

(No Model.)

D. A. WOODBURY.  
BALANCED SLIDE VALVE.

No. 331,018.

Patented Nov. 24, 1885.

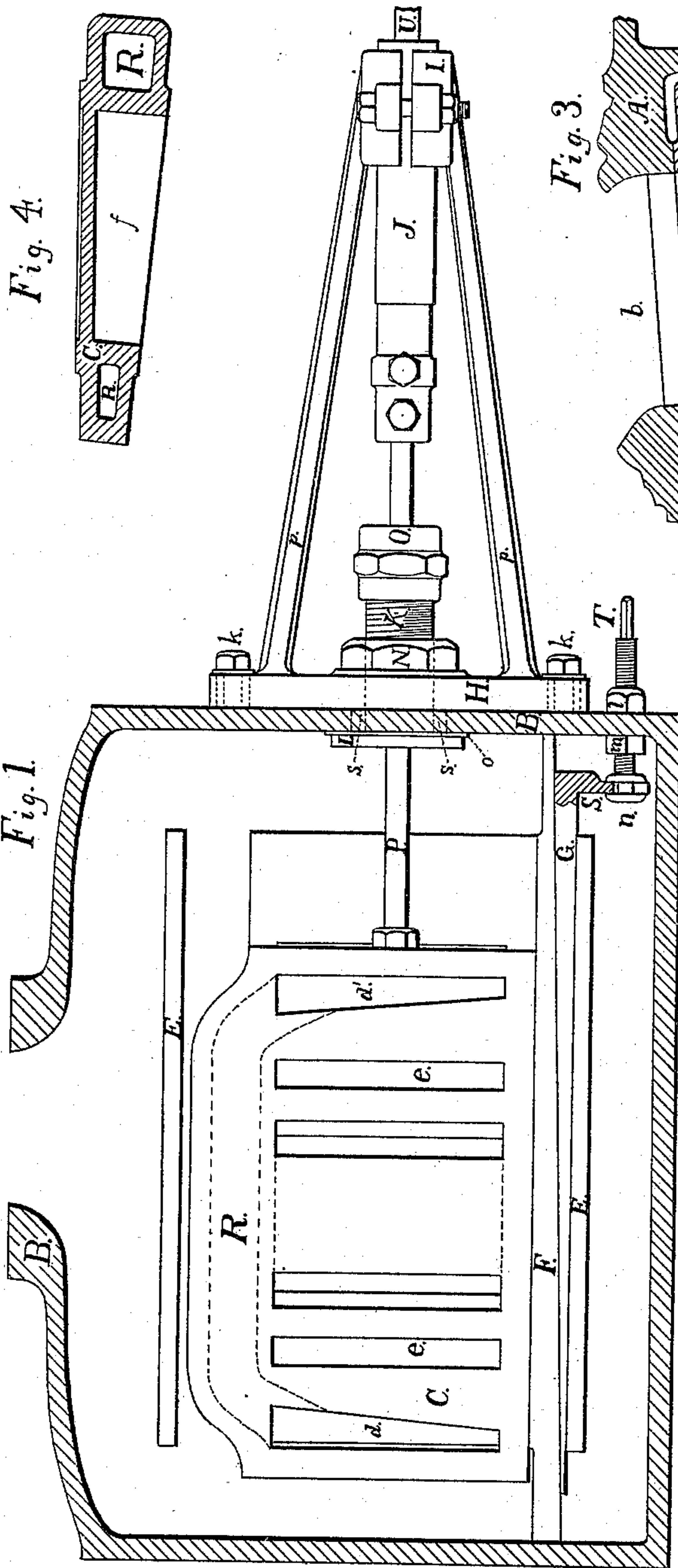


Fig. 4.

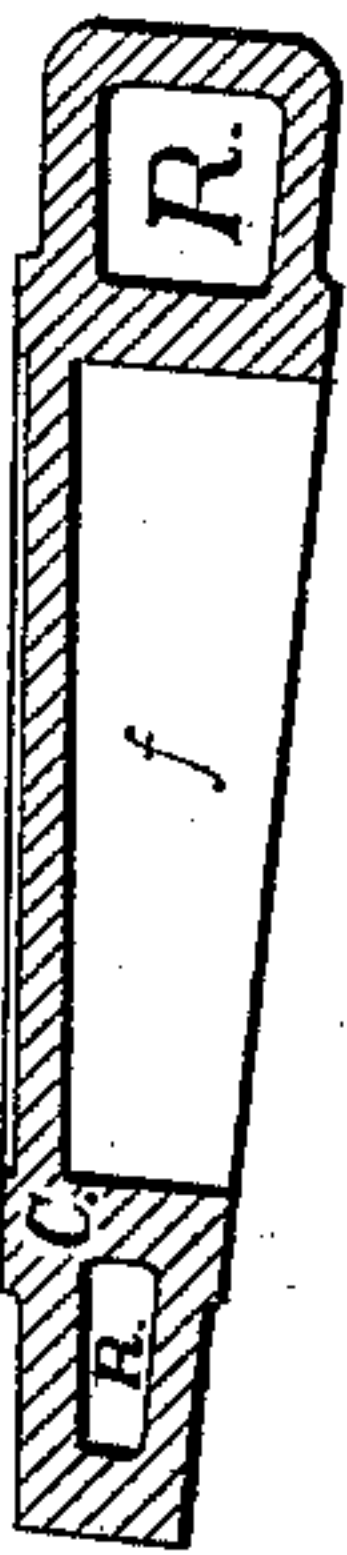


Fig. 3.

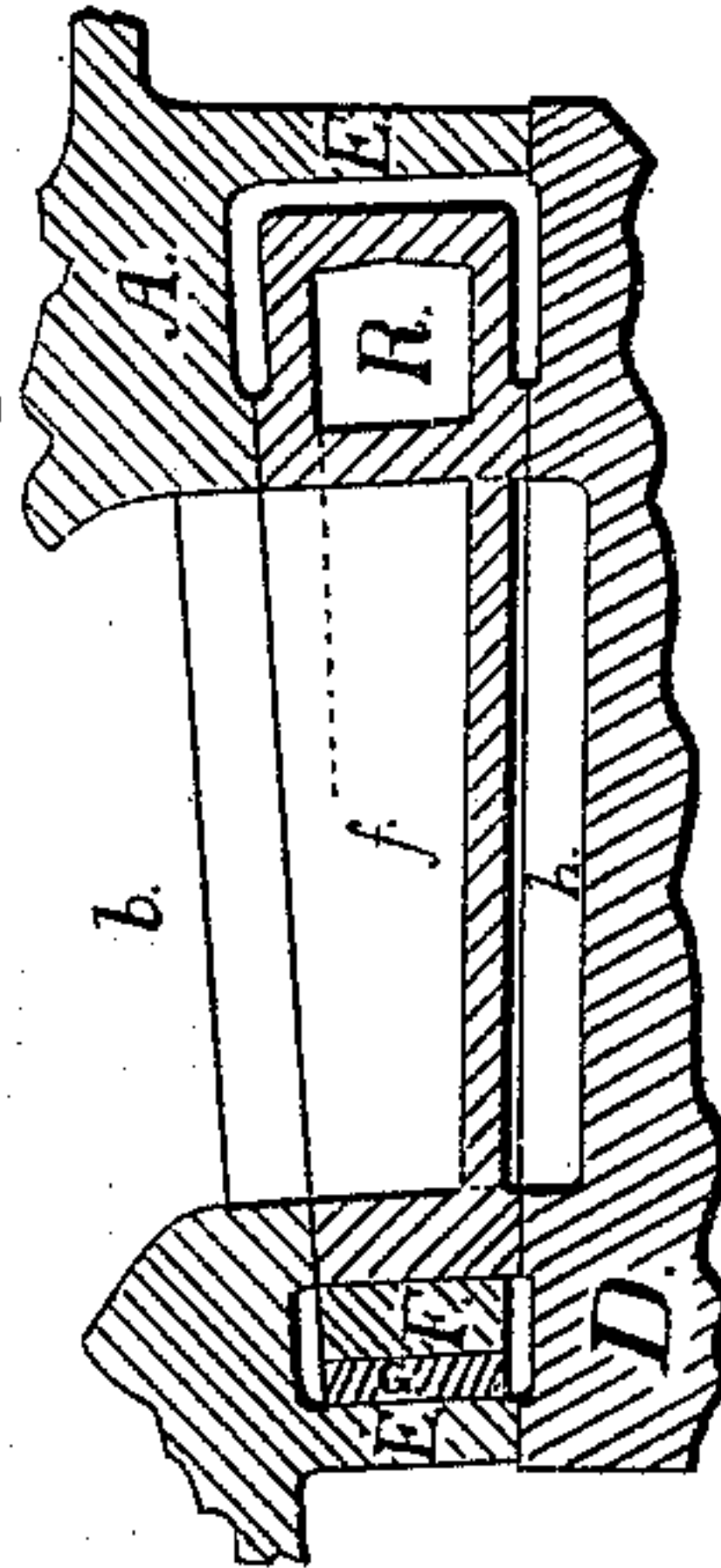
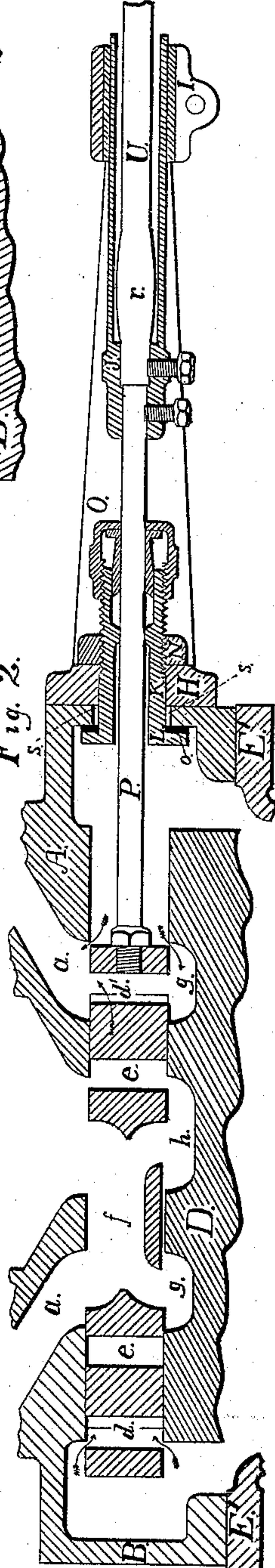


Fig. 2.



WITNESSES:

*Am. Bassett.*  
*Henry B. Horn*

INVENTOR:

*D. A. Woodbury*



# UNITED STATES PATENT OFFICE.

DANIEL A. WOODBURY, OF ROCHESTER, NEW YORK.

## BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 331,018, dated November 24, 1885.

Application filed April 8, 1885. Serial No. 161,560. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL A. WOODBURY, a citizen of the United States, residing in the city of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Balanced Slide-Valves for Steam-Engines, of which the following is a specification.

My invention relates to improvements in balanced valves of the class in which the valve works under a relief-plate, and has for its objects, first, to increase the facilities for both the induction and eduction of the steam without increasing the thickness of the valve; second, to afford more convenient means for obtaining the alignment of the stuffing-box and valve-rod guide; and, third, to provide better and more compact means for adjusting the pressure of the relief-plate upon the valve.

In the drawings, Figure 1 is an elevation, the steam-chest being shown in section and the relief-plate removed; Fig. 2, a horizontal longitudinal section through the center, with only fragments of the cylinder and relief plate shown; Fig. 3, a transverse section through the center of the valve with fragments of the surrounding ports. Fig. 4 is also a transverse section through the valve, showing a modification.

The cylinder A is in the usual form, when intended to be used with a D slide-valve, being provided with the usual steam ports and passages, *a a*, and exhaust-port *b*. The ports are somewhat enlarged to adapt them to use with a valve having supplemental ports. The steam-chest B is shown cast in one piece with the cylinder, but may be separate, if desired. It is provided with the usual cap or cover, E'. The valve C is provided with a central exhaust-cavity, *f*, and with supplemental exhaust-passages *e e* and steam-passages *d d*. The passages *d d* are connected at one end through the passage R, running along the side of the valve, as shown in Fig. 1. Two such passages may be used, if desired, one upon each side, as shown in Fig. 4. If the valve be of equal thickness at both edges, two are best, if trapezoidal, one is preferable. This device applies equally well to a "double-D valve," but in that case only one of the pas-

sages *e* is required in each valve, and the other should be omitted. In order to give greater passage-way into and from R, the passages *d d* are enlarged where they connect with it. It will be readily seen that this arrangement gives four different points of admission, one at the end, as in an ordinary D-valve, another at the same end through the cavity *g* and passage *d'*, and two at the opposite end into *d* and through the passage R to *d'*, thence into the cylinder-port *a*. The same operations will take place in the opposite direction when the valve is in the reverse position. As these additional points of admission are not ordinarily important, except just after the opening and just before the closing of the port, or when working at short points of cut-off, the passage R may be of quite moderate size.

I am aware that valves have been provided with passages connecting those corresponding with *d d*. The patents of J. F. Allen, No. 95,858, and S. E. Jarvis, Nos. 267,791 and 278,020, all show such passages. Neither of these, however, permit the use of the passages *e e*, and the additional facility for eduction afforded by these passages is very important. They also all require a large addition to the thickness of the valve to obtain even an ordinary exhaust-cavity. This increases the danger from the unequal expansion of the ports and adds to the weight.

That the valve-rod P may obstruct the inflowing steam as little as possible, it is attached rigidly to the valve. This necessitates the adjustment of the stuffing-box and the slide-box I to procure and maintain the proper alignment of the ports. For this purpose the plate H of the supporting-bracket is made adjustable along the face of the chest. The body or barrel of the stuffing-box K extends through this plate and the wall of the chest and is provided with the wide flange or collar L. It fits closely in the plate, but the opening through the wall of the chest is made larger to leave an annular space, 3, around it, of sufficient size to admit of all needed adjustment. This flange is broad enough to not only cover this opening, but the packing ring or gasket O, making a steam-tight joint.

As the stuffing and guide boxes must move



simultaneously, it is obvious that the adjustment of one will also adjust the other. To effect an adjustment the nut N and bolts *k k* are slackened and the plate moved along the 5 face of the chest until the proper position is reached, when by tightening them again the whole is again secured.

As shown, the stuffing-box proper is formed in the end of K, and the cap O fits the same 10 thread as the nut N; but, if desired, all outside of the nut may be made separate and screwed into it, or attached in any other convenient way. The weight of the valve and the pressure due to its unequal thickness at the 15 two edges is borne by the guide-bar F, and under this is placed the adjusting-wedge G, and all resting upon the support E. The wedge is made with an L-head, S, which engages the spool-head *n* of the adjusting-screw T, by which 20 it is operated. This screw is provided with a set or jam nut, *l*, outside, and another, *m*, inside, of the wall of the chest. The valve being placed in position, its surface and those of the supports E E being worked down evenly 25 and truly to a common plane, and the bearing-surfaces of the relief-plate also made true and level, it will when in place bear evenly throughout. Then by a slight forward movement of the wedge as much of the pressure as 30 is desired will be brought to bear upon the supports. As the valve when once properly adjusted will take care of itself for a long time, the nut *m* should then be screwed down firmly, to not only assist in preventing

leakage, but meddlesome interference with the 35 adjustment.

I am aware that the device of Howaldt, Patent No. 301,990, resembles this in some of its features; but that herein shown and described possesses, among other advantages, that of enabling the wedge to be readily removed and 40 replaced, and without interfering in the least with the adjustments. It also only requires one opening through the wall of the chest, and in this the screw fits tightly, and can therefore be much more easily kept from leaking. 45

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

1. In a slide-valve working under a relief-plate, the combination of the exhaust-cavity *f*, 50 passage or passages *e*, passages *d* and *d'*, and passage or passages R, all arranged and operating substantially as set forth.

2. The combination, with a slide-valve having the rod or spindle attached rigidly thereto, 55 of an adjustable bracket provided with suitable guide-box or guide, and a stuffing-box, constructed and operating substantially as shown and described.

3. The combination, with an adjusting-wedge 60 and adjusting-screw, of the nut *m*, located inside of the chest, substantially as and for the purpose specified.

DANIEL A. WOODBURY.

Witnesses:

HENRY B. HOWE,  
A. M. BASSETT.