No. 627,350. Patented June 20, 1899.

F. A. PRATT.

DROP HAMMER OPERATING MECHANISM.

(Application filed Oct. 28, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

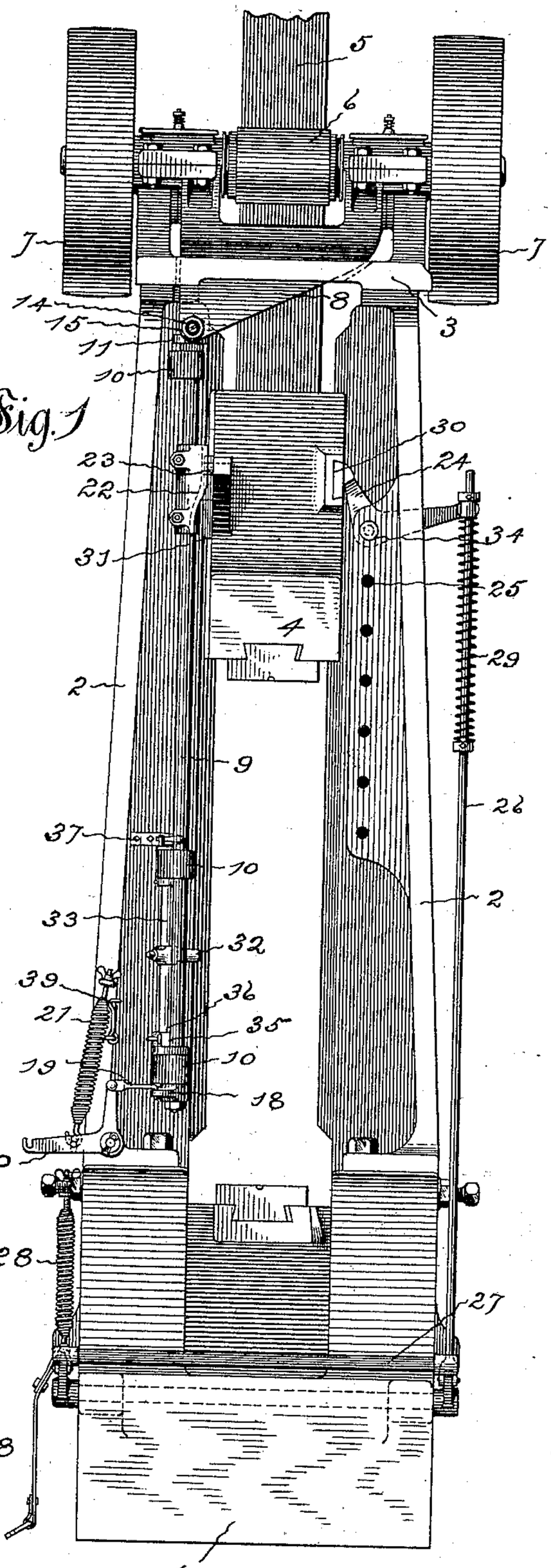
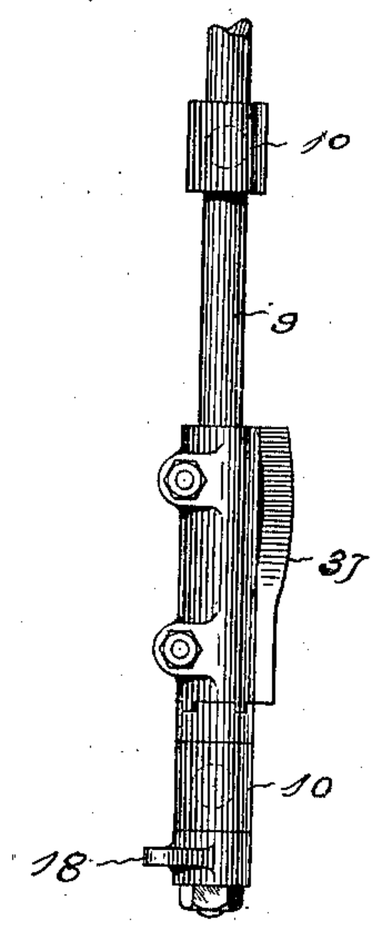


Fig. 9



Witnesses:
E. W. Fothergill.
E. J. Hyde.

Inventor:
Francis A. Pratt, by
Harry P. Williams,
Atty.

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Fig. 4

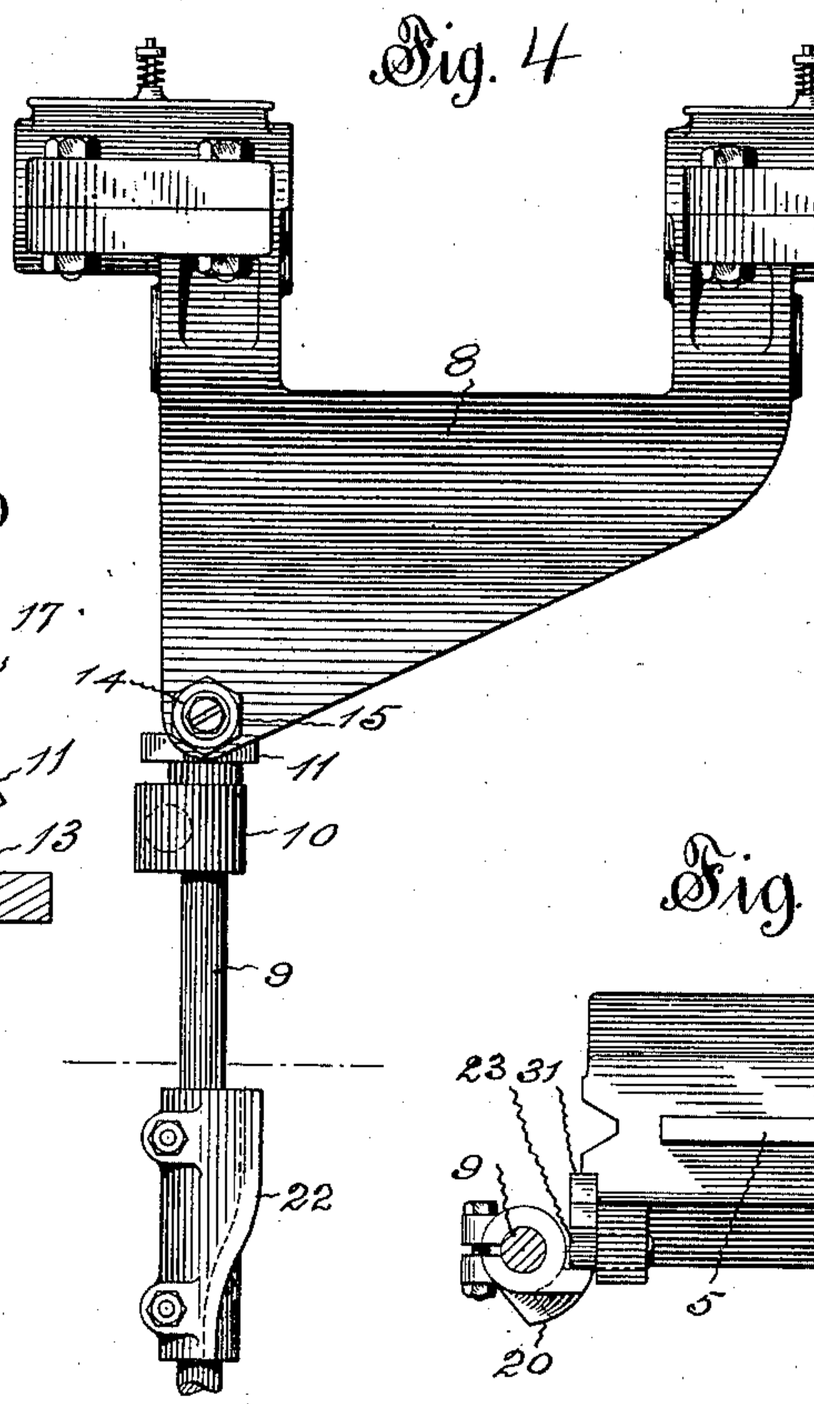


Fig. 2

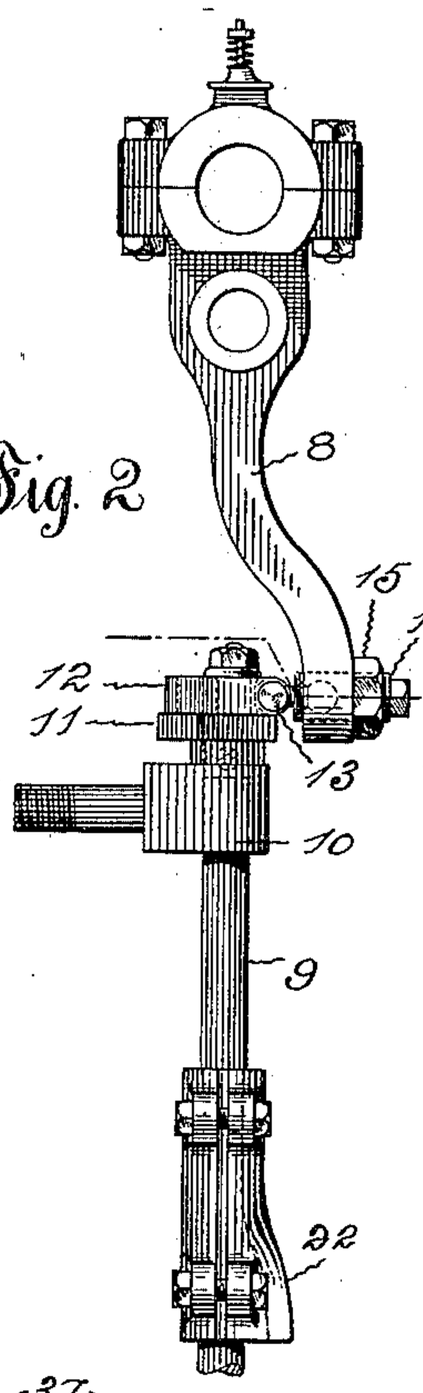


Fig. 6

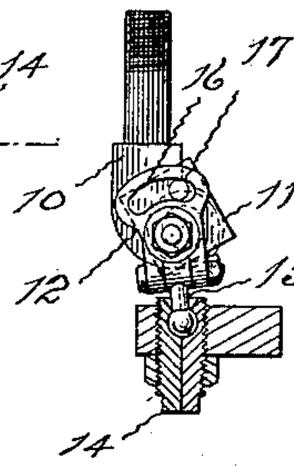


Fig. 7

Fig. 3

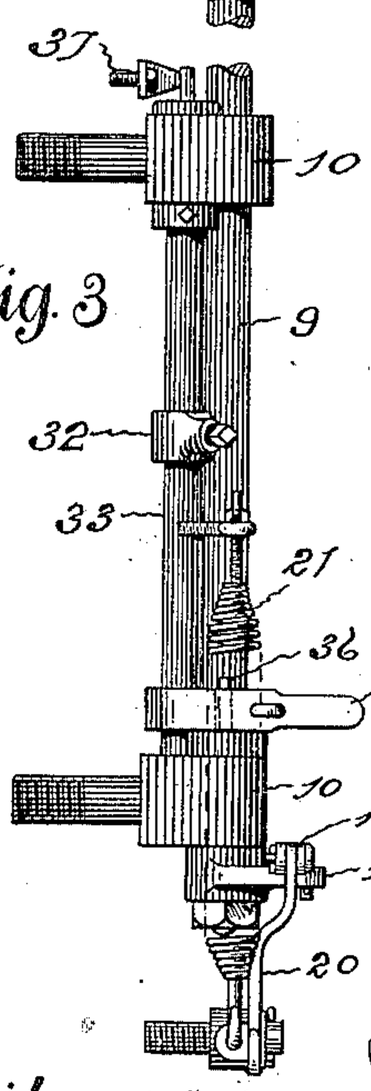


Fig. 5

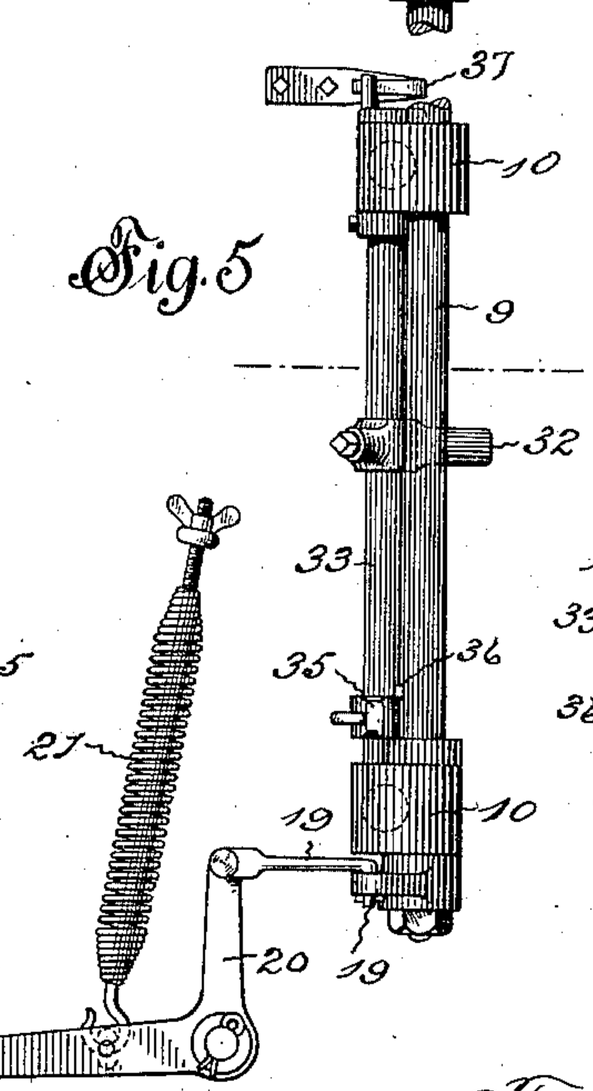
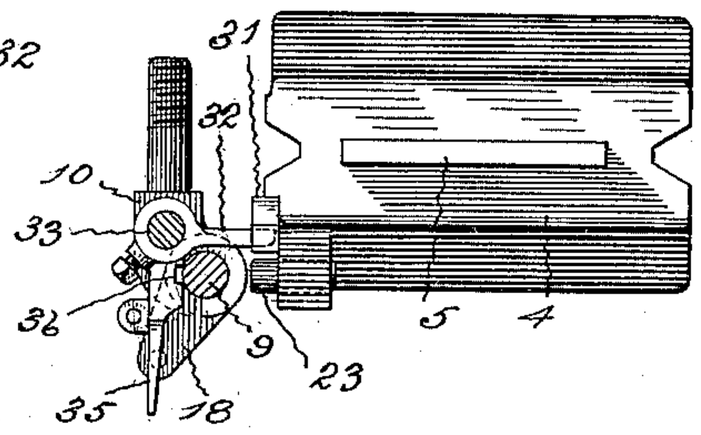


Fig. 8



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Inventor:
Francis A. Pratt by
Harry P. Williams
atty.

UNITED STATES PATENT OFFICE.

FRANCIS A. PRATT, OF HARTFORD, CONNECTICUT.

DROP-HAMMER-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 627,350, dated June 20, 1899.

Application filed October 28, 1898. Serial No. 694,809. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS A. PRATT, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Drop-Hammer-Operating Mechanisms, of which the following is a specification.

This invention relates to the mechanism which is employed for operating the hammer-board gripping and releasing rolls of a drop-hammer.

The object of the invention is to provide a simple, durable, and finely-adjustable mechanism which will operate the gripping and releasing rolls surely, smoothly, and without shock and cause the hammer-head to be automatically lifted and dropped rapidly without loud noise, thus increasing the efficiency of the hammer and minimizing the objectionable features.

The drop-hammer illustrated as embodying the invention has a bed with standards forming a guideway, a hammer-head movable up and down the guideway from and toward the bed, rotating rolls for gripping and lifting the hammer board and head, parts for causing the rolls to move and grip and release the hammer-board, and adjustable parts adapted to be given a rotative movement by the movements of the hammer-head for at the proper time operating the roll-moving parts, as more particularly hereinafter described, and pointed out in the claims.

Of the accompanying illustrations, Figure 1 shows a front elevation of a drop-hammer provided with the invention. Fig. 2 shows an enlarged side elevation of the upper portion of the gripping-roll-operating mechanism. Fig. 3 shows a similar view of the lower portion of the same mechanism. Fig. 4 shows a front elevation of the upper portion of the gripping-roll-operating mechanism. Fig. 5 shows a similar view of the lower portion of the same mechanism. Fig. 6 shows a view looking down from the dotted line of Fig. 2. Fig. 7 shows a plan of the hammer-head and the cam represented in Fig. 4 looking down from the dotted line of that figure. Fig. 8 shows a plan of the hammer-head and a view looking down from the dotted line of Fig. 5, and Fig. 9 shows a modified arrangement that may be utilized in place of that shown in Fig. 5 for causing the rolls to grip the hammer-board.

The bed 1 of this drop-hammer may be made of any desirable metal in a suitable shape to receive and properly support one of the shaping-dies. Extending upwardly from the bed and adjustably mounted thereon are standards 2, that at their upper ends are joined by a cap-plate 3. The inner edges of the standards are shaped to form a guideway for the hammer-head 4, which is made of suitably strong and heavy metal and is arranged to receive in its lower face the other of the shaping-dies. The hammer-head has a tail-board 5, that is usually formed of wood.

Lifting-rolls 6 are mounted, one in front and one behind the hammer-board, upon shafts that are provided with driving-pulleys 7. The bearings for the rear-roll shaft are preferably permanently fixed in position upon the cap 3, while the bearings for the front-roll shaft are formed in the upper ends of the arms of a swinging plate 8, that is pivotally supported by the cap. The lower end of this swinging plate is connected with the upper end of a vertical shaft 9, that is loosely supported by brackets 10, secured to one of the standards. Attached to the upper end of the vertical shaft is a block 11, and eccentrically pivoted to this block is a plate 12. One end of a link 13 is hinged to this plate 12, while the other end, which is provided with a globular head, is inserted in a corresponding socket in a socket-piece 14, adjustably mounted in the lower end of the swinging plate. The socket-piece is formed in two parts to permit the introduction into the socket of the head of the link and is threaded and screwed into a threaded perforation in the swinging plate. A check-nut 15 is provided for holding the socket-piece in position after it has been adjusted. The plate 12 preferably has a slot 16, into which extends a stud 17, that is secured to the block on the end of the shaft. This stud limits the amount of movement of the plate with relation to the block. Attached to the lower end of the vertical shaft is an arm 18, which is connected by a hook 19 with an angle-lever 20. A spring 21 is connected between this lever and the standard, and the pull of this spring tends to rock the lever

and impart a rotary movement to the shaft, so that the swinging plate connected with the upper end of the shaft will be oscillated and the front roll carried against the face of the hammer-board. When the vertical shaft is free to be given a rotary motion in this manner, the parts are so moved by the tension of the spring that the hammer-board is gripped between and lifted by the rotation of the two rolls.

Adjustably secured to the vertical shaft is a spiral cam 22, and projecting from the hammer-head so as to engage with this cam when in its uppermost position is a stud 23. When the hammer-head is lifted, the engagement of this stud with this cam gives a rotary movement to the vertical shaft, and this so moves the connecting parts and oscillates the swinging plate that the front roll is carried away from the hammer-board. This cam is secured to the shaft in such position that at the time the hammer-head reaches the desired limit of its upward movement the parts are moved sufficiently to release the grip of the rolls from the hammer-board. If the hammer-head is not then caught by a catch-lever, it will drop to the bed. The amount of upward movement of the hammer-head is determined by the position of the cam 22 on the vertical shaft, and thus by adjusting this cam the force of the drop can be regulated.

A catch-lever 24 is pivoted to one of the standards for holding the hammer-head raised. This catch is held by a pivot-pin 34, that can be thrust into any one of a number of sockets 25 that are provided, depending on the height at which it is desired to hold the hammer-head. The outer end of the catch is adjustably and elastically connected with a rod 26, that is attached to a treadle 27, which is pivotally supported by the bed and normally held lifted by a spring 28. A spring 29 normally forces the latch into position to engage a socket in a lug 30, projecting from the hammer-head; but when the treadle is depressed the catch is released and the hammer-head free to drop. Just about the moment the dropping hammer strikes a blow upon the piece to be forged a wedge 31 on the hammer-head engages and moves an arm 32, that is adjustably secured to a rock-shaft 33, held by brackets attached to one standard adjacent to the lower end of the vertical shaft 9. The engagement of this wedge and arm rocks the shaft 33 and a latch 35, borne by the shaft, so that this latch is disengaged from a locking-rib 36 on the vertical shaft 9. When the rib 36 is released, the shaft 9 is free to be given a rotary movement by the spiral spring 21, and this movement causes the rolls to again grip the hammer-board and as they are rotating lift the hammer for another drop. A spring 37 is arranged to normally hold the rock-shaft 33 so that the latch 35 is in position to engage and hold the rib 36.

If the treadle is held depressed, so that the catch will not engage with and keep the hammer-head raised, the up-and-down movements of the hammer-head will be continuous, for at each upward movement by engagement with the upper cam the rolls will be moved so as to release the hammer-board and allow the hammer-head to drop, and at each downward movement by engagement with the rocker-arm the parts will be so moved that the rolls will again grip the hammer-board and lift the hammer-head.

Instead of having a rocker-arm and latch on a rock-shaft at the lower end of the vertical shaft 9 and a spring for so imparting a rotary movement to the shaft that the rolls will grip the hammer-board when the blow of the hammer-head is struck, a spiral cam 37, Fig. 9, may be adjustably attached to the lower end of the shaft in position to be engaged by the stud 23, projecting from the hammer-head. This cam may be so arranged that at the proper time, which is about the instant the blow is struck, the shaft will be given a rotary movement, so that the rolls will grip the hammer-board and again lift the hammer-head. With this form no spring is needed to cause the rolls to grip the hammer-board. The upward movement of the hammer-head by engagement with the upper spiral cam will cause the rolls to release the hammer-board, and the downward movement of the hammer-head by engagement with the lower spiral cam will cause the rolls to grip the hammer-board. In the first form the upper cam is on the rotative vertical shaft and is engaged by a stud projecting from the hammer, while the lower cam is on the hammer and engages a lug on the rock-shaft. In the second form the lower cam is on the vertical shaft the same as the upper, except that it is reversed.

The treadle 27 may be connected by a strap 38 with the lever 20 when it is desired to discontinue the automatically-operating apparatus and control the movements of the hammer-head by the foot of the operative. In this case, however, the latch 35 is held away from the rib 36 by a hook 39. When in this condition, the depression of the treadle permits the hammer-head to drop, and the lifting of the foot from the treadle causes the parts to so act that the hammer-head will be raised and held up.

The mechanisms set forth herein are very sure in action, for the cams can be regulated to operate at the exact predetermined times, and the engagement of the hammer-head with these cams causes a very positive action for oscillating the vertical shaft and moving the gripping-roll parts. With these operating mechanisms the powerful effect required for causing the rolls to properly grip the hammer-board is accomplished without any direct blow upon any part, so that racking the operating parts is avoided, wear is eliminated, and noise is reduced to a minimum. All these parts can be adjusted quickly, so that a heavy or light blow can be struck, either

singly or continuously, upon work varying in size. The application of the operating mechanism herein disclosed greatly increases the efficiency and reduces the disagreeable features of drop-hammers.

I claim as my invention—

1. In a drop-hammer, in combination with the hammer-head and rolls for raising the head, a rotative shaft extending substantially parallel with the plane of movement of the head, means connected with the head for imparting a rotary movement to said shaft, and connections between said shaft and the head-raising rolls whereby the rolls are caused to alternately raise and release the head, substantially as specified.

2. In a drop-hammer, in combination with the hammer-head and rolls for raising the head, a rotative shaft extending substantially parallel with the plane of movement of the head, means connected with said shaft and projecting into the path of a part of the head whereby said shaft is given a rotary movement in one direction by the upward movement of the head, means connected with said shaft and projecting into the path of a part of the head whereby said shaft is given a rotary movement in a reverse direction by the downward movement of the head, and connections between said shaft and the head-raising rolls whereby the rolls are caused to alternately raise and release the head, substantially as specified.

3. In a drop-hammer, in combination with a hammer-head and rolls for raising the head, a rotative shaft extending substantially parallel with the plane of movement of the head, a cam borne by said shaft, means connected with the head for engaging the cam and imparting to said shaft a rotary movement in one direction, a spring for imparting to said shaft a rotary movement in the opposite direction, and a connection between said shaft and the head-raising rolls whereby the rolls are caused to alternately raise and release the head, substantially as specified.

4. In a drop-hammer, in combination with the drop-hammer and rolls for raising the head, a rotative shaft extending substantially parallel with the plane of movement of the head, a cam borne by said shaft, means connected with the head for engaging the cam and imparting to said shaft a rotary movement in one direction, a spring for imparting to said shaft a rotary movement in the opposite direction, a latch adapted to engage and retain said shaft against the tension of the spring, a rock-shaft for releasing the latch from the rotative shaft, a part connected with the head for moving the rock-shaft, and connections between the rotative shaft and the head-raising rolls whereby the rolls are caused to alternately raise and release the head, substantially as specified.

FRANCIS A. PRATT.

Witnesses:
HARRY R. WILLIAMS,
E. W. FOTHERGILL.