

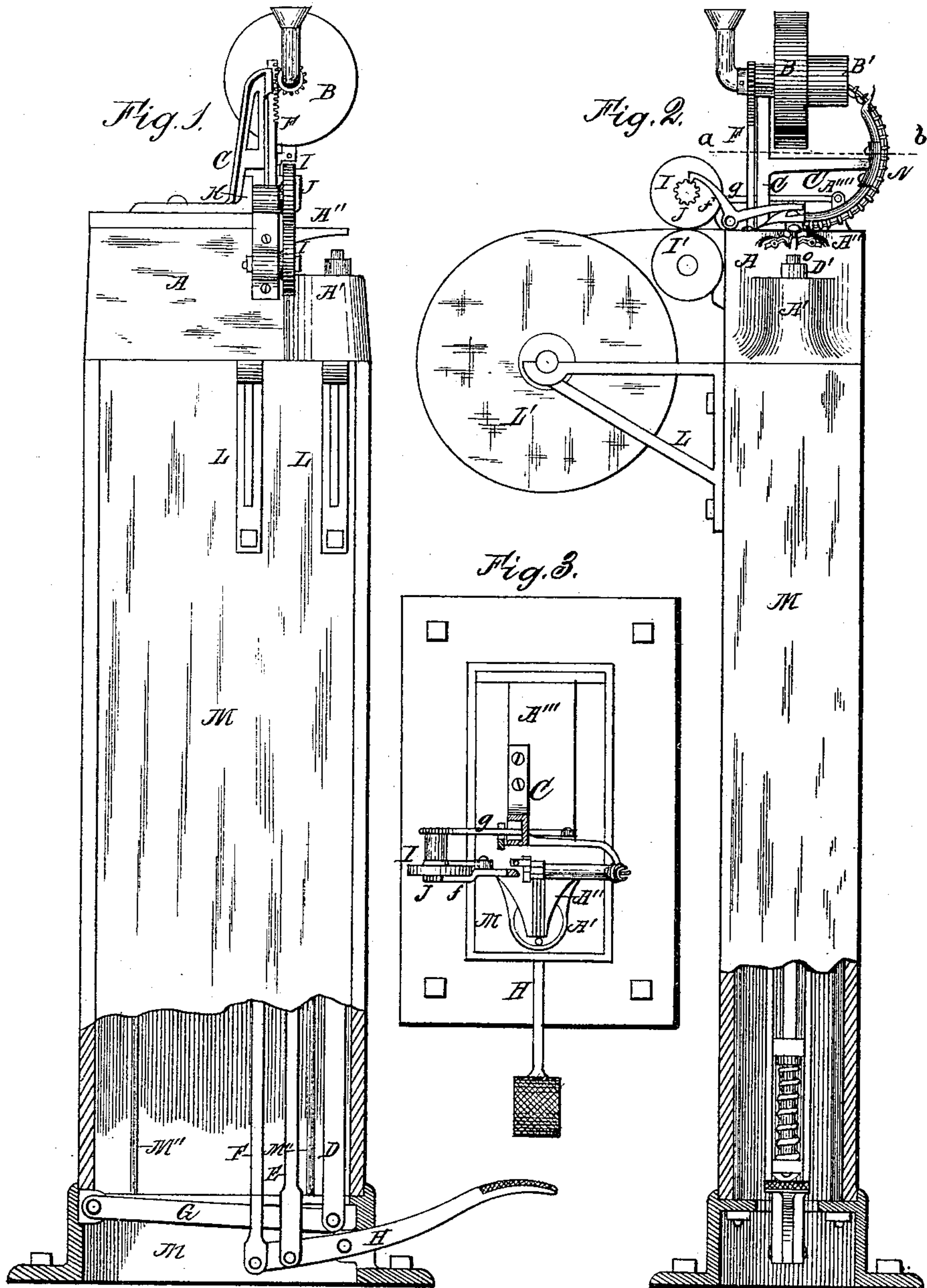
(No Model.)

3 Sheets—Sheet 1.

E. M. MURRAY.
BUTTON ATTACHING MACHINE.

No. 389,237.

Patented Sept. 11, 1888.



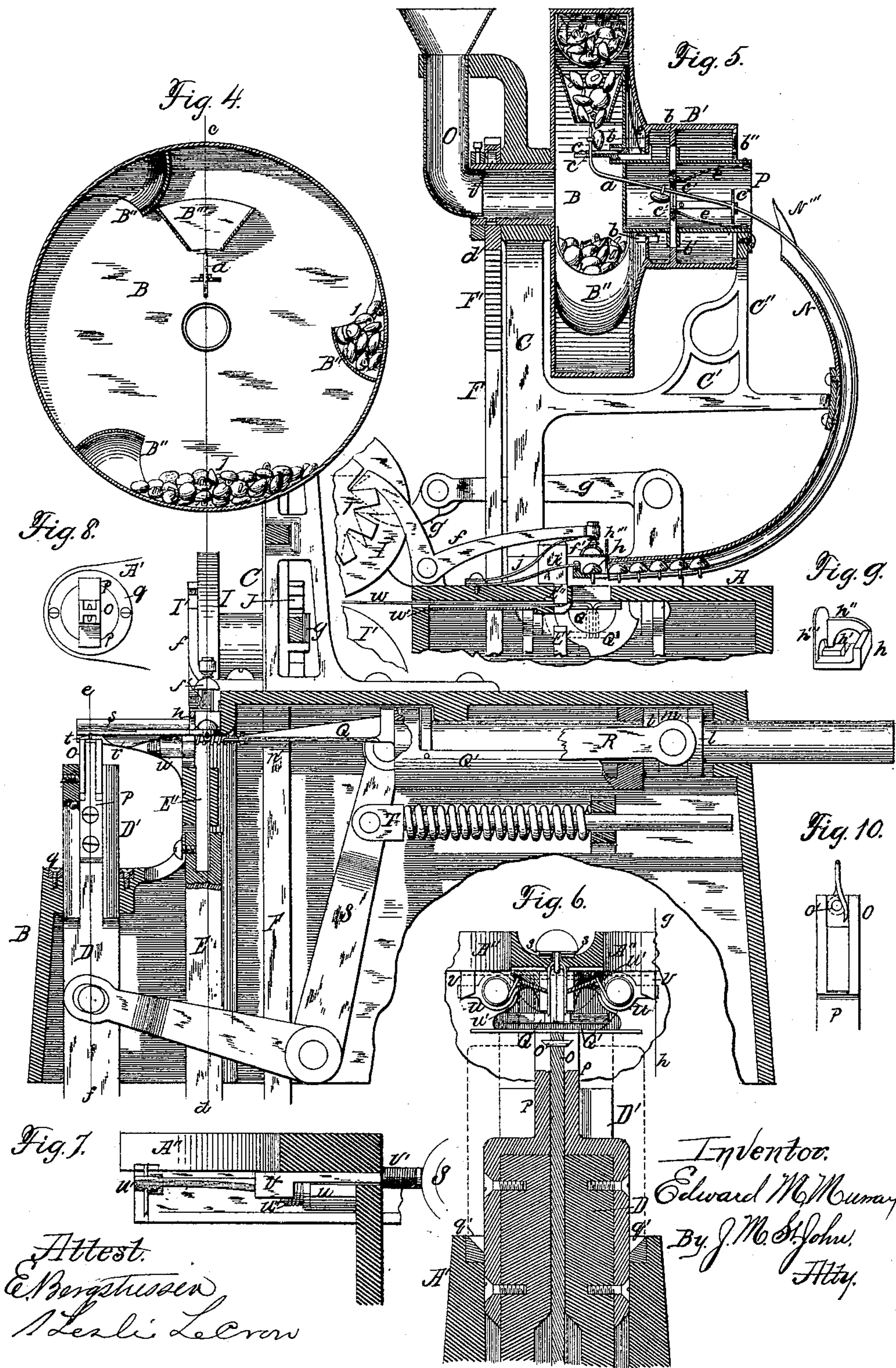
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3 Sheets—Sheet 3.

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Fig. 11.

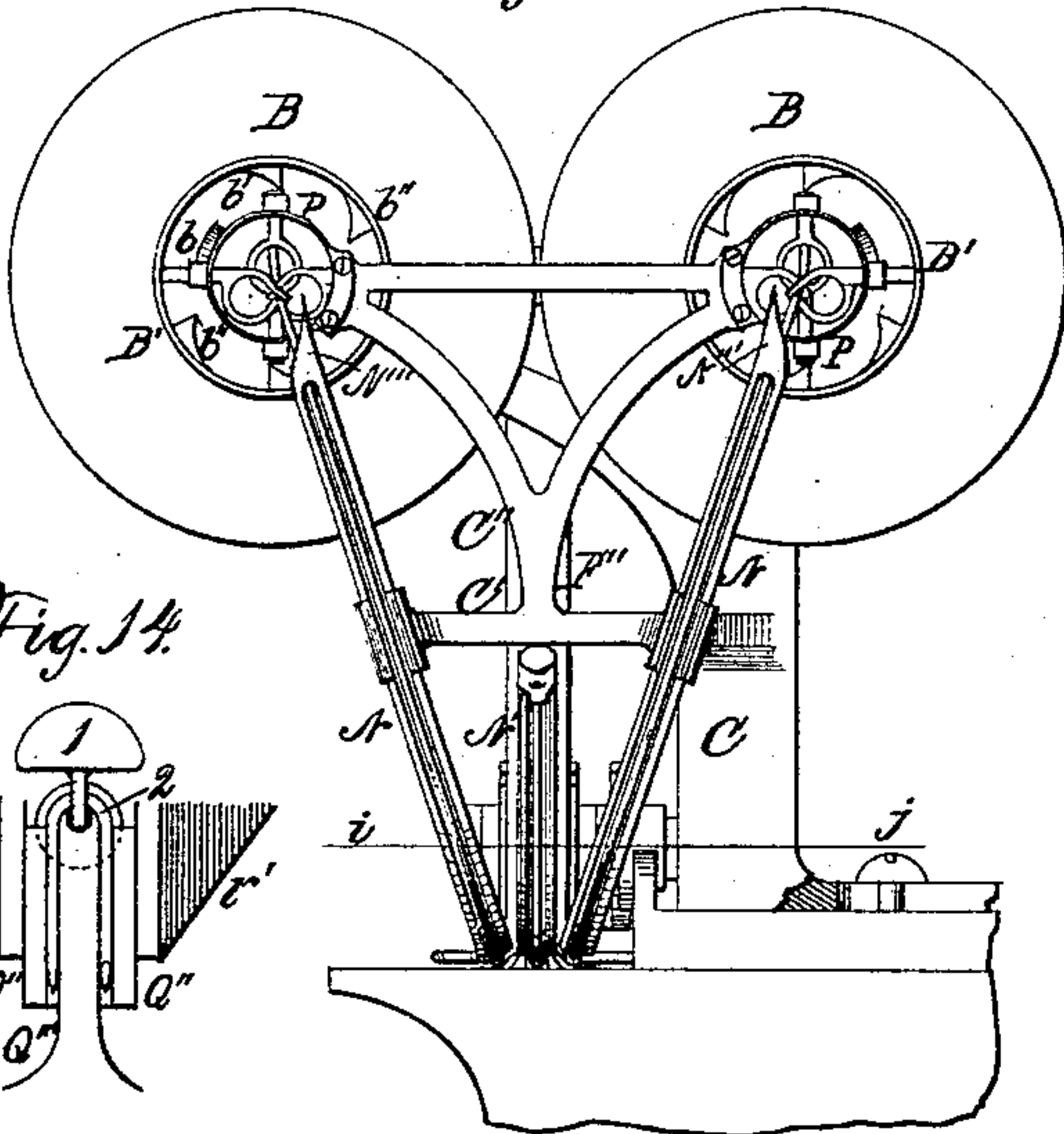


Fig. 12.

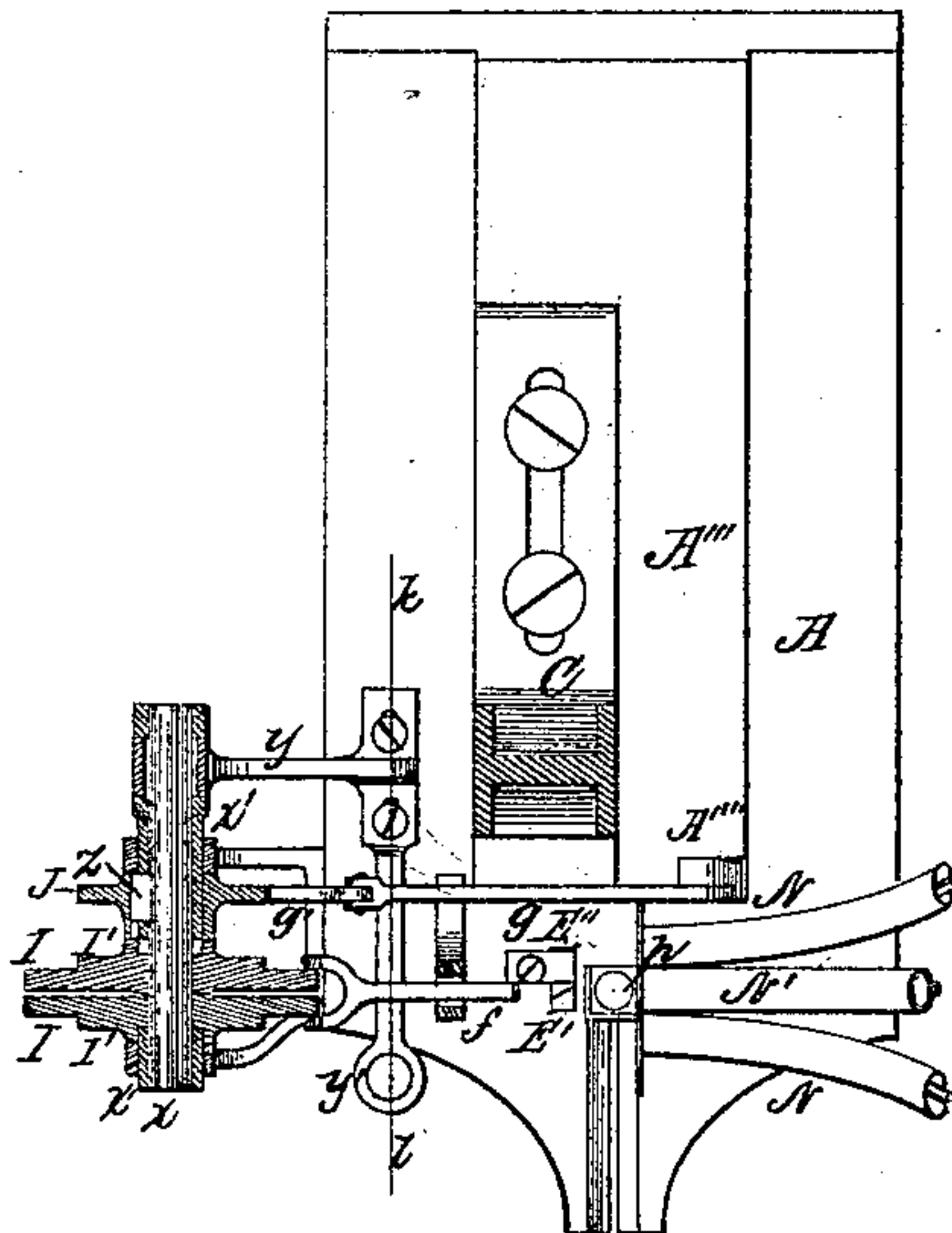


Fig. 14.

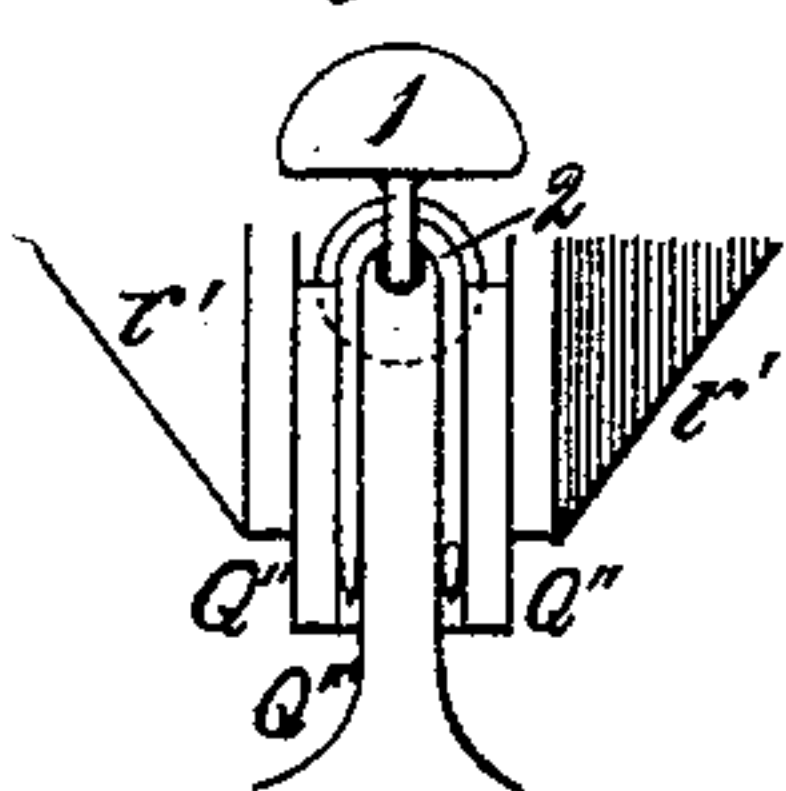


Fig. 13.

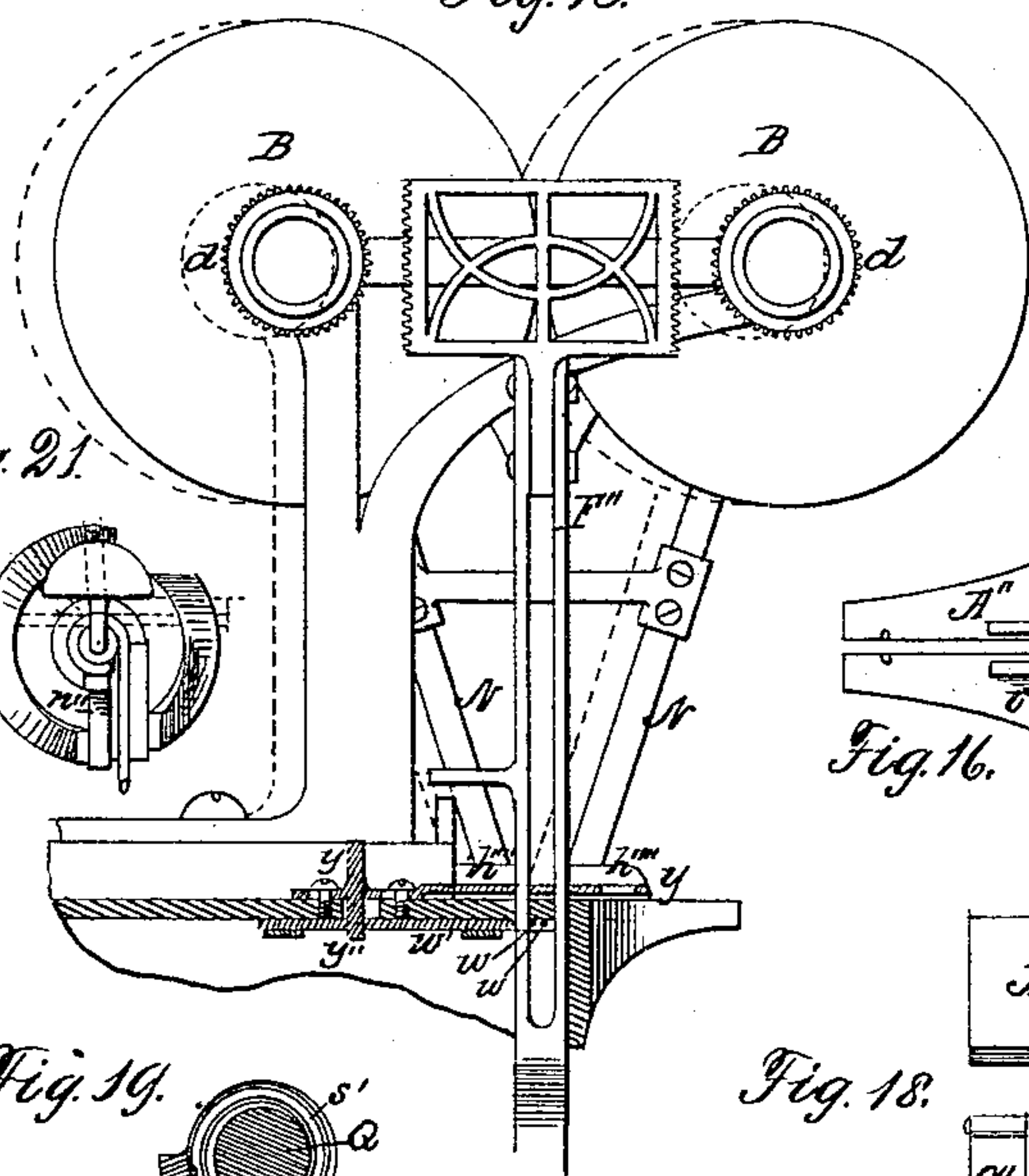


Fig. 15.

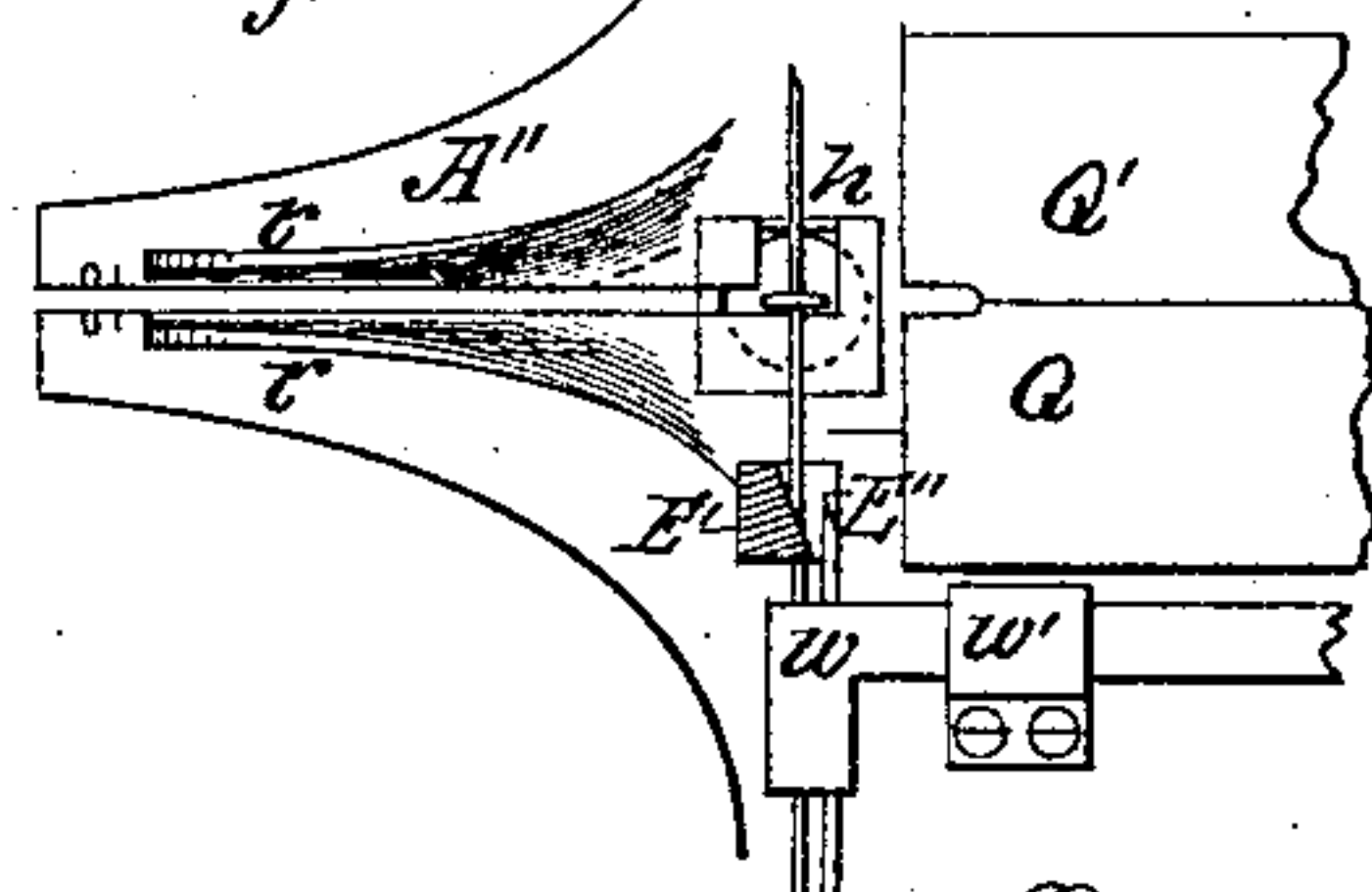


Fig. 21.

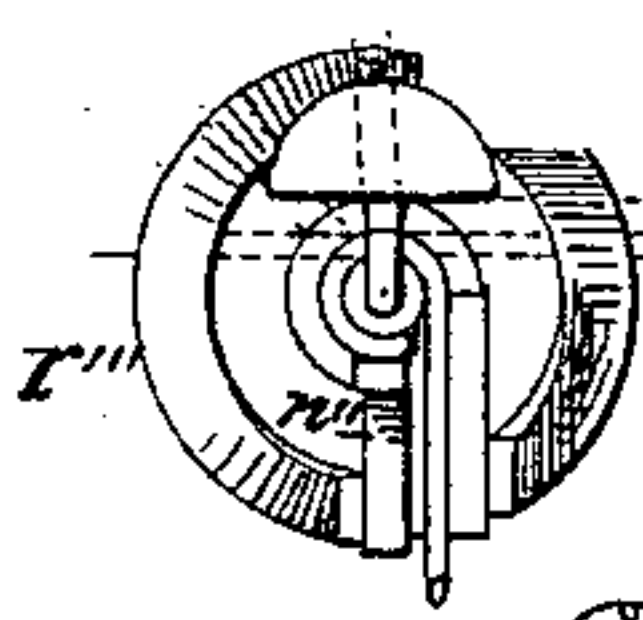


Fig. 17.

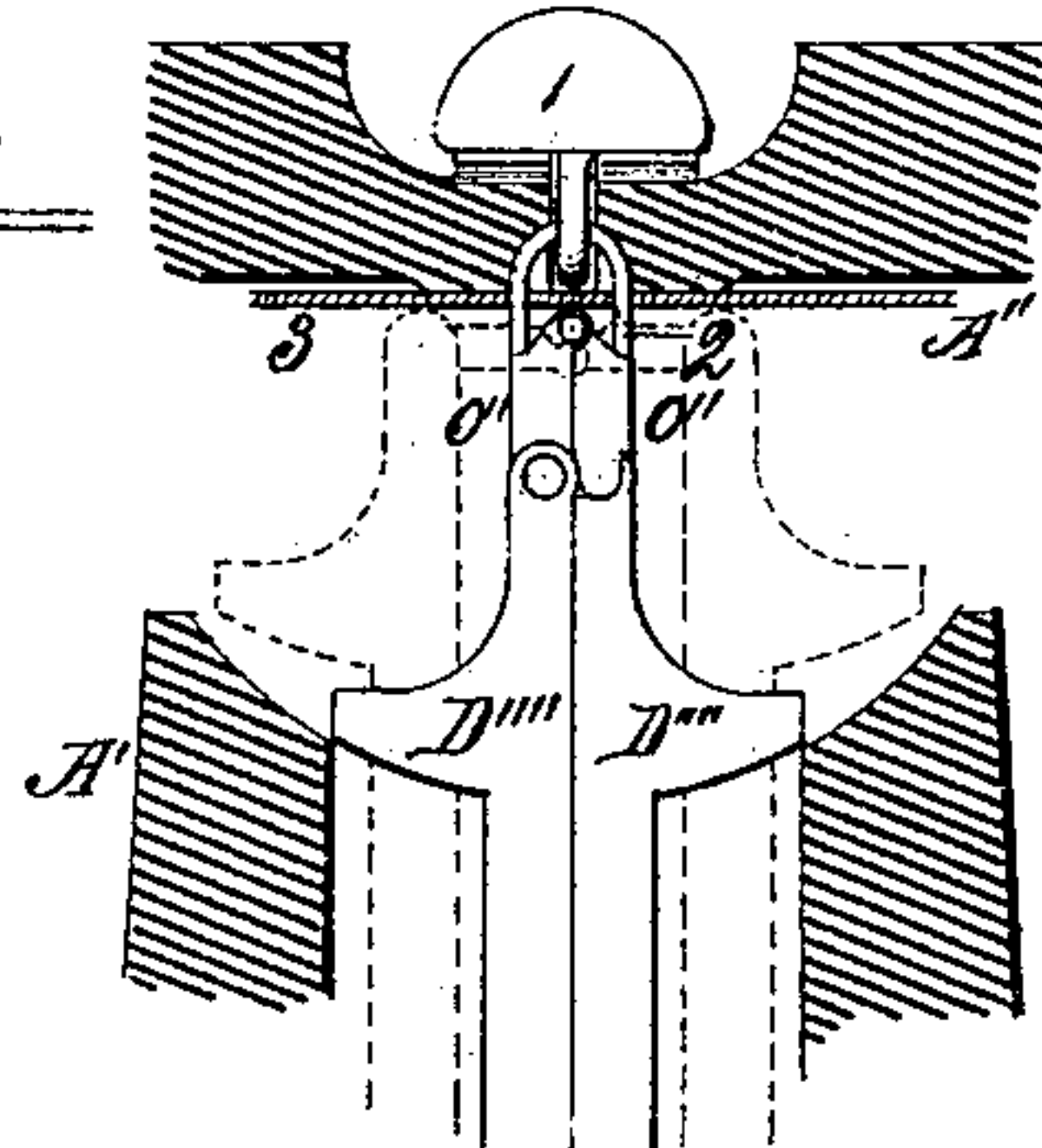


Fig. 19.

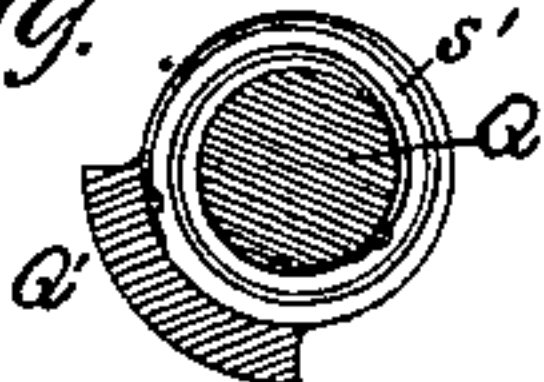


Fig. 16.

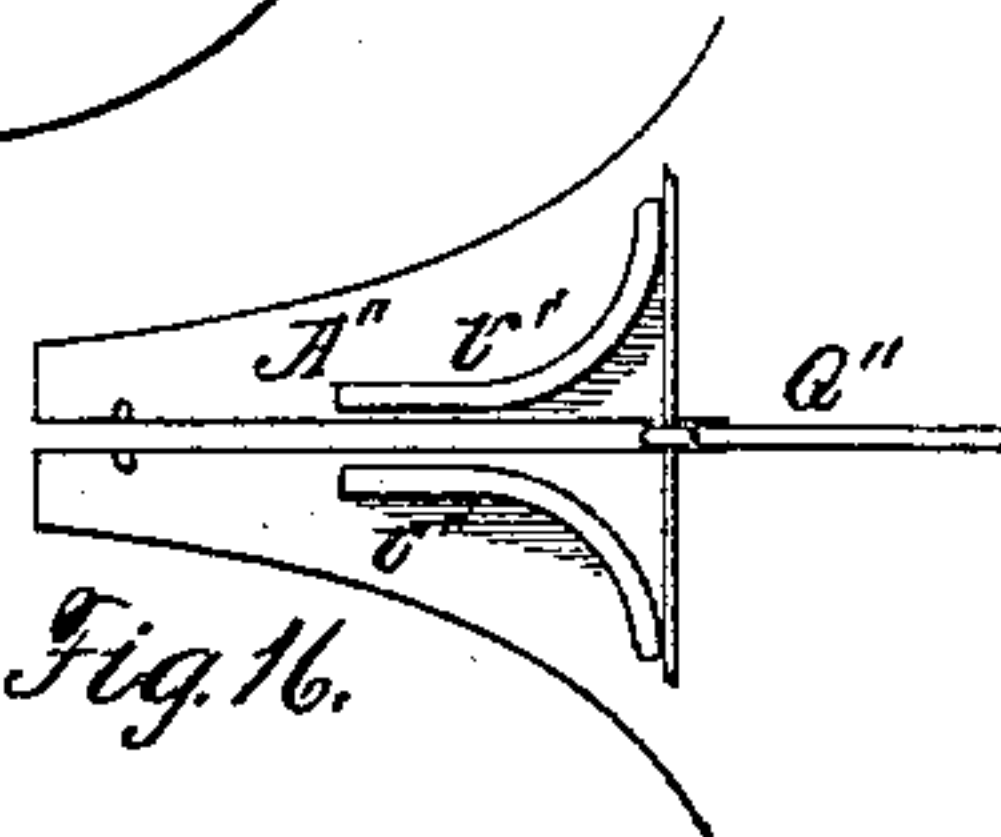


Fig. 18.

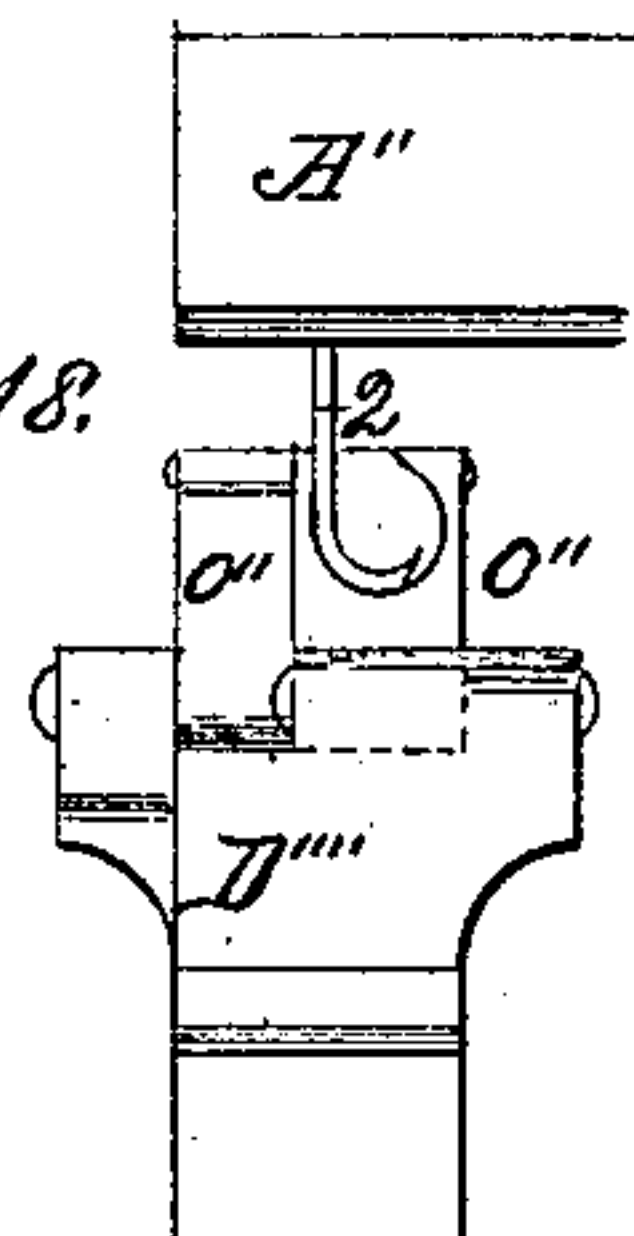
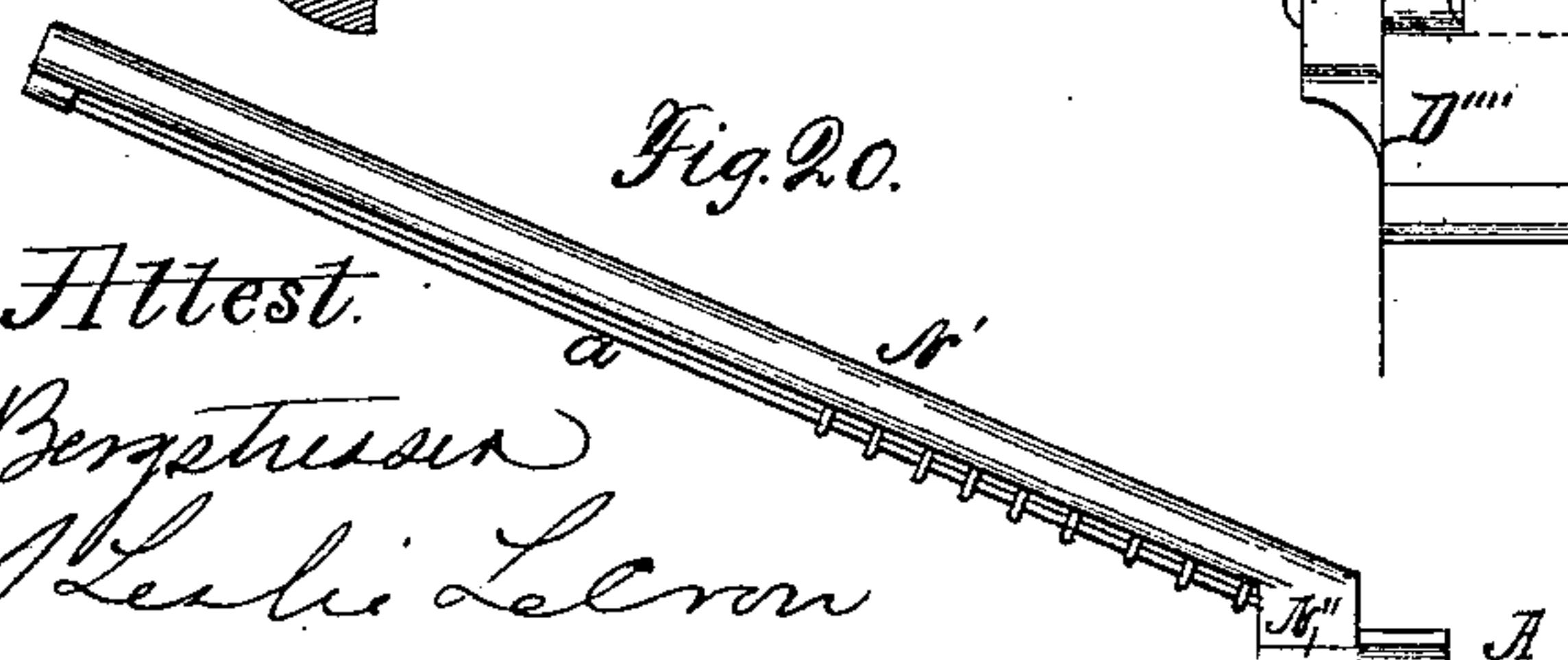


Fig. 20.



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UNITED STATES PATENT OFFICE.

EDWARD M. MURRAY, OF CEDAR RAPIDS, IOWA.

BUTTON-ATTACHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 389,237, dated September 11, 1888.

Application filed December 9, 1887. Serial No. 257,471. (No model.)

To all whom it may concern:

Be it known that I, EDWARD M. MURRAY, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Button-Attaching Machines, of which the following is a specification.

This invention relates to the art of attaching buttons to shoes and fabrics, and my object is to facilitate this operation by the use of apparatus which shall automatically form the fastener and attach the button.

The invention consists in the novel construction, combination, and arrangement of mechanism for this purpose, as hereinafter set forth and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of the machine embodying my invention, partly in section, to show the arrangement of foot-levers and rods; Fig. 2, a front elevation of the same; Fig. 3, a plan view of the same, less the wire-spool and its connections, below the section-line *ab* of Fig. 2. Fig. 4, Sheet 2, is a central longitudinal section of the upper portion of the machine; Fig. 5, a transverse section of the same on the line *cd* of Fig. 4; Fig. 6, a fragmentary sectional view of the parts which finish the button-fastener on the line *ef* of Fig. 4; Fig. 7, a fragmentary longitudinal section of the button-fastening parts on the line *gh* of Fig. 6; Fig. 8, a plan view of the button-fastening dies; Fig. 9, the button-table in perspective, and Fig. 10 a side view of the button fastening dies. Fig. 11, Sheet 3, is a side elevation of a portion of the upper part of the machine, showing a modification in the device for feeding buttons; Fig. 12, a plan view of the same below the section-line *ij* of Fig. 11; Fig. 13, a reverse view of Fig. 11 on the section-line *kl* of Fig. 12; Fig. 14, a front view of a modification in the device for forming the staple; Fig. 15, a plan view from the under side of the device for forming the staple shown in the principal figures; Fig. 16, a modification of the same; Fig. 17, a front view, partly in section, of a modification in the construction of the finishing dies; Fig. 18, a side view of the same; Fig. 19, a sectional end view of the staple-forming plunger of Fig. 4, showing the form and attachment of the spring which

opens the parts of the plunger; Fig. 20, a side elevation of a button-chute adapted to be filled by hand, and Fig. 21 a front view of a device adapted to form an eye on a fastener with one tang.

Similar letters of reference indicate corresponding parts.

This machine is designed to form from continuous wire and within the eye of the button a fastener, press the point or points of the same through the leather or fabric, and form on the under side a suitable eye or loop, which, when finished, lies flat against the leather or fabric. The mechanism through which this operation is performed admits of considerable modification in form and construction, some of which modifications are shown in the accompanying drawings. Apparatus fully illustrating the principles and operation of the invention will now be described.

A is a bed-block mounted on a suitable frame, M, which is preferably made high enough to bring the bed-block to within easy reach of the operator. A cheap and simple frame is made of wood in the manner shown in Figs. 1 and 2, and this is preferably mounted on a suitable iron base, M', said base and the bed-block being connected by bolt-rods M". The frame M thus serves as a casing for the internal parts of the machine. On suitable brackets, L L, attached to this frame, is mounted the wire-spool I'. To this base M' is pivoted a foot-lever, H, and to the inner arm of the lever, by suitable connections, are pivoted rods D, E, and F. It is not absolutely necessary that there should be more than the one rod D connecting with the foot-lever, as the others may branch from that, as indicated by the construction shown in Fig. 13, where the arm F" is made a branch of the rod E. The construction shown in Fig. 1 is, however, more suitable to the simple form of the machine shown in the first two sheets of drawings. It is desirable to bring the pedal of the foot-lever comparatively close to the machine; and so, in order to get the requisite leverage, I connect the lever to a pivoted arm, G, and this to the foot of the rod D. The others may be connected directly to the inner arm of the lever, as shown.

In the upper end of the rod D are set the

dies which form the finish of the fastening on the under side of the leather, and which will be hereinafter more particularly described. In the upper end of the rod E is the wire-cut-
 5 ter E', and the rod F terminates at the upper end in means for actuating the wire and button feed, which will also be hereinafter described in detail.

Within the bed A is mechanism for forming
 10 the staple from which the complete fastener is made. This device consists of a plunger, Q Q', adapted to catch the piece of wire as cut off on its forward end and thrust it forward to the point of attachment. In its passage the
 15 wire is pressed between the sides of a bell-mouthed former, r r, on the under side of the forwardly-projecting horn of the bed A'. This feature of the invention admits of considerable variation in construction, the principle being the formation of the staple by the
 20 forward movement of a plunger adapted to carry the piece of material of which the fastener is made from the point where it is cut off to the point of attachment. The device
 25 illustrated in Figs. 8 and 15 shows a simple and efficient manner of performing this operation. The plunger is made of two principal parts, Q Q', hinged together. The shank of the part Q is a round shaft mounted in and
 30 adapted to slide endwise in suitable bearings formed within the bed A. Its mate Q' is hinged to it in the simple manner shown in Figs. 4 and 19, a helical spring, s', serving to automatically spread the staple-forming wings
 35 of the plunger to the horizontal. These wings in the forward movement of the plunger pass between the sides of the bell-mouthed former r r and are gradually turned by a spiral movement to the vertical, as shown in Fig. 6. The
 40 plunger is actuated by means of a bell-crank, S, connecting with the rod D, and by suitable connecting-rods, R, with a sleeve, m, loosely mounted on the shaft of the plunger between two fixed collars, l l. A powerful spring, T,
 45 forces the plunger forward and the downward pressure of the foot-lever carries it back.

In the device just described the staple 2 is formed around the reduced end of the wings
 50 n n, the outer sides of the staple bearing against the inner sides of the former r r. The shoulder near the ends of these wings is made at right angles to their length. Consequently when the staple is finished it stands vertical, with the points down. The same result may
 55 be effected by forming the staple between the wings n' n', as illustrated in Fig. 14, in which case the device is preferably provided with a central core, Q'', over which the staple is bent by the passage of the wings between the
 60 guides r' r'.

A further modification is shown in Fig. 16, in which the staple is formed by simply thrusting the wire straight forward through a bell-mouthed former, r'' r'', by a single plunger,
 65 Q'', in which case the staple would naturally be horizontal when finished. As means may be easily devised for righting the staple should

its own gravity be insufficient, this device may serve the purpose in view.

As the plunger cannot remain at the forward
 70 point during the attachment of the fastener, I provide means whereby the staple is held securely in an upright position during this operation. It will be understood that previous to the formation of the staple the wire w has
 75 been fed through the eye of the button l. In its forward movement the shank of the button passes along a slot in the middle of the horn A'', the slot being but little wider than the
 80 thickness of the shank, so that the sides of the button lie above a thin flange of this part A'. This would, of course, be sufficient, ordinarily, to prevent displacement of the button at any time; but to insure the proper position of the
 85 staple under all circumstances I provide these flanges with a notch, t, on the under side at the point where the staple stops in its forward movement, and by means of a spring, s, under
 90 the button draw the loop of the staple into this notch. The notch not only serves to right the staple in the first place, but affords a secure bearing for the loop during the formation of the fastener.

The apparatus for thrusting the staple through the leather or fabric and completing
 95 the formation of the fastener is shown in Figs. 6, 7, 8, and 10, and also in Fig. 2. Referring to said Fig. 2, it will be observed that the rod D is composed of two parts, and between these
 100 parts lies the rod D'. The latter is arranged to have a limited movement vertically between the parts of D, and is pressed upwardly by a powerful spring, D'', bearing at its lower end on a transverse portion of the part D and at its
 105 upper end against a collar on the part D'. The sides of the rod D are made slightly flexible, and are so constructed that their natural tendency is to spread apart at the upper end, which passes through a suitable hole in a forwardly-projecting portion of the bed A'. To the up-
 110 per end of each part is secured a die, p, the lower end of which die forms an angle and projects out from the part D. A corresponding angle is formed in the upper side of the block A', so that as the rod D rises the parts are
 115 spread when the bottom of the dies p p reach this angle in the block and are correspondingly drawn together as it descends. The upward motion of these dies tends to form the
 120 eye, loop, or coil on the lower end of the fastener, and the outward motion to spread the legs of the same apart in the operation of clinching, as will be evident upon a reference to the dotted lines in Fig. 6.

As before stated, the machine is more spe-
 125 cially designed to make a fastener, the ends of which are turned into an eye or coil and then bent flatwise against the material to which the button is secured. It is evident, however, that it may be used in connection with other forms
 130 of fasteners, the construction of the die being varied to suit the circumstances. Thus in the case of a fastener made by spreading the prongs of the staple simply the dies may be single

and little more than a flat piece of steel with slight concavities in the top for the points of the staple, according to a common and well-known construction. In the application of the machine to the formation of my style of fastener, however, special means are required.

The first part of the operation is to force the points of the staple 2 through the leather or other material, 3. It is desirable that this should be done somewhat in advance of the turning of the eyes on the ends of the staple, and I therefore prefer to use a separate die for that purpose. This die *o* is set in the upper end of the central rod, *D'*. It is preferably made H-shaped in cross-section, the central web, *o''*, corresponding in thickness to the space between the prongs of the staple. The outer dies, *pp*, are fitted to the channel between the lateral flanges of the die *o* and are free to slide therein. To deflect the points of the staple, I provide the die *o* near its upper end with a laterally-projecting pin or lug, *o'*, which strikes the prongs of the staple on their beveled sides, respectively, and bends them outwardly in the opposite directions indicated in Fig. 10. The points of the staple striking the inner sides of the flanges of the die are then deflected inwardly, and the eye is thus partially formed by this central die. The outer dies, *pp*, then moving upward come in contact with the unfinished coil and complete it, and with the final movement spread it sideways, as already described. The upper side of the lateral lugs *o'* may project outward considerably; but the under side should be beveled to allow for the movement of the outer dies in completing the fastener. The central die is carried upward by the general upward movement of the rod *D*; but, being connected to the rod *D* by a spring, as before stated, it may move in advance of the outer dies until it reaches its terminus, when the spring yields and allows the outer dies to finish the work.

A modified form of dies which dispenses with the central one is shown in Figs. 17 and 18. In this case the dies *o'' o''* are hinged together at the upper end, and are separately hinged to the upper ends of the rods *D'' D''*. The eye or coil of the fastener is formed by the single die *o''* by the straight upward motion of the same to a certain point, when the rods *D'' D''*, being liberated, are free to spread apart, correspondingly spreading the lower part of the fastener, as indicated by the dotted lines in Fig. 17.

The buttons are fed to the machine through a chute, *N*. This may be automatic, as illustrated in the principal figures, or a chute filled by hand, as shown in Fig. 20. In its simplest form it consists of a tube, *N'*, a little larger than the head of the button inside, and with a groove in one side a little wider than the shank of the button in its widest diameter. Parallel with the tube and along the center of the groove lies a wire, *a*, upon which the buttons are strung, and which serves to keep them in uniform position. The chute may be

connected with the top of the bed-block *A* by a simple dovetail connection, *N''*, so simple as to require no further description.

In practice it is desirable to make the machine so as to supply the chute automatically and render it capable of being used in connection with the one or the other at will. It is also desirable to have more than one automatic chute—the one for bright and new buttons and the other for old ones—and to so construct the machine that the one or the other may be connected at will. In Figs. 4 and 5 is shown a single automatic button-feed, and in Figs. 11, 12, and 13 a double one, the machine being also adapted to operate in connection with a hand-filled chute.

The chute for the automatic machine is constructed in substantially the same manner as for the one above described, with the exception that the wire *a* is not connected to the chute at any point, and the chute itself is preferably semicircular in form, as shown. It is secured to the machine by an arm, *C'*, of the standard *C*, and the upper end of the wire *a* communicates with the interior of a drum, *B*, containing a quantity of buttons, *l*. This drum is provided with buckets *B''* inside, and is mounted to revolve in a suitable bearing at the upper end of the standard *C*. Motion is imparted to the drum by means of a rack, *F'*, connected with or forming a part of the rod *F*, and a pinion, *d*, having a suitable pawl therein adapted to engage with notches in the journal of the drum. Within and above the center of this drum I mount a hopper, *B'''*, converging at the lower end to an opening something larger than the diameter of a button. This hopper is supported from and by a cylinder, *P*, passing through a hollow hub, *B'*, of the drum, and this is in turn secured to an upwardly-extending arm, *C''*, of the arm *C'*. Through this cylinder the wire *a* passes in the inclined position indicated, and at the inner end turns up vertically under the center of the hopper *B'''* and terminates in a point to facilitate the attaching of button-shanks thereon. The elevator-buckets of the drum are preferably made somewhat rounding on the under side, so that in discharging they tend to converge the buttons toward the center of the hopper, though this is not absolutely necessary, as in the operation of dropping the buttons through the hopper some of them will catch on the wire.

The wire *a* is supported near the upper end, preferably at three or more points, by a series of grippers, *c*, *c'*, and *c''*. The first mentioned gripper, *c*, is preferably mounted horizontal and at right angles to the vertical portion of the wire. The others operate at a right angle, or nearly so, to the inclined portion of the wire passing through the cylinder *P*. The construction of the grippers is shown in Fig. 11. They consist, essentially, in a pair of rings arranged side by side, and terminating outwardly in shanks adapted to slip endwise in suitable bearings and inwardly in an angular

portion adapted to centralize and tightly hold the wire. Springs *eee* tend to draw the rings toward the wire, and cams *b b' b''* inside the hub *B'* to force them in the opposite direction.

5 These cams are preferably arranged at different points in the inner circumference of the hub, so that the operation of the grippers is alternate, two holding while one is open. The opening of the rings allows a button to pass
10 through, and on the passage of the cam the spring throws the gripper back to its normal holding position.

The inclined position of the wire *a* is calculated to keep the shank of the button uppermost until it shall have passed the mouth of the chute *N*, when its position is positively controlled; but in the event that a button should get wrong side up its position is reversed by the curved extension of the upper
20 end of the chute *N'''*. Buttons may be poured into the drum through the pipe *O*, communicating with the hollow journal of the drum.

The lower end of the chute communicates directly with a device which may be designated as the "button-table," since it is on this
25 that the button rests while the wire *w* is being fed through its shank. The construction of this button-table is shown in Fig. 9. It consists of a thin plate, *h*, having a portion turned
30 upwardly to connect with the spring *k*, Fig. 5, said plate being rectangular, with a notch cut out of one corner. In this corner is placed a corner-piece, *h'*, smaller than the notch in the plate *h*, and connected to the larger part
35 by bridges *h'' h'''*. The channel formed by the separation of the bottom parts of the table is under the bridge *h'''* wide enough to admit the shank of the button sidewise and under the bridge *h''* to allow for the exit of the
40 button-shank edgewise. It will be readily seen that a button passing under the bridge *h'''* from the chute will stop in the center of the table and can only pass out at a right angle to the line of entrance.

45 In its normal position the button table is too high for the passage through its shank of the wire to form the fastener; so it is necessary to cut out this button from the rest of the row and drop it below the others. To this end a
50 suitable hole is made in the top of the bed-block *A*, and at the proper time a presser, *f*, actuated by the same mechanism which governs the feeding of the wire *w*, forces the table down and holds it in that position until
55 the wire has been fed through the shank of the button. A simple actuating device for this purpose is shown in Fig. 5, the outer arm of the presser engaging with a notched wheel, *I'*, connected with or forming a part of the wire-
60 feed roller *I*. On the release of this outer arm of the presser the inner end flies up by the action of a spring, *j*. By a suitable adjustment of the respective parts of the machine this may be made to act just as the wire *w* has been
65 cut off, or a short time before that. While the table is depressed the upper portion of the bridge *h'''* shuts off the column of buttons in

the chute. The presser may be provided with a conical or cup-shaped part, *f'*, to centralize the button, and any inequalities in the size of
70 the buttons is compensated for by a suitable spring between the presser and this cap.

The wire for the fasteners is wound on a spool, *L'*, and from this is carried between
75 rollers *I I*, suitably mounted at the side of the machine. Motion is imparted to these rollers by a ratchet-wheel, *J*, which is actuated by a pivoted pawl-lever, *g*, having a pawl, *g'*, hinged thereto. The pawl is carried upward by a lateral
80 lug of the rod *F*, and descends of its own weight. After passing from the rollers the wire is carried to the cutting-dies *E' E''* by a guide, *w'*, the hole through the guide at the terminus next the dies being but a trifle larger
85 than the wire, so that the same is directed with certainty to the hole in the button shank.

In the application of the machine to the attaching of shoe-buttons it is desirable to use
90 two or more sizes of wire for the fasteners—one for ordinary work and a smaller size for ladies' fine shoes. The machine may therefore be provided with double feed-rollers for the wire and with mechanism for shifting the one or the other in and out of gear at will. The device for this purpose is shown in Figs.
95 12 and 13. Rollers *I I* are mounted loosely on a shaft, *x*, and as closely together as may be practicable. A sleeve, *x'*, is secured to the shaft each side of the pair of rollers and forms a clutch-connection with the portion of the
100 hub of each roller next the shaft. The clutch is made to engage with the respective rollers by means of a simple shifter, *y*, an arm of which connects with the shaft *x* by means of a loose bearing between two collars. The
105 shifter has a slotted connection with the top of the bed *A* and is shifted by means of the handle *y'*. A lug, *y''*, extends downward through a slot in the top of the bed and connects with the wire-guide *w'*, whereby the wire
110 is shifted simultaneously with the changing of connection with the rollers. A spline, *z*, connects the shaft with the hub of the ratchet-wheel *J*, and at the same time admits of the limited movement of the shaft endwise.
115

In the formation of the fastener it is important that the staple should be held quite
120 securely in a vertical position. The upper end of the staple is held in the notch *t*, as already described; but it is desirable that the middle of the staple should also be held to prevent it spreading or becoming otherwise displaced. The device for this purpose is
125 shown in Figs. 6 and 7. It consists of a pair of keepers, *u u*, pivoted to a convenient portion of the bed-block *A*, and provided with a spring, *u''*, which tends to throw the staple-holding end *u'* downward, as shown in Fig. 6. This portion of the keeper has a notch in which
130 the leg of the staple rests and whereby it is held in position during the upward movement of the dies which form the fastener. As the dies move upwardly, they press the staple-holding parts of the keepers *u' u'* into recesses

formed on the under side of the horn A'' , and thus serve as the surface against which the eye of the fastener is pressed in finishing. These keepers should be up and out of the way as the staple is pushed forward, and they are accordingly provided with a device which locks them in the upper position until the staple has nearly or quite reached its final position. The pivotal portion of the keeper is provided with a lug extending in the opposite direction to the arm u' , and over this lug is mounted a slide, v , having a head on its outer end, as shown in Fig. 7. The other end of the slide passes through the side of the bed-block and terminates in a suitable head, between which and the bed-block is interposed a coil-spring, v' , tending to throw the slide inwardly. The action of the parts will be readily understood. As the keepers rise with the upward movement of the dies $o p$, the lugs are correspondingly depressed until they finally reach a point where the head of the slide can slip over them, carried back by the spring. They remain in this position until the forward movement of the plunger Q or the upper end of the bell-crank S brings a portion thereof in contact with the inner head of the slide and forces it outwardly until at the proper time the keeper is liberated and forced down by its spring over the leg of the staple.

The wire-cutters are two simple dies, $E' E''$, beveled to the desired angle for cutting off the wire, so that it may have a sharp point. The upper die, E' , is set in a suitable socket in the top of the bed-block, so that the lower side of said die is about flush with the under side thereof and on the level of the wire as fed to the button-shank. The die E'' is a plug of similar shape in cross-section secured in the upper end of the rod E , and is adapted to move vertically in suitable guides.

In the use of two button-feeders the chutes are necessarily set at an angle, converging at the bottom to near the common center, space being preferably left between them for the independent chute N' . Each side of the central space the ends of the chutes are closed by suitable fixed stops, $h''' h'''$. Either chute is thrown in or out of gear by simply moving the standard C backward or forward, it having a slotted connection with the bed-piece A''' for that purpose. The same movement throws it in or out of connection with the feeding apparatus of the drums, as indicated by the dotted lines in Fig. 13. In the middle position there is no connection of the operative mechanism with the button-drums, the independent chute supplying their functions. The rack F' , which imparts motion to the drums $B B$, is in this case attached to a supplemental arm of the rod E , and as this arm crosses the path of the wire w the same may be bifurcated, as shown, to admit of the passage of the wire.

The operation of the invention will now be clearly understood. Supposing that the machine is in its normal position with the pedal

of the foot-lever up, the relative position of the parts will be the reverse of that shown in Fig. 4—that is to say, the plunger will be forward and the dies will be down. The first downward motion of the foot-lever moves the dies upward and the plunger backward. As the dies continue to move upward, they form and finish the fastener. In the meantime, or during the last third of the stroke, the wire w has begun to feed toward the eye of the button, and about the same time the presser has begun to push the button and the button-table down to position for the shank of the button to receive the wire. This movement is completed just as the plunger passes the hole in the bed-block through which the table descends. The final motion of the pedal downward cuts off the wire, and on the liberation of the foot from the pedal the spring carries the plunger forward, forming the staple and completing the movements of the machine. The operation of the drum B and its connections being independent of the mechanism which forms the fastener, it may be moved at any time during the stroke of the machine. After the wire has passed through the shank of the button and the free end has passed the opening in the bed through which the button-table descends, the button need be no longer held by the presser, which may rise at once to its normal position. The spring k then tends to lift the button-table, thus drawing the wire up against the under side of the bed A and holding it secure from displacement while being cut off. When the button has been carried out of the table by the forward movement of the plunger, the table at once springs up to its normal position and receives another button from the chute.

While the machine as already described is more specially adapted to the formation of fasteners with two tangs, it may also be used to make a single-tang fastener, the only material change being in the construction of the device for forming the connection of the fastener with the button-shank and the position of the cutters. This modification is illustrated in Fig. 21, where the short end of the wire is carried a quarter of a revolution farther than in the case of a staple by the increased turning of the wing n'' , governed by the spiral guide n''' . One-half of the mechanism for forming the fastening from the staple will of course suffice for a single tang.

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

1. In a button-attaching machine, the combination of a plunger adapted to engage a section of wire as fed through the shank of a button and cut-off and to push the piece of wire and the connected button from the point where the wire is fed into the button-shank to a position for attachment to the leather or fabric, and a former, substantially as described, acting in conjunction with said plunger, whereby the forward movement of the plunger forms a

loop or eye in a portion of the wire simultaneously with such movement to a position for attachment, substantially as specified.

2. In a button-attaching machine, the combination of a plunger having pivotal wings adapted to engage a section of wire as fed through the shank of the button, and a spirally-formed guide for said wings, whereby they are folded inwardly by the forward movement of the plunger, forming a loop or eye in the wire connecting it with the button-shank, substantially as specified.

3. In a button attaching machine, a plunger composed of two portions hinged together, each of said parts being provided with a wing adapted to engage with a piece of wire fed through a button-shank, a spring connected with both parts of the plunger and adapted to distend the wings normally to the plane of the wire, and means, substantially as described, for reciprocating the plunger and folding the wings together in their passage from the initial to the final point, substantially as set forth.

4. In a button-attaching machine, the combination, with a plunger adapted to form from a straight piece of wire, in the passage of said plunger from its initial to its final position, an eye or loop connecting with the shank of the button, of a grooved bed-plate, within which groove the button is adapted to slide in the formation of said eye or loop, a notch on the under side of said bed-plate at the final position of the button adapted to receive the upper part of said eye or loop, and a spring under the button adapted to draw the eye or loop into said notch, substantially as and for the purpose set forth.

5. In a button-attaching machine, the combination of the plunger Q Q', having wings adapted to engage with the piece of wire as fed through the shank of a button and to form a portion of the same into a loop or eye in its passage from the initial to the final point, the spring T, the bell-crank lever S, the rod D, and the pedal H, all substantially as and for the purpose set forth.

6. In a button-attaching machine, the combination, with means, substantially as described, for holding the button and its connected fastener in position for attachment to the fabric, of an eye or coil forming die having an inclined portion coincident with the point of the fastener-tang as thrust through the fabric, and adapted to deflect said point, and having an annular groove or recess into which said inclined portion leads, and whereby an eye or coil is formed on the tang below the fabric, and an independent die with a plane bearing-face for said eye or coil, adapted to press the same against the fabric, substantially as set forth.

7. In a button-attaching machine, the combination, with means, substantially as specified, for holding the button and its connected fastener in position for attachment to the fabric, of a central eye or coil forming die hav-

ing an inclined portion coincident with the point of the fastener-tang as thrust through the fabric and adapted to deflect the same, an annular groove or recess into which said inclined portion leads, adapted to form a coil or eye on the tang, lateral dies having shoulders on their outer opposite faces, and with guides therefor adapted to allow the dies to move vertically a limited distance and to spread outwardly as the shoulders pass out of contact with the guides, whereby the central die forms an eye or coil and the outer dies turn the same up against the fabric, substantially as specified.

8. In a button-attaching machine, the combination of the central die, *o*, having the lug or projection *o'*, adapted to deflect the point of the tang, and the lateral dies *p p*, adapted to complete the formation of the lower part of the fastener, the central die being provided with a spring-connection with the lever which operates the lateral dies, whereby it may operate in advance of them and stop on the completion of its stroke, allowing the lateral dies to move up and finish their stroke, substantially as set forth.

9. In a machine for attaching buttons, the combination of the central rod, D', with its die *o*, the lateral rods D D, with their dies *p p*, said rods being slightly flexible and tending to spread apart and having a shoulder near the upper end, the bed-block A', having a hole therein to receive the rods at their widest part and allow them to spread apart as the shoulder passes the top of the bed-block, and a foot-lever, H, with a pivotal connection with the rods D D and a spring-connection with the central rod, D', substantially as and for the purpose set forth.

10. In a button-attaching machine, the combination, with the bifurcated portion of the bed-plate forming the holding-jaw for the button and fastener when in position for attachment to the fabric, and consisting, essentially, of a plate having a slot slightly wider than the shortest diameter of the button-shank, in which slot the shank of the button rests with the button above and the connected loop of the fastener below, of pivoted keepers, substantially as described, adapted to hold the middle portion of the fastener-tang during the formation of the eye or coil thereon and to form a portion of the anvil-block against which said coil is pressed, substantially as described.

11. The described device for holding the tang of a button-fastener in the process of attachment to the fabric, which consists of a pivoted body, *u*, having an arm, *u'*, with a notch therein to engage with the tang of the fastener, a spring to press the same downward, a projection adapted to engage with the head of a slide, *v*, and a spring, *v'*, adapted to draw the slide backward as the keeper reaches its final position and to be pushed forward by some part of the operative mechanism of the machine, substantially as set forth.

12. In a button-attaching machine, the com-

5 combination of a button-chute and a movable table forming the lower terminus thereof, a presser adapted to push said button while resting on said table into position for the insertion of wire in its shank, and a spring connected with said table to return the same to normal position after the release of said button, all substantially as described.

10 13. The described button-table, consisting of the parts *h*, *h'*, *h''*, and *h'''*, constructed and arranged substantially as and for the purpose set forth.

15 14. In a button-attaching machine, the combination of the button-table adapted to be raised or depressed, a presser adapted to depress said table and hold the button in position thereon, a wire guide adapted to direct the point of a wire through the eye of the button, and wire-feeding mechanism, substantially as specified.

20 15. In a button-attaching machine, the combination of a movable table adapted to receive and isolate from the chute a single button and to hold the same in position for the insertion in its shank of the fastener-wire, a wire-cutting die, a reciprocating plunger moving transversely to said wire and having pivotal wings engaging therewith, and a spiral guide for said wings, whereby the button and fastener are simultaneously pushed to the proper position for attachment and are connected by a loop or eye, substantially as set forth.

30 16. A button-chute for button-attaching machines, consisting of a tubular body having a slot along the under side slightly wider than the greater diameter of the button-shank, a wire disconnected at both ends arranged central to said slot, and two or more sets of grippers, substantially as described, adapted to alternately hold and release said wire and allow buttons to pass along said wire, as specified.

40 17. The combination, in a button-attaching machine, of a chute, substantially as described, a revolving drum having elevator-buckets inside adapted to carry up buttons, a hopper inside said drum to centralize the buttons as dropped into it from the said bucket, an opening in the central portion of one side through which the upper end of the chute-wire enters the drum and terminates under the hopper,

and means, substantially as specified, for alternately holding said wire and opening to allow for the passage of buttons caught on the upper end, substantially as set forth. 55

18. In a button-attaching machine, the described device for stringing buttons on a wire, which consists of a revolving drum, *B*, having buckets *B'*, a hopper, *B'''*, to centralize the buttons in their discharge from the buckets, a hollow hub, *B'*, provided with internal cams, *b b' b''*, a cylinder within said hub provided with a series of grippers, *c c' c''*, with springs to actuate said grippers in one direction, said cams operating them in the other direction, and a wire entering the drum through said cylinder and terminating with its point upward under said hopper and being held by said grippers, substantially as described. 60 65

19. In a button-attaching machine, the combination of a revolving button-receptacle having internal elevators, substantially as described, a button-carrying wire, the upper end of which extends into said receptacle and is turned upwardly to catch the shanks of said buttons as they fall, and two or more sets of grippers adapted to alternately hold and release said wire and permit the passage of buttons, substantially as specified. 70 75

20. In a button-attaching machine, the combination, with a button cut-out, substantially as described, of a plurality of button-chutes mounted on a movable frame, by the movement of which the said chutes may be connected with and disconnected from said cut-out at will, substantially as set forth. 80 85

21. In a button attaching machine, the combination of a plurality of wire-feed rollers mounted on a longitudinally-movable shaft, each of said rollers having a clutch adapted to engage with a similar clutch on said shaft, a shifter connected with said shaft, and a wire-guide adapted to receive a plurality of wires and connected with said shifter, all constructed, arranged, and adapted to operate substantially as and for the purpose set forth. 90 95

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD M. MURRAY.

Witnesses:

J. J. LE CRON,
S. LESLIE LE CRON.