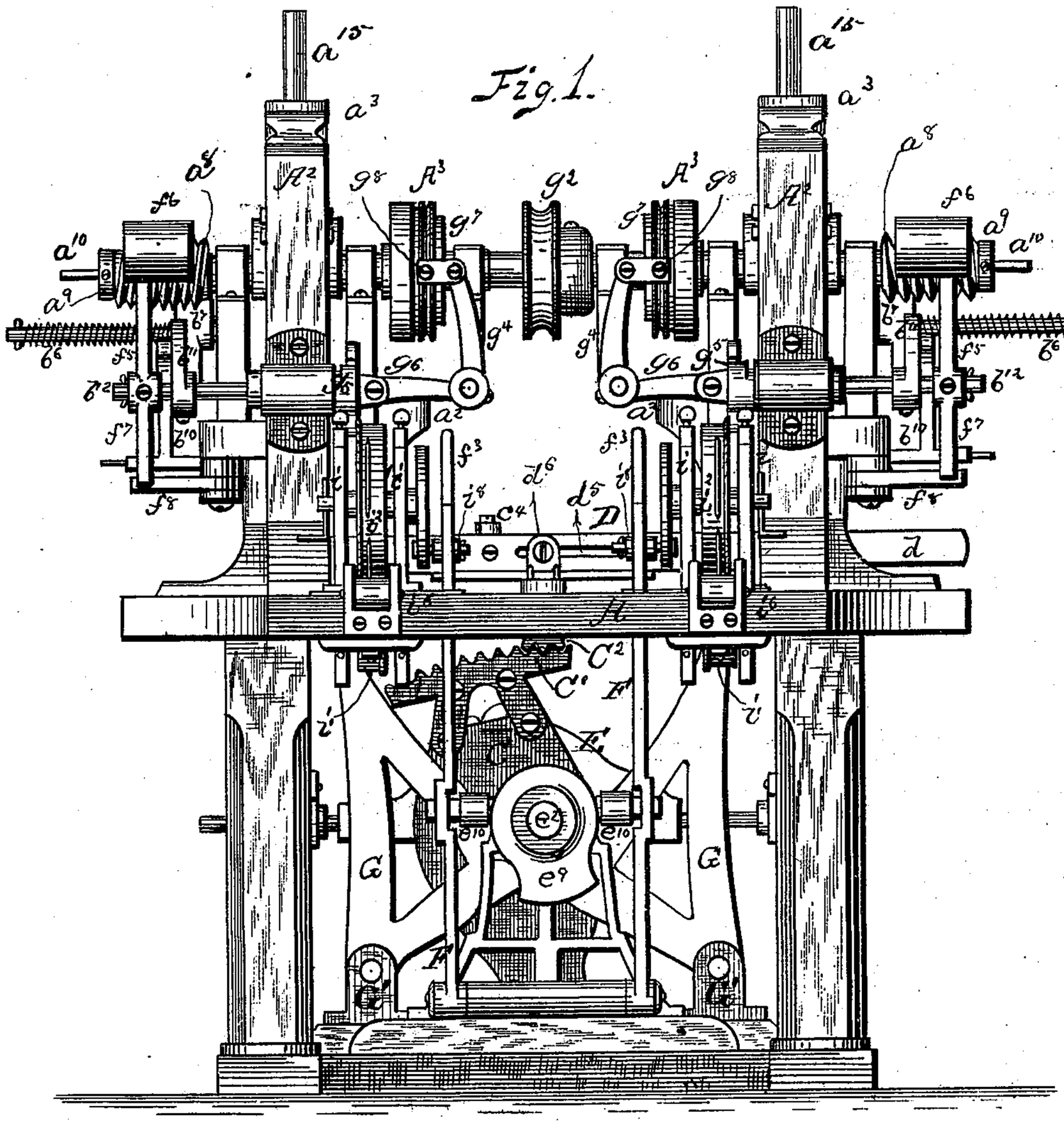
8 Sheets—Sheet 1.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. **Patented July 27, 1880.**

Fig. 1.



Witnesses:
E. L. Bates
Fred Gymer

Inventor:
Edward W. Tyrrell.
Mills & Sattorf.
Attorneys.

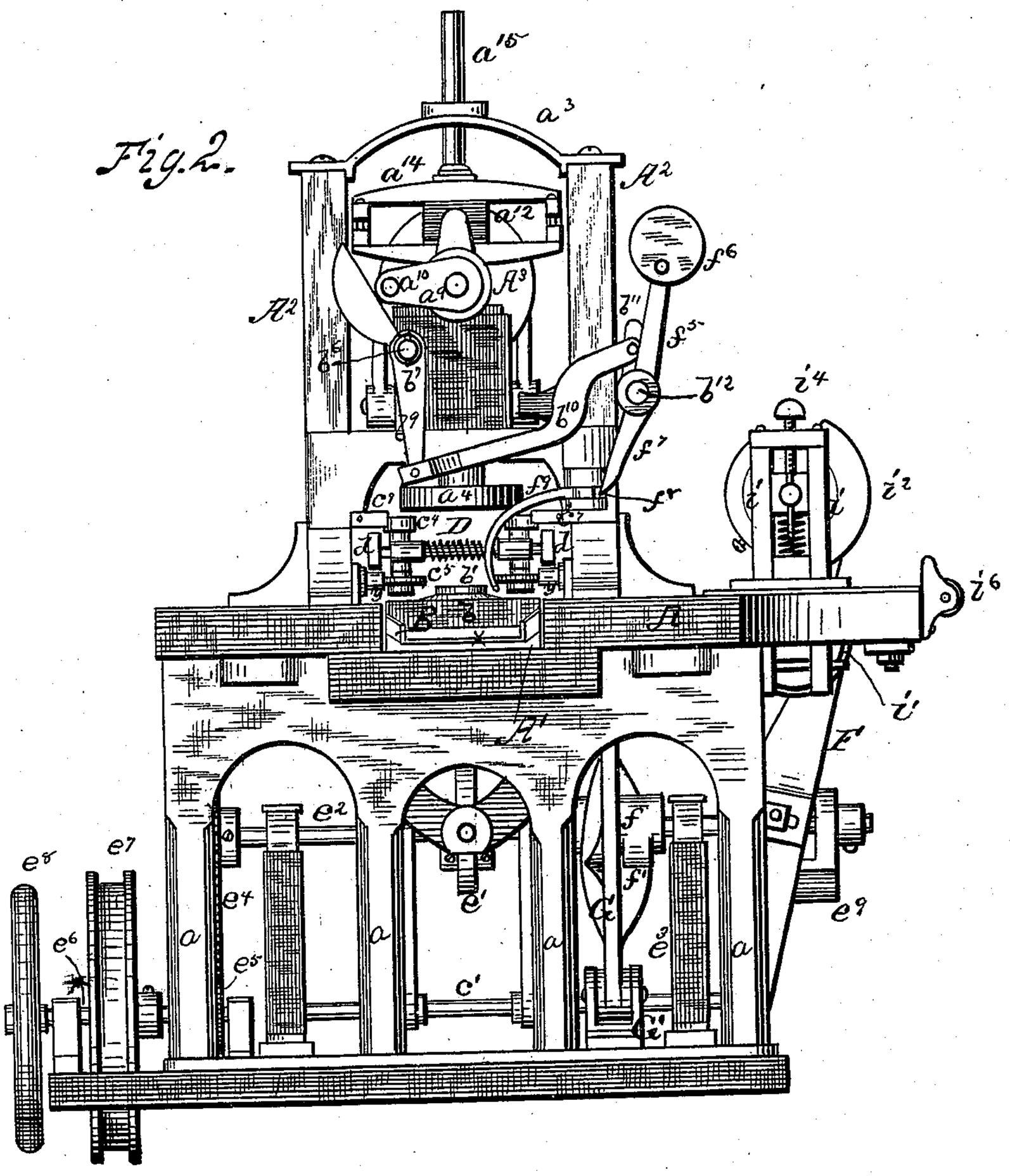
8 Sheets—Sheet 2

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. Patented July 27, 1880.

Fig. 2.



Witnesses:
E. A. Bates
Thos Tyrrell

Inventor:
Edward W Tyrrell
Millet Lothrop &
Attorneys

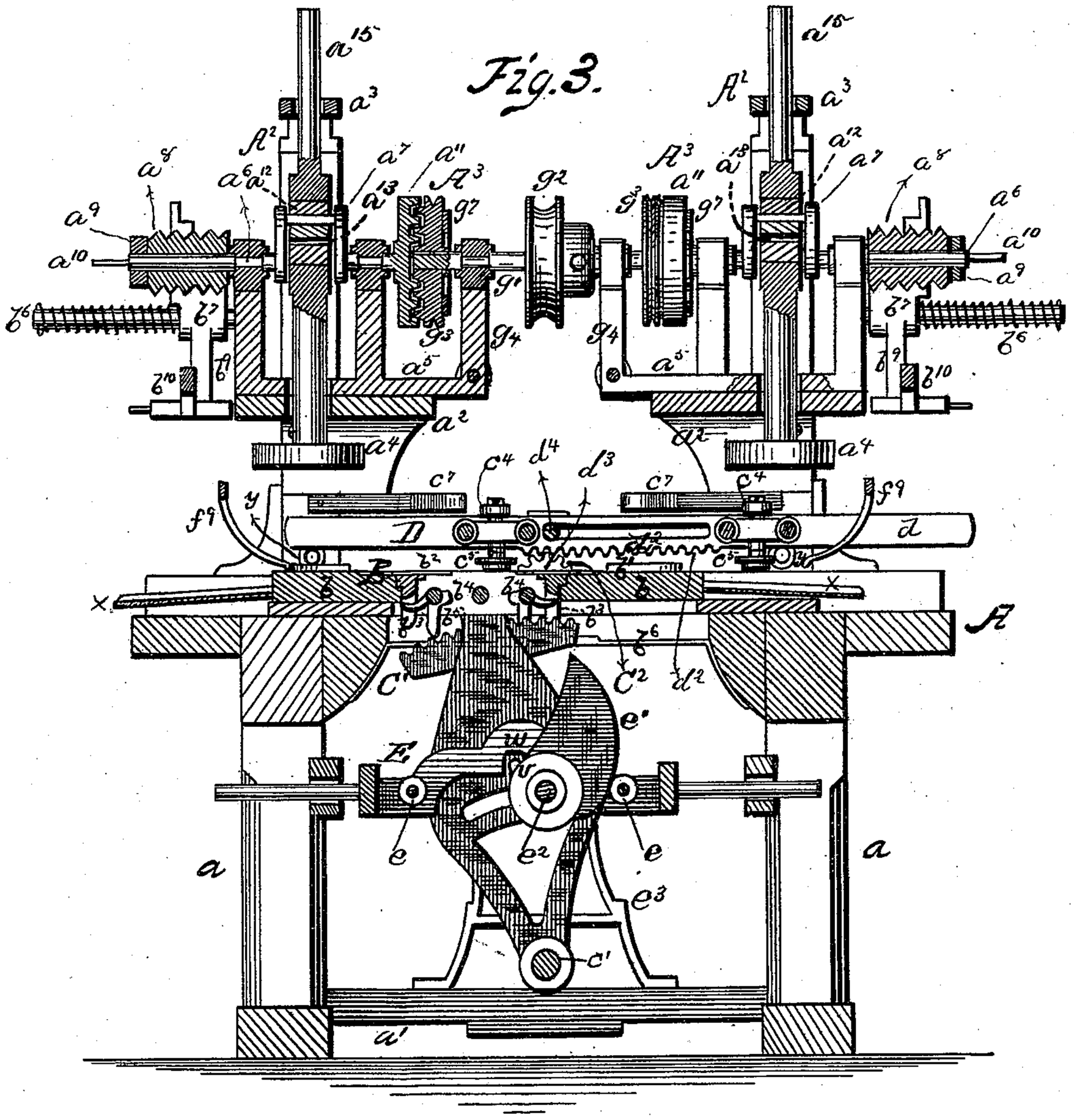
8 Sheets—Sheet 3.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. Patented July 27, 1880.

Fig. 3.



Witnesses:
E. C. Bates
H. L. Sprague

Inventor:
Edward W Tyrrell.
Mills & Lathrop.
Attorneys.

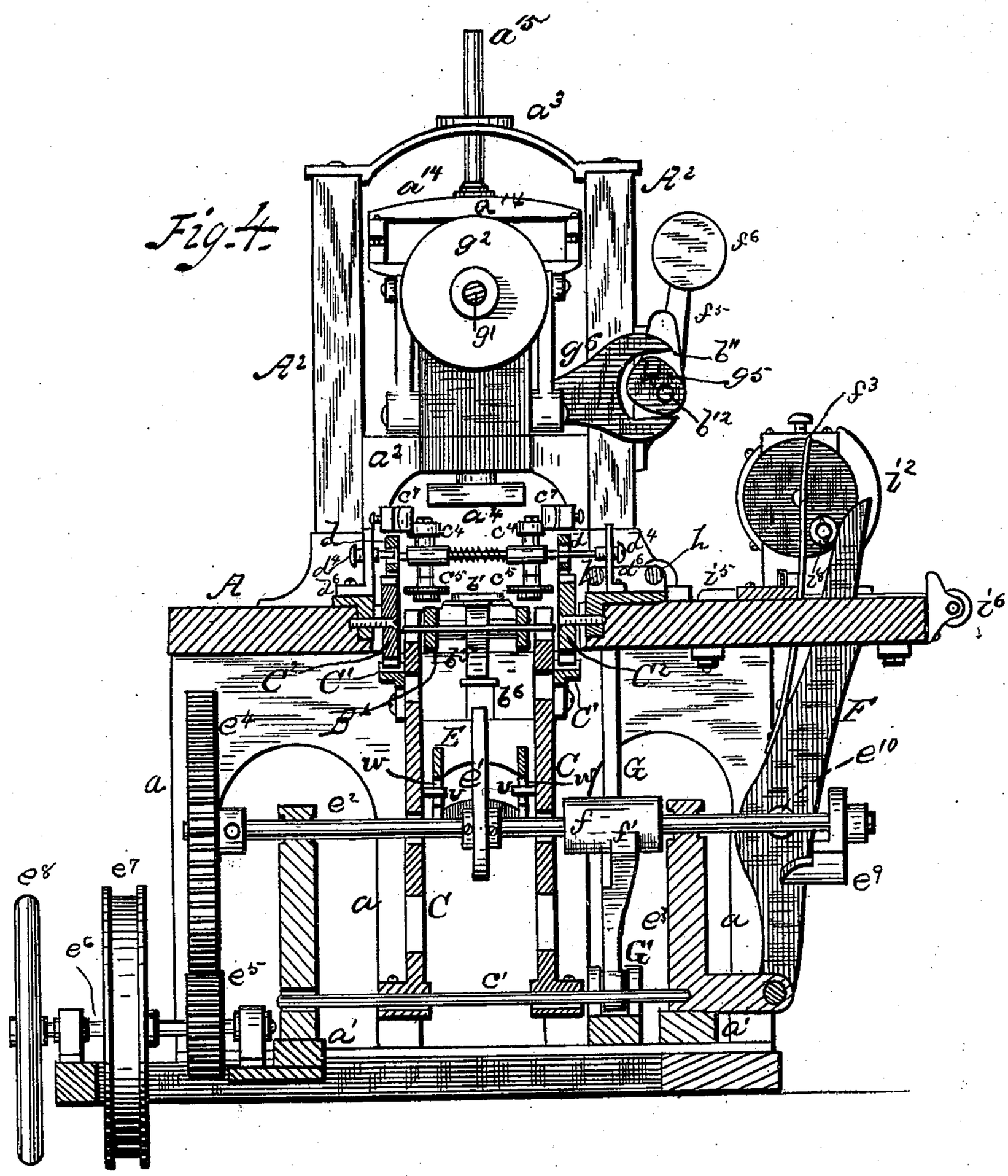
8 Sheets—Sheet 4.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. Patented July 27, 1880.

Fig. 4.



Witnesses:
E. F. Bates
Thos. Tyrrell

Inventor:
Edward W. Tyrrell
Miller & Lathrop
attorneys

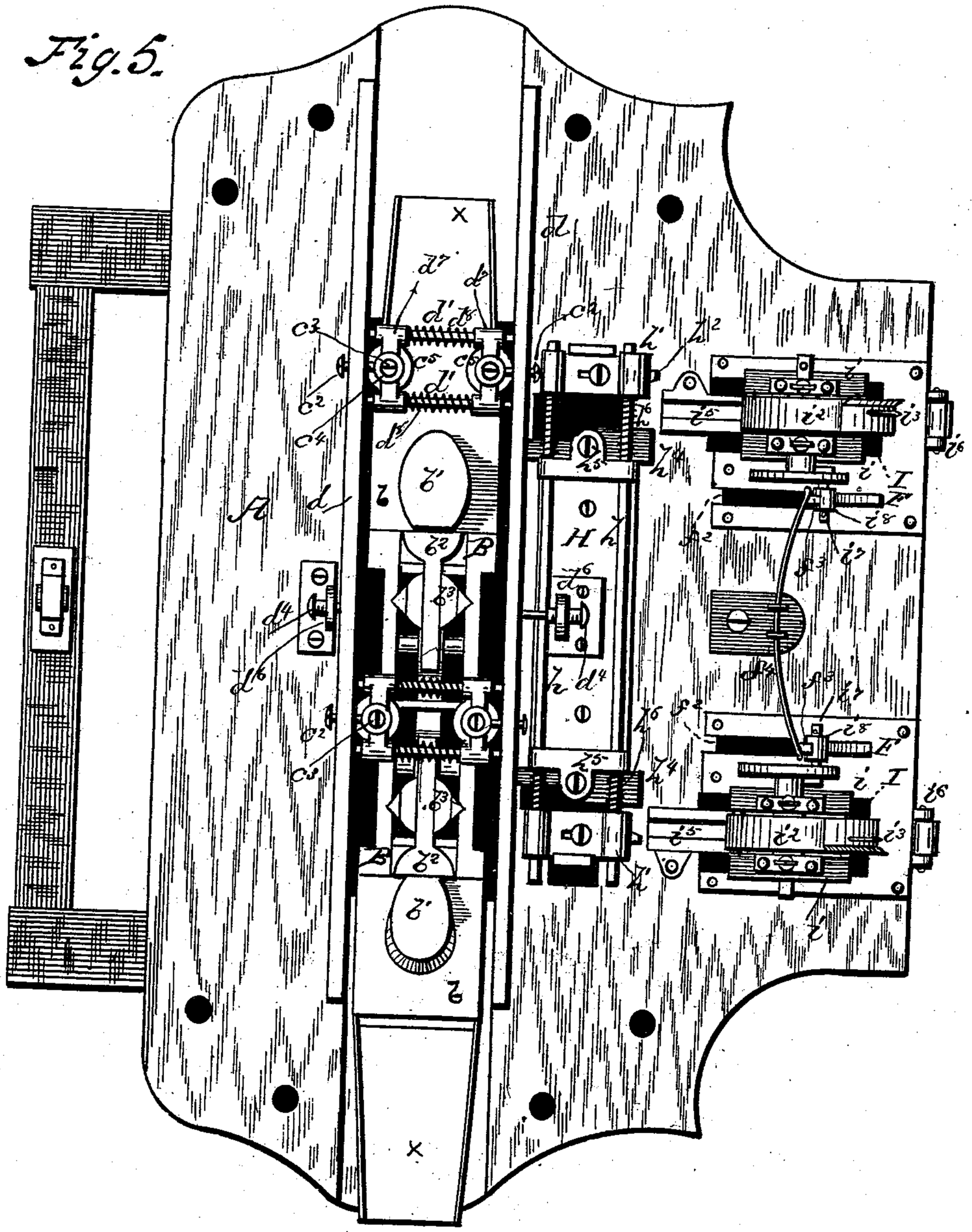
8 Sheets—Sheet 5.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. Patented July 27, 1880.

Fig. 5.



Witnesses:
E. A. Bates.
Thos. Tyrrell

Inventor:
Edward W. Tyrrell.
Millet & Lathrop.
Attorneys.

8 Sheets—Sheet 6.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. **Patented July 27, 1880.**

Fig. 6.

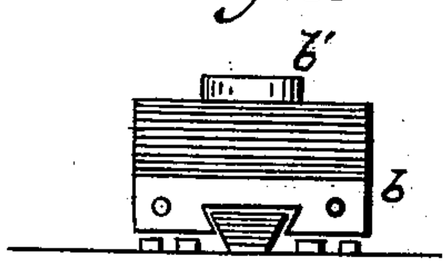


Fig. 7.

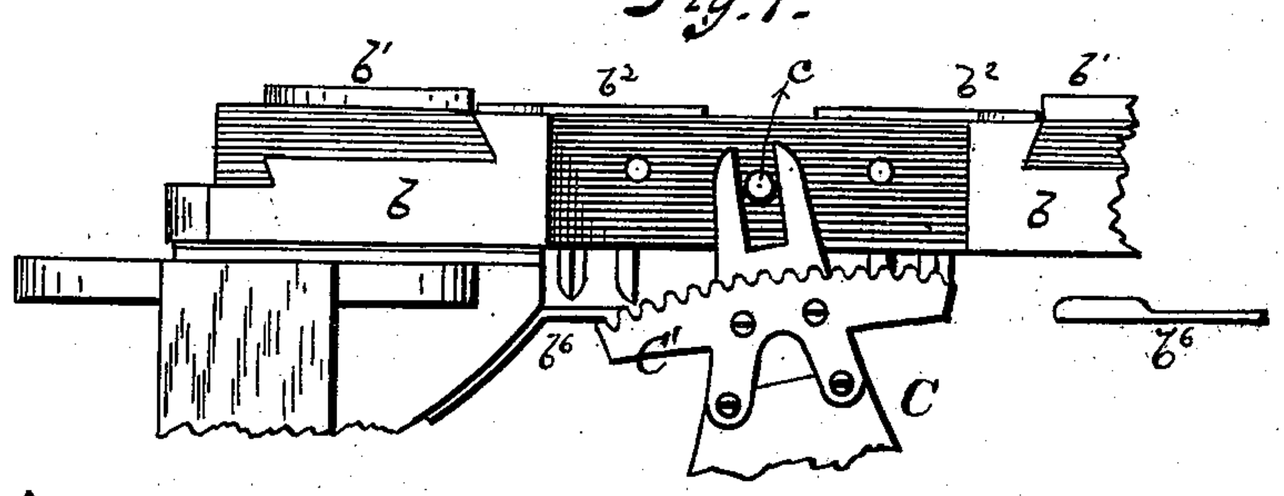


Fig. 8.

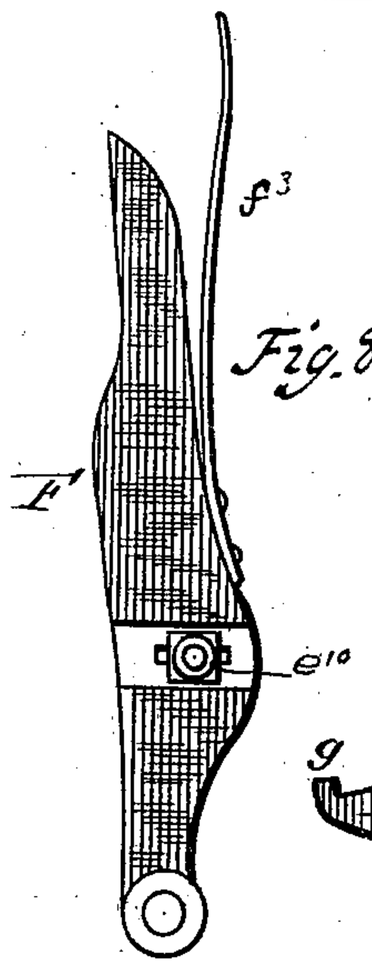


Fig. 9.

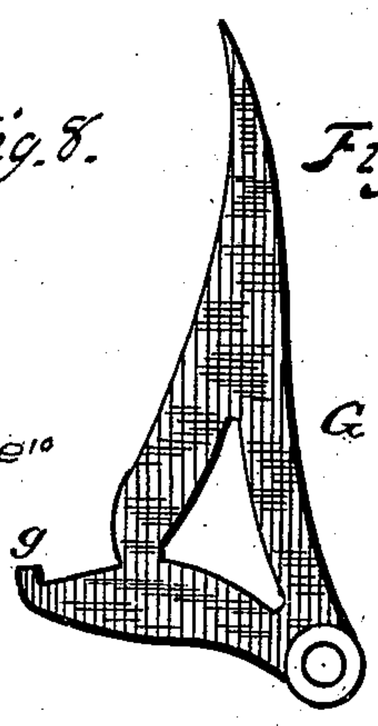


Fig. 10.

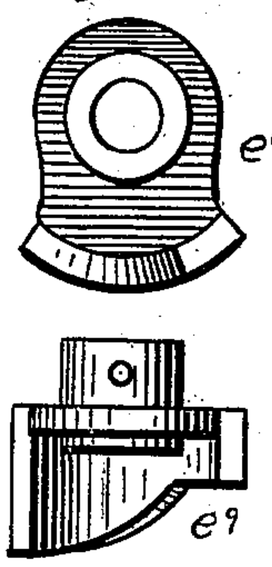


Fig. 11.

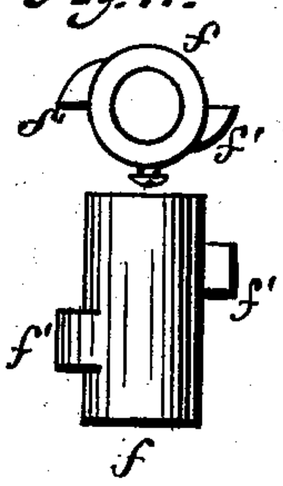


Fig. 12.

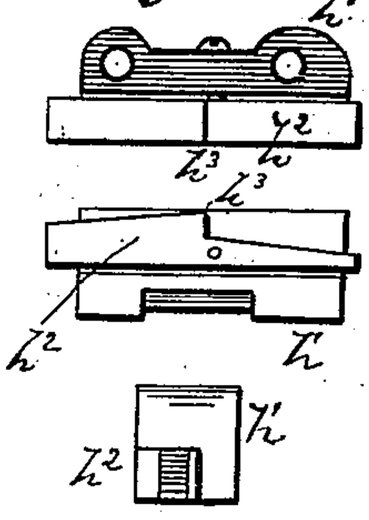


Fig. 13.

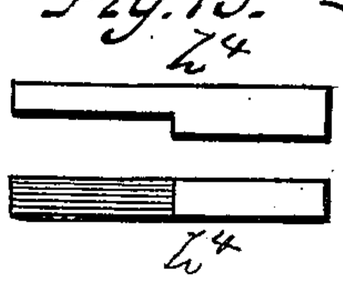


Fig. 14.

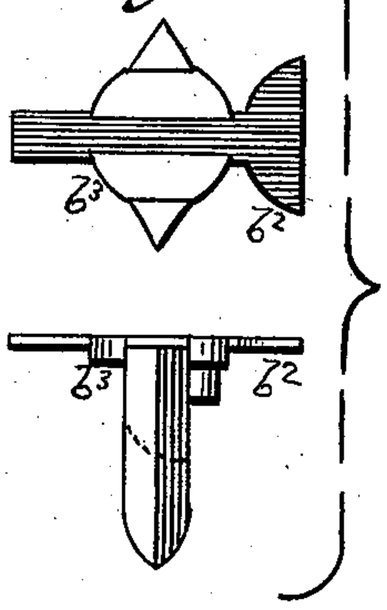


Fig. 15.

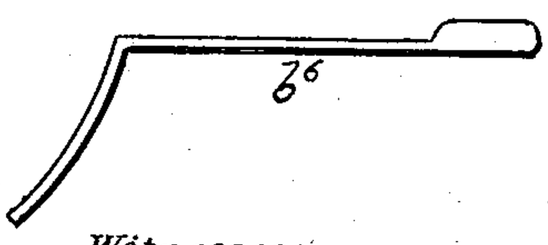
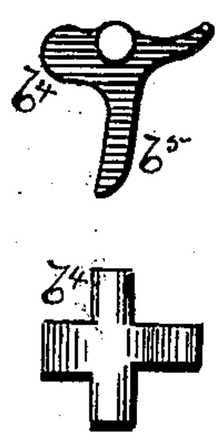


Fig. 16.



Witnesses:
E. F. Bates
Thos. Tyrrell

Inventor:
Edward W. Tyrrell.
Miller & Lathrop
Attorneys.

8 Sheets—Sheet 7.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. **Patented July 27, 1880.**

Fig. 17.

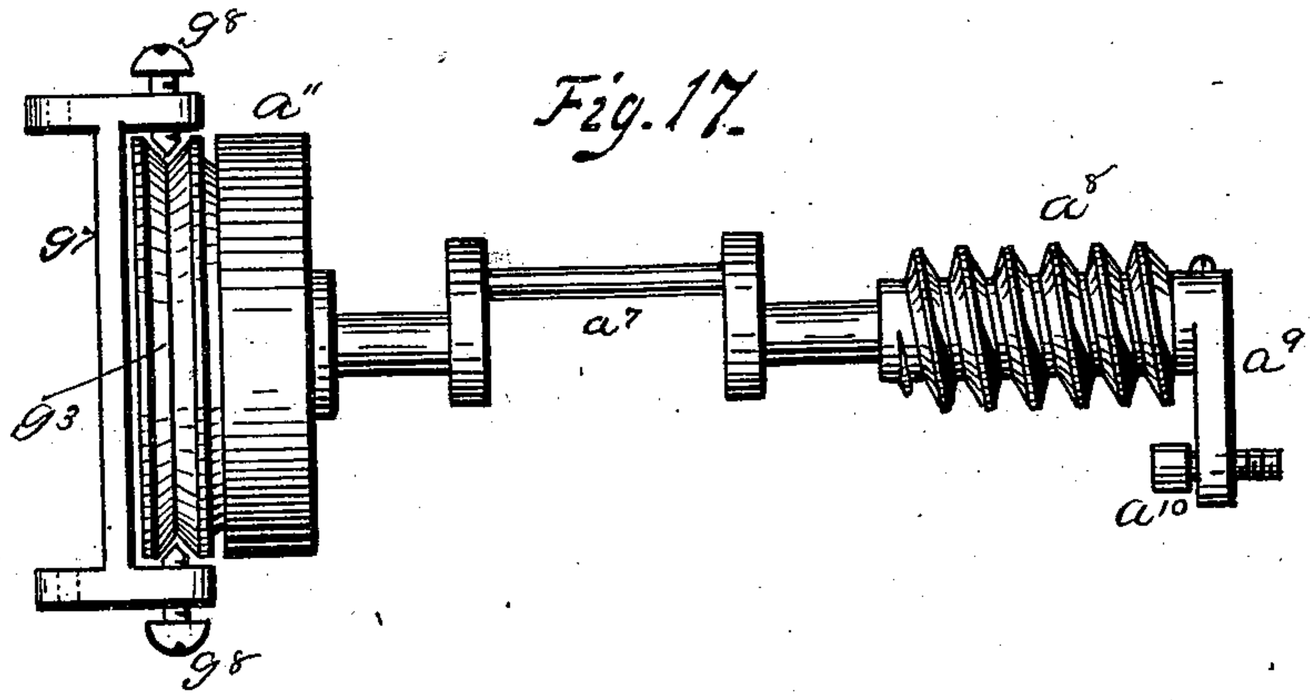


Fig. 18.

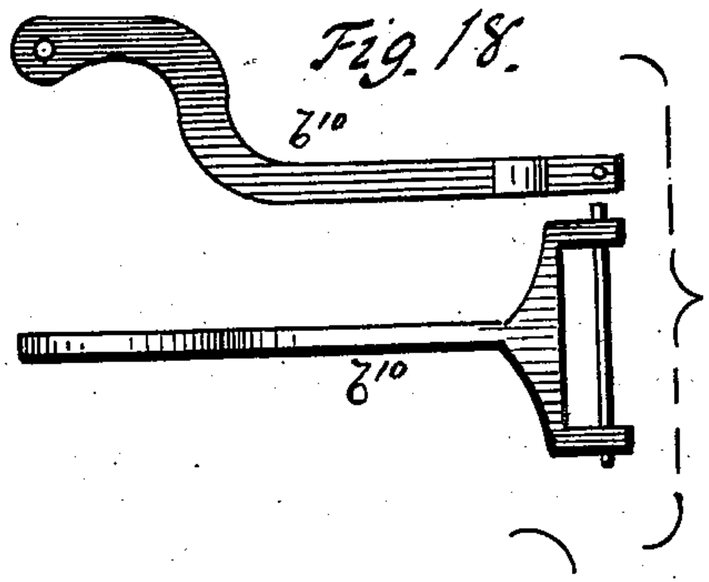


Fig. 19.

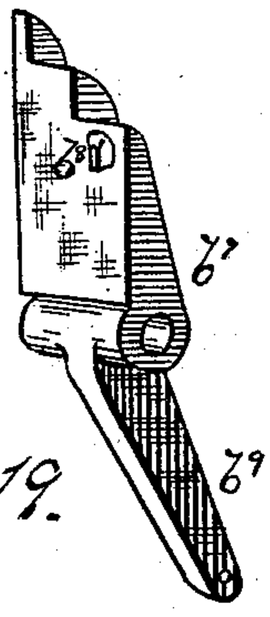


Fig. 20.

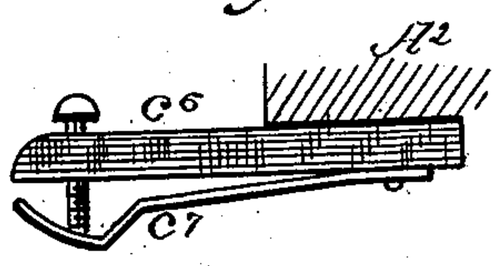


Fig. 21.

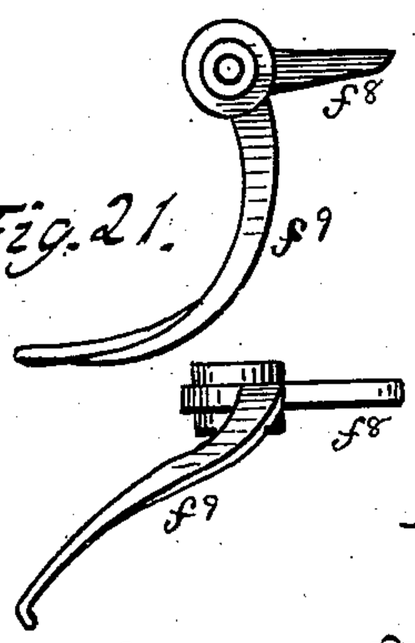


Fig. 22.

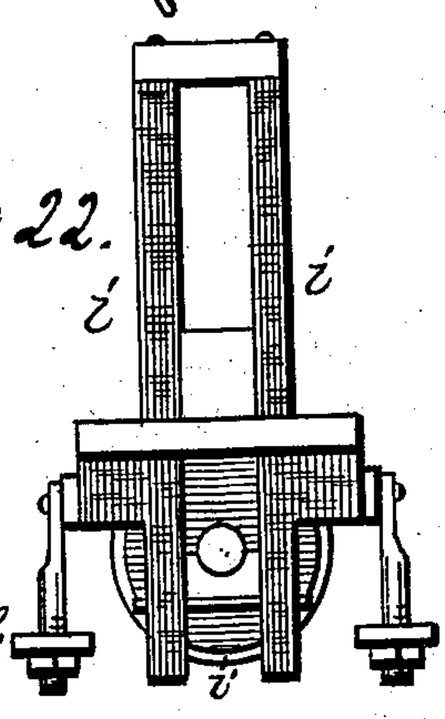
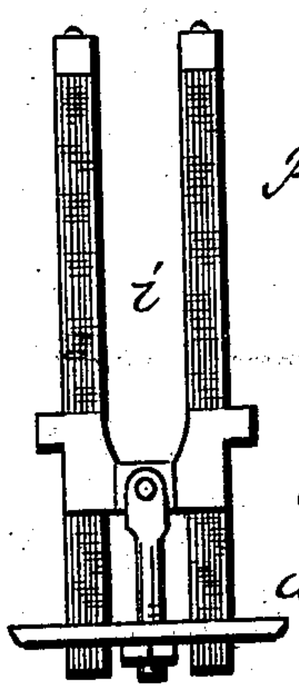


Fig. 23.



Witnesses:
E. H. Bates
Thos. Tyrrell

Inventor:
Edward W. Tyrrell
Miller & Lathrop
attorneys.

8 Sheets—Sheet 8.

E. W. TYRRELL.

Horseshoe Machine.

No. 230,450. Patented July 27, 1880.

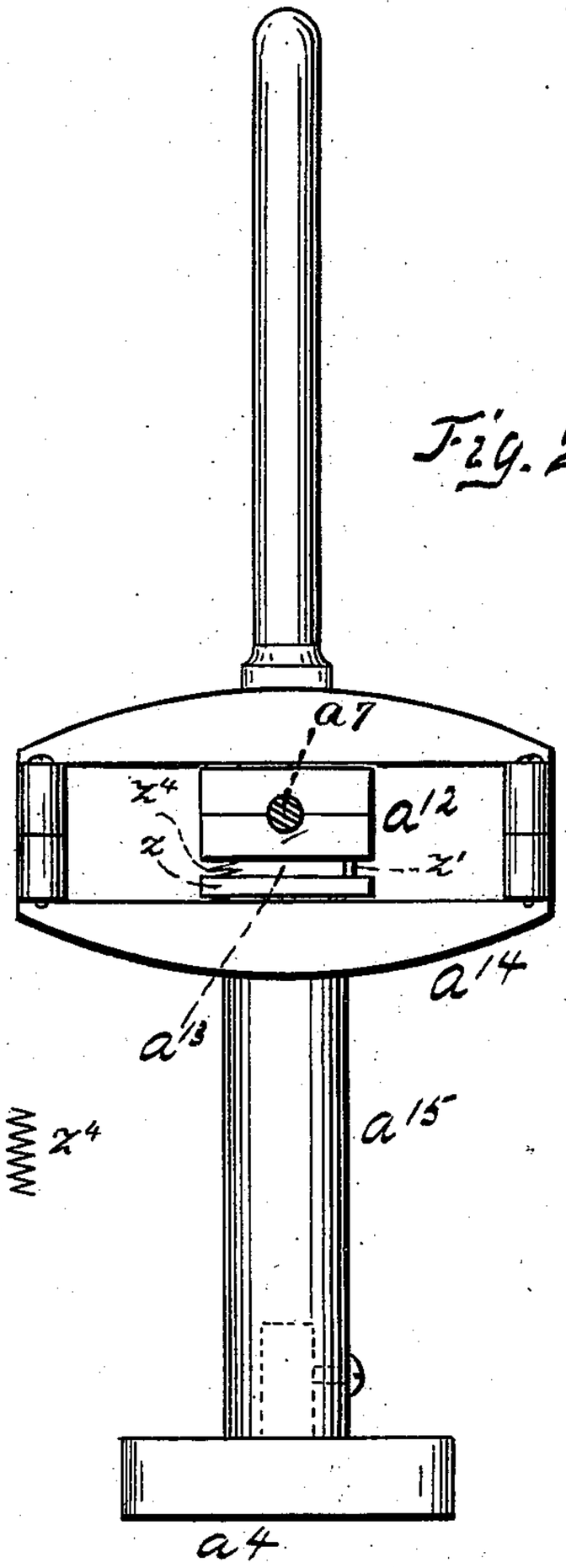
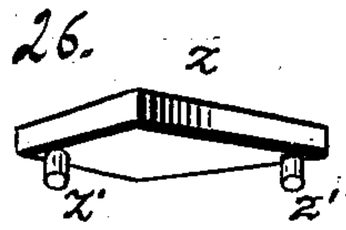


Fig. 24.

Fig. 26.



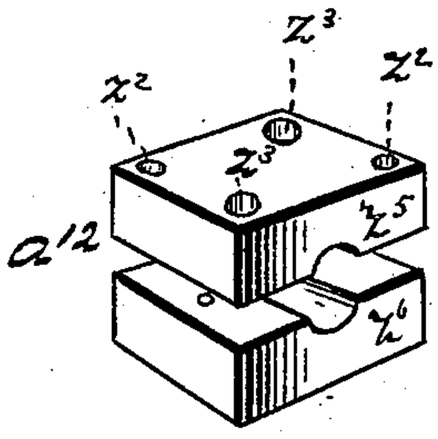


Fig. 25.

Witnesses:
E. F. Bates
Jas. Lorcombe.

Inventor:
Edward W Tyrrell
Mills & Lattrop
attorneys

UNITED STATES PATENT OFFICE.

EDWARD W. TYRRELL, OF PROVIDENCE, RHODE ISLAND.

HORSESHOE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 230,450, dated July 27, 1880.

Application filed December 13, 1879.

To all whom it may concern:

Be it known that I, EDWARD W. TYRRELL, of Providence, in the county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Horseshoe-Machines; and I do hereby declare that the following is a full, clear and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to improvements in that class of devices known as "machines for the manufacture of horseshoes;" and it consists in the novel construction and arrangement of the various parts, whereby a bar of iron is fed to the machine after leaving the rolling-mill. Said bar is first creased and then cut the desired length, and at the same time pressed to the desired form, for the shape of the heels of the shoe.

The bar is then bent around a suitable former, after which it is passed beneath a hammer and pounded a sufficient number of blows, after which the shoe-blank passes from the machine, all of which will be hereinafter more fully explained.

I construct a horseshoe-machine that allows of two shoes being made at each reciprocation of the pitman, which may be a front and hind shoe, or two front shoes, or two hind shoes.

The two operating parts being alike, I will describe but one portion of the machine.

The annexed drawings, to which reference is made, fully illustrate my invention.

Figure 1 represents a front view of my improved horseshoe-machine. Fig. 2 represents an end view of the same. Fig. 3 represents a vertical longitudinal sectional view. Fig. 4 represents a vertical cross-sectional view of the same. Fig. 5 represents a plan or top view with a portion of the machine removed. Figs. 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, and 26 represent different parts of the machine in detail.

Letter A designates a table supported by legs *a a*, and connected to one another at their lower ends by cross-pieces *a' a'*. In the top of the table A is made a channel, A', of suitable width, running horizontally from end to end, a portion of which in the center thereof is bottomless. On either side of the channel A' aforesaid, and secured to the top of the table A and arising therefrom, are vertical standards A^2 A^2, joined to one another near their lower ends by a block, a^2, which also serves as a rest or support for the upper mechanism of the machine, which will be further explained. The tops of said standards are connected to each other by a curved bar, a^3, having a perforation through its center to receive a vertically-operating rod of the hammer a^4, above mentioned.

B designates a carrier placed within the channel A', the center portion of which is of skeleton form. The ends thereof are formed into a suitable block, *b*, on which is placed a die provided with the formers *b'*, on which the shoes are made.

In the space between the bars that form the skeleton-frame and directly behind each former is placed a lifting-plate, b^2, adjustably secured to the top of a vertically-moving block, b^3, the sides of which are pointed and work within a corresponding groove on the inner face of the bars of the carrier aforesaid, as shown in Fig. 5 of the drawings. In the rear of said block b^3 and between said bars is pivoted a trigger, b^4, the horizontal arm of which acts upon the under side of the block b^3. In tilting the same the downward arm b^5 comes in contact and rides over a horizontal bar, b^6, secured to the under side of the table.

In the center of the skeleton-frame above mentioned, running crosswise of the same, is a pin, the outer ends *c* of which project beyond said frame and enter a slot in the upper end of a rocking lever, C, which is secured at its lower end to a shaft, *c'*, running crosswise and beneath the table A.

D designates a carriage constructed of two bars, *d*, traveling upon rollers *y y*, secured to the inside of the standards A^2 A^2, and connected to one another by cross-bars *d' d'*, and having on its under side a rack, d^2, in which meshes a small cog-wheel or pinion, d^3, journaled to the table on either side of the channel A'. Said carriage D is also provided with a slot, d^5, on either side, in which is placed a guide-pin, d^4, secured to small standards d^6, attached to the top of the table A, as shown in Figs. 1, 4, and 5 of the drawings.

On the carriage and between the cross-bars *d'*, are placed sliding blocks d^7, between which

and around the bars d' are springs d^8, and through each bar d of the carriage are screws c^2, which press against each block d^7. In the center of the sliding block d^7 is a perforation, through which is passed vertically a short axle, c^3, on the top of which is a loose roller, c^4, and at the bottom thereof a loose flanged wheel, c^5, that bends the shoe around the former b'. Directly above the carriage D, and secured to the inside of the standards A^2, and projecting inwardly, are bars c^6, through the end of which passes an adjusting-screw that engages with the end of a guide-spring, c^7, attached to said bar.

E designates a sliding frame, having its bearing in suitable brackets fixed to the legs a, and provided with loose rollers e, upon which acts the cam e' secured to a shaft, e^2, running crosswise of the machine, and supported by standards or bearings e^3 fixed to the cross-pieces a' a'. Said shaft e^2 has on one end a cog-wheel, e^4, fixed thereto, which meshes with a smaller cog-wheel or pinion, e^5, secured to a short shaft journaled in suitable bearings e^6 upon cross-pieces a', and having a belt-wheel, e^7, and a fly-wheel, e^8.

On the shaft e^2, and opposite to the cog-wheel e^4, is a flanged cam, e^9, that operates a vertical lever, F, pivoted at its lower end to a projection at one side of the standard or bearing e^3. On the shaft e^2, and to one side of the cam e' that operates the sliding frame aforesaid, is placed a collar, f, having projections f' f', that act upon and operate a lever, G, the lower end of which is journaled in suitable bearings G' G' fixed to the cross-piece of the frame. The portion of said lever G is provided with a tooth, g, upon which acts the projection f' above mentioned, and the upper portion operates the cutting-knife, hereinafter mentioned.

H designates a plate bent at right angles at each end, secured to the top of the table A at one side of the channel A'. Said plate is bent at right angles upwardly, and is provided with perforations, through which are passed stationary rods h, on the outer end of which is removably applied a block, h', having perforations similar to those of the plate aforesaid. Said block is recessed on its under side to receive a cutting-bar, h^2, both edges of which are beveled, and the center portion, h^3, of which serves as a cutting-knife in separating the bars of iron out of which the shoes are made. Opposite said knife or beveled bar h^2 is a cutting-bar, h^4, held in place by an adjustable bolt applied to the plate h^5, as shown in Fig. 5 of the drawings.

Through the top of the table A and in the front end thereof are slots I, in which are placed the lower ends of vertical standards i, between which are secured a flanged wheel, i', and a creaser-wheel, i^2, having one side flanged and provided on its outer face with a cutting-edge or creaser, i^3. Said creaser-wheel, as well as the flanged lower wheel, is journaled in suitable boxes in the standards aforesaid, and provided with adjusting-bolts i^4, and below the box with a spring to aid in said adjustment.

Through the top of said standards, directly beneath the wheel, and secured to the top of the table A, and running to the cutting-knives aforesaid, is a trough or guide-box, i^5, and opposite said trough or guide-box, and secured to the front edge of the table A, is a loose guide-roller, i^6.

On the inner end of the shaft that passes through the creaser-wheel i^2 and the standards i is a disk having an adjustable arm, i^7, on its outer edge, and provided with a loose roller, i^8, that is operated upon by the upper end of the vertical lever F. Said lever passes up through a slot, f^2, in the table A, and has fixed thereto a spring, f^3, for a purpose hereinafter mentioned.

A spring is secured to a block, f^4, on the top of the table A, that acts with the lever aforesaid.

On the top of the block a^2 a^2 that connects the lower ends of the standards A^2 A^2, and between said standards, is placed a plate, a^5, having arising therefrom suitable bearings, through which is passed a horizontal shaft, a^6, in or near the center of which is a crank, a^7, that operates the hammer a^4. Said crank a^7 passes through the journal-box a^{12}, which is composed of parts z z^5 z^6, sliding within the frame a^{14} of the vertical plunger a^{15}, on the bottom of which the hammer a^4 is applied. The lower portion of said box is so arranged as to allow sufficient space a^{13} between that and the upper portion to prevent sudden jars to said hammers.

A spring, z^4, is interposed between the surface of the part which enters suitable holes z^3 on the under side of the box a^{12}, for the purpose of retaining the part z to the inner face of the frame, as shown in Figs. 24, 25, and 26.

On the shaft a^6, to one side of the crank a^7, is secured a worm-screw, a^8, and also a crank-arm, a^9, having an adjustable pin, a^{10}. On the opposite end of said shaft is secured one half, a', of a friction-clutch, A^3.

Secured to the outside standard or bearing projects a rod, b^6, upon which works a lever, b^7, the upper portion of which is provided with a tooth, b^8, that engages the worm a^8, and the lower longest arm, b^9, of which connects with one end of a forked lever, b^{10}, the opposite end of which is pivoted to an arm, b^{11}, secured to a shaft, b^{12}, applied to a bearing on the outer face of the standard A^2. There is also applied to this end of the shaft a lever, f^5, the upper portion of which is provided with a weight, f^6, and the lower arm, f^7, of which engages with a short arm, f^8, of a curved arm, f^9, that is pivoted to the outside of the block a^2.

On the short shaft g' is secured a pulley, g^2, and at each end thereof is adjustably applied the portion g^3 of the friction-clutch A^3 aforesaid. Said shaft has its bearings in the upper end of the standard g^4.

Secured to the inner end of the shaft b^{12} is a cam, g^5, that works in a slot made in the forward end of an angular lever, g^6. Said angu-

lar lever is pivoted to the standard g^4, and at the upper end connects with a plate, g^7, which has a lug, through which passes a screw, g^8, that enters a V-shaped groove on the outer face of the friction-clutch aforesaid.

Having thus described the different parts of which my horseshoe-machine is constructed, I will now proceed to give the manner in which it is operated.

Operation: The bar of iron out of which the shoes are made passes over the roller i^6 and enters between the creaser-wheel i^2 and the lower flanged wheel, i'. At the same time the cog-wheel e^4 is given motion by the pinion e^5 on the shaft e^6, on which the belt-wheel e^7 is applied. This movement conveys motion to the flanged cam e^9 on the outer end of the shaft e^2. Said cam strikes the roller e^{10} on the inner face of the vertical lever F, and causes the upper end of said lever to strike the loose roller i^8 on the disk aforesaid, and carries said roller therewith, at the same time revolving the creaser-wheel i^2 and causing the creasers i^3 to crease the bar of iron and feed the same to the machine. The iron is guided by the trough or guide-box i^5 into the space between the cutting-bars h^2 h^4. The bar of iron is then pressed between the cutting-bars h^2 h^4, in order to give the desired thickness to the heel of the shoe and at the same time taper said heels. The desired length is at the same time cut off, and the spring h^6 throws the block h' to its former place. The bar then enters upon the block b of the carrier B, directly in front of the former. The carrier B and carriage D move simultaneously in opposite directions to one another. This is caused by means of the slot w, formed in the center of the sliding frame E, and operating upon a pin, Y, secured to one side of the levers C, near the center thereof, and the slot in the upper end of the lever C operating upon the pins c, secured to said carrier B, and, by the cogs C′ on the upper end of the lever C, meshing with the small cog or pinion C^2, and the latter operating upon the under side of the carriage D. At the same time the flanged wheels c^5 strike the bar of iron and carry the latter around the former b' about half-way. The rollers c^4 then strike the incline plane of the guide-bars c^7, thus causing the two flanged wheels c^5 on opposite sides of said former to move toward one another, thereby turning the heels of the shoe inwardly to its desired shape. After the latter operation the block b, with the former b' and shoe, remain directly beneath the hammer a^4. This is caused by the lost motion in the time it takes the cam e' to revolve and again come in contact with the opposite roller, e, to that it previously left. The hammer a^4 is then brought into action by means of the clutch A^3 revolving with the shaft a^6 and pulley g^2. At the same time the tooth b^8 on the upper end of the lever b^7 engages with the screw and causes said lever a^8 to move outwardly upon the rod b^6 until a sufficient number of strokes have been given by the hammer a^4, after which the pin a^{10} comes in contact with the upper end of said lever b^7 and throws the tooth b^8 out of engagement with the worm-screw a^8, thereby causing the forked lever b^{10} to act upon the shaft b^{12} and throw the weighted lever f^5 outward. At the same time the spring on the rod b^6 causes the lever b^7 to return to its former position, in order to be thrown into engagement again at the proper time, and by the movement of the shaft b^{12} the slotted angular arm g^6 causes the clutch A^3 to disengage, while the lower short arm, f^7, of the weighted lever f^5 strikes the short arm f^8 of the curved arm f^9 and throws said curved arm into its former position.

The heel portion of the shoe is raised from the former b' by means of the plate b^2 being struck on its under side by the short arm of the trigger b^4, when the downward arm or trigger b^5 engages with the raised portion of the bar b^6 beneath the table a.

In the backward movement of said trigger the same rides over said raised portion of said bar b^6, and does not cause the plate b^2 to rise after the shoe is raised, as before stated. The hook end of the curved arm f^9 catches the shoe and holds it, thus allowing the carrier B to move and leave the shoe upon a pan or receptacle, x, attached to the end thereof. When the carrier B is returning beneath the hammer a^4, the hooked end of the curved arm is struck by the shoe on the former and thrown outwardly, which causes the short arm f^8 to strike the lower arm, f^7, of the weighted lever f^5, thereby causing the clutch A^3 to act upon the shaft, which acts upon the hammer a^4, and at the same time the tooth b^8 is thrown into engagement with the worm-screw a^8 by means of the forked lever b^{10}.

It will thus be seen by the foregoing description that when the creasers make their partial revolution in creasing the bar of iron the spring f^3, applied to the vertical lever F, causes the creaser-wheel i^2 to make a complete revolution by means of the spring f^4, and the different parts are constructed in order that the same may be adjusted to suit the different thicknesses of iron; and, further, the creasing-wheels may be removed and others for a different kind of a shoe substituted therefor.

The standards i i can be moved toward or from the main portion of the machine to allow of different sizes of shoes.

It will also be observed that while a shoe is being formed there is always sufficient iron between the creaser-wheel i^2 and the former to form a shoe while the second is being fed to the machine.

It will also be understood that the creasers i^2, hammers a^4, cutting-blocks h^2 h^4, bending-wheels c^5, lifting-plate b^2, and all that portion connected with the hammer, as well as levers F G, operating alternately upon the opposite side of the machine—that is to say, while one portion of the machine is engaged the other is disengaged.

It will also be seen that the movement of the hammers is caused to act only when the die-block with its former and shoe is directly beneath the same.

The formers may be removed and others substituted for different forms of shoes.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the carrier B, former b', of the lifting-plates b^2, applied to the block b^3, trigger b^4, and the horizontal bar b^6, substantially as and for the purposes set forth.

2. The creaser-wheels i^2 herein described, constructed as shown, and having the crank-arm i^8, in combination with the levers F, having vertical springs f^3, operated by means of the flanged cam e^9 and the horizontal spring f^4, substantially as and for the purposes set forth.

3. The hammers a^4, arranged as shown, in combination with the worm-screw a^8, lever b^7, forked arm b^{10}, cam g^5, angular arm g^6, weighted lever f^5, friction-clutch A^3, short arm f^8, and curved arm f^9, the whole being arranged to operate substantially as and for the purposes herein specified.

4. In a horseshoe-machine, the levers c c F F G G, cog-wheel e^4, pinion e^5, sliding frame E, having rollers e and cams e' e^9, the whole combined and operated in the manner and for the purposes herein described and set forth.

5. The combination of the crank a^7, journal-box a^{12}, composed of parts z z^5 z^6, the plunger a^{15}, and frame a^{14}, all constructed and arranged to operate in the manner shown and described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

EDWARD W. TYRRELL.

Witnesses:

O. W. MARSH,

THOS. F. DOYLE.