No. 837,519. PATENTED DEC. 4, 1906.

G. H. TOLLEY & W. G. SIMCOCK.

POWER HAMMER.

APPLICATION FILED MAY 3, 1906.

2 SHEETS—SHEET 1.

Fig. 2.

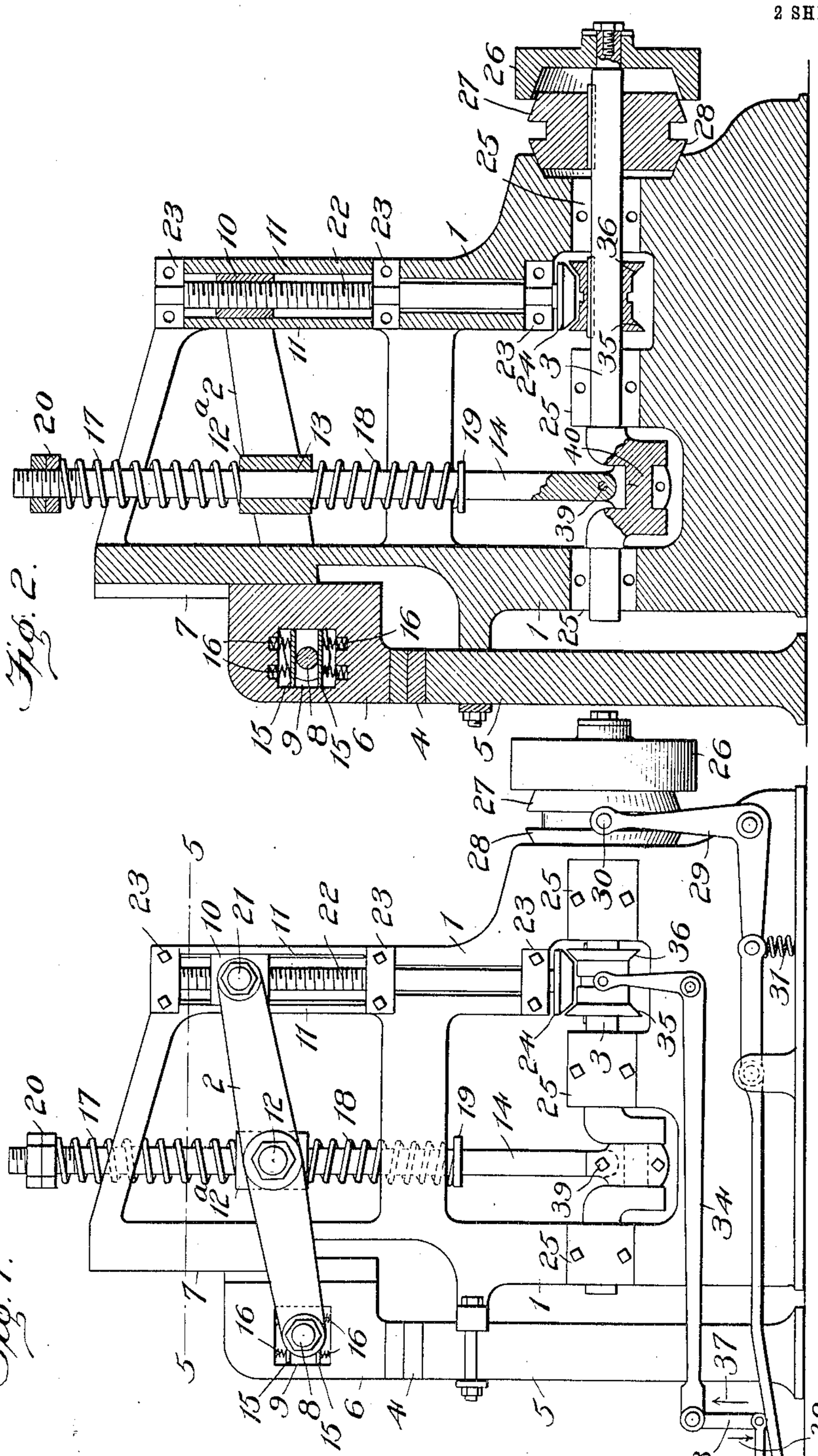

Fig. 1.

Witnesses

Edwin L. Bradford

Anne B. Johnson

Inventors

George H. Tolley

William G. Simcock

By Johnson and Johnson

Attorneys

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Fig. 4.

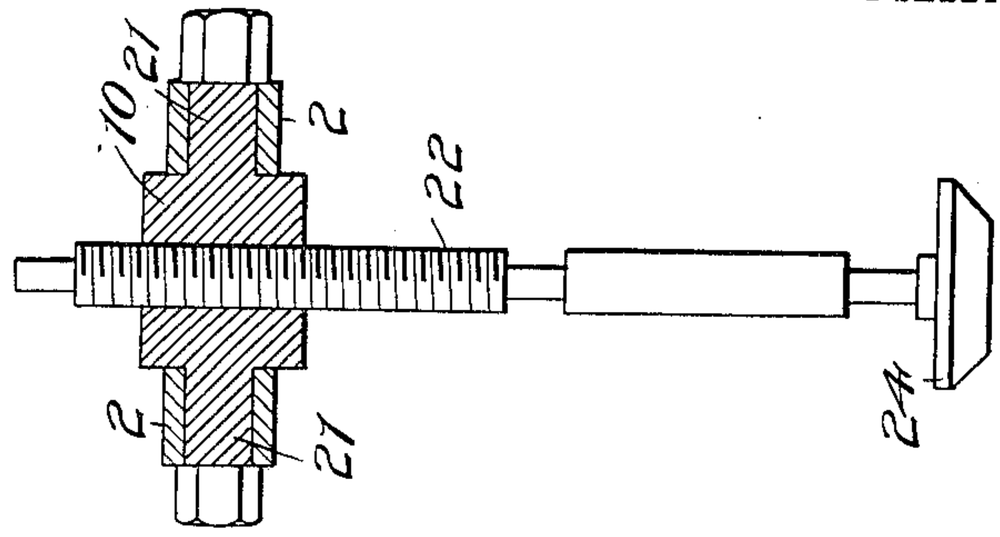


Fig. 6.

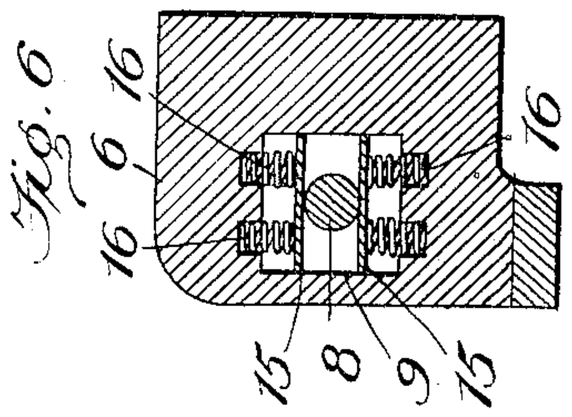


Fig. 3.

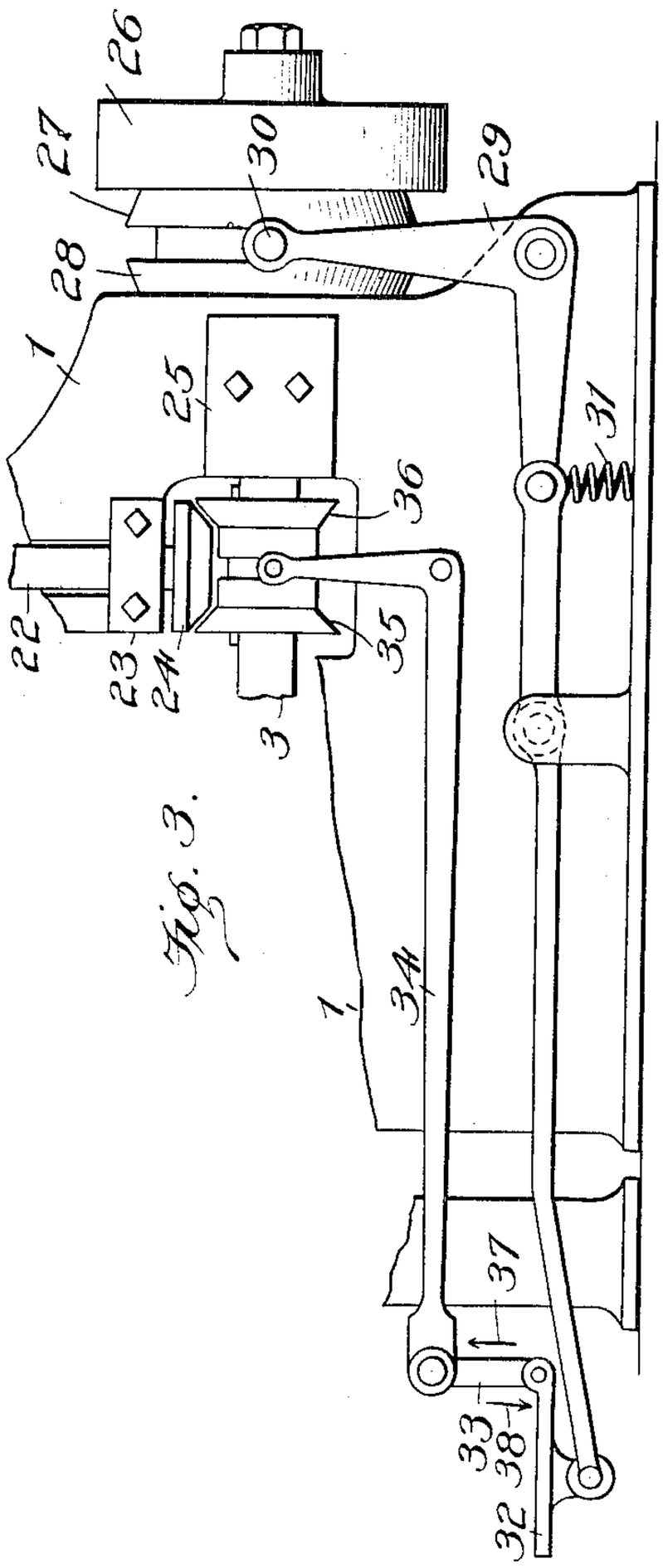
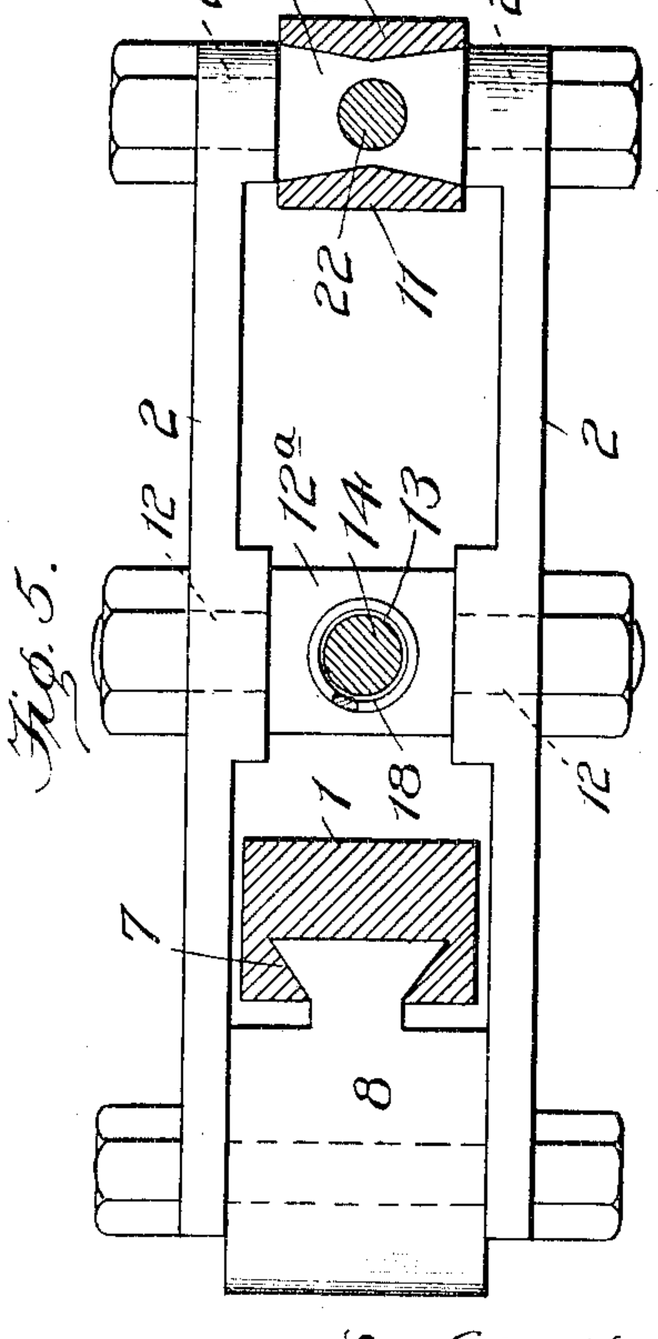


Fig. 5.



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Anna B. Johnson

Inventors

George H. Tolley

William G. Simcock

By Johnson & Johnson

Attorneys

UNITED STATES PATENT OFFICE.

GEORGE H. TOLLEY AND WILLIAM G. SIMCOCK, OF DENVER, COLORADO.

POWER-HAMMER.

No. 837,519. Specification of Letters Patent. Patented Dec. 4, 1906.

Application filed May 3, 1906. Serial No. 314,977.

To all whom it may concern:

Be it known that we, GEORGE H. TOLLEY and WILLIAM G. SIMCOCK, citizens of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Power-Hammers; 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.

For beam or helve operated power-hammers we have made certain improvements designed to effect more advantageous control over the hammer under all conditions of work and in which the structure is organized to cause the blow of the hammer to be rendered light or heavy, to render the same weight of blow constant, to maintain a uniform length of stroke under all conditions, to hold the hammer-head when not working at any adjustment, to cause the hammer to fall lower or to rise higher under different work, to so lower the fulcrum of the beam to cause the lowering of the hammer for working with a light blow or to raise the fulcrum to cause a heavy blow, and thereby adapt the hammer to a thin or to a thick piece to be treated, and to effect all these adjustments automatically by the treadle and connections therewith and at the will of the operator in changing the position of his foot on the treadle.

The structure shown in the accompanying drawings illustrates our invention in the form which at present is preferred by us; but we wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art and without departing from the spirit of our invention and without exceeding the scope of the claims.

Referring to the drawings, Figure 1 represents our improved power-hammer in side elevation, the actuating-treadle and its connections being in their normal positions with the hammer-driving friction-gear out of engagement. Fig. 2 is a vertical longitudinal section of the same with the operating-gear in the position shown in Fig. 1. Fig. 3 is an enlarged view of the treadle and its operating connections with the operating-gear in the positions shown in Fig. 1. Fig. 4 shows, enlarged, in vertical section the adjusting-screw and cross-head which connect the hammer-actuating beams at the rear of the frame. Fig. 5 is a horizontal section on the line 5 5 of Fig. 1, showing enlarged the hammer-actuating beams and their connections with the hammer-head, the adjusting-screw, and the crank-connected rod. Fig. 6 is a vertical section of the hammer-head, enlarged, showing its cushioning-springs.

Referring to Figs. 1 and 3, it will be noted that the treadle and its connections are in their normal positions.

The frame 1 is of a construction adapted for the work of a power-hammer and in which the hammer-head is mounted at the front and operated by a pair of beams or helves 2 2, fulcrumed at the rear, and the power-driven crank-shaft 3 is mounted in the lower part of the frame.

The anvil 4 and its supports 5 may be of the usual construction and connected to the front of the frame in any suitable way, while the hammer-head 6 is mounted for vertical movement in guides 7 at the front of the frame in a way well known in power-hammers. It is not, therefore, deemed necessary to particularly describe these parts. The hammer-head is operated by a beam or helve movement, and for this purpose a pair of beams 2 2, one on each side of the head, are connected to the ends of a pin 8, which passes through an opening 9 in the head, the other ends of said beams being pivotally connected to a cross-head 10, mounted in vertical guides 11 at the rear of the frame. Mediately of the beams they are connected by pivots 12 to a guide-block 12^a, through a central guide-opening 13 in which the crank-actuated connecting-rod 14 passes and actuates the beams vertically to transmit the crank movement to the hammer-head. The pivot-pin 8 for the front ends of the beams is supported between a pair of plates 15, fitted in the opening in the hammer-head and cushioned each by a pair of springs 16, seated in the opening to cushion the blows of the hammer. These springs, while serving to cushion the hammer-blows, also prevent the jar affecting the fulcrum of the beams and also the beams themselves. The working of the pivot of the beams in the opening in the hammer-head allows it to have free vertical movements in the frame-guides and compensates for the arc described by the beams from their fulcrum. At the mediate guide-block the connection of the beams with the crank-actuated connecting-rod is made by a pair of coiled springs 17 18, one above and the

other below the said guide-block, the under spring resting on a shoulder 19, fixed on the rod 14, the upper spring held on the rod by nuts 20, and both springs pressing against the guide-block of the beams so that the tension of the springs can be regulated by the nuts. The rear ends of the beams are fulcrumed on pivot-bearings 21 21 of the cross-head 10, which is vertically adjustable in guides 11, fixed upon the rear of the frame. A screw-threaded shaft 22 passes vertically through a threaded central opening in this cross-head and is suspended in bearings 23 in the frame and carries at its lower end a friction-gear 24, so that the rotation of the screw-shaft in either direction will cause the cross-head 10 to rise or fall, and with it the connected ends of the beams, for a purpose presently stated.

The beam-actuating crank-shaft is mounted horizontally in bearings 25 in the base portion of the frame, and has splined thereon a duplex friction-gear adapted to be engaged alternately with the friction-gear 24 on the lower end of the screw-shaft, whereby to cause it to be rotated to the right or to the left, there being for this purpose a loose power-driven pulley 26 on the rear end of the crank-shaft, controlled by a clutch operated by the treadle. The clutch is splined upon the shaft and is formed of a double cone, one part 27 adapted to engage a corresponding recess in the loose pulley, the other cone part 28 adapted to engage a corresponding recess in the frame, while a bell-crank lever 29 is caused to engage in the usual way by a pin 30 a groove in the clutch and is at its lower arm connected by a spring 31 to the base of the frame, which spring constantly tends to pull the lower arm of the bell-crank down, and thereby cause its clutch-connected end to be forced inward, thereby causing the clutch part 28 to be pressed into the frame-recess, giving the clutch the function of a brake during which the clutch part 27 is released from the loose pulley and the crank-shaft disconnected from the power.

While it is the function of the treadle to control the rotation of the crank-shaft, it is the function of the friction-gear to control the vertical adjustments of the fulcrum of the beams by means which we will now describe. The treadle is pivotally mounted at the base of the frame and at its inner end is pivoted to the horizontal spring-connected arm of the clutch-lever 29, and at its other end the treadle has a foot-rest 32, pivoted thereon so as to project equally at both sides of the pivot to allow a rocking movement. At its inner end this foot-rest has pivoted thereto a link 33, to the upper end of which is pivoted a horizontal bell-crank lever 34, which at its vertical branch is pivoted to the frame and engages by its upper end the groove of a duplex friction-gear splined on the crank-shaft, whereby the friction-gear is caused to have a slidable movement to cause either gear to be engaged with the friction-gear of the screw-shaft to cause its rotation to the right or to the left to adjust the fulcrum of the beams up or down. For this purpose the friction-gear 24 of the screw-shaft has a conical form, and the duplex friction-gears each have a corresponding conical form, and the screw-shaft is mounted so that the conical face of its gear will work between the conical faces 35 and 36 of the duplex friction-gear, the distance between the latter being a little greater than the diameter of the conical face of the shaft-gear to allow a slight movement of the duplex gear on its shaft for the engagement of either gear with said shaft-gear to cause it to be rotated to the right or to the left. As the cross-head 10 of the beams is caused by the rotation of the screw-shaft to be adjusted up or down, as said shaft may be rotated to the right or to the left, the hammer will be caused to fall lower or be raised higher, and if the cross-head be lowered, and with it the fulcrumed ends of the beams, the object placed on the anvil will not be hit so hard; but if the cross-head be raised, and with it the fulcrumed ends of the beams, the hammer will fall lower and be caused to strike a heavier blow, and in this way the hammer can be adjusted to cause a blow ranging from no blow at all to the full blow of the hammer. As the rotation of the screw-shaft is very rapid when in engagement with the friction-gear, a slight pressure upon the foot-rest will cause the hammer to be raised a quick full stroke or less, or a quick full stroke or less down, it being understood that the operator maintains his foot upon the foot-rest so long as the hammer is operating. Whatever adjustment the operator may give, the stroke of the hammer will always be the same, because the adjustment of the height of the fulcrumed end of the beams will cause the angle of the beams to be greater or less in rel tion to a horizontal plane and cause the hammer to work closer or farther away from the anvil when the beam-actuating crank is turning its lowest point.

In operating the hammer the operator puts his foot with uniform pressure upon the foot-rest and presses it down and holds it down with the treadle-lever to which it is pivoted, which causes the rear end of said treadle-lever to be raised, raising thereby its connected arm of the clutch-lever and causing the outer member 27 of the clutch to be moved outward and engaged with the loose pulley, causing the rotation of the crank-shaft and by its connecting-rod 14 and beams the operation of the hammer. Should it be deemed best to increase the force of the hammer-blow, the operator throws the pressure on his heel, which causes the foot-rest to be tilted in the

direction of the arrow 37, raising thereby its end, and with it the link 33 and its connected bell-crank lever, which causes the duplex-gear to be moved rearward and engaging its member 35 with the shaft-gear 24, causing the rotation of said shaft to the right, and thereby causing the fulcrumed ends of the beams to be raised, and necessarily lowering the hammer to increase the force of the blow. If, however, it be deemed best to decrease the force of the blow, the operator, still keeping the clutch by his foot in engagement with the power-driven pulley, brings the toe part of his foot into pressing action upon the foot-rest, causing it to be rocked forward on its pivot, as indicated by the arrow 38, pulling down its connected bell-crank lever and causing the rear member 36 of the duplex friction-gear to be moved frontward into engagement with the gear of the screw-shaft, causing thereby its rotation to the left, and necessarily the hammer will not be caused to fall so low and giving a lighter blow. When the operator has found the desired adjustment of the fulcrum of the beams, he holds his foot with uniform pressure upon the foot-rest until he desires to change again the force of the blow. In this way the rocking of the foot-rest frontward or rearward by pressure of the toe or of the heel of the operator's foot will give the desired adjustment to the hammer-actuating beam to change and determine the force of the blow. We prefer friction-gear for operating the crank-shaft, because it insures quick and certain engagement for rotating the screw-shaft.

It is important to note that the crank-connected rod is cushioned on its upward throw by compressing the lower spring against the guide-block of the beams, while the rod is cushioned on its downward throw by compressing the upper spring against said block. It is also important to note that while the foot-rest is pivotally mounted on the treadle its connections for causing the rotation of the screw-shaft in either direction are independent of the treadle in its function of controlling the operation of the hammer; but the mounting of the foot-rest upon the treadle gives the important advantage of controlling the foot-rest and the treadle by the same foot-pressure and at the same time. As the crank-connected rod is caused to have a slight lateral swing with the movement of the beams, the rod is pivotally jointed at 39, near the crank-bearing 40, to allow of such swing.

We claim—

1. In a power-hammer, a frame, an anvil, a vertically-slidable hammer-head and a crank-shaft, a pair of beams pivotally connected to the hammer-head and having a cross-head at their rear ends, vertical guides for said cross-head, said cross-head having a screw-threaded opening and bearings on which the beams are fulcrumed, a screw-shaft vertically mounted in engagement with said cross-head opening, a guide-block mediately of said beams having a central opening, a crank-connected rod passing through said opening, means for cushioning the connection of said rod with the beams, means under the control of the operator whereby the screw-shaft may be rotated in either direction, and means for operating the crank-shaft.

2. In a power-hammer, a frame, an anvil, a vertically-slidable hammer-head, and a crank-shaft, a pair of beams pivotally connected to the hammer-head and having a cross-head, vertical guides for said cross-head, said cross-head having a screw-threaded opening and bearings on which the beams are fulcrumed, a screw-shaft vertically mounted in engagement with said cross-head opening, a duplex gear on the crank-shaft adapted to engage and operate said screw-shaft, a crank-connected rod for operating said beams, a treadle and means connecting it with said crank-shaft, a foot-rest pivoted on said treadle, and means connecting it with said duplex gear whereby the screw-shaft may be rotated in either direction to raise and lower the fulcrumed ends of said beams for the purpose stated.

3. In a power-hammer, a frame, an anvil, a vertically-slidable hammer-head and a crank-shaft mounted in the frame, a pair of beams pivotally connected to the hammer-head and having a vertically-slidable cross-head at their rear ends on which the beams are fulcrumed, a screw-shaft vertically mounted in the frame in engagement with said cross-head, a crank-connected rod for operating said beams, and means under the control of the operator whereby the screw-shaft is caused to be rotated in either direction, consisting of a friction-gear on the depending end of said screw-shaft, a duplex friction-gear splined on the crank-shaft each of said duplex gear adapted for engagement with the gear of the screw-shaft, a lever having pivotal connection with said duplex gear, and a pivotally-mounted foot-rest pivotally connected with said lever, whereby the tilting or oscillation of the foot-rest is caused to shift the duplex friction-gear to cause it to be put in engagement with the gear of the screw-shaft to cause its rotation in either direction.

4. In a power-hammer, a frame, an anvil, a vertically-slidable hammer-head, and a crank-shaft having a slidable duplex gear a pair of beams pivotally connected to the hammer-head and having a cross-head, vertical guides for said cross-head, said cross-head having a screw-threaded opening and bearings on which the beams are fulcrumed, a screw-shaft vertically mounted in engagement with said cross-head opening, a crank-

connected rod for operating said beams, a pivoted foot-rest means connecting it with said duplex gear, whereby the screw-shaft may be rotated in either direction to raise and lower the fulcrum ends of said beams, a clutch on the crank-shaft, a treadle on which said foot-rest is pivoted, and means connecting said treadle with the clutch whereby the said duplex gear and the clutch are actuated by said pivoted foot-rest for the purpose stated.

5. In a power-hammer, a frame, an anvil, a vertically-slidable hammer-head, a vertical screw-shaft mounted in the rear of the frame and having a gear on its lower end, a pair of beams pivotally mounted on the hammer-head and on said screw-shaft and the latter engaging the pivotal mounting of said beams, a crank-connected rod mediately connected to said beams, a crank-shaft mounted in the base of the frame, a slidable duplex gear on the crank-shaft adapted to engage the gear on the vertical screw-shaft, a power-driven pulley and a clutch on the crank-shaft, a treadle engaging said clutch, a foot-rest pivoted on said treadle, means connecting said foot-rest with the duplex gear whereby the duplex gear is engaged to cause the screw-shaft to be rotated in either direction to raise and to lower the beams at their screw-shaft-connected ends and the clutch operated in connection with the engagement of the duplex gear with said screw-shaft for the purpose stated.

6. In a power-hammer and in combination, a vertical slidable hammer-head, a vertical screw-shaft having a gear on its lower end, a pair of beams pivotally mounted on the hammer-head and on said screw-shaft the latter engaging the pivotal mounting of said beams, a crank-shaft, a crank-connected rod mediately engaging and actuating said beams, a slidable duplex gear on said crank-shaft, a slidable clutch and a power-driven pulley all on said crank-shaft, a treadle connected with said clutch, a foot-rest pivotally mounted on said treadle and means connecting said foot-rest with the duplex gear, whereby the combined treadle and foot-rest are conjointly operated to cause the screw-shaft to be rotated in opposite directions for the purpose stated.

7. In a power-hammer and in combination, a vertically-slidable hammer-head, a vertical screw-shaft having a gear at its lower end, a pair of beams pivotally mounted on the hammer-head and on said screw-shaft the latter engaging the pivotal mounting of said beams, a crank-shaft, a rod connected to said crank and mediately engaging and actuating said beams, a slidable duplex gear on said crank-shaft, a foot-rest and means whereby it is connected to operate said duplex gear in engagement with the gear of said screw-shaft, to cause its rotation in opposite directions, and means for controlling the operation of said crank-shaft.

8. In a power-hammer, a slidable hammer-head, a screw-shaft having a gear on its lower end, a pair of beams pivotally mounted on the hammer-head, a cross-head engaging the screw-shaft and pivotally engaging the rear ends of the beams, a guide-block having pivot-bearings mediately connecting the beams, a crank-shaft, slidable gear thereon adapted to engage the gear on the screw-shaft, a rod passing through said guide-block connecting the crank and having a pivot connection at right angles to the crank, means for operating the crank-shaft, and means whereby the gear thereon is caused to engage the gear of the screw-shaft to cause its rotation to the right or to the left.

9. In a power-hammer, a slidable hammer-head, a pair of beams, pivotally connected to the hammer-head, a crank-shaft, a crank-connected rod mediately connecting said beams, a screw-shaft on which the rear ends of said beams are fulcrumed, a gear on the lower end of said shaft, a duplex gear on the crank-shaft adapted to engage the gear on said screw-shaft, a pivotally-mounted foot-rest, lever connections for said duplex gear and the foot-rest, means for adjustably connecting said screw-shaft with the fulcrum of the beams, and means for operating the crank-shaft, whereby the foot-rest is adapted to control the gear to rotate the screw-shaft in opposite directions, for the purpose stated.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE H. TOLLEY.
WILLIAM G. SIMCOCK.

Witnesses:
FRED. I. BURRIS,
H. P. ELLIS.