(No Model.) 3 Sheets—Sheet 2.

O. P. BRIGGS.

STAPLE MAKING MACHINE.

No. 325,814. Patented Sept. 8, 1885.

Fig. 3.

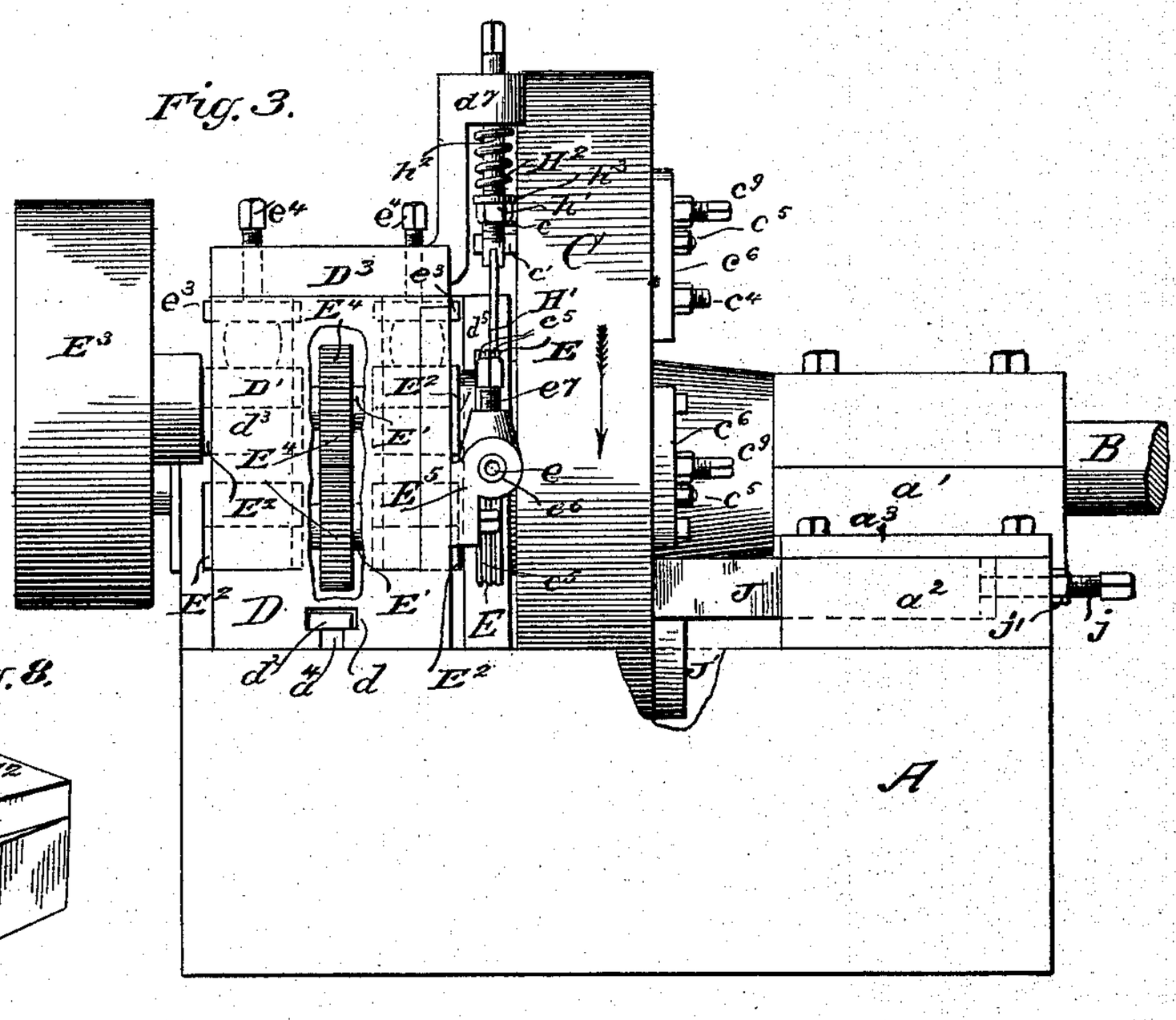


Fig. 8.

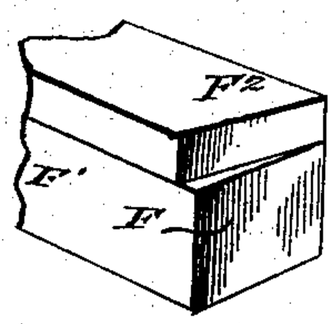


Fig. 4.

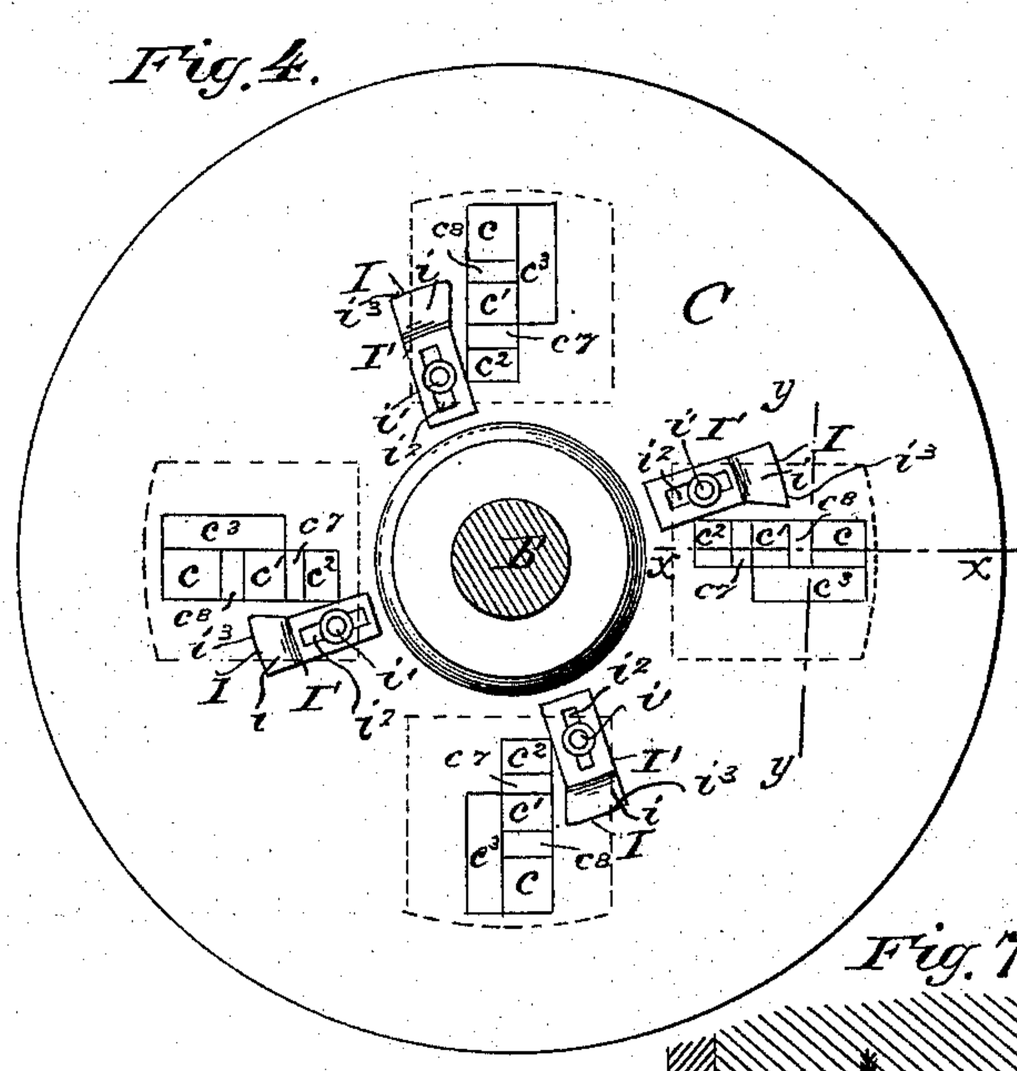


Fig. 5.

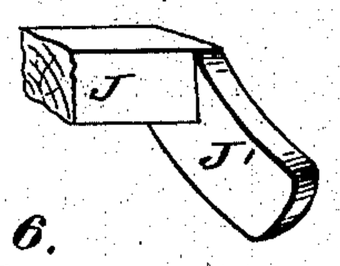


Fig. 6.

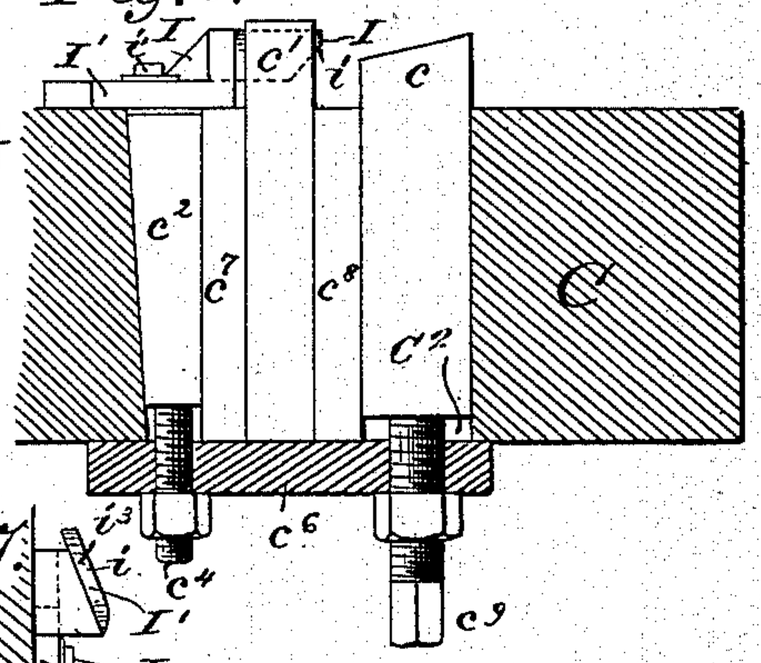
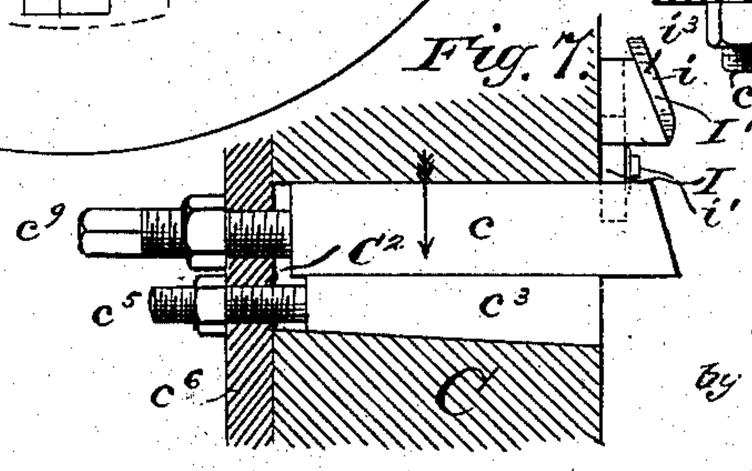


Fig. 7.



Witnesses
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C. C. Poole

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Attorney.

(No Model.) 3 Sheets—Sheet 3.

O. P. BRIGGS.

STAPLE MAKING MACHINE.

No. 325,814. Patented Sept. 8, 1885.

Fig. 9.

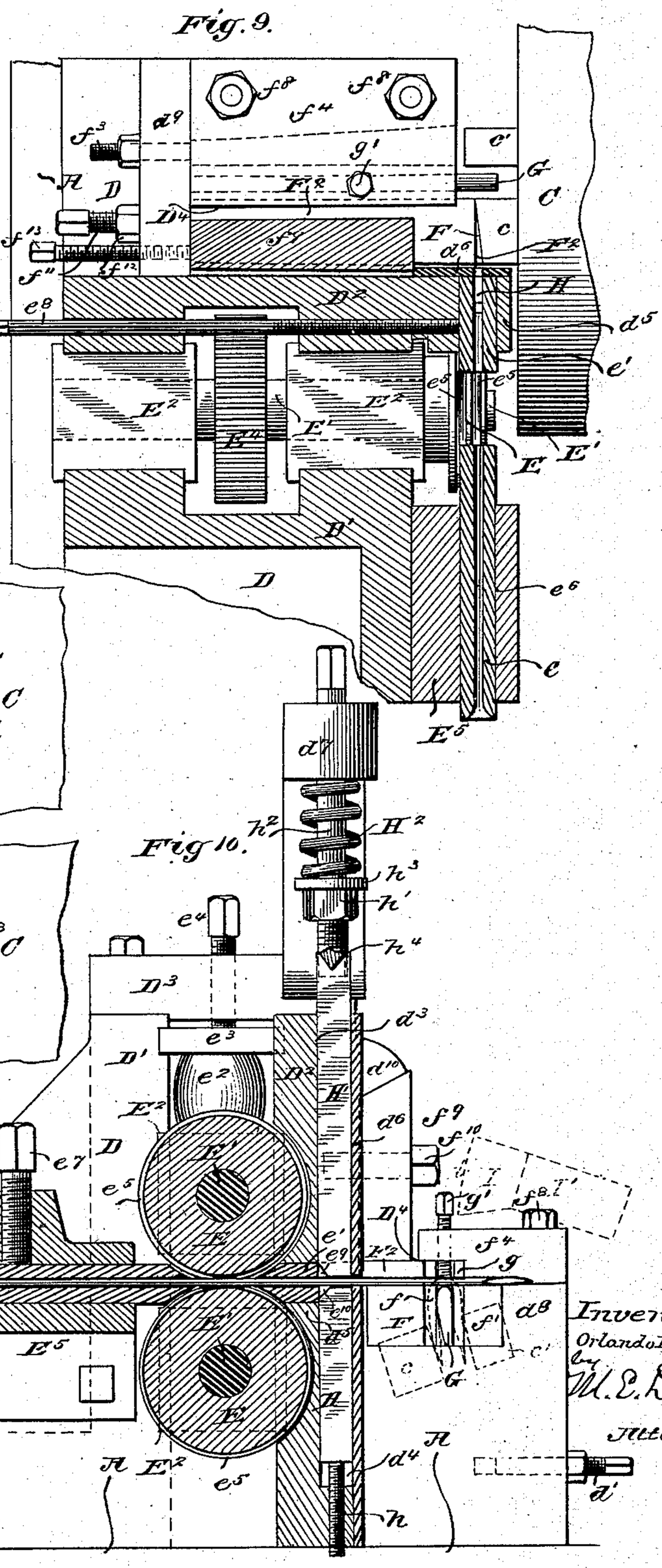

Fig. 11.

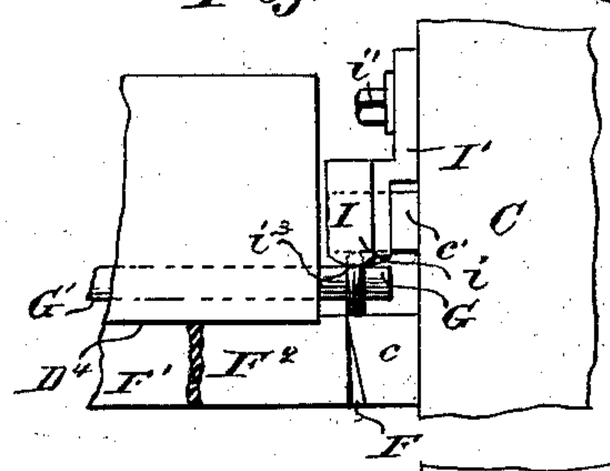

Fig. 12.

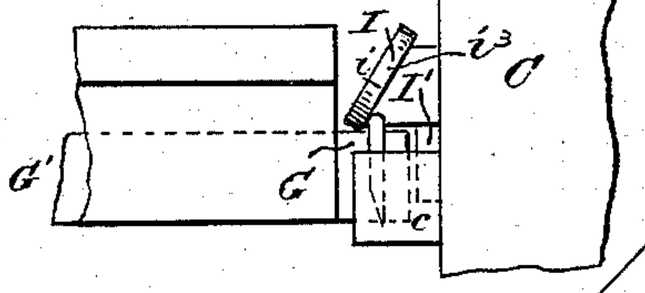

Fig. 10.

Witnesses:
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C. C. Poole

Inventor:
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by
M. E. Dayton
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UNITED STATES PATENT OFFICE.

ORLANDO P. BRIGGS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE THORN WIRE HEDGE COMPANY, OF SAME PLACE.

STAPLE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 325,814, dated September 8, 1885.

Application filed October 18, 1884. (No model.)

To all whom it may concern:

Be it known that I, ORLANDO P. BRIGGS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Staples; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improved construction in machines for making wire staples, whereby such machines will be more simple in construction and will operate more rapidly than heretofore, and whereby, also, said machines may be used to operate upon the short pieces of wire usually treated as scrap or waste and sold or thrown away as such, as well as upon wire in coils; and the invention consists in the matters hereinafter described, and pointed out in the claims.

The machine herein illustrated as embodying my invention is provided with a stationary shear-blade, and one or more revolving shear-blades constructed to operate in connection with the stationary blade to cut the wire into blanks of the desired length, a stationary bender, over or around which the staples are bent or formed, one or more revolving benders that act severally in conjunction with each of the revolving shear-blades to bend the wire around the said stationary bender to form the staple, and a suitable feed mechanism for continuously feeding the wire to the cutting and bending devices. Certain devices for accurately adjusting the various working parts of the machine with relation to each other and for insuring the stability of such adjustment when once obtained are also provided, as will more clearly appear from the accompanying drawings, and in the following detailed description of the said machine.

In the accompanying drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation of the same, a part of the frame and a part of the rotating disk that carries the revolving shear-blades and benders being cut away in order to show other working parts more clearly. Fig. 3 is a front elevation of the machine. Fig. 4 is a side elevation in detail of the disk that carries the revolving shear-blades and benders. Fig. 5 is a perspective detail view of an adjustable guide-block used to keep the disk to its work and prevent the shear-blades from springing away from each other when cutting the wire. Fig. 6 is a section in detail of a portion of the disk on the line *x x* of Fig. 4. Fig. 7 is a similar section of the same on the line *y y* of Fig. 4. Fig. 8 is a perspective view of the end of the stationary cutting-knife. Fig. 9 is an enlarged detail plan section of Fig. 2. Fig. 10 is an enlarged detail vertical section of Fig. 1. Fig. 11 is a detail plan view showing a device for removing the finished staples from the stationary bender. Fig. 12 is a detail side elevation of the parts shown in Fig. 11. Figs. 13, 14, and 15 are fragmentary views in detail of devices for clamping and holding the wire while the blank is being cut from it.

As illustrated in the drawings, A is the main frame or bed-plate of the machine, and B is the main driving-shaft thereof, which is supported in bearings *a a'* upon the said frame.

C is a metal disk, which is rigidly secured to the said shaft and which carries a series of revolving cutters or shear-blades, *c c*.

E are feed-rolls for supplying the wire to the machine, and F is a stationary shear-blade which operates in connection with the revolving cutters *c c* to cut or shear from the wire fed into the machine the blanks to form the staples. The disk C also carries a series of benders, *c' c'*, which are arranged radially in line with the cutters *c c*, and operate in connection with the said cutters, and a stationary prong or bender, G, supported upon the machine-frame to bend the blanks into the desired form.

The feed-rolls E are located one above and one below the path of the wire in the usual manner, and are provided with suitable opposing grooves to receive the latter, and a guide-tube, *e*, is preferably provided in connection with the rolls for directing the wire to the grooves thereof, and a second guide-tube, *e'*, is also provided for guiding the wire from the rolls to the cutters. A clamping device consisting of two relatively movable jaws, H

slot being V-shaped, and the top of the jaw of corresponding shape, so as to hold the parts in alignment with each other. The engagement of the jaw with the slot also serves to prevent the bolt from rotating when the nut h' is turned for the purpose of adjusting the spring. The lower corners of the clamp-jaws H H′ adjacent to the feed-rolls, are preferably beveled or rounded in order to more readily admit the advance end of the wire beneath them, as shown in Fig. 10 and in dotted lines in Figs. 2 and 13.

The stationary cutter or shear-blade F is, as herein shown, formed upon the end of a rectangular shank, F′, which is secured in a seat or recess, D^4, formed in the casting D, adjacent to the upright D^2 thereof, and the bender G is similarly constructed with a shank, G′, which is also held within the said recess D^4, a spacing piece or block, f, being inserted between the shank of the knife and bender to properly fix their distance apart. Said knife and bender are, as a preferred construction, secured in the recess by means of a wedge, f', inserted between the bender and a lip or flange, d^8, upon the casting D, which flange forms the rear wall of the said recess. A second spacing-piece, g, is also, as herein shown, located between the wedge and bender.

In order to hold the wedge firmly in its seat and to enable it to be readily tightened when desired, said wedge is provided with a screw-threaded cylindric prolongation, f^3, which passes through a flange or plate, d^9, forming the side wall of the recess D^4, and is provided upon its outer end with a nut, f^2, adapted to draw the said wedge inwardly for the purpose of tightening the parts within the recess. A cap, f^4, is placed over the recess D^4 for the purpose of holding the bender, wedge, and spacing-pieces in place, the said cap being secured in place by bolts f^8 f^8 inserted through the cap and into the flange d^8.

For the purpose of holding the bender from longitudinal movement, and to permit its adjustment longitudinally when desired, a set-screw, g', is, as herein shown, inserted through the cap f^4 in position to bear upon the shank of the said bender.

The shank F′ of the shear-blade F is held firmly in contact with the bottom of the recess D′ by means of a vertically-placed plate or gib, f^9, the lower edge of which bears upon the top of the said shank and the upper edge of which is beveled and adapted to bear against the lower inclined surface of a horizontal rib, d^{10}, formed upon the upright D^2. The said plate or gib f^9 is held adjustably in place by a screw-bolt, f^{10}, which passes horizontally through the said plate and into the upright d^2, whereby the said plate may be drawn inwardly so as to give a desired pressure upon the shank F′ to hold the shear-blade firmly in place. The shear-blade may be adjusted laterally, referring to its cutting-edge, by means of a horizontal set-screw, f^{11}, preferably provided with a jam-nut, f^{12}, and inserted through the flange or rib d^9 so as to bear at its inner end upon the end of the shank F′ of said shear-blade.

The cutting-edge of the shear-blade F is arranged obliquely in the path of the wire passing from the guide-tube e', and the opposing cutting-edges of the revolving cutters c are correspondingly inclined, the angle of said cutting-edges to the axis of the wire being such that the ends of the blanks will be cut with suitably-tapered points.

As preferably constructed, a guide piece or plate, F^2, is located between the shank F′ of the shear-blade F and the gib f^9, with its end or working face at one side of the path of the wire, as clearly shown in Figs. 8, 9, and 10. The purpose of the said plate F^2 is to afford lateral support for the portion of the wire over the knife-edge, so that the wire will be held from movement away from the movable blade during the operation of shearing. The said plate F^2 may be adjusted so as to compensate for wear by means of a set-screw, f^{13}, inserted through the flange d^9 and bearing upon the end of said plate, as shown.

The revolving shear blades or cutters c, of which there are four in the machine shown in the drawings, are held rigidly in the disk C by having their shanks C′ inserted in slots or recesses C^2 in the said disk and secured in said recesses by means of wedges c^2 and c^3. The studs or benders c', which operate in conjunction with the cutters c to bend the staples over the stationary bender G, are also held in the said slots C^2 by the wedges c^2 and c^3, the slots being of L shape and the wedges arranged to act at right angles to each other upon two adjacent sides of the cutters and benders, so as to clamp them firmly against the opposing sides of the slots. Filling pieces or blocks c^7 c^8 are herein shown as inserted between the wedges c^2 and the benders and between the cutters c and the benders, respectively, the said blocks being of proper thickness to retain the cutter and bender in the proper relation to each other, to the stationary shear-blade F, and the bender G.

As herein shown, the slots C^2 are extended entirely through the disk C, and the wedges c^2 and c^3 are provided at their smaller ends with cylindric screw-threaded prolongations c^4 and c^5, which pass through suitable apertures in the plates c^6, secured to the disk over the recesses and are adapted to bear on the plates, whereby the said wedges may be tightened, as desired. The cutting-edges of the cutters may be adjusted nearer to or farther from the disk by means of set-screws c^9, inserted through the plate c^6, so as to bear upon the inner ends of the cutters, and preferably provided with jamb-nuts, as shown.

The stationary bender G is so located with reference to the revolving cutters c and benders c', that the latter pass the said stationary bender at either side of the latter and at a distance therefrom slightly greater than the thickness of the wire operated upon.

In the machine herein shown the disk C is provided with four sets of cutters and benders, and the pulleys B′ upon the driving-shaft B, and the pulley E^2, upon the feed-roller shaft E′, are proportioned to drive the feed-rollers at the proper speed to advance over the stationary cutter and bender sufficient wire to form one staple during each quarter-revolution of the disk. The oblique cutting-edges of the stationary and movable cutters are inclined rearwardly and away from the face of the disk C, so that the longest portion of the said cutters is adjacent to the stationary bender and extends over the end of the wire or staple-blank, so as to rest across the stationary bender at the moment the blank is severed by the action of the said stationary and movable cutters. The advance edge or face of each of the movable benders *c′* is located approximately in the same plane with the advance face of the movable cutter *c*, so that said movable bender strikes and depresses the end of the staple-blank which projects past the stationary bender G at the same moment that the blank is severed and carried downwardly at the side of the stationary bender by the action of the said movable cutter. The upper or top surface of the bender G is, as herein shown, rounded and located slightly below the plane of the shear-blade F, so that the blank is entirely severed before the end of the blank which is beneath the cutter is carried downwardly thereby. The path of the revolving cutters and benders being curved, the ends of the staple-blank will obviously be carried slightly toward the center of the disk C in the downward movement of the cutters and benders. For this reason the lower portion of the stationary bender is, as herein shown, cut away or inclined at its side adjacent to the cutters *c′* to permit the free passage of the said cutters. The same result may, however, be effected by slightly inclining the stationary bender so as to bring its lower edge at about the same distance from the center of the disk as its upper surface.

The staple, after being formed in the manner above described, will be left astride of the stationary bender, and may be removed therefrom by any automatically-acting device adapted to thrust it laterally outward so that it will fall from the end of the said bender. As a simple and convenient device for discharging the staples, means are herein shown, constructed as follows:

Upon the face of the disk C at the rear of each of the benders *c′* is placed a cam-plate, I, having an overhanging radially-projecting part, I′, the outer edge of which is adapted to pass close to the rear face of the bender G, and is provided with a cam-face, *i*, inclined backwardly and toward the surface of the disk and adapted to engage one side of the leg or staple left upon the said bender so as to move it laterally until it falls from the end thereof. The cam-plates I are preferably secured to the disks by means of bolts *i′*, passing through slots i^2 in said plates, whereby the outer edges thereof may be accurately adjusted with reference to the stationary bender. The outer edges, i^3, of the overhanging parts I′ are preferably formed upon a circular curve approximately concentric with the disk, so that the said plates may be adjusted to pass close to the stationary bender throughout their entire length without touching it.

In the operation of the revolving cutters *c* and the shear-blades in shearing the wire to form the staple-blanks there will obviously be some tendency in the opposing cutters to separate from each other, and it is not always practicable to entirely prevent endwise movement in the shaft or spring in the parts of the machine so as to hold the cutters properly up to their work. I have therefore provided in the machine herein illustrated a guide piece or block, J, which is rigidly attached to the machine-frame and arranged to bear against the surface of the disk near its periphery at a point opposite the stationary cutter, the said block preferably being adjustably supported upon the machine-frame so that its bearing-face may be adjusted with reference to the disk as found necessary or desirable in the operation of the machine. As illustrated in the drawings, the block J is supported in a bearing or recess formed in a raised portion, a^2, of the bed-plate A, and is held in the said recess by means of a cap, a^3, secured over the recess by suitable screws or bolts. As a means of adjusting the said block, a horizontal set-screw, *j*, provided with a jam-nut, *j′*, is inserted through the part a^2 of the bed-plate and adapted to bear upon the end of the block. In order to give a more extended bearing-surface between the block J and the disk the said block is preferably provided with a downwardly-projecting curved portion, J′, (shown more plainly in Fig. 5 of the drawings,) adapted to bear throughout its entire length upon the disk. The contact-surfaces of the disk and the block J are usually lubricated to prevent friction between the parts.

The clamping device consisting of the jaws or strips H H′, before described, obviously operates to hold the wire being operated upon firmly in position at a point close to the shear-blades. The use of the said clamping device, as far as the general operation of the machine is concerned, is obviously not essential. The object of said clamping device is more especially to provide means for holding the wire accurately in position with reference to the knife and bender, notwithstanding any wear that may take place in the guide-surfaces with which the wire is in contact. The lower jaw, H, of the clamping device being vertically adjustable, its upper guide-surface may obviously be moved upwardly as fast as it is worn away, and the upper jaw, H′, being held in contact with the wire by the spring H^2, will move downwardly as it becomes worn, and any lateral play in the wire which would be permitted by the enlargement of the guide-

aperture by wear if the parts of the clamp were stationary will thereby be prevented.

As a preferred means of adjustably securing to the bed-plate A the casting D, in order to enable the shear-blade F and bender G upon the casting to be adjusted with reference to the revolving cutters and benders, the said bed-plate is provided upon its upper horizontal surface with an upwardly-projecting rib, a^4, arranged at right angles with the axis of the crank-shaft and adapted to engage the lower opening of a T-groove, *d*, formed in the bottom face of the casting D. The said rib operates to hold the casting accurately in position laterally with reference to the disk *c*. The said casting is firmly clamped upon the bed-plate by means of headed bolts d^2 engaged with the said groove *d* and extending through the said bed-plate. The casting D is preferably provided upon its inner face adjacent to the bearing or pillow-block *a'* of the shaft B with a set-screw, *d'*, which is tapped into the casting and adapted to bear at its outer end against the vertical face of the said bearing. The said screw *d'* is adapted at its end for the application of a wrench, and is provided with a jam-nut, and its purpose is both to move the casting D upon the bed-plate when the bolts d^2 are loosened in adjusting the casting, and also to enable the casting to be returned accurately to its proper position when removed or shifted for the purpose of cleaning or repairs.

Instead of driving the feed-rollers by means of the belt-pulleys B' and E^2, suitably-proportioned intermeshing gear-wheels may obviously be used for the same purpose, and in some cases, perhaps, with more accurate results.

In the machine herein shown the disk C is provided with four sets of cutters and benders, and the feeding devices are driven at the proper speed to advance sufficient wire to form a staple during each quarter revolution of the disk. It is obviously not necessary that the exact number of revolving cutters and benders herein shown should be used, and the disk or other revolving cutter-support which may be used in its place may be provided with one, two, three, or more than four of said cutters and disks, according to the size and weight of the cutter-support, the speed desired, or other considerations. The feed devices herein shown may obviously be adapted to any number of cutters and benders by properly proportioning the pulleys or gears by which the feed-rollers are actuated so as to cause a length of wire sufficient for a staple to be fed across the bender during the interval between the passage past the latter of each of the revolving cutters and benders.

The feed of the wire being continuous in the machine shown, the revolving cutters *c* are backwardly and rearwardly inclined or beveled from their cutting-edges, so as to permit the forward movement of the wire past the cutter after it has severed the staple-blank. The cutting being practically instantaneous, no interruption is caused to the continuous advance of the wire by the movement of the movable cutters past the stationary one. It is obviously practicable, however, to make the operation of the feed-rolls intermittent by the use of any one of the several well-known devices for this purpose; but the use of a continuous feed is preferred, for the reason that a much greater speed in the machine and a corresponding larger production may be obtained with a continuous than with an intermittent feed.

By mounting the movable parts of the cutting and bending devices so that they may be revolved continuously around a fixed center these parts may be driven past the stationary parts to form staples at a much higher speed than would be possible where the usual reciprocating, rectilineal, or circular motion is employed, whereby it becomes practicable to use a continuous feed, and the product of a single machine is greatly increased. In this construction, also, the impetus acquired by the rapid movements of heavy moving parts is utilized to a large extent in doing useful work, instead of being expended in wearing out the machine, as is the case where reciprocating parts of great weight are used.

I claim as my invention—

1. In a staple-making machine comprising a stationary shear-blade and bender and one or more movable shear-blades and benders, the combination, with the parts mentioned, of feed-rollers for the wire and a clamping device for guiding the wire to the shear-blades, consisting of an adjustable jaw, H, and an opposing yielding jaw, H', substantially as and for the purpose set forth.

2. In a machine for making staples, the combination, with the feed-rollers E E and the shear-blades, of a clamping device comprising a stationary part or jaw, H, a movable jaw, H', and a spring applied to the movable jaw to hold it yieldingly in contact with the wire, substantially as and for the purpose set forth.

3. In a machine for making staples, the combination, with the feed-rollers E E and the shear-blades, of a clamping-device comprising a stationary part or jaw, H, a movable jaw, H', a spring applied to the movable jaw to hold it yieldingly in contact with the wire, and means, substantially as described, for adjusting the force of the spring, substantially as and for the purpose set forth.

4. In a machine for making staples, the combination, with the feed-rollers E E and the shear-blades, of a guide, *e'*, for directing the wire from the feed-rollers to the shear-blades, provided with notches e^9 e^{10}, at its end adjacent to the shear-blade, and a clamping-device comprising a stationary jaw, H, and an opposing yielding jaw, H', said jaws being arranged with their adjacent ends within the said notches, substantially as and for the purpose set forth.

5. In a machine for making staples, the

combination, with the feed-rolls E E, and the shear-blades, of a clamping-device comprising a stationary jaw, H, a movable jaw, H′, a sliding bolt, h^2, having bearings in the machine-frame and adapted to bear upon the said movable jaw, and provided with a nut, h', and a spring interposed between a stationary part of the frame and the nut, the nut being adjustable upon the bolt for the purpose of varying the pressure of the clamp, substantially as and for the purpose set forth.

6. In a machine for making staples, the combination, with the machine-frame provided with a recess, D^4, and an upright, D^2, provided with a rib, d^{10}, of the shear-blade F, having a shank, F′, a wedge, f', inserted between the side wall of the recess and the shank F′ for holding the shear-blade from lateral displacement, and a gib, f^9, adapted to bear upon the top of the shank F′ and the rib d^{10}, and a screw-bolt, f^{10}, for adjustably holding said gib in place, substantially as described.

7. In a machine for making staples, the combination, with the machine-frame provided with a recess, D^4, of a bender, G, a wedge, f', and set screw, g', for holding said bender in place within the recess, substantially as and for the purpose set forth.

8. In a machine for making staples, the combination, with the machine-frame provided with a recess, D^4, and a cap, f^4, placed over said recess, of a shear-blade, F, having a rectangular shank, F′, located within the said recess, a bender, G, a spacing-piece, f, inserted between the shank F′ and the bender, and a wedge, f', for clamping the shear-blade and bender within the recess, substantially as and for the purpose set forth.

9. In a machine for making staples, the combination, with a revolving disk, C, provided with L-shaped recesses C^2, of shear-blades c, and benders c', inserted in said recesses, and wedges c^2 and c^3, adapted to bear at right angles upon the said shear-blades and benders to secure the latter in place, substantially as described.

10. In a machine for making staples, the combination, with a disk, C, provided with recess C^2 and with plates c^6, covering said recesses, of shear-blades c, wedges for securing the said shear-blades in place within the recesses, and set-screws c^9, inserted through the said plates and bearing upon the shear-blades, substantially as and for the purpose set forth.

11. The combination, with a stationary shear-blade and a stationary bender, of a revolving disk carrying one or more shear-blades and a corresponding number of benders, and one or more cam-plates I, secured to the said disk, and adapted to engage the finished staples and remove them from the bender, substantially as described.

12. The combination, with a stationary shear-blade and bender and a revolving disk carrying one or more shear-blades and a corresponding number of benders, of a block, J, adapted to bear upon the marginal portion of said disk at its side opposite the stationary shear-blade, substantially as and for the purpose set forth.

13. The combination, with the frame of a staple-making machine, a stationary shear-blade and bender thereon, and a revolving disk carrying one or more shear-blades and a corresponding number of benders, of a block, J, secured upon the frame, and adjustable thereon with reference to the disk, substantially as and for the purpose set forth.

14. In a staple-machine, the combination, with the machine-frame and a revolving disk, C, of a block, J, mounted upon the machine-frame and provided with a projection, J′, at its end, forming an extended bearing-surface in contact with the disk, substantially as and for the purpose set forth.

15. In a machine for making staples, the combination, with a bed-plate, A, of a casting, D, adjustably attached to said bed-plate, a stationary shear-blade and bender secured upon the said casting D, and a revolving disk, C, mounted upon the said bed-plate and carrying one or more shear-blades and a corresponding number of benders, whereby the said stationary shear-blade and bender may be adjusted with reference to the disk, substantially as described.

16. In a machine for making staples, the combination, with the bed-plate A, provided with a rib, a^4, of a casting, D, provided with a groove, d, adapted to fit over the said rib, and bolts d^2 d^2, for securing the said casting to the bed-plate, a stationary shear-blade and bender secured upon the said casting D, and a revolving disk mounted upon the said bed-plate and carrying one or more shear-blades and a corresponding number of benders, substantially as and for the purpose set forth.

17. In a machine for making staples, the combination, with the bed-plate A, provided with a rib, a^4, upon its upper surface, of a casting, D, provided with a groove, d, bolts d^2 d^2, for securing the casting to the bed-plate, and a set-screw, d', for determining the position of the casting upon the bed-plate, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

ORLANDO P. BRIGGS.

Witnesses:

C. CLARENCE POOLE,
OLIVER E. PAGIN.

(No Model.)

A. H. BROTHERS.

NEEDLE PRESSER FOR KNITTING MACHINES.

No. 325,815. Patented Sept. 8, 1885.

Fig. 1.

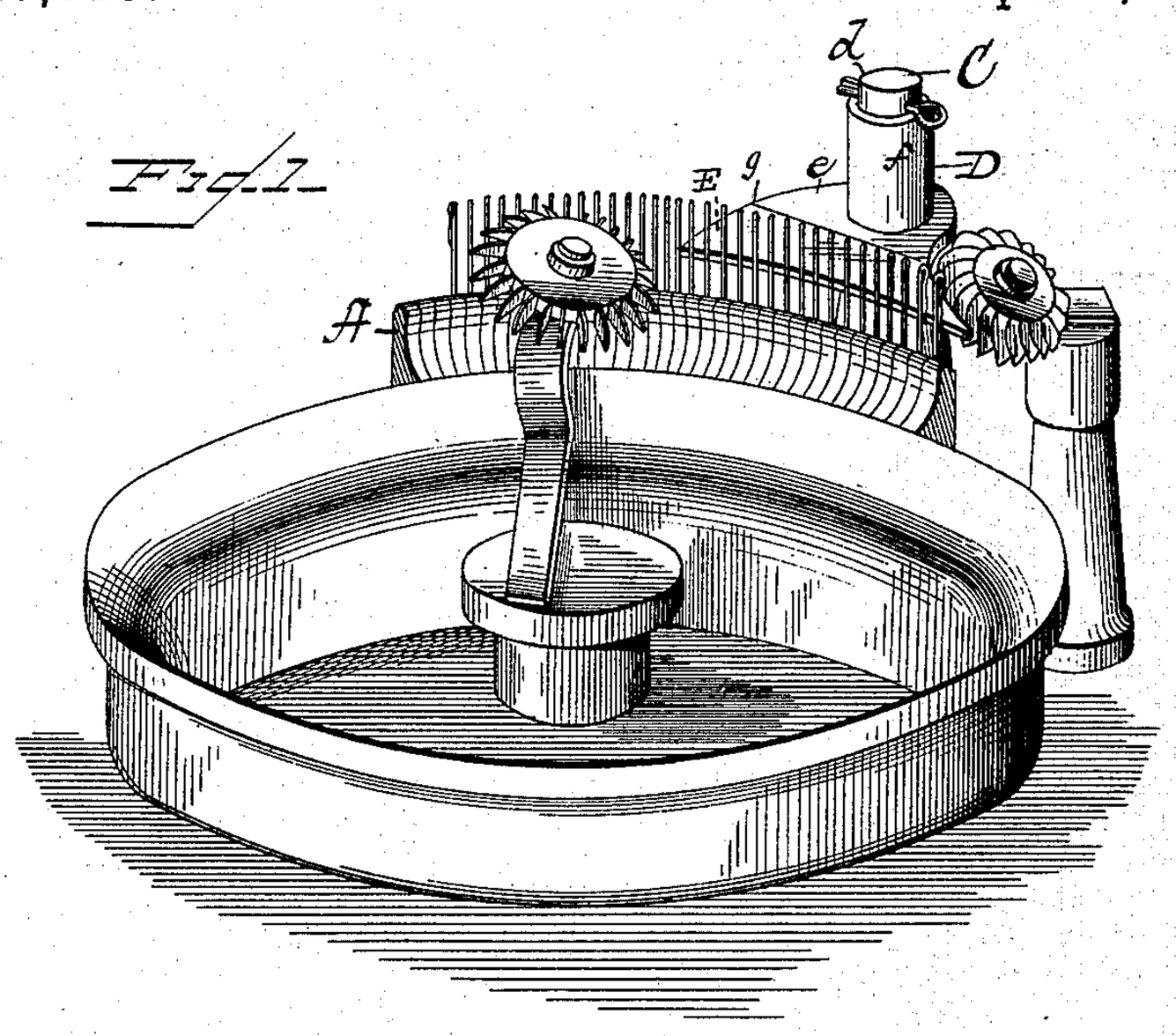


Fig. 2.

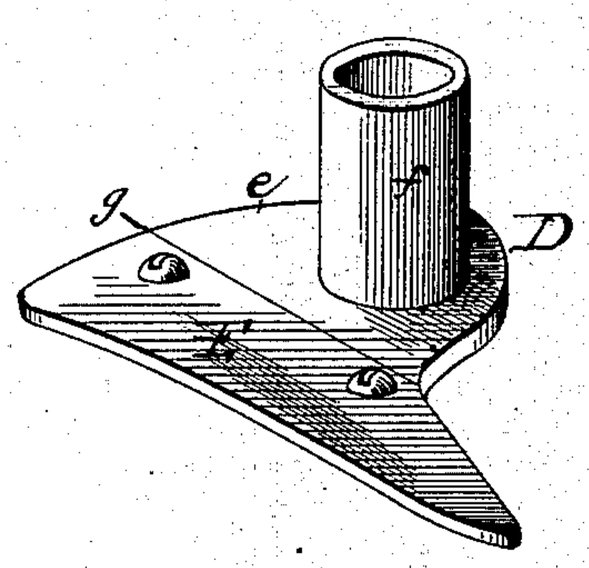
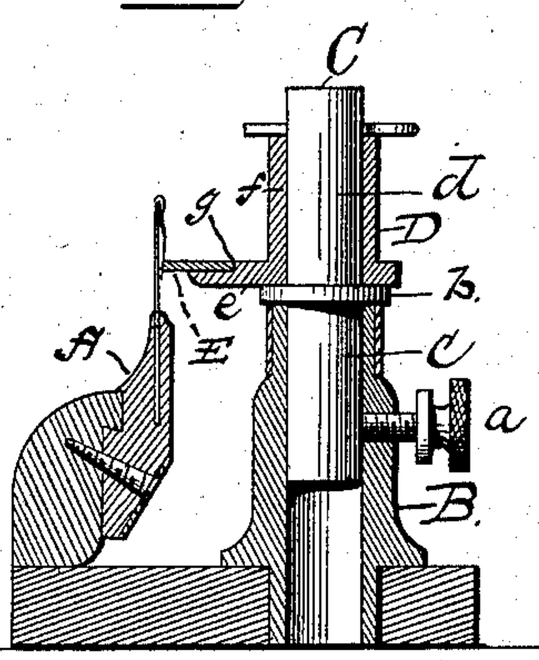


Fig. 3.



WITNESSES

E. F. Pitchard.

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