

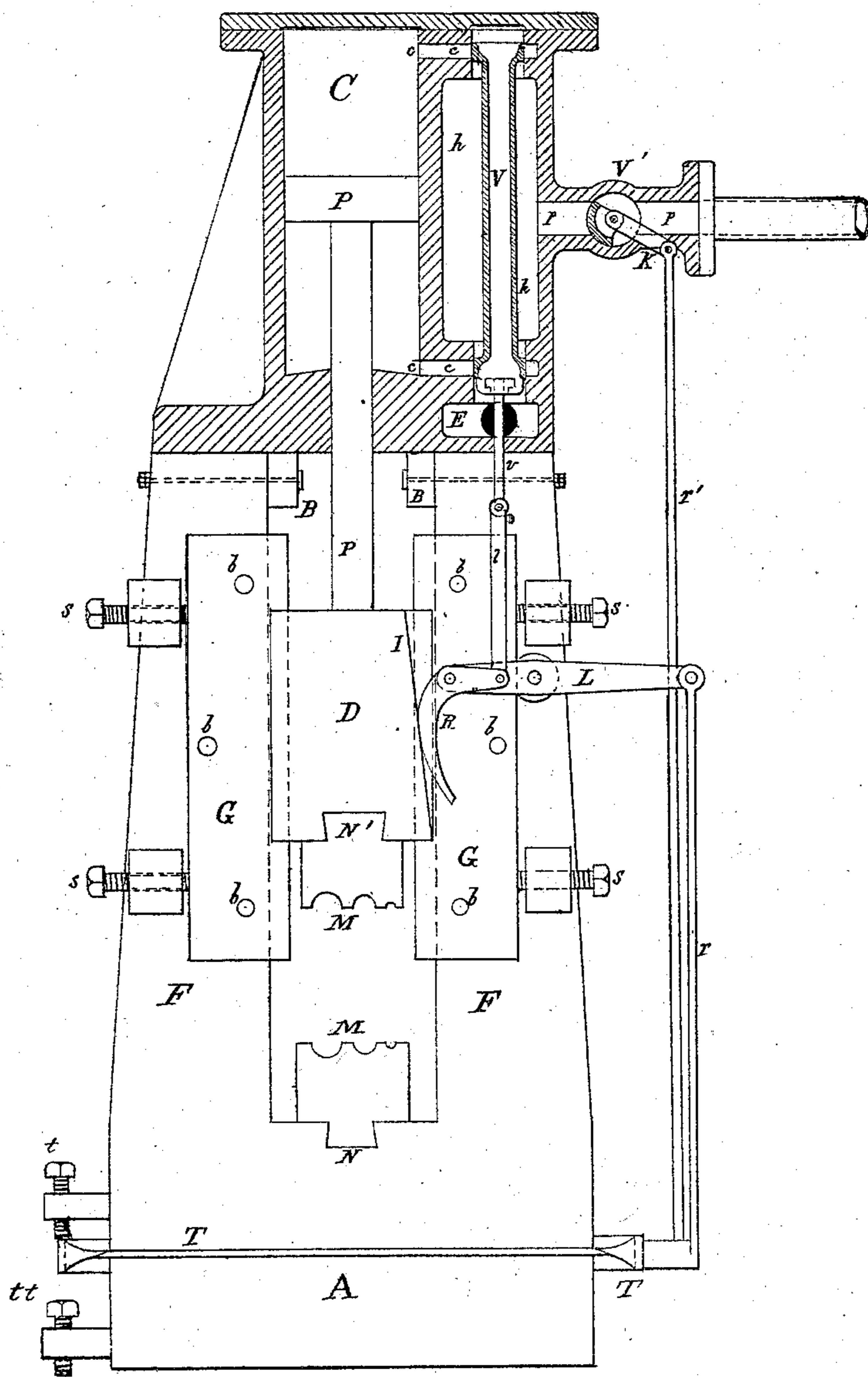
F. B. MILES.

Steam Drop Hammers.

No. 137,313.

Patented April 1, 1873.

Fig 1



Walter H. Benzey—
T. Mellon Rogers.

Frederick B. Miles

2 Sheets--Sheet 2.

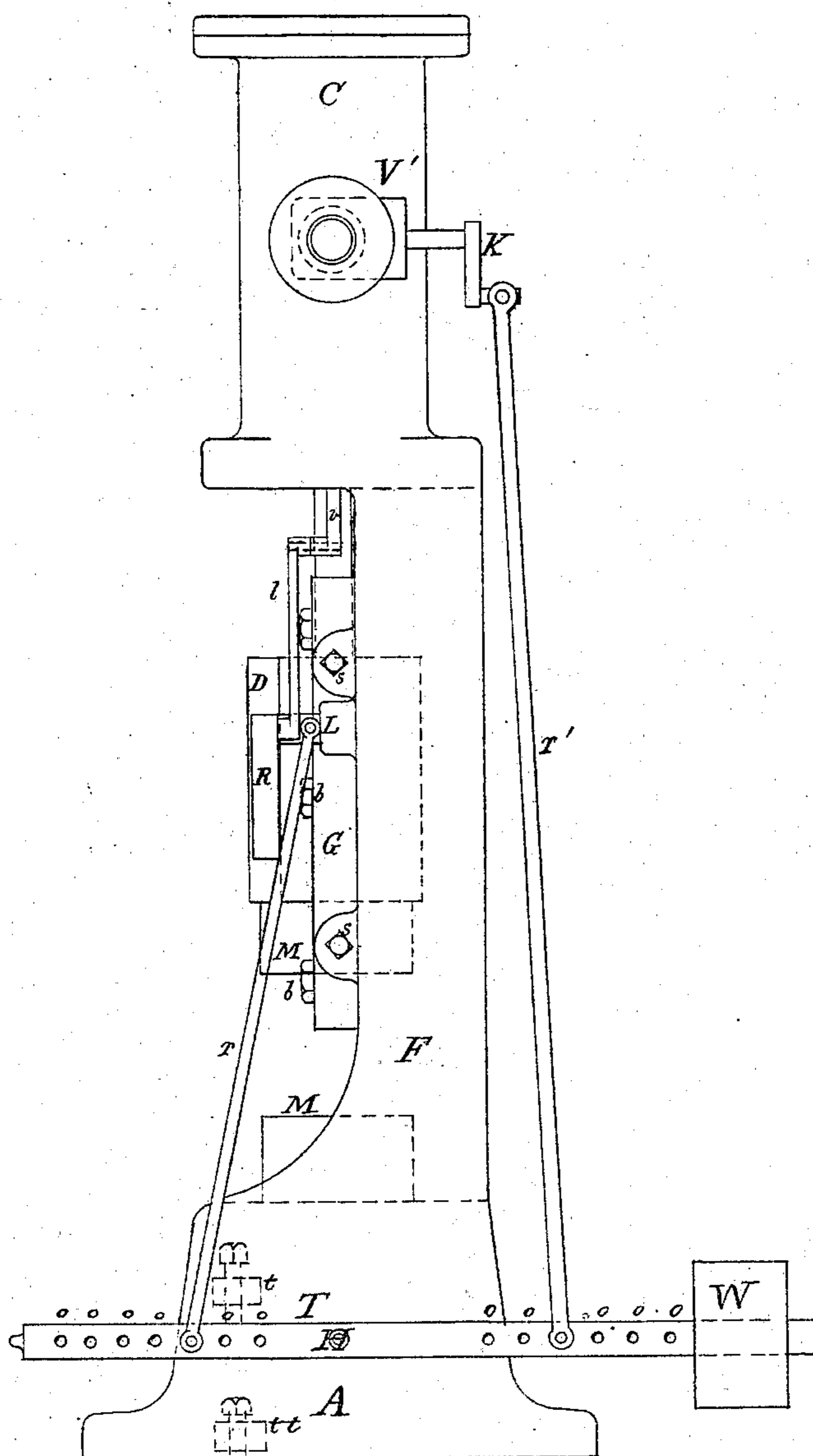
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Fig 2



*Walter H. Benzey—
T. Mellon Rogers.*

Frederick B Miles

UNITED STATES PATENT OFFICE.

FREDERICK B. MILES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
FERRIS & MILES, OF SAME PLACE.

IMPROVEMENT IN STEAM DROP-HAMMERS.

Specification forming part of Letters Patent No. **137,313**, dated April 1, 1873; application filed
July 29, 1872.

To all whom it may concern:

Be it known that I, FREDERICK B. MILES, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a Steam Drop-Hammer, of which the following is a specification:

My invention relates to the construction of a machine operated by steam that shall be adapted for use as a "drop," for the purpose of stamping masses of metal, or sheet metal, into dies or molds of any required shape. In the present state of the art this is sometimes accomplished by machinery operated by belts, pulleys, or gearing, which are very complicated and self-destructive as well as rather unmanageable. It is greatly to be desired for the improvement of many different branches of manufacture that a simpler and more manageable machine should be introduced operated directly by steam.

It is essential to the correct working of such a machine that the drop be guided truly in line so that the dies or molds may match perfectly, and that means be provided for adjusting it whenever it wears loose in its guides; also, that such governing apparatus be provided that the workmen may, by setting it in certain definite and different positions, cause the machine to deliver a light or heavy blow; and that so long as these definite positions be not altered the machine shall continue to deliver at every stroke a blow of precisely the same force, and this with positive certainty. I therefore construct a machine similar in its general features to a steam-hammer, but so arranged that the drop shall remain suspended by the steam, when not in actual operation, either at the top of its stroke or at any desired point thereof; and furnished with adjustable guide-plates set up by screws or wedges or other convenient device; and having its slide valve or valves, and also its regulator or stop valve or valves connected together by rods and levers or other convenient device in such manner that the workman or his assistant may operate them simultaneously, or in certain definite relations to each other, so as to produce by their combined and concerted action upon the piston a certain definite result, which

can be varied only by varying the relations between the valves.

Figure 1 is a front elevation, partly in section, of a machine embodying my invention. Fig. 2 is an elevation of that side of the machine which is at the right hand in Fig. 1.

A is the base or anvil, having at N a notch, into which dies or molds M are fastened. F F are the frames; C, the cylinder. D is the drop, operated by piston P working in cylinder C. N' is a notch at its lower end, into which dies or molds M M are fastened to match those in the anvil. G G are adjustable guide-plates, bolted to frames F F by bolts *b b b b*, and adjusted by set-screws *s s s s*. They may also be adjusted by wedges or other convenient device, so as to take up any play or looseness resulting from wear of drop D, or of themselves, and so keep the dies M M always perfectly matched. B B are bumpers or buffers, made of India rubber, metal springs, or other elastic material, and placed so as to receive drop D when it is thrown to the top of the stroke, and so prevent any damage to the machine. V is the main or slide valve in steam-chamber *h h*, whose office is to direct the admission and exhaustion of steam through ports *c c* above and below piston P, as required. It is in form a tube, whose ends are larger than the barrel or intermediate portion. These ends are accurately turned and fitted to the cylindrical bearings about the ports *c c* at upper and lower ends of steam-chamber *h h*, which bearings are bored perfectly true and of the same diameter. The valve is thus perfectly balanced to the steam in chamber *h h*. Any other form of balanced slide-valve will answer the purpose, but I consider this the best. E is the exhaust-chamber, from which the exhaust-pipe is taken off, as shown by black circular space in E. V' is the regulator or stop-valve, placed in the steam-pipe adjacent to steam-chamber *h h*, to which no steam is admitted except through regulator V' and pipe *p p*. T is the treadle or lever for working the valves by the workman's foot. It is pivoted at H, and has holes or other convenient device for attaching, at different points on the one side of fulcrum H, the rod *r*, which, through lever

L, rod *l*, and valve stem *v*, controls the position of the slide-valve V, and on the other side of fulcrum H the rod *r'*, which controls the regulator V' by arm K on its spindle. *t t* are adjustable screw-stops for regulating throw of treadle T; and W is a weight suspended to treadle T to keep it against upper screw-stop *t*, except when pressed down, the object in all cases being to move both valves to act together in concert upon piston P in cylinder C. This combination of rods, levers, and valves constitutes the governing apparatus.

Reciprocating motion may be conveyed to slide-valve V to make the machine automatic, by means of incline plane I on drop D, rocker R, rod *l*, and valve-stem *v*, rocker R being pivoted to lever L, as in Figs. 1, 2, and, if preferred, automatic motion may be dispensed with, and the valves coupled directly to lever L or treadle T. Any other mode of conveying reciprocating motion to valve V may be employed, so that the connection between valves V and V' be preserved.

The operation of this mechanism is as follows: We will suppose the drop D to be resting on anvil A, so that dies M M are touching treadle T, held by weight W against upper stop *t*, and length of rod *r'* such that it will just close regulator V' and prevent any steam entering chamber *h h*. The other rod *r* is of such length that in this position of things valve V is just on the point of closing lower port *c* to steam-chamber *h h*, in which there is as yet no steam. The valves are then said to be set. Steam is now admitted from the boiler, but cannot pass regulator V'. The upper stop *t* is therefore screwed down a little, elevating rod *r'* and slightly opening regulator V', so that a little steam can enter chamber *h h*. Here it finds the lower steam-port *c*, though almost closed, still accessible, and through it enters cylinder C beneath piston P in sufficient quantity to raise it, and with it drop D to the top of the stroke. The machine is then ready for action. If, now, the workman place his metal in the anvil-die M, and with his foot press down treadle T against lower stop *t t*, rod *r'* is elevated, and regulator V' opened more or less, according to which hole *o* of treadle T its rod *r'* is connected to. At the same moment rod *r*, which is depressed, draws down the outer end of lever L and elevates thereby slide-valve V, admitting steam

above piston P and allowing that below it to escape into exhaust-chamber E. Piston P will therefore descend, impelled by its own gravity, that of drop D, and the pressure of the top steam, whose quantity admitted will be greater in proportion to the distance from fulcrum H, at which the rod *r* is connected to treadle T. If, now, the workman release treadle T weight W brings it against upper stop *t*, and the valves resume their original relation; valve V descends, admitting steam beneath piston P and allowing the top steam to escape by upper port *c* and down the interior of V to exhaust-chamber E, and so out of exhaust-pipe. Piston P rises, driven by the steam beneath it, and were regulator V' left open would strike violently on bumpers B B and perhaps break some portion of the machine. But as treadle T rises regulator V' closes, cutting off the supply of steam. Drop D therefore rises with diminishing velocity, and remains suspended until treadle T is again pressed down.

If the machine be furnished with automatic motion it will go on striking of itself as long as treadle T is held down; and the length of rod *r* must be so adjusted that rocker R will not entirely close lower port *c* when treadle T is released and drop D rises. The workman can, therefore, by selecting the proper holes *o o o o o o o o*, for attaching rods *r* and *r'*, obtain the result he has found best suited for each kind of work, and with the perfect certainty that the same holes will always produce the same result, upon which he can calculate safely; and furthermore, that the machine will always deliver precisely the same blow at each stroke.

I claim as my invention—

1. The drop D, piston P, and guide-plates, in combination with valves V V' and mechanism, substantially as described, for connecting and operating the same.

2. The treadle T with adjustable screw-stops *t t t* and holes *o o o o o o o o*, in combination with rods *r* and *r'* connecting it to valves V and V'.

3. The bumpers B B in combination with the drop D, when arranged in the manner and for the purpose substantially as specified.

FREDERICK B. MILES.

Witnesses:

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