(No Model.) 2 Sheets—Sheet 1.

S. M. KEPLINGER.

VALVE FOR STEAM ENGINES.

No. 400,919. Patented Apr. 9, 1889.

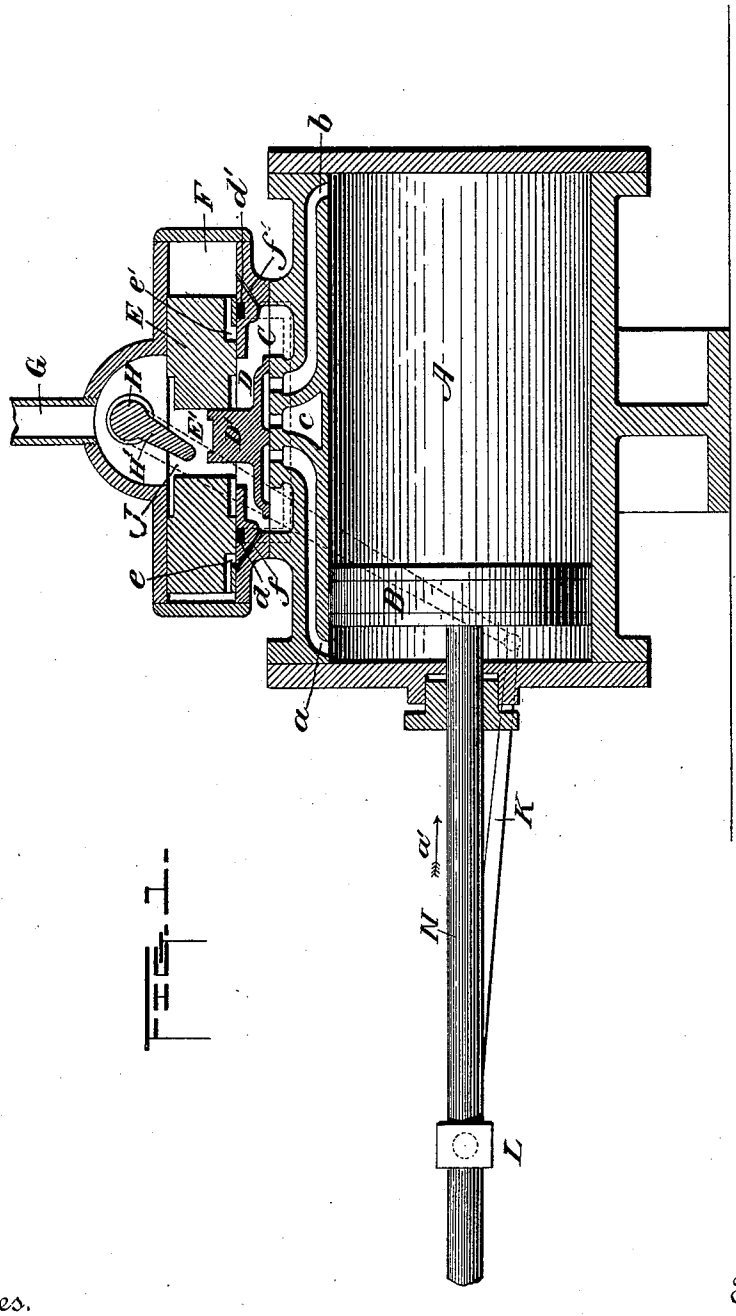


Fig. 1.

Witnesses.
N. B. Corwin
N. L. Gill

Inventor.
Samuel M. Keplinger
by M. Burnell & Sons
Attorneys

N. PETERS. Photo-Lithographer. Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

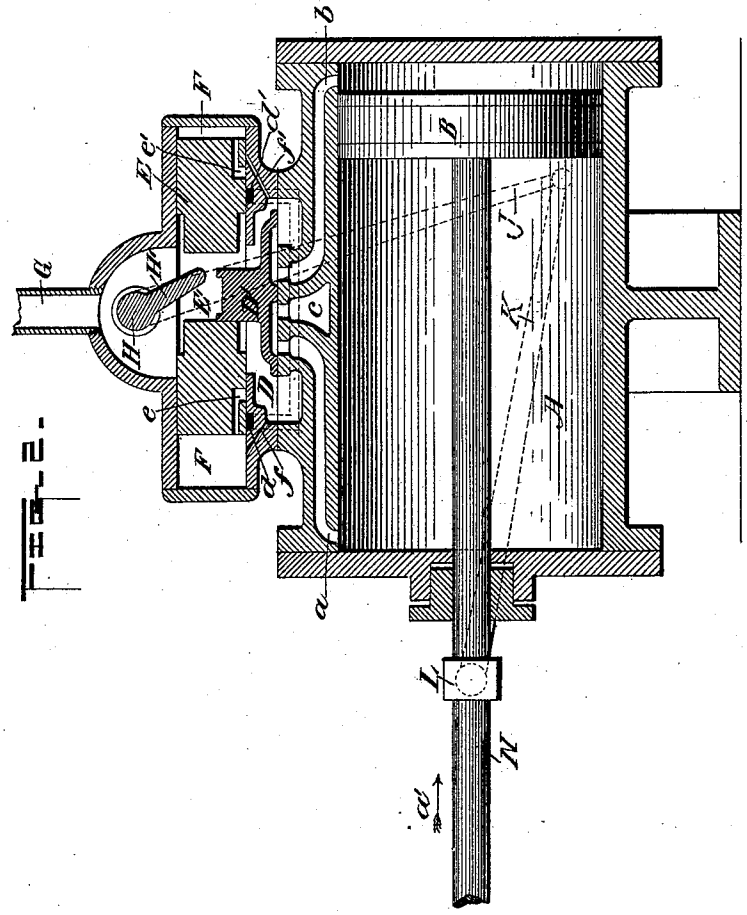
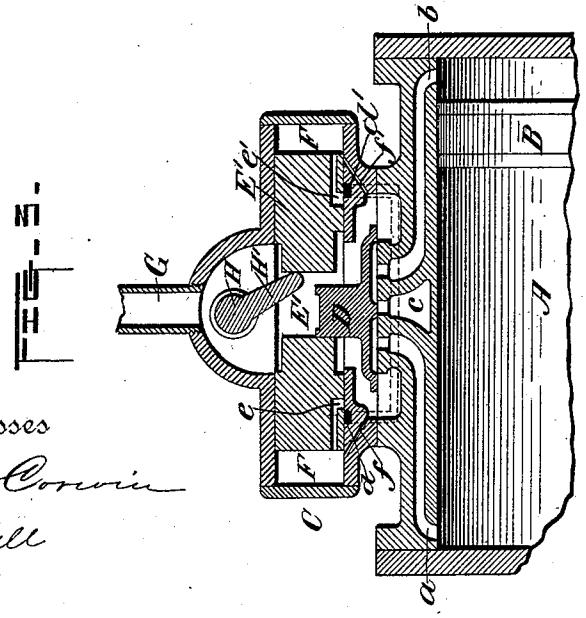


FIG. 3.



Witnesses
W. B. Corwin
H. L. Gill

Inventor
Samuel M. Keplinger
by W. Baxendell & Sons
Attorneys

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL M. KEPLINGER, OF FRANKLIN, PENNSYLVANIA.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 400,919, dated April 9, 1889.

Application filed May 21, 1888. Serial No. 274,496. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. KEPLINGER, of Franklin, in the county of Venango and State of Pennsylvania, have invented a new and useful Improvement in Valves for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to steam-valves of direct-acting engines for pumping and other purposes.

The object of the invention is to provide a new and improved valve which is very simple and durable in construction and very effective in operation.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

I will now describe my improvement, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation of the improvement as applied. Fig. 2 is a like view of the same in another position. Fig. 3 is a like view of the same in still another position.

Like letters of reference indicate like parts in each.

In the steam-cylinder A the piston B operates between the steam-inlet ports *a* and *b*, leading from the said cylinder to the steam-chest C, in which operates the slide-valve D, over the said inlet-ports *a* and *b* and the exhaust-port *c*. On the top of the slide-valve D, in its middle, is held a lug, D′, projecting into a slot, E′, formed in the auxiliary piston E, held to slide in the auxiliary cylinder F, into which opens the steam-inlet pipe G. Into the slot E′ also projects a finger or arm, H′, secured to a rock-shaft, H, mounted transversely in the top of the auxiliary cylinder F, and carrying on one outer end an arm, J, pivotally connected with the rod K, which is itself pivotally connected with the outer end of the cross-head L, secured to the piston-rod N, fastened to the piston B. From the exhaust-steam port or passage *c* branch the channels *d* and *d′* to the right and left, said channels registering alternately with the L-shaped channels *e* and *e′*, formed in the ends of the auxiliary piston E. From the steam-chest C lead the live-steam ports or small channels *f* and *f′* into the respective ends of the auxiliary cylinder F.

The operation is as follows: In the position shown in Fig. 1 the live steam, entering the inlet-pipe G, passes to the steam-chest C and from the latter to the open port *a*, and through the same into the inner end of the cylinder A. The pressure of the live steam forces the piston B outward in the direction of the arrow *a′*, and when the piston B has completed about one-half of its stroke the cross-head L has moved the rod K in the direction of the arrow *a′*, whereby the shaft H is turned, and the finger H′ is swung to the right, so that it is brought in contact with the auxiliary piston E, which on the further forward motion is caused to slide to the right by the said finger H′ until the inner end of the channel *e* has passed the channel *d*, leading to the exhaust-port *c*, and the channel *f* opens into the left end of the auxiliary cylinder F. When the piston B is at full stroke, just before the main slide-valve D is on dead-center, as in Fig. 3, going toward the right, the channel *f′* is closed and the channel *f* is open, the channels *e′* and *d′* are open, and the channels *e* and *d* are closed. The pressure at the right end of the auxiliary piston E is now released through the exhaust-channels *e′* and *d′*. The channels *e* and *d* on the left end of the auxiliary piston E being closed, the pressure of the live steam now going through the small channel *f* forces the main auxiliary piston E to the right; but sufficient steam remains in the right end of the auxiliary cylinder F to form a cushion, owing to the lap of *e′* and *d′*. This completes the outward throw of the main auxiliary piston E and main slide D, as shown in Fig. 2. The auxiliary piston E by the last movement acts on the lug D′ of the slide-valve D, and causes the latter to slide to the right, so that the live-steam port *a* is closed to the live steam and connected with the exhaust-port *c*, while the other inlet-port, *b*, is opened. The live steam now passes from the steam-chest C through the port *b* into the outer end of the cylinder A, whereby the piston B is forced to make its return-stroke. When the piston B has made about one-half of its return-stroke, the finger H′ shifts the auxiliary piston E to the left

until the channel e' passes the exhaust-channel d', and the channel f' opens into the right end of the auxiliary cylinder F. The piston B then completes its inward stroke, and just before the main slide-valve D is on dead-center going toward the left the channel f' is open and the channel f is closed, the channels e' and d' are closed, and the channels e and d are open. The pressure at the left end of the auxiliary piston E is now released through the channels e and d. The channels e' and d' on the right end of auxiliary piston E being closed, the pressure of the live steam going through the small channel f' forces the main auxiliary piston E to the left; but sufficient steam remains in the left end of the auxiliary cylinder F to form a cushion, owing to the lap of e and d. This completes the inward throw of the auxiliary piston E and main slide-valve D', and starts the main piston to make its outward stroke again.

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

1. The combination, with a steam-cylinder and a slide-valve operating over the usual ports of the steam-cylinder, of an auxiliary piston loosely connected with the said slide-valve and an auxiliary cylinder receiving the auxiliary piston, and having ports connecting its ends directly with the steam-chest and other ports connecting it with the exhaust, and a rocking finger loosely connected to said auxiliary piston to give it an initial movement, which traps live steam from the steam-chest in that end of its cylinder toward which said auxiliary piston is moving to cushion the piston, and lets in live steam at the other end of the said cylinder to finish the stroke of the auxiliary piston and the slide-valve, substantially as described.

2. The combination, with a steam-cylinder and a slide-valve operating over its ports, of an auxiliary piston loosely connected with the slide-valve and having an exhaust-channel in each end, and an auxiliary cylinder for said piston provided with channels leading from the live-steam chest to each of its ends, and also provided with channels extending to the exhaust-port of the cylinder and adapted to register with the exhaust-channels of the auxiliary piston, and an initial motor for the auxiliary piston—such as a finger rocked from the main piston-rod—which moves the auxiliary piston a distance sufficient to put one or the other of its channels in communication with the exhaust and to open the live-steam channel in the auxiliary cylinder at the opposite end to let in live steam from the steam-chest, which live steam, acting upon the auxiliary piston, moves it to close the exhaust, and thereby entrap some live steam at the leading end to cushion the piston, and completes the stroke of the auxiliary piston, and through it finishes the stroke of the slide-valve, substantially as described.

In testimony whereof I have hereunto set my hand this 8th day of May, A. D. 1888.

SAMUEL M. KEPLINGER.

Witnesses:
E. W. SMILEY,
GEO. S. CRISWELL.