No. 681,873. Patented Sept. 3, 1901.

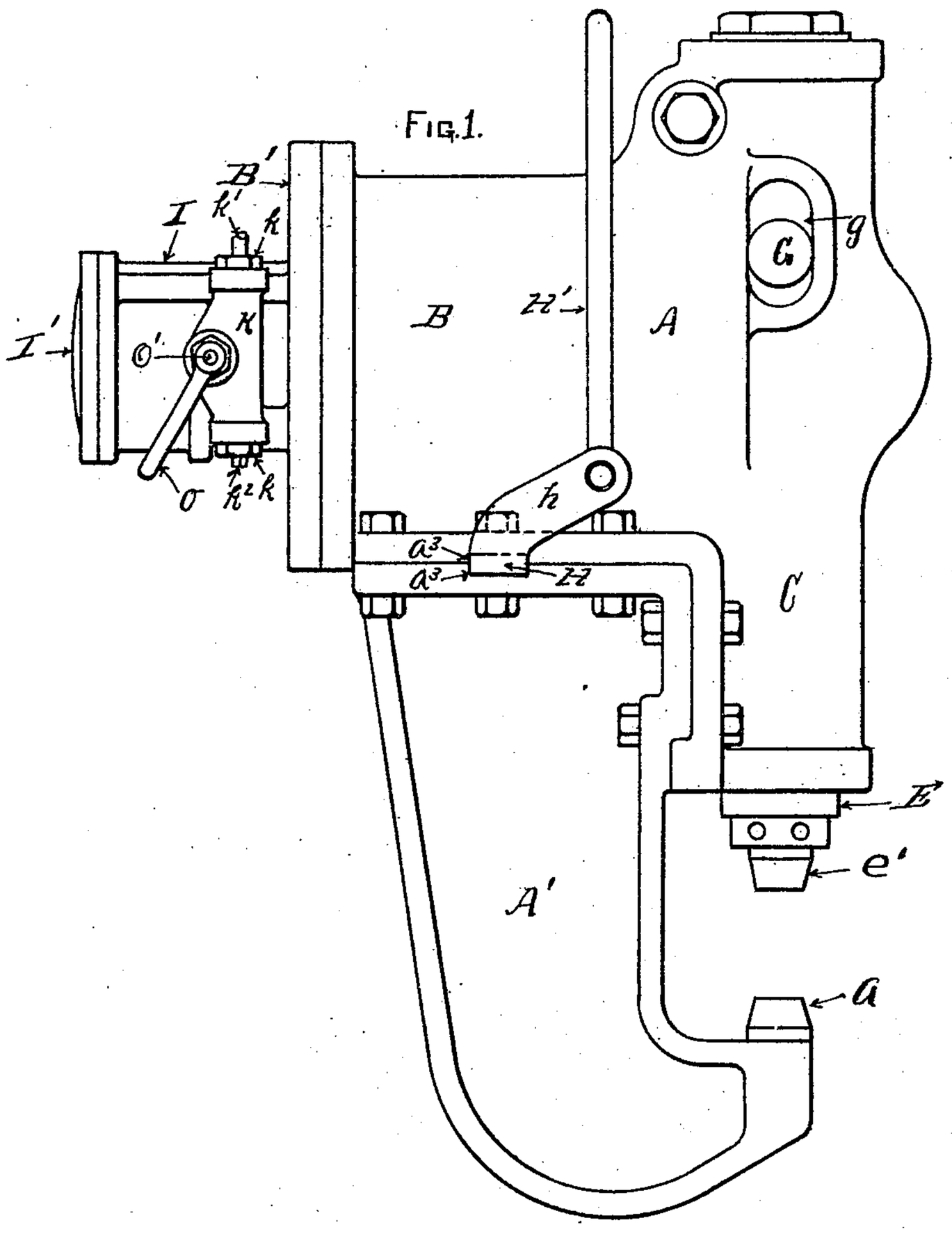
C. J. CARNEY & J. C. GORTON.

RIVETING MACHINE.

(Application filed July 2, 1900.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.



Witnesses.
L. P. Harrison
B. R. Kuffard

Inventors.
Charles J. Carney
John C. Gorton

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Fig. 3.

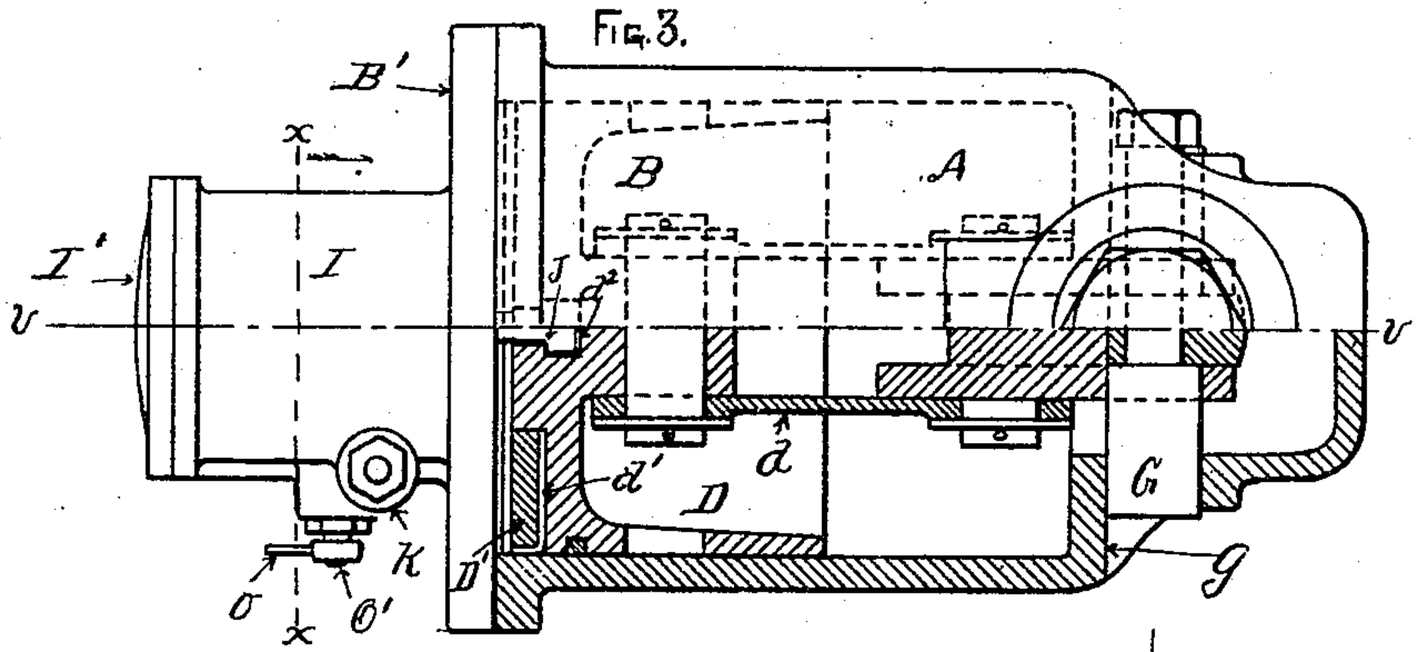

Fig. 2.

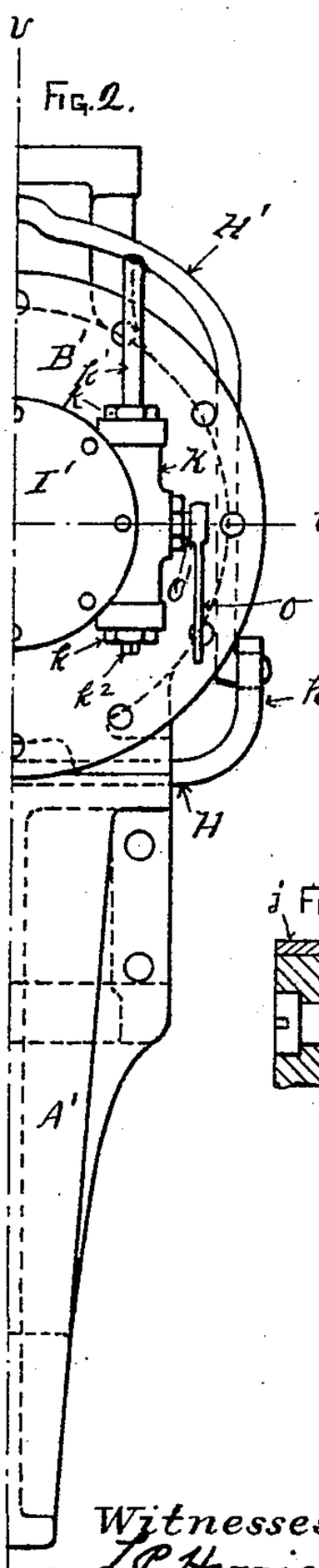

Fig. 4.

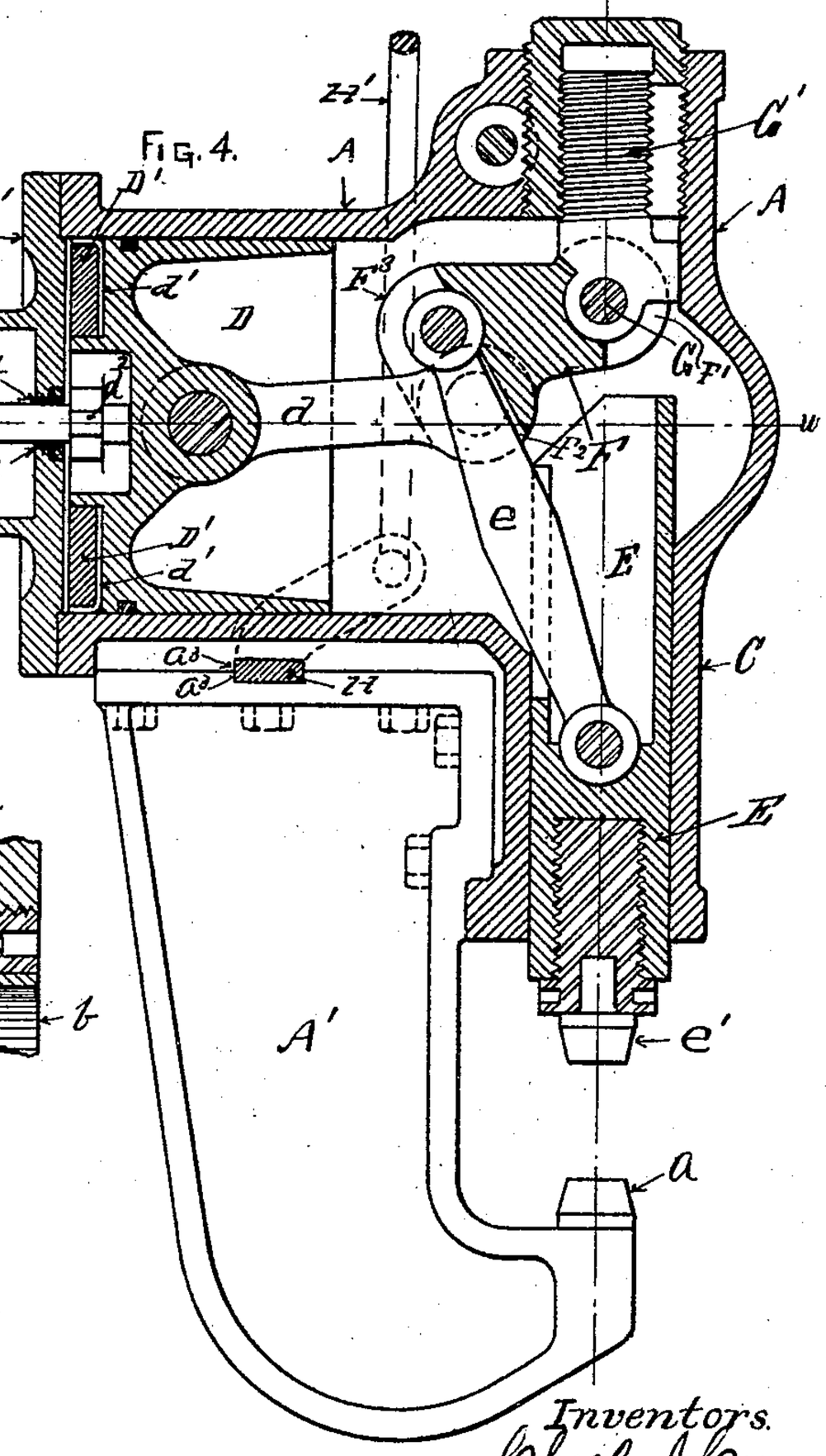

Fig. 8.

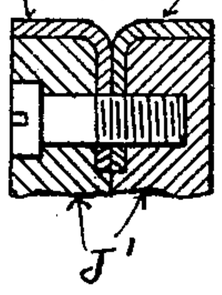

Fig. 9.

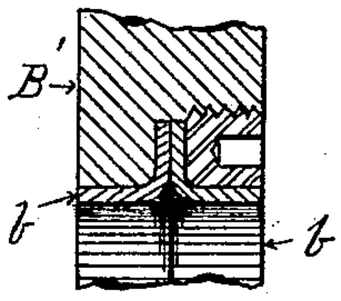

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FIG. 6.

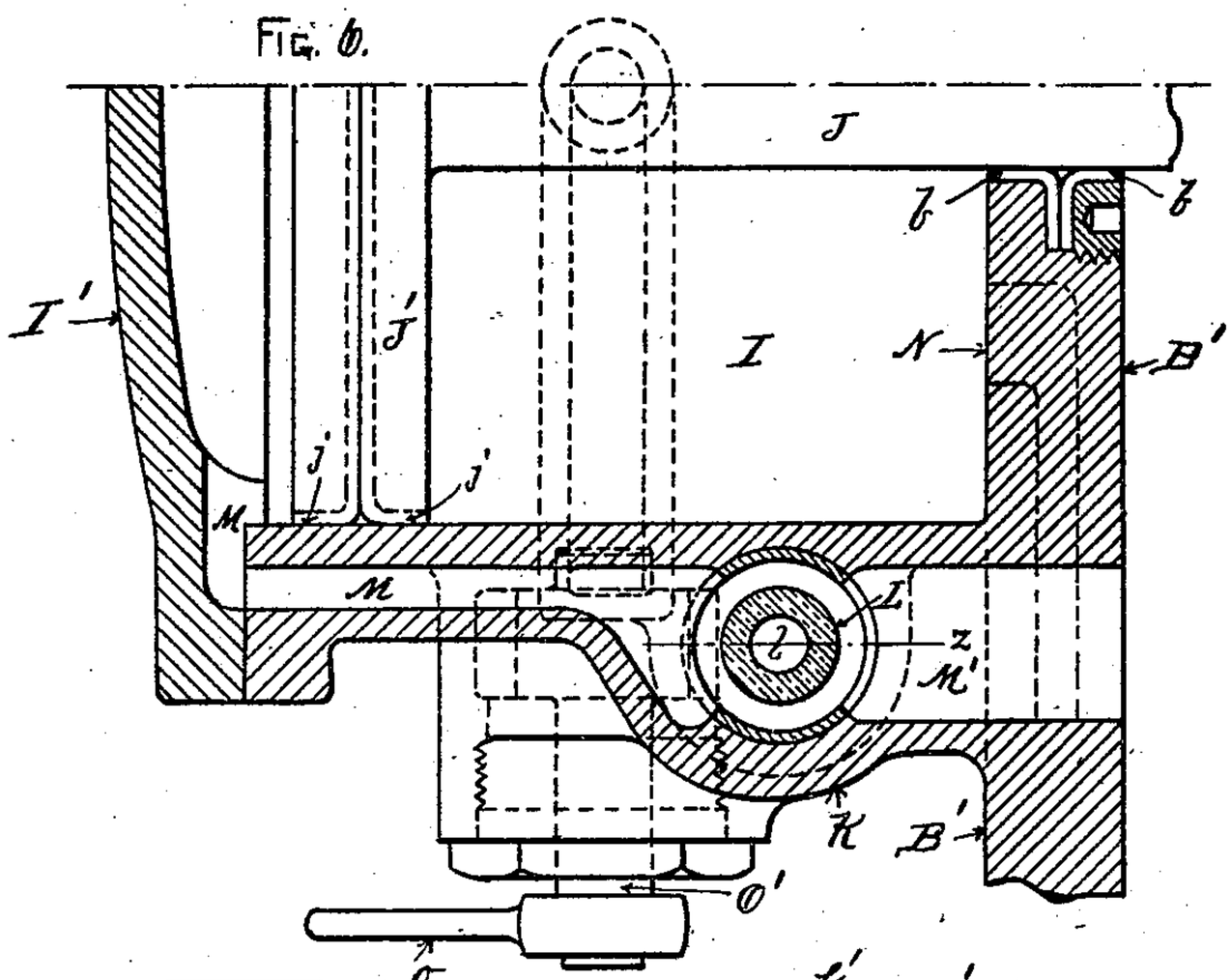


FIG. 5.

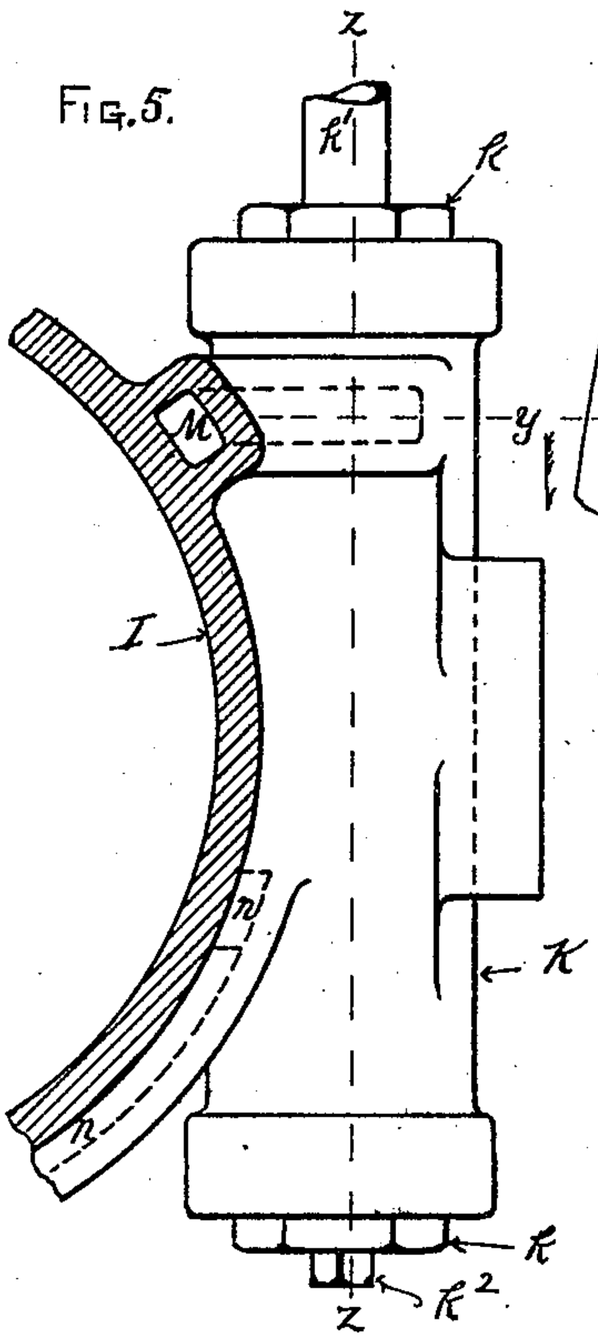
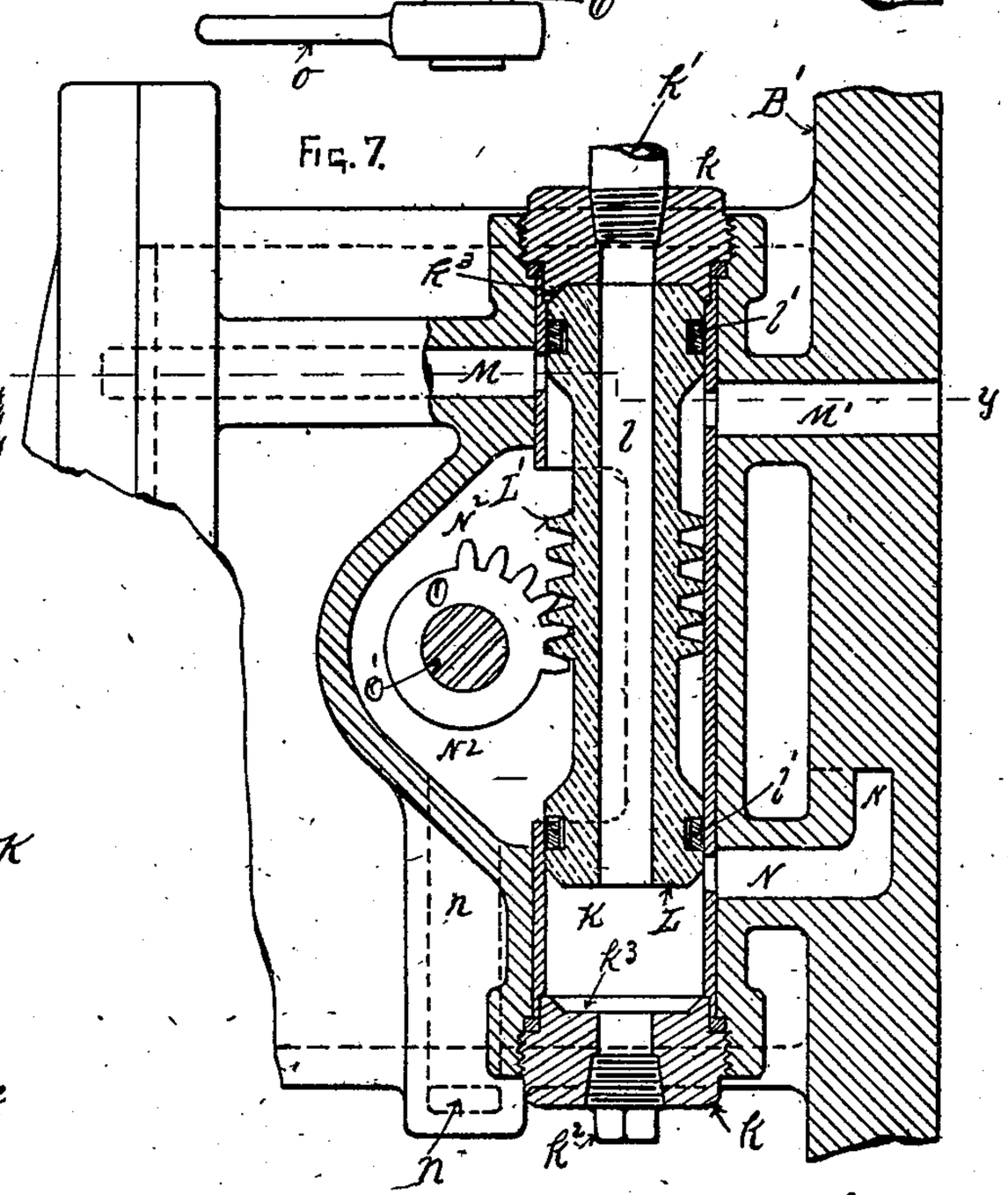


FIG. 7.



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B. R. Kiffard

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John C. Gorton

UNITED STATES PATENT OFFICE.

CHARLES J. CARNEY AND JOHN C. GORTON, OF DUNKIRK, NEW YORK.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,873, dated September 3, 1901.

Application filed July 2, 1900. Serial No. 22,290. (No model.)

To all whom it may concern:

Be it known that we, CHARLES J. CARNEY and JOHN C. GORTON, citizens of the United States, residing at Dunkirk, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Riveting-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming part of this specification.

This invention relates to riveting-machines, and is designed as an improvement of the invention set forth in Letters Patent No. 646,952, granted to us on April 10, 1900; and it consists, substantially, in the improvements hereinafter set forth and described, and illustrated in the accompanying drawings, in which—

Figure 1 is a side view in elevation of our improved riveting-machine. Fig. 2 is an end view of one-half of same. Fig. 3 is a top or plan view of the same with a portion thereof in section approximately on the line *w w* in Fig. 4. Fig. 4 is a vertical section of the same on the line *v v* in Figs. 2 and 3. Fig. 5 is an enlarged transverse section of a portion of the same on the line *x x* in Fig. 3. Fig. 6 is an enlarged horizontal section of a portion of the same on the lines *y y* in Figs. 5 and 7. Fig. 7 is an enlarged vertical section of a portion of the same on the line *z z* in Fig. 5. Fig. 8 is a detail showing construction of double cup-packing for auxiliary cylinder. Fig. 9 is a detail showing construction of double cup-packing for auxiliary piston-rod.

The riveting-machine thus shown is designed to overcome certain defects in machines of this character and to enable the machine to be handled and utilized with a much greater degree of facility than has heretofore been done with machines of this character.

Heretofore as a very general thing portable riveting-machines have been provided with a single cylinder which operated to set down the rivet and head it at one operation. In lieu of this construction we have constructed the machine with a main cylinder and an auxiliary cylinder which coöperate and with a single valve mechanism controlling the ports leading to both cylinders, so that the auxiliary cylinder operates first to set down the plunger-die upon the rivet. During this portion of the travel of the two pistons there is a constantly-increasing vacuum being created behind the main piston, which balances to a considerable extent the power exerted by the auxiliary cylinder, so as to permit the operator to properly center the plunger-die upon the rivet before finally setting and heading it, after which a further movement of the valve mechanism brings the main piston into action, so that both pistons act conjointly in setting and finishing the rivet, both pistons meanwhile so conjointly exerting their power upon the plunger-die through the bell-crank lever and link mechanism connecting the pistons therewith as to cause the power-arm of the bell-crank lever to travel across and the weight-arm thereof toward the line of greatest efficiency during and at the completion of the travel of said pistons. Again, as such machines are usually made the jaw supporting the anvil is an integral part of the frame and the machine can only be utilized for work within the scope of the jaw. We have overcome this difficulty by making the jaw removable, so that any one of a number of different-shaped anvil-supporting jaws can be attached to the frame, according to the character of the work desired to be done. Again, we have provided means for supporting the machine so that it will properly balance with any-shaped jaws that may be attached to the frame, so that the machine can be handled with the greatest facility under all circumstances. These and other features hereinafter described are embodied in our improved riveting-machine, substantially as shown, whereby the utility and convenience of the operation of the machine are greatly facilitated and improved.

In this construction the frame of the machine consists, substantially, of the main cylinder B, forming one end thereof, a plunger-die guide C, integral with said cylinder and at right angles thereto, an auxiliary cylinder I on the head B′ of the cylinder B, a valve-chest K on the auxiliary cylinder I, and an anvil-jaw A′, removably secured to the under surface of the main cylinder B and the side of

the plunger-die guide C. The piston D in the main cylinder B and the piston J′ in the auxiliary cylinder I are connected together by a piston-rod J, so that they coöperate. In the upper part of the frame of the machine and directly above the plunger-die E there is an adjustable fulcrum G′, to which the bell-crank lever F is pivoted by means of a pivot G, passing through the arm F′ thereof, which arm operates as the axis upon which the bell-crank lever turns. A link *d*, pivoted to the piston D, extends to the bell-crank lever F and is pivoted to the power-arm F^2 thereof, and a link *e*, pivoted to the weight-arm F^3 of said bell-crank lever, extends to and is pivoted in the plunger-die E, near the lower end thereof, so that as the pistons J′ and D move forward the power-arm F^2 travels across and the weight-arm F^3 toward the line of greatest efficiency, and thus the full effective power of the coöperating pistons J′ and D is delivered to the plunger-die E with increasing efficiency until the completion of its downward traverse. The head B′ of the cylinder B has an auxiliary cylinder I thereon concentric with and of smaller diameter than the cylinder B. The auxiliary cylinder is provided with a piston J′, connected with the piston D by means of a piston-rod J, so that the two pistons coöperate with each other. The piston D, operating in the cylinder B, is provided with cup-packing *d′*, secured in place by a ring D′ in the usual manner, and the outer end of the center of the piston D is recessed out, so as to form a T-slot d^2, with which the end of the rod J of the piston J′, operating in the auxiliary cylinder I, engages, and in the cylinder-head B′ there is a double cup-packing *b* around the piston-rod J, a section of which is clearly shown and illustrated in Fig. 9. The piston J′ is also provided with double cup-packing *j*, a section of which is clearly illustrated in Fig. 8. Upon one side of the auxiliary cylinder I there is a valve-chest K, which is bored out to receive a cylindrical valve L, the ends of the valve-chest being closed with screw-plugs *k k*, provided with central openings, in one end of which an air or steam inlet pipe *k′* is secured, while the other is closed with a plug k^2. Leading from the upper part of the valve-chest K is a port M, extending along the side of the auxiliary cylinder I to a recess under the head I′ thereof, and slightly below the plane of the port M there is a port M′, extending from the opposite side of the valve-chest K into the end of the main cylinder B, as is clearly shown in Figs. 6 and 7, and in the lower part of the valve-chest there is a port N, leading to the cylinder I, as illustrated by the full and dotted lines in Figs. 6 and 7, and in the opposite side of the valve-chest K there is an exhaust-chamber N^2 on one side of the valve-chest, from which an exhaust-passage *n* in the shell of the cylinder I leads out to the open air, as illustrated in Figs. 5 and 7, all of these ports being cored out in casting the valve-chest K, the cylinder I, and the cylinder-head B′ in the usual and ordinary manner. The cylindrical valve L (see Fig. 7) has a central opening *l*, extending through the valve longitudinally, and also has the periphery of its central portion cut away, leaving only the ends of the valve contacting with the valve-chest K, which ends are provided with packing-rings *l′* of ordinary construction. Pivoted in the walls of the exhaust-chamber N^2 there is a segmental pinion O, which intermeshes with teeth L′ on the valve L. The shaft O′ of the pinion O extends out through the wall of the exhaust-chamber N^2 and is provided with an operating-lever *o*, (see Figs. 1, 2, 3, and 6,) by means whereof the valve L can be moved back and forth in the valve-chest K as desired, the movement thereof being limited by the contact of the ends of the valve L with the seats k^3 in the inner ends of the plugs *k* closing the ends of the valve-chest K. In the operation of the valve mechanism Figs. 6 and 7 show the mechanism with the port M′, leading to the rear of the main cylinder, open to exhaust and air passing through the port N into the front end of the auxiliary cylinder I, so as to retain the plunger E in a raised position ready for operation. When the valve L is moved downward, it operates first to close the port M, leading to the rear of the auxiliary piston J′, to exhaust, and at the same time closes the port N, leading to the front of the piston J′, to air, and in its further traverse it opens the port M to air and also opens the port N to exhaust, while at the same time it closes the port M′, leading to the rear of the main piston D, which port M′ remains closed until the mechanism, actuated by the pressure behind the auxiliary piston J′, moves the plunger-die *e′* down into contact with a rivet, to be headed upon the anvil-die *a*, during which movement a partial vacuum is formed in the main cylinder B behind its piston D, thus preventing any pressure being exerted by the main piston D upon the plunger-die *e′* until the further movement of the valve L opens the port M′, so as to admit air into the main cylinder behind its piston D, which then operates in conjunction with the auxiliary piston J′, so that the full power of both pistons is exerted to complete the rivet-head, after which, by reversing the movement of the valve L, air is admitted again to the port N, and the ports M′ and M are successively opened to the exhaust-chamber N^2, which operates to move the pistons J′ and D and the mechanism operated thereby back to their normal positions. It will be observed that the construction and operation of the mechanism are such that there is no cushion action upon the mechanism during any part of its operation, and that the action of the air-pressure behind the piston J′ and the auxiliary cylinder I being opposed by the partial vacuum behind the piston D in the main cylinder B, which vacuum constantly increases during the forward traverse of the pistons, op-

erates to so balance the mechanism that the operator is enabled to set down the plunger-die upon a rivet to be headed, so that little or no pressure is exerted thereon until a further movement of the valve L opens the port M′, so as to admit air into the main cylinder behind the piston D. This is an entirely new feature in mechanisms of this character. To the under side of the frame A there is bolted a removable anvil-jaw A′, adapted to support an anvil *a* in line with the plunger-die *e*′. The anvil-jaw A′ is removably secured to the under surface of the main cylinder B and to the side of the plunger-guide C, both of which are integral parts of the frame A, by means of ordinary bolts passing through flanges on the sides of the upper part of the jaw A′ and corresponding flanges on the frame A. The object of so bolting an anvil-jaw to the frame is that interchangeable jaws having different-sized openings to adapt them to receive different-sized material upon which the machine is intended to operate can be bolted to the frame A and used with equal facility. In the upper part of the jaw A′ we make the lower half of a transverse slot a^3, the upper or corresponding half of which slot is made in the under surface of the frame A, and in this slot we place a removable U-shaped trunnion-piece H, in the arms *h* of which are pivoted the ends of a bail H′. These trunnion-pieces H are made with the arms *h* thereof of different lengths, so that when different-shaped anvil-jaws are attached to frame A a trunnion-piece H can be used therewith, having its arms of the proper length, so that the riveter will swing and balance on the bail H′ in any position.

We have thus shown and described convenient mechanism for utilizing our invention; but we are aware that the same may be modified in construction without departing from the spirit of our invention, and therefore we do not confine ourselves to the exact construction shown and described, as what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination in a riveting-machine, of a main cylinder, a cylinder-head on the rear end thereof, an auxiliary cylinder secured to the main-cylinder head, pistons in both cylinders, a piston-rod passing through said cylinder-head and connecting the pistons in both cylinders, a valve-chest having a port leading to the rear of the auxiliary cylinder, a port leading to the rear of the main cylinder on a plane somewhat below the plane of the port leading to the rear of the auxiliary cylinder, and a port leading to the front of the auxiliary cylinder, and a valve in said valve-chest adapted to successively close the port leading to the rear of the main cylinder, open the port leading to the rear of the auxiliary cylinder to air, and the port leading to the front of the auxiliary cylinder to exhaust, without opening the port leading to the rear of the main cylinder, until by a further movement of said valve it opens the port leading to the rear end of the main cylinder to air, and when reversed in like manner successively open the ports leading to the rear ends of the main and auxiliary cylinders to exhaust, and the port leading to the front of the auxiliary cylinder to air, substantially as and for the purpose set forth.

2. The combination in a riveting-machine, of a main cylinder, a cylinder-head on the rear end thereof, an auxiliary cylinder secured to the main-cylinder head, pistons in said main and auxiliary cylinders, a piston-rod passing through said main-cylinder head and connecting the pistons in both cylinders, packing in said cylinder-head around said piston-rod, a valve-chest having a port leading to the rear of the auxiliary cylinder, a port leading to the rear of the main cylinder on a plane somewhat below the plane of the port leading to the rear of the auxiliary cylinder, and a port leading to the front of the auxiliary cylinder, and a single valve in said valve-chest adapted to successively close the port leading to the rear of the main cylinder, open the port leading to the rear of the auxiliary cylinder to air, and the port leading to the front of the auxiliary cylinder to exhaust, without opening the port leading to the rear of the main cylinder, until by a further movement of said valve it opens the port leading to the rear end of the main cylinder to air, and when reversed in like manner successively open the ports leading to the rear ends of the main and auxiliary cylinders to exhaust, and the port leading to the front of the auxiliary cylinder to air, substantially as and for the purpose set forth.

3. The combination in a riveting-machine, of main and auxiliary cylinders, pistons operating therein, a piston-rod connecting both pistons together, a valve-chest, a single valve therein adapted to successively close the port leading to the rear of the main cylinder and open the port leading to the rear of the auxiliary cylinder, so as to produce a constantly-increasing vacuum in the main cylinder during a portion of its forward stroke, a plunger-die guide, a plunger-die operating therein, a bell-crank lever and link mechanism connecting the main piston and plunger-die, and so arranged that the power-arm of the bell-crank lever travels across, and the weight-arm thereof toward the line of greatest efficiency, substantially as set forth.

4. The combination in a riveting-machine, of a frame substantially composed of a main cylinder, a plunger-die guide, an anvil-jaw removably secured to said cylinder and plunger-die guide, and a trunnion removably secured in a slot between the under side of said cylinder and the top of the removable anvil-jaw, substantially as and for the purpose set forth.

5. The combination in a riveting-machine, of a frame comprising substantially a main cylinder and a plunger-die guide at right an-

gles to each other, and an anvil-jaw removably secured to said cylinder and plunger-die guide, a removable trunnion removably secured in a slot between the upper end of the anvil-jaw and the lower surface of the main cylinder, a yoke or bail pivoted to said trunnion, an auxiliary cylinder secured to a head on the rear end of the main cylinder, pistons in both of said cylinders, a piston-rod passing through said cylinder-head and connecting both of said pistons together, a valve-chest having ports leading to both of said cylinders, and also an exhaust-port, and a valve in said valve-chest operating to control the ports to both cylinders, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES J. CARNEY.
JOHN C. GORTON.

Witnesses:
W. E. PHELPS,
R. C. COLMAN.