

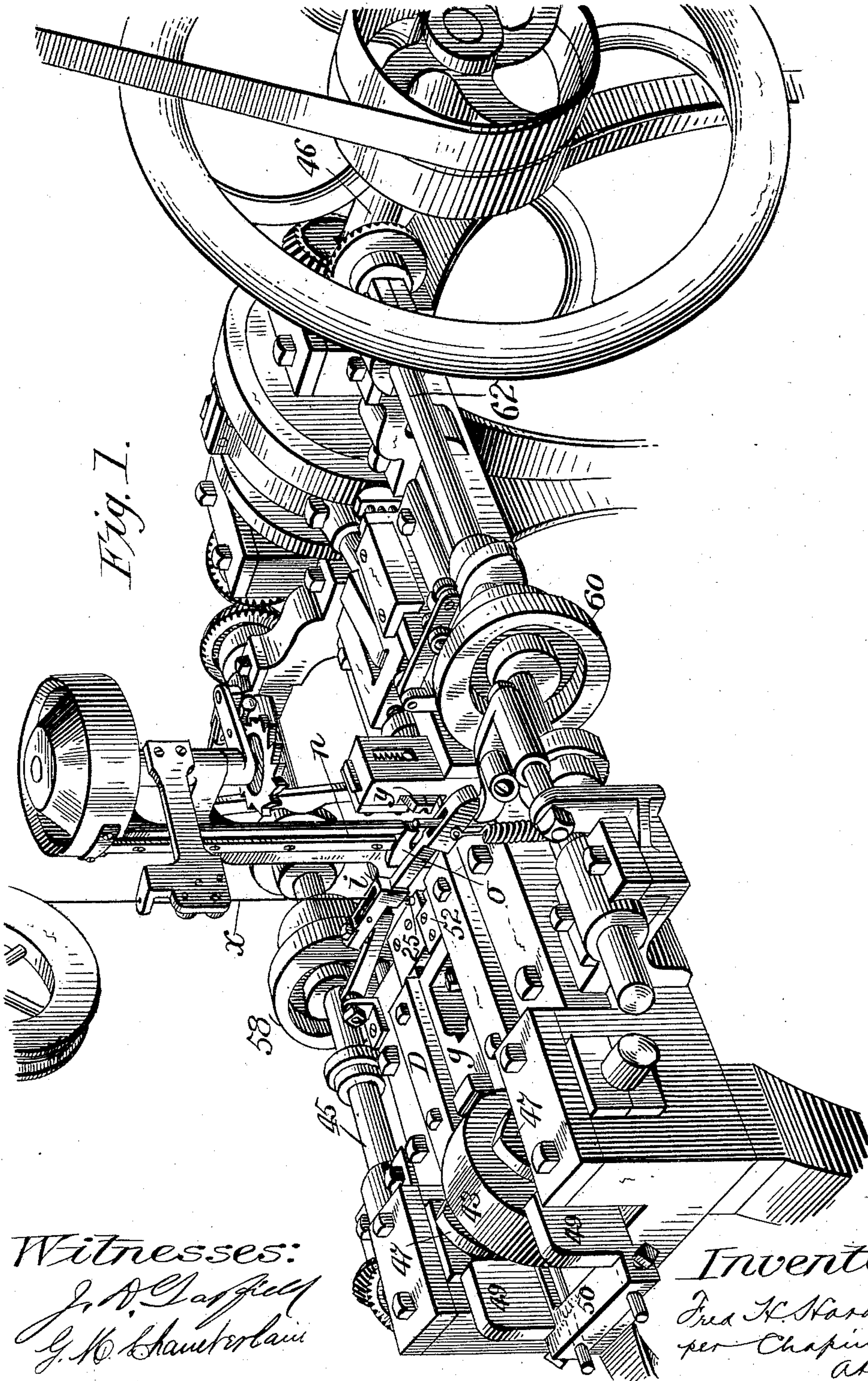
(No Model.)

5 Sheets—Sheet 1.

F. H. HARDMAN.  
BUTTON MACHINE.

No. 474,320.

Patented May 3, 1892.



Witnesses:  
*J. A. Gaffney*  
*G. H. Hamerlain*

Inventor,  
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*per Chapin & Co.*  
*Atty-*

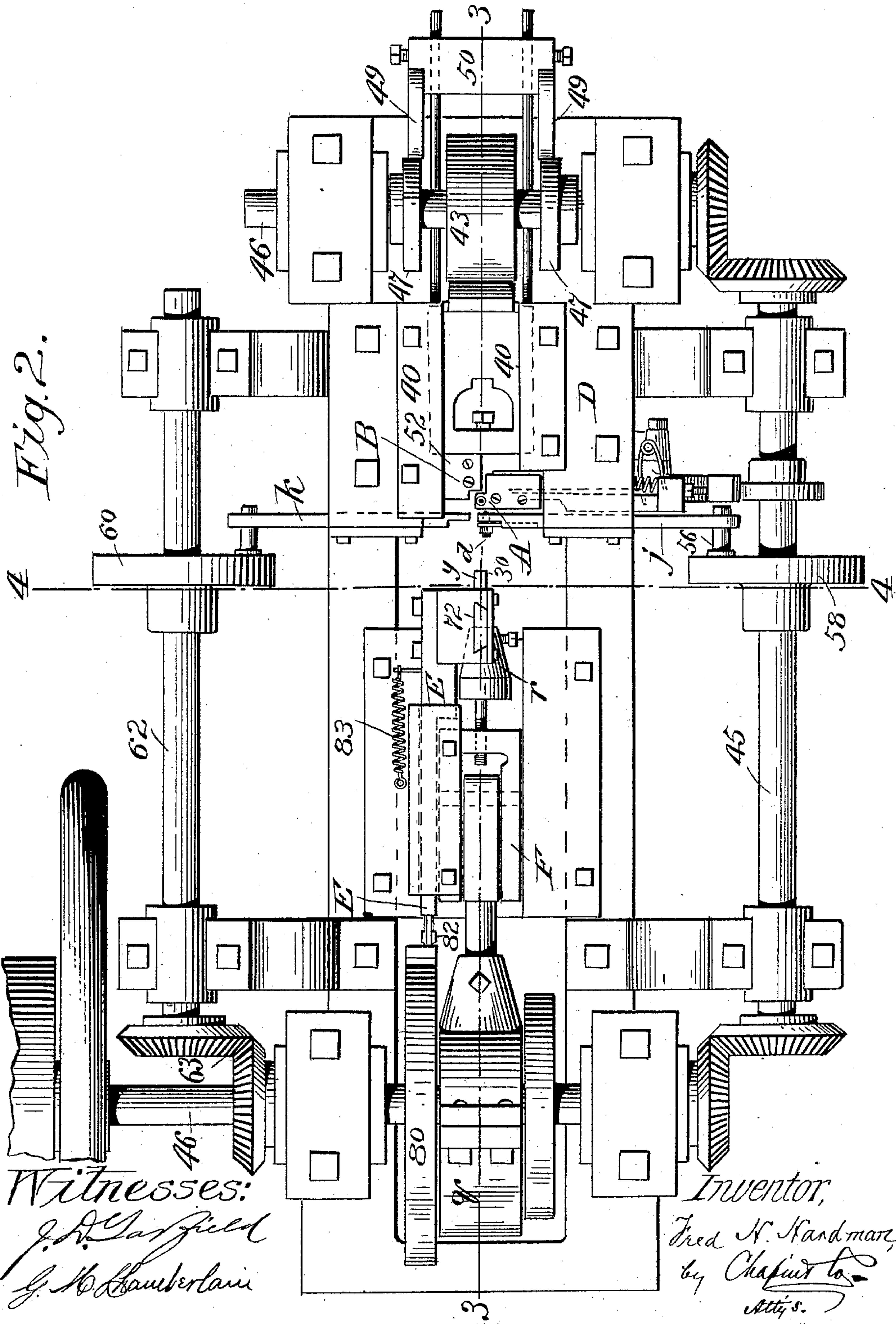
(No Model.)

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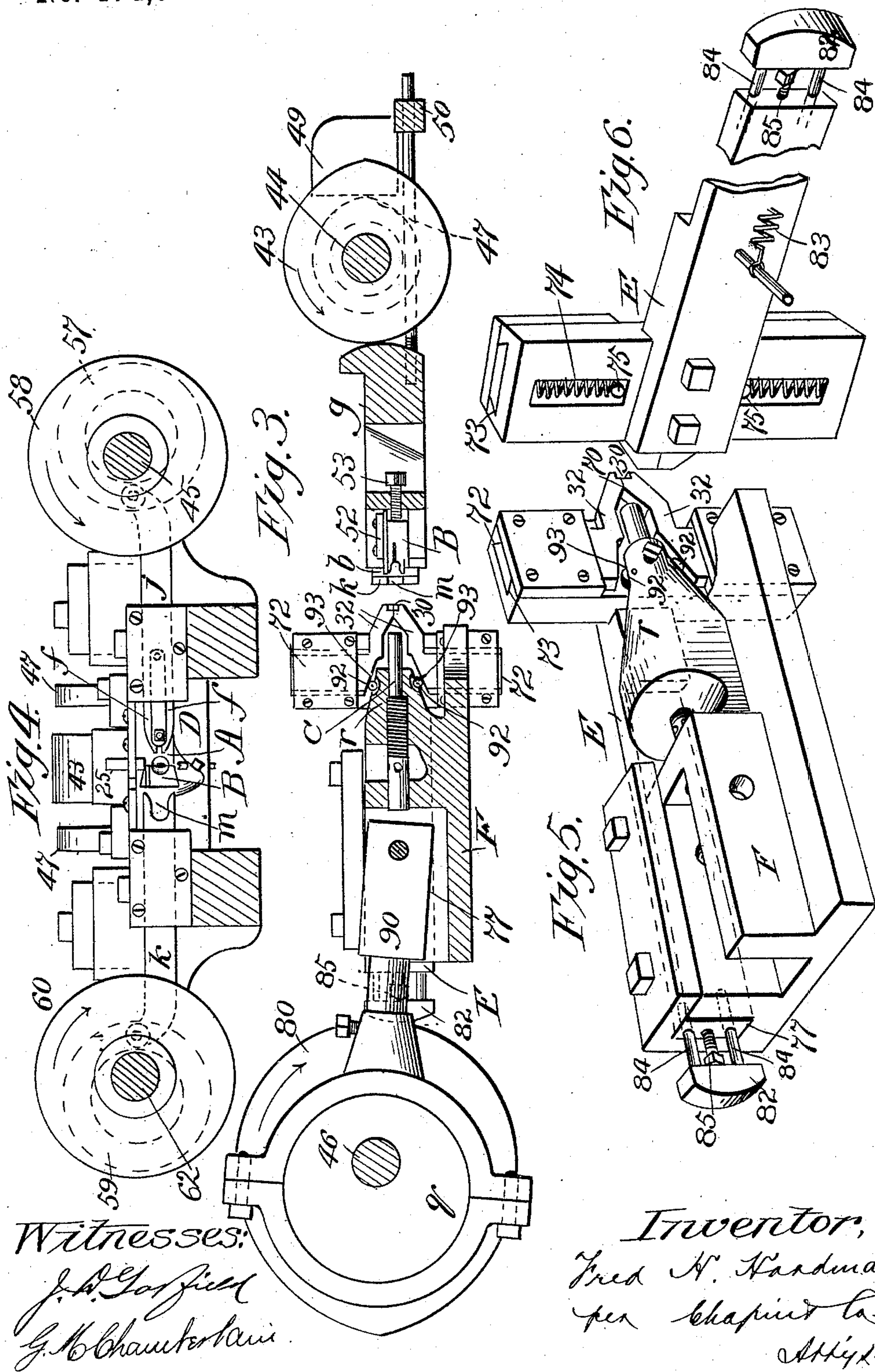
(No Model.)

5 Sheets—Sheet 3.

F. H. HARDMAN.  
BUTTON MACHINE.

No. 474,320.

Patented May 3, 1892.



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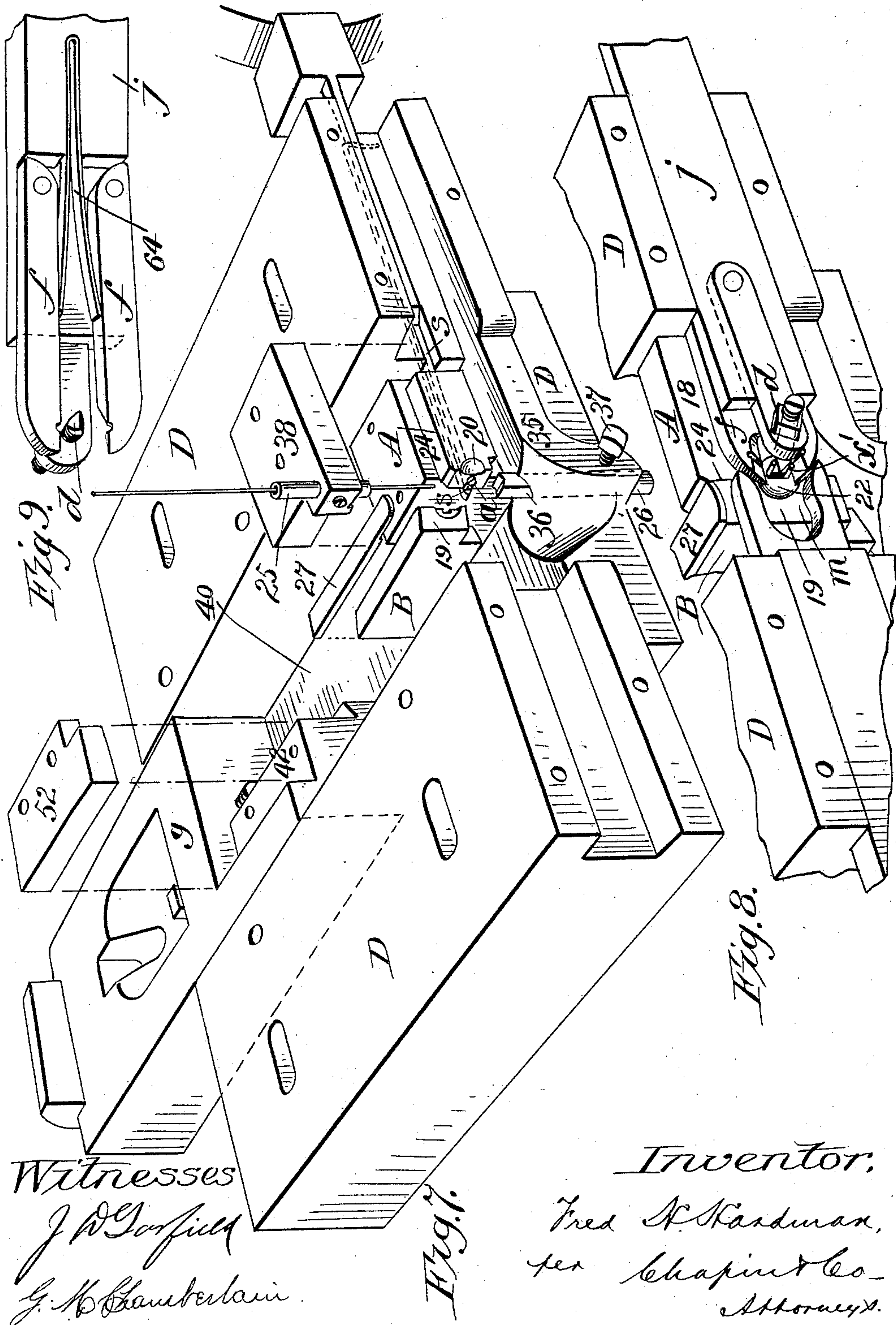
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(No Model.)

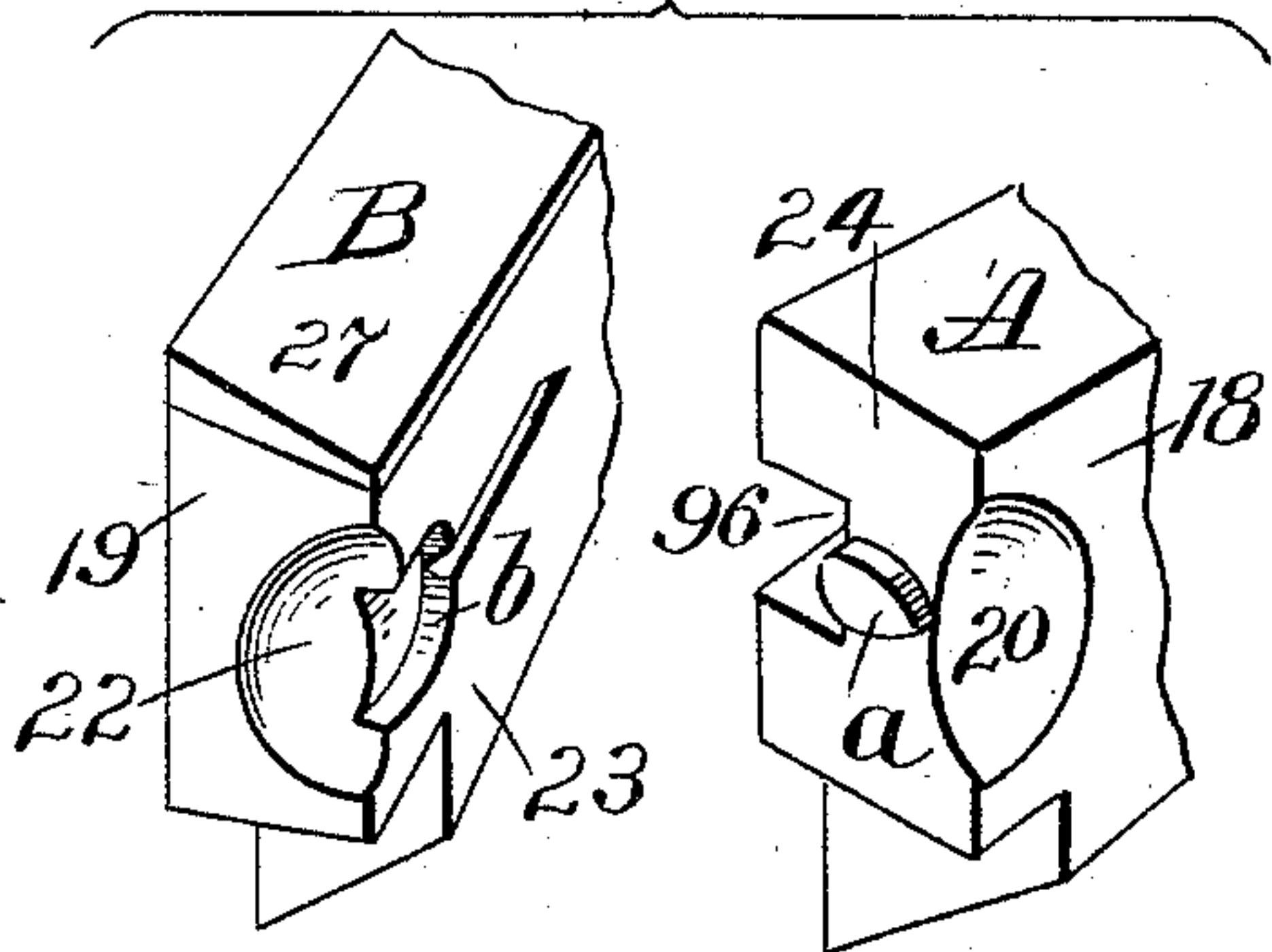
5 Sheets—Sheet 5.

F. H. HARDMAN.  
BUTTON MACHINE.

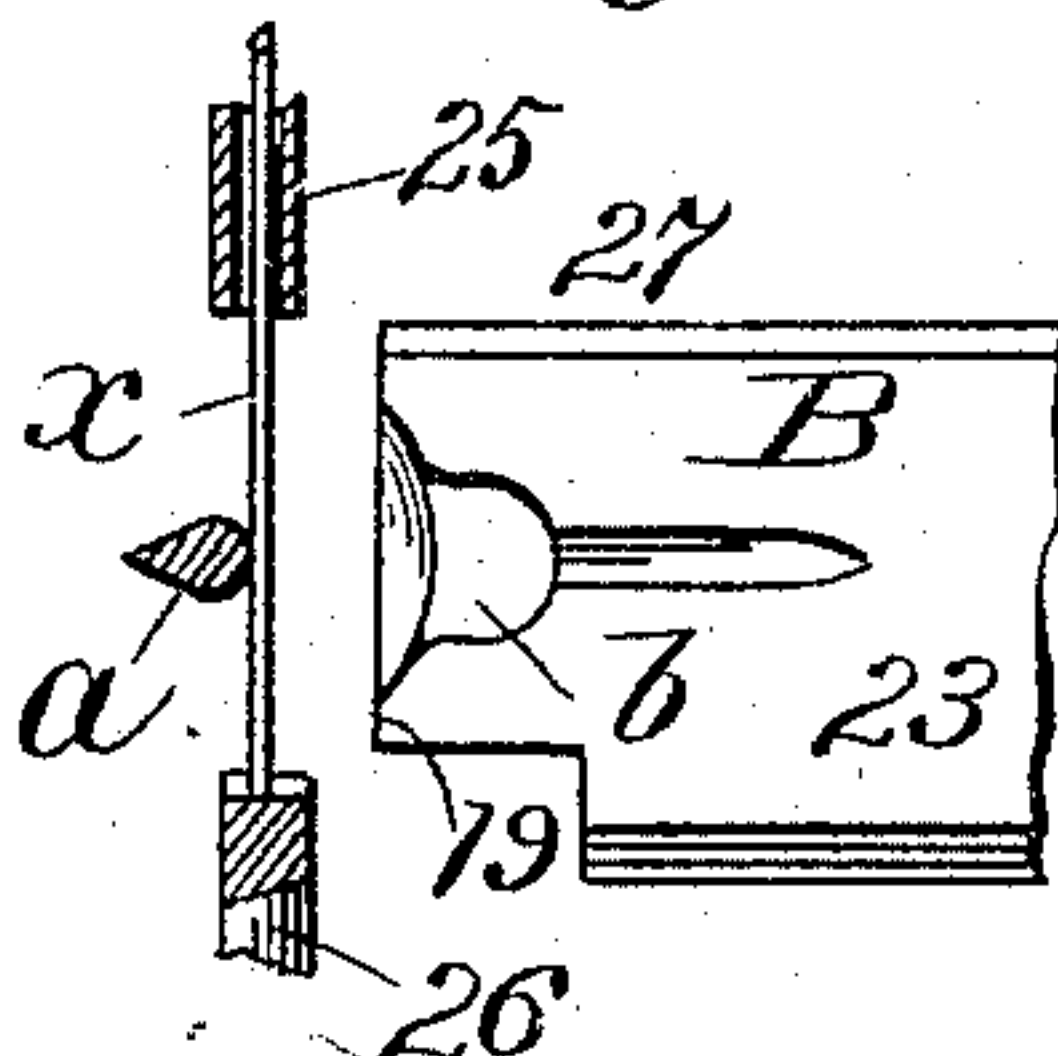
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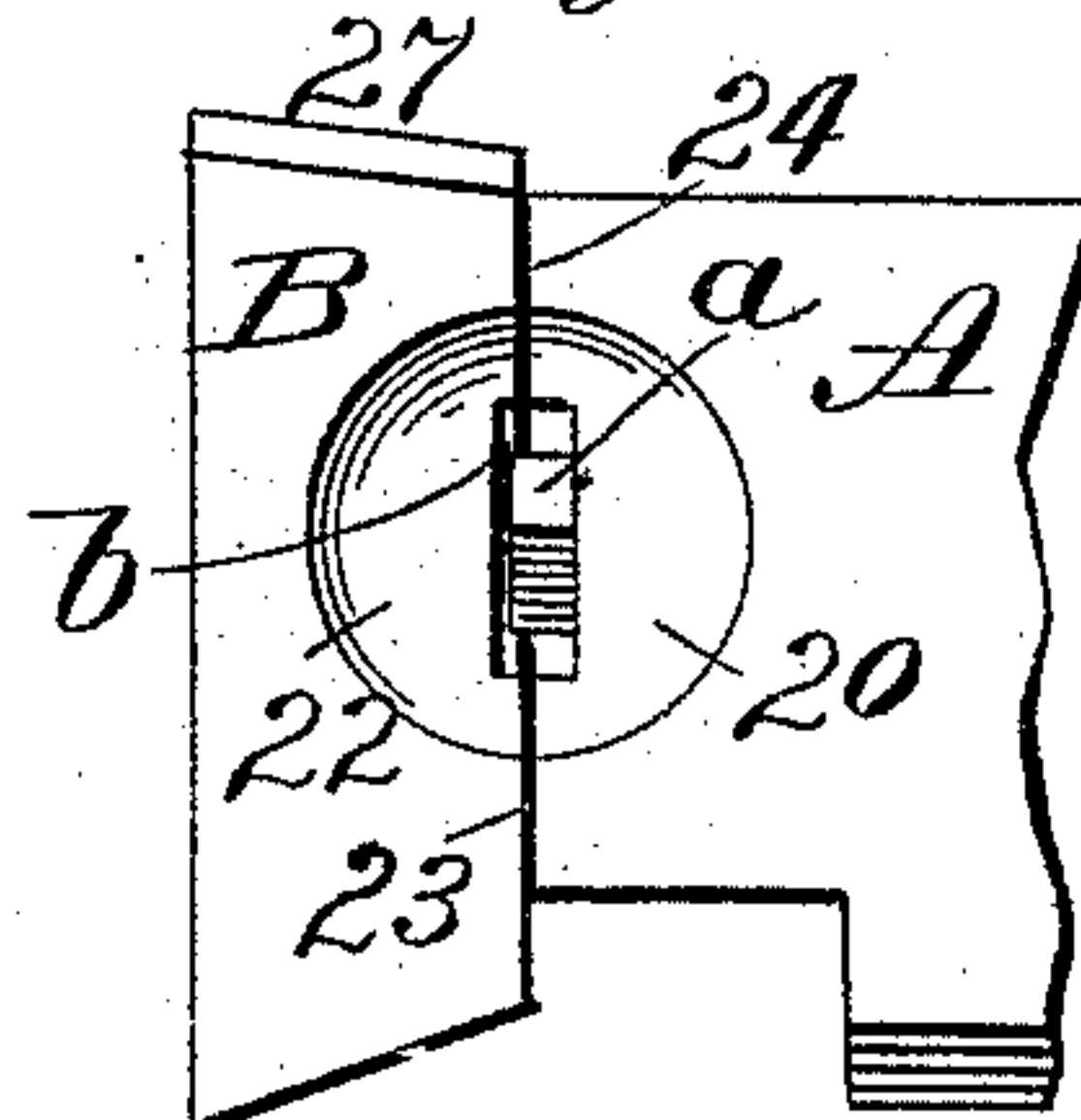
*Fig. 10.*



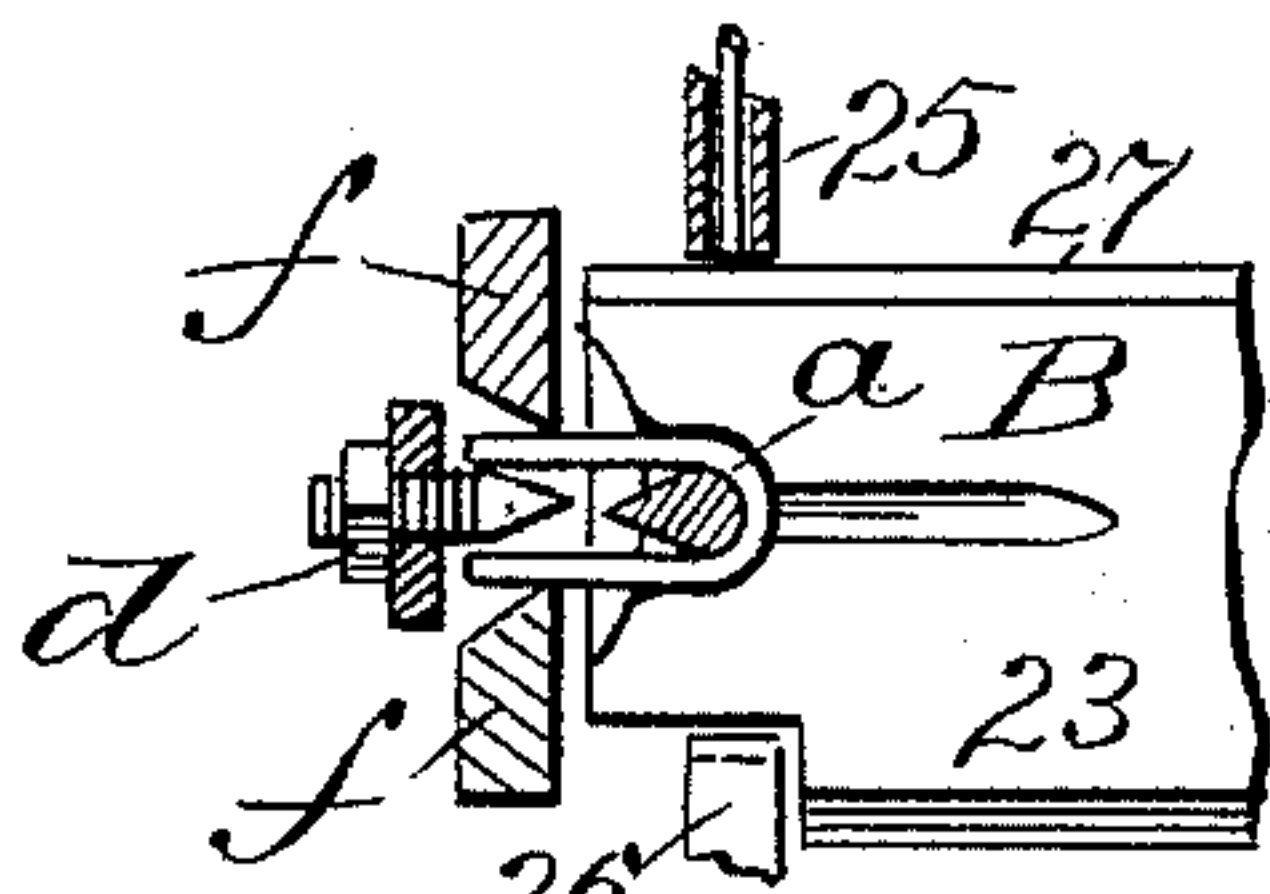
*Fig. 12.*



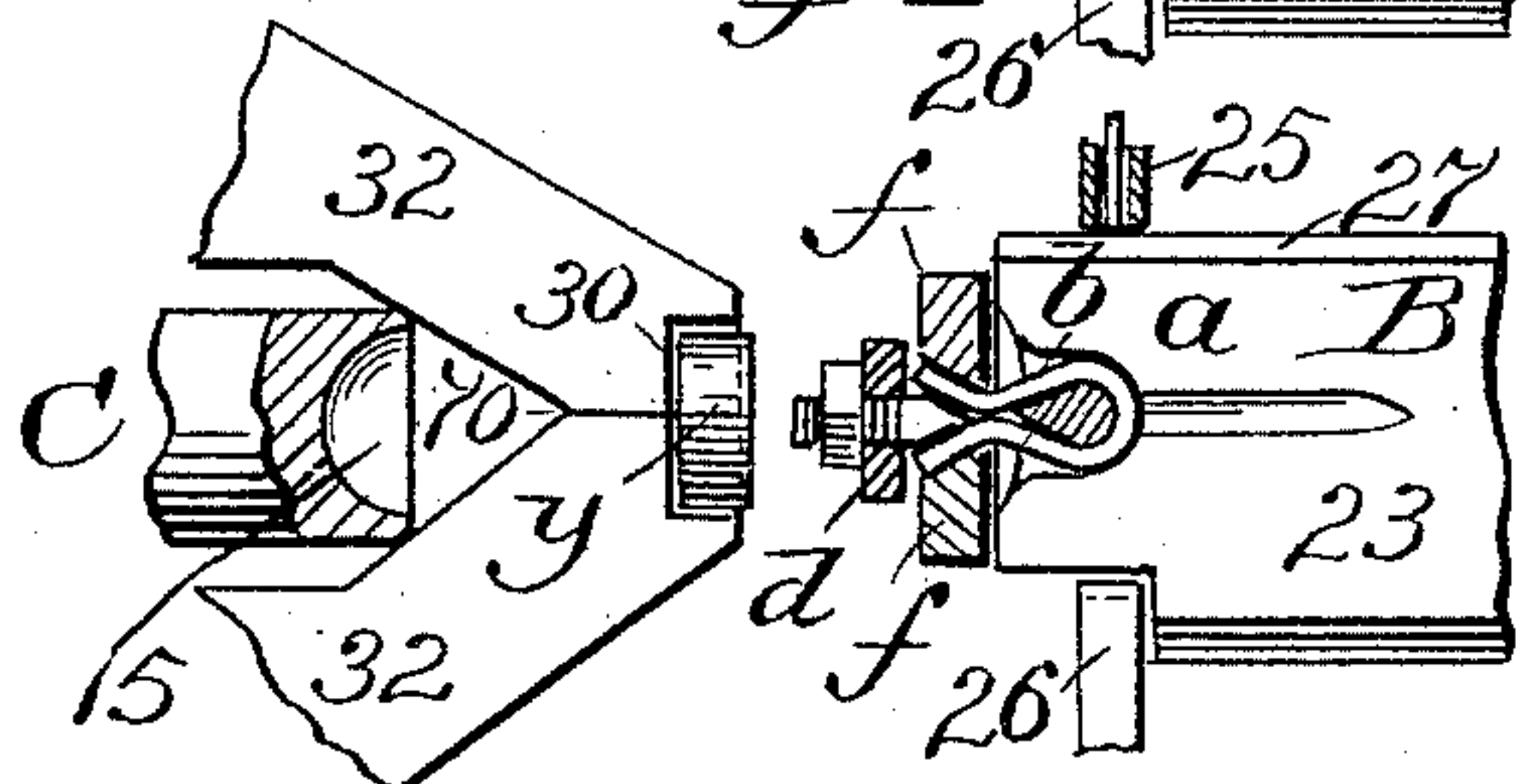
*Fig. 11.*



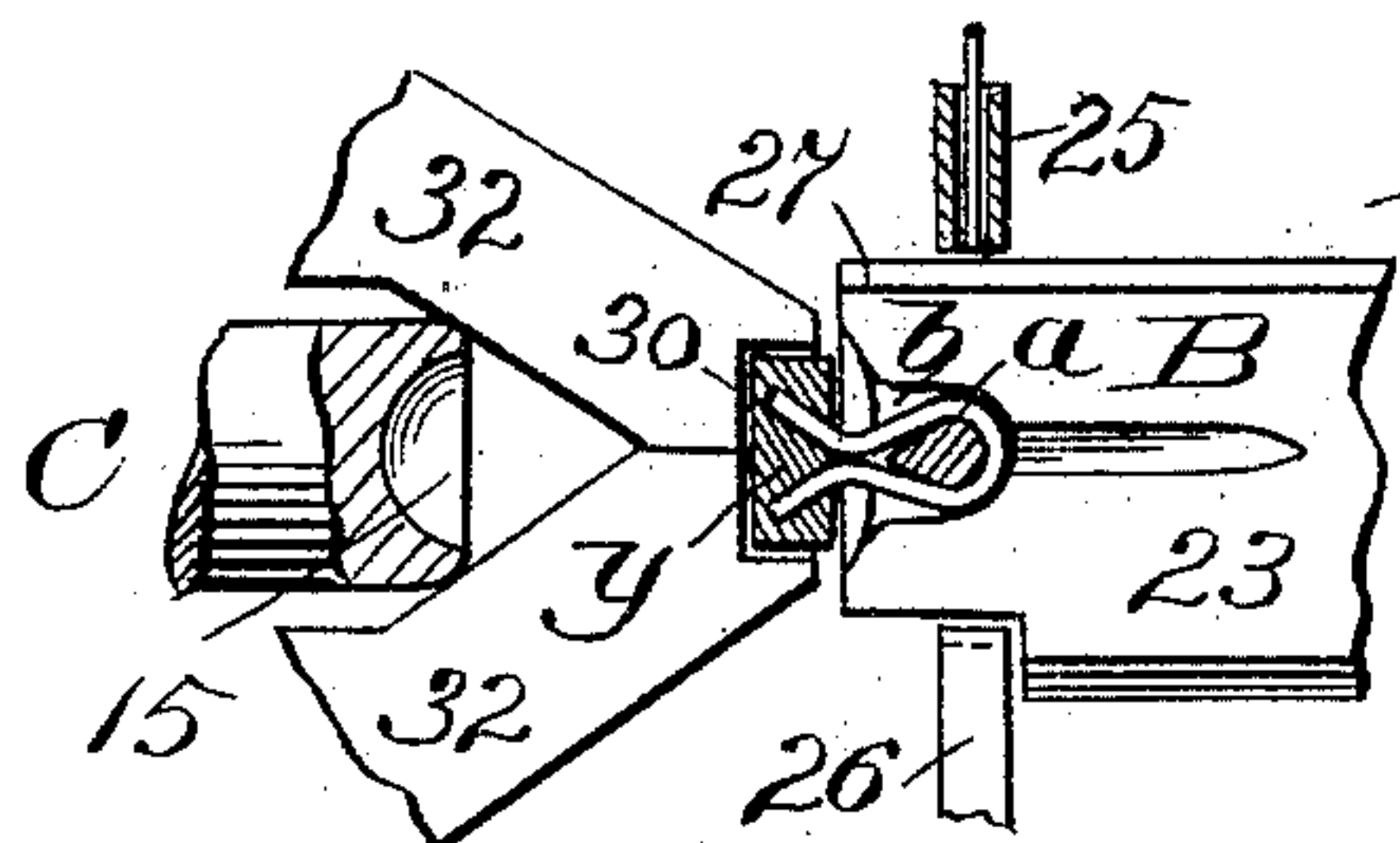
*Fig. 13.*



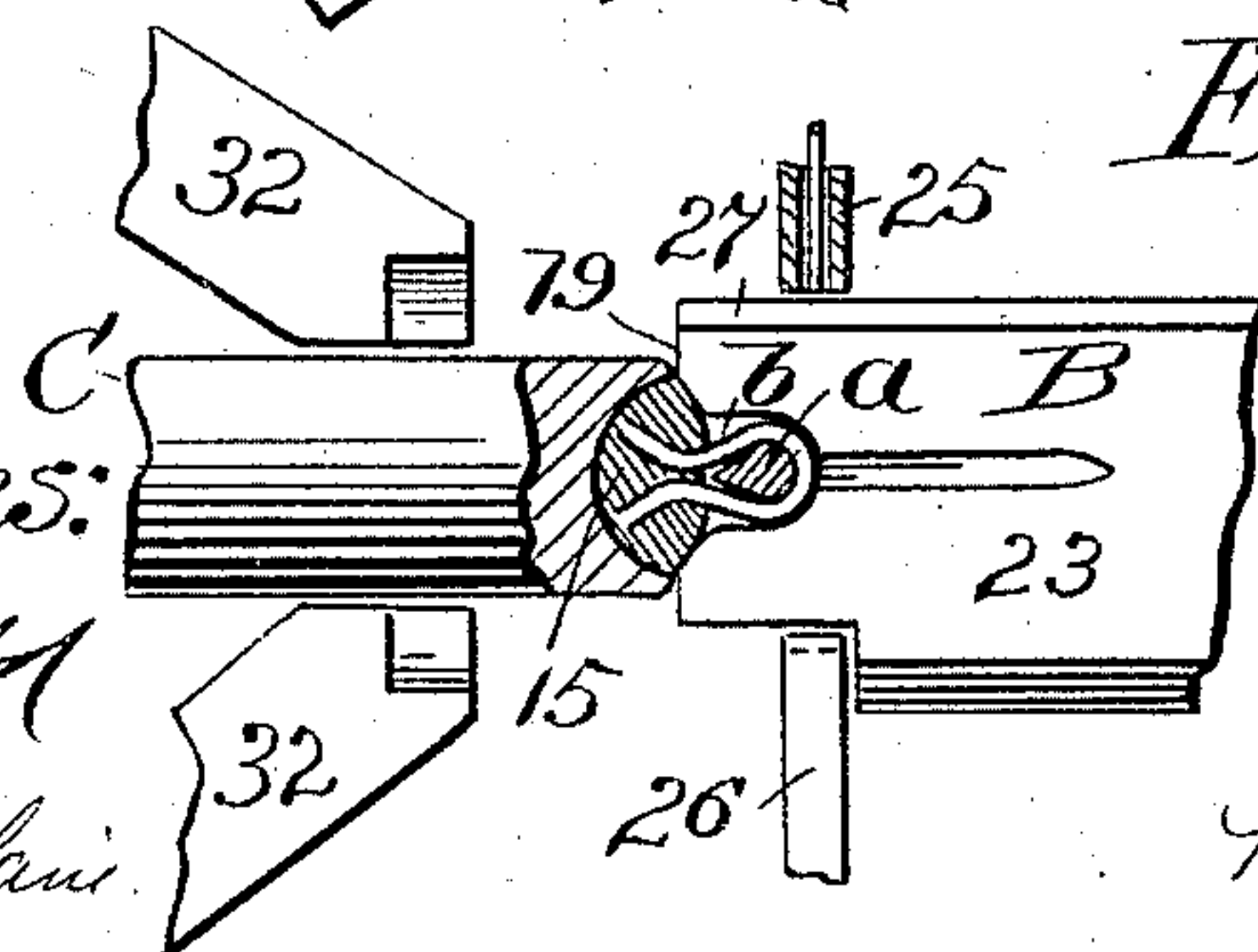
*Fig. 14.*



*Fig. 15.*



*Fig. 16.*



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per Chapman & Co.  
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# UNITED STATES PATENT OFFICE.

FRED. H. HARDMAN, OF BEVERLY, ASSIGNOR TO WALTER E. BENNETT, OF BOSTON, MASSACHUSETTS.

## BUTTON-MACHINE.

SPECIFICATION forming part of Letters Patent No. 474,320, dated May 3, 1892.

Application filed August 21, 1891. Serial No. 403,365. (No model.)

*To all whom it may concern:*

Be it known that I, FRED. H. HARDMAN, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Button-Machines, of which the following is a specification.

This invention relates to improvements in machines for making buttons which have a molded head or body and an eye-shank engaged therewith, such particularly as shoe-buttons.

In the machine of which the present improvements form a substantial part the eye-shank is automatically formed from a suitably-fed supply of wire, lengths of which are successively cut therefrom for the formation of the eye-shank, and suitable wads or blanks of paper, papier-maché, or other analogous or suitable material are brought to proper position relative to the eye-forming mechanism, and the engagement of the blank with the eye-shank is effected and the blank molded to form the head.

The invention consists in the combinations or arrangements of devices or instrumentalities and in the formation of special parts comprised in such devices or instrumentalities, all substantially as will hereinafter more fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, in which the present improvements are fully illustrated, and in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the machine, and Fig. 2 is a plan view thereof. Fig. 3 is a longitudinal vertical section of the principal parts of the machine, taken on line 3 3, Fig. 2. Fig. 4 is a vertical cross-section taken on line 4 4, Fig. 2. Fig. 5 is a view in perspective, on a large scale, of the blank-holding mechanism and of one molding or die member, which has a co-operative action therewith. Fig. 6 is a perspective view of a portion of the last-mentioned mechanism, shown in a different position. Fig. 7 is a perspective view of parts of the eye-forming mechanism, certain of such parts being shown as separated and projected from the positions rela-

tive to other of the parts to which they are attached when in use. Fig. 8 is a perspective view of some of the eye-forming devices shown in the preceding view and still further parts of the eye-forming mechanism. Fig. 9 is a perspective view of some of the parts shown in Fig. 8, the function of which is to give the form to the extremities of the eye-shank legs. Fig. 10 is a perspective view of separated parts, which comprise dies for shaping the eye-shank and for molding the lower portion of the button-head. Fig. 11 is a face view of the parts indicated in Fig. 10, said parts in this view being shown as placed the one upon the other, as is the case at certain periods in the operation of the machine. Figs. 12, 13, 14, 15, and 16 are views in sectional elevation in illustration of different stages in the operation of the machine.

It is believed that the detailed description to be hereinafter given will be rendered more clear by a brief statement of the operations of the parts which act directly upon the material composing the buttons and which are illustrated in their different relations at different stages in the button-forming operation, said parts being particularly, for the present reference, indicated in Figs. 10 to 16, inclusive.

There are three different die members A, B, and C. Die member A has the die-depression 20 therein, which is adapted to form one half of the under portion of the button-head, and the said die-block A is provided with a short stud or protuberance, which in section, taken parallel with the end of the die-blocks from which said stud protrudes, is in the form of the axial section of an oval and is indicated by the letter *a* in the drawings, and will be hereinafter termed the "V-stud." The die-block A is fixed, and the die-block B has in its end the die-depression 22 to correspond with the one 20 in the block A, and said block B has a reciprocating movement with its face 23 in the plane which is coincident with the end face 24 of block A, so as to bring the depression 22 to form, with the one 20 in the other block, the semi-spheroidal die-depression for the half of the button next to the eye-shank.



The die-block B in its face 23 is provided with a U-formed staple-forming depression or die-opening *b*, which merges into the depression 22, and the said U-opening permits die-block B to slide on the end face of the other block A without any interference, as would otherwise be occasioned by the V-stud, and the depression *b* is of such area as to provide a semi-annular or horseshoe-formed opening between its walls and the walls of the V-stud, the legs of which opening lead to the head-forming depression in said die-block.

Before the die-block B is forwardly projected the shank-forming wire *x* is led or fed down vertically through the wire-guide 25 back of and next to the wider portion of the V-stud and against the wire stop or gage 26. The lower end of the wire-guide 25, which is stationary, forms one member of a shear, the other member 27 of which is formed on or attached to the top of die-block B, and as the latter block moves forward into juxtaposition with the block A it cuts off a section of the wire *x*, of a length sufficient to form the eye-shank, and bends the same into the form of a staple, as indicated in Fig. 13. A suitable slide is next moved to present a lug or stud *d* thereof, which has a V-formed extremity between the legs of the staple, and a pair of jaws *ff* next close upon the staple-legs back from the ends thereof and about opposite the apex extremity of the stud *d*, thereby spreading the extremities of the staple-legs, the diverging opening between then corresponding substantially to the taper of the said stud *d*. The stud comprises a screw engaging the slide and is adjustable for longer or shorter shank-legs. The slides or carriers on which the last-mentioned parts *d* and *ff* are mounted now move to carry such parts free and clear from the working parts of the dies, and in the meantime the blank *y*, from which the button-head is to be formed, has been deposited in the pocket 30 in the jaws 32 32 of what will be herein termed a "blank-receiver." The third die C is at the rear of and between the jaws 32 32 of the receiver. Said receiver-jaws move forward with the blank and force the same over and about, being penetrated by the legs of the eye-shank. The die C, which had moved somewhat forwardly with the blank-receiver, is now given a still farther forward movement, causing the jaws of the receiver to separate the one from the other, and the said die, coacting with the dies A B, completes the molding and compression of the button-head, and about at this time the said jaws of the receiver return to their normal positions rearwardly with relation to a position near the dies A B, and then after the die C has moved rearwardly the receiver-jaws come together in readiness to receive another blank, which, by suitable mechanism, is conveyed thereto. The button being discharged, these operations are repeated.

Proceeding, the parts will now be described more in detail, and D indicates a compara-

tively heavy bed-piece affixed on the frame of the machine near one end of the latter, and the die-block A is bolted or otherwise confined at the inner edge of said bed D. The said bed-piece D has its lower edge portion 35 extended somewhat to underlie the end face 24 of the die A, and such extended portion 35 is provided with a vertical aperture, (indicated by 36,) through which the gage-bar 26 is passed and held in confinement adjustably by the set-screw 37. An upper portion of the bed-piece is formed with or has attached thereto a suitable block or lug 38, through which the tubular wire-guide 25 passes and is confined, capable of being adjusted, however, by the set-screw 41. On raising the shear constituting wire-guide 25 and lowering the gage 26, a longer section of wire may be measured and then cut, or by reversely moving the parts 25 and 26 a shorter section may be gaged and severed. When wire-guide 25 is adjusted higher, the shear part 27 may be correspondingly raised by placing thin strip material between it and the die B.

The bed-piece D has the slideway 40 therein, in which the slide-piece *g* is movably fitted, and it is upon the seat or rest 42 of the said slide *g* (see Fig. 7) that the die-block B is supported and confined. In the said figure the die-block B is shown as removed from the seat 42, and the part 27, constituting one member of the wire-shear, removed from the die-block. The forward or inward motion is imparted to the die-block-carrying slide *g* by the cam 43 on the shaft 44, which is rotated through the intermediate shaft 45, geared thereto, and to the main shaft 46 of the machine. The return motion is imparted to the slide by the cams 47 47 on said shaft 44 working against portions 49 of the extension-frame 50, which is rigidly secured to the slide *g*.

The adjustment of the die-block B on the slide *g* so that it may always be brought in its inward movement to exactly correspond by its end 19 with the face 18 of the die-block A notwithstanding the wear of the parts is insured by loosening the confining-bolts for the clamping-plate 52 and turning the screw 53, which has a screw engagement with a suitable part of the slide *g* and bears against a rear portion of the said movable die-block.

In an application filed by me of even date herewith, under Serial No. 403,368, I have described and claimed automatic mechanism for feeding down or forward the wire in successive hitches or sections, which mechanism may be advantageously used in this machine, and while needing no particular description herein is indicated in the perspective view, Fig. 1, at *i*, and, as already plain, the feed-in of the wire back of and next to the V-stud takes place, as indicated in Fig. 12, at the time the die B is drawn back, so that on the forward movement of the die it will cut the wire and form it into the staple shape with the



legs of the staple projecting beyond the outer faces 18 19 of the then proximate dies, as indicated at  $x'$  in Fig. 8.

The slides  $j$  and  $k$ , which carry the tapered shank-leg forming lug  $d$ , together with the forming-jaws  $f f$ , and the part having the U-shaped cam-socket  $m$  for effecting the contraction of said jaws  $f f$ , work from different sides and transversely of the machine and at right angles to the line of movement of the die B. (See, particularly, Figs. 2 and 4.) The slide  $j$  has a lateral support and cam-roll 56 thereon, which latter has an engagement in the cam or eccentric slot or way 57 of the cam-disk 58 on the shaft 45. The slide  $k$  has a similar lateral support and cam-roll, and has an engagement in the cam or eccentric way 59 in the cam-disk 60 on the shaft 62 at the side of the machine opposite that at which the shaft 45 is located. Said shaft 62 receives its rotary motion from the main shaft 46 through the gearing 63. The slide  $j$  is timed to move inwardly slightly before the slide  $k$  is moved inwardly from the opposite side of the machine, so that the tapered lug  $d$  may properly be brought between the extremities of the eye-shank legs and the hinged or pivotally-hung jaws  $f f$  in a line next to and outside of said extremities before the horseshoe-socket or cam  $m$  at the extremity of the slide  $k$  will, as the slide  $k$  completes its inward movement, force the jaws  $f f$  together to effect the spreading of the shank extremities, as most particularly illustrated in Fig. 14. As soon as the slide  $k$  withdraws the jaws  $f f$  separate by the reaction of the spring 64, the application of which to the jaws is clearly shown in Fig. 9, and the said slide  $j$  and the jaws  $f$  carried thereon are also then immediately moved outwardly to clear the way for the blank-receiver  $y$ , which at this time holds a blank and is moved to force the latter over and about the extremities of the eye-shank legs.

The blank-receiver is shown in Figs 1, 2, 3, 5, 6, and 14 to 16, more or less in each of said views, and the structure and arrangement of the same will be now particularly described. The said receiver consists of the pair of jaws 32 32, which at the forward ends thereof are inclined so as to meet, as at 70, Figs. 5 and 14, in a common horizontal plane which is coincident with the axis of die C and of the die-depression constituted by the openings 20 and 22 in the die-blocks A and B. Openings are formed, as shown, in the forward extremities of the jaws 32, to constitute, when said jaws are together, as shown in most of the views, the pocket 30 for receiving the blank, which pocket opens to one side of the said jaws 32. The said jaws, extending rearwardly and diverging, are provided with vertical extensions 72 72, which are constrained to move in vertical guideways 73 of a movable carrier-frame. (Generally indicated by the reference-letter E.) Springs (indicated at 74, Fig. 6) are applied between suitable shouldered parts of the said frame or carrier E and portions or studs,

as 75, of said jaws to normally maintain the jaws, together with the pocket 30 thereof, intact.

I have in another application for Letters Patent of the United States, filed by me simultaneously herewith, Serial No. 403,369, described and claimed conveyer devices for receiving therein blanks from the chute (which is indicated at  $n$  in Fig. 1) and depositing the blanks one at a time into the pocket of the said receiver, and the said conveyer is slightly indicated at  $o$  in Fig. 1; but being made the subject of another application, as mentioned, particular description of the same will not be herein given.

The carrier-frame for the receiver-jaws is movable longitudinally of the machine in suitable ways therefor (indicated at 77) in the carrier-frame F for the die C, which latter carrier is also movable longitudinally of the machine; but its movement is independent of that of the said jaw-carrier E. The inward movement of the jaw-carrier E is secured by the cam 80 on the driving-shaft 46, the same having an engagement with the rear portion 82 of the said frame. The spring 83 (indicated in Fig. 2) effects the return or outward movement of the carrier and the jaws. The rear portion 82 of carrier E is constituted by a block, as particularly shown in Figs. 3, 5, and 6, which is carried by a couple of parallel bars or rods 84 84, which play in longitudinal sockets therefor in the rearwardly-extended portion of the carrier-frame. The screw 85, by its head against the inner surface of the block 82 and by its shank, screws into the end portion of the frame E. By turning the said screw outwardly obviously the frame may become slightly distended, and then the cam will cause the blank carried in the blank-receiver to be crowded a little farther upon the extremities of the eye-shank, as in the making of some buttons may be deemed desirable. The blank having been forced upon the shank extremities, and as the blank-receiver is about to move back or moves back, the extreme forward movement of the carrier F is imparted thereto, and the die C is carried into proximity to the blank on the shank and the dies A B to mold, compress, and complete the button, and such forward or inward movement of the carrier F insures the forcing apart or separation of the blank-receiving jaws 32 32. The manner of this operation will be clearly understood on reference to Figs. 3 and 5. The eccentric  $q$ , through its strap and connection 90 with the carrier F, positively insures the reciprocal movement of the latter, and it will be noted that toward its forward portion the carrier F is provided with the conical head  $r$ , axially through and forward of which the shaft or spindle-like die C passes and is supported with a screw engagement. The said head  $r$ , at the upper and lower sides thereof, is provided with the friction-rolls 92 92, which bear against the inclined inner portions 93



of the parts comprising the blank-receiver jaws. Clearly the impingement of the head or part *r* of the die-carrier E against the said separable parts comprising the jaws 32 insures the forcing of the latter apart, the same resuming their closed relations on the return movement of the carrier F.

As particularly shown in Fig. 3, the head *r* of the die-carrier F has the bore or passage therethrough which is screw-threaded, and the shaft or spindle-like part, in the forward end of which the depression 15 is formed for the die C, is also screw-threaded to engage the tapped opening through the head *r*. By turning the die-spindle C it may be adjusted for the most advantageous presentation to and coaction with the die-depressions in the blocks A and B. The button having been completed, the dies C and B receding from their working positions, the finished button is then left, with its axis horizontal, by its eye supported on the V-stud *a* of the die-block A, and the same may be removed from the machine in any approved manner.

In an application for Letters Patent of the United States filed by me simultaneously herewith under Serial No. 403,366 I have described and claimed an ejecting device which is operative automatically to expel the button from the machine, and such device is shown in Fig. 7 of the drawings at *s*, and embodies a rod which moves in a groove within the face of the die-block A opposite to the face 18 thereof. The groove in which this ejector plays is indicated at 96 in Fig. 10.

What I claim as my invention is—

1. In an eye-forming mechanism for button-machines, the combination of a main support or bed-piece having a block or portion A thereon, with the stud *a*, and said bed-piece having the underlying ledge 35 provided with the vertical aperture 36 and set-screw 37, and provided above said block A with the part or extension 38, adjustably supported, the wire-guide 25, the gage-bar 26, and the sliding die-block B, having the U-opening *b* and provided with a part to act in conjunction with the wire-guide as a shear, substantially as described.

2. In a button-machine, the combination, with a die-block, as A, having a stud projecting from the end thereof, and a die-depression 20 in the side next to said end, which depression leads to said end adjacent to said stud, of a die-block B, movable by one side thereof in the plane of the end of the other die-block and provided with the U-opening *b* in its side and the depression 22 in its end, and the die C, movable at right angles to the plane of the ends of said die-blocks which have said depressions therein, substantially as described.

3. In an eye-forming mechanism for button-machines, in combination, a block having a stud projected from one face thereof, and another block movable by one side thereof in the plane of said face and provided within

such side with the U-opening *b*, a guide for directing the wire across the side of said stud in a line at right angles to the movable block, a member carrying a tapered stud or lug and movable to present it into proximity to said stud on said block, and a pair of jaws *f f*, movable to swing toward and from each other and the sides of said tapered lug, and means for moving one of said die-blocks and the lug-carrying member independently of each other, and a means for contracting the said jaws, substantially as set forth.

4. In an eye-forming mechanism for button-machines, in combination, a block having the V-stud projected from one face thereof and the movable block having the U-opening, a slide carrying a tapered stud or lug and movable to carry it into proximity to the said V-stud, and jaws *f f*, mounted on said slide at each side of the said lug and adapted to swing toward and from the latter and having a spring 64, and another slide having a cam-opening *m* and movable relative to said jaws *f f* to contract the same, and means for imparting the respective movements to the movable die-block and the said slides, all for operation as described.

5. In an eye-forming mechanism, the combination, with the block and V-stud and the block with a U-opening, of the slide with the tapered lug *d*, which has a screw engagement with the slide for lateral adjustment, the jaws *f f*, and means for contracting same, as set forth.

6. In an eye-forming mechanism for button-machines, the combination, with the die A, having the V-stud, and the slide *g*, having thereon the die B, and the latter provided with the U-opening, and the cam 43 for moving said slide, of the slide *j*, movable at right angles to the movement of the slide *g* and having the shank-forming lug and also the pair of pivoted jaws *f f* and the expanding spring therebetween, and the cam 51, and the slide *k*, having the opening *m*, and the cam 59 for said slide, as described and shown.

7. In an eye-forming mechanism for button-machines, the combination, with the die-block A, having the V-stud *a*, and the slide *g*, of the die-block B thereon, which has the U-opening, said slide being movable to place the said block in the relation to the other block, as described, the cam 43, acting to force the said slide forward, and one or more cams 47, acting relative to an extension which is provided on the slide *g* to effect the return movement of the latter, substantially as described.

8. In a button-machine, the combination of the button-blank receiver consisting of the jaws 32 32, having the pocket therein, and the carrier on which said jaws are mounted and movable, as described, provided with the block 82, and parallel rods 84 84, movable in sockets which are provided therefor in the carrier, and the screw 85 by its shank entering the carrier and by its head bearing against



said block, and the cam 80, having an engagement with the said block, all as and for the purpose set forth.

9. In a button-machine, the combination  
5 of the dies A B, having the depressions 20  
22, and the carrier E and ways in which the  
same has a longitudinal movement, supplemental ways provided on said carrier at right  
angles to its line of movement, the blank-re-  
10 ceiver consisting of forwardly-extended jaws  
32 32, having their edges which are toward  
each other inclined and having the outwardly-

extended extensions 72 fitted and adapted to  
be guided in the transverse ways of the car-  
rier, springs applied to maintain the jaws to- 15  
gether, and the reciprocatory carrier F, hav-  
ing the head  $r$ , adapted to impinge upon the  
inclined portions of said jaws and carrying  
in advance thereof the die C, substantially as  
described.

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