

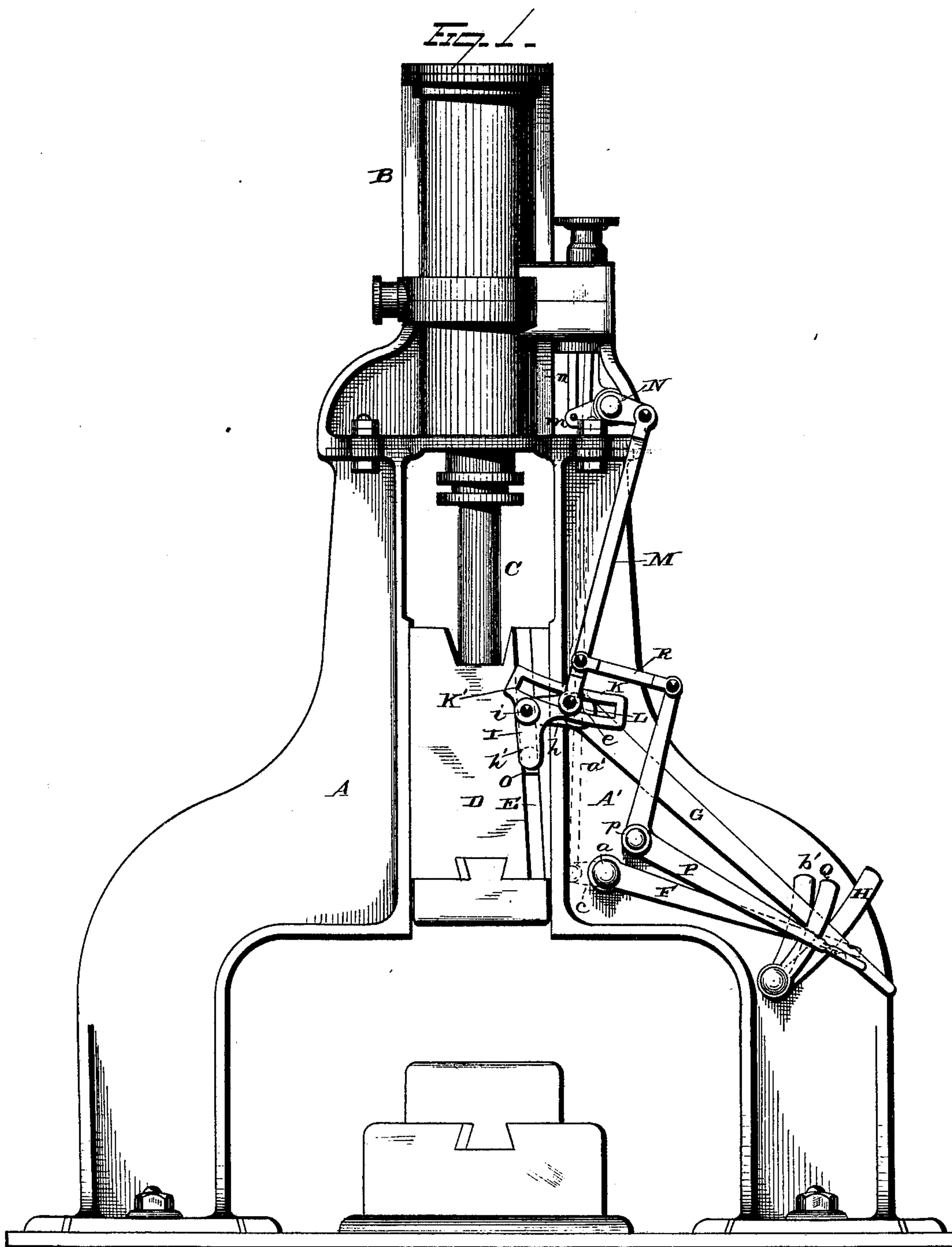
(No Model.)

2 Sheets—Sheet 1.

T. R. MORGAN.
Steam Hammer.

No. 231,185.

Patented Aug. 17, 1880.



WITNESSES

Edinburgh
A. N. B. right.

INVENTOR

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By A. Seymour.
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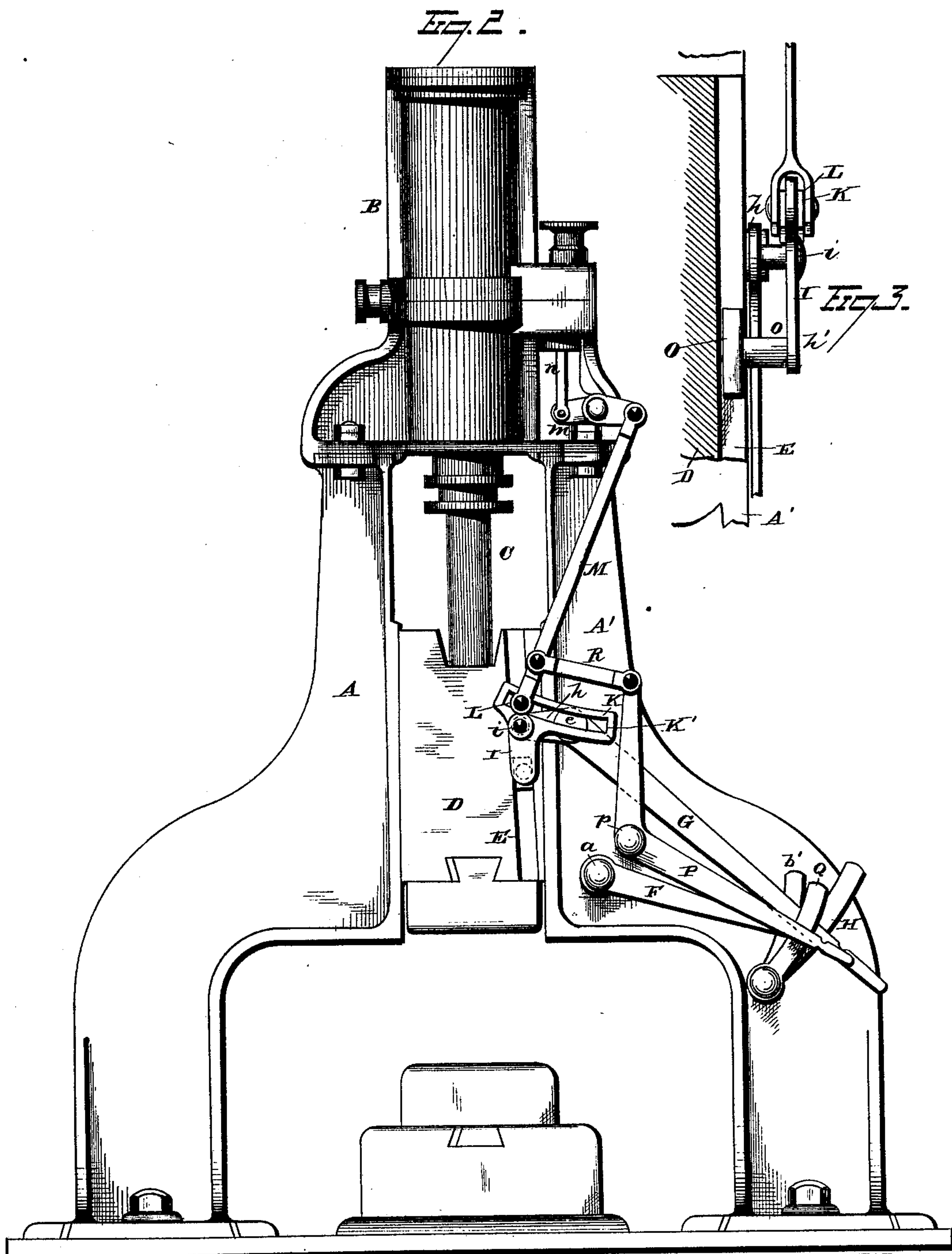
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WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

THOMAS R. MORGAN, OF ALLIANCE, OHIO.

STEAM-HAMMER.

SPECIFICATION forming part of Letters Patent No. 231,185, dated August 17, 1880.

Application filed July 3, 1880. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful
5 Improvements in Steam-Hammers; and I 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 pertains to make and use it, reference being
10 had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in steam-hammers.

Heretofore steam-hammers have been constructed to be operated automatically, the
15 valve-gearing being shifted by the up-and-down stroke of the hammer, and also to be operated in a positive manner to strike dead blows by manipulating a hand-lever. Hammers of such construction, though differing
20 in the relative arrangement of parts and in details of construction, have been found objectionable in practical use, for the reason that when it is desired to operate the hammer
25 by a hand-lever great care and skill are required on the part of the operator in adjusting the hand-lever to counteract the movement imparted to the valve-gearing by the mechanism connecting the same with the hammer. In
30 fact, it is practically impossible to regulate the blows of the hammer by the hand-lever with any degree of certainty when the valve-gearing is at the same time operated automatically by its connection with the hammer,
35 because the automatic connections will cause the valve to shift and take steam, and thus destroy the effect secured by dead blows.

The object of my invention is to obviate these objections and difficulties and provide a
40 steam-hammer of such construction that the valve may be operated automatically through gearing connecting with the hammer, and the gearing so constructed and arranged that when it is desired to cause the hammer to strike
45 dead blows of regular or varying intensities the gearing may be readily adjusted, so that it will not be affected by the movement of the hammer, but may be readily and accurately adjusted by the hand-lever, and thus not require the skill and care in manipulating the

hand-lever necessitated in other kinds of steam-hammers now in use.

To these ends my invention consists in the several details in constructions and combinations of parts, as will be hereinafter described
55 and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a steam-hammer embodying my improvement, the valve-gearing being adjusted to be operated automatically by the
60 hammer. Fig. 2 is a similar view, showing the valve-gearing adjusted to be operated by hand. Fig. 3 is an enlarged view, in elevation, of a portion of the valve-gearing.

A A' represent the two standards of the
65 frame of a steam-hammer. B is a steam-cylinder bolted to the upper ends of standards A A'. C is a piston-rod, and D a hammer or ram attached to the lower end of the piston-rod. These parts, together with the slide-
70 valve, may be of ordinary or of any preferred construction, as my improvement is applicable to any construction of steam-hammers.

The hammer D is provided with a diagonal slot or rib, E, by means of which motion is
75 imparted to the valve-gearing, as will be hereinafter described.

F is a throttle-valve lever, secured at one end to a rock-shaft, *a*, and its opposite end provided with a slot, through which passes the
80 adjustable guard-rod *b'*, the lever being adjustably secured to said rod by means of a set-bolt or spring-catch engaging in the teeth of a rack formed on the outer edge of rod *b'*. To the opposite end of rock-shaft *a* is secured
85 an arm, *c*, having the lower end of a connecting-rod, *a'*, connected therewith, the upper end being attached to the stem or crank-arm of a throttle-valve. Thus the amount of steam supplied to the slide-valve chamber may be
90 regulated by varying the position or adjustment of the throttle-lever F.

G is a slide-valve adjusting-lever, the same being fulcrumed at *e*, the outer end thereof having a slot formed therein, through which
95 passes the adjustable guard-rod H, the lever G being adjustably secured to said radius-rod by means of a set-bolt or spring-catch engaging in teeth formed on the outer edge of said guard-rod.

To the short end h of lever G is pivoted the rocker-arm I . Above the pivotal bearing i of the rocker-arm the latter is provided with a link, K , in which is formed an arc-shaped or radius slot, K' , struck from the pivotal point of the upper end of the connecting-rod M , and within which slot is placed a sliding block, L , to which is connected the lower end of connecting-rod M , the upper end of which is attached to a rock-shaft, N , through which the slide-valve is operated, by means of the arm m and valve-stem n .

To the lower end of the arm h' of the rocker-arm is secured a stud, o , to the end of which is pivoted a sliding block, O , which fits in the diagonal slot in the face of the hammer, and as the latter is moved through its up-and-down stroke a lateral or transverse movement is imparted to the arm h' , and a vertical movement to the outer end of the arc or radius slotted arm.

P designates a hand-lever pivoted at p . The lower end of lever P is provided with a slot, through which passes the adjustable guard-rod, Q , thereby enabling the lever to be secured in any desired adjustment by means of a spring-catch pivoted to the handle and arranged to engage in teeth or notches in the guard-rod.

Lever P is of bell-crank form, and to its upper end is pivoted a link, R , the opposite end of which is pivoted to the connecting-rod M . The purpose of lever P is to impart lateral adjustment to the sliding block connected with the lower end of connecting-rod M , and thus quickly vary the length of stroke of the slide-valve.

Having described the construction and arrangement of parts of my improvement, I will now describe the operation.

When it is desired to operate the hammer in an automatic manner and secure the most effective blows of the hammer, the sliding block L is moved to the central portion of the radius-slot K . The lever G is then adjusted to regulate the extent of movement of the hammer. By operating the throttle-lever steam will then be admitted to the lower end of the steam-cylinder raising the hammer, and as the latter reaches the limit of travel in its upstroke, the diagonal slot and slide-block therein will have shifted the slide-valve to such an extent as to open the exhaust-port connecting with the lower end of the steam-cylinder and allow the steam to freely escape from below the piston, and at the same time admit live steam above the piston to force the same and hammer through its downstroke to impart an effective blow on the work. When the hammer reaches the limit of its downstroke the valve is again shifted, the steam allowed to escape from above the piston and enter below the piston and raise the hammer. Hence, when the hammer is worked automatically, blows of regular and various degrees of intensity may be produced.

As heretofore stated, the slide-block connect-

ed with the lower end of the connecting-rod M is placed in the center of the link K when it is desired to secure the most effective strokes of the hammer. That portion of the slot in the link which extends beyond the point of adjustment just described serves the following highly-useful function: It is very essential that a steam-hammer shall be capable of performing very diversified kinds of work, and it is often the case that it is necessary to impart very short and rapidly-succeeding blows to the work in hand. To enable this to be done it is not only necessary to reciprocate the hammer very quickly through a small portion of its full stroke, but it is also necessary to quickly move the valve through its full stroke, because the valve must always travel a certain fixed distance to open and close the steam-ports. Hence it is that the speed of the valve must be increased when it is desired to impart short quick strokes to the hammer. To accomplish this result link K is made of sufficient length to allow the slide-block on the lower end of the connecting-rod M to be moved outward from the center of the slot K' , which results in increasing the length of the arm between the pivotal bearing i and the lower end of the connecting-rod. By imparting a short stroke to the hammer a long quick stroke is given the slide-valve by reason of the attachment of the connecting-rod M to the outer end of the link K . Hence it is that I am enabled to adjust the gearing for any desired length of stroke to be given the hammer.

Now, it is oftentimes desired to produce dead blows of greater intensity, irregular in action, and also single successive blows of various intensities for blooming and forging purposes. In such cases it becomes necessary to operate the hammer through the hand-adjusting lever, and thus adjusting the position of the slide-valve and holding it open at will until the hammer has struck the blow, and also hold the hammer raised until the operator is ready for the blow to be imparted to the work. To effect such an operation of the hammer the slide-block L is moved to the opposite end of the radius-slot, or immediately over the pivotal bearing of the rocker-arm, and in this position the lower end of the connecting-rod M will be moved transversely only, and cannot be moved vertically by the rocker-arm and connections with the hammer. Therefore the latter will have no effect on the valve-gearing, and the slide-valve may be accurately and positively adjusted by means of the hand-lever.

While I have described my preferred construction, I do not limit myself to the exact construction and arrangement of parts shown and described.

Instead of producing the rocker-arm with an arc-shaped or radius slot and a sliding block, the rocker-arm may have a series of holes formed on an arc and the lower end of the connecting-rod adapted to be pivoted in any of said holes to effect the desired result.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-hammer, the combination, with
5 the hammer or ram and a rocker-arm connected with the hammer so as to be actuated thereby, of a rod connecting at its upper end with devices for operating the valve, and means for securing the lower end of the connecting-rod
10 at variable distances from the pivotal bearing of the rocker-arm, substantially as set forth.

2. The combination, with the hammer or ram and a rocker-arm connected with the hammer so as to be actuated thereby, of a hand
15 adjusting-lever to which the rocker-arm is pivoted, said rocker-arm provided with a radius-slot struck from the center of the pivotal bearing of the valve connecting-rod, and a slide-block located in said radius-slot and having
20 the lower end of the connecting-rod pivoted thereto, substantially as set forth.

3. In a steam-hammer, the combination, with the hammer or ram provided with a diagonal slot or rib and a rocker-arm having a

slide pivoted thereto which engages said slot 25 or rib, said rocker-arm having a link connected therewith, of a hand-lever to one end of which is pivoted said rocker-arm, and a valve connecting-rod, the lower end of which is provided with a slide-block which engages in the 30 link and is adapted to be laterally adjusted thereon, substantially as set forth.

4. In a steam-hammer, the combination, with the hammer or ram provided with a diagonal slot or rib and a rocker-arm having a 35 link connected therewith, of a valve connecting-rod constructed to have its lower end adjustably secured to said link, and a hand-lever for imparting lateral adjustment to the lower end of the connecting-rod, substantially 40 as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of June, 1880.

THOS. R. MORGAN.

Witnesses:

JAS. H. LANGE,

A. W. BRIGHT.