

(No Model.)

2 Sheets—Sheet 1.

E. T. GREENFIELD.
STAPLING MACHINE.

No. 572,293.

Patented Dec. 1, 1896.

Fig. 2,

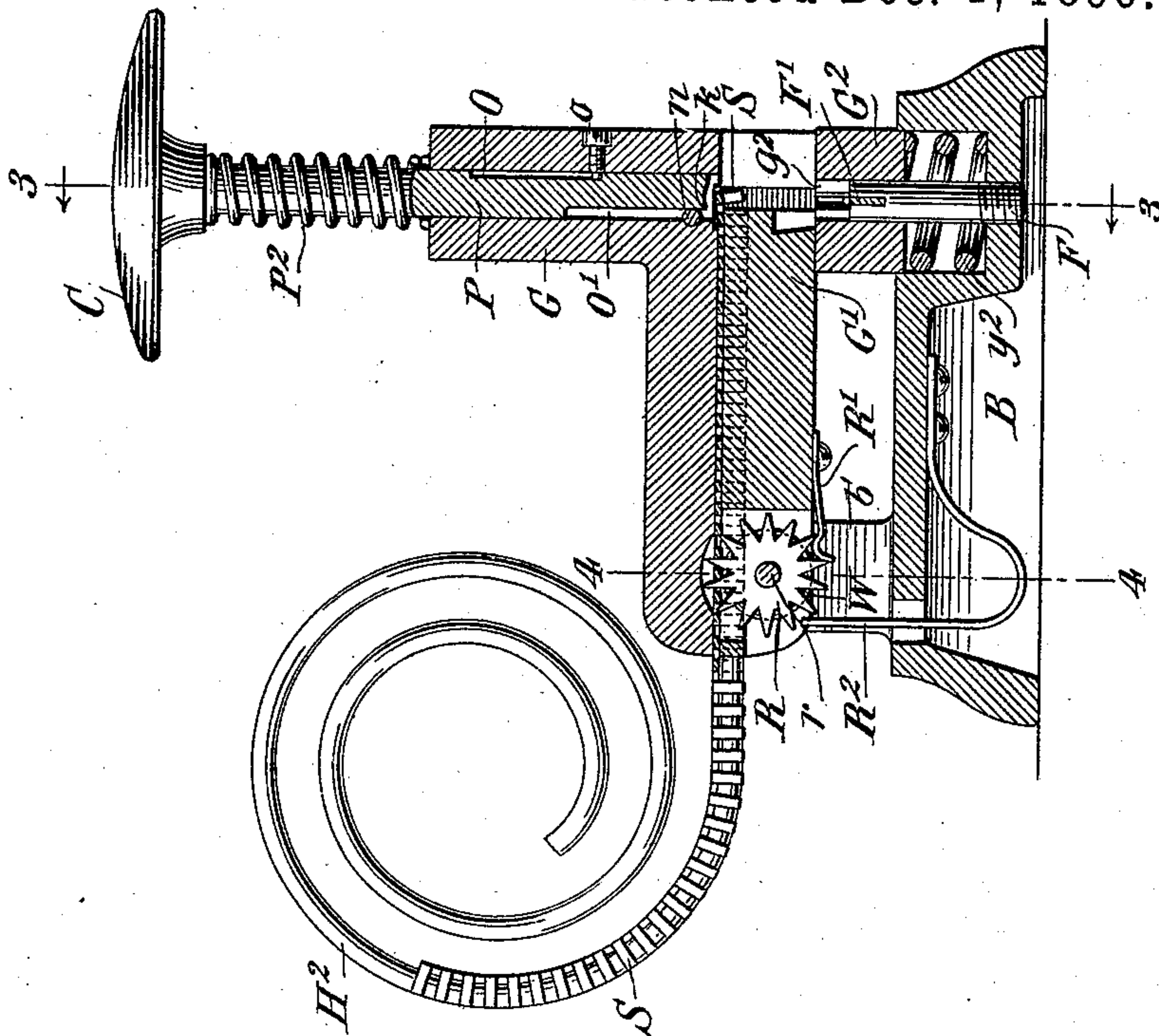
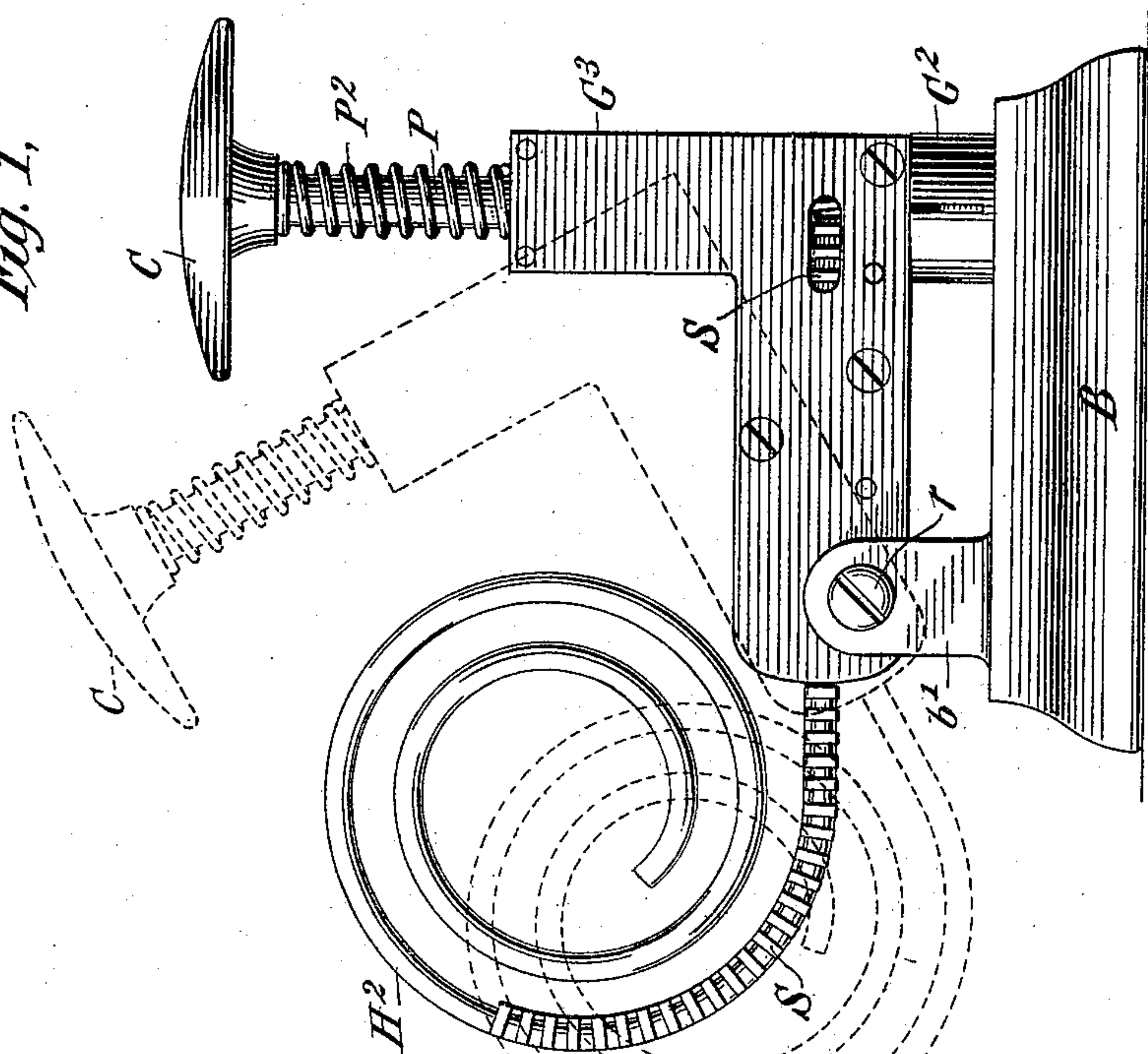


Fig. 1,



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By his Attorney
Charles J. Kintner

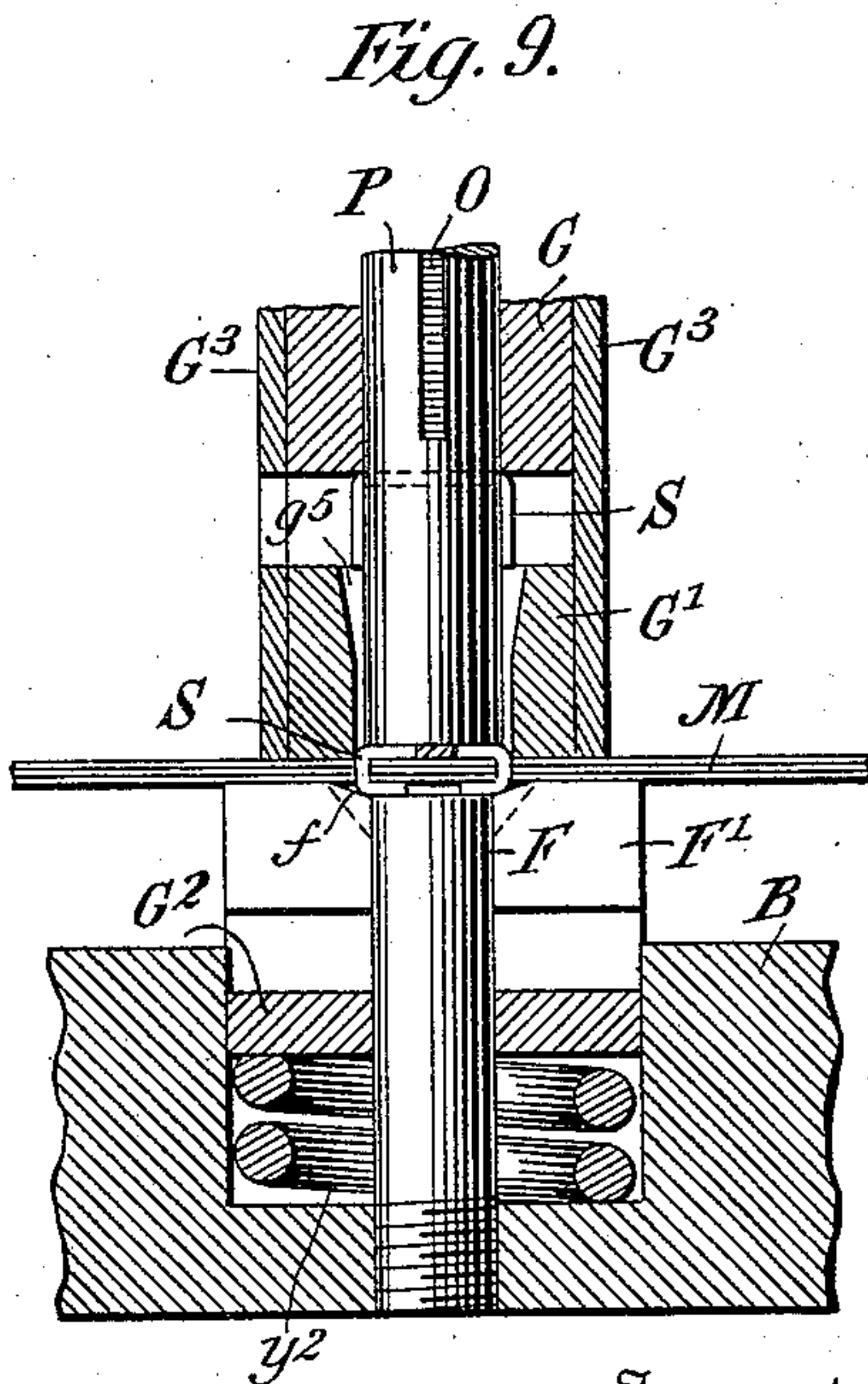
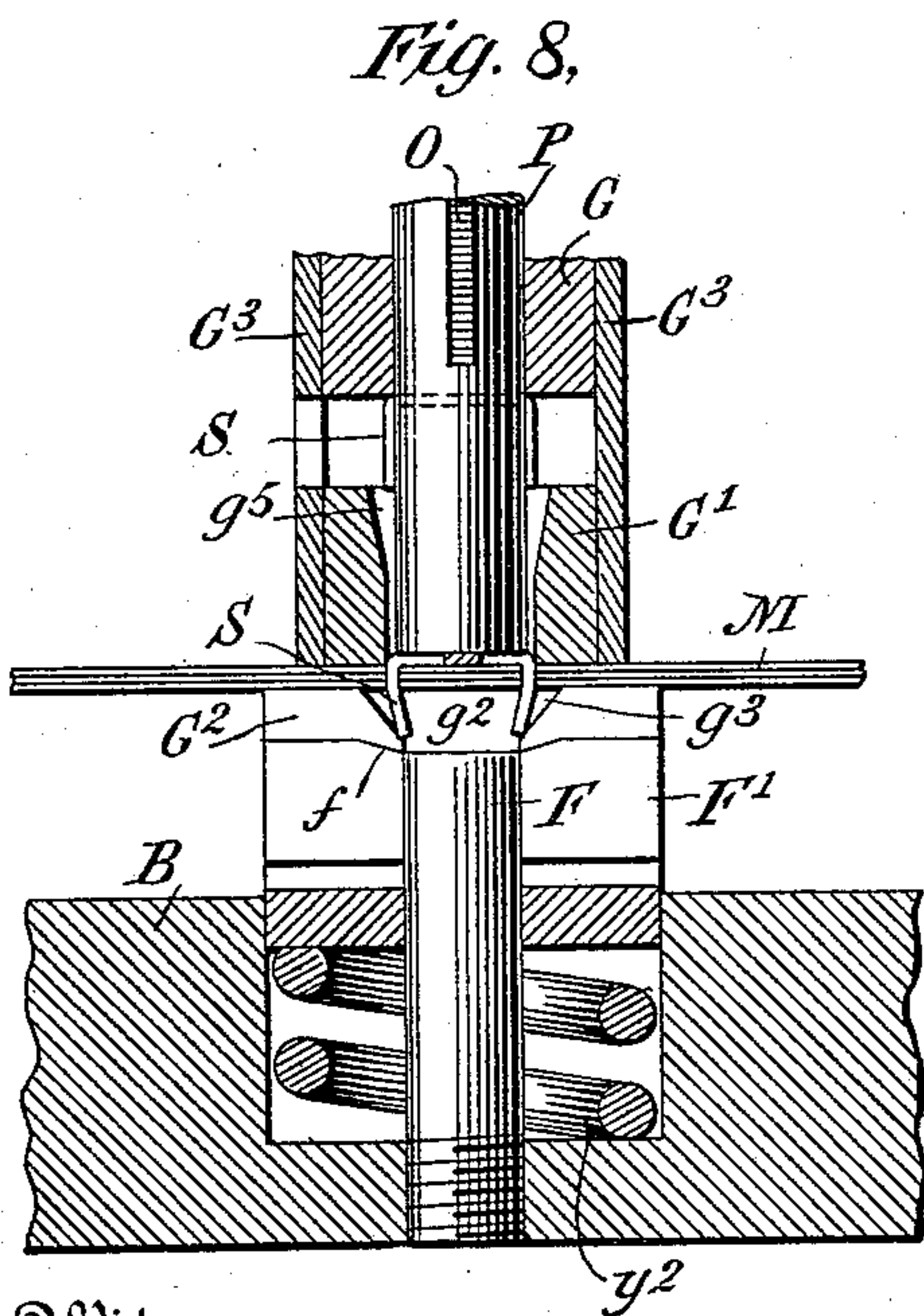
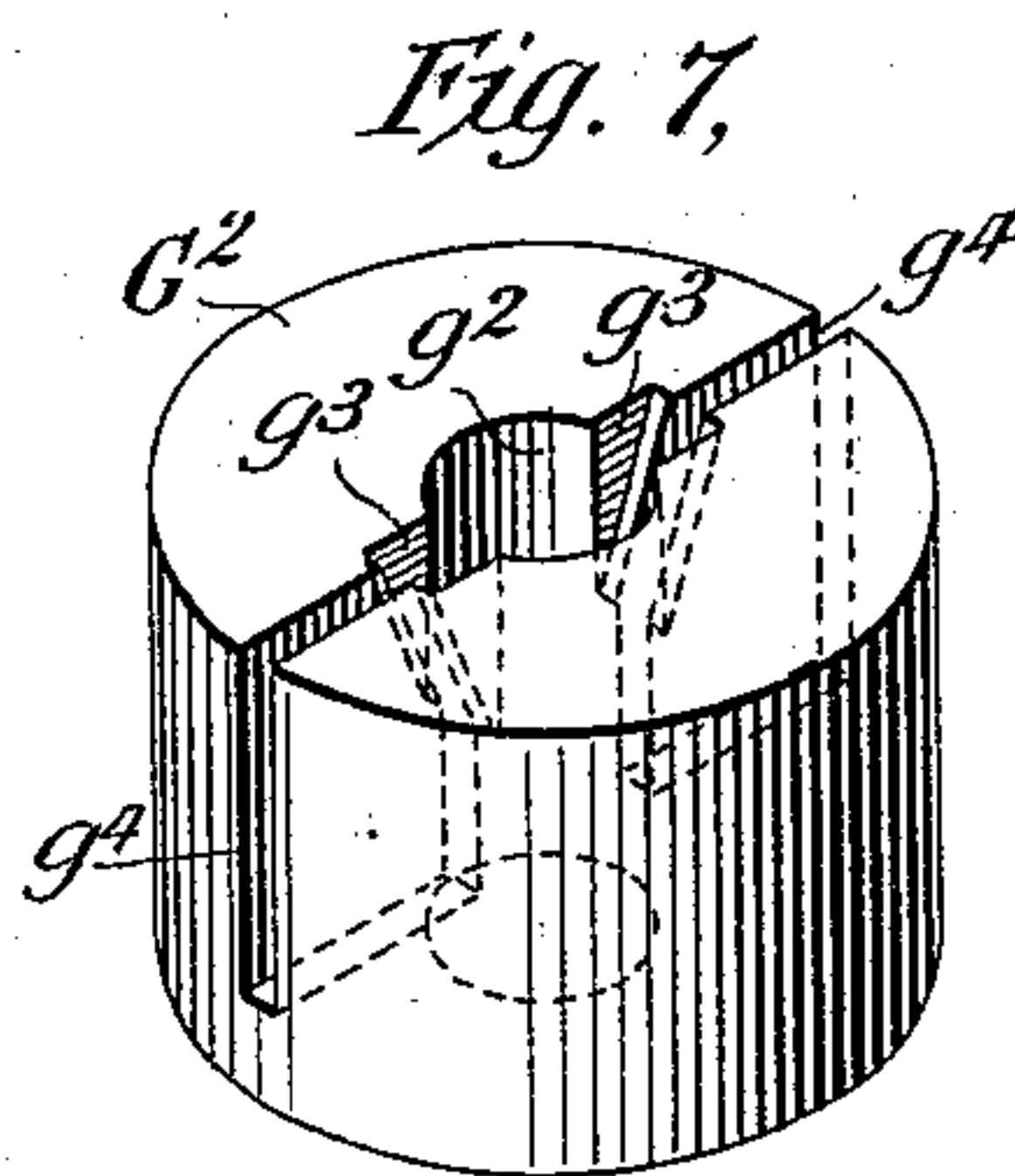
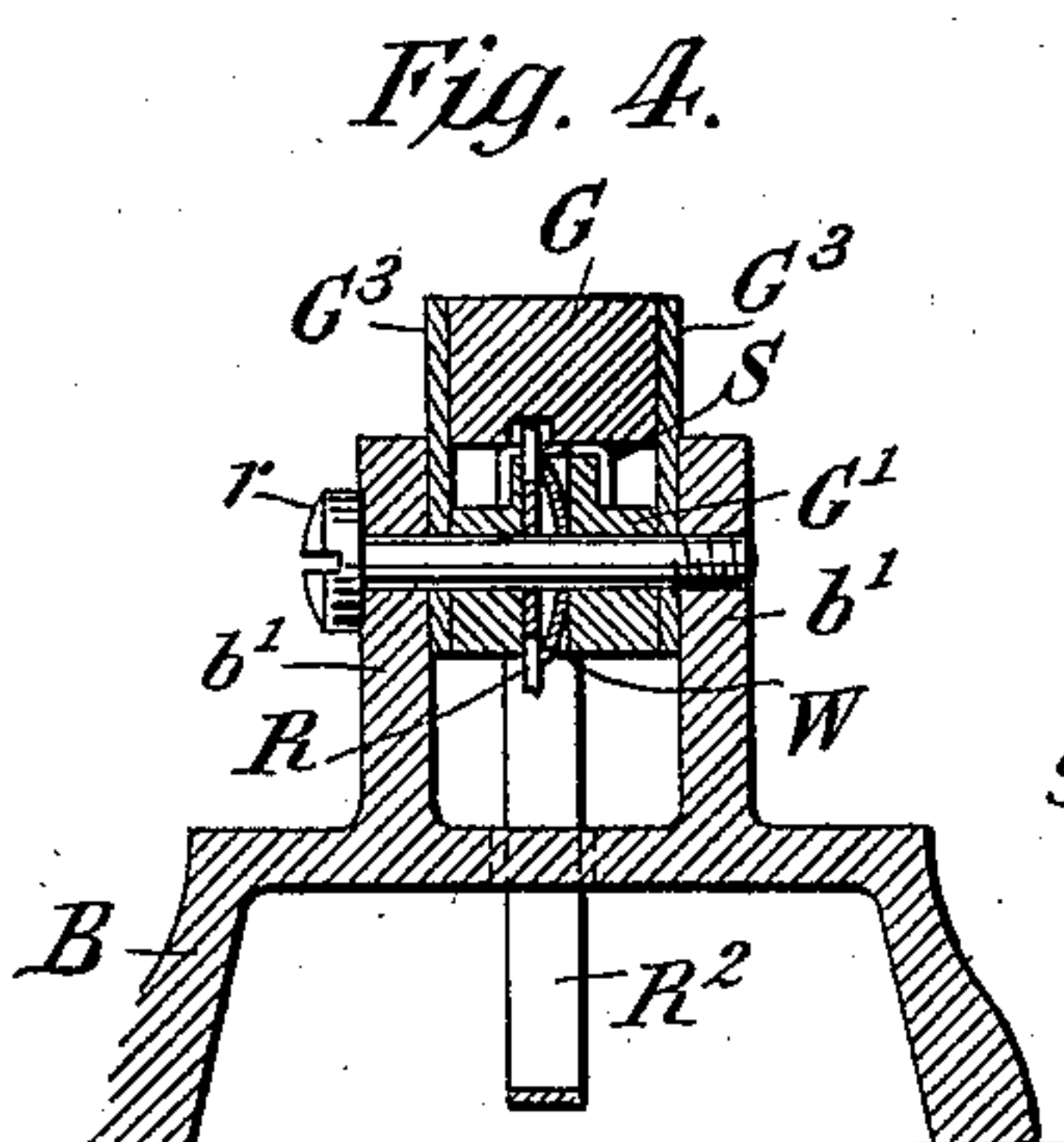
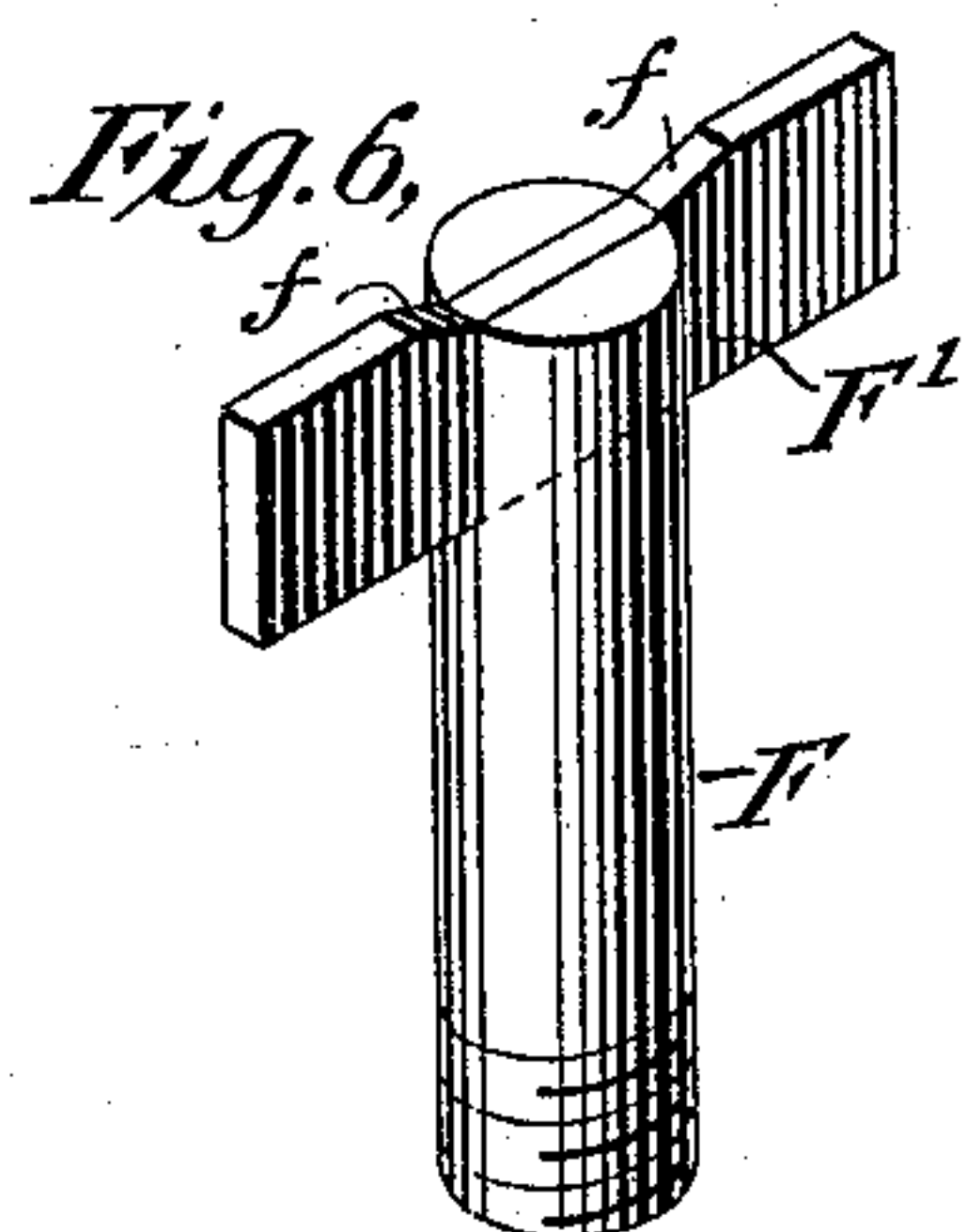
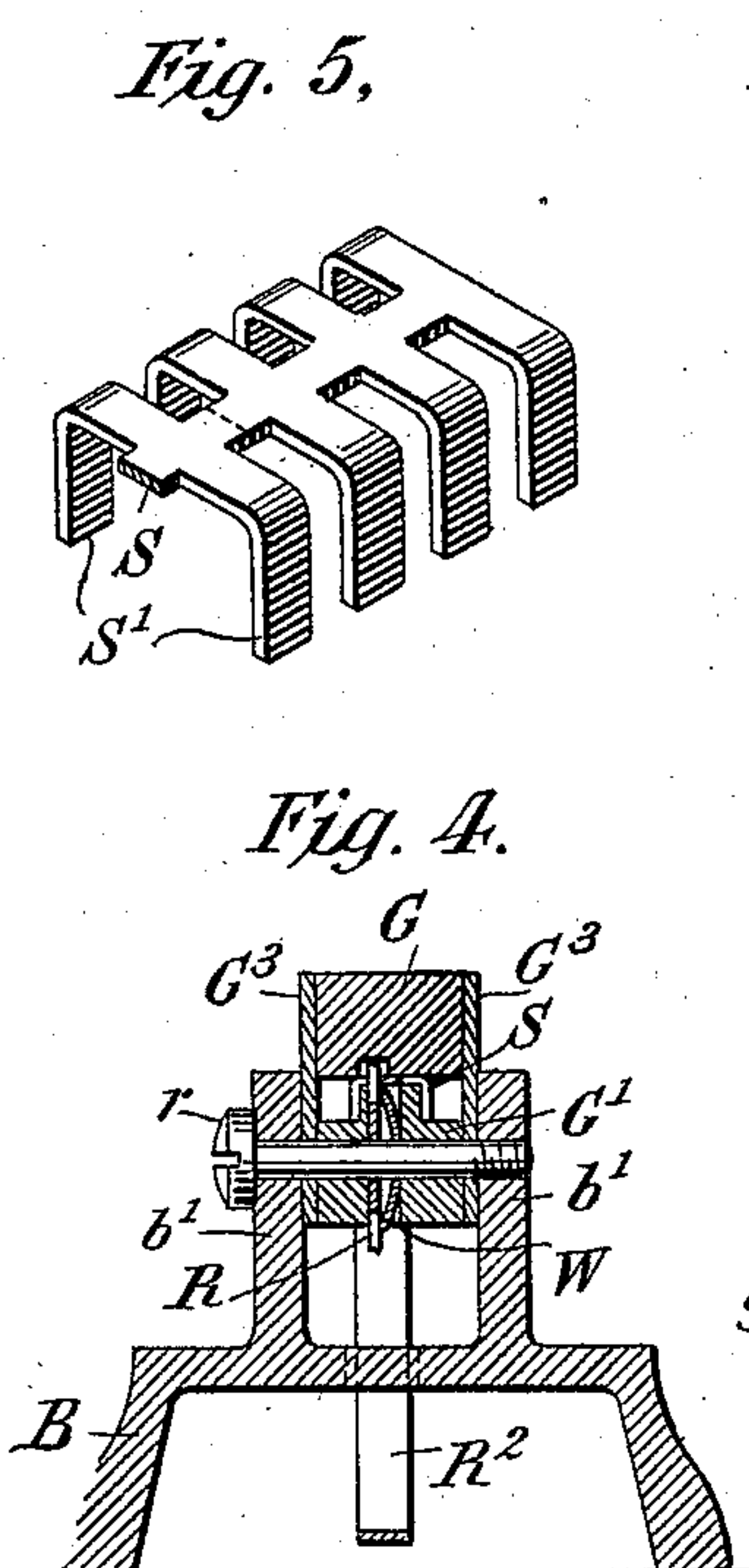
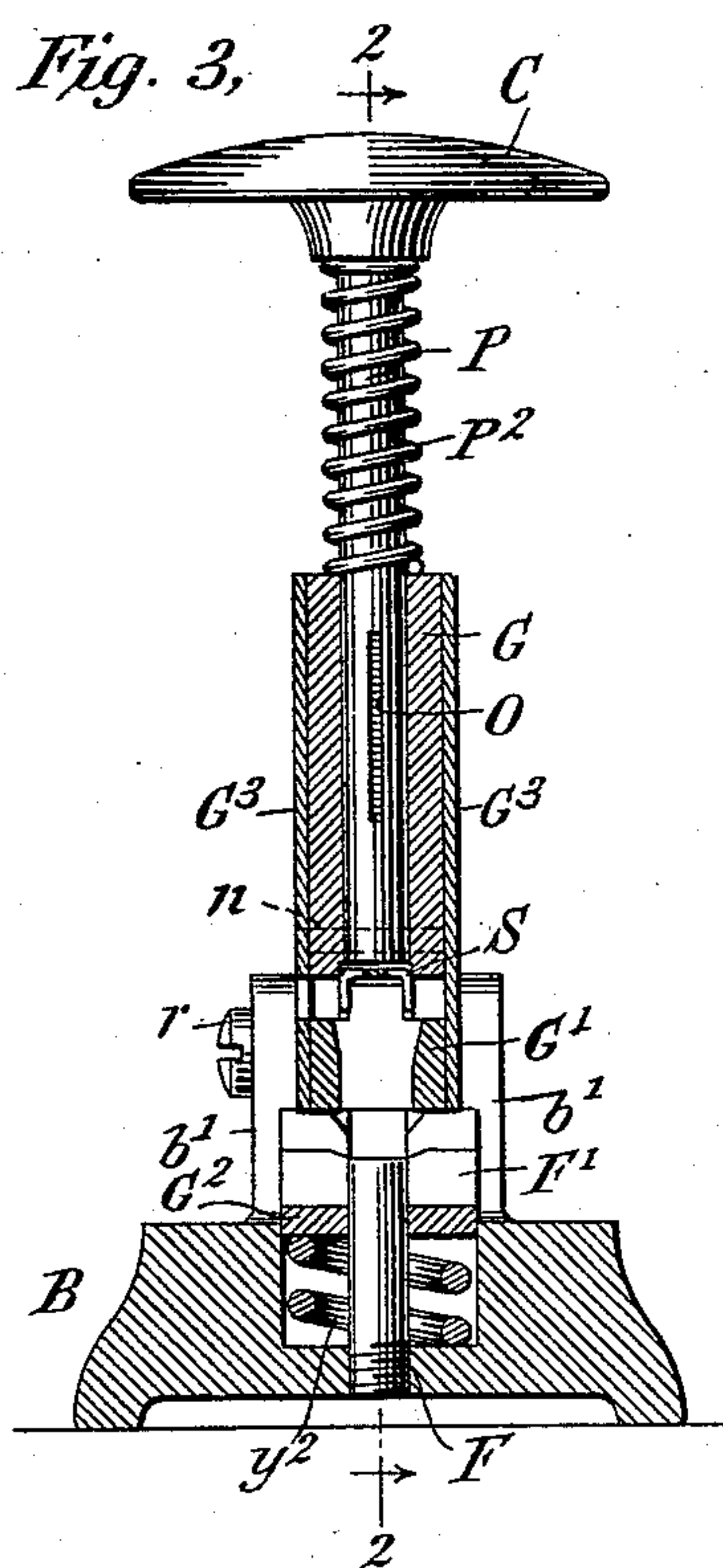
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UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF NEW YORK, N. Y., ASSIGNOR TO THE GREENFIELD AUTOMATIC FASTENER COMPANY, OF SAME PLACE.

STAPLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,293, dated December 1, 1896.

Application filed November 16, 1894. Renewed January 9, 1896. Serial No. 574,916. (No model.) Patented in Belgium June 14, 1895, No. 116,040; in Canada August 2, 1895, No. 49,588, and in France October 5, 1895, No. 248,107.

To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have made a new and useful Invention in Stapling-Machines, of which the following is a specification.

My invention is directed particularly to improvements in stapling-machines which sever and simultaneously drive staples from a metallic strip of formed staples which are united together and are severed one by one and driven through the material to be bound or held by the driven staple; and to this end it consists, first, in the novel mechanism hereinafter described for simultaneously severing and driving staples one at a time from a strip of formed staples united together at their backs; second, in the novel means for holding the supply of united staples as they are fed forward for use, and, third, in the details of construction hereinafter described, all of the novel points of my invention being particularly pointed out in the claims at the end of this specification.

The mechanism for severing, driving, and clenching previously formed or prepared staples as hereinafter described and claimed has been patented to me in the following-named foreign countries, to wit: Belgium, No. 116,040, dated June 14, 1895; Canada, No. 49,588, dated August 2, 1895, and France, No. 248,107, dated October 5, 1895. I also filed an application for a patent upon said apparatus in Great Britain on June 5, 1895, No. 11,091, and in Austria on June 11, 1895. Said invention has not, however, been patented to me or with my knowledge and consent in any other countries than those hereinbefore referred to.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 is a side elevational view of a complete machine embodying my improvements, illustrating also in dotted lines the position of the pivoted portion of the machine in the act of feeding the supply of staples forward. Fig. 2 is a vertical sectional view taken through the body of the machine on the line

2 2, Fig. 3, and as seen looking from left to right in the direction of the arrows upon that figure. Fig. 3 is a transverse sectional view taken through the body of the machine on the line 3 3, Fig. 2, and as seen looking from right to left in the direction of the arrows upon that figure of the drawings. Fig. 4 is a similar transverse sectional view taken through Fig. 2 on the line 4 4. Fig. 5 is a perspective view of previously-prepared staples united together in strip form. Fig. 6 is an enlarged perspective view of the stationary portion of the clenching-anvil. Fig. 7 is a similar enlarged perspective view of the movable portion of the clenching-anvil. Figs. 8 and 9 are enlarged transverse sectional views of the staple-driving and staple-clenching apparatus, taken on the line 3 3, Fig. 2, the former indicating the act of severing and driving a staple and the latter the completed act of clenching it through the material to be bound or held.

Referring now to the drawings in detail, in all of which like letters of reference represent like parts wherever used, B represents the base of the machine, which is preferably of cast metal and is provided with a pair of lugs or ears $b' b'$, to which is pivoted by a screw-rod r the frame or support G for the staple-severing and staple-driving apparatus.

H^2 is a spiral rod secured to one end of the frame G and adapted to sustain a strip of prepared staples S as they are fed forward, by a feed-wheel R, through a guideway formed between the frame G and a detachable part G' , the latter being secured to the former by detachable side plates $G^3 G^3$. This guideway is in the nature of a longitudinal rib of substantially the same conformation as the completed staples and is so located that as the strip of staples is fed forward they straddle it and are held firmly in position, as is clearly illustrated in Fig. 4 of the drawings.

P is the staple-severing and staple-driving plunger having vertical movement in the body of the frame G, which movement is regulated in one direction by a stop-rod n and in the other direction by a set-screw o upon the opposite flattened faces O and o' of the plunger. The lower and inner edge k of this plunger is

in the nature of a knife-edge and is adapted to shear off one of the staples S' from the next adjoining staple as it is forced past the cutting edge of the part G' .

5 P^2 is a strong spiral spring surrounding the upper end of the plunger P , its opposite ends bearing, respectively, against the upper portion of the frame G and the under portion of the operating-handle C . The feed-wheel R is frictionally journaled upon the screw-rod r by a cup-shaped washer W (see Fig. 4) and is operated by a propelling-pawl R' , secured to the part G' , said pawl being adapted to feed the staple-strip S forward one step at a time after the machine is tilted into the position shown in dotted lines.

10 R^2 is a yielding feeding-pawl secured to the under side of the base B by screws and so arranged that its free or yielding end will come into contact with the teeth of the feed-wheel R as the pivoted part of the apparatus is tilted into the position shown in dotted lines in Fig. 1, and R' is a check-pawl secured to the under side of the pivoted part of the machine and designed to fall between each pair of teeth in succession.

15 F is a stationary anvil which has secured to its upper end a cross-arm F' , having inwardly-inclined faces $f f$ on its upper edge, said anvil fitting in an opening g^2 of a movable anvil, which in turn is adapted to rest upon a strong spiral spring y^2 when the parts are put together and the stationary anvil secured by screw-threads in the base B , as clearly shown in Fig. 2. The movable anvil G^2 is provided with a lateral slit g^4 , in which the ends of the cross-arm F' are located.

20 $g^5 g^5$ are inclined faces in the upper surface of the part G' , adapted to give to the free ends of the staple S' , after it is severed and driven forward, an inward inclination, and $g^3 g^3$ are similarly-inclined faces in the upper part of the movable anvil G^2 , adapted to give to the free ends of said staple S' a further inward movement as it is forced forward.

25 The operation of the mechanism is as follows: The strip of prepared staples S having been placed upon the spiral rod H^2 in the manner shown in Fig. 1, so that the inner staple lies directly under the knife-edge k of the plunger P , and the material M to be bound placed upon the anvil G^2 , the handle C is then given a sharp blow by the hand of the operator, thus causing the plunger P to be forced forward against the action of the spiral spring P^2 . As the knife-edge k comes into contact with that portion of the strip which joins the staples S' together it severs the first staple and the plunger causes it to be driven forward until the free ends $S' S'$ are bent inward slightly by the inclined faces $g^5 g^5$. A further forward movement of the plunger causes the staple to pass through the material M until the ends come into contact with the inner inclined faces $g^3 g^3$ of the yielding or spring-seated anvil G^2 , thus bending them into the position shown in Fig. 8. A fur-

ther forward movement causes the spring-seated anvil to be forced forward against the action of the strong spiral spring y^2 until the ends of the staples $S' S'$ come into contact with the inclined faces $f f$ of the arm F' , carried by the fixed anvil F . This last movement turns the ends of the staple inward to such an extent that they now are in position to be forced upward against the under face of the material M by the upper surface of the fixed anvil F in the manner shown in Fig. 9, the strong spiral spring y^2 being now compressed to its lowest position. Immediately after the blow thus given by the operator the spiral spring P^2 restores the plunger P to its uppermost position, and in like manner the strong spiral spring y^2 under the yielding-anvil G^2 restores it to normal position, as shown in Fig. 2. The body part or frame G is now tilted into the position shown in dotted lines in Fig. 1 and the material to be bound placed in position for the next succeeding staple. As the frame was tilted into the position shown in dotted lines in Fig. 1 the end of the yielding feed-pawl R^2 came into contact with the teeth just above it and imparted to it a forward motion sufficient to feed the strip forward until the next staple to be severed came into contact with the inner face of the guideway for the plunger and thus checked its forward movement, leaving said staple in position to be severed upon the next downward motion of the plunger P . At the same time the check-pawl R' , by reason of the rotation of the feed-wheel R , fell into position between the next succeeding pair of teeth of said wheel. Should the operator rotate the pivoted part of the machine again into the position shown in dotted lines in Fig. 1 before the staple now in position is severed, the yielding nature of the feed-pawl R' will not permit it to force the strip forward until a staple has been severed. At the same time the check-pawl R' will maintain the feed-wheel in the position in which it was last left by reason of its frictional bearing upon the teeth of that wheel.

I make no claim in the present application to this type of feeding apparatus, which operates only after a staple has been severed, as this subject-matter broadly constitutes in part the subject-matter of another application filed of even date herewith and bearing Serial No. 574,915, and is only shown and described in the present application for the purpose of illustrating a complete and operative machine embodying this feature in connection with other features hereinbefore described and hereinafter claimed.

I do not limit myself to the special details of construction hereinbefore described for severing and driving staples from a strip of prepared staples; as it is obvious that many of the details of construction might be materially departed from and still come within the scope of my claims hereinafter made.

To make a single illustration, although I

have shown a spiral rod H², which acts in the nature of a reservoir or support or chamber for the staple-binding material S, it is obvious that this specific form of apparatus might be modified in many ways and still come within the scope of my claims hereinafter made, so long as the arrangement of the support, chamber, or reservoir for the staple-forming material be in the nature of a spiral guideway which causes the material to be held in compact form in the manner shown. It is also obvious that this form of reservoir or support or chamber for the staple-forming material might be modified to suit different types of staple-forming material, such as wire and other types of material in which the staple-blanks are united together and stored in quantity for use as wanted, and still come within the scope of my invention.

I make no claim in the present application to a staple-strip consisting of a series of formed staples united together by a narrow web at their backs, such as is shown in Fig. 5 of the accompanying drawings, as this feature is claimed as an article of manufacture in a separate application filed by me in the United States Patent Office on the 26th day of December, 1895, and bearing Serial No. 573,341.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a stapling-machine a spirally-disposed support adapted to sustain a strip of united staples, the distance between the convolutions of said support being greater than the length of the legs of the staple.

2. In a stapling-machine a spirally-disposed support adapted to sustain a strip of united staples in combination with feeding mechanism adapted to feed the material forward and a plunger adapted to shear off and drive a single staple at each operation, the distance between the convolutions of the spirally-disposed support being greater than the length of the legs of the staples.

3. A stapling-machine provided with mechanism for feeding forward a strip of completed staples, a single plunger for severing and driving one staple at a time and a clenching-anvil for clenching the staple upon the under side of the material to be bound, said

feeding mechanism being carried by an arm pivoted to the base of the machine and provided with means for preventing the forward movement of the completed strip of staples, and additional yielding means which is brought into action after the strip of staples is checked in its forward movement and is thereby adapted to feed the strip forward only after each complete operation, substantially as described.

4. A stapling-machine provided with mechanism for feeding a strip of completed staples forward as they are used one at a time, a single staple-severing and staple-driving plunger, said feeding mechanism and plunger being carried by an arm pivotally secured to the base of the machine, in combination with a yieldingly-supported anvil adapted to bend the inner ends of the staple inward as they are driven through the material to be bound; a stationary or fixed anvil adapted to clench the ends into the under surface of the material at the completion of the stroke of the plunger, means for preventing the forward movement of the staple-strip after a staple has been placed in position beneath the plunger, and a yielding attachment in connection with the feeding mechanism which permits said feeding mechanism to yield after the staple-strip has been checked in its forward movement.

5. A stapling-machine provided with a single plunger adapted to sever and drive one staple at a time from a strip of completed staples; a clenching-anvil for clenching the free ends of the staples upon the under side of the material to be bound; checking or holding means for preventing forward movement of the completed strip of staples when a staple is in position to be severed and driven therefrom; additional yielding means acting in conjunction with the feeding mechanism and adapted to prevent the latter from forcing the staple-strip forward after it is held by the checking or holding means.

In testimony whereof I have hereunto subscribed my name this 15th day of November, 1894.

EDWIN T. GREENFIELD.

Witnesses:

C. J. KINTNER,
M. M. ROBINSON.