

(No Model.)

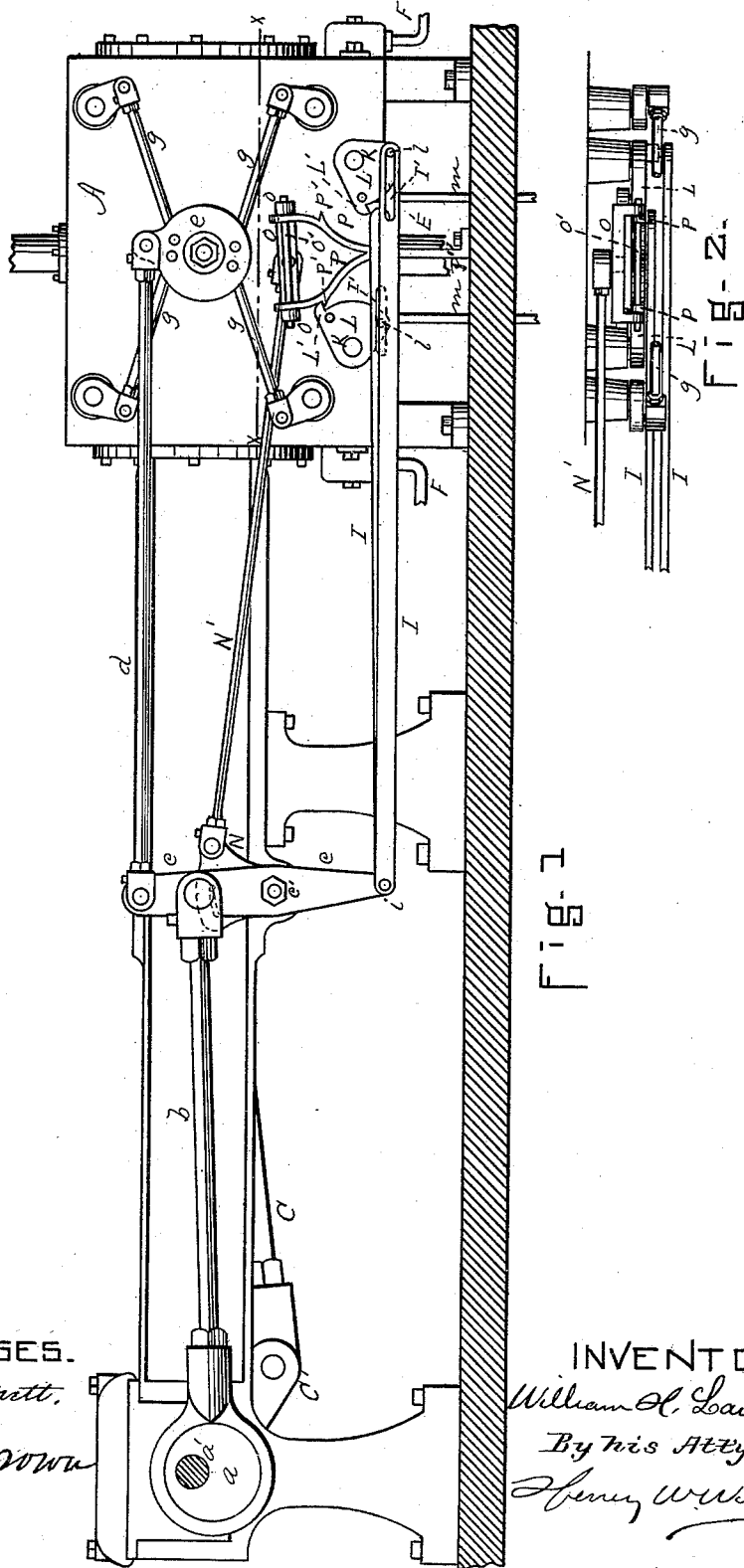
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W. H. LAWRENCE.

CUT-OFF BACK PRESSURE VALVE FOR STEAM ENGINES.

No. 418,034.

Patented Dec. 24, 1889.



WITNESSES.
J. M. Hartnett.
J. M. Brown

INVENTOR.
William H. Lawrence,
By his Atty
Henry W. Williams

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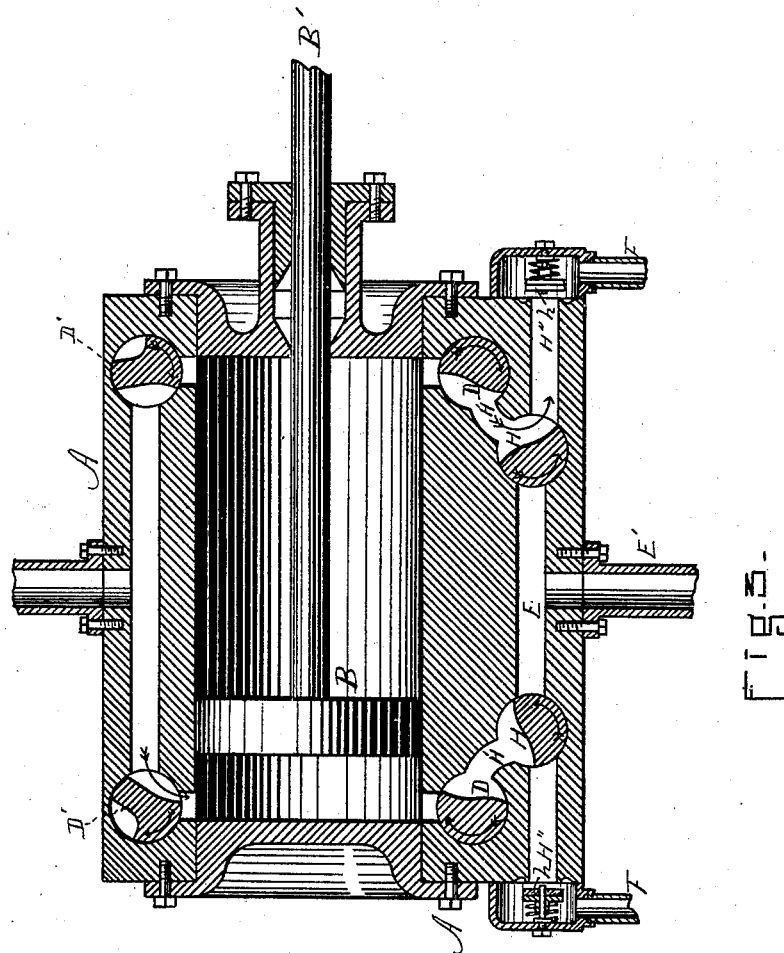
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UNITED STATES PATENT OFFICE.

WILLIAM H. LAWRENCE, OF NEWBURYPORT, MASSACHUSETTS.

CUT-OFF BACK-PRESSURE VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 418,034, dated December 24, 1889.

Application filed July 3, 1889. Serial No. 316,449. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LAWRENCE, of Newburyport, in the county of Essex and State of Massachusetts, have invented a new and Improved Automatic Cut-Off Back-Pressure Valve for Steam-Engines, of which the following is a specification.

In this invention a valve is placed near the exhaust-steam valve, whereby the exhaust-steam or a portion of it may be conveyed to pipes for heating purposes. This valve is provided with means for adjustment, so that the stroke may be cut off at any point when sufficient exhaust-steam has been taken for that purpose, at once changing the engine from non-condensing to condensing for the remainder of the stroke. The same valve also saves all steam that may leak past the exhaust-valve, such steam (which would otherwise be lost) being also conveyed away for heating purposes.

The nature of the device is fully described below, and is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a sufficient portion of a steam-engine to embody the invention. Fig. 2 is a plan view taken on line *x*, Fig. 1. Fig. 3 is a longitudinal vertical section.

Similar letters of reference indicate like parts.

A represents the cylinder; B and B', the piston and piston-rod; C, the pitman; C', the crank; D D, the ordinary exhaust-steam valves; D' D', the inlet-valves; E, the exhaust-port; E', the exhaust, and F F are pipes leading to a heating system or contrivance.

H H are my valves placed near the exhaust-valves D, connected therewith by passages H' H', and connecting with the pipes F F by passages H'' H'', at the ends of which are spring-valves *h h* of any suitable description.

In order that the operation of the valves H relative to the movement of the valves D may be understood, I will describe the actuating mechanism, much of which is of course not new in this invention.

a is an eccentric on the shaft *a'*, (on which is the crank C'.) *b* is the eccentric-rod, pivotally secured to the lever *c*, pivoted at *c'*. *d* is a rod pivotally secured at its ends to the lever *c* and disk or hub *e*, by which the exhaust-valves D D

and the inlet-valves D' D' are operated through the agency of the rods *g g*, all constructed as usual. I I are rods pivotally secured at *i* to the lever *c*, and slotted at I' I' to receive pins *l l*, extending from the cams L, which are eccentrically placed on the shafts K, on which are fixed the valves H H, which are the principal subject of my invention. Arms *m m* connect the cams L L with the dash-pot. N is a lever turning on the pivot *c'*, and connected by a rod N' with the U-shaped frame O, pivotally secured to said rod and carrying a small rod or bar O'. This rod O' passes loosely through the two spreading springs P P, which are united to or integral with a standard P'', and are provided on their outer sides with notches or teeth P' P', adapted to be engaged by notches L' L' on the cams L L.

The operation is as follows: Taking the device in the position shown in Figs. 1 and 3, the left valves (in Fig. 3) D H are closed and the right valves D H are open. The stroke is almost finished. As the stroke proceeds to a finish, the rod I pulls the cam K, connected with the left valve H, Fig. 3, until its notch L' catches on the notch P' and pulls away the right valve, Fig. 3, from the notch P' next it, with the result that the left valve is opened and the right valve is closed. The reverse occurs at the other end of the stroke. Meantime the ordinary exhaust-valves D D have been operated in the usual manner by the mechanism above described. The mechanism operating the valves H H is timed so as to open said valves a little after the valves D D are opened and close them at about the same time. By this system less water is required for condensing, also smaller air-pumps, where such are used.

By suitably setting the mechanism the valves H can be used to save all the exhaust-steam, if necessary, or all exhaust-steam can be turned into the condenser, as desired.

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

1. The combination, with the cylinder A, provided with the exhaust-steam valves D and exhaust-ports E E', of the automatic valves H, connected with the valves D by passages H' H', and with the steam-pipes by passages H'' H'', all arranged and constructed to oper-

ate substantially as and for the purpose set forth.

2. The combination, with the mechanism for operating the exhaust-steam valves, of the
5 lever N, rod N', frame O O', spreading arms or springs P, provided with the notches or teeth P', cams L, provided with the teeth L'

and pins l, slotted rods I, and lever c, said cams acting on the valves H, substantially as and for the purpose described.

WILLIAM H. LAWRENCE.

Witnesses:

EDWARD H. BARTLETT,

PAUL A. SMITHSON.