

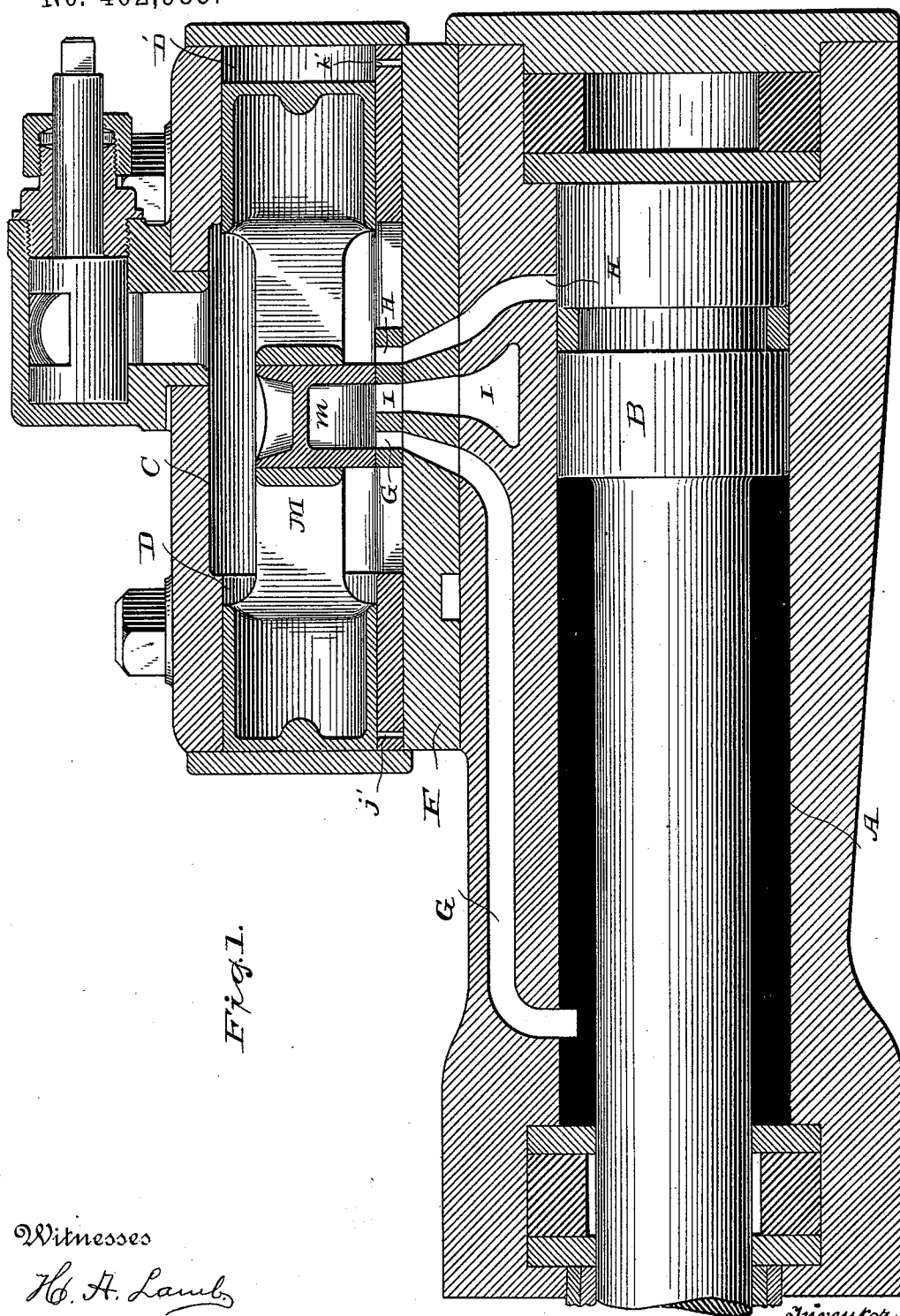
(No Model.)

2 Sheets—Sheet 1.

H. C. SERGEANT.
VALVE FOR ENGINES.

No. 402,985.

Patented May 7, 1889.



Witnesses

H. A. Lamb.

Joseph Becker

Inventor

Henry C. Sergeant.

By his Attorney

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Frankland James.

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Fig. 3.

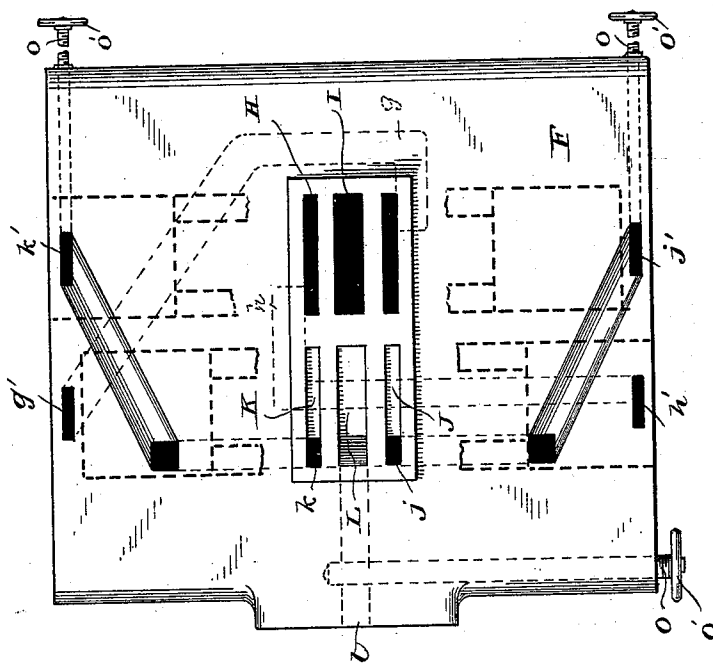
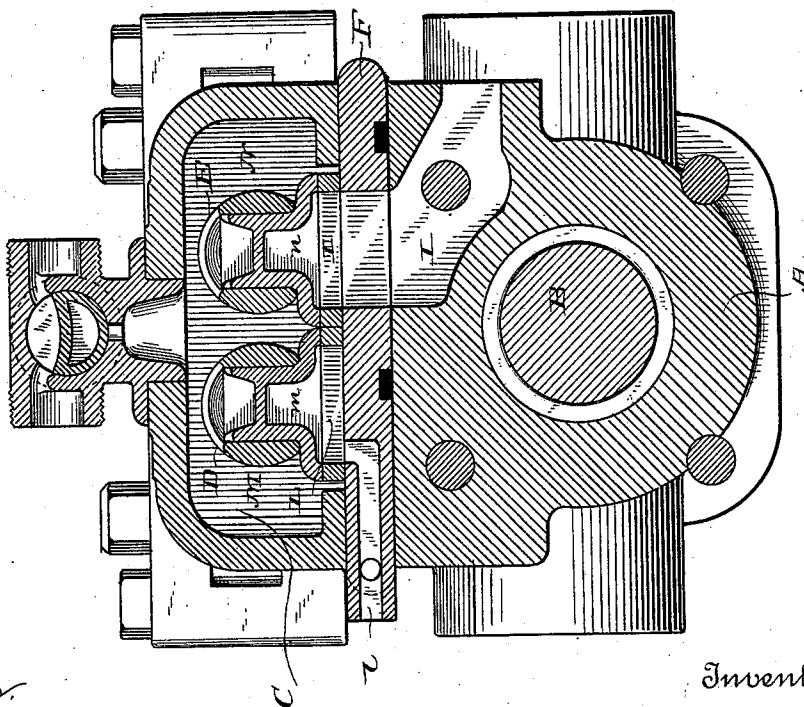


Fig. 2.



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UNITED STATES PATENT OFFICE.

HENRY CLARK SERGEANT, OF NEW YORK, N. Y., ASSIGNOR TO THE INGER-SOLL-SERGEANT ROCK DRILL COMPANY, OF SAME PLACE.

VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 402,985, dated May 7, 1889.

Application filed August 10, 1888. Serial No. 282,418. (No model.)

To all whom it may concern:

Be it known that I, HENRY CLARK SERGEANT, a citizen of the United States, residing at New York city, in the county of New York, State of New York, have invented certain new and useful Improvements in Automatic Valves for Steam and Air Engines, of which the following is a description.

My invention relates to improvements in valves for reciprocating engines. As herein shown, my improved valve mechanism is applied to a drilling-engine; but it will be apparent that it is adapted for use in connection with reciprocating engines generally.

The invention comprises a steam (or air) actuated piston, to which the main slide-valve of the engine is attached, said piston being reciprocated within the steam-chest to shift the slide-valve in the necessary manner. Instead, however, of being actuated by steam from the main cylinder or controlled by the movement of the engine, a second similar piston is provided, said auxiliary piston also carrying a slide-valve and acting to control the motions of the main-valve piston irrespective of the movements of the engine.

In carrying out my invention the steam-chest is formed with a duplex system of ports and passages, one set extending to the main cylinder in the usual manner, but provided also with auxiliary passages extending to the opposite side of the steam-chest and controlled by the main-valve piston, and an auxiliary set of ports controlled by the auxiliary-valve piston and provided with a second set of passages likewise crossing to the opposite side of the steam-chest. The steam-chest itself is formed with two sets of single-acting cylinders placed side by side and in which the two steam or air actuated pistons are reciprocated, each moving a slide-valve for opening and closing the sets of ports referred to. A separate exhaust-passage, provided with means for varying its area, serves to control the speed of the auxiliary-valve-actuating piston, both valve-pistons being thus rendered wholly independent of the movement of the piston in the main cylinder.

In the accompanying drawings, Figure 1 is a sectional elevation of the cylinder, steam-

chest, and adjacent parts of a reciprocating engine embodying my invention. Fig. 2 is a transverse sectional end view thereof; and Fig. 3 is a plan view on the line 3 3 of Fig. 2, the positions of the valve-actuating pistons being diagrammatically indicated in heavy dotted lines.

Similar letters denote like parts throughout.

As illustrated in the drawings, A is the main cylinder and B the piston.

C represents the steam-chest, which is formed with two short single-ported cylinders at each end, which are marked D E and D' E', respectively.

F indicates a plate of metal interposed between the steam-chest and cylinder, and in which the auxiliary ports and passages are formed. The plate F will be referred to as the "valve-plate."

G and H represent the main ports, extending, respectively, to the forward and rear end of the main cylinder. I is the main exhaust-port. From the port G an auxiliary passage, *g*, formed in the valve-plate F, extends around and across the valve-plate, issuing at port *g'*, on the opposite side of the steam-chest. From the port H a similar passage, *h*, extends across and issues at port *h'*, also on the opposite side of the steam-chest.

J K indicate the auxiliary set of steam-ports, which, as seen, are located close to and in the same transverse plane as the ports G H, and comprise supply-ports J K and an exhaust-port, L. The port J leads through passage *j*, which is of less area than the port itself, and issues through port *j'* on the opposite side of the steam-chest. The port K extends by passage *k*, which similarly issues on the opposite side of the steam-chest by port *k'*.

The various ports and passages just referred to could of course be formed by cores in the main body of the metal of the cylinder A when said cylinder is cast; but for greater accuracy I prefer to form them in the valve-plate F, which can be readily planed and fitted, and is secured to the side of the said cylinder. Parts of the passages *g h* are open on one side of the plate F, as are parts of the passages *j* and *k* on its opposite side.

These are, however, tightly closed when the plate is in position, the metal of the cylinder A closing those on the lower side of the plate, and the end portions of the steam-chest closing those on the upper surface of the plate.

M is the main - valve - actuating piston, formed with cylindric end portions adapted to move under steam-pressure in the cylinders D D' of the steam-chest. The main slide-valve *m*, which moves upon the ports G H, is shown as being secured to the central portion of the piston M.

N is the auxiliary-valve-actuating piston, which moves in cylinders E E', the counterpart of piston M, so that their positions may be changed should one wear faster than the other. The piston N is attached to slide-valve *n*, moving upon the auxiliary ports J K.

It will be evident that the form of the valve-actuating pistons may be greatly varied, so long as one controls the other and they move independently of the main piston. The location of the said pistons may also be varied, as good results would also be secured were they separated by the entire width of the steam-chest and the slide-valves arranged in the space between them. Other immaterial changes might also be suggested.

The auxiliary exhaust-port L communicates with exhaust-passage *l*, which latter is provided, as also may the ports *j' k'*, with a controlling device—such, for example, as the screw-bolts O, having hand-wheels O'. By adjusting the appropriate bolt O the exhaust from cylinders D D' of the main-valve piston, as also the supply, can be throttled to any desired extent, and the speed of movement of the valves regulated, as desired.

The operation of the device is as follows:
 40 When the main-valve piston M is at the forward end of its stroke, the auxiliary - valve piston N will be in its rearward position. The cylinder E will then exhaust through port *h'*, the exhaust escaping through passage *h* and main auxiliary-port I. The piston M will now receive steam in cylinder D through port J, passage *j*, and port *j'*, and exhaust through port *k'*, passage *k*, its exhaust finding escape through the auxiliary exhaust-port L. Steam (or air) being continuously supplied from the steam-chest will now pass through main port G, auxiliary passage *g*, and through port *g'* to cylinder E', driving the auxiliary piston into its opposite position and opening auxiliary port K, through which steam or air will then pass by passage *k* and port *k'* and through the main piston M, thus completing a reversal of their positions and causing them subsequently to exhaust through the opposite set of ports and passages. These movements will continue alternately so long as steam or compressed air is supplied, and the speed at which the valve-actuating pistons move is readily controlled by means of the throttle or regulator O, by which the area of the exhaust-passage *j* is increased or diminished.

It will be understood that while, for purposes of illustration, I have described my improvements specifically I do not limit myself to the constructions or precise forms shown, since they may be modified in many respects without departing from the spirit or scope of the invention.

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

1. In a reciprocating engine, means for opening and closing the supply-ports thereof, comprising a pair of valve-actuating pistons driven by the motive fluid independent of the movement of the main piston, substantially as described.

2. In a reciprocating engine, the combination, with the main supply-ports and cylinder, of two valves arranged to move in alternation and to control the necessary supply ports and passages to produce said alternating motion independent of the movement of the main piston, substantially as described.

3. In a reciprocating engine, valve-operating mechanism therefor, consisting of a pair of reciprocating pistons, one of which is connected to and moves the main valve of the engine, the other operating a similar valve controlling the movements of the valve-controlling pistons independent of the movement of the main piston, substantially as described.

4. In a reciprocating engine, the combination, with the main supply-valve thereof, of a steam or air actuated piston for reciprocating the same, a second similar valve, and ports and passages in the steam-chest for imparting alternating reciprocating movement to the valve-controlling pistons independently of the movement of the main piston, substantially as described.

5. A reciprocating engine having a steam or air actuated piston arranged to open and close the main supply and exhaust ports independently of the movement of the main piston, an auxiliary piston and valve-controlling ports and passages for actuating the main-valve piston, and a contractible passage or passages for regulating the speed of the main-valve piston, substantially as described.

6. In a reciprocating engine, the combination of pistons M N, main valve *m*, attached to piston M, and an auxiliary valve attached to piston N, main supply-ports, and an auxiliary set of ports controlled by the piston N, valve-passages leading from said ports to actuate the piston M, and passages leading from the main ports to give motion to the piston, substantially as described.

7. In a reciprocating engine, the combination of pistons M N, main valve *m*, attached to piston M, and an auxiliary valve attached to piston N, main supply-ports, and an auxiliary set of ports controlled by the piston N, valve-passages leading from said ports to

actuate the piston M, passages leading from the main ports to give motion to the piston N, and a contractible exhaust-passage, Q, substantially as described.

- 5 8. The valve-actuating pistons M N, in combination with the steam-chest J, having oppositely-located cylinders to receive the pistons, and an enlarged central portion to per-

mit the free passage of steam or air to the ports, substantially as described.

In testimony whereof I hereto affix my signature in presence of two witnesses.

HENRY CLARK SERGEANT.

Witnesses:

W. B. W. BUNGEIRS,
C. H. SERGEANT.