

H. F. GASKILL.  
Pumping-Engine.

No. 217,526.

Patented July 15, 1879.

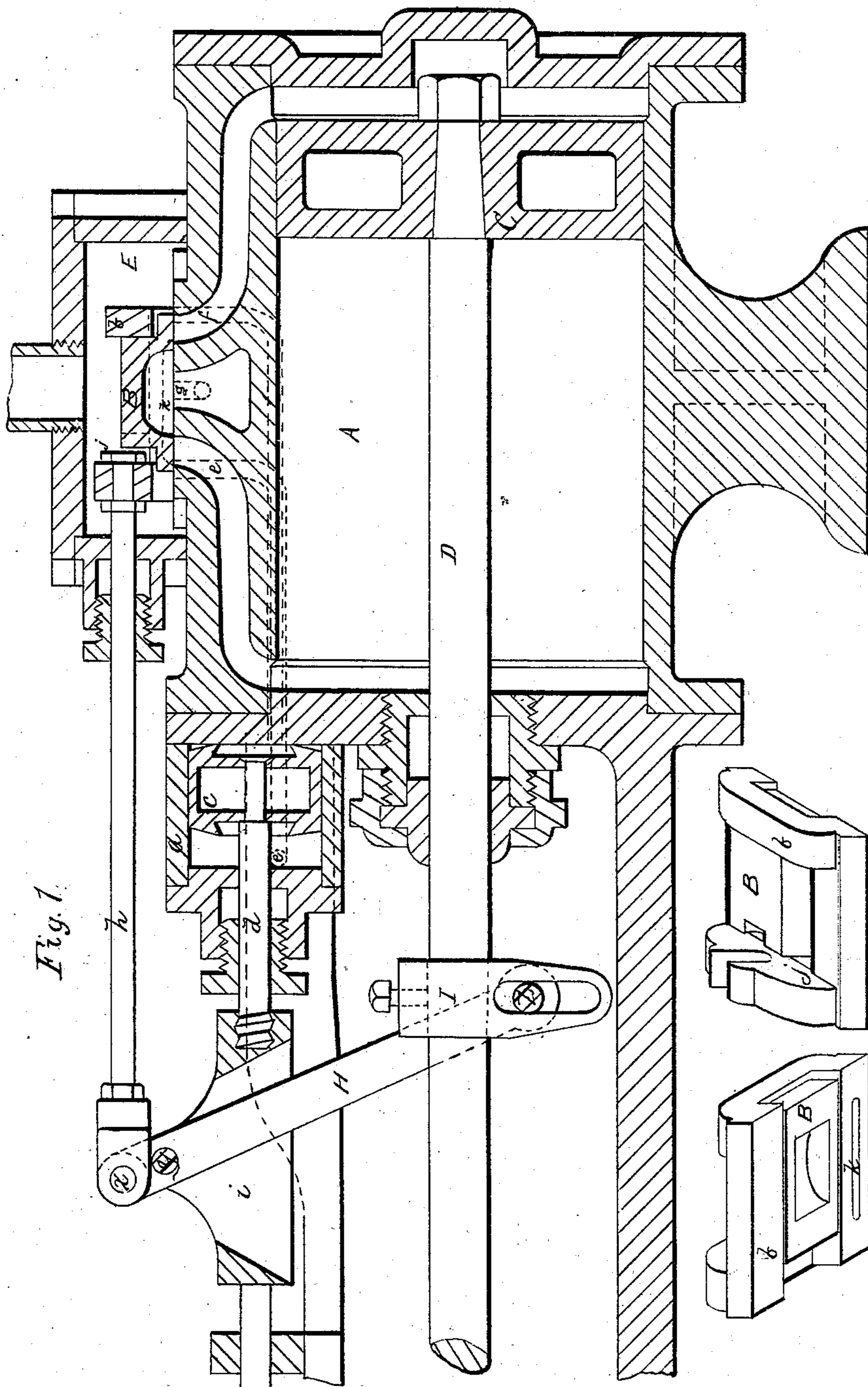


Fig. 1.

Fig. 3.

Fig. 2.

Witnesses  
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN PUMPING-ENGINES.

Specification forming part of Letters Patent No. **217,526**, dated July 15, 1879; application filed April 15, 1879.

*To all whom it may concern:*

Be it known that I, HARVEY F. GASKILL, of Lockport, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Direct-Acting Pumping-Engines, of which the following is a specification.

My invention relates to the class of engines which transmit reciprocating motion direct from the piston-rod.

Its main object is to cause the piston to reverse quietly and without shock, and this is done by giving the valve a motion similar to that produced by the ordinary eccentric of fly-wheel and similar engines.

The benefit of such an arrangement in direct-acting engines is obvious, as the sudden and violent changing of the motion common to such engines is very destructive to the machinery.

To enable others skilled in the art to fully understand my invention, I will now describe an embodiment of it.

In the accompanying drawings, Figure 1 is a longitudinal section of part of an engine containing my invention. Fig. 2 is a perspective bottom view of the main and auxiliary valves, and Fig. 3 is a perspective top view of the same.

A is the main steam-cylinder, of ordinary construction. C is the main piston, and D the main piston-rod. *a* is an auxiliary cylinder, attached to the forward head of the main cylinder, and having an auxiliary valve, *b*, in the chest E. This auxiliary cylinder receives and exhausts its steam through the small ports or openings *e f g*, which all terminate in the valve-chest E at one side of the main-cylinder ports.

The duct or passage *e* communicates with the forward end of the auxiliary cylinder *a*, and the passage *f* with the rear end of the same. *g* in dotted lines is the exhaust of the auxiliary cylinder, and communicates with the exhaust of the main cylinder.

H is a lever, connected at its upper end, at *x*, to the valve-rod *h*, and pivoted, at *y*, to a yoke, *i*, in the piston-rod *d* of the auxiliary cylinder. This lever is connected, at its lower end, Z, with the main piston-rod D, either by

the slotted connection I or by a link or other equivalent device. The valve-stem *h* is connected to the auxiliary valve *b*, and this latter forms a cage about the main valve B, and gives it motion; and as the main valve is somewhat shorter than the space inside the auxiliary valve the latter will move farther than the former, and will have a motion at the beginning of its stroke before it begins to move the main valve.

The main piston C operates on the lever H to close the main valve B during the latter part of its stroke, the first part of the stroke being taken up in moving the auxiliary valve through the space *j*, Figs. 1 and 3, and during this operation H has its fulcrum at *y*.

The mechanism is so arranged that when the valve B has the main-cylinder port nearly closed the auxiliary valve opens the auxiliary port at the other end of the valve-chest, at the same time connecting the other auxiliary port with the exhaust by means of recess *k*, so that the auxiliary piston *c* travels the length of its cylinder, and by so doing causes the valve to complete its stroke, thus opening wide the main port and admitting steam to the other side of the main piston. The main piston will then start in the opposite direction.

As already explained, the main valve B will have no motion until the auxiliary valve has traversed the space *j* between it and the main valve, and the main port will remain wide open during that time.

The several parts should be so proportioned that in case the auxiliary piston *c* from any cause should not start at the proper time the continued movement of the main piston C beyond its usual and proper limit will open the main port communicating with that end of the cylinder toward which it is approaching wide enough to prevent collision with the cylinder-head.

The motion of piston C is gradually decreased toward the end of its travel by the gradual closing of the admission-port, and in no case can it strike the cylinder-head, no matter how rapid its movement may be while in transit.

Having thus described my invention and one embodiment of it, what I claim is—

1. In combination with the main piston of a direct-acting engine, a lever with a movable fulcrum for operating the valve and a device for shifting the fulcrum of the lever, substantially as described.

2. The combination of main piston C, auxiliary piston c, and lever H, with its movable fulcrum, substantially as described.

3. The combination of the main valve and the auxiliary valve with the lever H, having a movable fulcrum, substantially as described.

4. The auxiliary valve b, receiving part of its

motion from the main piston and part of its motion from the auxiliary piston, in combination with said main piston and auxiliary piston, substantially as described.

5. The combination of the main piston C, the auxiliary piston c, the main valve, and the auxiliary valve with the lever having a movable fulcrum, substantially as described.

HARVEY F. GASKILL.

Attest:

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