D. H. SMITH.

Cut-Off for Steam-Engines.

No. 161,451. Patented March 30, 1875.

Fig. 1.

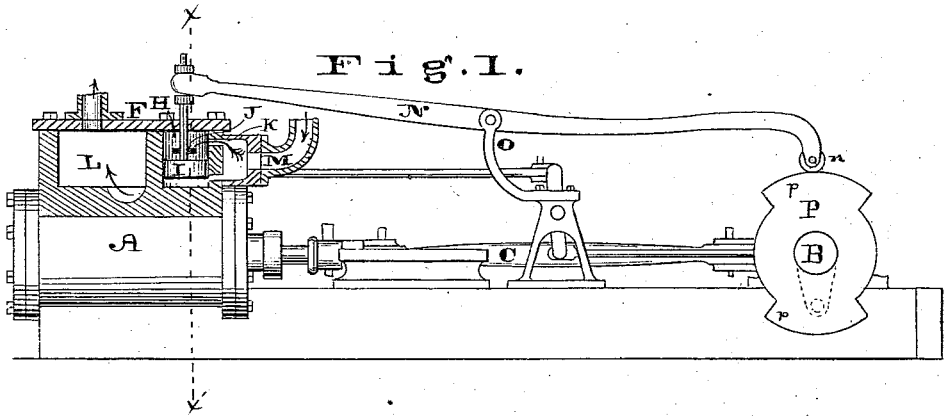


Fig. 2.

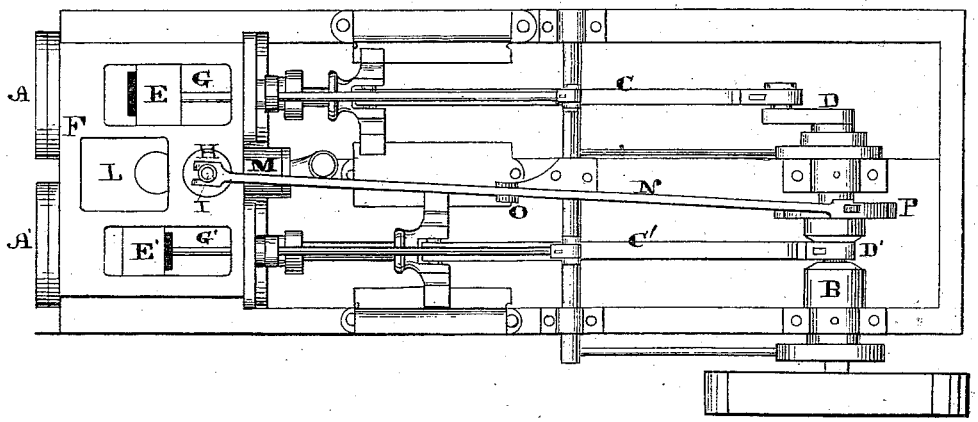
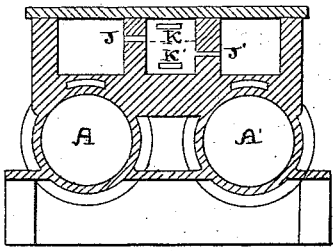


Fig. 3.



WITNESSES.

David Lewis

John W. Collins

INVENTOR.

David H. Smith.

By Chas. D. Moody

atty.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

DAVID H. SMITH, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN CUT-OFFS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **161,451**, dated March 30, 1875; application filed February 24, 1875.

To all whom it may concern:

Be it known that I, DAVID H. SMITH, of St. Louis, Missouri, have made new and useful Improvements in Steam-Engines, of which the following is a full, clear, and exact description, reference being hereby had to the annexed drawing, making part of this specification, where—

Figure 1 is a central sectional side elevation; Fig. 2, a plan, the top of steam-chest being removed; Fig. 3, a cross-section on the line *x x'*, Fig. 1.

Like letters indicate like parts.

The object of the present invention is to provide a steam-engine wherein steam is worked expansively, but in such manner as to produce an almost uniform thrust on the crank, and impart an even steady movement to the working parts. It consists in the peculiar combination and operation of the parts, substantially as is hereinafter described. It also relates to the cut-off valve and mode of operating it.

Referring to the accompanying drawing, A A′ represent a compound cylinder composed of two cylinders arranged side by side, and, preferably, similar in dimensions and capacity. They are similarly provided with pistons, connected with the main shaft B by the usual rods C C′, the cranks D D′ on the shaft being arranged at right angles to each other. The steam is admitted to and liberated from either cylinder by any suitable valves, E E′, operated in any suitable manner. F represents a steam-chest, arranged transversely over the cylinders. Therein at either end are chambers G G′, wherein the valves E E′ operate. Between these chambers is arranged another chamber, H, wherein a cut-off valve, I, works. From this central chamber H, and leading into either chamber G G′, are two ports, J J′, arranged at different levels, as shown. K K′ represent passages, opening into the chamber H, and, respectively, above and below the limit of the movement of the valve I. L represents the exhaust-port. M represents the supply-pipe leading to the passages K K′. The valve I is attached to a rod, N, which is pivoted to a fulcrum, O, arranged between the chest and main shaft. At its other end the rod N is provided with a roller, *n*, which rides upon a duplex cam, P, arranged on the main shaft. This cam is provided with two similar projections, *p p'*.

The operation of the invention is as follows: Steam is admitted through the pipe M into the cut-off chamber H. The valve I therein is so operated as to alternately admit the steam through the upper port J to the cylinder A, and through the lower port J′ to the cylinder A′, either port being closed while the other is opened. The steam passes to the cylinder A until the piston therein has made half its stroke. The valve I then operates to cut off the steam in that direction, and to divert the current into the other cylinder A′ until its piston has also made a half-stroke, when the steam, by means of the valve I, is again turned into the first cylinder A. The movement of the pistons in the cylinders A A′ is that one follows a half-stroke after the other. After the steam is cut off in either cylinder it continues to work expansively therein.

By this arrangement and operation a full head of steam is working upon the piston in one cylinder, while against the piston in the other cylinder it is working expansively. In consequence a very even movement is secured.

In carrying out my invention, while I prefer to cut the steam off at half-stroke I do not wish to be confined to that precise point. It may, for instance, be cut off at one-fourth without departing from the principle of the invention. In such case the valve in the cut-off chamber is suitably operated.

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

1. The compound cylinder A A′, provided with suitable pistons, the shaft B, rods C C′, cranks D D′, valves E E′, chest F, provided with the chambers G G′ and H, valve I, ports J J′ K K′, and pipe M, combined and operating substantially as described and shown.

2. The valve I, chamber H, ports J J′ K K′, pipe M, rod N, cam P, and shaft B, combined and operating substantially as shown and described.

3. The valve I, chamber H, ports J J′ K K′, pipe M, combined and operating substantially as described and shown.

DAVID H. SMITH.

Witnesses:
C. M. WHITNEY,
CHAS. D. MOODY.