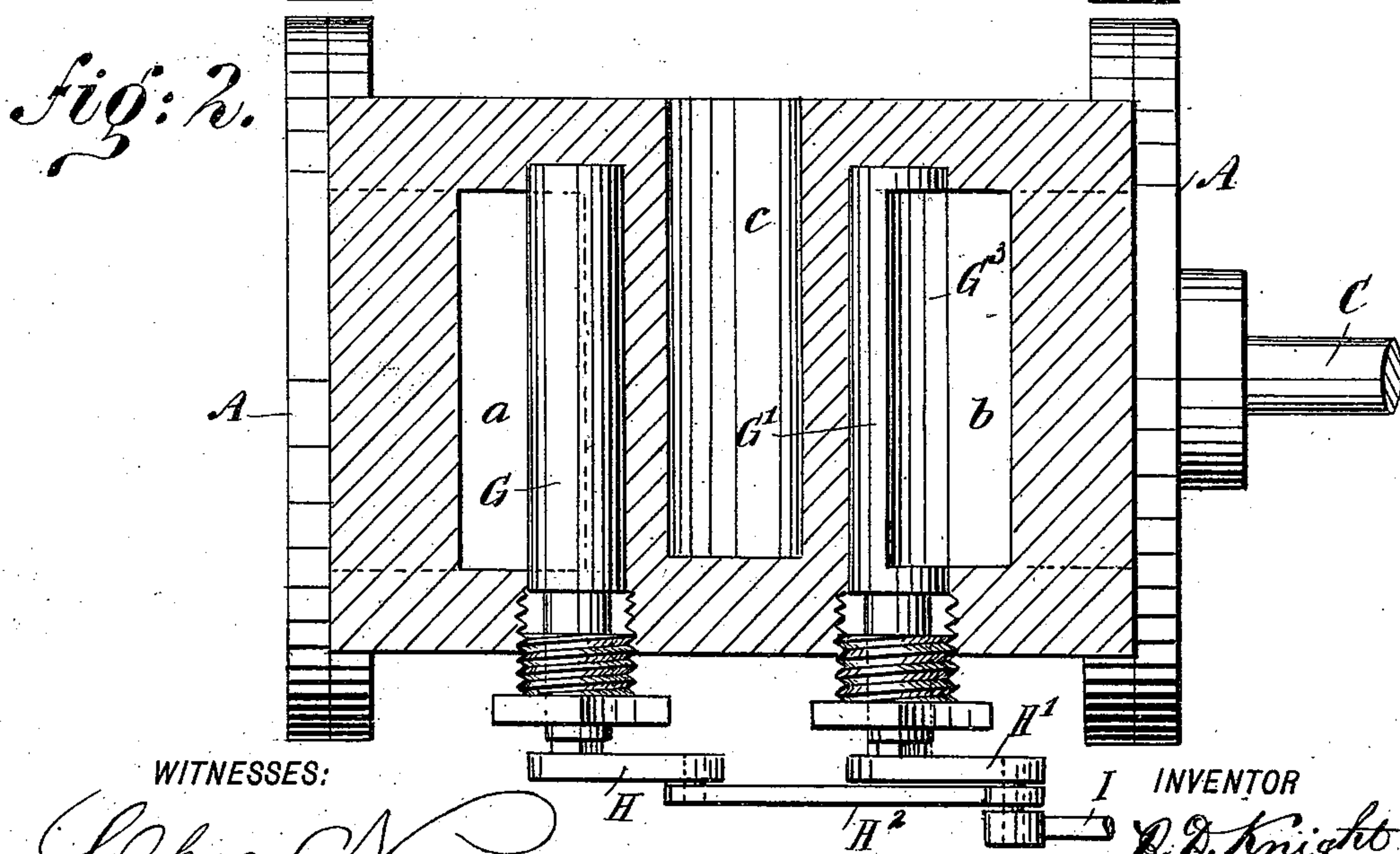
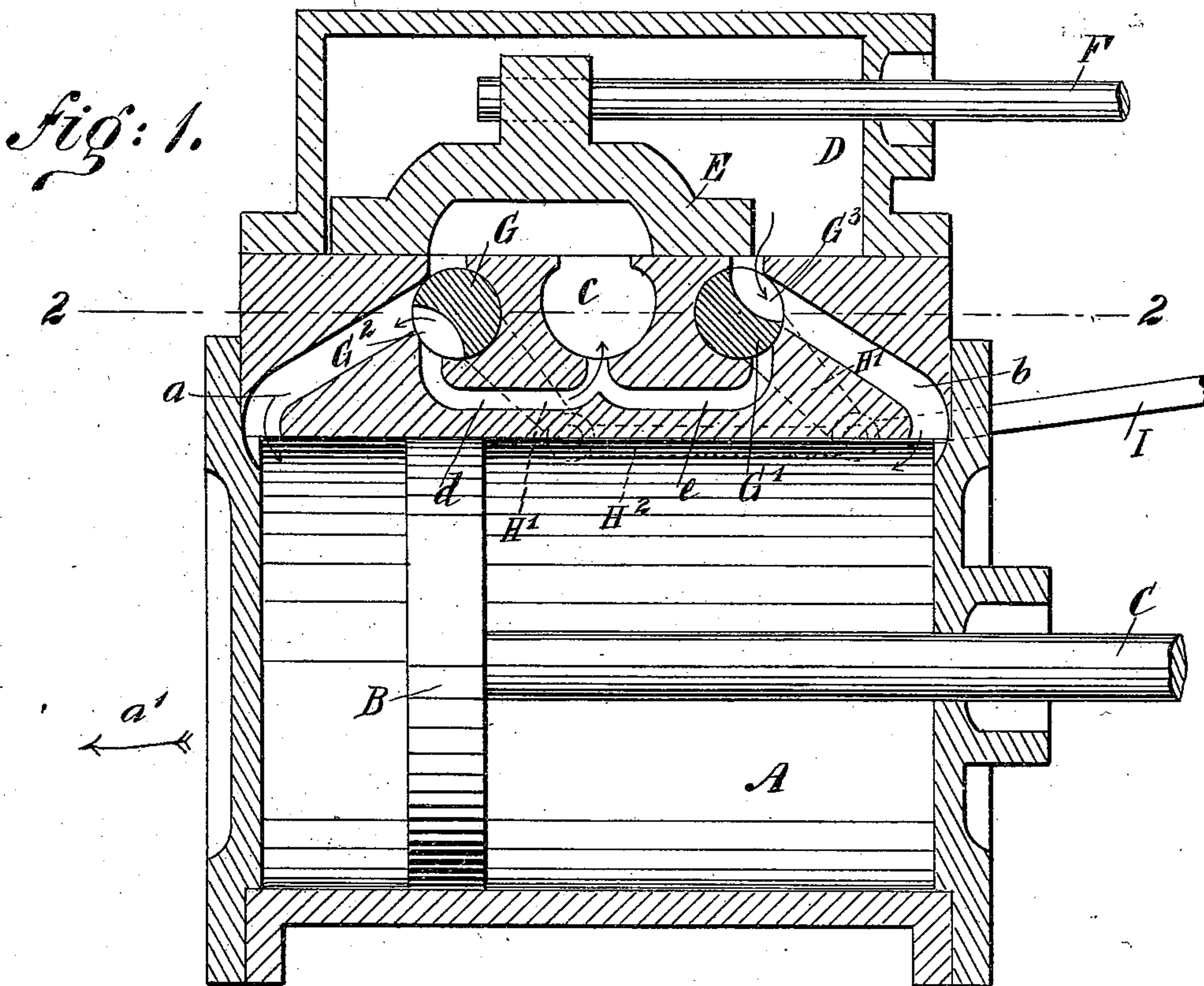


(No Model.)

R. D. KNIGHT.
ENGINE.

No. 556,272.

Patented Mar. 10, 1896.



WITNESSES:

Chas. Vida
New York, N.Y.

I INVENTOR

 BY

 ATTORNEYS.

UNITED STATES PATENT OFFICE.

ROBERT D. KNIGHT, OF VINITA, INDIAN TERRITORY.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 556,272, dated March 10, 1896.

Application filed July 17, 1895. Serial No. 556,247. (No model.)

To all whom it may concern:

Be it known that I, ROBERT D. KNIGHT, of Vinita, Cherokee Nation, Indian Territory, have invented a new and Improved Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved engine which is simple and durable in construction, more especially designed for use on locomotives, and arranged to utilize the motive agent to the fullest advantage and enable the engineer to control the introduction of the motive agent into the cylinder, regardless of the slide-valve.

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 claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional side elevation of the improvement, and Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1.

The improved engine is provided with a cylinder A, in which reciprocates the piston B, connected by the piston-rod C with the usual driving mechanism. The cylinder A is connected by the usual ports *a* and *b* with a steam-chest D, in which operates the slide-valve E, connected by a valve-stem F with the eccentrics or other mechanism, to impart the necessary motion to the said slide-valve, to alternately open and close the said ports *a* and *b* to the chest D in the usual manner.

In the ports *a* and *b* are arranged the plugs G G', formed with cut-out portions G² and G³ to conform to the shape of the said ports, so that the plugs can be turned to fully open the ports *a* and *b* and permit steam to enter the ends of the cylinder from the steam-chest D whenever the valve E is in a corresponding position. The plugs G and G' can, however, be turned so as to close the ports *a* and *b* to the steam-chest D, and to connect the said ports by additional ports *d* and *e*, respectively, with the exhaust *c*, as is plainly indicated in Fig. 1.

The outer ends of the plugs G and G' are provided with arms H and H', respectively, connected with each other by a link H² and

connected by a rod I with the cab of the locomotive, so arranged as to permit the engineer to change the position of the plugs whenever desired, singly or collectively, it being understood that the said plugs are so arranged relative to one another that when one plug closes its port the other plug opens its port, when desired, and connects it with the exhaust, as previously described. Now when these several parts are in the position illustrated in Fig. 1, then the plug G closes the port *a* to the steam-chest D and connects the port *a* with the port *d* and the exhaust *c*. The other port, *b*, is closed to the port *e*, but is open to the steam-chest D, so that the motive agent can pass from the steam-chest through the port *b* into the right-hand end of the cylinder A and drive the piston B therein forward in the direction of the arrow *a'*.

The admission of steam to the port *b* is governed in the usual manner by the slide-valve E, so that a forward impulse is given to the piston B—that is, during the time the wrist-pin of the driving-wheel passes forward or backward—while during the return stroke of the piston B—that is, while the wrist-pin passes between the axle and rail—the cylinder runs empty. Now the air in the front of the piston B is expelled through the ports *a*, *d* and *c*, so that there is no back-pressure in the cylinder, and on the return stroke of the piston air is again drawn into the cylinder through the said ports.

When the locomotive is to run backward, the engineer by manipulating the rod I shifts the position of the plugs G and G', so as to open the port *a* to the steam-chest D and to close the port *d* by the plug G' to the steam-chest, and at the same time connect the ports *b* and *e* with each other to permit air to pass freely in or out of the cylinder. By the arrangement described, the steam is only used in one end of the cylinder during either the forward or backward run of the locomotive, and consequently the steam thus employed is utilized to the fullest advantage and no steam is wasted during the return stroke of the piston by full backward pressure on the drive-wheels.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

An engine comprising a cylinder, a piston movable therein, a steam-chest connected by cylinder-ports with the said cylinder, a slide-valve in the said steam-chest and operating
5 over the said ports, and plug-valves under the control of the engineer, arranged in the said cylinder-ports and adapted to open one of the cylinder-ports while the other is closed to the steam-chest and is connected by an additional port with the exhaust-port, substantially as set forth.

ROBERT D. KNIGHT.

Witnesses:

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