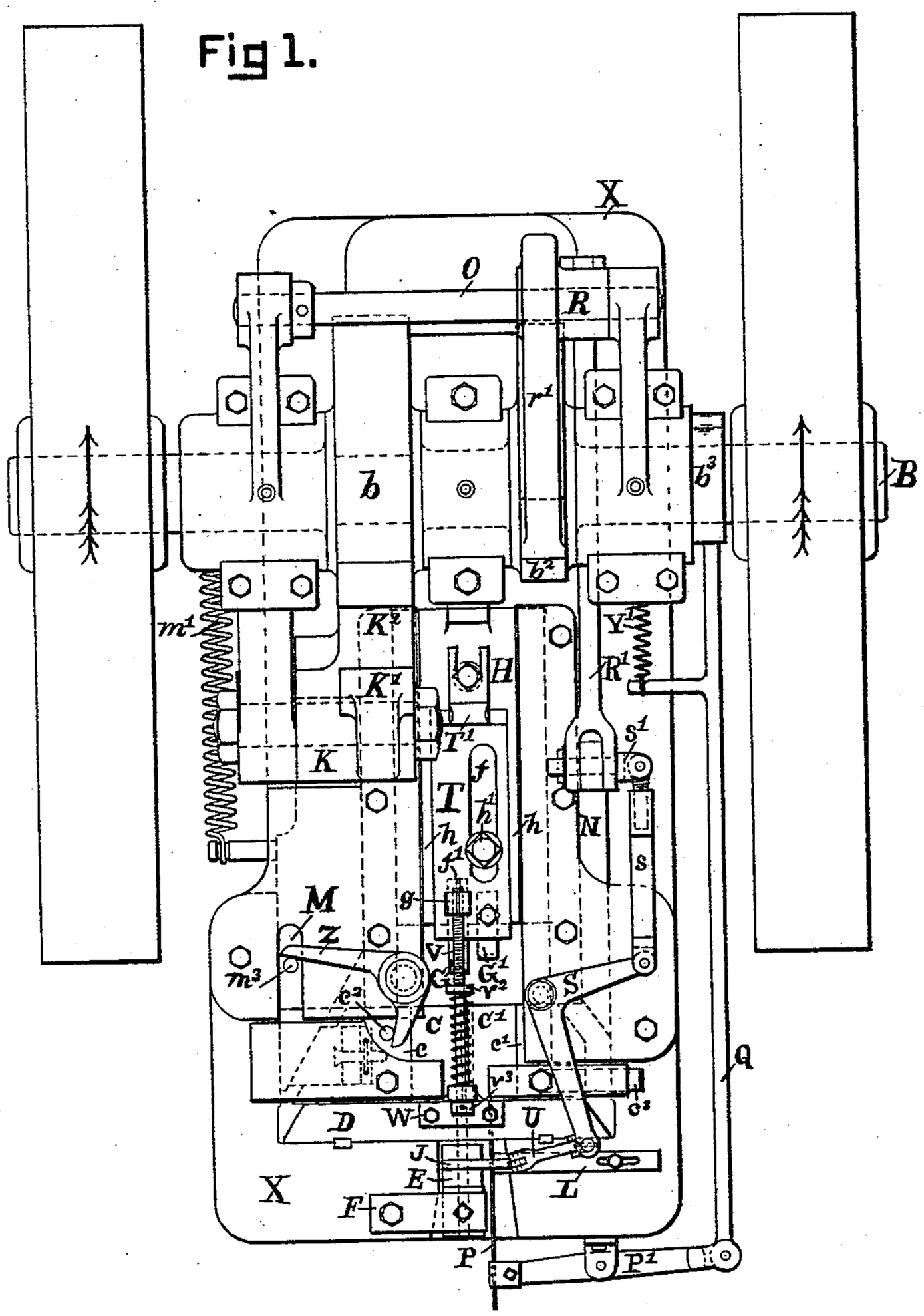
(No Model.) 5 Sheets—Sheet 1.

C. S. SEATON & F. MILLER.

MACHINE FOR HEADING BOLTS OR RIVETS.

No. 458,240. Patented Aug. 25, 1891.

Fig 1.



WITNESSES.

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(No Model.) 5 Sheets—Sheet 2.

C. S. SEATON & F. MILLER.

MACHINE FOR HEADING BOLTS OR RIVETS.

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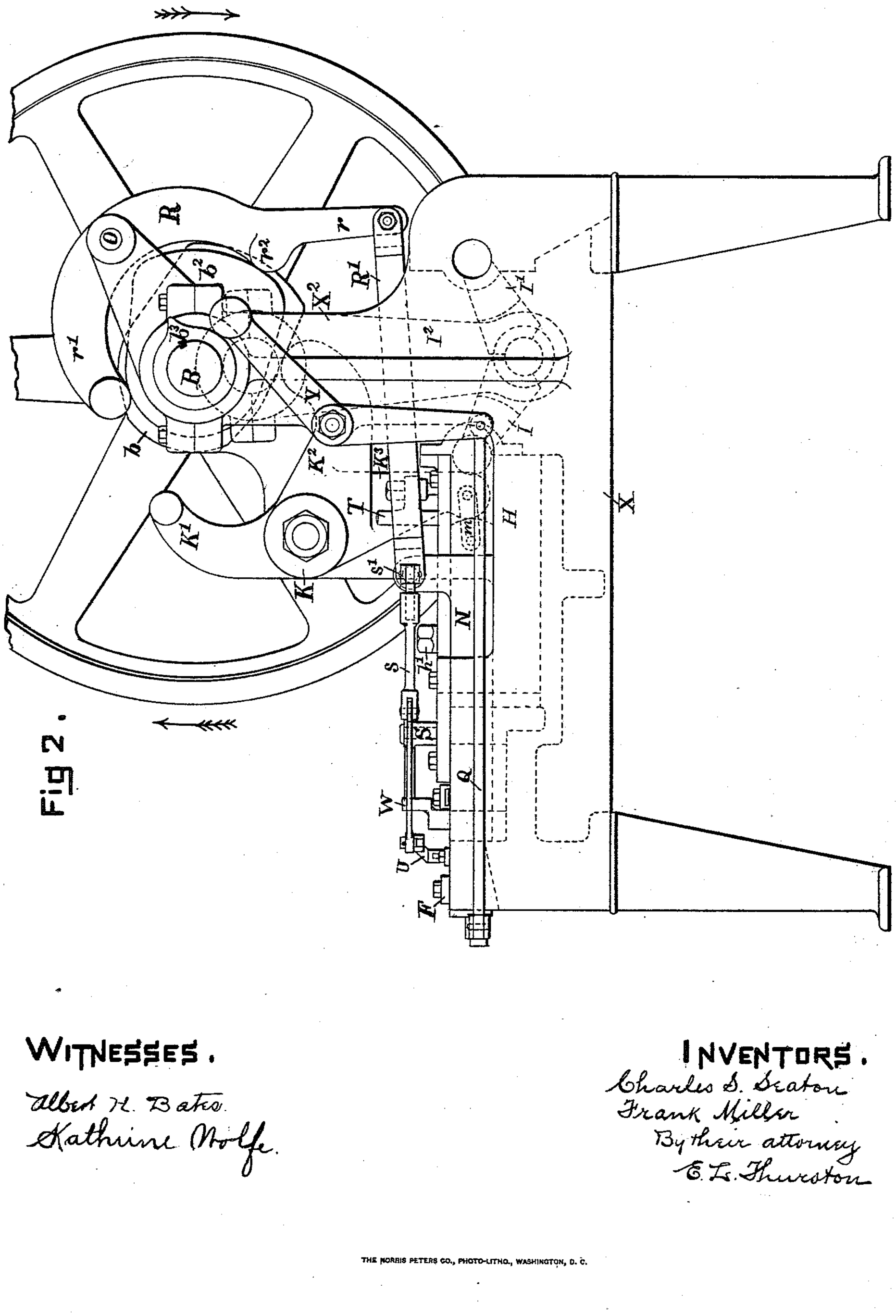

Fig 2.

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(No Model.) 5 Sheets—Sheet 3.

C. S. SEATON & F. MILLER.

MACHINE FOR HEADING BOLTS OR RIVETS.

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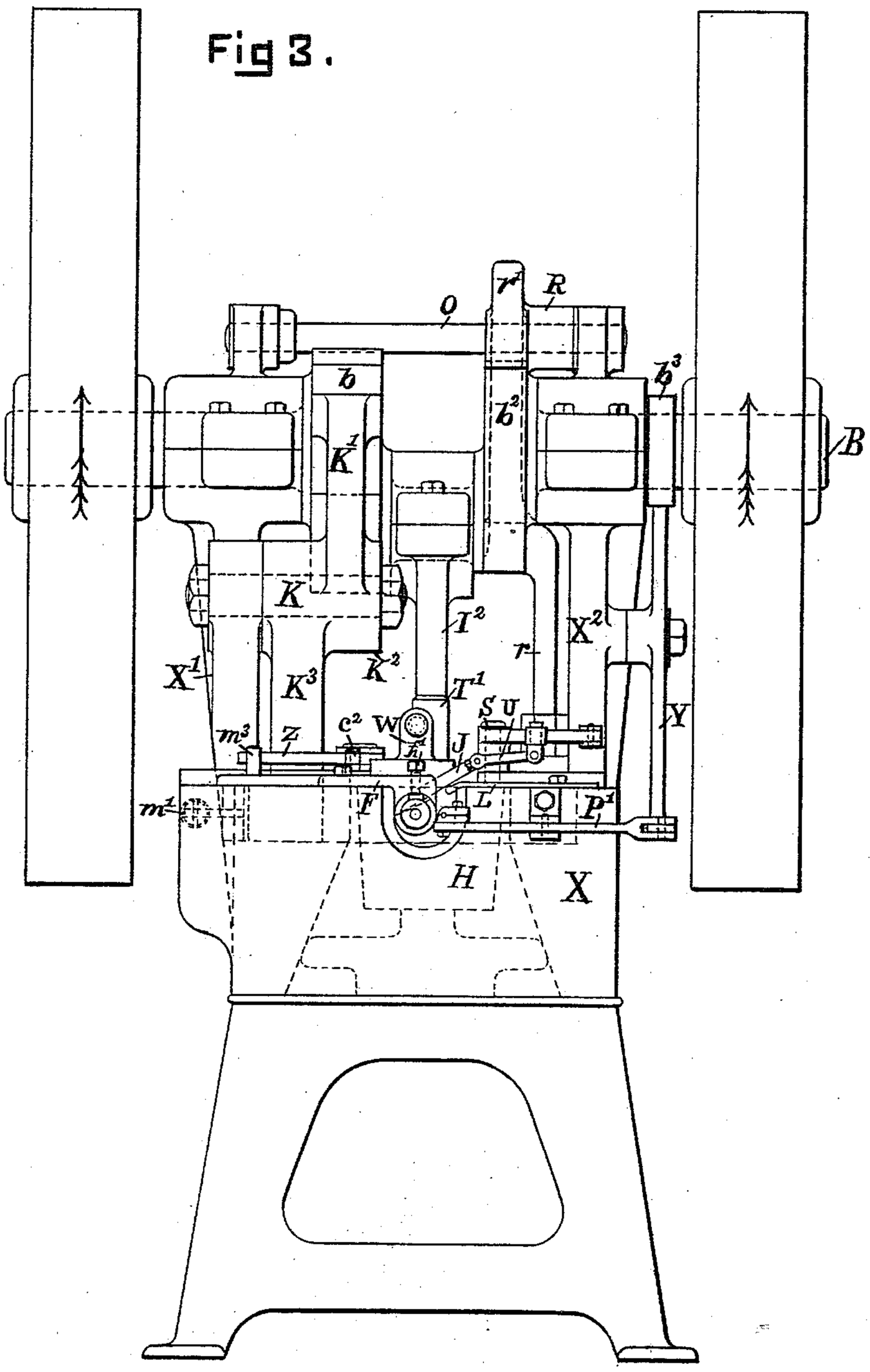
Fig 3.



WITNESSES.

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(No Model.) 5 Sheets—Sheet 4.

C. S. SEATON & F. MILLER.

MACHINE FOR HEADING BOLTS OR RIVETS.

No. 458,240. Patented Aug. 25, 1891.

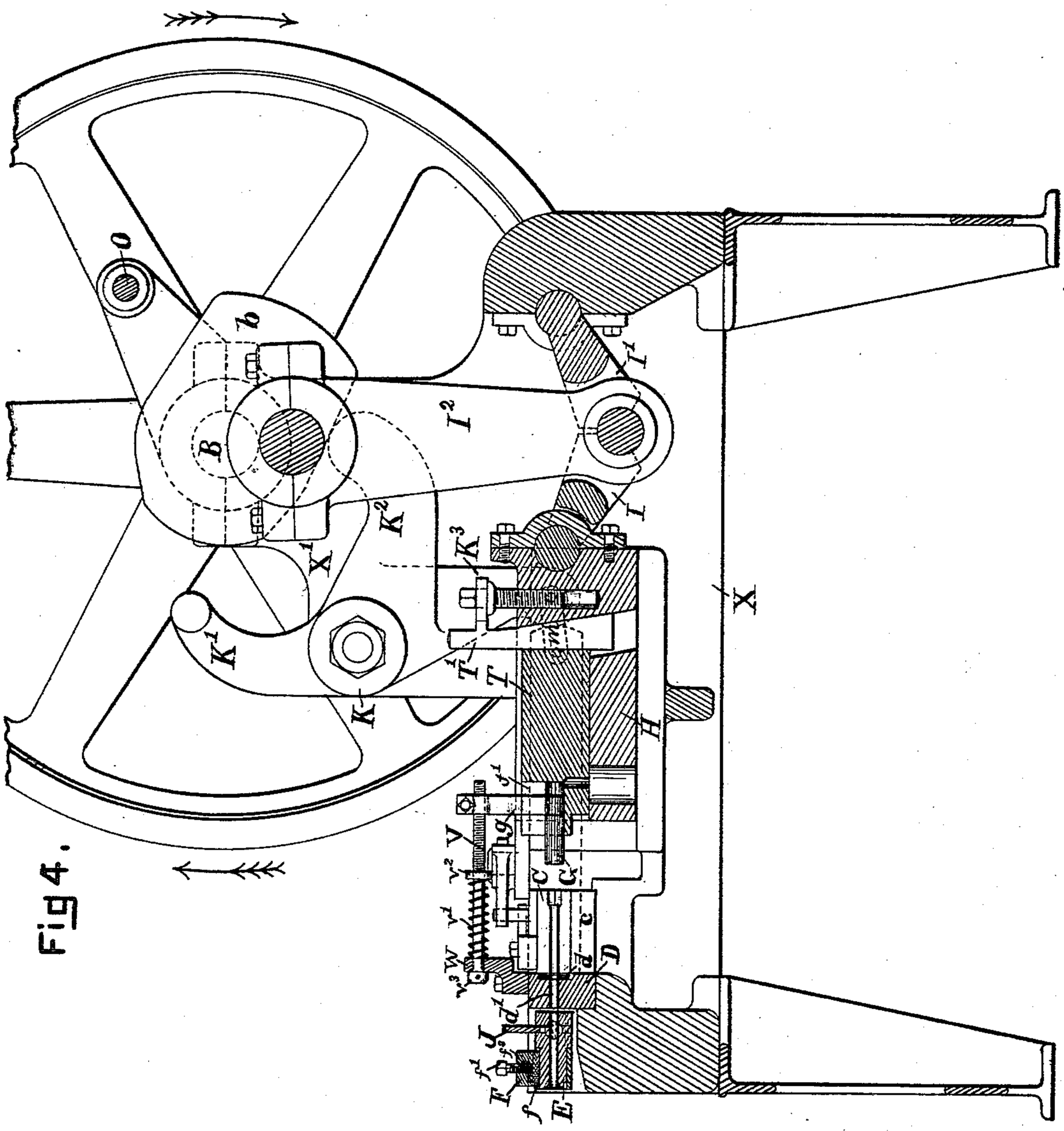

Fig 4.

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(No Model.) 5 Sheets—Sheet 5.

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MACHINE FOR HEADING BOLTS OR RIVETS.

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Fig 6.

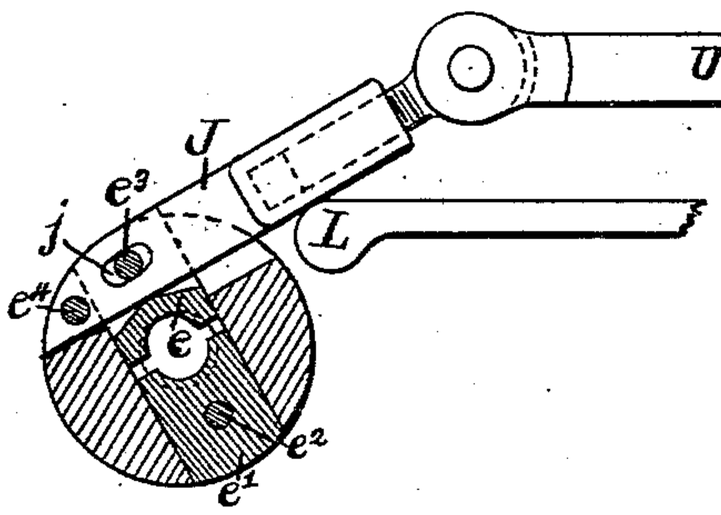


Fig 7.

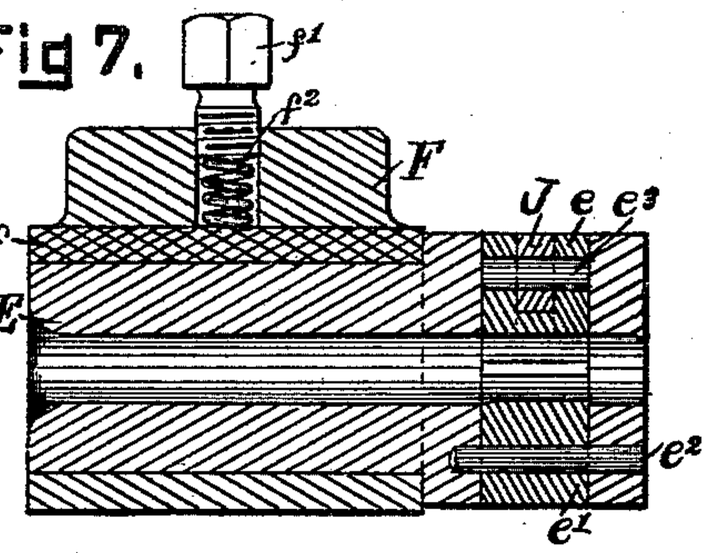
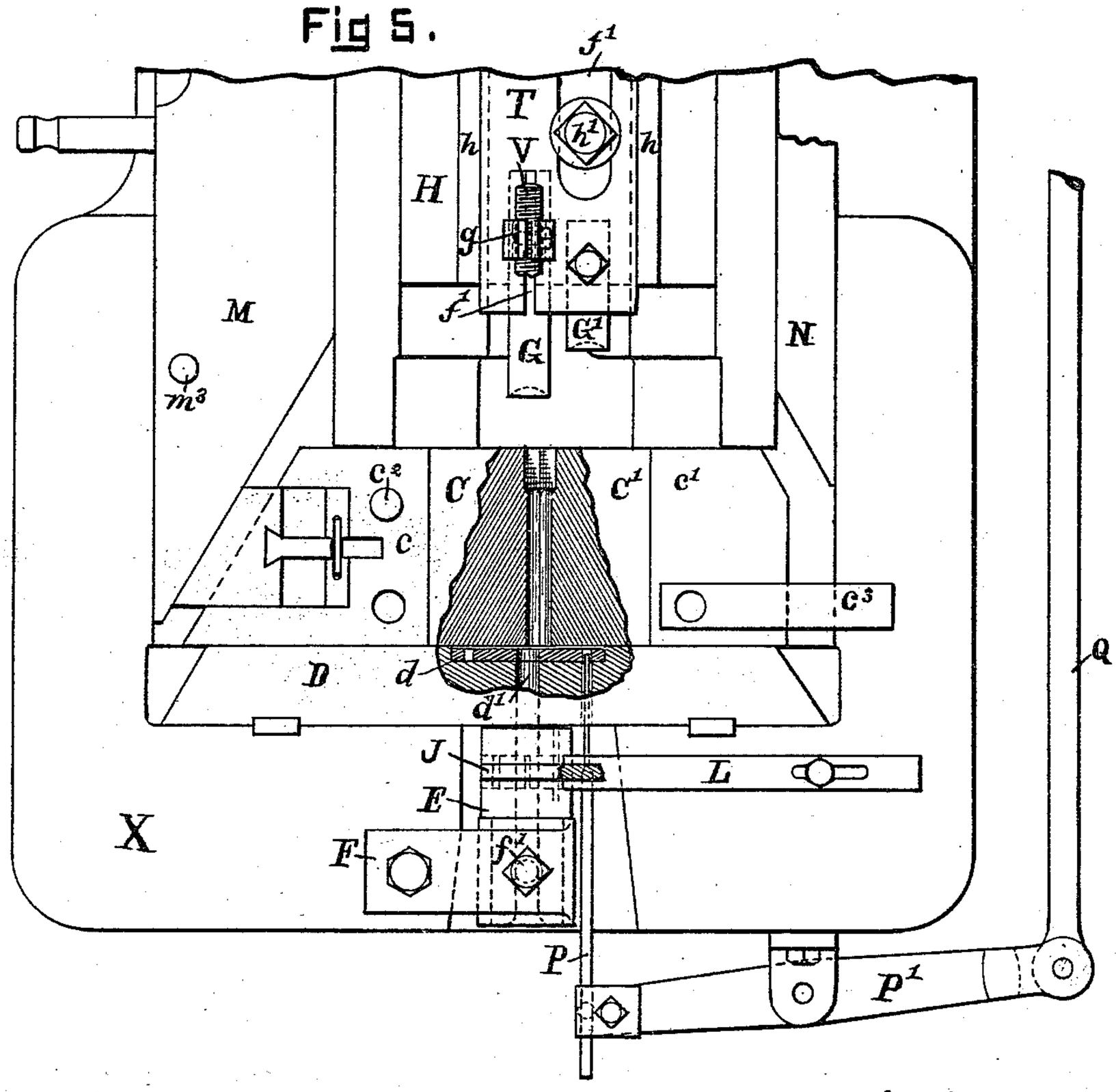


Fig 5.



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UNITED STATES PATENT OFFICE.

CHARLES S. SEATON AND FRANK MILLER, OF CLEVELAND, OHIO, ASSIGNORS TO SAID SEATON AND JOHN A. SEATON, OF SAME PLACE.

MACHINE FOR HEADING BOLTS OR RIVETS.

SPECIFICATION forming part of Letters Patent No. 458,240, dated August 25, 1891.

Application filed October 20, 1890. Serial No. 368,683. (No model.)

To all whom it may concern:

Be it known that we, CHARLES S. SEATON and FRANK MILLER, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Bolt or Rivet Heading Machines, of which the following is a specification, reference being had to the accompanying drawings.

The primary object of our invention is to reduce the cost of heading bolts or rivets, and especially to reduce the cost of heading the kind of bolts commonly known as "carriage-bolts"—that is to say, bolts which have a button-shaped head and a square shank for a short distance just behind the head—although much of the novel mechanism herein described is equally adapted to use in machines designed to make other kinds of bolts or rivets.

In the manufacture of certain kinds of bolts—for example, carriage-bolts—it is desirable to first upset the head by one or more blows from a heading-die, then to turn the unfinished bolt partly around, and finally to finish it by one or more blows from a heading-die.

In all prior machines in which it is possible to make bolts in the above-described manner it is necessary to turn the bolt by hand, so to speak, after the upsetting-blow is struck, and before the final or finishing blow is struck. This turning of the bolt is known in this art as "tonging," and it can only be done by a skilled artisan.

In the prior machines in which it is possible to turn the bolt, even by hand, the final or finishing blow is struck by the same heading-die which first upsets the head; but it is clear that the best results would be obtained by the employment of two dies, which, preferably, are slightly different in form to adapt them to perform their slightly-different functions.

In all prior machines in which bolts may be made by the several operations above pointed out it is necessary to first cut the rod on a separate machine into suitable lengths for convenient manipulation. Sometimes the rods used are of a length to make a single bolt; sometimes they are of a suitable length to make two bolts, and a head is formed on both ends thereof, after which the rod is cut in the middle on a separate machine. In no prior bolt-heading machine which permits of the turning of the bolt-rod is the bolt automatically cut from the long rod, either before or after the head is formed thereon.

Our invention herein described is an improvement on all prior machines in all of the particulars above pointed out, as well as in certain other particulars which will be hereinafter named, and the sum of the several improvements definitely pointed out in the claims is an automatic machine into which a rod of any length may be fed, which will upset the head with one heading-die, turn the rod, finish the bolt by a blow from a second heading-die, cut the bolt from the rod, and eject the finished bolt without any work by the attendant other than to feed the rod to a stop-gage.

Our invention consists in the novel construction, combinations, and sub-combinations of parts, which contribute to new results above pointed out both separately and in combination with each other, all of which will be definitely pointed out in the claims.

In the drawings, Figure 1 is a plan view of the machine. Fig. 2 is a side elevation. Fig. 3 is a front end view. Fig. 4 is a longitudinal vertical sectional view. Fig. 5 is an enlarged plan of the front end of the machine, from which some of the parts shown in Fig. 1 have been omitted. Fig. 6 is a transverse sectional view of the rod-turning device, and Fig. 7 is a central longitudinal section of the same part of the machine.

We will now proceed to describe in detail the complete machine embodying our invention, which the drawings show.

Referring now to the parts by letter, X represents the bed of the machine, having at its sides and near the rear end the standards X′ X^2, which support the driving-shaft B and other parts of the mechanism, to be hereinafter designated, in the proper position above the bed. Near the center of the bed are longitudinal guideways, in which the cross-head H slides backward and forward. The heading-dies G G′ are secured to the forward end of the cross-head by suitable mechanism in

substantially the same horizontal plane, whereby they are adapted to deliver successive blows on the same bolt during its formation.

One link I of a toggle is pivoted to the rear end of the cross-head H and the other link I′ is pivoted to the rear part of the bed in substantially the same horizontal plane. At about the middle of the shaft B is a double crank, to the wrist-pin of which a link I^2 is pivoted, the lower end of said link being pivotally connected to the joint of the toggle above mentioned. The wrist-pin of the crank is shown in the drawings at the lowest point of its movement. As it in revolving moves upward, the toggle is straightened, and when its central pivot or joint is in line with the two end pivots the cross-head is at the extreme forward end of its path of travel. A further revolution of the crank draws the toggle-joint above the central line, thereby causing the cross-head to move backward. It is clear from the above description that during each revolution of the shaft B the cross-head moves forward and backward twice.

At the front end of the bed X are transverse guideways, in which the independently-movable carriages *c c′* are guided in their movement to and fro across the machine for the purpose and by the mechanism hereinafter described.

C C′ represent the holding-dies, which are provided upon their proximate faces with horizontal grooves, which when the dies are closed form a socket, in which the bolt-rod is held. These holding-dies are secured to the carriages by any suitable means and move with said carriages. It is not claimed that there is anything novel in the construction of either the dies or carriages or in the manner of their connection with each other. The construction and connection of these parts, which are shown in the drawings, are substantially the same as the construction and connection of the movable die and carriage shown in my allowed application, Serial No. 345,196.

Each of the carriages *c c′* is beveled or inclined on its outer side, as shown most clearly in Figs. 1 and 5. A bar M, longitudinally movable in a suitable groove in one side of the bed, has a beveled end, which is adapted to engage with the beveled side of the carriage *c*, whereby when the bar M is moved forward—that is, toward the front or feed end of the machine—said carriage and the holding-die which it carries are moved inward or toward the other holding-die C′. The outer side of the carriage *c′*, to which the die C′ is attached, is also beveled substantially as shown, whereby the bar N, which is provided with a beveled front end, is adapted to engage with it during the forward motion of the said bar N, and thus crowd the carriage and the die which it carries inward or toward the die C.

Extending transversely across the machine and abutting the front ends of the dies C C′ is a plate D, in the face of which a cutting-plate *d* is inserted and secured. A feed-orifice *d′* extends through the plate D and cutting-plate *d*. The front ends of the dies C C′ abut against said plate D, and the edge of the cutting-plate *d* around the feed-orifice acts, in combination with the edge of the die C, to shear off the part of the rod which is to form the body of the bolt then being headed.

The front end of the bed is cut away directly in front of the feed-orifice *d′*, above mentioned, and in the space thus provided the automatic rod-turning device and ejecting-hammer hereinafter described are placed.

Securely bolted or otherwise rigidly secured to the bed and extending into the opening in the bed above referred to is a bracket F, in which is formed the bearing in which the turning device is supported. This turning device consists of a sleeve E, having a central feed-orifice. One end of this sleeve is mounted in the bracket F, as is clearly shown in Fig. 7. A friction-block *f* is inserted between the sleeve E and the bracket F, by means of which sufficient friction may be applied to the sleeve to prevent its movement until the clamp *e* has been moved, as described. A set-screw *f′*, passing through the bracket F, presses endwise against the spring f^2, which bears against the friction-block *f*, whereby the friction on the sleeve may be varied to suit the exigencies of the case. In that part of the sleeve E which lies outside of the bracket are inserted the clamps *e e′*, of which the latter (and lower) clamp is securely fastened to the sleeve by the pin e^2 or other appropriate instrumentality. The other clamp is radially movable toward and from its fellow, whereby the rod passing through the feed-orifice in the sleeve is clamped and released in the manner hereinafter described. The sleeve E and the outer end of the clamp *e* are slotted transversely, and the lever J plays in these slots. One end of the lever J is pivoted to the sleeve E by the pin e^4, and a pin e^3, secured to the clamp *e*, passes through the slot *j* in the lever J.

K represents a bell-crank lever having three arms *k′* k^2 k^3, which is pivoted to the standard X′. Its lower arm k^3 is connected by means of the link *m* to the rear end of the bar M. Its two upper arms *k′* k^2 engage with a cam *b*, which is formed on the periphery of the left-hand crank-disk in its revolution on the shaft B. When this cam engages with the arm *k′*, the lever is rocked on its pivot and the bar M is driven forward. When the cam engages with the arm k^2, the lever is rocked in the opposite direction and the backward movement of said bar is produced. A spring *m′*, connected at one end with the bar M and at its opposite end with the bed X, also exerts a continuous force, which co-operates with the lever *k* to draw the bar backward. The mechanism for actuating the bar N consists, also, of a three-armed lever R, which is loosely pivoted on a rod O, which is supported

at its ends in the standards X′ X². The engagement of the cam b^2 (which is formed on the periphery of the right-hand crank-disk on the shaft B) with the arm r' rocks the lever in one direction. Its engagement with the arm r^2 rocks it in the opposite direction. The lower arm r of said lever is connected by the link R′ with the vertical ear n on the bar N. The rocking of the lever R therefore causes the backward-and-forward movement of the bar N.

The rod-turning device is operated by the following mechanism, to wit: A bell-crank lever S is pivoted to the bed X. A link s is connected at one end to one arm of the bell-crank and at the other end to the bar N. The means for making this last-named connection is as follows: The pin s', by means of which the link R is connected with the ear n, extends sidewise, as shown, and its end is slotted. A screw-eye is pivoted in said slot and screws into the end of the link s. A link U is connected by universal joints with the bell-crank at one end and the lever J at the other.

Z represents a bell-crank lever loosely pivoted to the bed X. One arm engages with a pin m^3 on the bar M and the other end with a pin c^2 on carriage c, whereby the backward movement of the bar M causes the backward movement of the carriage c.

In order to regulate the feed in the above-described machine, the following mechanism, which can be most clearly seen in Figs. 4 and 1, is provided: T represents a block to which the heading-dies are connected and which is itself secured to the cross-head. This block sets between the two side flanges h h of the cross-head H and rests upon the bottom of said cross-head, to which it is fastened by a bolt h', which passes through a slot t. The rear end of the block abuts against an adjustable wedge T′. In the front end of this block is a socket in which the heading-tool G, which first acts upon the rod, is placed. This heading-tool is rigidly secured to a stem g, which enters the socket through a longitudinal slot t' in the block T. Into the upper end of this stem g the rod V screws. Thus the stem g can be secured at any desired point in the length of the rod V. The outer end of the rod is supported by a stationary bracket W, through which it loosely passes. A spring v' surrounds the rod and thrusts endwise against the bracket W at one end and the shoulder v^2 on the rod at the other end. Thus the spring always draws the rod as far through the bracket as its head v^3 will permit. The rod from which the bolt is to be made is fed into the machine until it is stopped by its engagement with the heading-tool G. Thus by screwing the rod out of or into the stem g a longer or shorter piece of the bolt-rod is provided for the head of the bolt. As the cross-head moves back, the heading-tool is moved back by the spring until stopped by the engagement of the head v^3 with the bracket W. As the cross-head moves forward, the heading-die remains stationary until its rear end is struck by the rear end of its socket, whereupon it is moved forward to deliver the blow which upsets the end of the rod.

The mode of operation of the machine is substantially as follows: The rod from which a bolt is to be made is fed into the machine through the feed-orifices in the sleeve E and bar D until it is stopped by its engagement with the heading-die C. The forward movement of the bar N moves the carriage c' forward until the groove in the face of the holding-die C′ is in line with the feed-orifices. The bar M is moved forward, thereby moving the carriage c until the rod is grasped between the dies C C′. The toggle is straightened by the downward movement of the crank-pin on the shaft B, which causes the forward movement of the cross-head H and the delivery of the first or upsetting blow. As the shaft B continues to revolve, the cross-head is drawn backward by the downward movement of the toggle-joint. While this movement is taking place the wedge-bar M is moved backward very slightly, thereby causing the holding-die C to move backward a very short distance. The wedge-bar N is also drawn backward, so that the carriage c' and the holding-die C′, which it carries, may be moved, as hereinafter pointed out. As the bar N is moved backward, the bell-crank lever S is caused to oscillate by its connection with said bar by means of the link s. This movement of the bell-crank lever S pulls through the link U upon the lever J. The first effect of the movement of the lever J is to move the clamp e inward and thus grasp the rod between the two clamps e e'. A further movement of the lever J causes the sleeve to revolve in its bearing, turning the bolt-rod with it. When the rod has been turned enough, the lever J strikes against the end of the adjustable stop L, which throws the clamp e upward and releases the rod. Instantly the cam b acts upon the arm k', moving it downward, and thereby, through the connecting mechanism above described, causes the wedge-bar M to move forward, its beveled edge bearing against the beveled back of the carriage c, whereby said carriage and the holding-die C, which it carries, is moved toward the right. By this movement this rod is once more grasped between the two dies. The carriage c continues to move in this same direction, thereby pushing the carriage c' ahead of it, the rod being carried by the dies C C′ until it is in the position to be struck by the heading-tool G′, when the carriage c' is stopped by its engagement with the bed X at the end of the guideway in which said carriage moves. During this movement the half-formed bolt has been sheared from the rod by the edges of the cutting-die d and the holding-die C. A flat spring c^3, attached to the carriage c', presses upon the bed X, the purpose of the spring being to prevent any sudden movement of the carriage c' when

the carriage *c* is moved against it, as last above described. The center pivot of the toggle is then pulled upward and the header G′ delivers its blow upon the partially-formed bolt and thus completes it and is withdrawn by the backward movement of the cross-head. Almost immediately after this blow has been delivered the wedge-bar M is moved backward by the engagement of the cam *b* with the arm *k′* of the three-armed lever K, the spring *m′* assisting and completing the complete backward motion of said bar M. As this bar M moves backward, the bell-crank lever Z, pivoted to the bed, is caused to oscillate on its pivot by means of the vertical pin m^2 on the bar M, which engages with one arm thereof. The other arm of the bell-crank lever engages with a pin c^2 on the carriage *c*, thereby drawing said carriage to the left. This completes the movement of the parts heretofore described. They have again returned to the position in which they were when we began the description of their action.

Just previous to the beginning of the movement of the holding-die C′ toward the left, as explained, the ejecting-hammer strikes a quick sharp blow against the end of the completed bolt, causing it to be released from the engagement with said die. The ejecting-hammer is a rod P, passing through a suitable orifice on the bar D and cutting-plate *d*, directly in line with the heading-die C′. Its rear end is connected with one arm of the lever P′, which is pivoted to the bed. The other arm of said lever is connected by means of a link Q with one arm of the bell-crank lever Y, which is pivoted to the standard X^2. The other arm of the bell-crank lever is in a position to be struck by the quick-acting cam b^3 on the shaft B. A spring Y′, connected at its ends, respectively, with the link Q and the bed, causes the withdrawal of the ejecting-hammer after it has accomplished its purpose.

Having thus described our invention, we claim—

1. In a bolt or rivet heading machine, a cross-head reciprocating in fixed longitudinal guideways and two heading-dies secured to said cross-head and thereby movable in straight longitudinal paths, combined with transversely-moving holding-dies having a socket adapted to hold the bolt-rod, said holding-dies being movable transversely in the plane of said two heading-dies, substantially as and for the purpose specified.

2. In a bolt or rivet heading machine, in combination, a reciprocating cross-head, two heading-dies secured thereto, two transversely-movable holding-dies having grooves in their proximate faces, which, when the dies are in contact, form a socket for holding the bolt-rod, a plate having a feed-orifice in line with one heading-die, against which the front ends of said holding-dies abut, and mechanisms for moving said holding-dies to a point where their grooves are in line with said feed-orifice and with one heading-die and for moving said holding-dies while in contact to a point where the said socket is in line with the other heading-die, substantially as and for the purpose specified.

3. In a bolt or rivet heading machine, in combination, a reciprocating cross-head having two heading-dies secured thereto in substantially the same horizontal plane, a bar having a feed-orifice in line with one heading-die, two transversely-movable holding-dies having their front ends abutting said bar, a sleeve journaled behind the bar and in line with the feed-orifice, clamps connected with said sleeve and adapted to grasp and release a rod passing through the sleeve, and suitable mechanism for oscillating said sleeve and operating said clamps, substantially as and for the purpose specified.

4. In a bolt or rivet heading machine, in combination, a reciprocating cross-head having two heading-dies secured thereto in substantially the same horizontal plane, two transversely-movable holding-dies having grooves on their proximate faces, which, when said dies are in contact, form a socket for holding the bolt-rod, a transverse bar abutting the front end of said holding-dies and having a feed-orifice, mechanism, first, for moving said dies to grasp the rod when fed through said feed-opening; second, for moving said holding-dies apart temporarily after the upsetting blow is struck by one heading-die, and, third, for moving the said dies into contact and while in contact to a point where the socket is in line with the second heading-die, a sleeve journaled directly in front of the feed-orifice, and mechanism for rigidly clamping the rod in said sleeve and for turning said sleeve in its bearing in the interval during which said holding-dies are temporarily separated, substantially as and for the purpose specified.

5. In a bolt or rivet heading machine, in combination, a sleeve suitably journaled in line with the feed-orifice, having a stationary clamp and a radially-movable clamp, a lever pivotally connected with said sleeve and engaging with said movable clamp, and suitable mechanism for actuating said lever, substantially as and for the purpose specified.

6. The combination of the sleeve E, mounted in a suitable bearing F, a fixed clamp *e′*, a radially-movable clamp *e*, a lever J, pivoted to the sleeve and having a slot *j*, a pin e^3, passing through the slot and fastened to the clamp *e*, suitable mechanism for operating said lever, and the stop L, substantially as and for the purpose specified.

7. The combination of sleeve E, the bracket F, adjustable friction-block *f*, a movable clamp *e*, lever J, pivoted to said sleeve, having slot *j*, pin e^3, and mechanism for actuating said lever, substantially as and for the purpose specified.

8. The combination of the sleeve E, mounted in a suitable bearing F, a movable clamp *e*, a lever J, pivoted to the sleeve and con-

nected by a pin and slot with said clamp, a bell-crank lever S, the link V, connected by universal joints with the levers S and J, and mechanism for actuating said lever S, substantially as and for the purpose specified.

9. In a bolt or rivet heading machine, a reciprocating cross-head having a socket in its forward end in line with the feed-orifice of the machine and a heading-tool loosely fitted into said socket, as described, and movable in a straight path to and from said feed-orifice, combined with adjustable mechanism engaging with said heading-tool and adapted to stop and temporarily hold it at a suitable distance from said feed-orifice, whereby said heading-tool serves as the stock-gage, substantially as specified.

10. In a bolt or rivet heading machine, in combination, a heading-die, a reciprocating cross-head having at its forward end a socket in which the end of said die is fitted, as described, and having a vertical longitudinal slot, a stem passing into said slot and rigidly connected with said die, a sliding rod connected with said stem, a stop adapted to limit the rearward movement of said rod, and a spring for moving it to said stop, substantially as and for the purpose specified.

11. In a bolt or rivet heading machine, in combination, the reciprocating cross-head having a socket in its forward end and a longitudinal vertical slot extending from said socket, a heading-die in said socket, a stem lying in said slot and having its lower end secured to said die, a longitudinally-movable rod, means for adjustably securing the upper end of said stem to said rod, a rigid bracket through which said rod slides, shoulders on said rod on both sides of said bracket, and a spring thrusting against said bracket and the rear shoulder on the rod, substantially as and for the purpose specified.

12. In a bolt or rivet heading machine, in combination, a bed having a transverse guideway, a carriage *c'*, having a holding-die C' secured thereto and movable in said guideway, mechanism for moving said carriage inward and other mechanism pressing directly against said die for moving it outward, and a spring adapted to apply friction to said carriage to prevent its sudden movement in either direction, substantially as and for the purpose specified.

13. In a bolt or rivet heading machine, in combination, a transversely-movable carriage carrying a holding-die and having an inclined surface on its outer side, a longitudinally-movable bar having an inclined surface at its forward end, a shaft, a cam on the shaft, and a rocking lever engaging with said cam and suitably connected with said bar, substantially as and for the purpose specified.

14. In a bolt or rivet heading machine, in combination, a transversely-movable carriage carrying a holding-die, a longitudinally-movable bar, a shaft, a cam on said shaft, a three-armed lever, two arms of which engage with said cam, a link connecting the third arm with said bar, and connecting mechanism between said bar and carriage whereby the forward movement of said bar moves said carriage, substantially as and for the purpose specified.

15. In a bolt or rivet heading machine, in combination, a reciprocating cross-head having two heading-dies secured thereto in substantially the same horizontal plane, two longitudinally-movable bars having beveled forward ends, two transversely-movable carriages having beveled outer sides, a holding-die secured to each carriage, a transverse bar having a feed-orifice against which the forward ends of said holding-dies abut, a shaft, two cams, and two three-armed rocking levers each engaging with one cam and one longitudinally-movable bar, substantially as and for the purpose specified.

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