

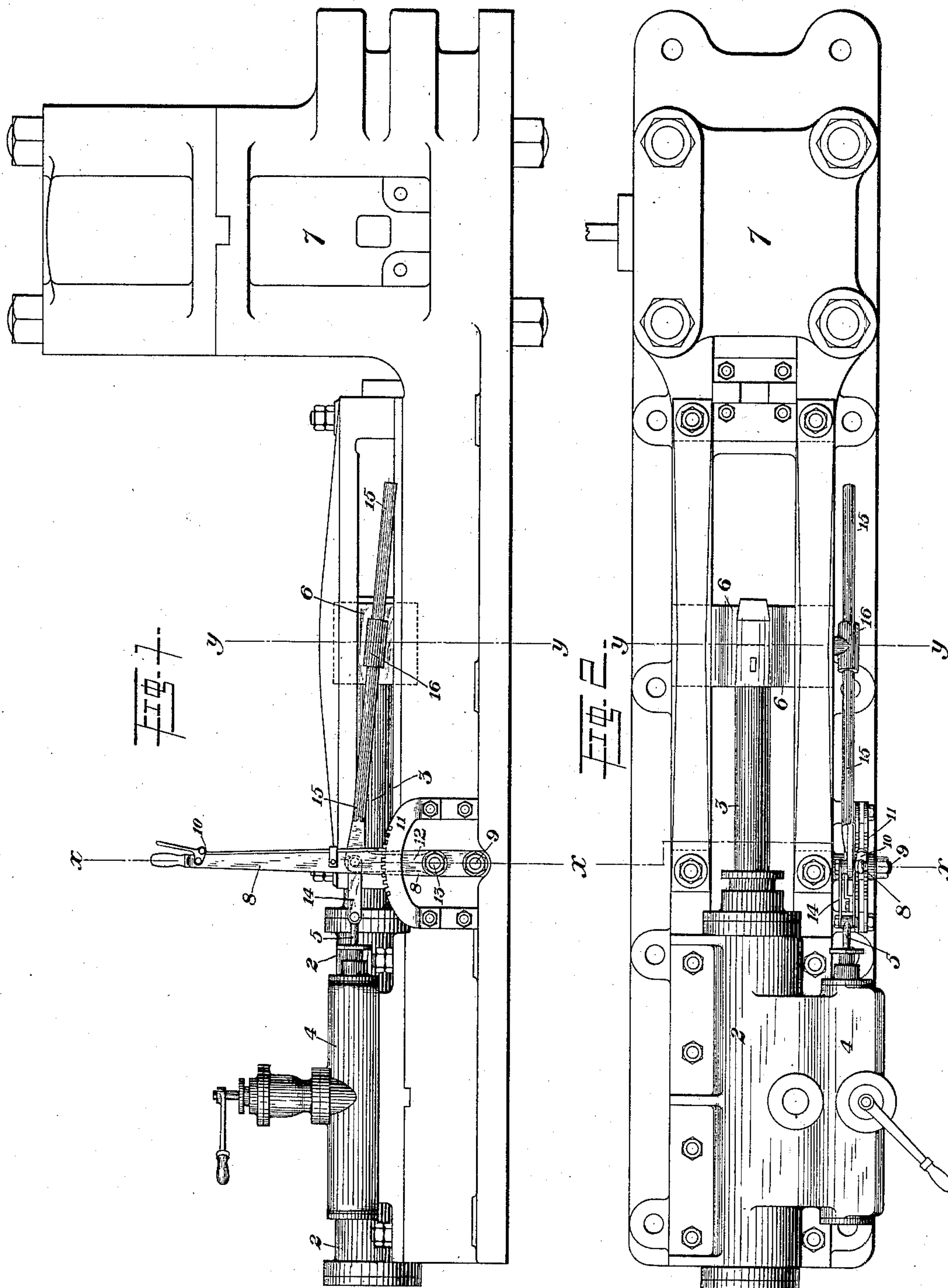
(No Model.)

2 Sheets—Sheet 1.

M. B. KIRKER.  
VALVE GEAR FOR STEAM HAMMERS.

No. 409,845.

Patented Aug. 27, 1889.



WITNESSES.

*H. L. Gill.*  
*N. D. Corwin*

INVENTOR.

*Milton B. Kirker*  
*by W. Baxendell & Sons*  
*his Attorneys*

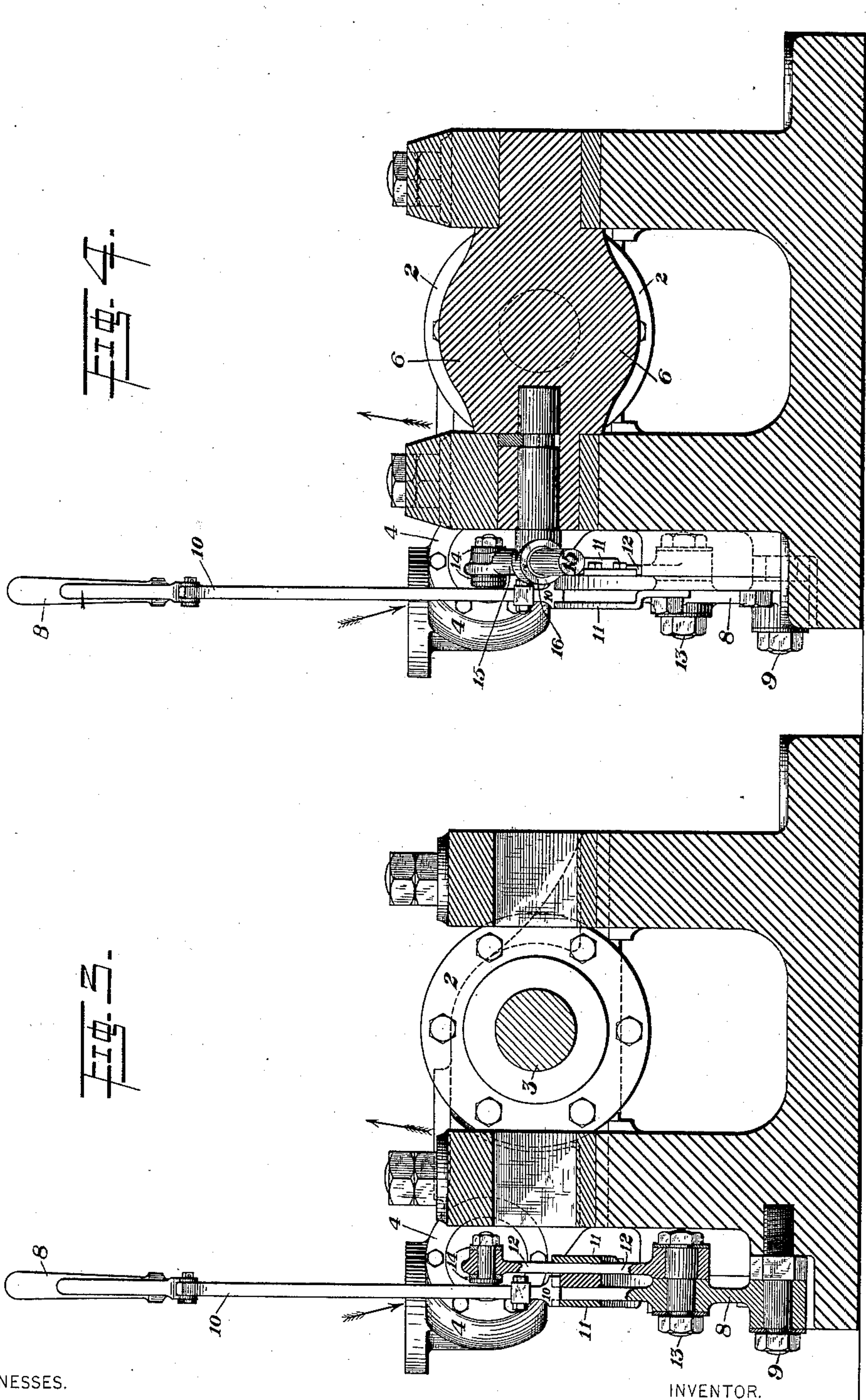
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*A. L. Gill*  
*M. B. Corwin*

INVENTOR.

*Milton B. Kirker*  
*by W. B. Darnall & Sons*  
*his Attorneys*



# UNITED STATES PATENT OFFICE.

MILTON B. KIRKER, OF MCKEE'S ROCKS, PENNSYLVANIA.

## VALVE-GEAR FOR STEAM-HAMMERS.

SPECIFICATION forming part of Letters Patent No. 409,845, dated August 27, 1889.

Application filed May 2, 1888. Renewed April 23, 1889. Serial No. 308,345. (No model.)

*To all whom it may concern:*

Be it known that I, MILTON B. KIRKER, of McKee's Rocks, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valve-Gear for Steam-Hammers; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a horizontal steam upsetting-machine or hammer provided with my improved valve-gear. Fig. 2 is a plan view thereof. Fig. 3 is a vertical cross-section on the line  $x x$  of Fig. 1 or 2. Fig. 4 is a vertical cross-section on the line  $y y$  of these figures.

Like symbols of reference indicate like parts in each.

My invention relates to an improvement in automatic devices for controlling the slide-valves of steam-hammers in such way that just before the end of the stroke is reached the slide-valve shall be moved so as to admit steam in front of the piston for the purpose of checking the piston and hammer and preventing the piston from knocking against the head of the cylinder. The reciprocations of the hammer are controlled, primarily, preferably by a hand-lever which is connected with the slide-valve, and this automatic device which I have named is used simply to govern and regulate the hammer in its action. Machines operating on the principle which I have described are not new, and I make no claim, broadly, thereto, since my invention consists only in an improved construction of the parts. The valve-gears which have heretofore been employed are not of a sort which can be conveniently applied to hammers or upsetting-machines of the kind which I have shown in the drawings, and are otherwise defective.

My invention consists in a mechanism wherein the valve is reciprocated by means of a guide projection consisting, preferably, of a swiveled ferrule fixed to the hammer, and bearing on an inclined rod or lever forming part of a bell-crank lever, which is connected with the valve-rod, and which is moved so as to operate the valve-rod by the reciprocating action of the hammer.

Referring now to the drawings, 2 represents the cylinder of the steam-hammer, 3 the piston-rod, 4 the valve-chest, 5 the valve-rod, 6 the reciprocating cross-head, which is connected with and is actuated by the piston, and 7 the frame containing the dies or anvil-block against which the hammer acts.

8 is the hand-lever, which is pivoted at 9 to the hammer-frame, and is provided with the usual latch 10 and notched quadrant 11. The short arm 12 of a bell-crank lever is pivotally connected at its lower end by a pin 13 to the lever 8, and at its upper end it is connected by a link 14 to the valve-rod 5. The long arm 15 of the bell-crank lever extends beside the steam-hammer at an inclination thereto and is inclosed by a guide projection consisting, preferably, of a ferrule 16, which is swiveled by a horizontal pivot to the side of the steam-hammer, as shown in Figs. 2 and 4.

The operation of the device is as follows: In order to move the slide-valve for the purpose of admitting steam to either end of the piston, the engineer moves the reversing-lever 8 on its pivot 9, and thereby, through the intermediate lever-arm 12 and connecting-link 14, operates the slide-valve. If the slide-valve is moved in the proper direction to cause the advance of the piston and hammer 6, the forward motion of the hammer, acting on the inclined rod 15 through the projection 16, elevates the arm 15, and thus causes the bell-crank lever 12 15 to turn upon the pivot 13, and to move back the valve-rod 5, so as to reverse the action of the engine automatically, as will be readily understood. A like action in a reverse direction takes place on the back motion of the steam-hammer, and in its continued action the hammer will automatically cut off the entrance of the steam before reaching the end of its stroke. The hammer thus protects itself from injury, and can be used by unskilled workmen without danger.

I do not limit the scope of my invention to its application to horizontal steam-hammers or upsetting-machines, since it may be applied to vertical hammers as well. The parts may also be varied in form and arrangement, especially so as regards the mode of connecting the hammer with the inclined rod 15, it being only necessary that the rod shall be

inclined to the line of motion of the hammer  
and that there shall be a projection of some  
kind on the hammer which bears thereon, the  
swiveled ferrule being shown only because it  
5 is the most convenient device which I have  
yet tried.

The advantages of my invention will be  
appreciated by those skilled in the art.

10 The mechanism is simple, not apt to get  
out of order, and may be applied with ad-  
vantage to hammers having very short heads,  
where other devices would be useless or in-  
convenient.

I claim—

15 1. The combination, with a steam-hammer  
and its slide-valve, of an interposed bell-  
crank lever connected at its angle to the slide-  
valve, having one arm fulcrumed on an oper-

ating-lever and its opposite arm in moving  
contact with the steam-hammer respectively, 20  
substantially as and for the purposes de-  
scribed.

2. The combination, with a steam-hammer  
and its slide-valve, of an interposed bell-  
crank lever connected with the slide-valve 25  
and with an operating-lever, and having one  
of its arms inclined to the line of motion of  
the steam-hammer and in moving contact  
therewith, substantially as and for the pur-  
poses specified. 30

In testimony whereof I have hereunto set  
my hand this 28th day of April, A. D. 1888.

MILTON B. KIRKER.

Witnesses:

W. B. CORWIN,

THOMAS W. BAKEWELL.