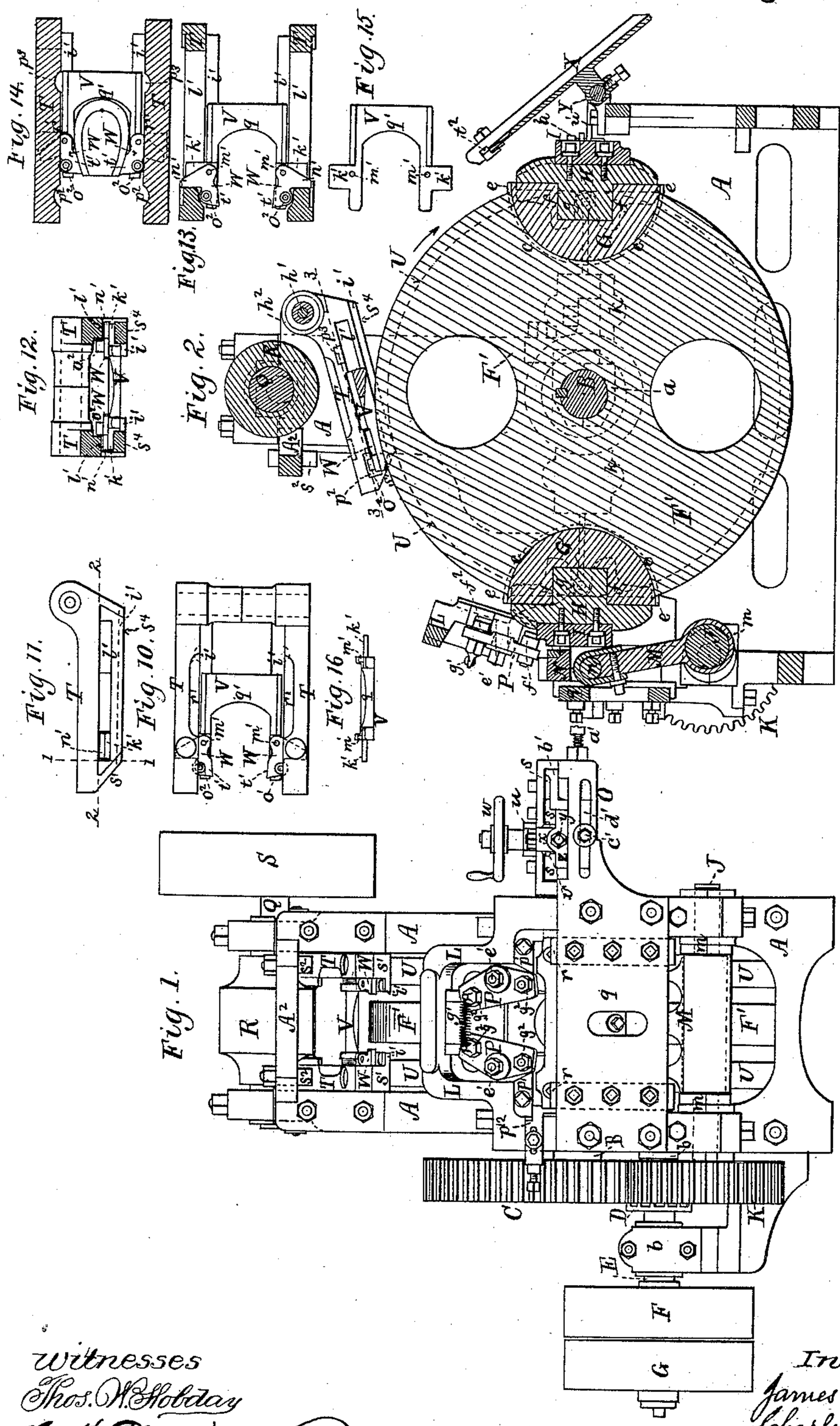
(No Model.) 3 Sheets—Sheet 1.

# J. H. TAYLOR & C. POVEY.

## HORSESHOE MACHINE.

No. 408,329. Patented Aug. 6, 1889.




Witnesses
Thos. H. Hobday
C. F. Daniels

Inventors,
James H. Taylor.
Charles Povey.
by Singleton & Piper, atty's.

(No Model.) 3 Sheets—Sheet 2.

# J. H. TAYLOR & C. POVEY.

## HORSESHOE MACHINE.

No. 408,329. Patented Aug. 6, 1889.

Fig. 3.

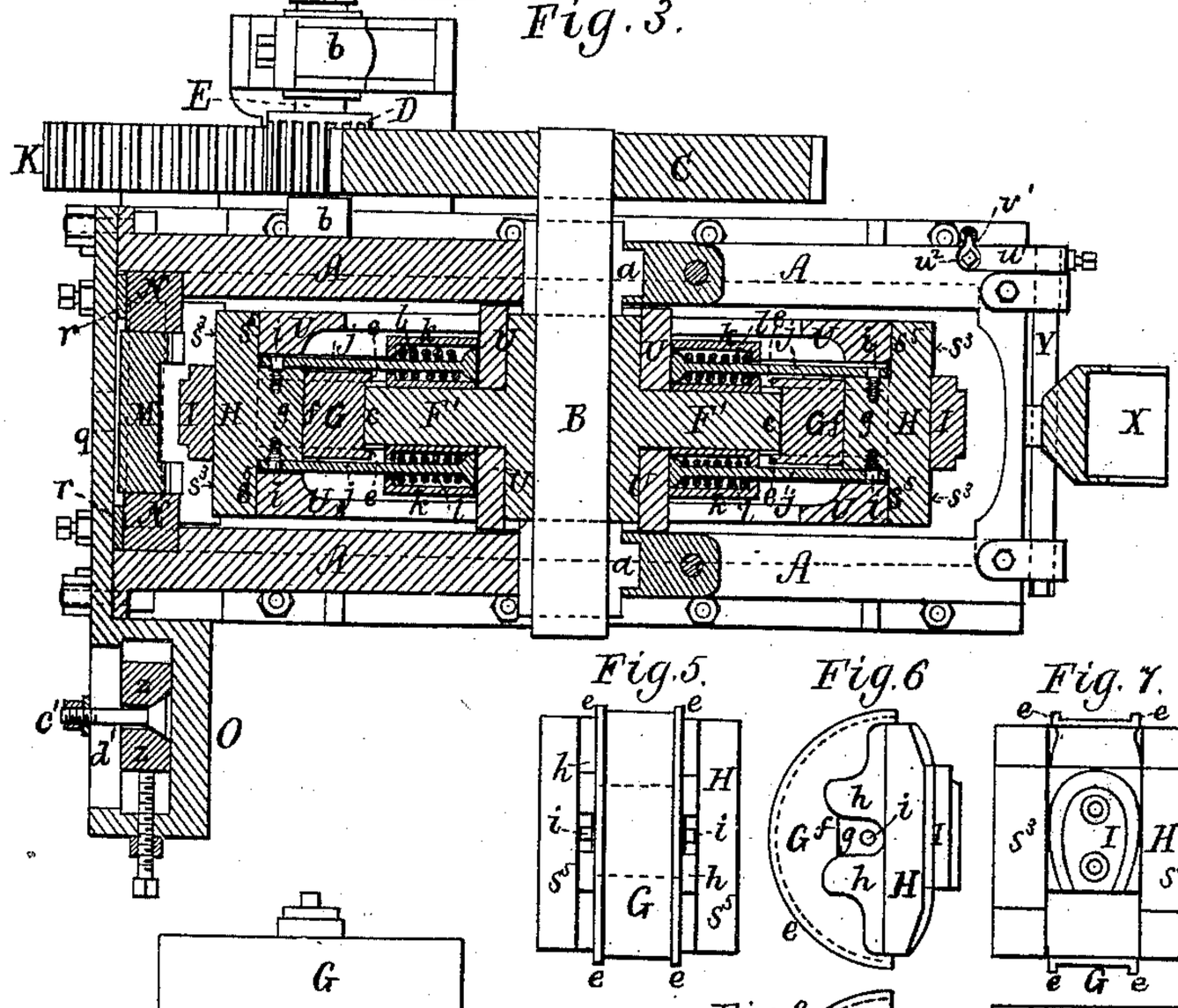



Fig. 5.




Fig. 6




Fig. 7.




Fig. 8

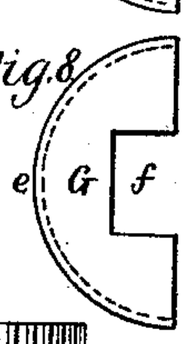



Fig. 9.

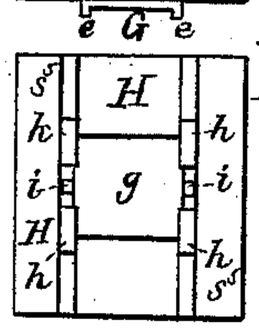



Fig. 4.




Witnesses
Thos. W. Hobday.
C. F. Daniels

Inventors.
James H. Taylor.
Charles Povey.
by Singleton & Piper, atty's.

(No Model.) 3 Sheets—Sheet 3.

# J. H. TAYLOR & C. POVEY.

## HORSESHOE MACHINE.

No. 408,329. Patented Aug. 6, 1889.

*Fig. 17.*

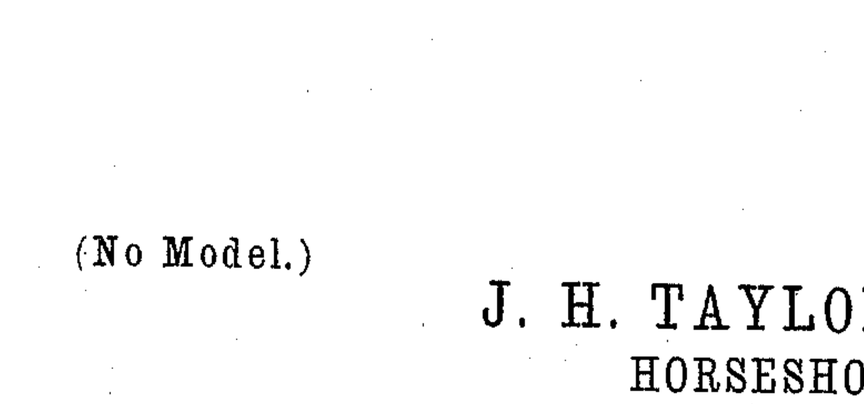



*Fig. 18.*

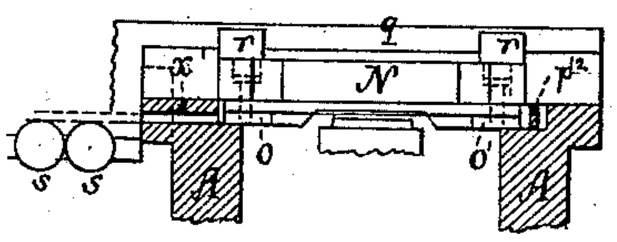



*Fig. 19.*

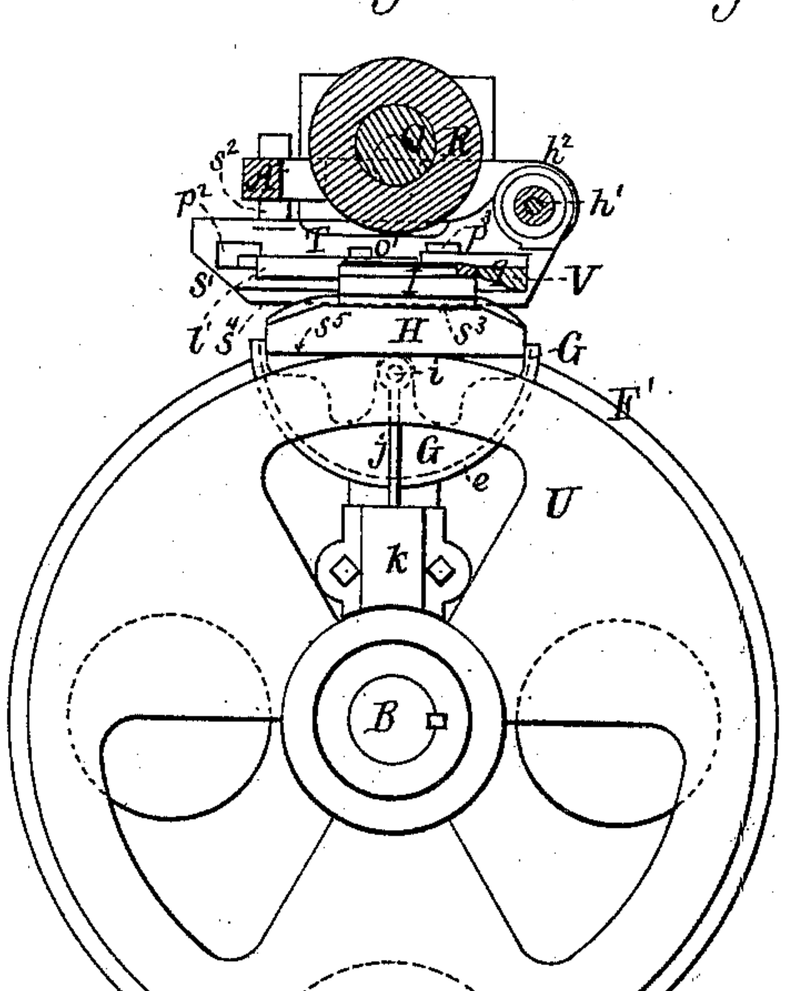



*Fig. 20.*

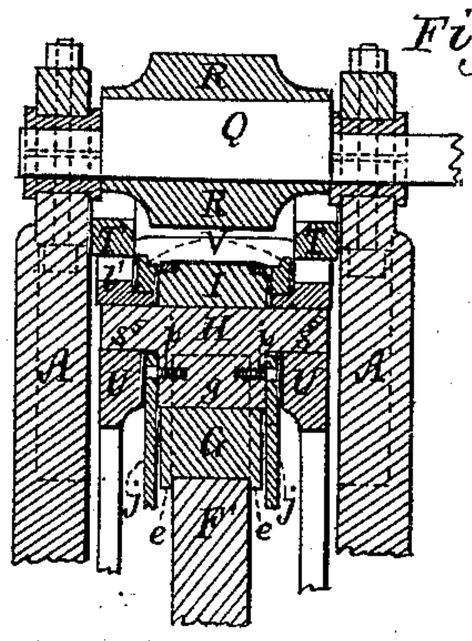



*Fig. 21.*

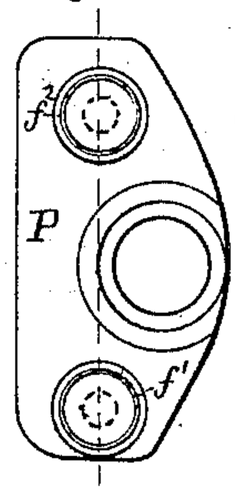



*Fig. 22.*

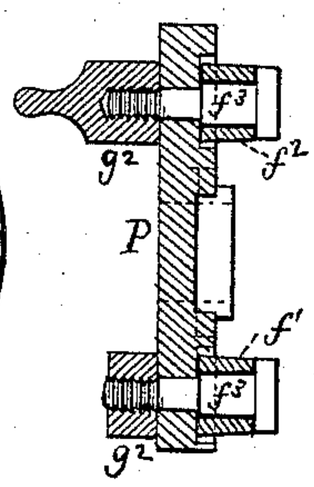



*Fig. 23.*

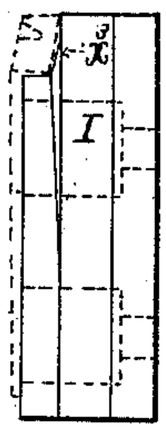



*Fig. 24.*

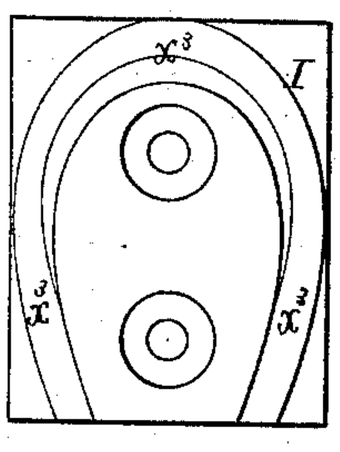



*Fig. 25*

*Fig. 26*

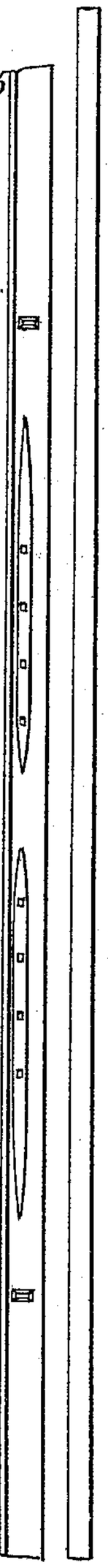


*Fig. 27.*

Witnesses.
Thos. W. Slobdary.
C. F. Daniels

Inventors.
James H. Taylor.
Charles Povey
by Singleton & Piper, atty's

# UNITED STATES PATENT OFFICE.

JAMES H. TAYLOR AND CHARLES POVEY, OF ATTLEBOROUGH, MASSACHUSETTS, ASSIGNORS OF ONE-THIRD TO JAMES E. JONES, OF CUMBERLAND, RHODE ISLAND.

## HORSESHOE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 408,329, dated August 6, 1889.

Application filed May 25, 1889. Serial No. 312,088. (No model.)

*To all whom it may concern:*

Be it known that we, JAMES H. TAYLOR and CHARLES POVEY, citizens of England, residing at Attleborough, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Horseshoe-Machines; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Figure 1 is a front elevation, Fig. 2 a longitudinal, median, and vertical section, Fig. 3 a horizontal section, and Fig. 4 a top view, of a horseshoe-machine of our invention. Fig. 5 is a rear view, Fig. 6 a side elevation, and Fig. 7 a front view, of the rocker G and the shoe-forming-die supporter H as they appear when together, the shoe-forming die being shown in edge view and in face view in the two latter figures. Fig. 8 is a side view of the rocker G, and Fig. 9 a rear view of the supporter H. Fig. 10 is a top view, Fig. 11 a side elevation, Fig. 12 a transverse section on line 1 1 of Fig. 11, and Fig. 13 a horizontal section on line 2 2 of said Fig. 11, of the arms T T and the parts supported by them, to be hereinafter described. Fig. 14 is a horizontal section of the said arms T T on line 3 3 of Fig. 2, showing the curved notches $p^2$ $p^3$ and a shoe as clamped to the die by the nippers W. Fig. 15 is a top view, and Fig. 16 is an end view, of the slide V. Fig. 17 is a vertical section of the machine, taken so as to show the passage through which the bar of which the shoe is to be formed is fed into position over the swaging-dies, said figure also showing in rear view the said swaging-dies and the arms P P, with the bending-rolls, and also adjacent parts. Fig. 18 is a horizontal section taken through the said bar-receiving passage and showing the said swaging-dies in top view. Fig. 19 is a view showing the shoe-forming die and its supporter as passing under the hammer. Fig. 20 is a cross-section of the upper portion of the machine, with the parts in the same position as in Fig. 19. Fig. 21 is a rear view, and Fig. 22 a section, of one of the levers P, on an enlarged scale, taken through the rolls $f' f^2$. Fig. 23 is a side view, and Fig. 24 a face view, of the shoe-forming die, on an enlarged scale. Fig. 25 is a bottom view, Fig. 26 an edge view, and Fig. 27 a cross-section, of the bar as formed ready to be fed into the machine.

The nature of our invention is defined in the claims hereinafter presented.

In the drawings, A denotes the frame of the machine supported in bearings *a a*, in which is a shaft B, having fixed on one end of it a gear C, engaging with a pinion D, secured on a driving-shaft E, sustained in bearings *b b*, fixed to the frame of the machine, the said shaft E being provided with a fast pulley F and a loose pulley G.

Keyed to the shaft B and arranged centrally thereon, between the sides of the frame A, is a bed-plate F′, the periphery of which, except where it is provided with the curved bearings *c c*, (see Figs. 2 and 19,) is concentric with the shaft B. The said bearings *c c*, of which there may be two or more in number, are arranged at regular intervals, the curved surface of each being the arc of a circle, and each receives and supports a semicircular rocker G, having flanges *e e* to keep it in position in the bed-plate. Said rocker also has a notch *f* to receive a projection *g* from a supporter H, to which is secured the shoe-forming die I, as shown. Projecting from the supporter H are flanges *h h*, which rest against the sides of the rocker G and keep it in its due relation therewith. Pins *i i*, secured in opposite sides of the supporter H, serve as pivots for the outer ends of headed rods *j*, arranged within and projecting from spring-cases *k*, secured to opposite sides of the bed-plate F′. The springs *l* in said cases encircle the rods *j*, and are compressed between the head of the said rods and the head of the cases *k*, and serve to keep the faces $s^5$ of the supporter H against the periphery of the circular auxiliary bed-plates U U, hereinafter referred to, and the circular face of the rockers G against their bearings in the bed-plate. (See Figs. 2, 3, and 19.)

Supported in bearings *m m* in the front portion of the frame A is an eccentric-shaft J, having fixed to one end of it a gear K, engaging with the pinion D. Said gear, owing to the fact that the bed-plate is shown as having but two shoe-forming dies, is provided with half the number of teeth of the gear C. Encompassing the eccentric portion of the shaft J is a sleeve forming part of a pitman M, its upper end being pivoted at *n* to a slide N, carrying the swaging devices *o o'*, which operate with the abutments *p p'* to thicken the ends of the bar of iron to form the shoe, and the pieces *o* and *p* also serve as shears to sever the said bar after being fed the proper distance into the machine, or until it reaches a gage $p^{12}$, provided with means for adjusting it and clamping it in position.

A plate *q* is secured to the front of the machine and supports gibs *r* between it and the slide N, and has screws for adjusting the gibs against the slide to compensate for the wear of said slide and its ways. Extending from said plate *q* and resting against one side of the frame of the machine is a bracket O, pivoted to which and so as to revolve in a horizontal plane is a series of rolls *s*, (see Figs. 1, 4, 17, and 18,) one of said rolls being connected to a gear *t*, engaging with a gear *u*, fixed to an arbor provided with a roll *v* and a crank-wheel *w*, supported by a slide *x*, which can be adjusted horizontally with relation to the rolls *s* by a screw *y*, so as to cause the roll *v* to bear against a bar of iron when between it and the rolls *s* sufficiently to feed the said bar through the passage *x'* and into the machine by turning the hand-wheel *w*. (See Figs. 17 and 18.) The slide *x* is sustained in another slide *z*, which can be adjusted horizontally by a screw *a'* in a direction at right angles to that in which the slide *x* can be moved, said slide *z* having a guide *b'*, arranged in front of the rolls *s*, as shown, to keep the bar in position against said rolls, and the said slide *z* is clamped in position in the bracket O by a screw *c'*, arranged in a groove *d'* therein.

Extending upward from the front portion of the frame is a yoke L, to which is pivoted at *e'* the levers P P, which carry the bending-rolls *f' f²*. (See Figs. 2, 17, 21, and 22.) These rolls are supported so that they can freely turn on bolts $f^3$, fixed to the arms by nuts $g^2$, and are slightly tapering, the ends of said rolls having the larger diameter being next the levers P, and the upper ends of the said levers are drawn toward each other by a spring *g'*. The object in tapering the rolls *f' f²* is to insure the forcing of the surface of the shoe, which, when it is completed, is the top surface of it, so that said surface shall bear near its outer edge on the face $x^3$ of the forming-die I. (See Figs. 23 and 24.) This will cause the bar to stand with relation to the die essentially as shown in dotted lines in Fig. 23. This is done to prevent the creases in the shoe from being narrowed or partially closed while the shoe is being acted on by the hammer, it being so arranged that when the die is passing under the hammer, the hammer shall barely touch the outer edges of the creases in forcing the shoe against the face $x^3$ of the die to incline or concave its upper surface.

Above the bed-plate F', and mounted in bearings in the frame A, is a shaft Q, the part of it between the said bearings being eccentric to the journals of said shaft, and on said eccentric is arranged a hammer R, applied to it so that it can revolve thereon. The said shaft is provided with a driving-pulley S.

Pivoted to a rod *h'*, supported in bearings $h^2$ in the upper part of the frame A, are two gravitating arms T, which rest at their free ends (see Fig. 2) on the periphery of auxiliary bed-plates U, supported on the hub of the bed F', so that they can turn thereon. The peripheries of said auxiliary bed-plates furnish bearings for the faces $s^5$ of the supporters H, and, together with the bed-plate F', sustain the die when the blank is forced against it during the bending of it, and also while being acted upon by the hammer R. Each of the arms T has an inwardly-projecting ledge *i'*, on which rests a slide V, projections *k'* from said slide extending into slots *l'* in the arms T. Supported on said projections *k'*, and pivoted to pins *m'*, projecting upward from the slide V, are nippers W, the tails *n'* of which rest on the projections *k'* and extend into the said slots *l'* in the arms T. Each nipper has a roll $o^2$ pivoted to it, which enters curved notches $p^2$ or $p^3$ in the arms T when the slide V is at either extreme of its range of movement in said arms. When the slide V is in its lowest or forward position in said arms T, as shown in Fig. 2, the rolls $o^2$ are moved into the notches $p^2$ by the tails *n'* of the nippers striking against the lower or forward ends of the slots *l'* in said arms T. (See Fig. 13.) The slide V and its nippers when in this latter position are ready to receive the shoe-forming die I with a shoe upon it, and supposing the bed-plate F' to be in revolution in the direction indicated by the arrow in Fig. 2, when the advance end of the supporter H strikes the inclined portion *s'* of the arms T, said arms will swing upward on their pivot into a horizontal position and bring up against stops $s^2$, fixed in a yoke $A^2$, secured to the frame of the machine, and the die I, with the shoe, will pass between the nippers W, and on the advanced or toe portion of the said die striking the slide V at *q* the said slide will be carried forward with the die, and as the rolls $o^2$ are moved out of the notches $p^2$ of the arms T the nippers W will turn on the pivots *m'*, and their jaws *t'* will grasp the shoe near its ends and firmly hold said shoe to the die while the rolls move along against the straight portion *r'* of the arms T.

The arms T so operate the die-supporter H and the rocker G as to maintain the die I with the shoe thereupon and held thereto, as here-

inbefore set forth, in a horizontal position while passing under and being operated upon by the hammer, so that the shoe when it leaves the hammer will be straight when viewed in edge view and not curved, as are the shoes heretofore made in machines having the forming-dies supported on a bed rotative on a horizontal axis. The shoe, having passed from under the hammer, is released from the grip of the nippers by the rolls $o^3$ swinging into the notches $p^3$ of the arms T, and at the same time the toe of the shoe will slip past and be carried under the part $q$ of the slide V, and in its downward course will meet the clearers $t^2$, which are adjusted to pass between the shoe and the die and disengage it therefrom and cause it to pass down the chute X.

The chute X is supported on a shaft Y, sustained in bearings fixed to the frame A, and has clamped to it an arm $u'$, provided with a set-screw $u^2$, which passes through said arm and bears on the frame. A spring $v'$, secured to the free end of said arm and to the frame, keeps the set-screw $u^2$ against the frame and allows the chute to swing in its bearings when the die is moving in contact with the clearers. The said clearers $t^2$ are secured in position by clamp-screws and nuts, as shown, which admit of their adjustment.

The bar $B^2$, from which the shoes are to be formed, is represented as creased and rolled into the required shape, and when introduced into the machine is to be heated to the proper temperature to enable the forming of it to be carried on.

The operation of the machine may be thus described: The bar, having been creased, partially punched, and rolled into the required shape, as shown in Figs. 25, 26, and 27, is introduced in a heated state between the guide $b'$ and rolls $s$, (see Fig. 4,) till it is gripped by the roll $v$, when the attendant, by revolving the crank-wheel $w$, advances the bar through the passage $x'$ a proper distance or till its forward end reaches the gage $p^{12}$, (see Fig. 17,) the bar being represented in dotted lines. The machine being in operation, the slide N will now rise and advance the swaging-dies $o\ o'$, the portion of the bar within the machine and between the gage $p^{12}$ and the cutting-edge $o^4$ of the die $o$ being severed from the bar by the edge $o^4$ and the lower end $p^4$ of the abutment $p$, which serve as shears. The severed portion of the bar or the shoe-blank will next be compressed between the swaging-dies $p\ p'$ and $o\ o'$ to thicken its ends, immediately following which the forming-die I will rise against the middle of the said blank, and the swaging-dies $o\ o'$ will simultaneously retreat from it. The said forming-die I in advancing will force the blank between and against the rolls $f'$ and $f^2$ successively, the former bending the toe portion of the blank and the latter the quarters and heel portions. The spring $g'$, resisting the spread of the upper arms of the levers P P, causes the rolls $f^2$ to bear the inner edge of the blank firmly against the edge of the die, and the taper of the said rolls $f'$ and $f^2$ causes them to force the surface of the blank near its outer edge, which is the top surface of the shoe, against the face $x^3$ of the die. (See Figs. 23 and 24.) It will be observed that when the die I bears the blank against the rolls $f'$ the rocker G will turn in its bearing in the bed-plate, so as to bring the face of the said die into parallelism with the inner face of the levers P, which position it will hold till the ends of the shoe-blank pass from contact with the rolls $f^2$, when the rocker will assume its normal position. The die continuing to advance, when the forward end of the supporter H reaches and moves against the inclines $s'$ of the arms T said arms will be raised against the stops $s^2$ and into a horizontal position, and the toe of the die I, meeting the part $q$ of the slide V, will carry said slide forward and cause the nippers W to grasp the shoe, as hereinbefore described, and hold it firmly to the die. The rocker G, when the supporter passes under the said arms, will turn in its bearing, so as to cause the surfaces $s^3$ of the said supporter to bear fairly against the surface $s^4$ of the arms T, (see Fig. 19,) and this movement of the rocker in its bearing will maintain the die I and its supporter in a horizontal position while said surfaces are in contact and the shoe is being subjected to the action of the hammer R, after which the nippers will be caused to release their hold on the shoe, as hereinbefore set forth, and the surface $s^3$ of the supporter being carried out of contact with the surface $s^4$ of the arms T the rocker will again assume its normal position, depress the toe of the die, and carry it under the part $q$ of the slide V. The free ends of the arms T, as soon as said surfaces $s^3$ and $s^4$ pass out of contact, will drop onto the periphery of the auxiliary beds U, the slide V will move forward into the position shown in Fig. 2, and the die I, with the shoe, will pass onto the clearers $t^2$, which will enter between the shoe and die and release the said shoe from the die, so that it will pass into the chute X and be conducted from the machine.

From the foregoing it will be seen that by our improvements a horseshoe, when it passes from the machine hereinbefore described, is much nearer completion than are the shoes formed in the machines heretofore in use, provided with dies fixed in the periphery of a rotary supporting-bed, as the shoes formed in said machines are curved, as seen in edge view, and before they can be used must be subjected to a straightening process in another machine adapted for the purpose, whereas the shoes formed in our machine are straight in this particular when they leave the machine, and do not require any such treatment. Furthermore, this machine admits of the making of a rolled or a hammered shoe, and when it is desired to make the latter the shaft Q is revolved in its bearings by a belt applied to the pulley S, which will impart to the hammer the

proper motion; but when it is desired to make a rolled shoe the belt is removed from the pulley S, and the shaft Q is turned in its bearings till the sleeve R is brought into the desired or proper position with relation to the die. Then said shaft is clamped in its bearings so that it cannot revolve, in which case the sleeve will turn on the said shaft and roll the shoe against its die as it passes along underneath and in contact with the said sleeve.

We claim—

1. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative on a horizontal axis, the series of forming-dies, the die supporters and rockers sustained in circular arcs in the periphery of said bed-plate, the rotary hammer, the gravitating arms, the slide movable in said arms, and the nippers pivoted to said slide, all arranged and to operate essentially as shown.

2. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative on a horizontal axis, the series of forming-dies, the die supporters and rockers sustained in circular arcs in the periphery of said bed-plate, the rotary hammer, the gravitating arms, the slide movable in said arms, the nippers pivoted to said slide, and the revoluble auxiliary bed-plates, all essentially as shown.

3. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative on a horizontal axis, the series of forming-dies, the die supporters and rockers sustained in circular arcs in the periphery of the bed-plate, the levers P P, fulcrumed to the frame, the bending-rolls pivoted to said levers, the gravitating arms, the slide movable in said arms, the nippers pivoted to said slide, which, together with the said slide, hold the shoe firmly to the die while operated on by the hammer, the revoluble auxiliary bed-plates, and the rotary hammer, all essentially as shown.

4. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative on a horizontal axis and provided with peripheral circular arcs, the rockers sustained and movable in said arcs, the forming-dies and supporters connected to said rockers, the swaging devices consisting of the abutments $p$ $p'$ and the vertically-movable dies $o$ $o'$, the slide N, operating the said dies $o$ $o'$, the levers P P, the bending-rolls $f'$ $f^2$, tapering as set forth and pivoted to said levers, the spring $g'$, connecting them, the gravitating arms, the slide movable in said arms, the nippers pivoted to said slide, the revoluble auxiliary bed-plates, and the rotary hammer sustained and revoluble on an eccentric-supporting shaft, all essentially as shown and set forth.

5. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative with a horizontal shaft and having in its periphery circular arcs, the rockers sustained and movable in said arcs, the forming-dies and the supporters connected to the rockers and having pivots $i$ $i$, the spring-cases $k$, fixed to the bed F′, the rods $j$, connected to the pivots of the supporters and having heads within the spring-cases, the springs bearing between said heads and the heads of the cases, the auxiliary beds revoluble on hub of the main bed and bearing at their periphery against the die-supporters, the levers P P, the bending-rolls tapered, as explained, and pivoted to the levers, the abutments $p$ $p'$, swaging-dies $o$ $o'$, shears $o^4$ $p^4$, passage $x'$, the vertically-movable slide operating the swaging-dies and shears and connected by mechanism with the shaft of the main bed-plate, the gravitating arms, the slide movable in said arms, the nippers pivoted to said slide, and the rotary hammer, essentially as shown and set forth.

6. In a horseshoe-machine, the combination, substantially as described, of the bed-plate rotative with a horizontal shaft and having in its periphery circular arcs, the rockers sustained and movable in said arcs, the shoe-forming dies and supporters connected to the rockers and to the bed-plate, the auxiliary bed-plates revoluble on the axis of the main bed, the feeding mechanism for advancing the bar into the machine, the abutments $p$ $p'$, the swaging-dies and shears having mechanism for operating them, the levers P P and their tapered bending-rolls, the spring $g'$, the gravitating arms, the slide movable in said arms, the nippers pivoted to the slide, and the hammer revoluble on an eccentric-shaft, all arranged and supported and to operate essentially as shown and set forth.

7. In a horseshoe-machine, the die-supporter H and rocker G, detachably connected to each other and constructed substantially as described, in combination with the bed-plate having peripheral circular arcs and rotative with a horizontal shaft, the rods, spring-cases, and springs connecting the bed-plate and said die-supporter, the auxiliary bed-plates rotative on the axis of the main bed, the levers provided with the tapering bending-rolls and having means for resisting the spread of said rolls while the forming-die with a blank for forming a shoe thereupon is forced between them, the gravitating arms, the slide movable in said arms, the nippers pivoted to the slide, and the hammer revoluble on an eccentric-shaft, all essentially as set forth.

8. In a horseshoe-machine, the gravitating arms independent of each other, and each pivoted at one end to the frame and grooved, notched, and arranged to support the slide V and operate the nippers pivoted to said slide to grip a shoe to the die when moved within said arms, as set forth, in combination with the bed-plate rotative with a horizontal shaft, and having peripheral circular arcs, the rockers sustained and movable in said arcs, the die-supporter connected to the rocker and bed-plate, the forming-die, the auxiliary bed-

plates revoluble on the axis of the main bed-plate, and the rotary hammer, all arranged and to operate essentially as set forth.

9. In a horseshoe-machine, the levers P P, with the tapering bending-rolls $f'$ $f^2$, said levers having means of resisting the spread of the rolls to cause them to fold the blank against the forming-die when forced between them, substantially as described, in combination with the forming-die, the die-supporter and rocker, the main bed-plate and the auxiliary bed-plates, both revoluble on a horizontal axis, the former having peripheral circular arcs, for the purpose set forth, the gravitating arms, the slide movable in said arms, the nippers pivoted to the slide, and the revoluble hammer, all essentially as shown and set forth.

10. In a horseshoe-machine, the rotary hammer having a body circular in cross-section and supported on a shaft provided with a bearing for said body which is eccentric to the journals of said shaft, substantially as described, in combination with the forming-die, the die supporter and rocker, the main bed-plate and the auxiliary bed-plates, having a common axis, the former having peripheral circular arcs which receive the said rocker and support the same with the supporter and die, the gravitating arms, the slide movable in said arms, and the nippers pivoted to said slide, all essentially as shown and set forth.

11. In a horseshoe-machine, the chute X, adjustably connected to a shaft pivoted to the machine and provided with an arm connected to a spring secured to the frame, said arm having a set-screw to operate it in a direction against the spring, and the chute having clearers adjustable therein to disengage the shoe from the die, in combination with the die, the die supporter and rocker, and the main bed-plate and the auxiliary bed-plates revoluble on a common axis, the former having peripheral circular arcs to receive the said rocker and support the same with the die-supporter and die, all essentially as set forth.

12. In a horseshoe-machine, the mechanism for feeding the bar into the machine, substantially as described, it consisting of the rolls $s$, the gear $t$, connected to one of said rolls, the gear $u$, engaging the gear $t$, and fixed to an arbor provided with a hand-wheel and a roll $v$, the latter in the same horizontal plane with the rolls $s$, and the slides $x$ and $z$, provided with means of adjusting them horizontally, in combination with the passage $x'$ and gage $p^{12}$, and the dies $o$ $o'$, for supporting the bar when fed into the machine, all essentially as shown and set forth.

13. In a horseshoe-machine, the rotary hammer having a body circular in cross-section and supported on a shaft provided with a bearing for said body which is eccentric to the journals of said shaft, substantially as represented, in combination with the forming-die and movable bed, essentially as shown and set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

JAMES H. TAYLOR.
CHARLES POVEY.

Witnesses:
S. N. PIPER,
J. E. JONES.