

No. 690,755.

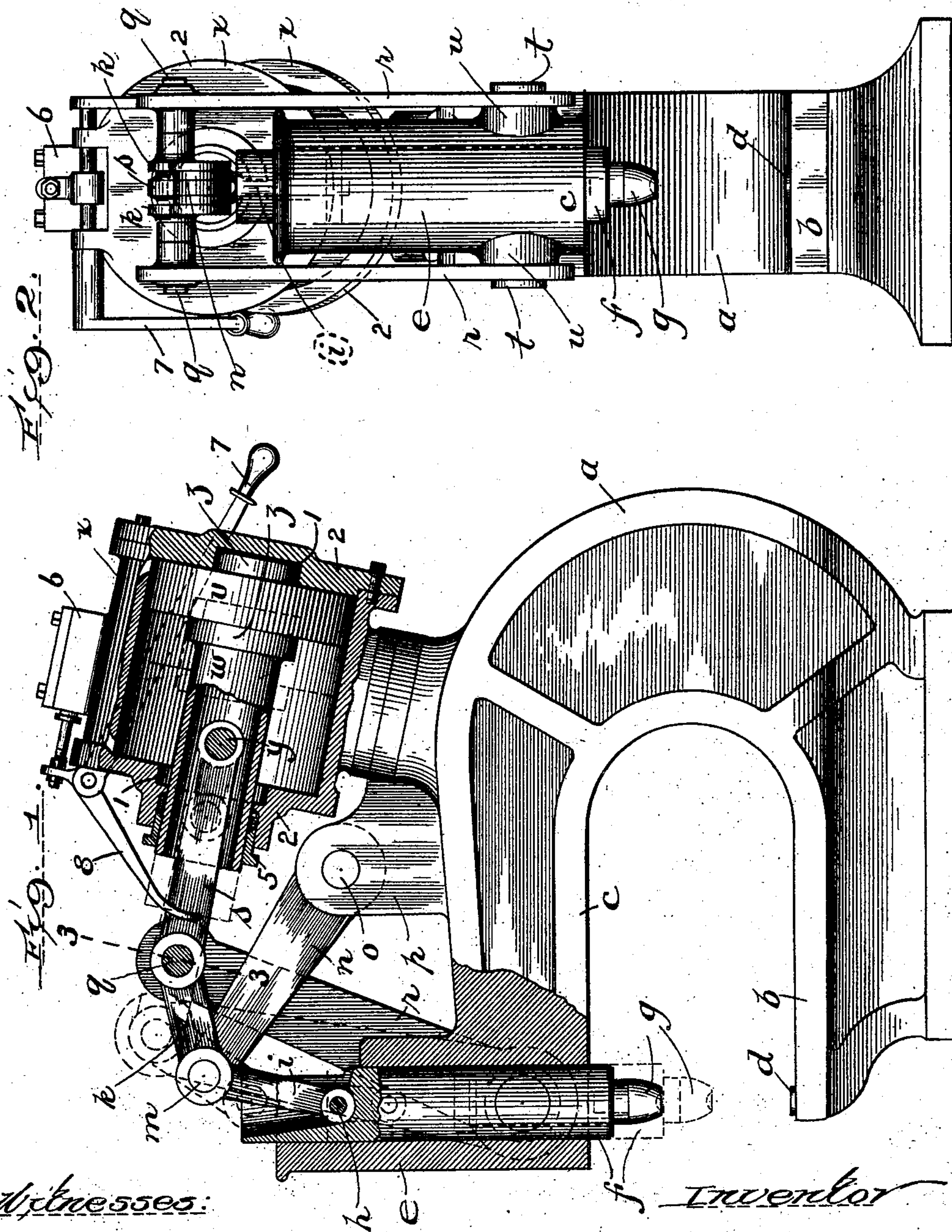
Patented Jan. 7, 1902.

W. S. MCKINNEY.
RIVETING MACHINE.

(Application filed July 24, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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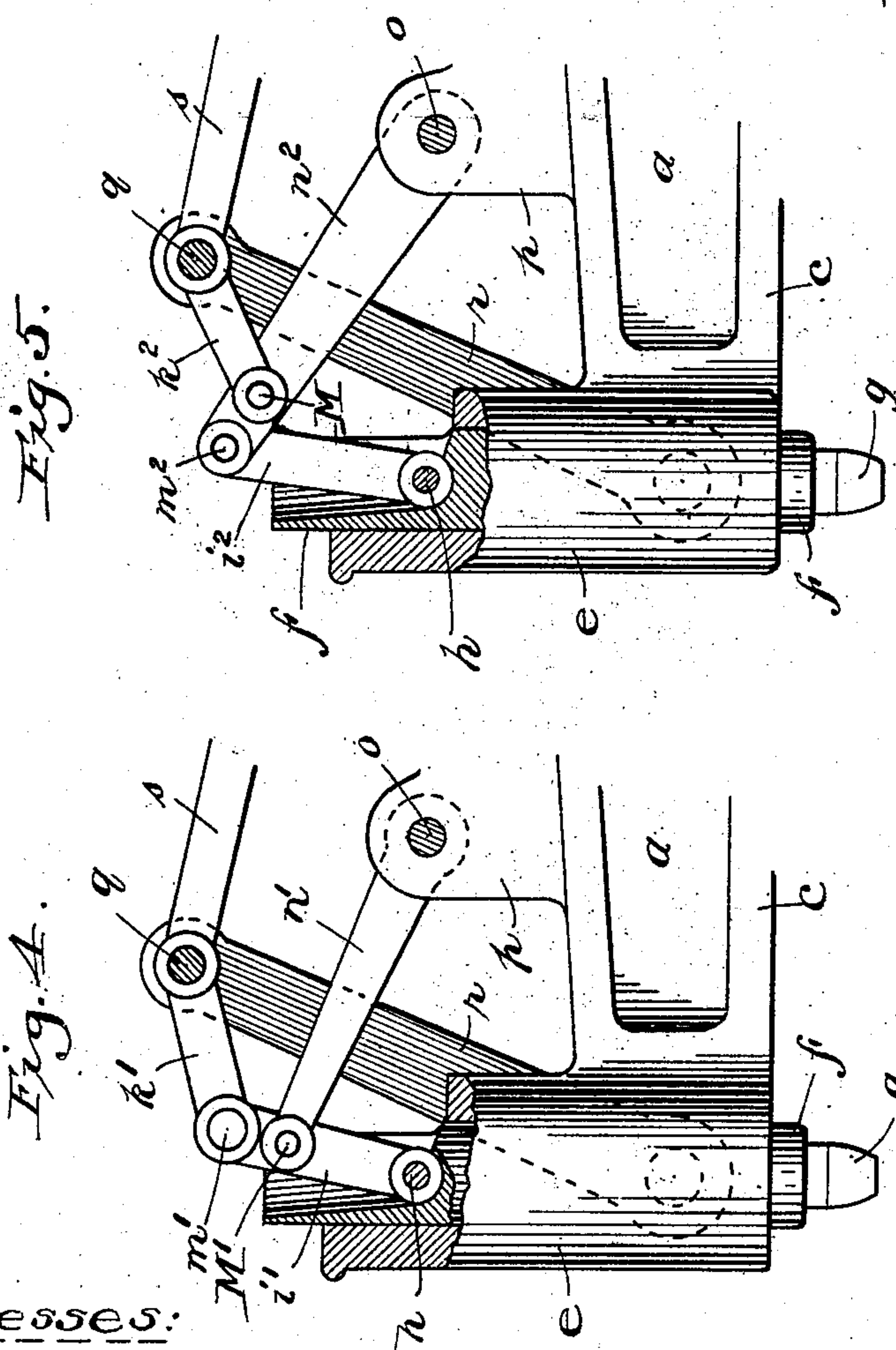
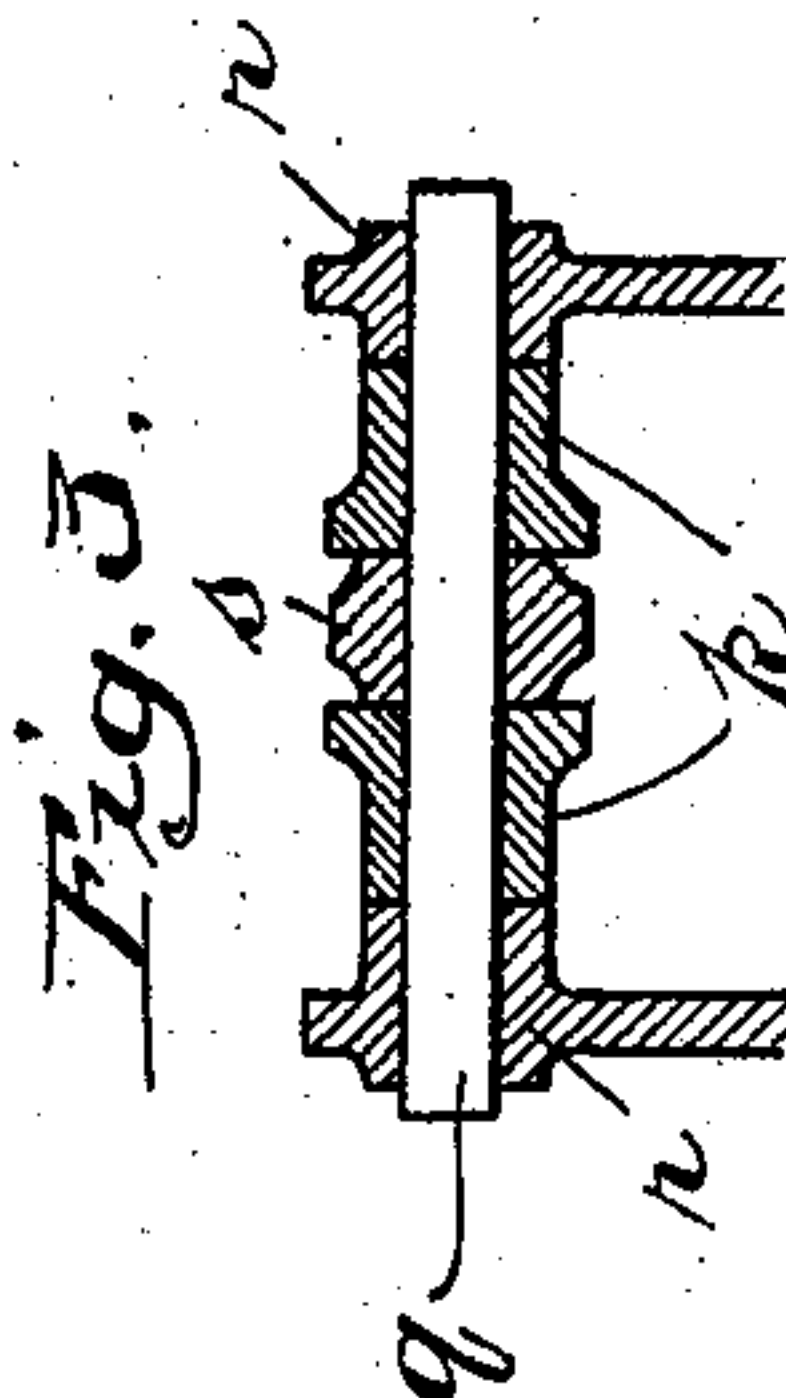
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UNITED STATES PATENT OFFICE.

WALTER SABIN MCKINNEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO WALTER S. MCKINNEY AND COMPANY, A FIRM COMPOSED OF WALTER S. MCKINNEY AND HOWARD M. COX.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 690,755, dated January 7, 1902.

Application filed July 24, 1901. Serial No. 69,517. (No model.)

To all whom it may concern:

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

My invention relates to riveting-machines, punches, and the like wherein pressure is applied through the medium of a reciprocating bar operated from a cylinder and piston; and the objects of my invention are, first, to reduce the travel of the main piston requisite for the attaining of any given travel of the reciprocating bar, and, second, to reduce the side thrust of the reciprocating bar against its guide. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, showing the complete machine. Fig. 2 is a front elevation of the machine; and Fig. 3 is a fragmentary view in section on the line 3 3, Fig. 1, showing the arrangement of the parts at the tension-bar pin. Figs. 4 and 5 show modifications in the manner of connecting the links which operate the tool-bar.

Similar characters refer to similar parts throughout the several views.

In the present instance I have shown my invention embodied in a riveting-machine, the main body or framework *a* whereof is massively constructed, preferably of cast-steel, shaped in such a manner as to form the lower jaw *b* and upper jaw *c*, as in the ordinary machine of this class. Upon said lower jaw is mounted the die *d*, and upon the upper jaw is formed the head or guide *e* for the reciprocating bar *f*. For the purpose of attaining accuracy of operation and effectually eliminating side play the bar *f* and head *e* are preferably cylindric. At the lower extremity of the bar *f* in the preferred construction, Figs. 1, 2, and 3, is secured the riveting-tool *g* for swaging or closing up the rivet.

The pin *h* is mounted in the rivet-bar *f*, near the upper portion thereof, and serves as a pivotal connection for the link *i*. The upper extremity of said link *i* is connected to the links *k k* by means of the pin *m*. Said pin *m* is also connected to the bar or link *n*, the

opposite extremity whereof is pivoted, by means of the pin *o*, to the lug *p*, formed upon the machine-frame *a*. The side-bar pin *q* forms a pivot, which is preferably common to the links *k k*, side bars *r r*, and connecting-rod *s*. The lower extremities of said side bars are pivotally connected by the pins *t t* to the bosses *u u*, formed upon the lower portion of the head *e* of the machine. The parts are so proportioned that when the pin *q* is at its rearmost position the links *i* and *k* are disposed at an obtuse angle with reference to each other, as indicated in Fig. 1. Said connecting-rod is reciprocated by means of the piston *v* and piston-rod *w*, traveling in the cylinder *x*, the latter being mounted upon the frame of the machine. Said piston-rod, which is hollow, has a pin *y* mounted therein to afford pivotal connection with the rear extremity of the connecting-rod *s*. By this construction the forward extremity of said connecting-rod is free to move vertically to follow the circular path of the side-bar pin *q*.

Upon the front and rear faces of the piston *v* are formed the projections *z z*, which are adapted to enter the corresponding recesses or chambers *1 1* in the front and back heads *2 2* of the cylinder. Said projections are designed to closely fit into said chambers and operate to cushion the piston at the ends of the stroke, for when one of said projections enters its respective chamber the air or other pressure medium is compressed in said chamber and prevents the piston from striking the cylinder-head suddenly.

The front head of the cylinder *x* is so constructed as to form a stuffing-box about the piston-rod *w*, said box being capped by the stuffing-box gland *5*. The entrance and exit of pressure medium to and from the cylinder is governed by valve mechanism of any suitable construction contained in and adjacent to the chest *6*, mounted upon the cylinder. The said valve mechanism is controlled by means of the hand-lever *7*. In order to shut off the pressure medium from the cylinder at the end of the back stroke, a safety-lever *8* is connected to the valve mechanism and adapted to be automatically engaged by the side bars *r* or connected parts.

In operation when the parts are in the

starting position shown in Fig. 1 a forward motion of the connecting-rod *s* causes the side-bar pin *q* to move in a forward direction upon a circular path having the pins *t* as a center. Now the sum of the lengths of the links *k* and *i* is less than the length of the side bars *r*, and therefore the forward motion of said bars and links would force the rivet-bar *f* downward even if the distance between the pins *q* and *h* remained constant; but this downward movement of the bar *f* is augmented for the reason that when in the said starting position the said links *k* and *i* are at an angle one to another, while the forward motion of said links results in a straightening thereof, and consequently an increase in the distance between said pins *q* and *h*. The straightening of said links *k* and *i* is due to the link *n*, which maintains the distance between the pins *m* and *o* constant, and thereby practically prevents the forward motion of said pin *m*. It will be seen, therefore, that the links *k*, *i*, and *n* virtually constitute a toggle, of which the pin *m* forms the central joint and the link *n* forms the pitman.

In riveting it is requisite that the machine exerts maximum pressure only at or near the end of its compressive stroke to close the rivet, and in order to attain the maximum pressure for any given force on the piston it is desirable that when the rivet-bar *f* is at the lowest position the links *i* and *k* and side bars *r* shall extend substantially in the same direction and be parallel with said rivet-bar.

The advantages of my invention will be more clearly understood by following the operation of the machine on the upward stroke of the rivet-bar. When the links *i* and *k* and side bars *r* extend in the same general direction, the piston *v* is at the forward end of its throw. Now as said piston moves backward the pin *q* moves backward also; but the pin *m*, being secured in the pitman-link *n*, is prevented from following, and there is a consequent flexure of the links or toggle members *i* and *k*. The effect of such flexure is particularly noticeable near the end of the piston-stroke, for as the links *k* and *n* approach more nearly into line the pin *m*, and consequently the rivet-bar *f*, are raised quite rapidly. Except at the lower part of the stroke of the rivet-bar *f* little or no force in said bar is necessary, and therefore rapidity of motion is greatly to be desired, for it permits the cylinder *x* to be shorter in length than heretofore, with a resulting saving in the consumption of the pressure medium. Conversely, this construction accomplishes a greater travel of the rivet-bar for any given length of main cylinder.

Another advantage in the present machine lies in the fact that at the upper end of the stroke the link *i* is not greatly inclined relatively to the rivet-bar *f*, and therefore there is little side thrust upon said bar *f* against its guide-surfaces.

The alternative constructions shown in Figs. 4 and 5 are analogous to the one above described. In the device illustrated in Fig. 4 the link *i'* is pivotally connected to the rivet-bar *f* by the pin *h* and to the links *k'* by means of the pin *m'*. The connecting-rod *s* is connected to said links *k'* by means of the pin *q*. The pitman-link *n'* is pivoted to the machine-frame by means of the pin *o*, but instead of being connected to the central joint of the toggle-forming members *i'* and *k'* is connected to the member *i'* by means of the pin *M'*, located near said pin *m'*. In the form of machine shown in Fig. 5 the links *i²* and *k²*, which correspond to the links *i* and *k*, are attached to the pitman-link *n²* at different points thereon, near the forward extremity thereof, by means of the pins *m²* and *M*, respectively. The operations of these modified forms are similar to the operation of the machine first described, except that the quantity of motion of the different parts is somewhat altered, the designs being varied to suit different conditions.

Although I have described my invention in connection with a riveting-machine, it is also applicable to the other machines of this general type—for example, punching, shearing, and stamping machines.

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

1. In a machine of the class described, the combination of a reciprocating tool-holding bar, side bars having one end pivoted at a fixed point and the other end revoluble about said fixed point, toggle members or links connecting said tool-holding bar to said side bars, means for revolving said side bars about said fixed point, and other means for controlling said toggle members.

2. In a machine of the class described the combination with the tool-bar, side bars, and a power device, of a pitman-like link or bar having an articulate bearing at a fixed point, link connections between said pitman-like member and the side bars; and other link connections between said pitman-like member and said tool-bar.

3. In a machine of the class described, the combination of a tool-bar, a machine-frame, a head formed thereon to guide said tool-bar, revoluble side bars pivoted to said head, a plurality of links connecting said side bars to said tool-bar, means for controlling the position of said links relatively to each other, and other means for revolving said side bars.

4. In a machine of the class described, the combination of a framework, a tool-bar reciprocating therein, revoluble side bars having fixed bearings at one end and having connections at the other end to a power device whereby said bars are revolved, link connections between said side bars and said tool-bar, said link connections having at least one joint between said power device and said tool-bar; and a member having a fixed pivot at one end and connected at the other end to said link

connections to thereby limit the motion of said link connections when said side bars are being revolved.

5. In a machine of the class described, the combination of a machine-frame, a tool-bar reciprocating therein, side bars pivoted to said frame, a power device connected to said bars, two links or sets of links connecting said side bars to said tool-bar, a pitman-like link or bar, a pivot whereby said pitman-like member is connected to said frame, and a second pivot whereby said pitman-like member is connected to said first-mentioned links to flex the same when said tool-bar is being raised, thereby augmenting the raising action of the parts whereby the tool-bar is operated.

6. In a machine of the class described, the combination of a tool-bar, a machine-frame, a head formed thereon to guide said tool-bar, side bars pivoted to said head, a piston-chamber, a piston therein, a rod connecting said

piston and said side bars, a plurality of links connecting said tool-bar to the connecting-rod of the piston; and a member having a fixed pivot at one end and connections at the other end to at least one of said plurality of links for the purpose described.

7. In a machine of the class described, the combination of a machine-frame, a tool-bar reciprocating therein, revolving side bars pivoted to said frame, means for revolving said side bars, and a self-operating toggle mechanism two of the members whereof form the connection between said side bars and said tool-bar, and the third or pitman-like member whereof has a fixed pivot at one end and is connected at the other end to at least one of said first two toggle members.

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