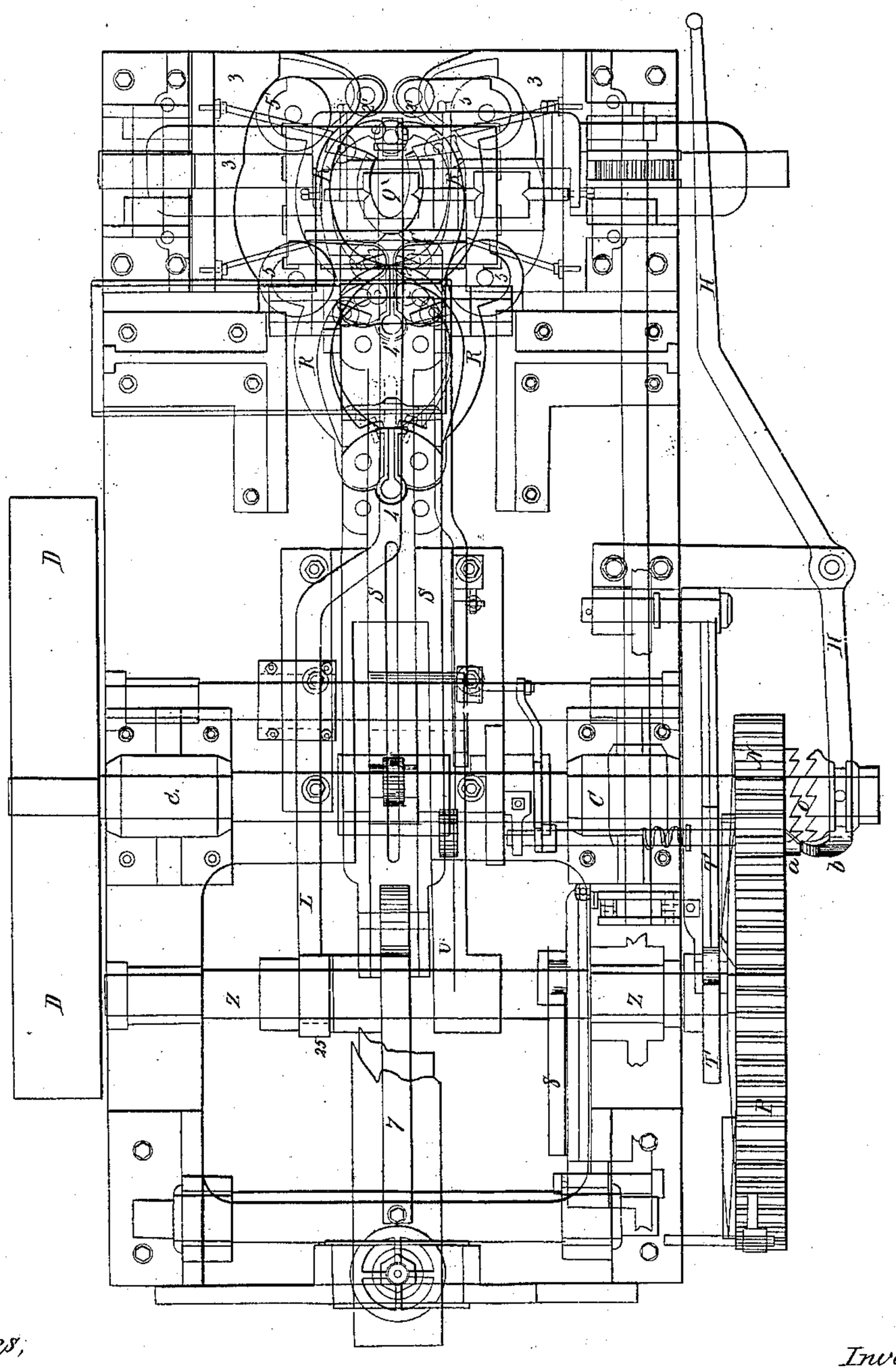
7 Sheets—Sheet 1.

C. H. PERKINS.

HORSESHOE MACHINE.

No. 32,645. Patented June 25, 1861.

Fig. 1.



Witnesses;
John Gaetane
Joseph N. Moore

Inventor;
Chas. H. Perkins

7 Sheets—Sheet 2.

C. H. PERKINS.

HORSESHOE MACHINE.

No. 32,645. Patented June 25, 1861.

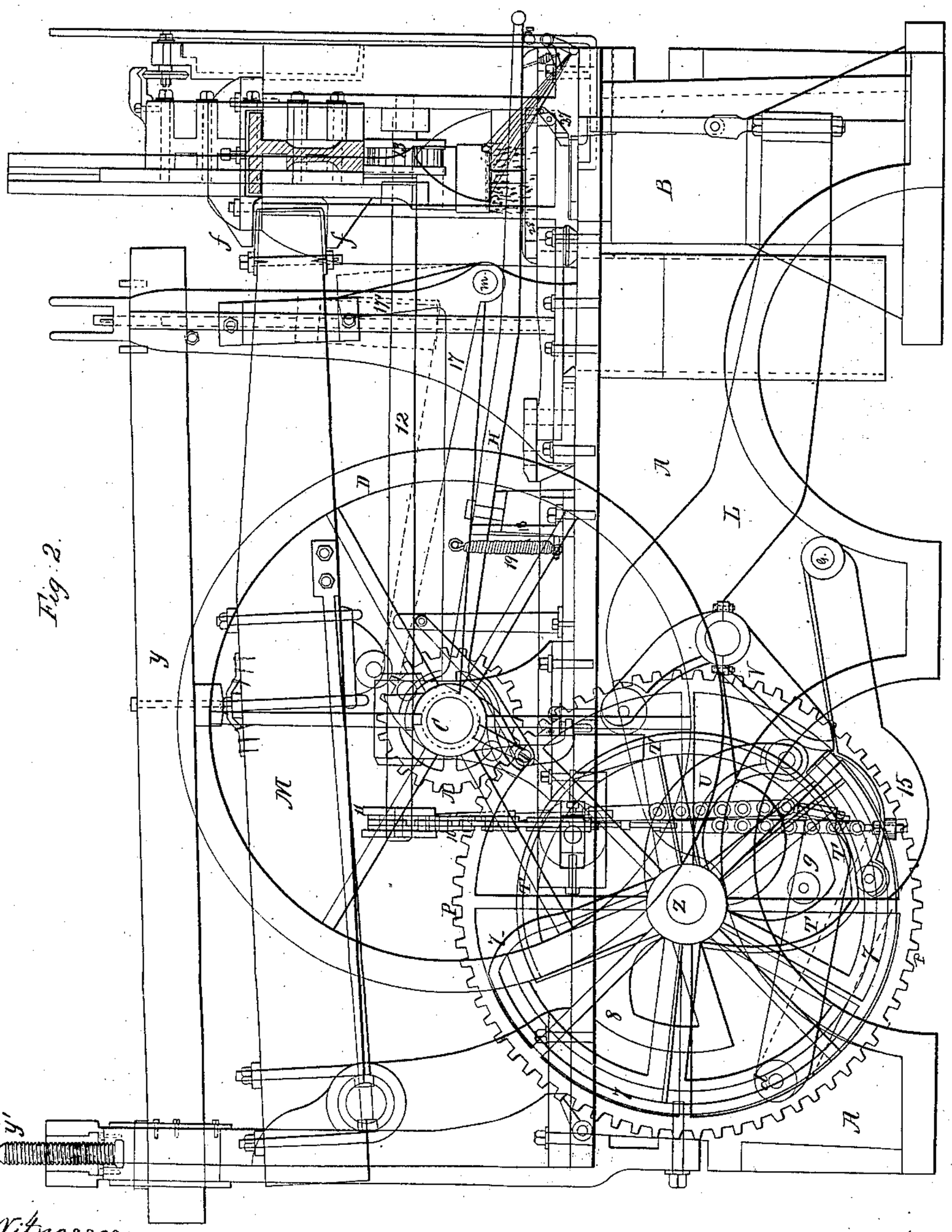


Fig. 2.

7 Sheets—Sheet 3.

C. H. PERKINS.

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Fig: 3.

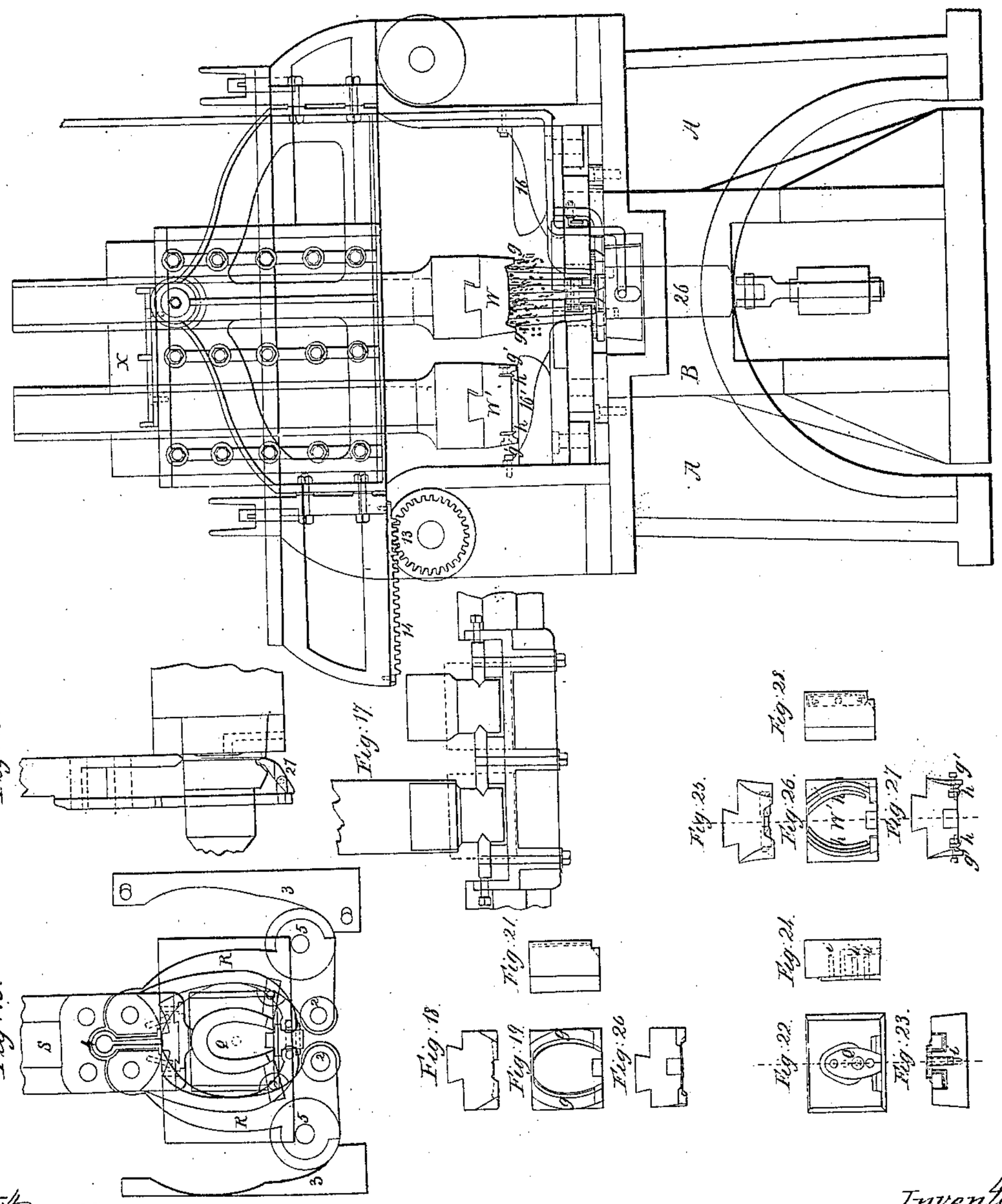

Fig: 16.

Fig: 17.

Fig: 15.

Fig: 21.

Fig: 18.

Fig: 19.

Fig: 20.

Fig: 24.

Fig: 22.

Fig: 23.

Fig: 25.

Fig: 26.

Fig: 27.

Fig: 28.

Witnesses;
John Gardner
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Inventor;
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7 Sheets—Sheet 4.

C. H. PERKINS.

HORSESHOE MACHINE.

No. 32,645. Patented June 25, 1861.

Fig: 6.

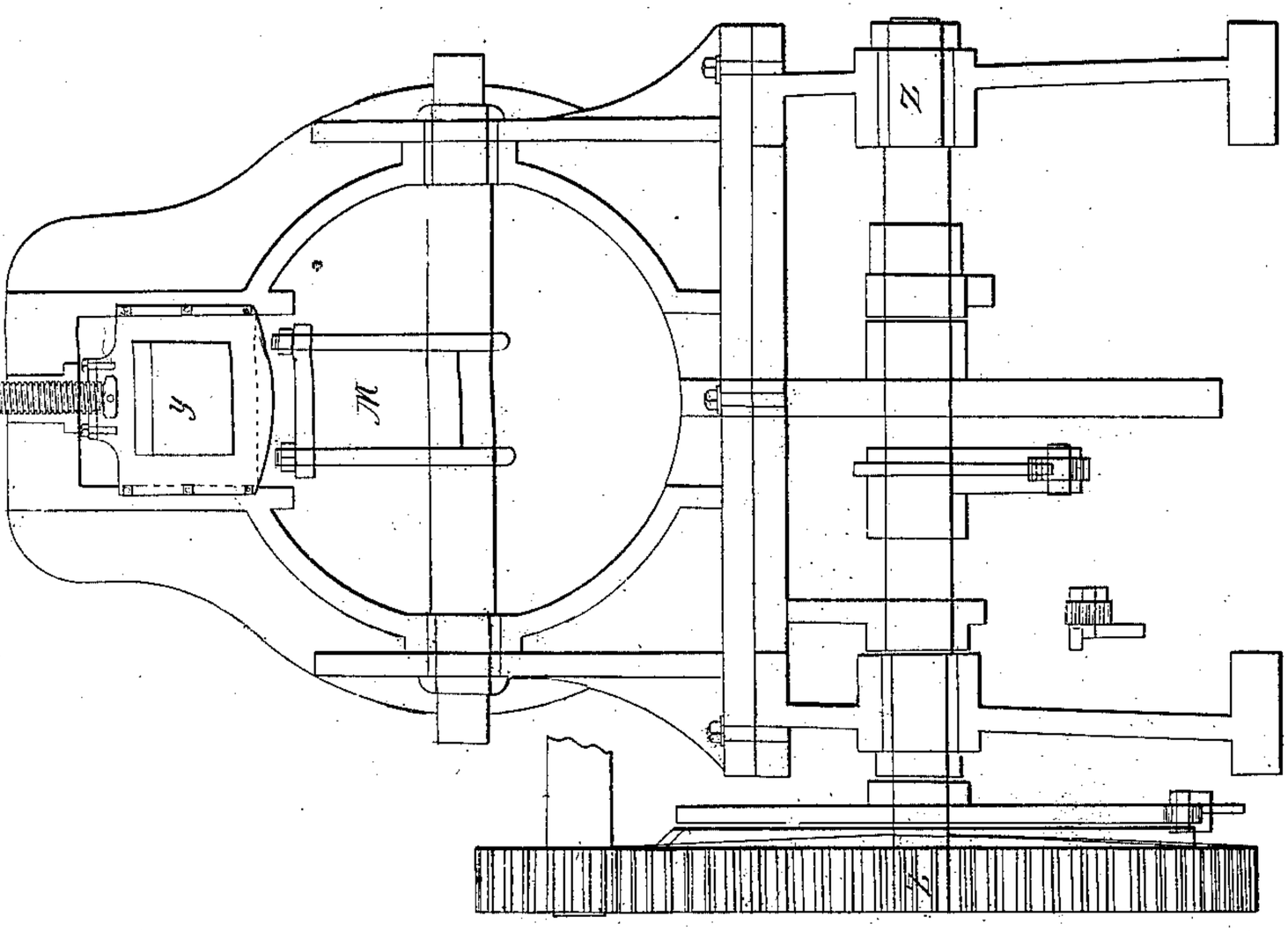
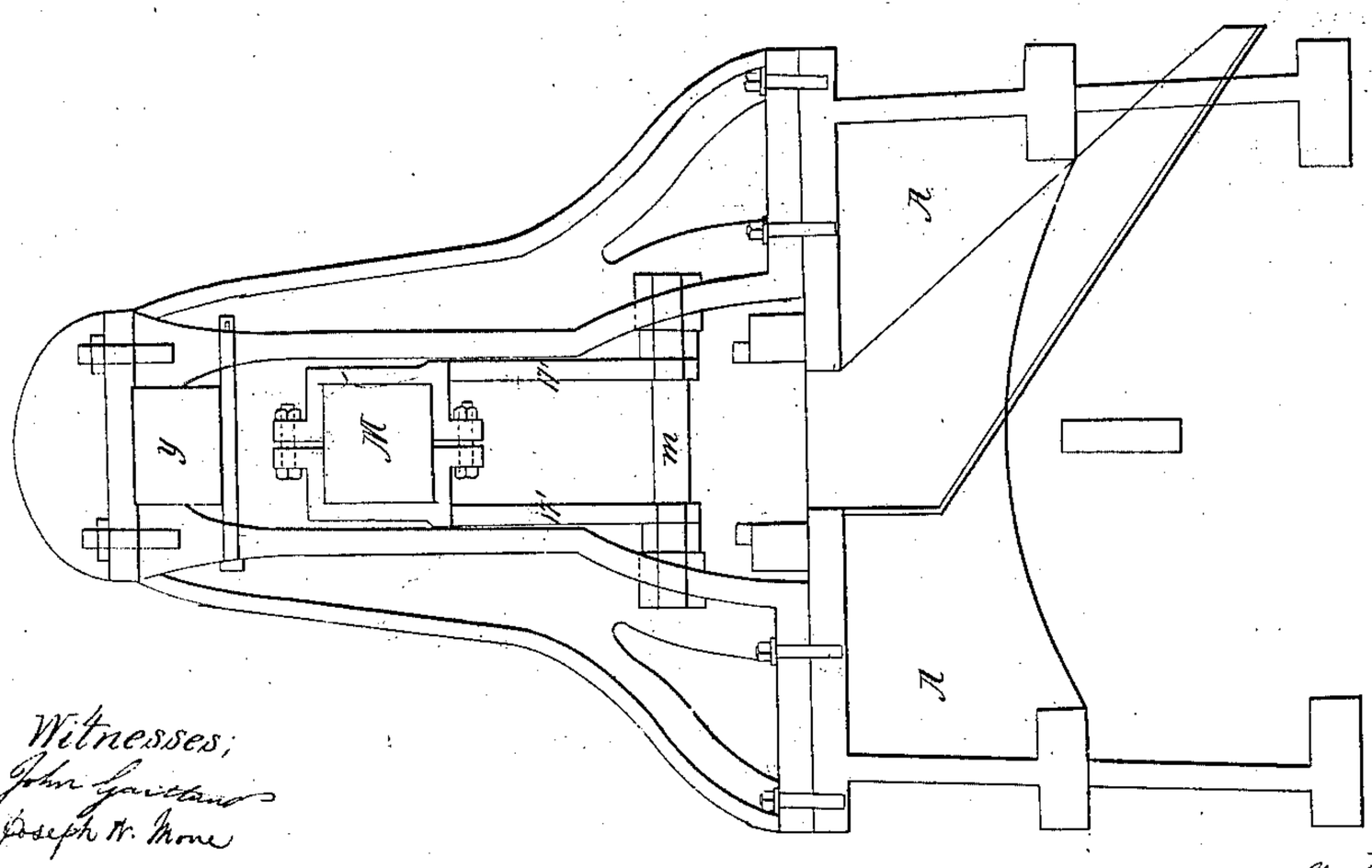


Fig: 4.



Witnesses;
John Gardner
Joseph W. Thorne

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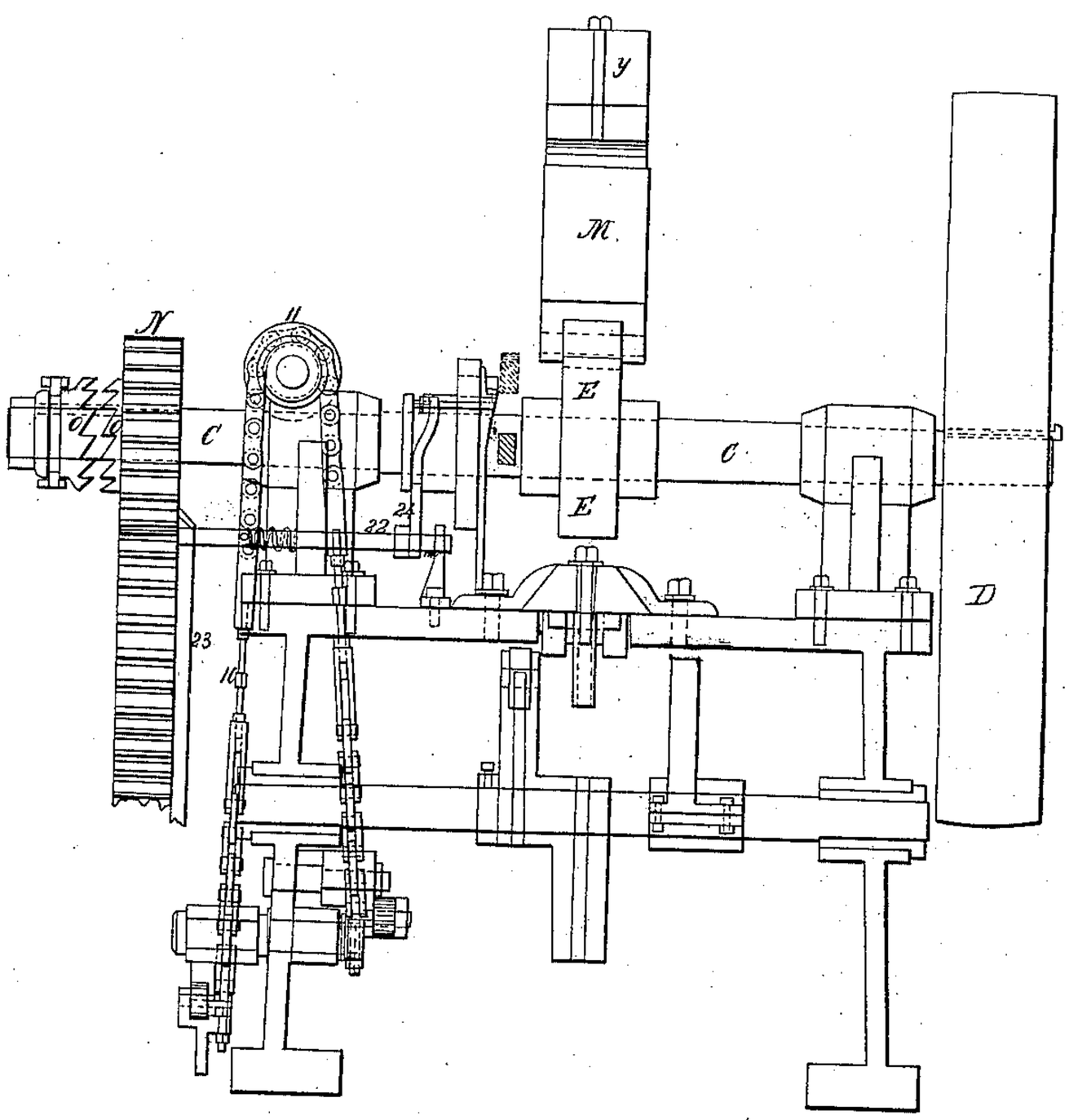
7 Sheets—Sheet 5.

C. H. PERKINS.

HORSESHOE MACHINE.

No. 32,645. Patented June 25, 1861.

Fig: 5.



Witnesses;
John Gorham.
Joseph W. Moore.

Inventor;
Charles H Perkins

7 Sheets—Sheet 6.

C. H. PERKINS.

HORSESHOE MACHINE.

No. 32,645. Patented June 25, 1861.

Fig: 7.

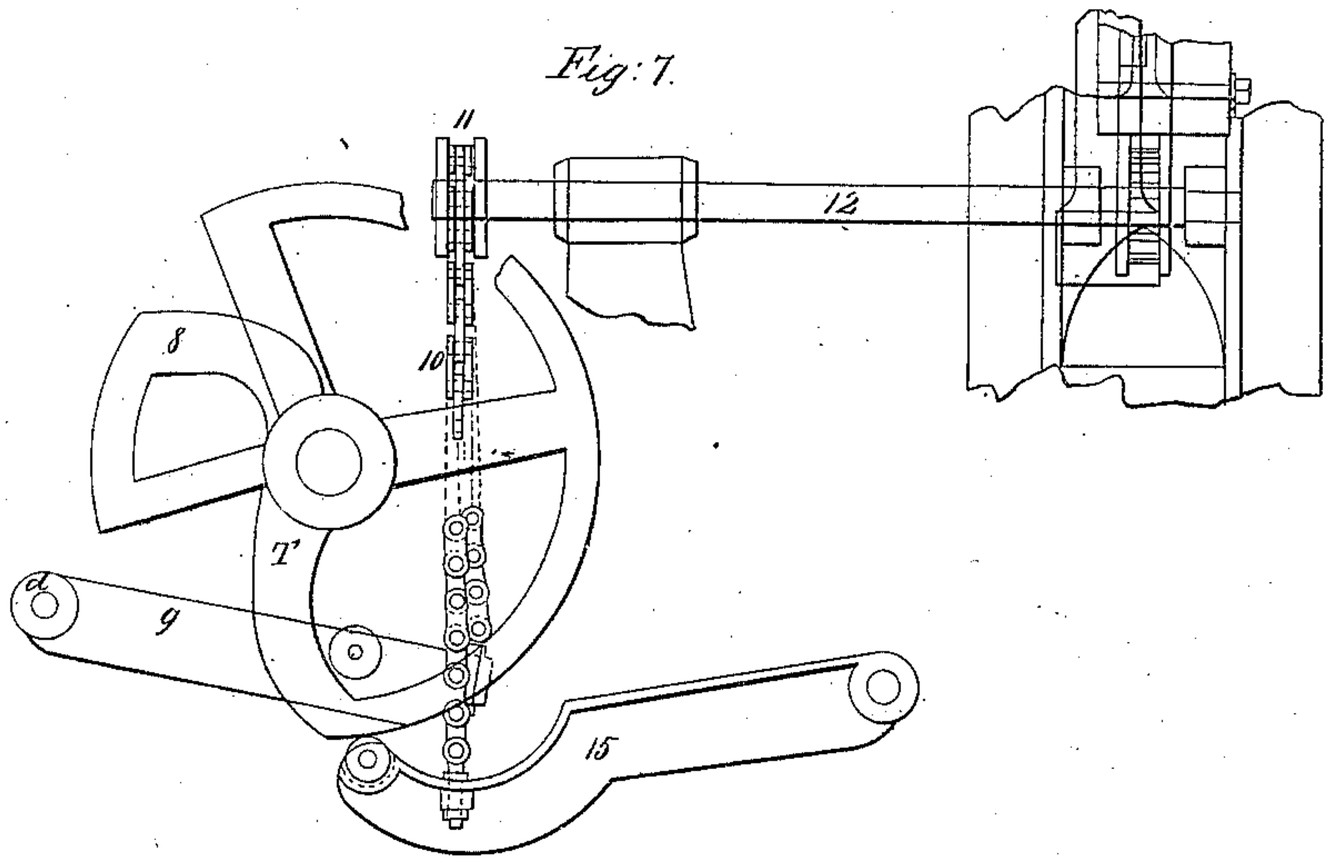


Fig: 8.

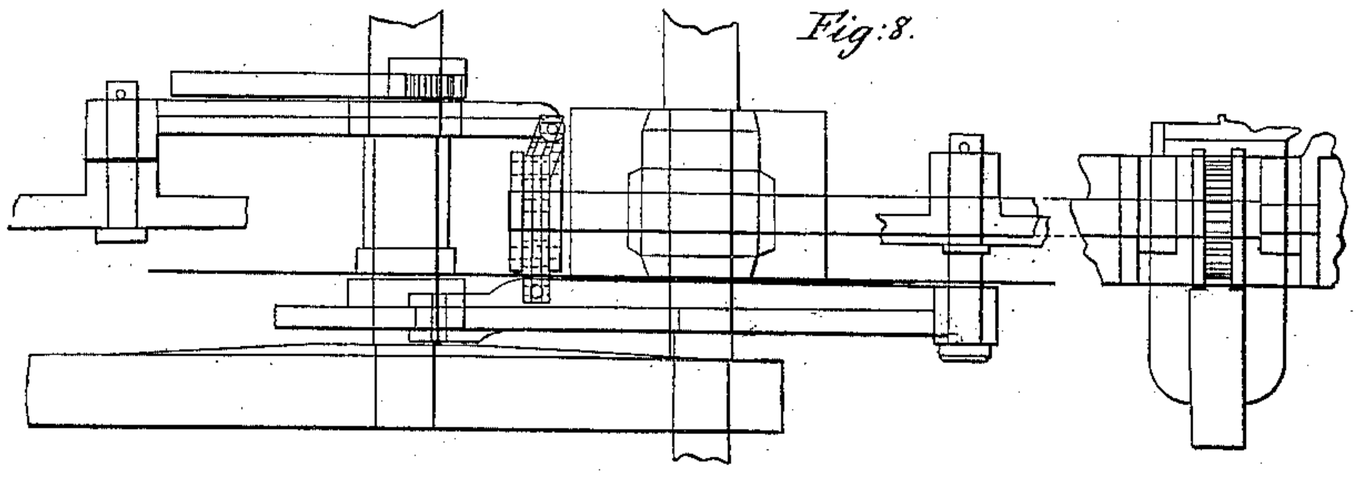


Fig: 9.

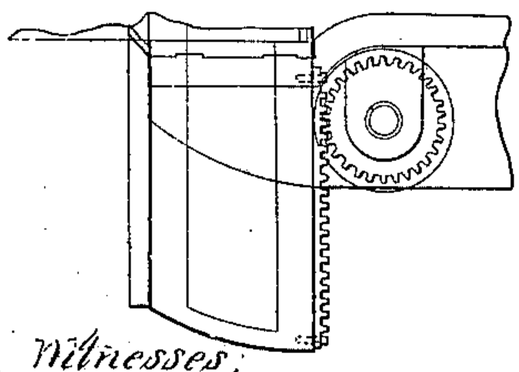
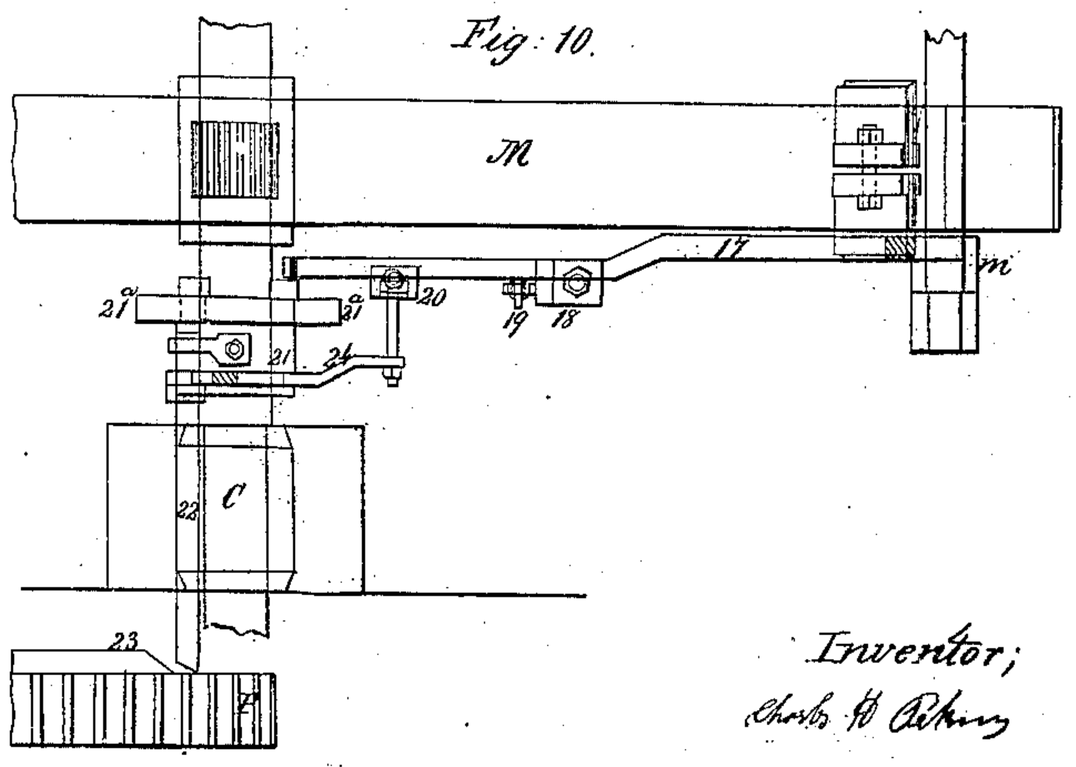


Fig: 10.



Witnesses;
John Gaittan
Joseph N. Moore

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Chas. H. Perkins

7 Sheets—Sheet 7.

C. H. PERKINS.

HORSESHOE MACHINE.

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Fig: 13.

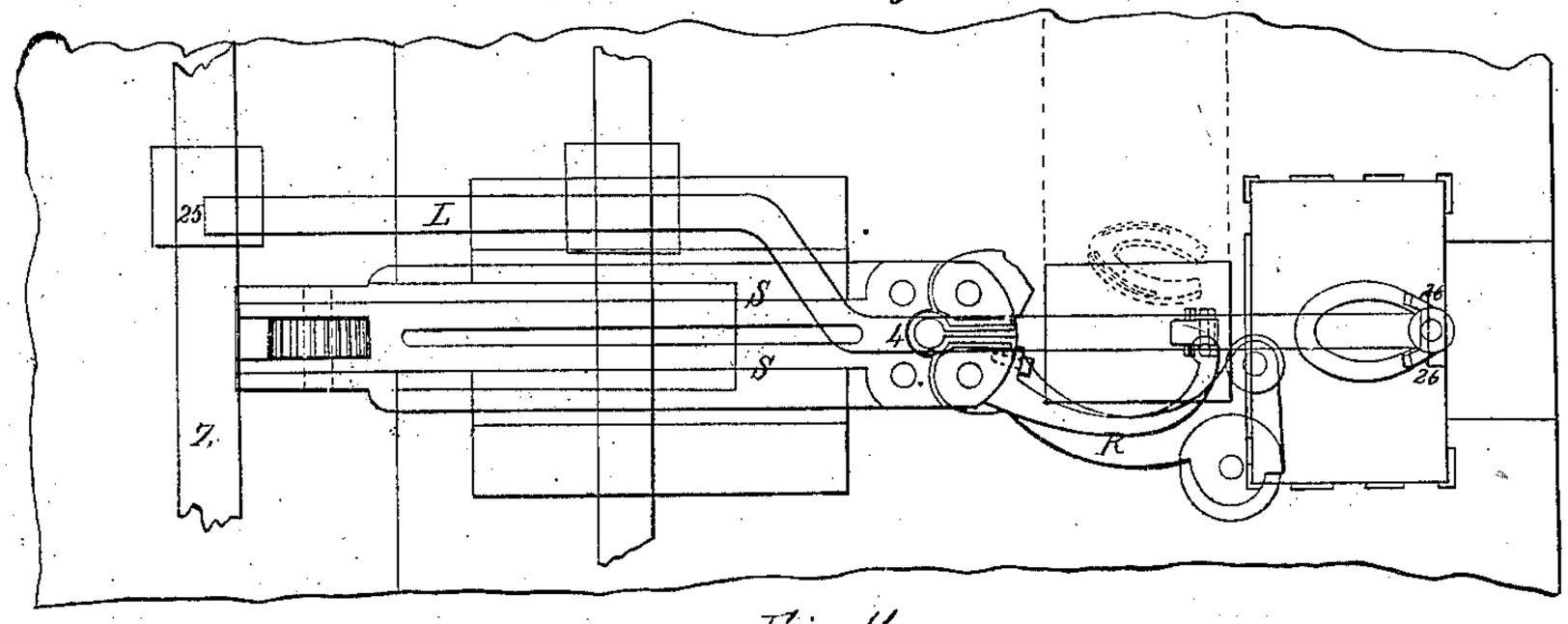


Fig: 14.

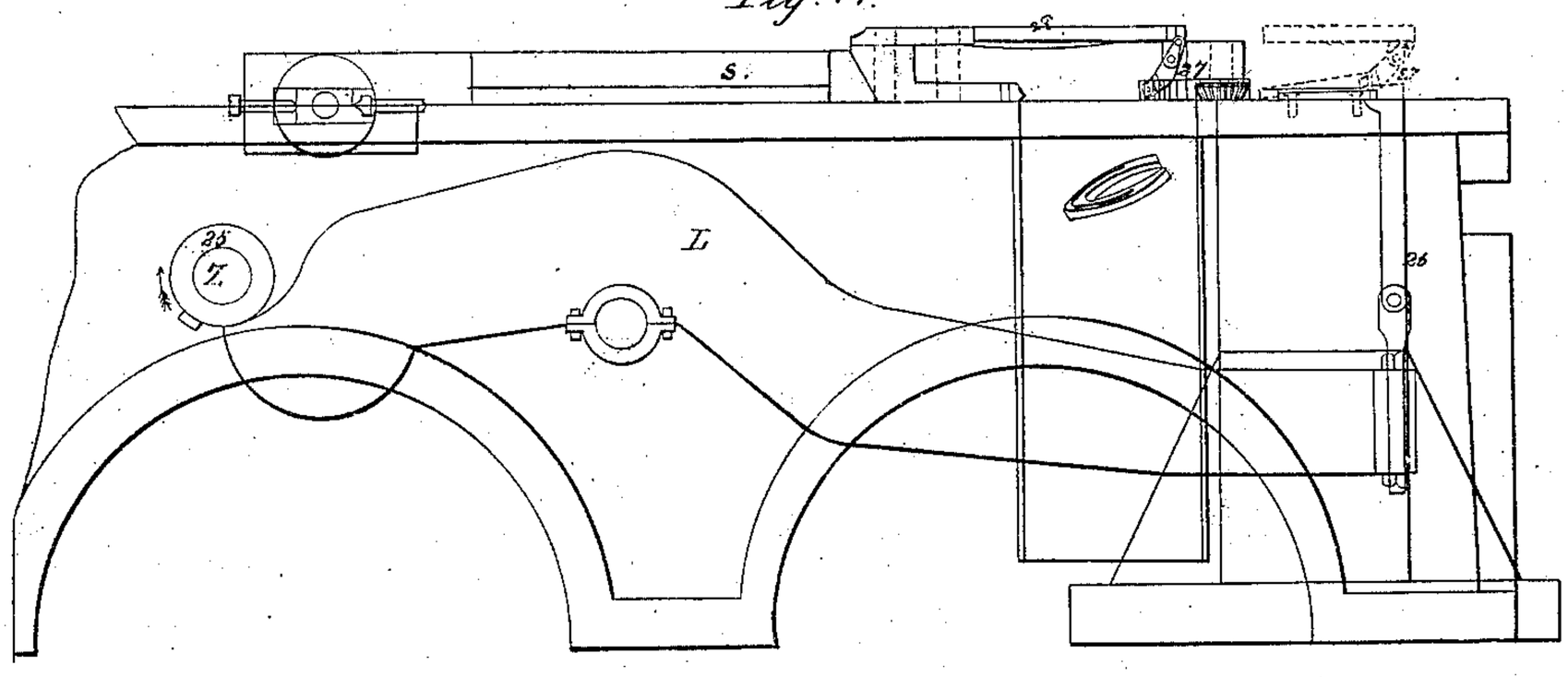
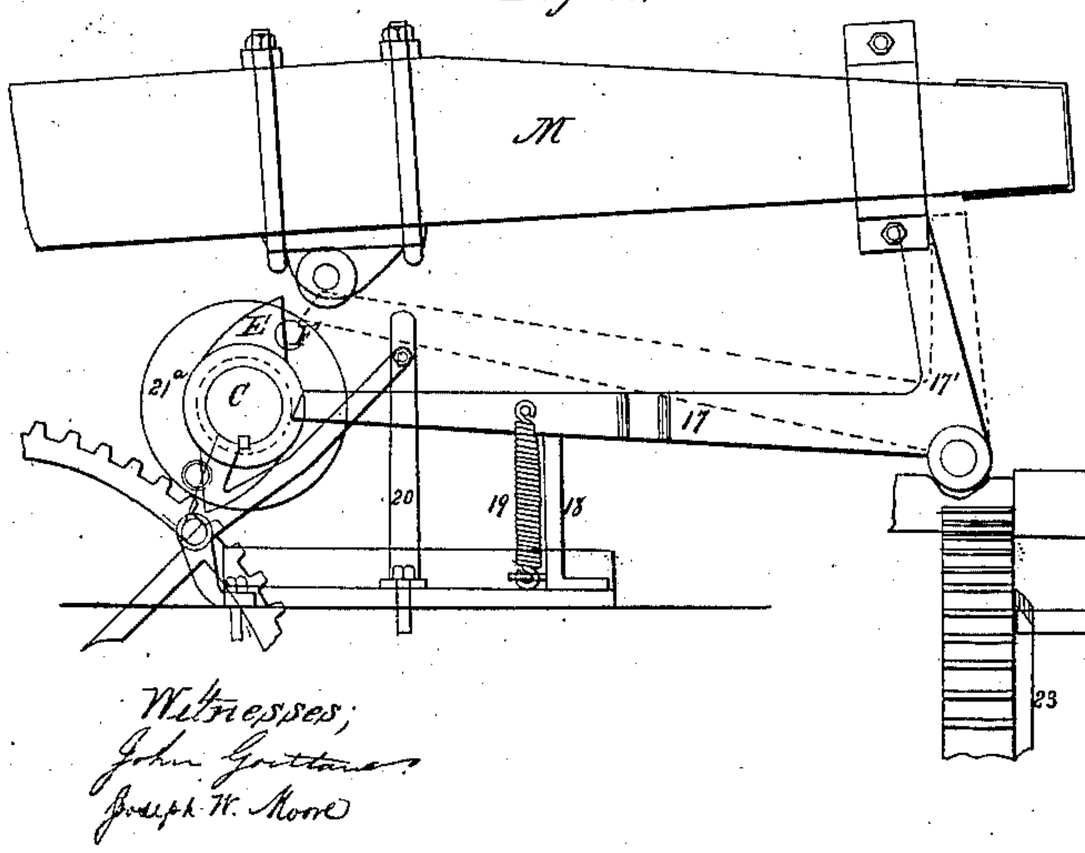
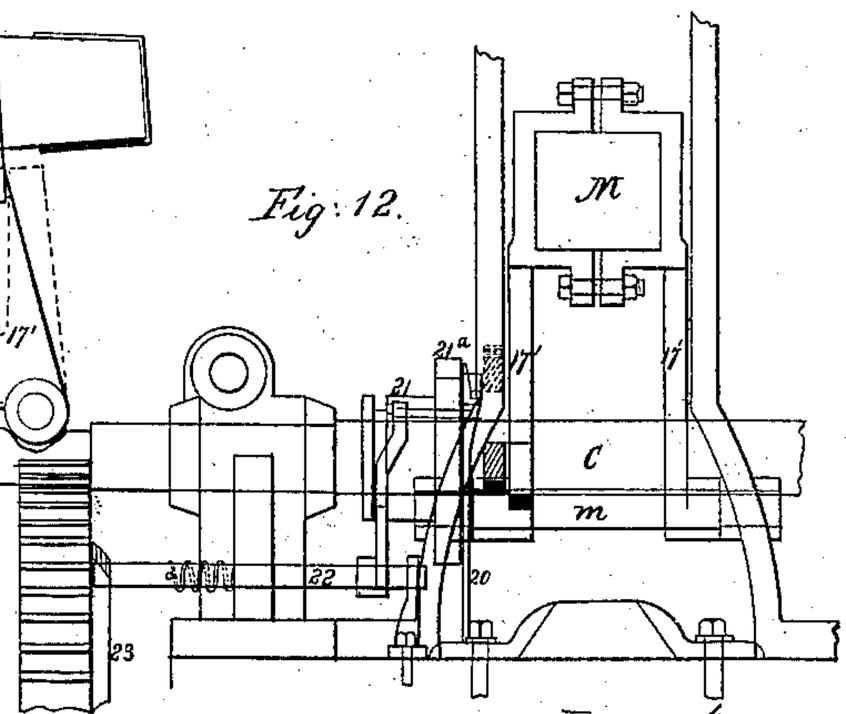


Fig. 11.



Witnesses;
John Gorham
Joseph W. Moore

Fig: 12.



Inventor;
Charles H Perkins

UNITED STATES PATENT OFFICE.

CHARLES H. PERKINS, OF PROVIDENCE, RHODE ISLAND.

IMPROVED MACHINE FOR MAKING HORSESHOES.

Specification forming part of Letters Patent No. **32,645**, dated June 25, 1861.

To all whom it may concern:

Be it known that I, CHARLES H. PERKINS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Machines for Making Shoes for Animals; and I do hereby declare that the following specification, taken in connection with the drawings, making a part of the same, is a full, clear, and exact description thereof.

Figure 1 is a plan of the machine. Fig. 2 is a side view, the side of the bed-plate being removed. Fig. 3 is a front view. Fig. 4 is a vertical section showing the means by which the hammer-helve is supported in order to avoid the "half-blow." Fig. 5 is a vertical section showing the chain-gear which works the sliding head. Fig. 6 is a rear view. Fig. 7 shows the cams and their arrangement for working the chain-gear to move the sliding-head. Fig. 8 is a plan of the same. Fig. 9 shows the rack of the sliding head and the pinion in the end of the chain-shaft which works it. Figs. 10, 11, and 12 show, respectively in plan, side view, and in section, the arrangement for avoiding the half-blow. Figs. 13 and 14 show the devices for removing the shoe after it is finished. Figs. 15 to 27 are detailed parts to be referred to hereinafter.

There are two general methods of making shoes for animals by means of machinery, one by rolling or compressing a bar of metal into the proper form and the other by hammering the bar and drawing it into the shape of a shoe by a succession of blows similar to the ordinary operation to effect the same purpose by hand labor.

The invention which is the subject of this patent relates to improvements in machinery for making shoes by the latter method and is composed of two principal parts. The first part consists in a new arrangement and combination of mechanical agencies for fashioning the shoe from a blank or bar of metal, and the second in a means for arresting the fall of the hammer at certain periods and thereby preventing the "half-blow," as it is termed, which is the well-known incident to the operation of all hammers worked by a tappet-shaft or "wild-cat."

In the several sheets of drawings the same parts are indicated by the same letters, and are also colored the same shade throughout the figures.

A, Figs. 2, 3, and 4, is the bed or frame of the machine, the top of which is planed smooth and is of ample size to accommodate the various parts of the machinery. Sufficient space should also be provided beneath the table of the frame to give room for the operation of the several parts presently to be described, while in front and underneath the platform of the frame A, but entirely disconnected from it, is the anvil-bed B, Figs. 2 and 3.

On the top of the platform of the frame A, mounted in suitable bearings, is the principal shaft C, Figs. 1, 2, and 5, provided with a heavy balance-wheel D and a driving-pulley of any desired size. This shaft is provided with a three-armed tappet-wheel or wild-cat E, Figs. 2 and 5, which operates on the hammer-helve M, Figs. 2, 5, and 6, and causes it to rise and fall three times during each revolution of the shaft. At the extremity of the shaft farthest from the balance-wheel is placed a loose pinion N, Figs. 1 and 2, which engages with the teeth of the gear-wheel P on the cam-shaft Z, the pinion being made to revolve with the main shaft at pleasure by means of the clutch or ratchet gear O O, one part of which is attached to the shaft by a feather and can be moved away from its counterpart, which forms a part of the pinion, by means of a controlling-lever H. The object of this clutch-gear is to disconnect the operating mechanism from the main shaft the instant that each shoe is completed. To effect this disconnection at the proper moment a cam *a* is placed on the rim of the gear-wheel P, Fig. 1, the inclined face of which at each revolution of the gear-wheel strikes against the inclined face *b* of the lever which works the clutch, and, forcing the faces of the clutch apart, effects the desired purpose. All the operations necessary to produce a shoe being effected during one revolution of the cam-shaft Z, to which the gear-wheel P is attached, it is evident that the disconnection of the main shaft from the other mechanism can be accomplished at the proper time by the means described without difficulty. We will suppose now that the clutch is in gear with the face of the pinion and the machine ready to commence its operation. A bar of metal *c*, Fig. 1, of the right length when bent to form a complete shoe is placed on the platform of the frame directly behind the raised "former"

Q on the anvil, Fig. 1. A pair of benders R R are now carried forward and bend the bar *c* around the former, the second position of the benders being shown at R′ R′. These benders are curved arms jointed at their rear ends to a sliding bar S and carrying rollers 2 2 on their front ends. The anterior part of the slider, or that portion which is between the benders R R, is made straight for the purpose of forming on a horseshoe what is termed a "square toe." Stationary cams 3 3, affixed to the top of the bed A, govern the movement of the benders in lateral directions toward the shoe-blank while such benders are being forced forward by the sliding bar S S, and a spring 4 4′ tends to force them apart and cause the friction-rollers 5 5 to bear at all times against the stationary guiding-cams 3 3.

The forward and backward movement of the slider S S at the proper times is regulated and effected by the cam-wheel 7, Fig. 2, working against a friction-roller in the rear end of the slider S to force the slider in one direction, and by the wiper U, actuating the bell-crank V, the upper arm of which works into a socket on the under side of the slider to force it in the other direction. This part of the mechanism is substantially the same in principle and mode of operation as that shown and described to accomplish the same purpose in the Letters Patent of the United States, granted to me June 1, 1858, and numbered 20,441. The bar of metal having been bent around the former Q, as described, the hammer-die W is now released by the removal of a prop which has hitherto supported it, and which will be expained in describing the second part of my invention, and is permitted to fall with its full force upon the shoe. The wild-cat on the shaft C now acts upon the hammer-helve, thereby causing the hammer-die to rise and fall as many times as is necessary (in the instance shown six times) to "plate out" the shoe. The hammer-helve is then caught up and sustained by the prop before mentioned. At this moment the cam 8, Fig. 2, presses down the treadle 9, pivoted at *d*, and works the chain 10, which passes over the chain-gear 11 on the shaft 12. The shaft 12 is in consequence rotated far enough to enable the toothed wheel 13 secured to it, and which works into the rack 14, to move the sliding head in which the hammer-die is mounted so far to the right as to bring the creaser-die W′, Fig. 3, directly over the shoe in the place previously occupied by the hammer-die. The supporting-prop to the helve M is now again withdrawn and the creaser-die falls upon the shoe. The wild-cat then causes it to give another blow, when the helve M is again caught up and sustained as before. The cam T, Fig. 2, now operates the treadle 15, pivoted at *e*, to which the other end of the chain 10 is attached, whereby the shaft 12 is rotated far enough to return the sliding head in which the hammer and creaser dies are mounted to the first position. At the same time the benders are drawn back by the action of the wiper U upon the slider S S through the bell-crank V, as already shown, in readiness to act upon a second blank of metal.

The hammer and creaser dies W W′, Fig. 3, are each secured to a separate shaft fitted to slide in guides in the carriage X. On the back of each shaft are two feet *f f*, Fig. 2, between which the end of the helve M projects. When the carriage X is moved so far to the right as to bring the creaser-die W′ over the shoe, the feet *f f* are carried with it away from the helve M, and the hammer rests upon the platform 16. The creaser-shaft W′ is now substituted in the place of the hammer-shaft, and is operated, as has been described, in the same manner as the hammer-shaft, and when the carriage X is moved back to the left, so as to bring the hammer-die to its original position, the creaser rests upon the platform 16′.

In operating the hammer or creaser an impetus additional to the force of gravity may be imparted to either by the use of a spring-pole Y, Fig. 2, bearing upon the back of the hammer-helve M, the strain of which can be regulated at pleasure by turning the screw *y*′, which works a sliding block, into which one end of the spring-pole is inserted, the other end having an upward bearing against some fixed part of the machine. The face of the hammer-die, Figs. 3 and 19, is surrounded by a flange or raised rim *g g*, with the exception of an opening at the toe of about two inches in length, which is for the purpose of permitting the metal to be flattened or drawn out at that place. The interior contour of the flange corresponds to the shape of the intended exterior edge, the interior edge of the shoe being formed against the exterior edge of the former Q, Fig. 1. The inner side of the raised rim *g g* is beveled, so that the edge of the shoe, after the hammer has ceased working, will be beveled also. This is done for the purpose of compensating for the effect of the creaser, as will presently be seen, so that the edge of the shoe, after it has been finished, will be at a right angle with its face. The creaser W′, Figs. 3 and 26, has also a raised rim *g′ g′*, similar to that which has been described as being on the face of the hammer, the only purpose of which, however, is to furnish a guard for the sharp creaser-dies *h h* in case a blow is struck when no shoe is upon the anvil, and also to furnish a protection for the creaser when resting on the platform 16′. The sharp creaser-dies *h h* indent the face of the shoe, and thereby force the metal out toward the edge, leaving the shoe "full," as it is called, and without any appearance of ever having had a beveled edge.

A great practical result is derived from the use of hammers provided with the rim or flange described over a smooth-faced hammer striking upon an anvil, upon which similar flanges are placed, as is the case in the

machine described in the Letters Patent heretofore referred to as granted to me. In the latter case much of the scale which is formed by the oxidation of the iron while it is being hammered is deposited within the rim on the anvil, and is driven into the face of the shoe greatly to the injury of its appearance, whereas by the plan above described the scale as fast as it forms is scattered by the force of the blow and by the jets of water thrown upon the anvil, so that the surface of the shoe is left as smooth and perfect as if worked by a hand-sledge.

The former Q, around which the bar of iron is bent, is also peculiarly constructed in order to avoid the difficulties incident to the use of blanks of metal, which are of slightly-unequal thickness. Experience has proved that although one of my machines will make a perfect shoe from a bar whose thickness is proportioned to the height of the "former" above the anvil, yet that in case a blank happens to be a little thicker than it should be a "fin" will be formed upon the shoe in consequence of the excess of metal being spread out upon the top surface of the former. I therefore make the former Q in such a manner that it shall yield slightly to the blow of the hammer, and thereby am enabled to make it accommodate itself to the varying thickness of the blanks. The same principle can be applied in various ways; but the one which I have successfully used is shown in Figs. 22, 23, and 24. That part of the former Q which projects above the anvil is provided with three or more plugs or pistons *i i i*, which fit into corresponding sockets in the anvil, as shown in Fig. 24, at the bottom of each of which, as a bearing for the end of the piston, is a disk of rubber or other elastic substance, the tendency of which is to keep the former raised higher than the intended thickness of the blank, but which will readily yield on receiving the blow of the hammer.

The second part of my invention relates to a means for arresting or "blocking up" the hammer-helve at certain periods during the operation of the machine for the purpose, principally, of preventing the occurrence of what is called the "half-blow," and incidentally to cause the faces of the hammer and the creaser to be raised sufficiently high to admit of the free movement of the sliding carriage X, to change their relative positions. The half-blow of a tilting hammer is produced by the fact that the helve is caught by one of the tappets of the wild cat before the hammer has reached the face of the anvil. Two powerful opposing forces are thus brought into opposition, involving the consequence of a severe shock to the machine. It is evident that this evil will insue in the operation of any trip-hammer where the speed of the wild-cat is disproportioned to the time required for the descent of the hammer. I do not propose to obviate the difficulty in such a case; but assuming the machine to be properly driven I have sought to prevent the now frequent occurrence of it at the moment of starting. At some convenient point near the forward extremity of the helve M a lever 17, Fig. 2, is attached to a shaft *m*, which has its bearings in standards on the platform. (See now Figs. 10, 11, and 12.) On this shaft are keyed two short arms 17′ 17′, Fig. 12, which can be adjusted at any angle with the long arm 17. When the two short arms are so placed as to be in the position shown in Figs. 11 and 12, it is evident that the helve M will be propped up. If, however, the position of the same arms be as shown in dotted lines, Figs. 2 and 11, the helve will be free to fall, and it is clear that the position of the supporting-arms is controlled by the position of the long arm 17, which operates the shaft to which they are keyed. Underneath the arm 17 is placed a standard 18, which limits the range of its downward motion, and a suitable spring 19 constantly tends to keep the arm 17 bearing upon the top of the standard and consequently prop up the helve. From this it is seen that the hammer-helve is at all times raised above the range of motion of the tappets of the wild-cat, except at the time when the long arm 17 is raised high enough to change the position of the supporting-arms 17′ 17′.

In order to permit the hammer-helve to fall at the proper times and to remain subject to the action of the wild-cat for the length of time necessary to allow the hammers to complete their work, I place on the platform of the machine near the extremity of the arm 17 a flexible standard 20, Fig. 11, which will afford a support for the arm 17, if raised high enough to bring it underneath, unless it is sprung aside by some agency. The standard 20 is controlled by means of a rod 24, which is attached to another rod 22, arranged as shown in Figs. 11 and 12. A coiled spring on the rod 22 is conveniently arranged so as to force the arm 24 in one direction, thereby springing the standard 20 out of its perpendicularity and maintaining it so until a cam 23 on the gear-wheel P bears against the end of the rod 22 and counteracts the strain. Thus no support is afforded for the arm 17, which when raised removes the prop to the hammer-helve, except during the time that the end of the rod 22 is acted upon by some countervailing force. The lever 17 is raised at the proper time to permit the hammer-helve to fall by the following arrangement: On the shaft C a grooved sliding collar 21 is placed, whose position on the shaft is controlled by the rod 24, (an arm from the rod being inserted in the groove.) To this collar is secured a disk-plate 21ª, on the face of which are a number of projecting pins equal to the number of the tappet-arms on the wild-cat. Any one of these pins will, by the revolution of the disk-plate, which by means of a feather is made to turn with the shaft C, raise the end of the arm 17 high enough to permit the flexible

standard, which at the same time is free to act, to spring underneath the arm to sustain it whenever the action of the cam 23 causes the collar 21 to be forced toward the hammer-helve. The pins are so adjusted relatively to the tappets of the wild-cat as that the one which acts to release the helve shall do so on the instant that one of the tappets has passed the highest point in its circle of revolution, and thus insure a full blow from the hammer before the next tappet comes in contact with the helve to tilt it.

From the preceding description it follows that the hammer-helve is at all times blocked up, so that the wild-cat will not act to tilt it, except at those times when the cams on the rim of the wheel P cause the pins on the disk-plate to raise the arm 17, and these cams are so adjusted as to act only during the time that the hammers are to be operated, thus effectually preventing the happening of the half-blow and also insuring the elevation of the hammer-faces while the various other motions of the machine are being made. After the shoe is finished I remove it from the machine by the following arrangement of mechanism: On the cam-shaft Z is placed a cam 25, Figs. 1, 13, and 14, arranged to act upon the lever L, extending from the shaft to the front of the machine once during every revolution of the shaft. To the forward extremity of the lever L is attached a jointed rod 26, which works in a guide through the platform and has its upper extremity terminating in two prongs, which embrace the rear portion of the former Q, Fig. 14. The cam 25 is adjusted to act on the lever L just in advance of the retreat of the slider S and benders R R. The rod 26 will in consequence be thrown upward and tip up the shoe. At this moment the benders start to return to their first position, and in their progress a scraper 27, attached to a frame 28, projecting over the benders from the slider S, drags the shoe off the platform and permits it to fall into the delivering-trough.

The operation of the whole machine is as follows: The blank of which the shoe is to be made having been properly placed, the benders come forward and bend the blank around the former. The supporting-prop to the hammer-helve is now removed and the plating-hammer falls with a full fair blow upon the blank. As the face of the hammer now rests upon the blank, the hammer-helve is within the range of the tappets on the wild-cat, and the consequence is that the hammer is tilted until the cam-shaft Z has revolved far enough to permit the flexible standard to be drawn away from supporting the arm 17 when the helve is on being raised again by the wild-cat propped up as before. The sliding carriage X now shifts the creaser-hammer to the place just occupied by the plating-hammer, which last is deposited upon a platform and disconnected from the helve. At this moment the supporting-prop to the helve is withdrawn, as before, and a full blow is struck by the creaser-hammer upon the blank. The wild-cat causes the blow to be repeated when the flexible standard is again sprung aside and the helve again blocked up. The sliding carriage now returns to its first position, disconnecting the creaser-hammer from the helve and depositing it upon a platform. The rod 26 then operates to cant up the heel of the shoe, which enables the scraper which depends from the frame over the benders to carry off the shoe as the sliding bar to which the benders are attached returns to its first position. The machine is now ready to repeat these described operations.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination and arrangement of a separate hammer and creaser with a single helve, so that while the one is at a state of rest and disconnected from the helve the other shall be connected therewith and capable of being operated by it independently of the other, substantially as described.

2. The use of a separate hammer and creaser capable of acting independently of each other, in combination with the instruments for giving the first bend to the shoe-blank, substantially as described.

3. Constructing the face of the hammer with a raised rim, as described, for the purpose of giving shape to the shoe and also for facilitating the escape of the scale as it is formed.

4. The combination of the prongs 26 and scraper 27 or their equivalents for the purpose of removing the shoe after it has been finished, applied and operated substantially as described.

5. The mode of operation, substantially as specified, by means of which the prop is removed from the hammer-helve to permit the operations of plating and creasing the shoe to be performed, and at such times relatively to the revolution of the wild-cat as to prevent a half-blow from the hammer, as set forth.

In witness whereof I have hereunto subscribed my name this 27th day of February, A. D. 1861.

CHARLES H. PERKINS.

Witnesses:

JOHN GARTTAND,

JOSEPH W. MOORE.