

(No Model.)

J. M. SMITH.

SLIDE VALVE FOR STEAM ENGINES.

No. 275,725.

Patented Apr. 10, 1883.

Fig. 1.

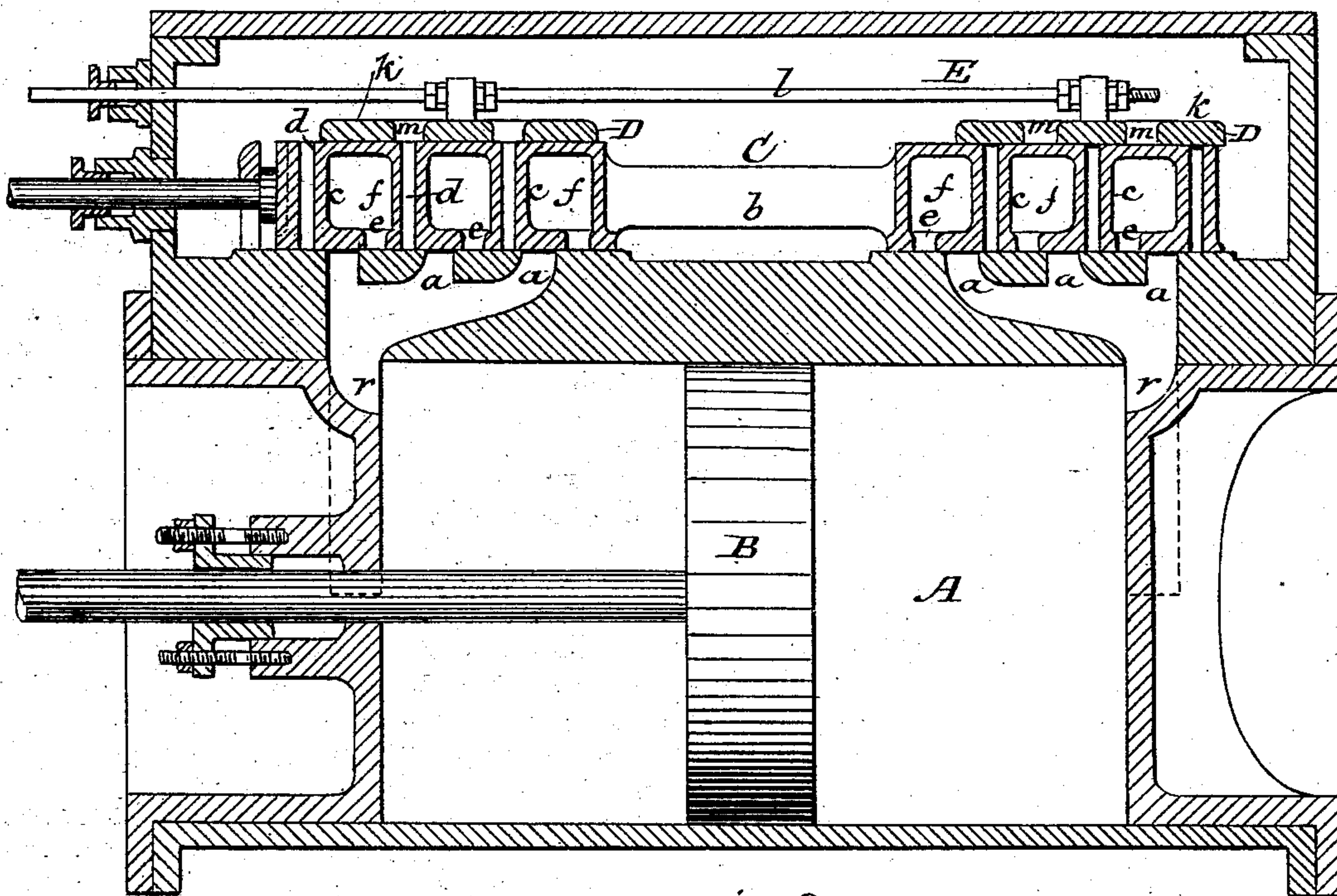


Fig. 2.

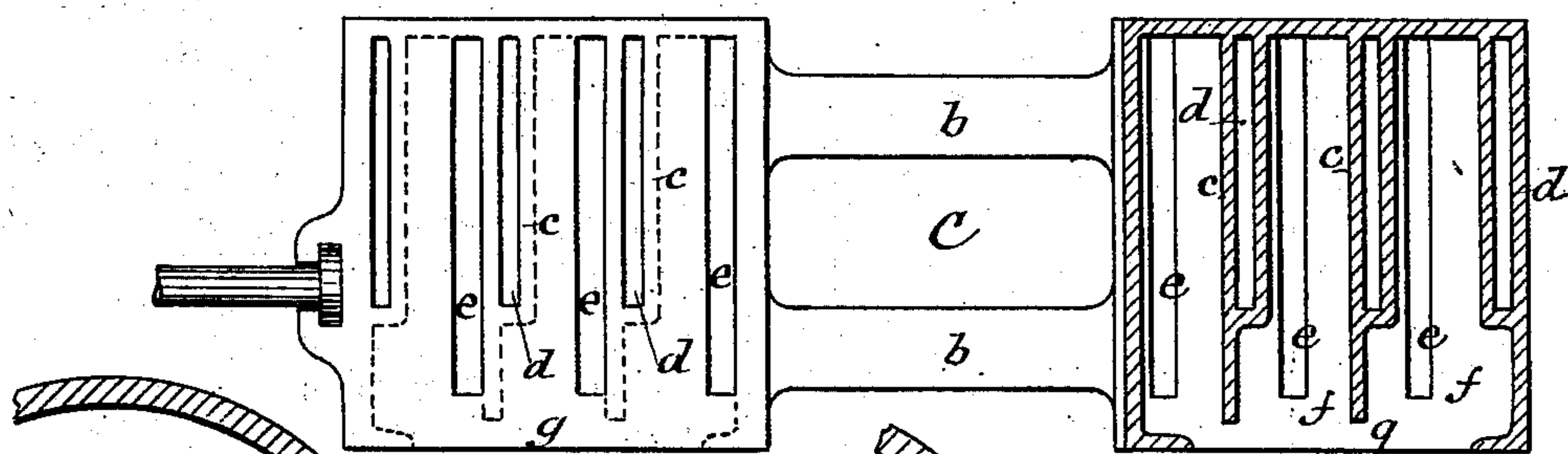
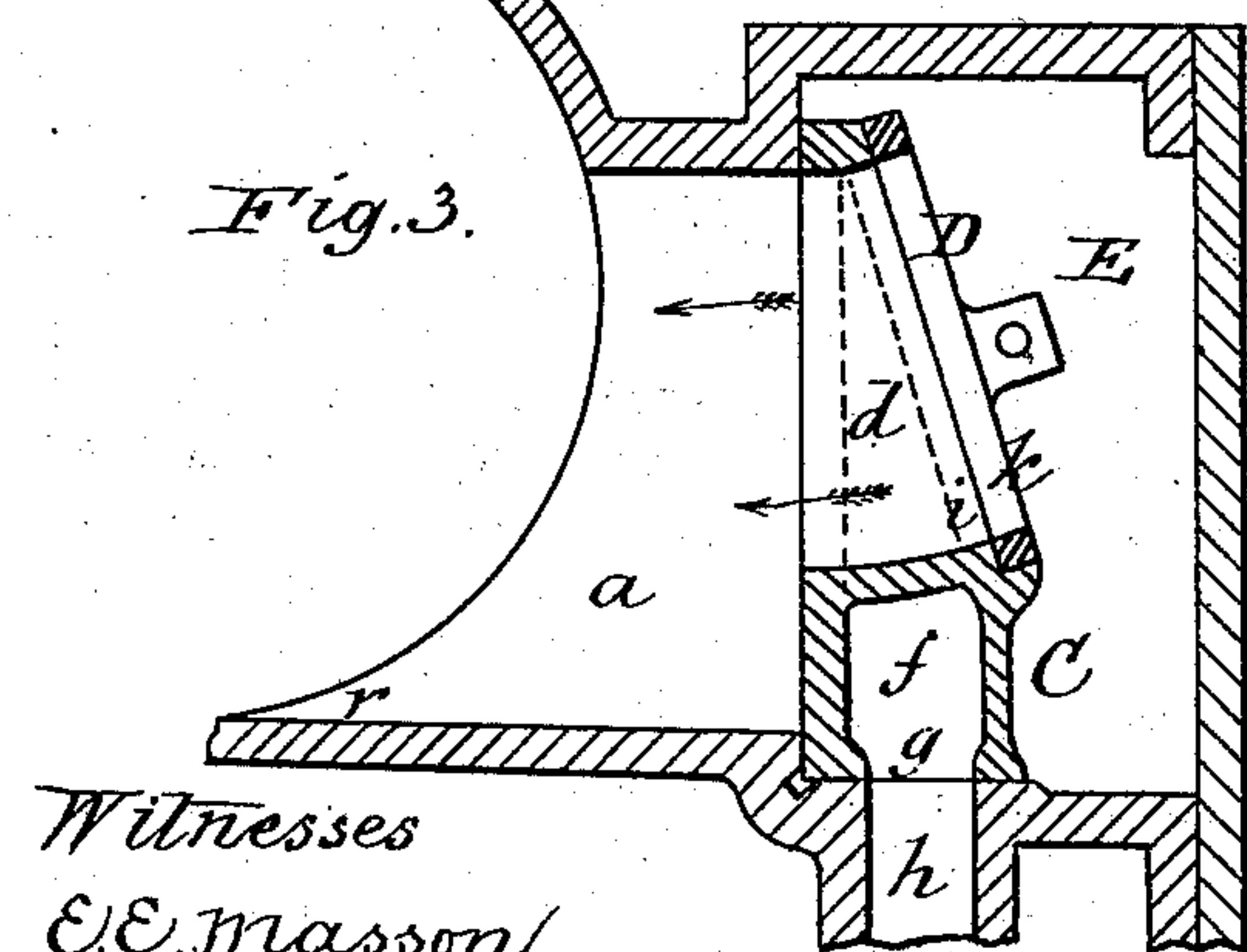
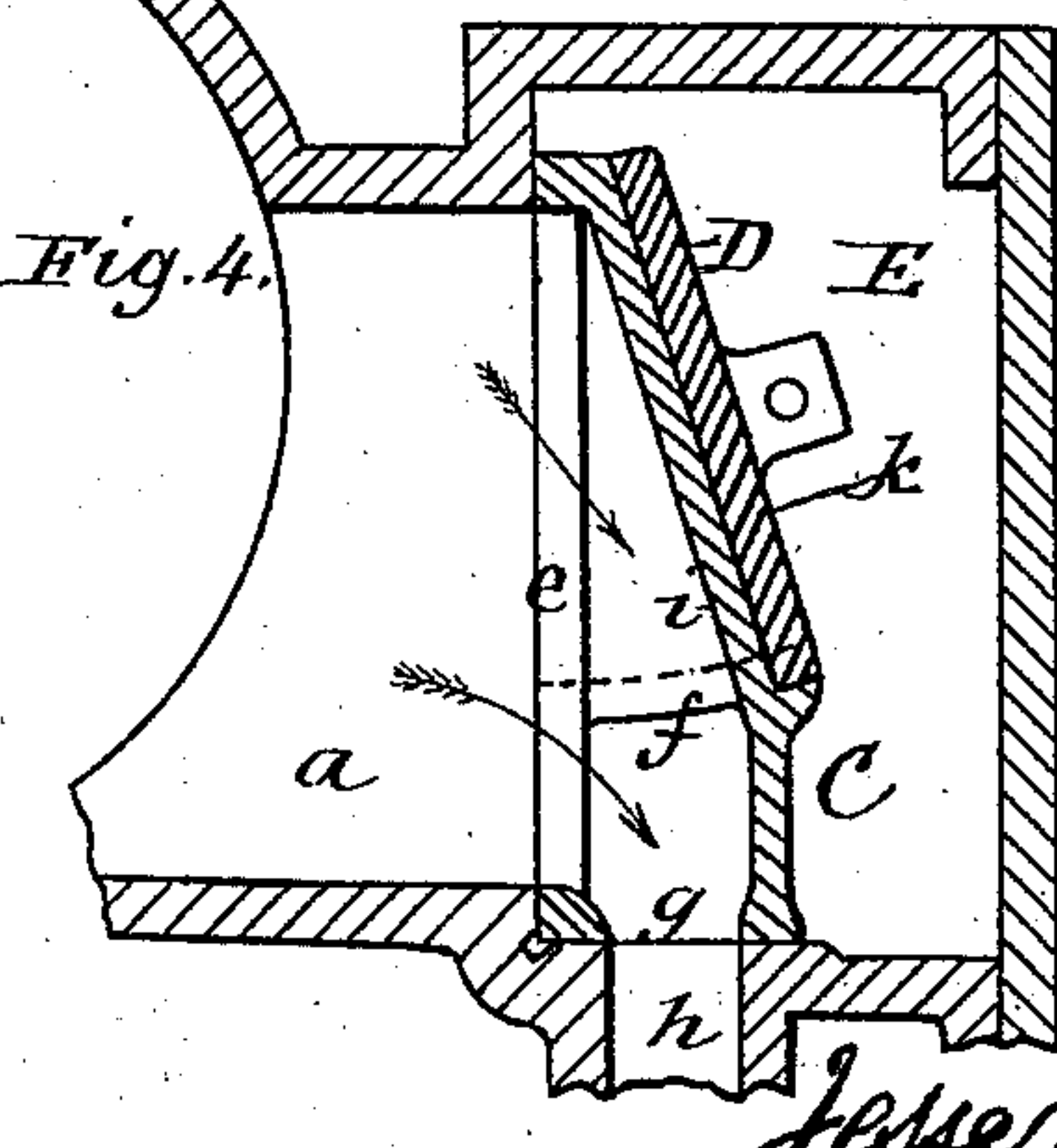


Fig. 3.



Witnesses
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Fig. 4.



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UNITED STATES PATENT OFFICE.

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SLIDE-VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 275,725, dated April 10, 1883.

Application filed January 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, JESSE M. SMITH, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Cut-Off Slide-Valves for Steam-Engines, which improvement is fully set forth in the following specification.

This invention has for its object to render small the travel of the slide-valve, to secure a large and free exhaust to limit the travel of the cut-off, and to combine these advantages in one apparatus.

It consist, first, in a multiported steam-valve having a series of enlarged exhaust-ports and a series of smaller steam-ports, in combination with a cylinder having a series of ports corresponding in size with the said exhaust-ports; and, secondly, in a multiported valve having a series of exhaust-passages extending from the ports at the face of the valve to the side and bottom of said valve, and provided with a series of steam-ports in the walls of the exhaust-passages.

It further comprises certain particular constructions and combinations of parts, as hereinafter set forth.

In the accompanying drawings, which form a part of this specification, Figure 1 is a horizontal section of an engine cylinder and valve constructed in accordance with the invention; Fig. 2, a view showing the valve partly in face view and partly in vertical longitudinal section; and Figs. 3 and 4, vertical cross-sections, showing the one the cylinder taking steam and the other the same exhausting.

A is the cylinder; B, the piston; C, the slide-valve, and D the cut-off valve. E is the steam-chest.

At each end of the cylinder A are a series of ports, *a*. Three ports are shown; but the number may be less or more. They communicate with a channel, *r*, at the circumference of the cylinder-head, which channel extends to the bottom of the cylinder. The slide-valve C is in two parts, connected by the bars *b*. Each part has its interior divided by webs or partitions *c*. In these webs or partitions *c* are formed the steam-ports *d*, in number corresponding with the cylinder-ports. In the face of the valve are formed the exhaust-ports *e*, which communicate with the exhaust-passages *f* between the webs or partitions *c*.

At the bottom of the valve is an opening, *g*, equal in area to the combined cross-section of the exhaust-passages *f*. In the bottom of the steam-chest is an opening, *h*, of similar dimensions, constituting the exhaust-outlet. This exhaust-outlet *h* is opposite the cylinder-ports *a*, so that the exhaust-steam has a direct path through the exhaust-passages *f*.

In order to secure a free exhaust without unduly enlarging the steam-ports, the latter extend or may extend only part way across the valve, and are or may be made rather narrower than the exhaust-ports *e*, with which the cylinder-ports correspond in size.

In order to drain the cylinder of condensed water, the bottoms of the cylinder-ports and of the channels *r* are inclined downward. (See Figs. 3 and 4.) The back of the valve is inclined at *i*. This contracts the exhaust-passages *f* at the top of the valve; but since only a small amount of steam passes through them the contraction does not interfere with the free flow of the exhaust-steam. It diminishes the weight of the valve by removing some of the material. The incline preferably extends about two-thirds the width of the valve, and in this upper part of the valve the steam-ports *d* are formed. The said ports *d* being formed in the webs or partitions *c*, the latter must have at the top sufficient thickness to contain them. Toward the bottom of the valve the thickness of the partitions is diminished; or the latter are altogether discontinued, thus increasing the area of the exhaust-passages.

The cut-off valve D comprises two plates, *k*, connected by the rod *l*, to which they are attached. Each plate has openings *m*, which register with the steam-ports *d* for a suitable part of the stroke. It is mounted upon the inclined part *i* of the back of the valve. The number of steam-ports in the valve diminishes the travel as well of the cut-off valve as of the slide-valve. As there may be as many ports *d* as desirable, they may be very narrow as compared with the travel of the valve, and the cut-off made as quick as desired. The valves may be operated by any suitable gear. The cut-off plates being small and with small travel, they may be driven by an eccentric loose on the shaft, and commanded by a governor mounted on the same shaft, the resistance of the cut-off valve being light compared with the force of

the governor. The main valve is commanded by an eccentric fixed on the shaft, which assures constant lead, exhaust - opening, and compression, while the cut-off may be varied
5 by turning the cut-off eccentric on the shaft more or less, according to the work to be done by the piston. The valve is therefore specially adapted to automatic engines.

Modifications may be made in the details of
10 construction without departing from the spirit of the invention, and parts thereof may be separately used, if desired. For example, a valve otherwise constructed as described could be made with the exhaust-outlet in the middle,
15 between the two parts of the slide-valve, the said outlet communicating with the exhaust-passages of both ends; but in this case the advantages of having the exhaust-outlet opposite the cylinder-ports would be lost; also, a
20 slide-valve with one exhaust-port and one steam-port could be made as described, except, of course, as to the multiplicity of ports, and of course, also, the advantages of such multiplicity would be lost. The slide-valve could be used
25 without a cut-off valve. Many other changes could be made, and the invention still be employed in whole or in part.

Having now fully described my said invention and the manner of carrying the same into
30 effect, what I claim is—

1. A multiported steam-valve having a series of enlarged exhaust-ports and a series of smaller steam-ports, in combination with a cylinder having a series of ports corresponding in size
35 with the said exhaust-ports, substantially as described.

2. A multiported slide-valve having its interior divided by one or more webs or partitions into exhaust-passages leading from the
40 face of the valve to the side or bottom thereof, and provided with a series of exhaust-ports opening into said passages, and a series of steam-ports in said partitions or the walls of said passages, substantially as described.

3. In a steam-engine, the cylinder having
45 ports extending to the middle thereof, and an upright steam-chest placed at the side of the cylinder, and having an exhaust-outlet in the bottom thereof, opposite the cylinder-ports, in combination with an upright slide-valve hav-
50 ing exhaust-passages extending from the face of said valve to the bottom thereof, substantially as described.

4. In a multiported valve, a series of exhaust-passages extending from the face of the valve
55 to the side or bottom thereof, and communicating with a common exhaust-outlet, substantially as described.

5. A multiported slide-valve having a series of steam-ports and a series of exhaust-ports,
60 with exhaust-passages extending from said exhaust-ports to the side or bottom of the valve, in combination with a cut-off valve carried on the back of the valve for controlling the admis-
65 sion of steam to said steam-ports, substantially as described.

6. A multiported slide-valve having exhaust-ports in the face, and the exhaust-outlet at the side or bottom thereof, substantially as de-
70 scribed.

7. A multiported slide-valve having steam-ports extending part way and exhaust-ports extending entirely or substantially across the same, and provided with exhaust-passages com-
75 municating with said exhaust-ports, said steam-ports being in the upper part of the valve, and said passages being larger at the bottom than at the top, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing wit-
80 nesses.

JESSE M. SMITH.

Witnesses:

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