

(No Model.)

2 Sheets—Sheet 1.

H. J. JOHNSON.

MACHINE FOR FORGING BOLT BLANKS.

No. 330,901.

Patented Nov. 24, 1885.

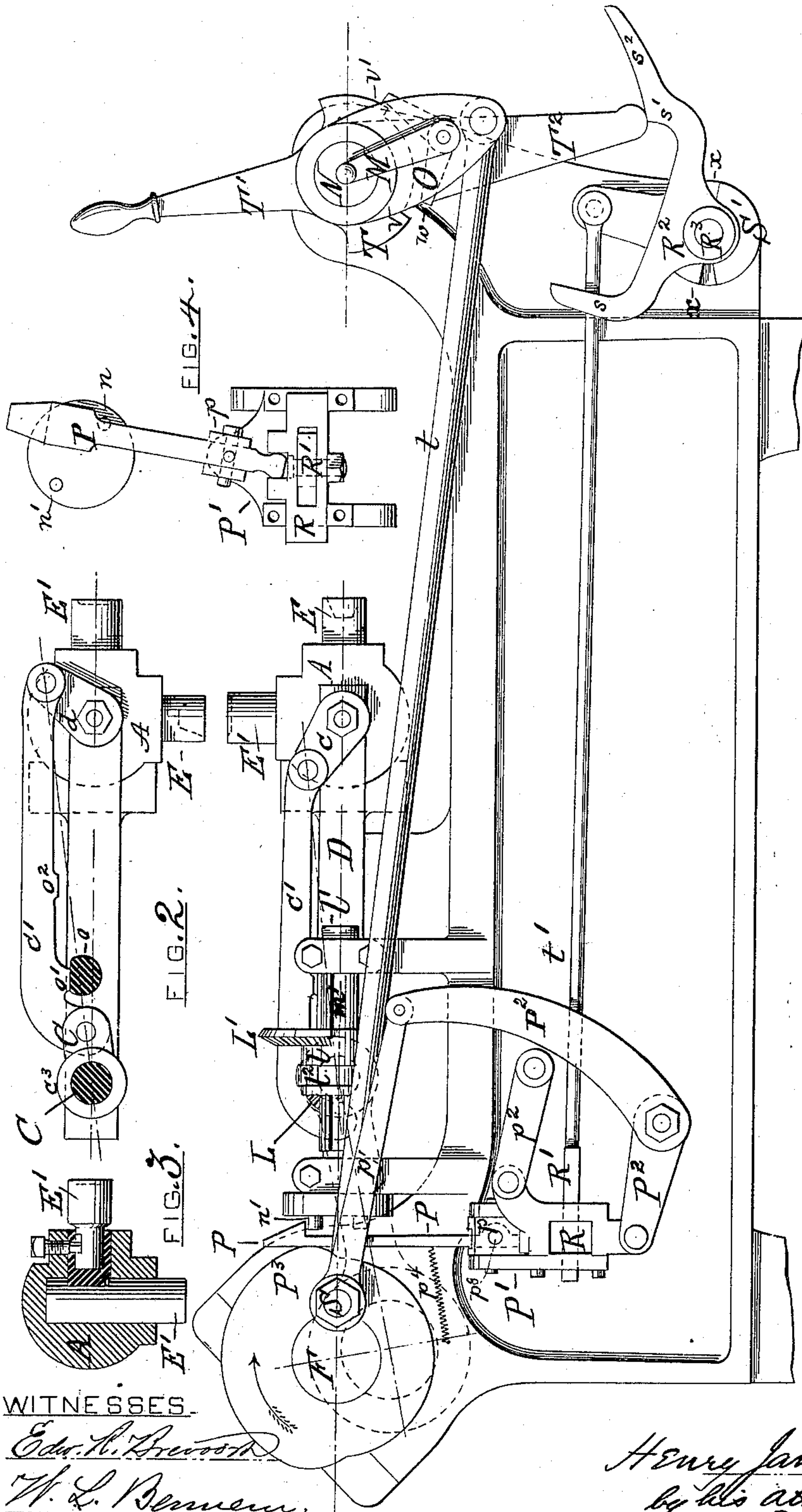


FIG. 1.



FIG. 5.

WITNESSES.

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(No Model.)

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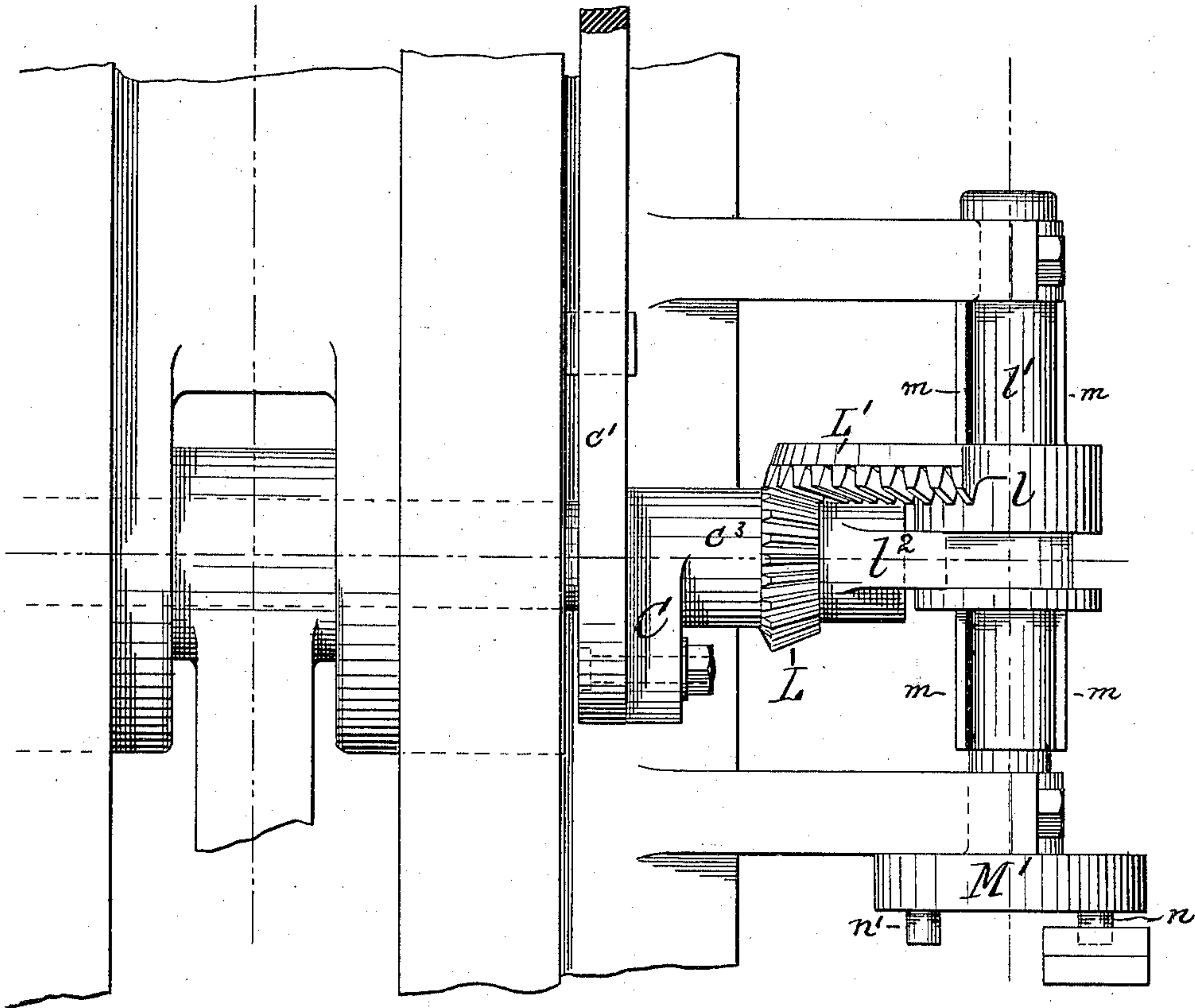


FIG. 6.

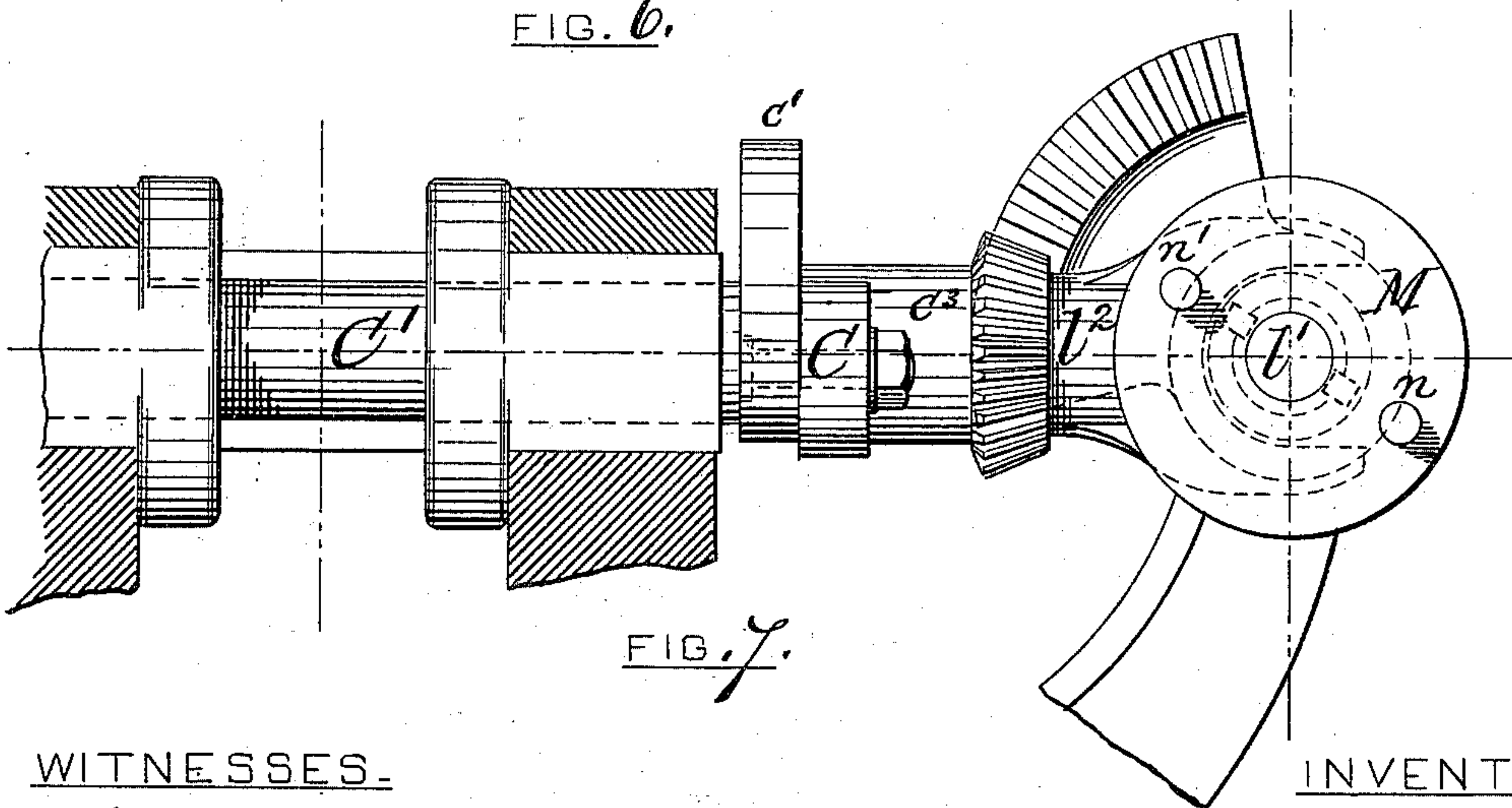


FIG. 7.

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UNITED STATES PATENT OFFICE.

HENRY JAMES JOHNSON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO
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MACHINE FOR FORGING BOLT-BLANKS.

SPECIFICATION forming part of Letters Patent No. 330,901, dated November 24, 1885.

Application filed July 12, 1884. Renewed July 22, 1885. Serial No. 172,345. (No model.)

To all whom it may concern:

Be it known that I, HENRY JAMES JOHNSON, of the city and county of Providence and State of Rhode Island, have made an invention of certain new and useful Improvements in Machines for Forging Bolt-Blanks, the Bars of Monkey-Wrenches, and Similar Articles; and I do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

This invention has reference to the forging of heads upon blanks by the operation of two upsetting heading-tools acting in combination with lateral forging-dies, and its object is to enable the attendant to control the shifting of the heading-tools while the machine is in operation, so that as many blows may be struck by the finishing heading-tool as the attendant deems expedient, and that the first blow will be struck by the first heading or upsetting tool.

The invention consists of certain combinations of mechanical devices, which are recited in detail at the close of this specification.

In order that my improvements may be fully understood, I have represented in the accompanying drawings and will proceed to describe parts of a machine in which I have embodied them in the best manner at present known to me.

Figure 1 represents a side view of certain parts of the machine, the residue being removed to enable the construction to be more readily understood. Figs. 2 to 7, inclusive, represent parts of the machine designated by the same letters as the same parts are in Fig 1.

The machine of which the devices represented in the above-mentioned drawings are parts is constructed in other respects substantially as described and represented in the patent granted to Orrin Clark Burdick the 28th day of September, A. D. 1875, No. 168,135. With the machine of that patent the heads are forged upon stems or blanks by the operation of a reciprocating heading-tool and lateral forging-tools, to which the blank is presented by means of a blank-carriage. In that machine there is but one heading-tool, which is moved by a reciprocating piston.

The piston D, which I have represented in my drawings, corresponds with the piston of the said Burdick patent; but instead of the said piston carrying and operating a single heading-tool, (as it does in said Burdick patent machine,) it carries two, E E'. The first of these heading-tools has a socket in it, and it is used to make the first blow upon the blank and to upset the metal and form a crude conoidal or pyramidal head ready for the subsequent work of the finishing heading-tool and lateral forging-dies. The second heading-tool, E', is used to finish the head upset by the action of the first heading-tool, E. In the present example the two heading-tools are of the form required to forge the heads of machine-bolts from blanks of the size of their round stems. When the machine is used for other articles, the forms of the heading-tools must be suited to the article to be forged, as is well understood by the users of such machines. The said two heading-tools are both secured to a shifting tool-holder, A, which in this case is fitted to turn upon trunnions, by which it is connected with the reciprocating piston D, the said trunnions passing through ears or cheeks, which protrude at the sides of the piston, and the shifting tool-holder is turned upon the axis of its trunnions to place one or the other heading-tool in its position for operating upon the blank to be forged.

The blank-carriage which is used in the machine is constructed and operated as described in the said Burdick patent, N being the rock-shaft, which is turned to advance and withdraw the blank-carriage. T' is the hand-lever by which the carriage may be moved by hand, and O is the vibrating frame, which is used to operate the rock-shaft N by the driving-shaft F of the machine, so that the carriage may be moved by power, the said frame O being connected by a rod, t, with a crank-pin, S, secured to the driving-shaft of the machine. The vibrating frame is caused to vibrate continually by the revolution of the driving-shaft, and it is fitted with a double-headed pawl, w, turning upon a pivot in the frame, and fitted to engage with either of two teeth, v v', formed upon the hub T, secured to the rock-shaft. When the pawl is turned by

hand so as to engage with the tooth v , the movement of the pawl by the crank-pin S and vibrating frame O turns the carriage rock-shaft N to advance the blank-carriage, and when the pawl is turned so as to engage with the other tooth, v' , the movement of the pawl turns the rock-shaft backward to withdraw the blank-carriage. The pawl w is held in its mean position without engagement with either tooth by a spring, as described in said Burdict patent, and a starting-handle, M, is provided to turn the pawl in either direction, so that the carriage may be either advanced or withdrawn, as required by the attendant, and when in either position may be left there by letting go the starting-handle, which permits the pawl-spring to restore it to its mean inactive position. The crank-pin S is so set relatively to the cranked part of the driving-shaft which operates the piston D and its heading-tools that the advance of the blank-carriage takes place while the heading-piston D is being drawn back from the blank, so that the heading-tool does not obstruct the presentation of the blank by the blank-carriage.

The shifting of the heading-tools E E' is effected by power, but is determined by the attendant, and in this example simultaneously with the advance and withdrawal of the bolt-carriage. To these ends one of the trunnions of the tool-holder A has a crank, c , secured to it, which is connected by a link, c' , with the pin of a crank, C, that projects from a rocking-sleeve, c^3 , which is fitted to rock upon an extension of the link-pin C' of reciprocating piston D. This rocking sleeve c^3 is fitted with a beveled pinion, L, whose teeth engage with those of a beveled segment, L', whose tubular hub l is compelled to slide upon a rock-shaft, l' , by the action of a fork, l^2 , that is engaged in a groove of the sleeve; but the sleeve is compelled to rock with the rock-shaft l' by means of two splines, m , which are fixed to the shaft and fit loose in grooves in the bore of the tubular segment-hub l . One end of the rock-shaft l' is fitted with a disk, M', from which two pins, n n' , project, so that the rock-shaft l' and rocking sleeve c^3 may be turned in one direction by pulling one of the pins, n , downward, and may be turned in the reverse direction by pulling the other pin, n' , downward. When the pin n is pulled downward, the turning of the rocking sleeve c^3 and its crank C compels the link-rod c' and the shifting tool-holder A to take the positions shown in Fig. 1, with the first heading-tool in its position for operating upon the blank, and when the other pin, n' , is pulled downward the turning of the rocking sleeve c^3 and its crank in the reverse direction compels the link-rod and the shifting tool-holder A to take the positions shown in Fig. 2, with the finishing heading-tool in its position for operating upon the blank.

In order that the rapid movement of the parts may not throw the sleeve-crank C too far in either direction, a stop, o , is secured to the piston D in such a position relatively to

two seats, o' o^2 , formed upon the link-rod c' , that excessive movement of that rod in either direction is prevented by said stop.

In order that either of the pins n n' of the rocking sleeve may be pulled downward, the shifting hook P is provided. It consists of a hook which is connected pivotally to a hook-stock, P', by means of the pivotal box p . This stock is connected by a pivot with one arm of an elbow-lever, P², whose other arm is connected by a link, p' , with the crank-pin S of the driving-shaft. Hence as the driving-shaft revolves the shifting hook P is caused to move up and down. The hook-stock P' is guided by a radius-bar, p^2 , one of whose ends is pivoted to the hook-stock and the other to the frame of the machine.

The pivoting of the shifting hook P to its hook-stock P' by the pivotal box p enables it to be moved laterally to engage with one or the other of the pins n n' of the rocking sleeve, as required. The hook is also connected with the pivotal box by a pivot, p^3 , so that the hook may be forced toward the pins n n' , or withdrawn from them. A spring, p^4 , is provided to withdraw the hook from the pins n n' , and the cam P³ is provided to force the hook toward these pins. This cam is so set relatively to the cranked portion of the driving-shaft F that the cam forces the hook into a position to engage with the pins n n' when the piston D of the heading-tools is being retrograded.

By reason of the above-described connections between the shifting tool-stock P' and the driving-shaft F the rocking sleeve c^3 may be turned in one direction or the other, to shift the heading-tools according as the shifting-hook P is placed in position to draw down one or the other of the pins n n' of the rock-shaft of the said rocking sleeve; and the machine is so constructed that the placing of the hook P in one or other position, and consequently the shifting of the heading-tools, is determined by the attendant. For this purpose the shank of the hook below its pivot is fitted in a slide, R, which is arranged to slide crosswise in the hook-stock P', and the slide is slotted to receive a cam-block, R', having an inclined slot which receives in it a pin, r , secured to the slide R, so that the movement of this cam-block R' endwise in one direction or the other shifts the hook laterally and places it in position to act upon one or other of the pins n n' of the rock-shaft l' . The cam-block R' is connected by a rod, t' , with the upright arm of a rocking crutch, R², which is fitted to vibrate upon a rock-shaft, R³. The two horns of this crutch are within the range of motion of an arm, T², which is secured to the rock-shaft N of the bolt-carriage, so that said arm T², the crutch R², upon which it acts, and the shifting-hook P may be controlled by the hand-lever T' and by the starting-handle M, either of which may be operated by the attendant.

When the bolt-carriage is in its withdrawn position for receiving a bolt-blank, the parts

of the machine occupy the several positions represented at Fig. 1, with the first heading-tool, E, in the position to operate. When a bolt-blank has been introduced into the bolt-carriage, and either the hand-lever T' or the starting-handle M is operated to advance the bolt-carriage, the same act forces the arm T² against the horn s of the crutch R², rocks it, moves the cam-block R', and places the hook P laterally in the position to operate upon the pin n', through which the rocking sleeve c³ may be turned; but as there is a large amount of play between the end of the arm T² and the horn s of the rocking crutch R², and as the cam P³ does not bear the hook toward the pin until the heading-piston D and its heading-tools E E' are being withdrawn, the hook P does not pull down the pinion n' and shift the shifting tool-holder A until the first heading-tool, E, has acted upon the blank in the blank-carriage and has upset its end to form a crude head. During the following retrograde movement of the heading-piston the hook P acts upon the pin n', thereby turning the rocking sleeve c³, shifting the shifting tool-holder A to the position shown at Fig. 2, and placing the second or finishing heading-tool, E', in the position to act upon the head of the blank. The shifting tool-holder remains in this position until the attendant finds the head of the blank is forged, when he withdraws the bolt-carriage either by the hand-lever T' or by operating the starting-handle M. The turning of the carriage rock-shaft N for the withdrawal of the bolt-carriage causes the arm T² to bear against the other horn, s', of the rocking crutch R², thereby restoring the cam-block R' to the position shown in Fig. 1, and placing the hook P laterally in the position to act upon the pin n, so that the first revolution of the driving-shaft F after the withdrawal of the bolt-carriage causes the hook P to turn the rocking sleeve and the shifting tool-holder, and to place the first heading-tool in position to operate upon the next blank which is subjected to the operation of the machine. In order that the rocking clutch R² may not be over vibrated in either direction, a fixed segment, S', is provided, to meet shoulders x x of the crutch-hub and act as a stop in each direction when the rocking crutch has been rocked to the required extent to shift the shifting tool-holder. The crutch-horn s' also is extended in the arc of a circle, so that the end of the arm T² can bear upon it and lock the crutch in its position, thereby preventing for the time the shifting of the shifting tool-holder and its heading-tools.

By reason of the combination of the shifting tool-holder A with the hand-lever T' and starting-handle M through the intervention of the devices above described, the attendant is able to control the shifting of the heading-tools E E' and to cause as many finishing blows to be struck by the finishing heading tool E' as he may deem necessary, while the first blow is always struck by the first heading-tool, E. In the above machine the link c', beveled pinion L, rocking sleeve c³, segment L', rock-shaft l', pins n n', shifting hook P, cam P³, and crank-pin S, with their connections, constitute the shifting devices for shifting the position of the shifting tool-holder A, and the hand-lever T' and starting-handle M constitute the controlling devices by which the attendant can control the operation of the heading-tools E E', carried by the shifting tool-holder A.

The shifting devices may be varied as circumstances render expedient, their function being to transmit motion from the main driving-shaft F to the shifting tool-holder A and to effect its movement in one direction or the other, as determined by the movement of either the hand-lever T' or the starting-handle M by the attendant of the machine.

I claim as my invention—

1. The combination, substantially as before set forth, of the shifting tool-holder, the piston which carries it, the main driving-shaft, the shifting devices, and the hand-lever which is adapted to be operated by the attendant.
2. The combination, substantially as before set forth, of the shifting tool-holder, the piston which carries it, the main driving-shaft, the shifting devices, and the starting-handle whereby the shifting of the shifting tool-holder is effected by power directed by the attendant.
3. The combination, substantially as before set forth, of the shifting tool-holder, link, rocking sleeve, the rock-shaft, and its pins.
4. The combination, substantially as before set forth, of the rock-shaft with its pins, the shifting hook, the hook-stock to which it is connected pivotally, the cam for moving it so as to operate upon said pins, and the crank-pin for moving it up and down.
5. The combination, substantially as before set forth, of the shifting tool-holder with the operating-arm T² through the intervention of the rocking crutch and the stop-segment.

In witness whereof I have hereto set my hand this 23d day of February, A. D. 1884.

HENRY JAMES JOHNSON.

Witnesses:

GARDNER C. ANTHONY,
WALTER F. BROWN.