(No Model.)

W. ROYCE.

STEAM ACTUATED VALVE.

No. 261,485. Patented July 18, 1882.

Fig. 2.

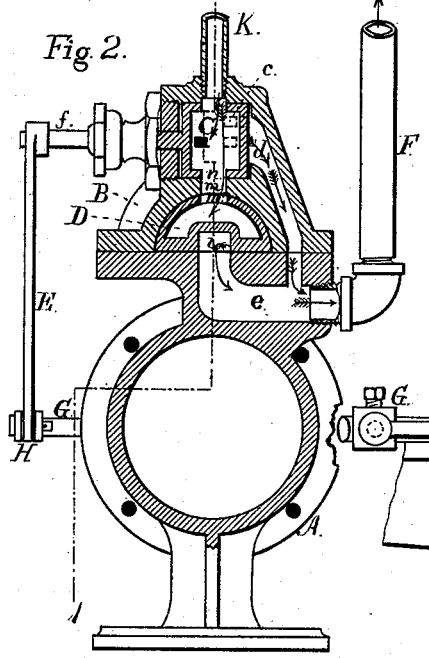


Fig. 1.

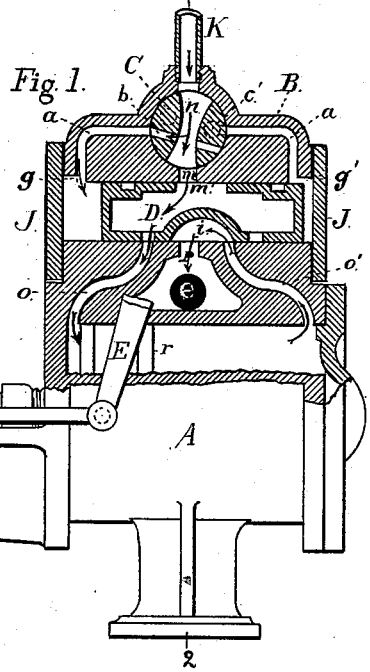


Fig. 3.

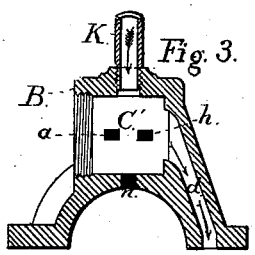


Fig. 4.

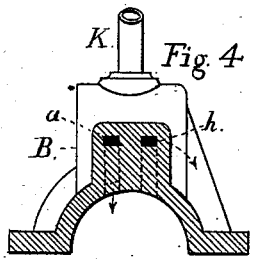


Fig. 5.

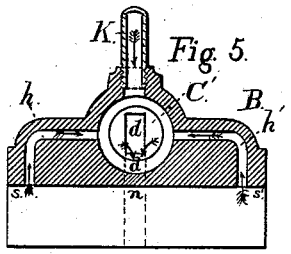


Fig. 6.

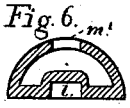


Fig. 7.

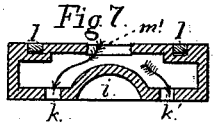


Fig. 8.

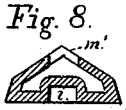


Fig. 9.

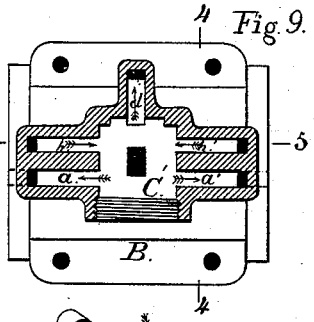


Fig. 10.

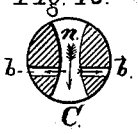


Fig. 11.

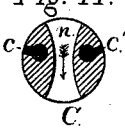


Fig. 12.

Fig. 13.

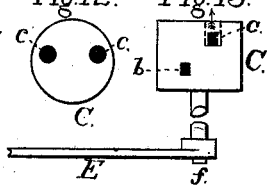
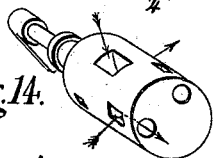


Fig. 14.



WITNESSES:

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Alfred Wilkin

INVENTOR:

Wesley Royce.

By Knight Bros. Attys.

UNITED STATES PATENT OFFICE.

WESLEY ROYCE, OF TOLEDO, OHIO.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 261,485, dated July 18, 1882.

Application filed March 16, 1882. (No model.)

To all whom it may concern:

Be it known that I, WESLEY ROYCE, of Toledo, Lucas county, Ohio, have invented a new and useful Improvement in Steam-Actuated Valves, of which the following is a specification.

My invention is an improvement in those valve movements of direct-acting steam-engines in which an auxiliary valve actuated from the main piston-rod governs a steam-actuated main valve, which in turn controls the engine proper.

My invention relates to a new and useful construction and arrangement of the main and auxiliary valves with their ducts, inclosing-chambers, and the connecting steam and exhaust passages.

In the accompanying drawings, Figure 1 is a vertical longitudinal section on the line I I, Fig. 2, of a direct-acting steam-engine embodying my improvements, the parts being represented in the positions which they respectively assume when the main valve, being thrown to the right, has begun to admit steam to the left of the main piston as the latter reaches the left extremity of its stroke. Fig. 2 is a transverse section on the line 2 2, Fig. 1, the parts being shown in the same relative positions as in Fig. 1. Fig. 3 is a section in the same plane as Fig. 2 of my two-chambered valve-chest, the valves being omitted. Figs. 4 and 5 are sections of the same on the lines 4 4 and 5 5, respectively, Fig. 9. Figs. 6 and 7 are respectively a transverse and a longitudinal section of the main valve in semi-cylindrical form. Fig. 8 shows by transverse section a modification of my main valve, having an angular instead of an arched crown. Fig. 9 is a section of the valve-chest in the horizontal plane of the auxiliary valve's axis. Figs. 10 and 11 are transverse sections of the auxiliary valve in the respective planes of the steam and escape ducts. Fig. 12 represents the escape-port end of the auxiliary valve. Fig. 13 is a side view, and Fig. 14 is a perspective view, of the auxiliary valve.

For simplicity of representation the customary fastening-bolts are omitted from the drawings.

The following parts may be of customary or of any suitable construction, to wit: steam-cylinder A, piston *r*, piston-rod I, cylinder-end ports *o o'*, exhaust-port P, lug G, connecting-rod H, auxiliary arm E upon auxiliary spindle *f*. These members require therefore no particular description.

My main valve D is a slide-valve, preferably of the hollow semi-cylindrical form shown, and has free longitudinal motion in a chest, J, of corresponding form and of sufficiently greater length to permit the proper stroke of the valve. Said valve has at the center of its crown a steam-inlet duct, *m'*, and at proper parts of its sole-plate ducts *k k'*, which serve alternately as induction and eduction passages in the usual manner of slide-valves. A customary cavity, *i*, at the mid-length of the valve's sole-plate affords the usual permanent communication with exhaust-port P, that conducts by passage *e* to the general escape-pipe F. The valve D should be fitted so nicely to its chamber as to be substantially steam-tight; but for additional security against steam-leakage the convex portion of the said slide-valve may have metallic packing *l l'*. The arched ceiling of the slide-valve chamber has four ports, two near each end, of which those on the right constitute the outlets of two steam-passages, *a a'*, and those on the left constitute the receiving ends of two exhaust-passages, *h h'*. Each of these steam-passages is alternately brought into action simultaneously with the exhaust-passage at the remote end of the chamber by the oscillations of my auxiliary valve C, of the represented cylindrical form, occupying a chamber of corresponding form within the chest. This valve at its mid-length is traversed diametrically by a duct, *n*, which, taking steam from the service-pipe K, transmits it through ports *m* and *m'*, and thence through port *k* or port *k'* to one of the cylinder-end ports *o* or *o'*. The duct *n* of the auxiliary valve has lateral branches *b b'*, of which one or the other (as the valve C is oscillated to the right or to the left) connects with its respective steam-passage *a* or *a'*, and at the same instant the same movement of the auxiliary valve opens communication from passage *h'* or *h* at the remote end of the engine, through duct *c'* or *c*, into the discharge-passage *d*. From passage *d* the steam exhausted from the slide-valve chamber empties into the general discharge *e*, and thence escapes, in company with the cylinder-steam, into the general discharge-pipe F. The steam-ports *a a'*, where

they enter the slide-valve chamber, are channeled, as at *g*, to insure the entrance of steam to the space between the head of the chamber and the adjacent end of the slide-valve. The ports *h h'*, on the contrary, stop somewhat short of the end of the slide-valve chamber, as at *s s'*, in order to imprison sufficient steam as the valve approaches the end of its stroke to cushion it, and thus prevent its impact with the chamber-head.

I claim herein as new and of my invention—

1. A hollow main valve entirely free to move within its chest, having a flat face or sole-plate, and formed with a central crown-port, *m'*, and end ports, *k k'*, and central recess or cavity, *i*, in its sole-plate, in combination with the ceiling of the valve-chamber, having two steam-passages, *a a'*, and two exhaust-passages, *h h'*, as set forth.

2. The combination of main valve D, constructed as shown, valve-chest ceiling, having passages *a a'*, *h h'*, and port *m*, service-pipe K, and an auxiliary oscillating valve, C, intermediate of service-pipe and port *m*, as set forth.

3. An auxiliary valve, C, provided with central duct, *n*, lateral branches *b b'*, and end ducts, *c c'*, as set forth.

4. The auxiliary valve C, having central duct, *n*, lateral branches *b b'*, and end ducts, *c c'*, in combination with steam-ports *a a'* and exhaust-ports *h h'*, as set forth.

5. The auxiliary valve C, located preferably above the slide-valve D in chest B, with which it communicates by duct *n* and ports *m m'*, and thence to steam-cylinder, said duct *n* being branched, *b b'*, for alternate connection with passages *a a'* to the slide-valve chamber, and having ducts *c c'* for alternate connection of exhaust-passages *h h'* from slide-valve chamber into the general exhaust, as and for the purposes set forth.

6. In the two-chambered chest B, the combination of the slide-valve D, the steam and exhaust passages *a a' h h'*, the positively-oscillated auxiliary valve C, having spindle *f*, arm E, connecting-rod H, lug G, and piston-rod I, as and for the purpose set forth.

7. In combination with the steam-ports K *m m' a a'* and the exhaust-ports *h h'*, the positively-oscillated auxiliary valve C, having the ducts or passages *n b b' c c'*, for the purpose indicated.

8. In combination with the steam-ports *m m' a a' o o'* and the exhaust-ports *h h' d e* P, the hollow steam-actuated main valve D, having the ports *m' k k'* and the cavity *i*, as and for the purposes designated.

9. The auxiliary valve C in chest B, which communicates with slide-valve D in said chest by duct *n* and ports *m m'*, and thence to the steam-cylinder, said duct *n* being branched, *b b'*, for alternate connection with passages *a a'* to the slide-valve chamber, and having ducts *c c'* for alternate connection of exhaust-passages *h h'* from slide-valve chamber into the general exhaust, as and for the purposes set forth.

In testimony of which invention I hereunto set my hand.

WESLEY ROYCE.

Attest:

ALFRED WILKINS,
E. H. BRENNAN.