

(No Model.)

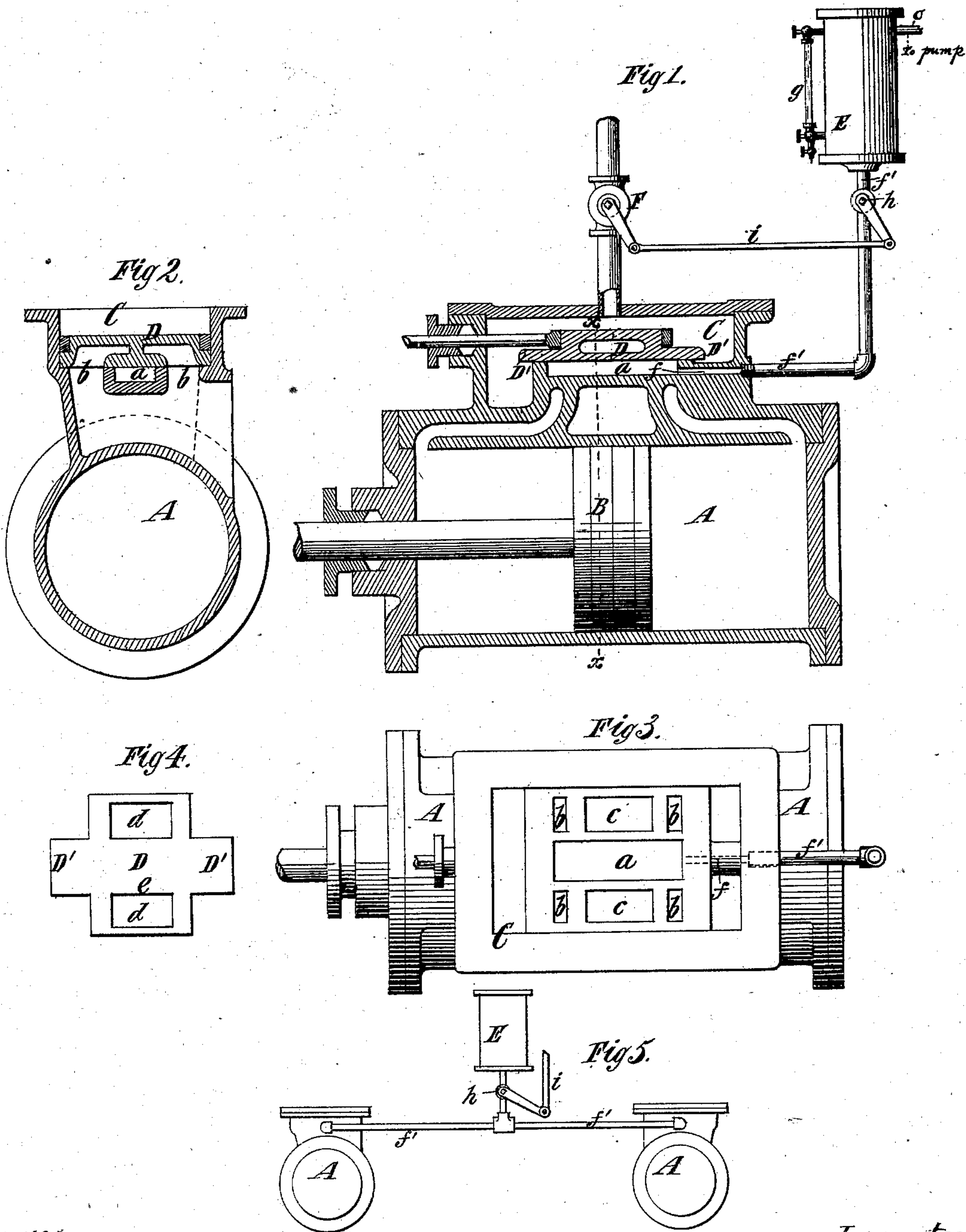
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BALANCING SLIDE VALVE.

No. 255,691.

Patented Mar. 28, 1882



Witnesses
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UNITED STATES PATENT OFFICE.

ALGERNON S. SULLIVAN, OF NEW YORK, N. Y., ADMINISTRATOR OF JOHN JAMES, DECEASED.

BALANCING SLIDE-VALVES.

SPECIFICATION forming part of Letters Patent No. 255,691, dated March 28, 1882.

Application filed January 17, 1882. (No model.)

To all whom it may concern:

Be it known that JOHN JAMES, deceased, formerly of the city of New York, in the county and State of New York, invented certain new and useful Improvements in Balancing Slide-Valves, of which the following is a specification.

The invention is applicable to all slide-valves—such as the induction and eduction valves of steam or compressed-air engines or other motors of similar nature or construction—which are held against their seats by the pressure of the steam or other motive agent acting upon their backs; and it consists essentially in a novel method of balancing such valves or relieving them of excessive pressure—namely, in exposing the face of the valve to the action of the pressure of a liquid which is contained in a reservoir or supply-vessel separate from the boiler or source of supply of the motive power of the engine—and which pressure tends to force the valve away from its seat and serves to counteract the greater part of the pressure exerted upon the back of the valve by the steam or other motive agent, the passage of which is controlled by the valve. The liquid thus employed to act against the face of the valve may be oil, which would serve the additional purpose of lubricating the valve and its seat.

The invention also consists in the combination, with a valve-seat and a slide-valve having a cavity between them, of a pipe or passage through which oil or other liquid or fluid may be conducted to fill said cavity and exert a pressure upon the face of the valve. The said pipe or passage may be supplied from a reservoir or supply vessel or chamber which is partly or entirely filled with the liquid employed, and in which a pressure is generated by a pump or other means, and there is employed a valve for controlling the passage of liquid or fluid from the reservoir to the cavity between the valve-seat and valve-face, and said valve is connected with the throttle-valve, so that it will be closed simultaneously with or a little before the closing of the throttle-valve to prevent the slide-valve from being raised or moved away from its seat when the pressure upon its back is diminished or removed.

In the accompanying drawings, Figure 1 rep-

resents a longitudinal section of a cylinder, slide-valve, and their appurtenances embodying the invention. Fig. 2 represents a transverse section on the dotted line *xx*, Fig. 1, the piston and valve-chest cover being omitted. Fig. 3 represents a plan of the cylinder with the valve-chest and valve removed so as to expose the valve-seat. Fig. 4 represents a plan of the valve-face, and Fig. 5 represents an end view of two engine-cylinders having the invention applied.

Similar letters of reference designate corresponding parts in all the figures.

A designates the cylinder of an engine, and B designates the piston. C designates the valve-chest, in which is a slide-valve, D. All these parts so far as described are of the ordinary or other suitable construction. In the valve-seat is a cavity, *a*, clearly shown in Fig. 3, which is represented as of considerable length, and upon opposite sides of said cavity are the supply or induction ports and passages *b*, leading to the interior of the cylinder and the exhaust-port *c*. The two supply or induction ports *b*, at each end of the cylinder, may be considered as a single port divided by the bar or metal in which is the cavity *a*; but if said cavity were shorter, a single unobstructed port *b* would be made, in lieu of the divided port.

The valve D should be long enough so that the cavity *a* will never be uncovered, and is here represented as having projections *D'* at the ends, which always cover the cavity *a*, even when the valve is at either end of its movement. As clearly seen in Fig. 4, the cove or cavity *a* in the slide-valve D is divided by a bar, *e*, which covers the cavity *a* and overlaps the edges thereof. In lieu of the cavity *a* being of the shape and in the position here shown, it might be of other form and otherwise situated in the valve-seat.

From the cavity *a* a duct or passage, *f*, leads to the exterior of the valve-chest C, and has connected with it a pipe, *f'*, which forms a continuation of said duct or passage.

E designates a reservoir or supply chamber or vessel, which connects by pipe *o* with a pressure device and likewise communicates with the cavity *a* through the duct or passage

f and the pipe f' , and which is adapted to be partly filled with oil or any other liquid. The reservoir or chamber E may be provided with a gage-tube, g , to indicate the level of liquid therein, and the passage of liquid through the pipe f' may be controlled by a cock or valve, h .

F designates the throttle or stop valve, whereby the admission of steam or other motive agent to the valve-chest C is controlled, and the throttle-valve and the cock or valve h may be connected by a rod, i , so as to be operated simultaneously.

The two valves may be connected by any suitable devices other than those shown.

The reservoir or chamber E is first partly filled with oil or other liquid, and pressure is applied thereto by a pump or otherwise. If the cock or valve h now be opened, the liquid or fluid under pressure will pass into and fill the cavity a between the slide-valve D and its seat, and will exert a pressure upon the valve which will tend to raise it or force it from its seat, and will act in an opposite direction to the steam or other motive agent which presses upon the back of the valve.

Inasmuch as the cavity a must necessarily be much smaller in area than the area of the back of the slide-valve D, the pressure of the liquid in the cavity should be greater per square inch than the pressure of the steam or motive agent which presses against the back of the valve; but the aggregate of pressure exerted by the liquid must be less than the aggregate pressure of the steam or motive agent on the back of the valve, else the valve would be raised or forced away from its seat.

The throttle-valve F and the valve h should be so connected that the valve h will be closed before the throttle-valve; for if the pressure on the back of the valve were greatly diminished or removed before the pressure of the liquid or fluid were removed from the face of the valve, the latter pressure might raise the valve from its seat and allow the liquid to escape.

Where the invention is applied to locomotives or other connected engines a single reservoir or supply-chamber, E, may be arranged between the cylinders and connected with both cylinders, as shown in Fig. 5. The use of oil in the cavity a is advantageous, because any oil which may escape therefrom into the valve-chest will pass to the cylinder and lubricate the piston, as well as lubricate the valve-seat.

By this invention a very simple and effective means is provided for balancing the slide-valve without the use of devices which are applied to and move with the valve, and which are expensive and require to be frequently adjusted.

What is claimed as new, and is desired to be secured by Letters Patent, is—

1. The method of balancing and lubricating a slide-valve, consisting in exposing the face of the valve to the action of the pressure of lubricating material which is contained under pressure in a reservoir or supply-vessel, substantially as herein described.

2. The method of balancing a slide-valve, consisting in exposing the face of the valve to the action of the pressure of a liquid which is contained in a reservoir or supply-vessel separate from the boiler or source of supply of the motive agent which acts upon the back of the valve, substantially as herein described.

3. The combination of a valve-seat and a slide-valve having a cavity between them, and a pipe or passage for supplying liquid under pressure to said cavity, substantially as and for the purpose herein described.

4. The combination of a valve-seat and a slide-valve having a cavity between them, a pipe or passage for supplying liquid to said cavity, and a reservoir or supply-chamber in which a constant pressure is to be maintained, communicating with said pipe or passage, substantially as and for the purpose herein described.

5. The combination, with an engine-cylinder and a slide-valve having a cavity between the valve face and seat, and a pipe or passage for supplying liquid under pressure to said cavity from a reservoir distinct and separate from the boiler or source of supply of the motive agent, of a throttle-valve for controlling the admission of the motive agent to the valve-chest, a valve for controlling the admission of liquid to said cavity, and devices connecting said valves so that they may be operated simultaneously, substantially as and for the purpose herein described.

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Witnesses:

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