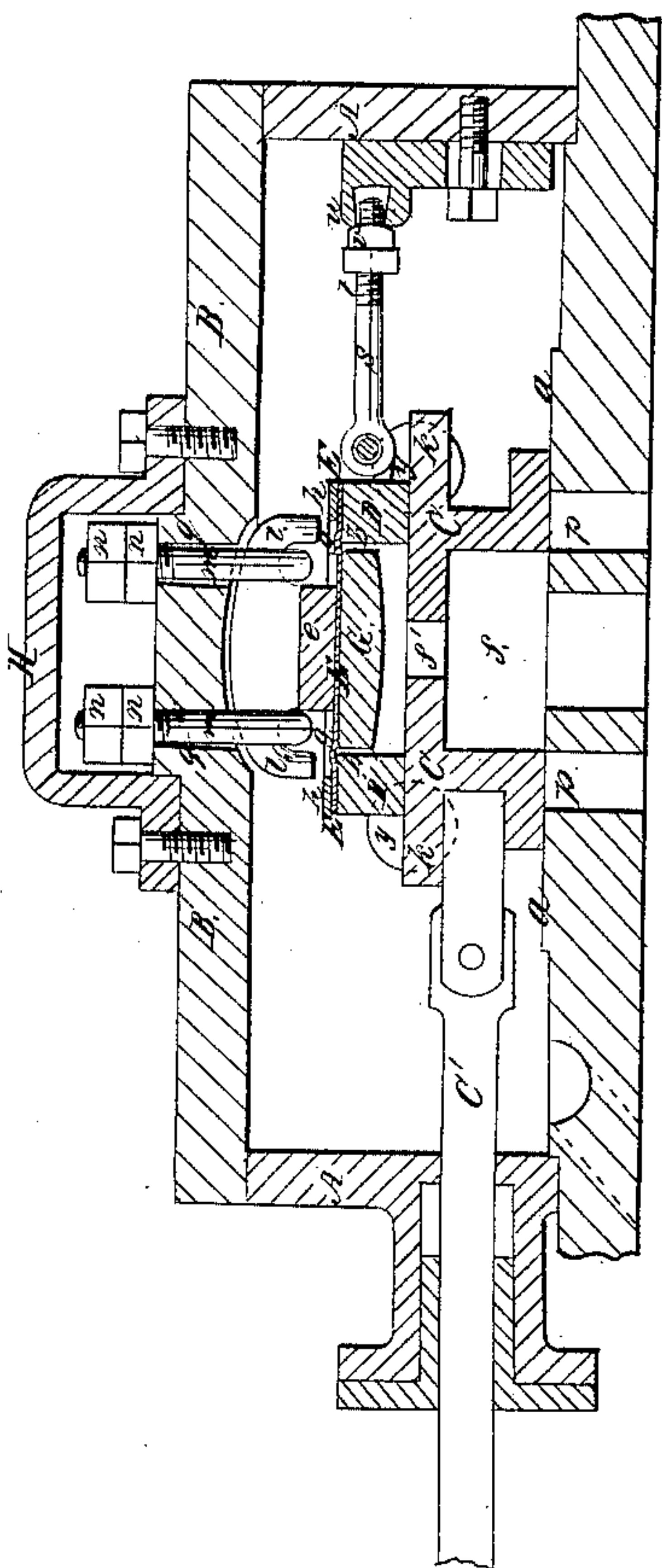
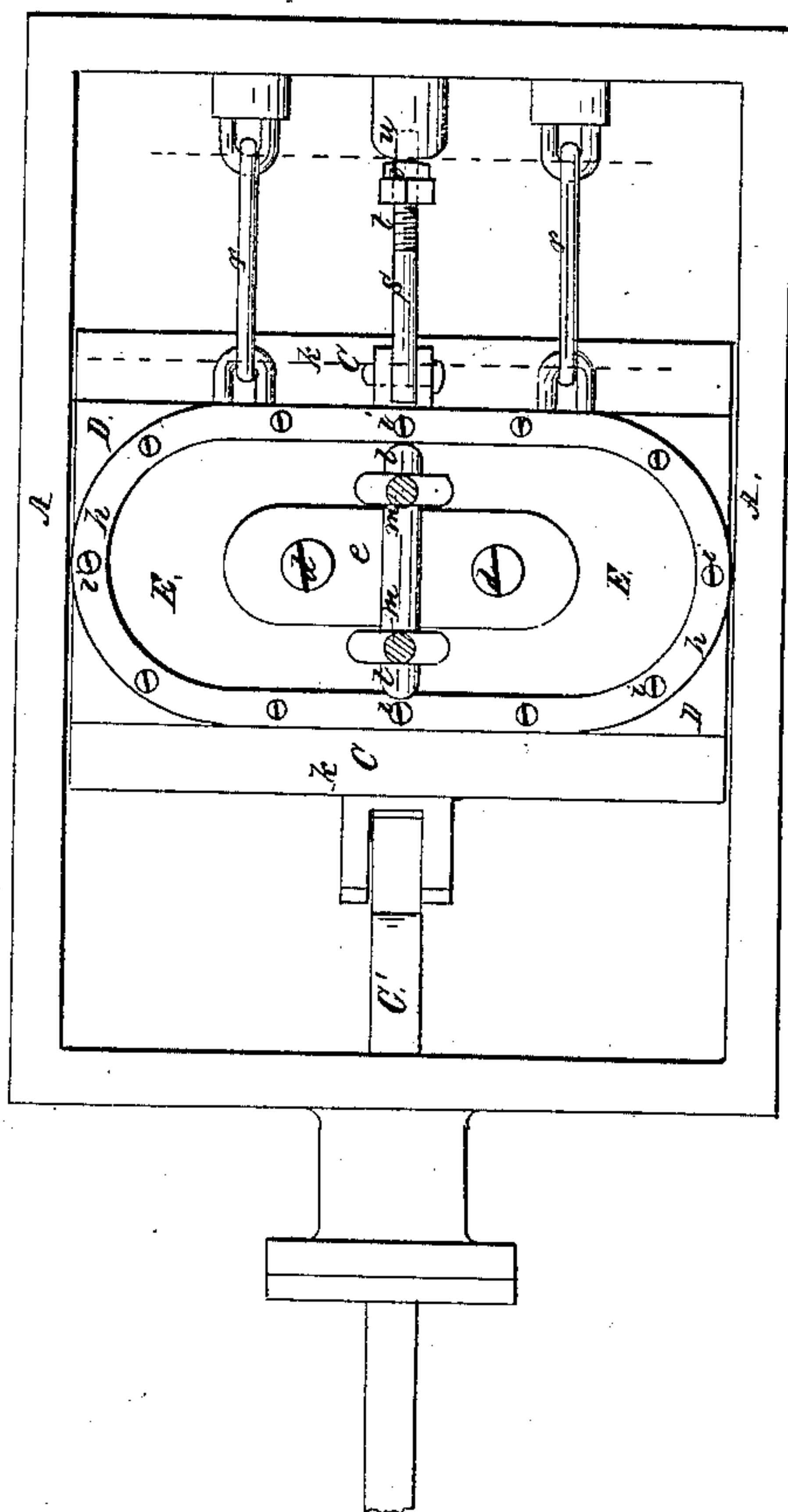


*A. Buchanan,*  
*Steam Slide Valve.*  
*N<sup>o</sup> 44,849.                      Patented Nov. 1, 1864.*

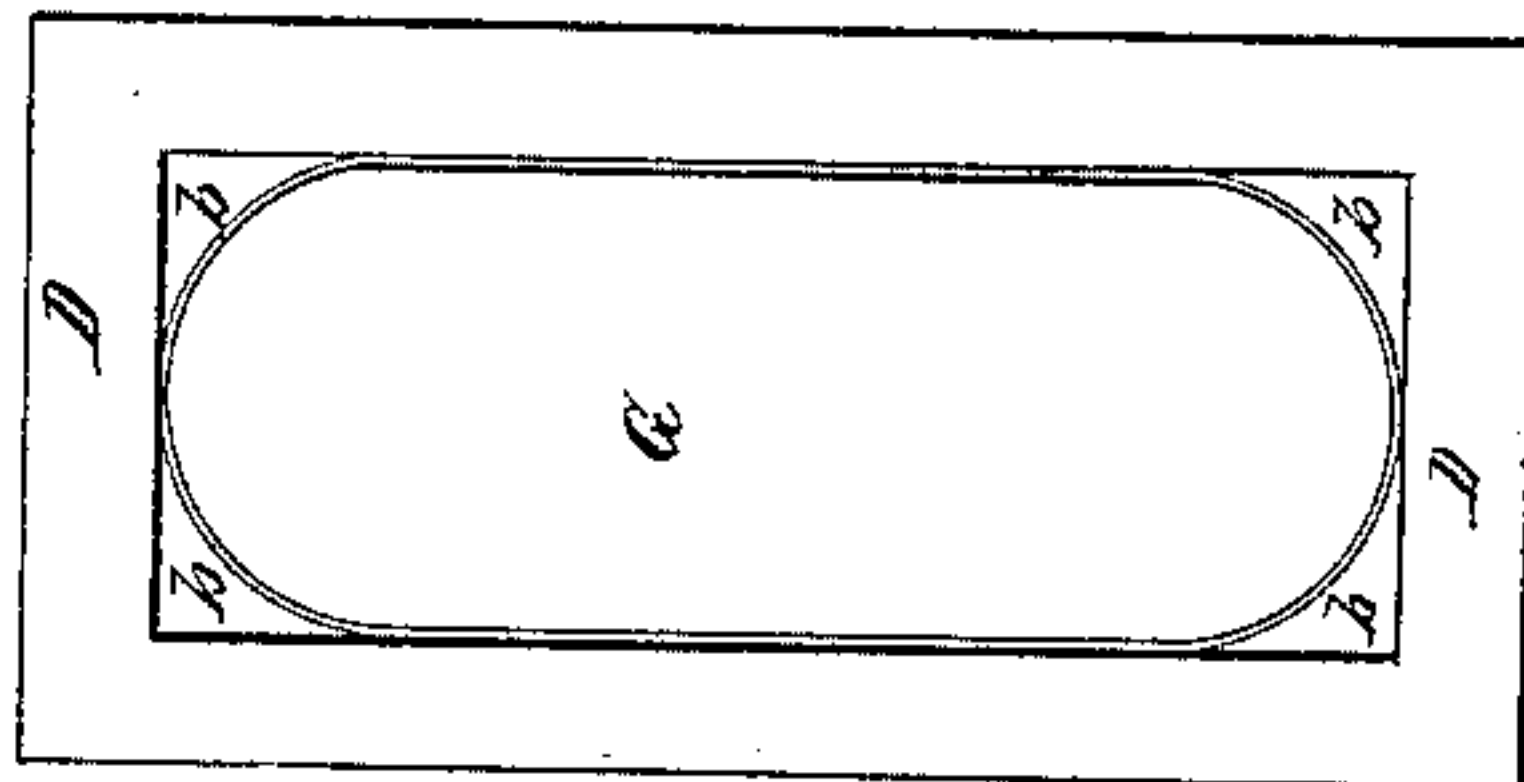
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



*Witnesses:*

*Henry T. Brown*

*M. M. Livingston*

*Inventor:*

*Alex Buchanan*



# UNITED STATES PATENT OFFICE.

ALEXANDER BUCHANAN, OF NEW YORK, N. Y.

## IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. 44,849, dated November 1, 1864; antedated October 30, 1864.

*To all whom it may concern :*

Be it known that I, ALEXANDER BUCHANAN, of No. 84 Cannon street, in the city, county, and State of New York, have invented a new and useful improvement in means of relieving the slide-valves of steam-engines of unnecessary pressure; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a valve-chest and valve to which my invention is applied. Fig. 2 is a plan view of the same, with the cover of the chest removed. Fig. 3 is a face view of the valve-cover.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to the protection of the back of the valve from the pressure of the steam by means of a valve-cover attached to the back or cover of the valve-chest; and it consists in a novel mode of supporting and sustaining such valve-cover, whereby it is enabled to adapt itself to the back of the valve in such manner that the valve will work against it perfectly steam-tight, but without binding or unnecessary friction, and that in case of the engine being suddenly reversed the valve may be permitted to be lifted off the seat and thereby prevent the compression of any steam that may have been shut in the cylinder.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the valve-chest, B the cover of the same, C the valve, and *a* the valve-seat. The valve only differs from the common slide-valve in having flanges *k k* at its ends to increase the area of its back surface, in having its back surface planed or otherwise finished to make it exactly parallel with its face, and in having an opening, *f'*, in its back communicating with its exhaust-cavity *f*, all of which features may be found in some other slide-valves, and it is operated in the usual manner by suitable valve-gear connected with its stem *C'*.

D and E are the principal parts of the valve-cover. The part D is a quadrangular frame, of cast-iron or other metal, of quadrangular

form, of a width equal to the whole width of the valve and of a length equal to the distance between the outer edges of the steam-ports *p p* in the valve seat, and this is planed up and finished to fit the back of the valve. The part E consists of a flexible elastic plate, of steel or other metal, the edges of which are firmly secured to the back of the said frame by means of screws *i i'* and a metal clamping-piece *h*, which conforms to the oblong rounded opening *b* of the said frame.

In order to confine the flexibility of the plate E near the interior of the frame D, the said plate is made with a corrugation, *g*, Fig. 1, running all around the opening *v*, and to the flat portion of the said plate within this corrugation there is secured a stiff plate, G, which conforms to but is somewhat smaller than the opening *f* of the frame D. This stiff plate G is confined to the plate E by means of a clamping-plate, *e*, applied to the upper side of the plate E, and screws *d d* passing through *e* and E and screwing into G. The plate D is furnished at the middle of its width with two rigid hooks, *l l*—one of which projects over its front and the other over its rear edge for the purpose of entering the eyes of two eyebolts, *m m*, which pass through holes *q q* in the cover B of the valve-chest, and which are secured by nuts *n n*, outside of the chest, thereby attaching the valve cover to the cover or back B of the valve-chest. The holes *q q*, nuts *n n*, and outer ends of the eyebolts *m m* are covered by a cap, H, which is fitted to the cover B with a steam-tight joint and bolted securely thereto to prevent any leakage of steam from the valve-chest around the eyebolts. Stuffing-boxes around the eyebolts might be substituted for the cap H, but I consider the cap preferable, as it is cheaper and more reliable. The valve-cover, as well as being attached to the cover or back B of the chest in the manner described, is connected by tension-braces *r r* and a thrust-brace, S, with one end of the valve-chest, to keep it from moving within the chest in a longitudinal direction and to keep it directly over the two ports *p p*, the thrust-brace S being made with a screw-thread, *t*, and having a bearing nut, *v*, fitted to the said screw-thread to bear against the fixed round-faced bearing *w* in the steam-chest, so that by screwing back



the nut against the bearing *v* the tension braces are set up tight and the valve is prevented from moving lengthwise of the chest, but the connections of all these braces with the valve and the connection of the tension-braces *r r* with the steam-chest are composed of hooks and eyes, pin-joints, or other flexible joints to permit the valve cover to be raised from the valve whenever it becomes desirable, owing to any excessive pressure of the steam in the cylinder either from sudden reversal or breakage of the valve-connections or from any other cause, the steam in such case being forced back through one of the ports *p p* into the cavity *f* and through the opening *f'* in the back of the valve.

The mode of adjustment of the valve cover is as follows: After it has been placed in the valve-chest on the top or back of the valve and properly connected with the braces *r r* S, the eyebolts *m m* are put on the hooks *l l*, and the chest-cover B is put on. The nuts *n n* are then applied to the bolts *m m* and screwed down to the top of the chest-cover and so adjusted that the bolts *m m* will just allow the frame D of the valve-cover to touch at all points on the back surface of the valve, which may be seen by holding a lighted lamp or candle to one of two peep holes, *y y*, in one side of the chest and looking in the other of said holes and working the valve back and forth by hand or by other means. If the adjustment is correct at one side of the valve and cover it must be on the other side, as the valve is balanced on opposite sides of the hooks *l l*, so that all the care in adjusting is to get the valve-cover suspended from the chest-cover in such manner that each end of the valve-cover will touch the valve. When this adjustment has been made, the cap H, the nuts *n n* are turned on the screws *n n* a short distance in a direction to raise up the bolts *m m* and so raise the valve-cover D E slightly from the valve a short distance, taking great care to turn both nuts exactly the same distance. The cap H is then put on, and when steam is admitted to the chest its pressure, acting on the upper side of the cover D E, while the lower side is in communication with the exhaust-cavity *f* of the valve through the opening *f'*, overcomes the resisting force of the flexible plate E and brings the outer portion of the frame—viz., the frame D—into such con-

tact with the valve that while no steam can get between them there will be no great friction produced between them, the valve-cover being almost entirely sustained against the pressure of the steam by the bolts *m m*, and the flexible portion E of the cover permitting it to accommodate itself to unequal expansion of the valve, valve-cover, and chest. Some experience will have to be acquired by experiment as to the proper distance to turn the nuts *n n* to raise the valve cover after the first adjustment, as it will depend on the degree of flexibility of the plate E and on the pressure of steam employed. When the cover is properly adjusted, the face of the valve and seat will be relieved of an amount of pressure equal to that which is sustained by the bolts *n n* and transmitted to the cover.

It will be understood that the hooks *l l* and eyebolts *m m* form a chain-like connection between the valve-cover and the back of the steam-chest, which is positively unyielding toward the valve, but perfectly limber in the opposite direction, and it is in this chain like peculiarity that the advantage of this mode of suspending the valve-cover consists, and any other construction of the connection by which this peculiar characteristic is obtained may be considered as the equivalent of the hooks and eyes.

This invention may in most cases be adapted to an old engine without changing the steam-chest, and in all cases without a new valve-seat, and it is much less costly and liable to get out of order than many or most of the so-called "balancing" contrivances for slide-valves.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The attachment of the valve-cover to the back or cover of the steam-chest by means of hooks *l l* and eyebolts *m m*, or their equivalents, substantially as and for the purpose herein specified.

2. The attachment of the valve-cover to one end of the steam-chest by braces having flexible connections, which permit the cover to rise from the valve, substantially as and for the purpose herein specified.

ALEXR. BUCHANAN.

Witnesses:

M. M. LIVINGSTON,  
J. W. COOMBS.