or until the rubber is flush with the upper surface of the projections c of the guard, after which the said rubber is vulcanized onto the copperized metal frame or portion. The rubber enters the interlocking apertures b, b^2 and also the space between the flanges b^4 b^5 of the guard and the metal web a. The rubber is, for the best results, prevented from filling the nail receiving holes a^6 by means of suitable cores, plugs or pins, not herein shown, but which are inserted into the said holes and which are removed after the rubber has been vulcanized onto the metal frame or portion of the shoe, the pins inserted into the nail holes nearest the toe acting to keep the guard herein shown in its proper position during the vulcanizing process. The guard b^3 is provided, as herein shown, with holes or ducts c^{10}, through which the rubber may pass to the under side of the guard and thereby the rubber assists in holding the guard in position. The nail holes, as represented in Fig. 1, do not extend through the rubber portion b' of the shoe, and by means of the cores or plugs inserted into the said holes, the rubber wearing surface is shaped to leave apertures about the said nail receiving holes to permit the easy dislodgment of dirt, &c.

The mold is preferably so constructed as to form a bevel d extended around the inner edge of the rubber wearing surface, as represented in Figs. 1 and 3, the said bevel being made of any desired or required length, but for the best results, I prefer the said bevel should extend back from the inner edge of the metal frame, about one-eighth of an inch. The rubber wearing portion of the shoe fills the locking apertures b, and as represented in Figs. 2 and 9, the rubber will be locked under the ribs or bars a^3 a^5, and the said apertures co-operating with the said locking bars or ribs serve to more firmly hold the rubber wearing surface to the metal portion of the shoe. These locking apertures are especially advantageous near the heel portion of the metal frame of the shoe, for experience has taught me, that the rubber wearing surface at the heel of the shoe is more likely to separate from the metal than at the front of the shoe. The holding action of the locking apertures is increased by making the said apertures wider on the rear or upper face of the metal portion of the shoe, as represented by dotted lines in Fig. 2.

It will be noticed that the metal guard is entirely embedded in the rubber wearing surface, with the exception of the wearing portions c, and by referring to Fig. 3, it will be noticed that a layer 2 of rubber of considerable thickness is interposed between the flanges b^4 b^5 of the guard and the metal web a, which, in practice, acts as a cushion to receive the force of the blow as the horse puts his foot down, and the layer 2 of rubber increases the efficiency of the rubber wearing surface b' in resisting or avoiding concussion. Furthermore, the layer 2 of rubber acts to electrically separate or insulate the metal guard from the metal frame, when the foot of the horse is resting on the ground, as the weight of the foot forces the flanges b^4 b^5 against the layer 2, which yields sufficiently to permit the flanges b^4 b^5 to be removed from contact with the flanges b^6 b^7, so that, when the foot of the horse is on the ground, it is electrically separated or insulated therefrom, and as a result, the liability of the horse receiving shocks by stepping on the rails of electric street railways, and other sources of electricity, is avoided.

I may prefer to employ the guard herein shown having the protecting surfaces or projections c made in one casting or piece and separated from each other by the rubber, as represented in Fig. 1, but I do not desire to limit my invention in this respect as the protecting surfaces or guards c may be made independent of one another and secured in any suitable manner to the metal frame or portion of the shoe. As for instance, in Fig. 8, the wearing portions c constitute the toe-guard and are integral with or firmly secured to the

metal frame of the shoe, but are separated from one another to permit the rubber to fill in the space between adjacent wearing portions *c*. So also, the wearing portions *c* may be made removable and secured or otherwise fastened to the metal frame of the shoe. Furthermore, I do not desire to limit my present invention to a rubber wearing surface covering the entire surface of the metal frame, as the rubber may be vulcanized onto the metal frame, so as to cover only portions of the said frame. As for instance, the toe and heel portions might be covered with rubber and the portion of the frame between the heel and toe, from about the dotted lines 10—12, may be left uncovered. In this latter case, the portion of the web *a*, thus left uncovered, may be left plain and solid, with the exception of the nail holes as described, or the above wearing surfaces of rubber may be connected by a thin layer of rubber like an inverted arch.

The rubber wearing surface may and preferably will be made of considerable thickness, preferably about one-half inch, and extends below the side flanges as represented in Fig. 9 and if desired, the said rubber wearing surface may be made thicker in some parts than others. As for instance, the heel portions may be made thicker than the toe.

As represented in Fig. 2, the rib a^3 extends entirely around the web *a*, but I do not desire to limit my invention in this respect, as the rib or ribs a^3 may extend but partially around the web *a* as represented in Fig. 8, wherein is shown a compound shoe particularly well adapted to be used as the hind shoe of the horse, but which may be used as a forward shoe.

The shoe represented in Fig. 8, may and preferably will be provided at the heel portions with guards or metal wearing portions *f*, herein shown as triangular in shape, but which may be of any other desired form, the said wearing portions being made of sufficient thickness or height to lie substantially flush with the rubber. The toe portion of the shoe shown in Fig. 8, may be provided, in addition to the wearing portions *c*, with one or more wearing portions *f'* projecting from at or near the inner edge of the web *a*.

The metal plate or web is of substantially the same width as the ordinary metal horseshoe and forms a substantially wide, solid backing for the elastic wearing surface.

I claim—

1. A compound horse-shoe consisting of a metal frame composed of a plate or web having one or more ribs and provided with locking apertures, and a wearing surface composed of an elastic substance vulcanized onto the said web or plate and enveloping the said rib, the said plate forming a substantially wide, solid backing for the elastic wearing surface substantially as described.

2. A compound horse-shoe consisting of a metal frame or shoe, an elastic wearing surface, and a cushioned guard locked to the metal frame or shoe and having its wearing surface substantially flush with the elastic wearing surface, substantially as described.

3. A compound horse-shoe consisting of a metal frame composed of a web or plate having side or edge flanges, one or more ribs secured to or forming part of the said web or plate between the said edge flanges, and a wearing surface of elastic material secured to the said plate or web between the side flanges, substantially as described.

4. A compound horse-shoe consisting of a metal frame composed of a web or plate having side or edge flanges and provided with locking apertures, a wearing surface of rubber or like elastic material vulcanized onto the said frame and extended below the side flanges, and one or more metal surfaces embedded in the elastic wearing material and substantially flush with the same, to protect the elastic material from wear, substantially as described.

5. A compound horse-shoe consisting of a copperized metal frame composed of a plate or web, one or more ribs secured to or forming part of the web or plate between its edges and extended for the whole or a portion of its length as described, and a wearing surface of rubber or like elastic material vulcanized onto the said copperized plate or web, substantially as described.

6. A compound horse-shoe consisting of a copperized metal frame or shoe, a wearing surface of rubber or like elastic substance vulcanized onto the said copperized metal frame or shoe, and one or more metal wearing surfaces locked to the metal frame or shoe and embedded in the elastic wearing substance and substantially flush with the same, substantially as and for the purpose specified.

7. A compound horse-shoe consisting of a metal frame composed of a plate or web provided with a plurality of countersunk holes or openings, forming locking apertures, one or more ribs attached to the lower surface of the plate between its sides, and a rubber wearing surface secured to the lower surface of the plate and extended into the countersunk holes and enveloping the said rib, substantially as described.

8. A compound horse-shoe consisting of a copperized metal frame composed of a plate or web provided with a plurality of countersunk holes, and having one or more ribs attached to the lower surface of the plate or web and extended across the said countersunk holes, and a rubber wearing surface vulcanized onto the lower surface of the copperized plate or web, filling the countersunk holes and enveloping the said rib, substantially as described.

9. A compound horse-shoe consisting of a copperized metal frame composed of a plate or web having locking apertures and one or

more ribs attached to the lower surface of the said plate and extended across the said locking apertures, and a wearing surface composed of rubber vulcanized onto the copperized lower surface of the plate or web, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MYRON L. CHAMBERLAIN.

Witnesses:
JAS. H. CHURCHILL,
J. MURPHY.