

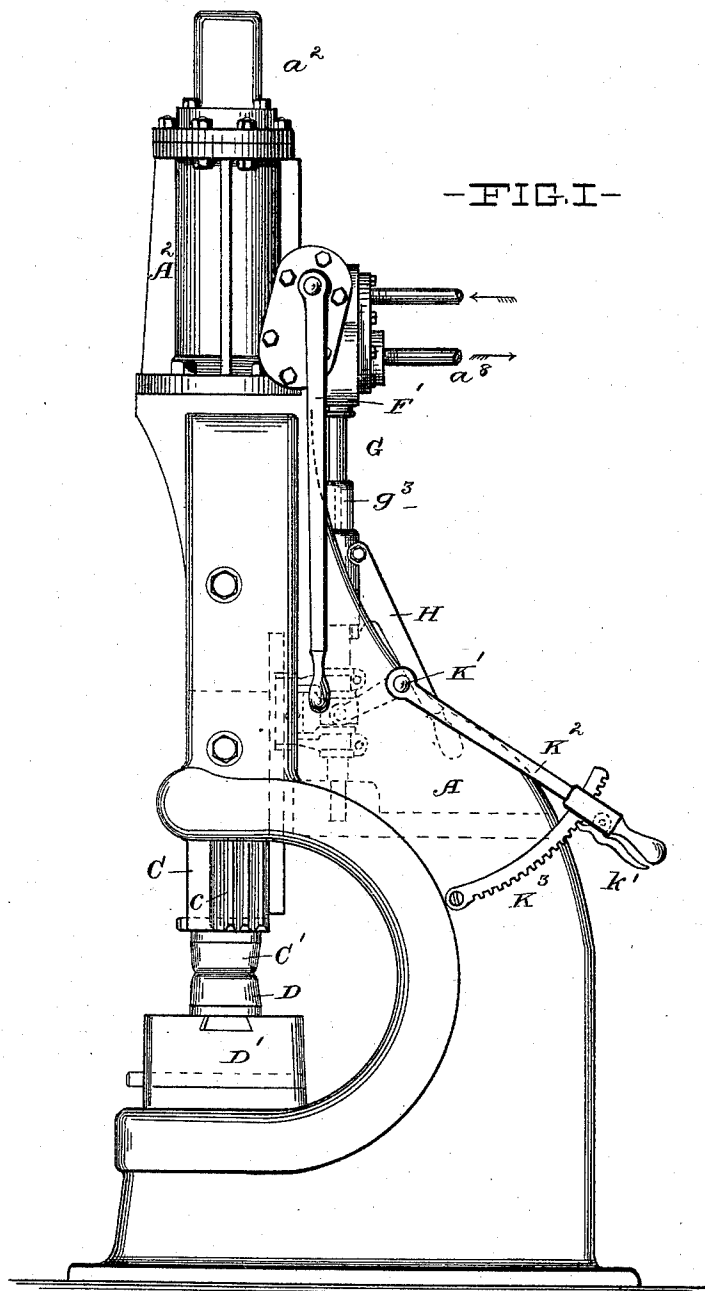
(No Model.)

5 Sheets—Sheet 1.

J. F. DOOLITTLE.
STEAM HAMMER.

No. 541,785.

Patented June 25, 1895.



Witnesses,
J. C. Turner
J. F. Lecher

Inventor,
J. F. Doolittle
By Hall & Fay
Attys.

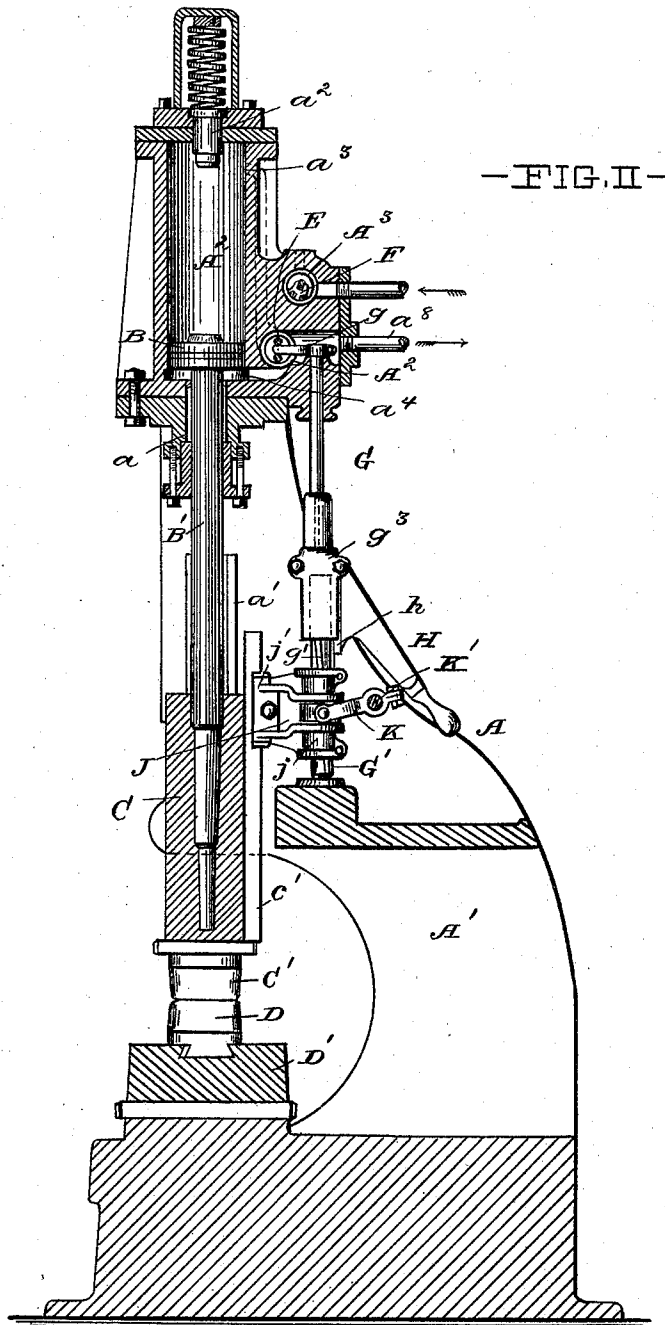
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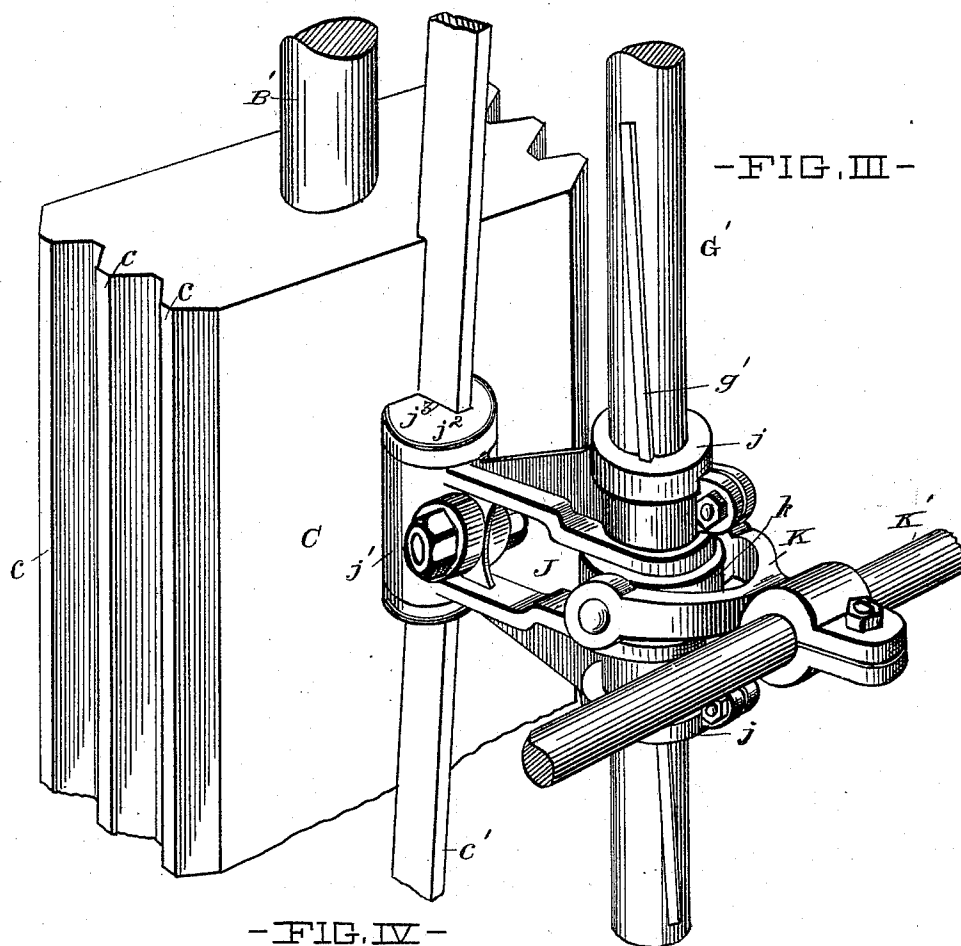
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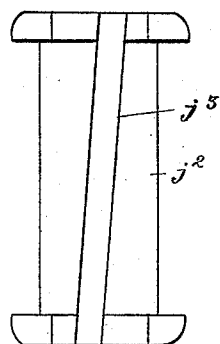
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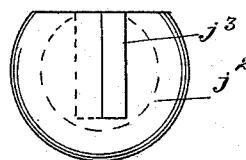
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-FIG. III-



-FIG. V-



Witnesses,

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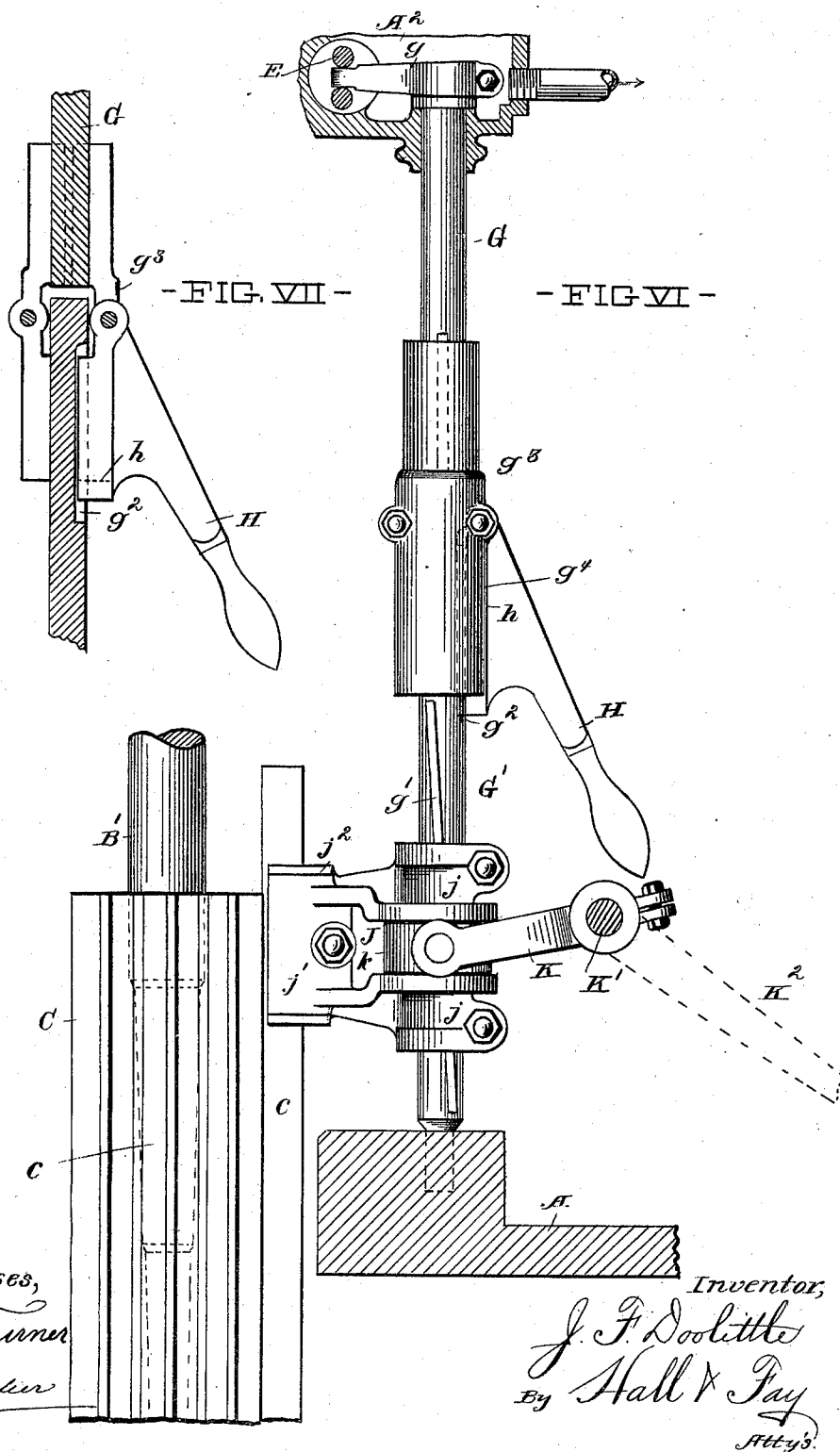
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5 Sheets—Sheet 4.

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(No Model.)

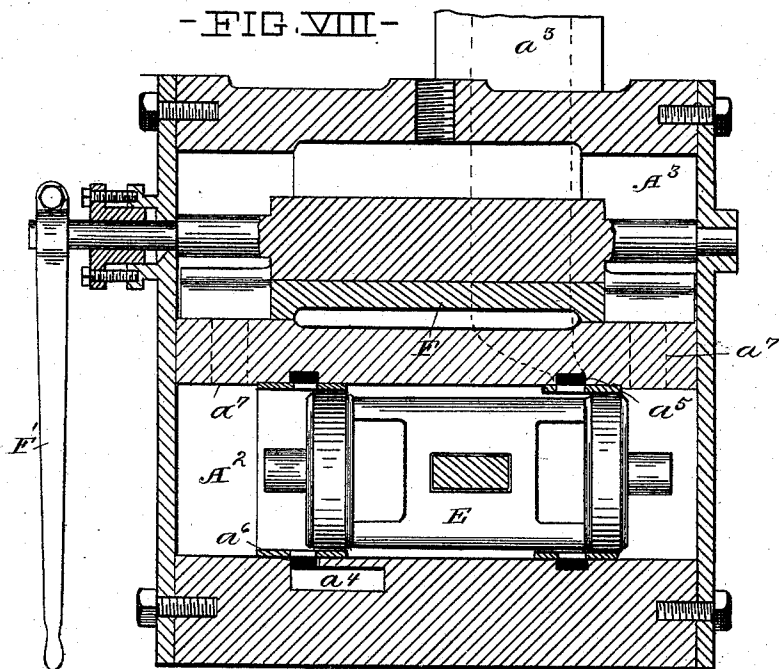
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J. F. DOOLITTLE.
STEAM HAMMER.

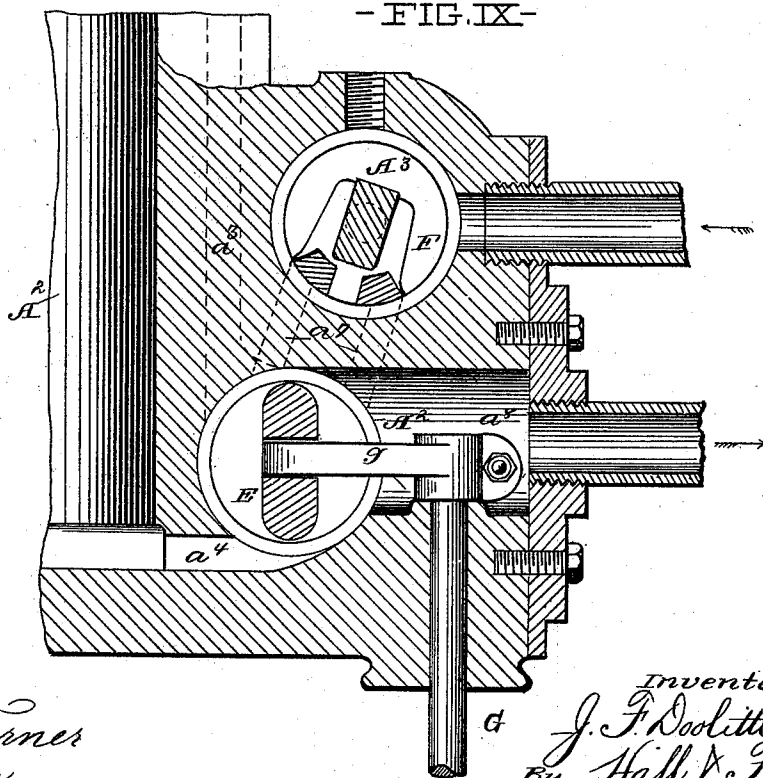
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- FIG. VIII -



- FIG. IX -



Witnesses,

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UNITED STATES PATENT OFFICE.

JOHN F. DOOLITTLE, OF CLEVELAND, OHIO.

STEAM-HAMMER.

SPECIFICATION forming part of Letters Patent No. 541,785, dated June 25, 1895.

Application filed August 4, 1894. Serial No. 519,461. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DOOLITTLE, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Steam-Hammers, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail, one mechanical form embodying the invention; such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a side view of my improved steam-hammer; Fig. II, a vertical section of the same; Fig. III, a perspective view of the mechanism for automatically and positively operating the valve mechanism when making cushioned blows; Figs. IV and V, a side view and an end view, respectively, of the bushing which plays upon the incline of the hammer; Fig. VI, a side elevation and part section of the valve-operating mechanism; Fig. VII, a sectional detail view of the connection to the valve-operating shaft of the lever which is actuated when making dead blows; Fig. VIII, an axial section of the two valve-chambers, and Fig. IX a transverse section of said valve-chambers.

The hammer is illustrated as provided with a frame, A, the upright portion of which, above the base and at and below the face of the anvil, is formed with an opening, A', so that a long forging may be placed upon the anvil from directly in front of the same and passed through the opening, thereby admitting of the forging being presented at almost every possible angle beneath the ram and upon the anvil. A steam cylinder, A², is formed in the top of the frame, and has a piston, B, reciprocating within it. The piston rod B', which is secured to this piston, slides in a suitable gland, a, in the lower cylinder head, and has the tup or ram C, suitably secured to its lower end. The ram is provided with suitable vertical guides, c, upon its sides, which slide in corresponding guides, a', upon the frame. A

suitable die, C', is secured to the lower end of the ram, and corresponds to a stationary die, D, upon the anvil D', which is either supported by or through the base. The steam cylinder has a spring buffer, a², arranged in its upper head, so that the piston may be cushioned at the extreme of its up-stroke. Steam distributing channels, a³ and a⁴, extend, respectively, from the upper and lower end of the cylinder, into a horizontal slide valve chamber, A², where they have ports, respectively, a⁵ and a⁶, which may alternately be placed into communication with live steam channels, a⁷, at each end of the slide valve chamber, and with an exhaust, a⁸, at the middle of said chamber, by means of a horizontal slide valve, E. A throttle valve, F, rocks in a horizontal throttle valve chamber, A³, and controls the live steam channels a⁷. The throttle valve has a hand lever, F', secured to its stem, by means of which it may be rocked to admit or cut off live steam to or from the live steam channels. The slide valve is horizontally moved by means of an arm, g, the free end of which has pivotal connection to the slide valve, and which is secured to radially project from the upper end of a divided valve operating shaft, G G'. The lower portion G' of said shaft is stepped in the frame, and has a spiral feather, g', upon it. The upper end of the lower portion of the valve operating shaft has a longitudinal groove, g², and fits into a socket, g³, which is secured to the lower end of the upper portion G, and in which the upper end of the lower portion may turn. A hand lever, H, is pivoted at one end to the socket, and has a feather, h, upon the inner side of its inner pivoted end, which feather passes through a longitudinal slot, g⁴, in the socket, entering the groove in the upper end of the lower portion of the valve operating shaft, thereby connecting both portions of the shaft so that they may rock as one shaft. By disengaging the feather from the groove, by raising the hand lever, the upper portion of the shaft may be rocked and the valve positively moved by means of the hand lever. Two sleeves, j, having grooves in their bores corresponding to the spiral feather upon the lower portion of the valve operating shaft, fit upon said shaft and are connected to a box, j', open at one

side, by means of short arms,—the whole forming one forked frame, J. The bore of the box is cylindrical, and a collared bushing, j^2 , fits into said bore so as to turn within it, and has a spiral groove, j^3 , in one side, which fits upon a spiral feather, c' , upon the rear side of the ram,—said feather forming the valve actuating incline when making cushioned blows. A forked arm, K, projects from a transversely journaled rock shaft, K' , and has its ends pivoted to a collar, k , fitting loosely between the sleeves of the forked frame J, so that the rocking of said shaft and arm may vertically slide the forked frame. The rock shaft has a hand lever, K^2 , upon one end, and said lever has a latch, k' , which engages a cogged segment, K^3 , so that the hand lever may be adjusted and held at varying angles to the vertical line.

When a source of live steam is connected to the live steam inlet of the throttle valve chamber, the hammer is ready for operation. The reciprocation of the slide valve in its chamber will alternately admit and exhaust steam from the ends of the steam cylinder, so that the piston and ram may be reciprocated. The throttle valve admits and cuts off live steam to or from the valve chest.

When the hammer is wanted to deliver cushioned blows, automatically controlled, steam is turned on at the throttle valve, and the incline upon the ram will rock the forked frame and the valve operating stem so as to cause the valve to properly distribute steam in the cylinder, and to cut off the exhaust before the extreme of the down-stroke of the piston, so as to cushion the blow of the ram. The length of the stroke of the hammer may be controlled by adjusting the hand lever which raises and lowers the forked frame upon the valve operating shaft, the blow being stopped earlier in the stroke, when the forked frame is raised, and later in the stroke, when the frame is lowered. When positively controlled, cushioned blows are desired, the forked frame may be reciprocated upon the valve operating shaft, rocking the latter by the action of the spiral feather upon the same, by rocking the vertically movable hand lever, and the length and force of the blow may be gaged by the extent of the movement of the hand lever. When positively controlled dead blows are desired, the horizontally swinging hand lever is sufficiently raised to disengage its feather from the groove in the lower shaft portion, when the upper portion of the valve operating shaft may be rocked by horizontally rocking the hand lever, and the slide valve may be moved to distribute steam for dead blows of the ram. Cushioned blows may, of course, also be delivered by rocking said hand lever, if the lever be reversed in its motion before the end of the desired stroke. The ram and movable die may be retained at the end of the down-stroke, with down-pressure exerted upon them, when the horizontally swinging hand lever is used, so that the ham-

mer may advantageously be used as a drop press for drop forgings or the stamping of metal articles.

It is not new in steam engines, to have the eccentric rod capable of being disconnected from the valve mechanism, and to have a handle or similar device for operating the valve rod by hand. Such devices have been employed since the early history of the marine engine for side and stern wheel steam ships, to enable the engine to be reversed or slowly operated. It is, however, impossible to apply the principles embodied in such devices to a steam hammer, as the revolving shaft and the eccentric and its rod are missing in the steam hammer. Therefore, while I do not claim to be the inventor of the principle of disconnecting the eccentric rod from the valve mechanism of a steam engine, and of positively operating the valve in such engine, I believe myself to be the first inventor of mechanism for disconnecting the distributing valve of a steam hammer from its connection to the reciprocating parts of the same, and for then actuating said valve by hand. This, I believe, has never before been done, and adds an important improvement to a steam hammer, admitting of automatically controlled and positively controlled blows being delivered, and admitting of such control of the hammer, that all kinds of blows may be delivered with as much ease of control, as if they were delivered by hand.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a steam hammer, the combination of a distributing valve, a shaft having means for being actuated by the movement of the hammer and having a detachable connection to the valve, and means for positively actuating the valve when said shaft is disconnected from the valve, substantially as set forth.

2. In a steam hammer, the combination of a distributing valve, a two-part shaft connected to actuate said valve, means for automatically actuating said shaft from the movement of the hammer, and means for positively actuating the part of the shaft connected to the valve, substantially as set forth.

3. In a steam hammer, the combination of a distributing valve, a lower shaft portion connected to be rocked by the movement of the hammer and having a groove in its upper end, an upper shaft portion connected to actuate the valve and having a slotted socket at its lower end fitting upon the upper end of the lower shaft portion, and a lever pivoted to said socket and having a feather entering the slot in the socket and the groove in the lower shaft portion, substantially as set forth.

4. In a steam hammer, the combination of

a ram provided with an incline, a distributing valve, an actuating shaft for said valve, a frame sliding upon and rocking with the shaft and constructed to rock the shaft when longitudinally moved upon the same and to be transversely rocked by the incline upon the ram, and means for longitudinally moving and adjusting the frame, substantially as set forth.

10 5. In a steam hammer, the combination of a ram provided with an oblique feather, a distributing valve, an actuating shaft for said valve provided with a spiral feather, a frame sliding upon the shaft and provided with a
15 groove which fits upon the feather of the shaft and with a box which fits upon the feather of the ram, and a lever movably connected to the frame to slide the same upon the shaft and spiral feather and thereby rock the same, sub-
20 stantially as set forth.

6. In a steam hammer, the combination of a ram provided with an oblique feather, a distributing valve, a lower shaft portion having a spiral feather and formed with a longitudi-

nal groove at its upper end, a frame having 25 two collars formed with grooves in their bores and sliding upon the shaft portion and feather and having a box, a collared bushing fitting in the box and having an oblique groove fitting upon the feather on the ram, a rock shaft 30 having a hand lever and an arm engaging between the collars of the frame, means for adjusting the lever at various angles, an upper shaft portion connected to actuate the slide valve and having a longitudinally slotted 35 socket at its lower end, and a lever pivoted at the end of the slot in the socket and having a feather which enters the slot and engages the groove at the upper end of the lower shaft portion, substantially as set forth. 40

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 3d day of August, A. D. 1894.

JOHN F. DOOLITTLE.

Witnesses:

WM. LEDUE,
DAVID T. DAVIES.