No. 751,778. PATENTED FEB. 9, 1904.

C. W. BLACKSTONE.

RIVETING MACHINE.

APPLICATION FILED AUG. 21, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

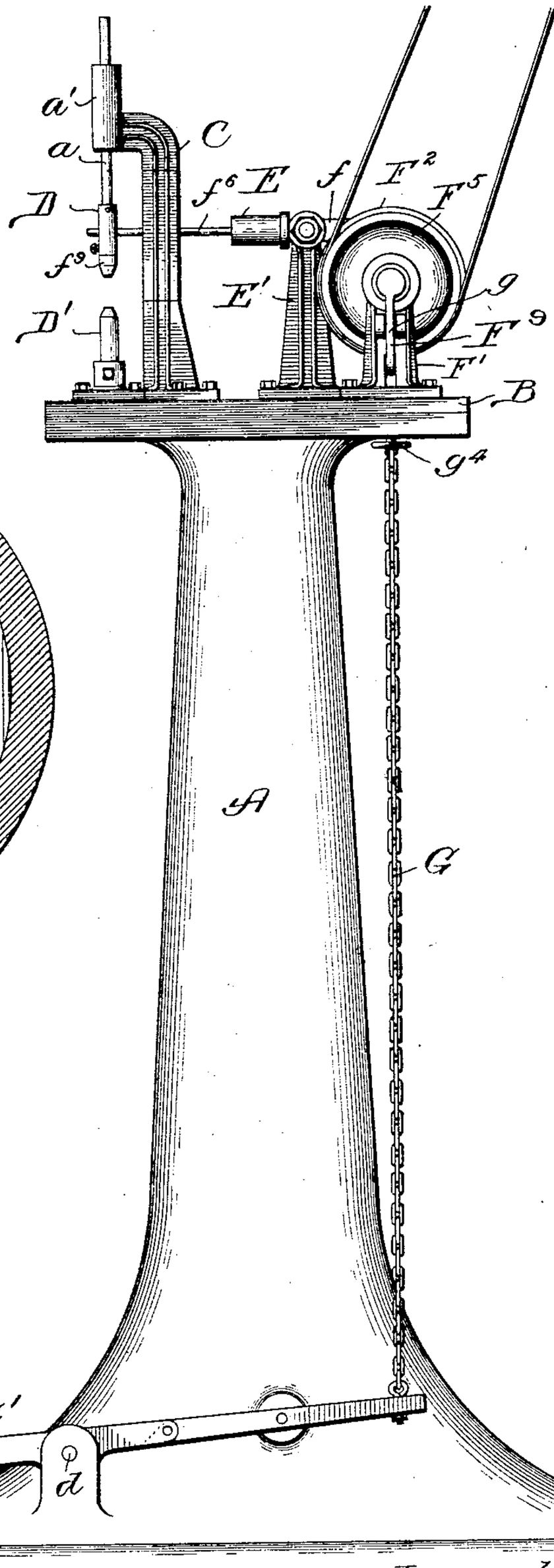
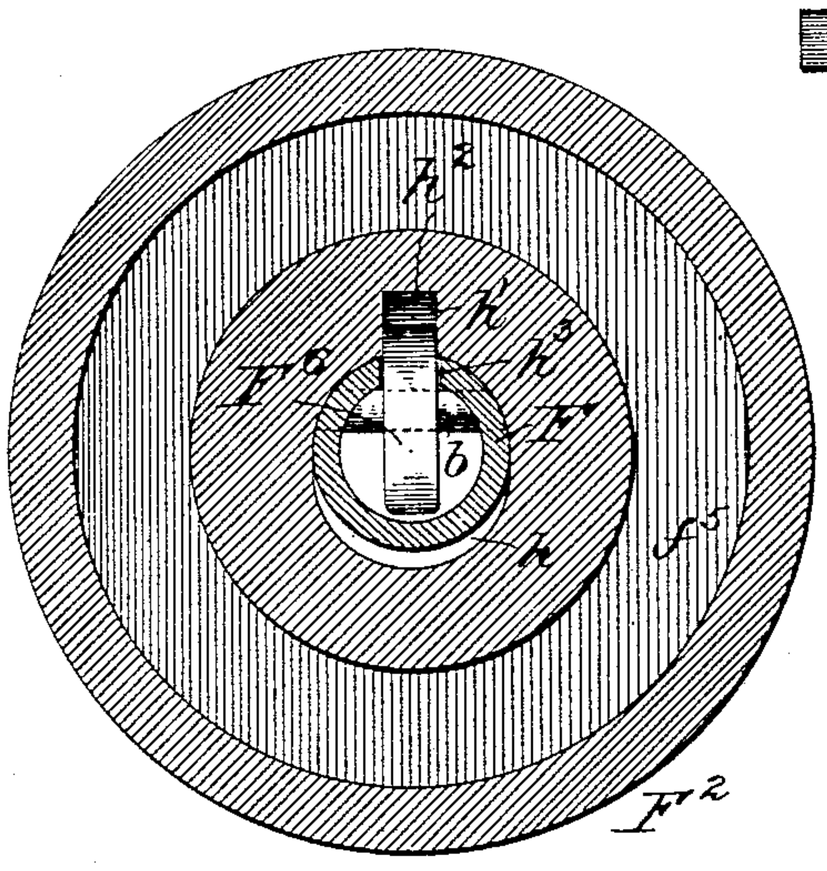


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

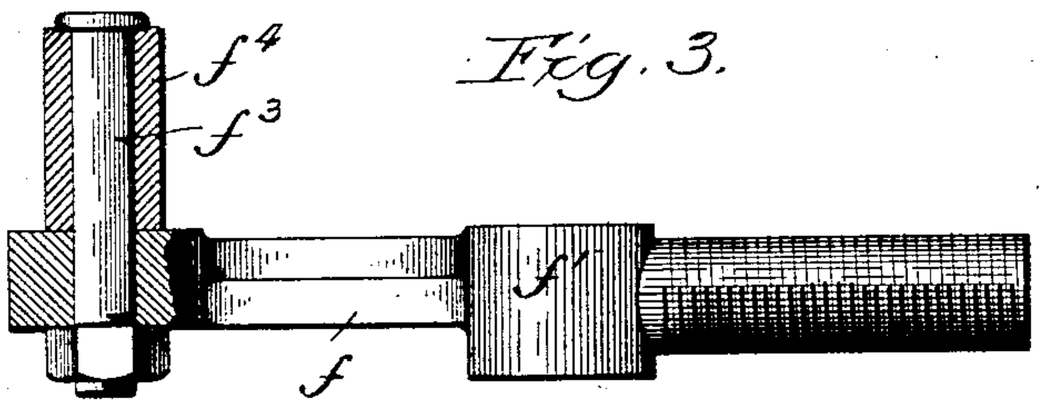
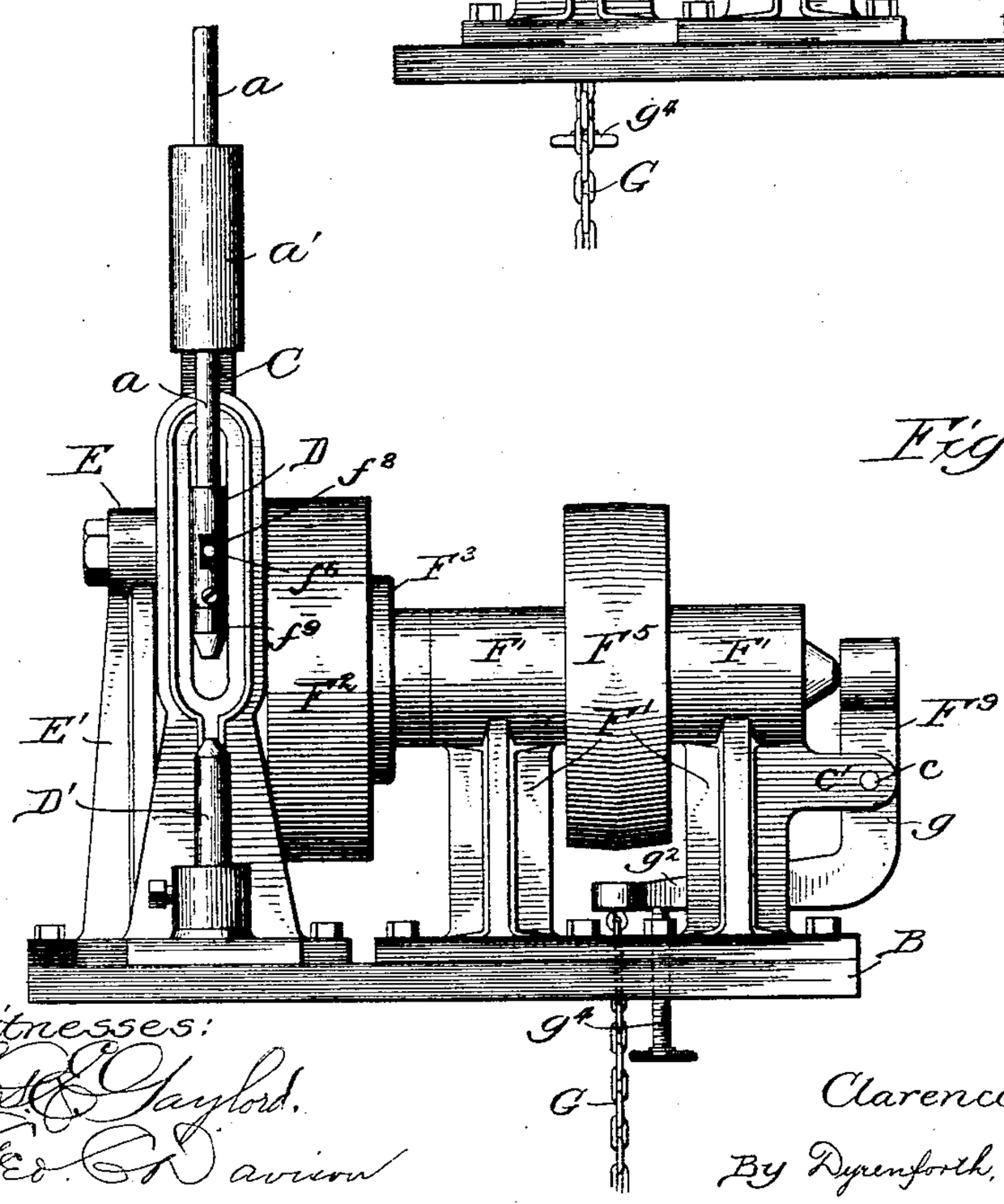


Fig. 4.

Fig. 5.



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RIVETING MACHINE.

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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

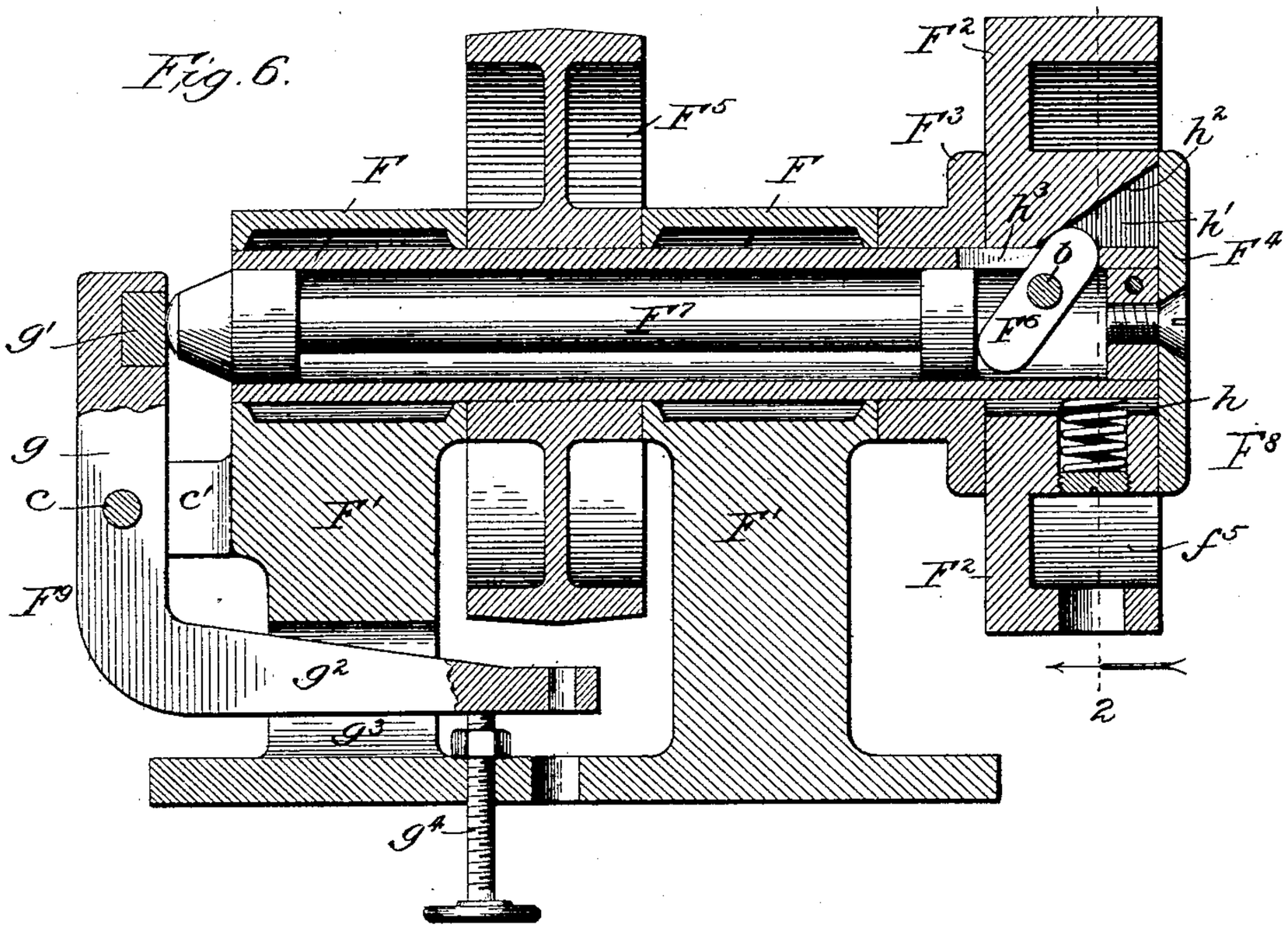
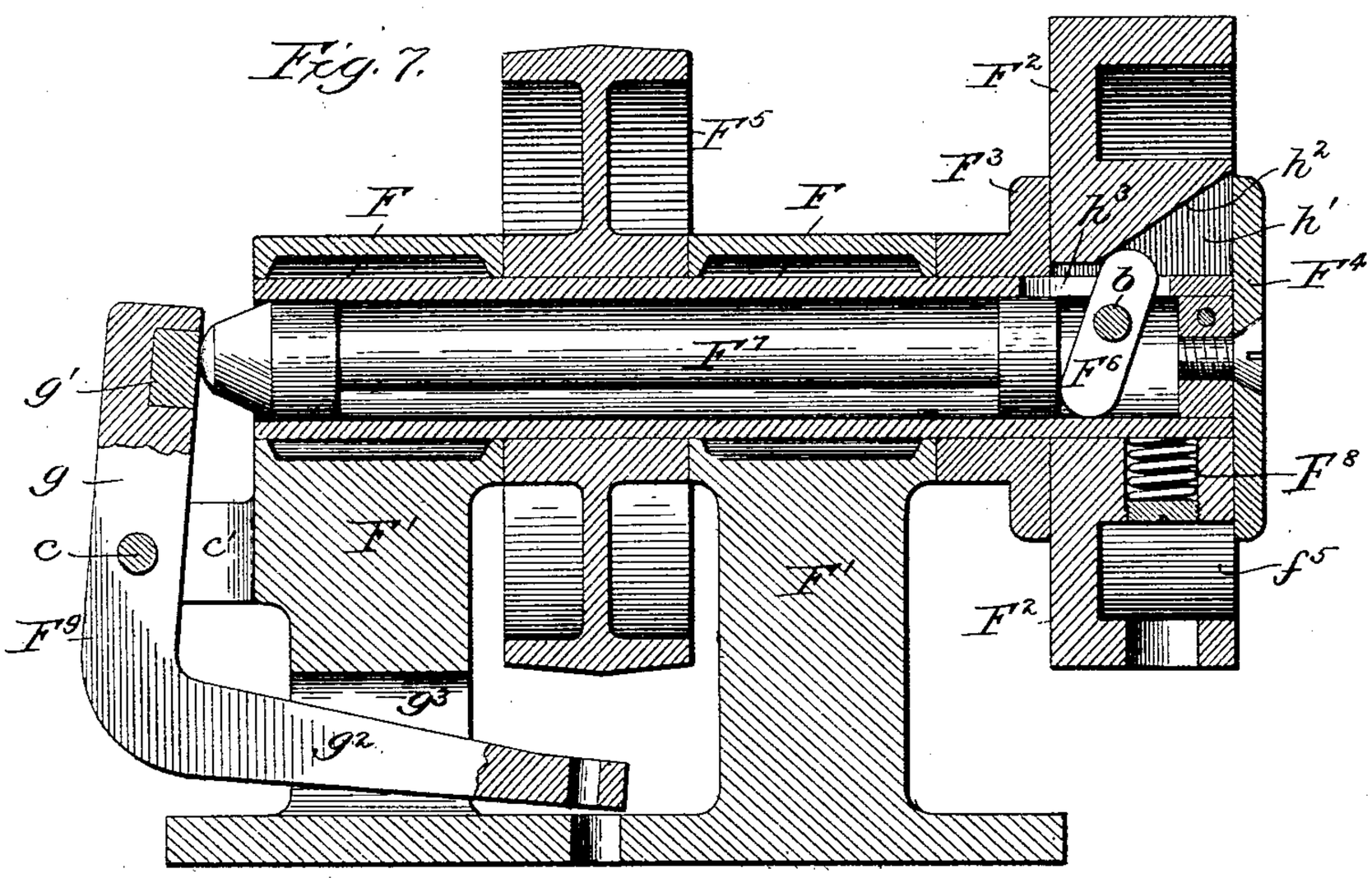


Fig. 7.



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No. 751,778. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

CLARENCE W. BLACKSTONE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FRED H. KNAPP, OF CHICAGO, ILLINOIS.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,778, dated February 9, 1904.

Application filed August 21, 1902. Serial No. 120,492. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE W. BLACKSTONE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Riveting-Machines, of which the following is a specification.

My invention relates particularly to riveting-machines adapted for light rapid work; and my primary object is to provide a simple and inexpensive machine of this character capable of ready adjustment during operation to adapt it to strike a blow of any desired character.

The invention is illustrated in its preferred form in the accompanying drawings, in which—

Figure 1 represents a view in side elevation of the improved riveting-machine; Fig. 2, an enlarged section taken as indicated at line 2 of Fig. 6 and showing the connection between a rotary shaft and eccentric employed; Fig. 3, an enlarged broken section taken as indicated at line 3 of Fig. 4 and showing the connection between the eccentric and the hammer-actuating lever; Fig. 4, an enlarged view of the upper portion of the machine looking at the opposite side of the machine from that shown in Fig. 1; Fig. 5, an end elevational view of the upper portion of the machine observed from a point at the left of Fig. 1; Fig. 6, an enlarged vertical section of the rotary shaft and eccentric employed and showing the eccentric in its depressed or non-working position, in which position it is concentric with the rotary shaft; and Fig. 7, a view similar to Fig. 6, but showing the eccentric in an operative position.

The preferred construction is as follows:

A represents a base or support for the operative mechanism; B, a plate surmounting the top of said base; C, a guide-standard supported on the plate B; D, a hammer equipped with a guide-rod a, passing through a sleeve a' with which the standard C is provided; D′, an anvil removably connected with the plate D and located vertically beneath the hammer; E, a hammer-actuating lever pivotally secured on a standard E′, connected with the plate B; F, a hollow rotary shaft disposed perpendicularly to the lever E and journaled in a standard F′; F^2, a shiftable eccentric connected with the shaft F and confined between a collar F^3 and a removable face-plate F^4; F^5, a pulley by means of which the shaft is rotated; F^6, a lever supported on a transverse pivot b, connected with the shaft F; F^7, a plunger serving to actuate the lever F^6; F^8, a spring serving to hold the plunger in a condition of rest in the position shown in Fig. 6; F^9, a bell-crank lever secured by a pivot c to a bracket c' on the standard F′; G, a chain connected with the lever F^9, and G′ a foot-lever connected with the chain G and supported on a pivot d and serving as a member of a compound lever for moving the chain G.

The lever E has a substantially rigid member f, Fig. 3, supplied near its central portion with a boss f', which is perforated and connected with the standard E′ by a pivot f^2. One end of the part f is equipped with a stud f^3, bearing a roller f^4, which engages an annular groove f^5 with which the eccentric F^2 is provided. The opposite end of the part f has a socket which receives a flexible resilient member f^6 of relatively small diameter, and said end is externally threaded to receive an adjustable sleeve f^7, which has at its outer extremity a perforation for snugly receiving the member f^6. The member f^6 is of circular cross-section, so that the sleeve f^7 can be readily adjusted. The free extremity of the member f^6 passes through a transverse perforation f^8 with which the hammer is provided. The upper and lower walls of the perforation f^8 are rounded, so as to afford convex bearing-surfaces for the extremity of the member f^6. The hammer has a removable tip f^9, as shown. As indicated in Fig. 5, the standard C is slotted to allow the member f^6 to work through it.

As shown in Fig. 6, the bell-crank lever F^9 has an upturned arm g, equipped with a steel or agate bearing g', engaging the rounded end of the plunger F^7. Said lever has an inturned arm g^2, which projects through a slot

g^3 in the lower portion of one member of the standard F′. The inner extremity of the arm g^2 is connected with the chain G, and adjacent to this connection there is an adjustable bolt g^4, which may be set to serve as a stop for the lever F^9. As shown in Fig. 2, the eccentric F^2 is provided with a slot h, which permits transverse adjustment on the shaft F, and said eccentric is further provided with a slot h', having a beveled or oblique surface h^2, which receives one extremity of the lever F^6. The other extremity of the lever F^6 bears against the inner head of the plunger F^7.

As may be understood from Fig. 6, the spring F^8 tends to force the eccentric F^2 to a non-eccentric position, from which position it may be shifted in any required degree by properly lowering the stop G^4 and depressing the lever so as to shift the member F^7 to the right. In Fig. 7 the stop is omitted, and it is to be understood that it may be used or not, as desired.

The operation will be readily understood from the foregoing detailed description. The shaft F is put into constant rotation from any suitable source of power, and the eccentric is caused to rotate with the shaft by the lever F^6 projecting into the slot h', it being observed that the shaft is provided with a slot h^3, through which the lever F^6 projects. The work is held upon the anvil D′ by the operator, and the foot-lever G′ is depressed, thereby throwing the cam F^2 into eccentricity with relation to the shaft that rotates it. The shaft rotates at quite a high speed, so that the rigid member f of the lever E is rapidly oscillated. This imparts vibration to the flexible resilient member f^6 of said lever, and by reason of the flexibility of the member f^6 the hammer has a greater traverse than it would have if the lever E were rigid throughout its length, and at the same time the flexibility of the member f^6 permits the hammer to rebound, so that a more delicate blow can be struck than would be possible without this feature of the construction. When desired, the sleeve f^7 may be unscrewed somewhat, thereby increasing the length of the rigid portion of the lever E and lessening the length of the flexible portion of said lever. Thus by adjustment of the sleeve f^7 and by a variation in the eccentricity of the cam F^2 great variation in the character of the blow imparted may be secured.

In addition to the variations just noted the hammer-trip f^9 may be replaced by a heavier hammer, so that the machine will be thereby adapted to heavier work. Experiment has demonstrated that the machine is capable of such adjustment as to permit it to operate upon delicate rivets without danger of bending them and that work of this character can be very rapidly performed with the machine.

Many changes in details of construction within the spirit of my invention may be made. Hence no undue limitation should be understood from the foregoing detailed description, which has been given for clearness of understanding only.

What I regard as new, and desire to secure by Letters Patent, is—

1. In a machine of the character described, the combination of a hammer, a flexible resilient stem for said hammer, adjustable means for varying the flexibility of said stem, and means for vibrating said stem, for the purpose set forth.

2. The combination of a hammer, an actuating-lever having a substantially rigid portion and a flexible resilient portion, an adjustable device for varying the relative lengths of the two portions of the lever, and means for oscillating the rigid portion of the lever, for the purpose set forth.

3. The combination of a hammer, an actuating-lever having a substantially rigid portion and a flexible resilient portion, a sleeve adjustably connected with the rigid portion of said lever and fitting closely upon the flexible portion thereof, and means for oscillating the lever.

4. The combination of a hammer, an actuating-lever, a freely-movable eccentric for oscillating said lever, a spring holding said eccentric normally in the concentric position, and a foot-lever serving to move said eccentric against the force of the spring and vary the throw thereof.

5. The combination of a hollow rotary shaft, an eccentric connected with said shaft, an eccentric-shifting lever pivoted to said shaft, a plunger extending through said shaft and serving to move said last-named lever, and means for shifting said plunger.

6. The combination of a hollow rotary shaft, an eccentric connected with said shaft, an eccentric-shifting lever pivoted to said shaft, a plunger extending through said shaft and serving to move said last-named lever, a spring for moving said eccentric and plunger in one direction, and a lever bearing against the free end of said plunger and serving to move it against the force of said spring, for the purpose set forth.

7. The combination of a rotary hollow shaft, an eccentric movable transversely thereof and provided with a slot having a beveled surface, an eccentric-actuating lever connected with said shaft by a transverse pivot and extending into said slot, a plunger serving to move said lever, means for shifting said plunger, and mechanism operated by said eccentric, for the purpose set forth.

8. The combination of a hollow rotary shaft, an eccentric shiftably connected with said shaft, means including a plunger for shifting said eccentric, a lever for shifting said plunger, adjustable means for limiting the throw of said last-named lever, and a foot-lever serving to actuate said last-named lever.

9. The combination of a suitable frame,

shaft-bearings supported thereon, a hollow shaft journaled in said bearings, an eccentric shiftably connected with said shaft, a plunger extending through said shaft and serving to move said eccentric and projecting from one end of the shaft, a bell-crank lever having an upturned end bearing against the projecting end of said plunger and an inturned end projecting beneath one of the shaft-bearings, a foot-lever connected with the inturned end of said bell-crank lever, and mechanism actuated by said eccentric, for the purpose set forth.

10. The combination of a suitable frame, shaft-bearings supported thereon, a hollow shaft journaled in said bearings, an eccentric shiftably connected with said shaft, a plunger extending through said shaft and serving to move said eccentric and projecting from one end of the shaft, a bell-crank lever having an upturned end bearing against the projecting end of said plunger and an inturned end projecting beneath one of the shaft-bearings, a foot-lever connected with the inturned end of said bell-crank lever, a lever pivoted to swing in a plane substantially perpendicular to said shaft and actuated by said eccentric, and mechanism actuated by said last-named lever, for the purpose set forth.

CLARENCE W. BLACKSTONE.

In presence of—

WM. B. DAVIES,

A. C. KITTLESON.