(No Model.) 2 Sheets—Sheet 1.

W. SCHMIDT.

CUT-OFF SLIDE VALVE.

No. 305,762. Patented Sept. 30, 1884.

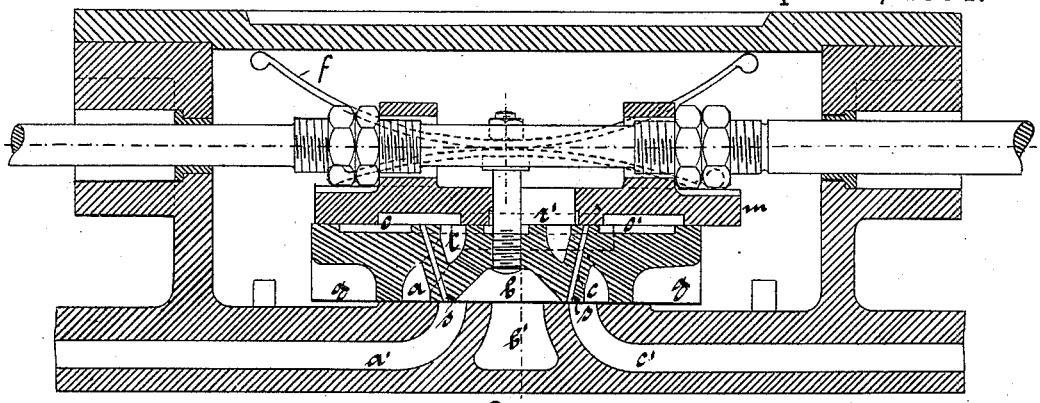

Fig. I.

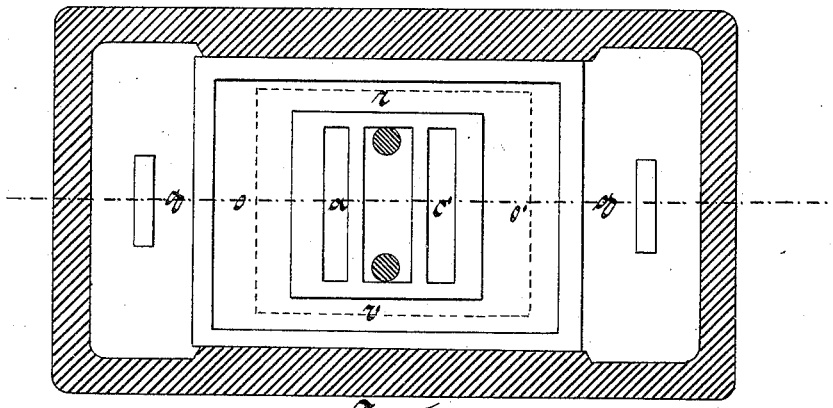

Fig. III.

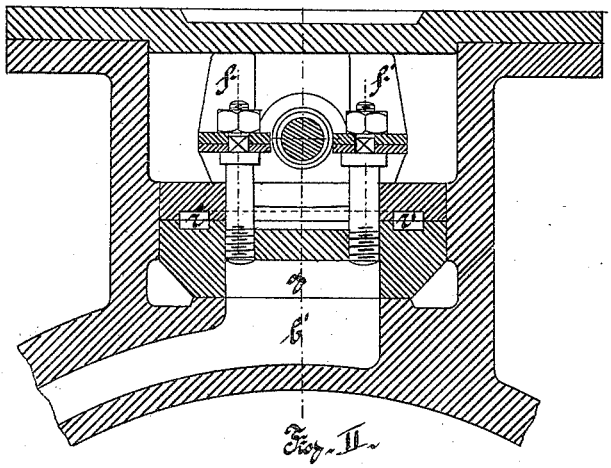

Fig. II.

Witnesses.
J. Wetter
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(No Model.) 2 Sheets—Sheet 2.

W. SCHMIDT.

CUT-OFF SLIDE VALVE.

No. 305,762. Patented Sept. 30, 1884.

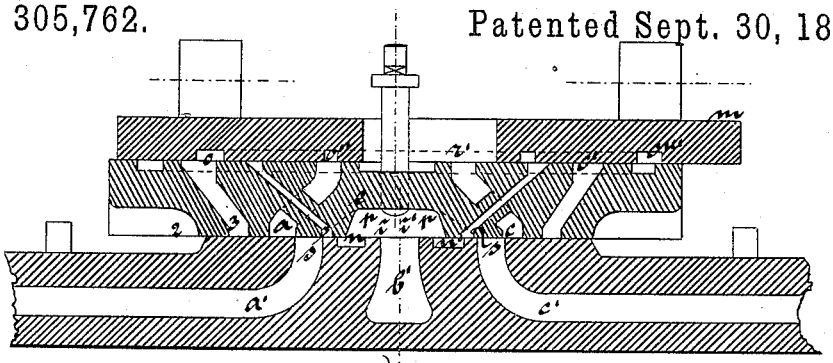


Fig. IV.

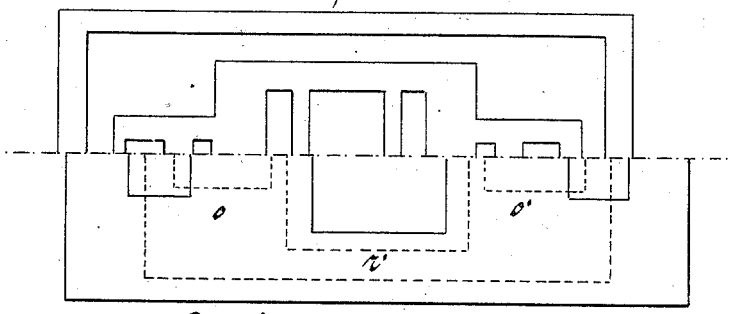


Fig. V.

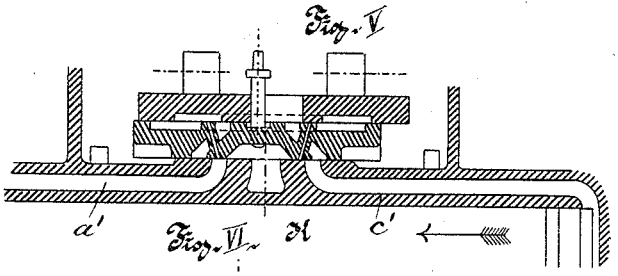


Fig. VI.

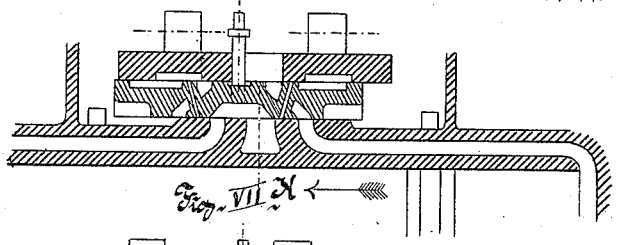
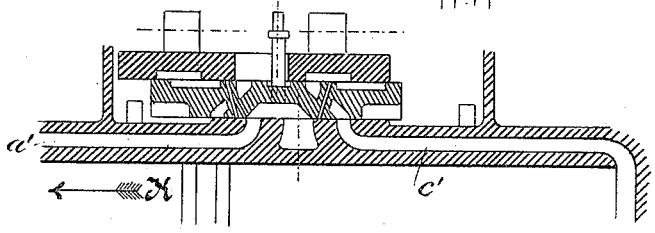
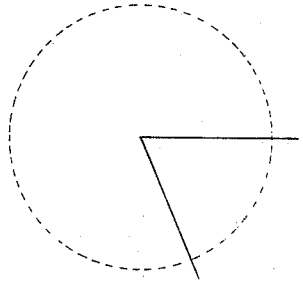
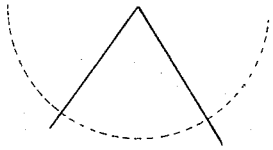
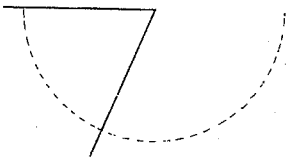


Fig. VII.









Witnesses.
J. Weller
J. D. Rae

Inventor.
W. Schmidt
by Whittaker
Atty

UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF BRUNSWICK, GRAND DUCHY OF BRUNSWICK, GERMANY.

CUT-OFF SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 305,762, dated September 30, 1884.

Application filed April 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILHELM SCHMIDT, of the city of Brunswick, Grand Duchy of Brunswick, German Empire, have invented a new and useful Improvement in Cut-Off Slide-Valves, of which the following is a full, clear, and exact specification.

This invention relates to slide-valves for steam, gas, and other fluid-pressure engines. The improved valve has the peculiar feature that the expansion-valve is moved direct by an eccentric, while the main valve has no positive motion, but is periodically moved by the admission and exhausting of steam between the valves.

In further describing the invention reference will be made to the accompanying drawings, Figures I to VII, which show two different arrangements of slide-valves embodying this invention. Fig. I is a longitudinal vertical section, Fig. II a cross-section, and Fig. III a horizontal section, of a valve-chest. Fig. IV shows a longitudinal section and plan of a modification, and Figs. V to VII are diagrams showing the relative position of the engine-piston and valves, and serving to explain their function. The corresponding position of the crank and eccentric is indicated at the side of these figures.

The main valve *g*, Figs. I and II, is similar to an ordinary slide-valve having three steam-ports, *a b c*, adapted to periodically communicate with the steam-ports *a' b' c'* of the cylinder. The expansion-valve *m* has in its base recesses *o o'*, which form, with the recesses *r r'*, a sort of hollow frame. The main-valve *g*, which may have similar recesses, contains two perforations, *s s'*, extending from its base to its upper side across the ports *a* and *c*. For securing or arresting the freely-movable main valve *g* when the engine runs light two weak springs, *f f''*, may be employed.

The mode of operation is as follows: In the position corresponding to Fig. I the engine-piston is at the right end of its stroke, (see Fig. V,) and the space K of the cylinder communicates with the exhaust-port *b'*, leading into the atmosphere or to the condenser; but the condenser also produces a diminution of pressure in the recess *o* of the expansion-valve, so that the latter is firmly coupled with the main valve by the pressure of steam on the back of the valve *m*. The main valve *g* will be dragged with the expansion-valve *m* as long as the recess *o* (and consequently also *o'*) remains closed against the interior of the valve-chest; but as soon as the port *a* communicates at its lower end with the steam-space of the valve-chest, Fig. VI, the pressure on the top of the valve is balanced by the pressure from below, the connection between the two valves ceases and the lower valve, *g*, remains stationary, while the upper valve continues its motion to the end of its stroke. (See Fig. VII.) In this position the recess *o'* communicates already with the port *c'* through the port *c*, and therefore with the expanded steam in the steam-cylinder. When the valve commences its motion to the right, the pressure in the recesses is already sufficiently low to cause a suction or coupling action between the two valves, in consequence of which the lower valve will be dragged along until the port *c* communicates below with the steam-space of the valve-chest, which terminates the connection between the two valves. It is evident that the valves would also work without the perforations or auxiliary ports *s s'*; but these ports are advantageous, inasmuch as any vapors which may pass between the two valves through leakage will escape, and thereby insuring a perfect working of the valves. These recesses may be employed in various expansion-valves. If the expansion-valve *m* is made in two parts, the recesses *o o'* must be made separately in each part of the same, and connected with each other by a U-shaped canal, *t*, provided in the main valve, as shown in dotted lines on Fig. I.

Fig. IV shows a modification of the improved valve, in which the ports *s s'*, serving to temporarily take up any steam escaped through leakage, are not in communication with the steam-ports *a' c'*, but with the exhaust-port *b'*, which communication is maintained during the motion of the valve. For this purpose, notches *n n'* are provided in the valve-face of the cylinder, and projections *i i'* are adapted to effect the coupling and uncoupling of the valves in a manner analogous to that described in Fig. I. In the position represented by the drawings the exhaust from between the valves takes place through the exhaust-port *b'*, recess *n'*, duct *s'*, and recess *o'*. The coupled valves move to-

ward the left until the edge 3 has passed over the left-hand edge 2 of the valve-face of the cylinder, whereupon the connection between the valves ceases. The expansion-valve continues to move until the end of its stroke, in which position the lower valve is again moved with the upper one, because the recess *o* communicates with the duct *s*. At this moment the latter terminates in the port *a'*, and as the latter is not covered along its whole width by the part *e*, the port *a'* will also communicate with the exhaust-port *b'*.

What I claim is—

1. A pair of slide-valves adapted to slide upon each other, and provided at their contact-surface with recesses adapted to periodically communicate with the exhaust-space or exhaust-port of the engine, for the purpose of reducing the pressure between the said valves and causing them to move together, substantially as described.

2. The combination of a main valve having auxiliary ducts *s s'*, crossing the main ports *a c*, with an expansion-valve adapted to slide on the back of the main valve, the contact-surface of one or both of the valves being provided with recesses *o o'*, communicating with the ducts *s s'*, substantially as and for the purpose described.

The foregoing specification of my improvement in slides for engines and machines signed by me this 20th day of December, 1883.

WILHELM SCHMIDT.

Witnesses:
B. ROI,
A. KUHNT.