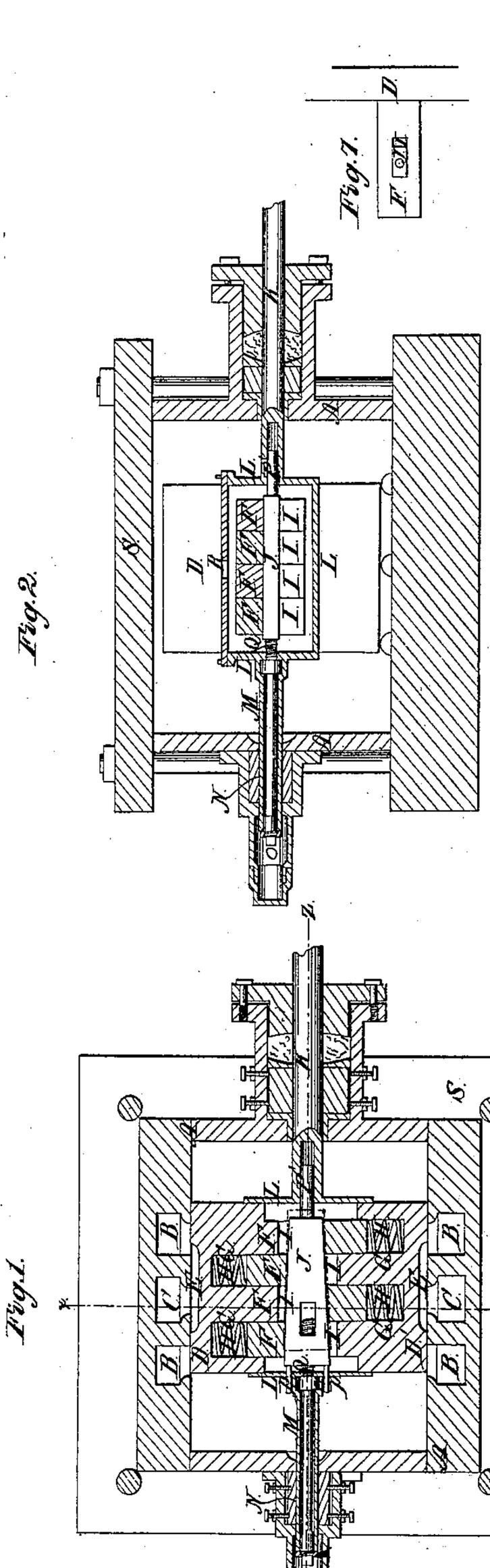
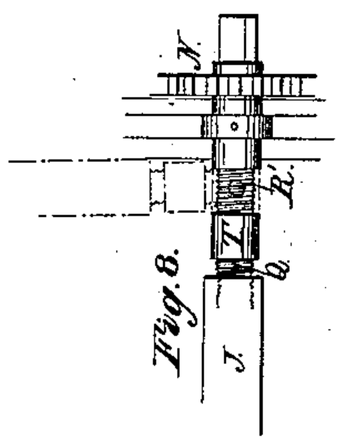
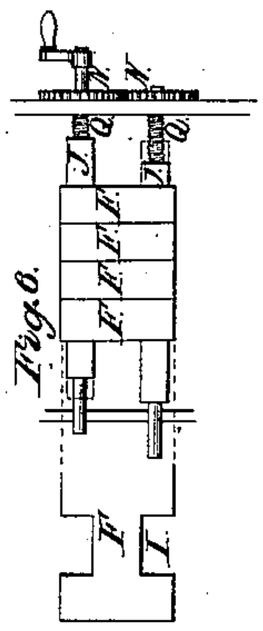
E. D. Taylor,

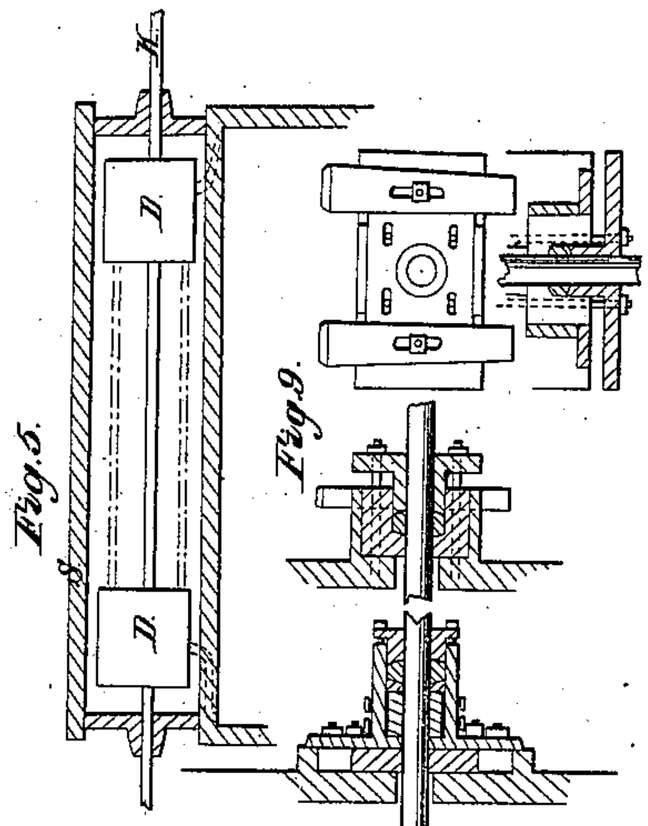
Steam Balanced Valve.

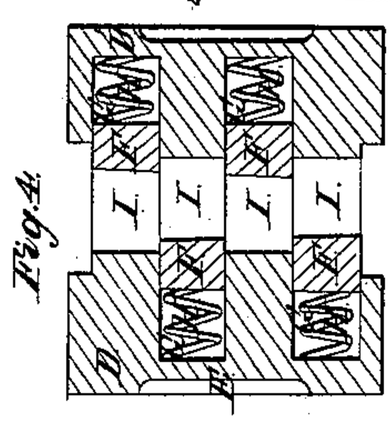
No. 59,480. Patented Nov. 6, 1866.

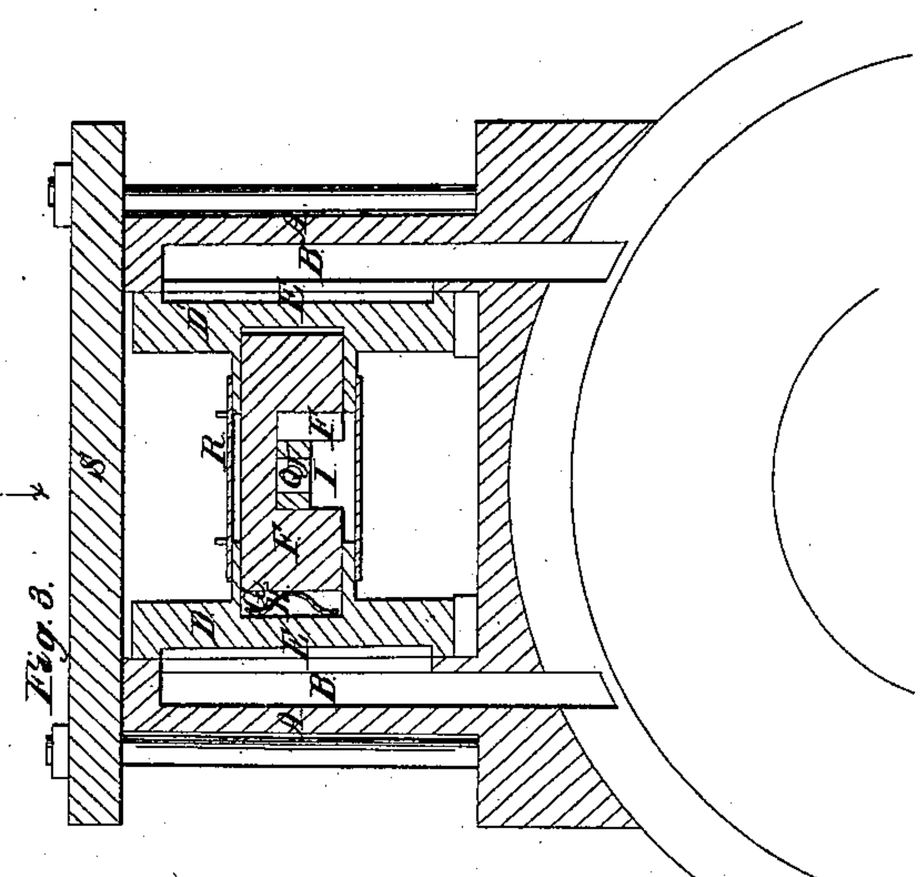












Witnesses.
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ESAU D. TAYLOR, OF HORNELLSVILLE, NEW YORK.

IMPROVEMENT IN STEAM-ENGINE SLIDE-VALVES.

Specification forming part of Letters Patent No. **59,480,** dated November 6, 1866.

To all whom it may concern:

Be it known that I, ESAU D. TAYLOR, of Hornellsville, in the county of Steuben and State of New York, have invented a new and useful Improvement in Slide-Valves for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal horizontal section through the center of the valve-stem. Fig. 2 is a longitudinal vertical section through the center of the valve-stem. Fig. 3 is a vertical cross-section of the valve and steam-chest. Fig. 4 is a horizontal longitudinal section of the valves detached. Figs. 5, 6, 7, and 8 represent a modification of the arrangement and construction of the valves and keys. Fig. 9 represents an adjustable stuffing-box to be used with this valve, for which I intend to make separate application for Letters Patent.

The object of my invention is to make balance slide-valves for steam-chests, so that the pressure of the face of the valve against the seat can be adjusted to a nicety, and the entire friction relieved under great pressure of steam, while the valves are held to their seats when there is no pressure in the steam-chest, but at the same time admit of withdrawing, to relieve the back-pressure caused by a vacuum in the steam-chest and cylinder when steam is suddenly cut off.

My invention consists in the construction of a balanced slide-valve in two parts, with parallel arms, so arranged with springs as to hold the faces of the valves against their seats without the pressure of steam in the chest, in combination with a yoke, adjusting-screw, guide-pins, and a taper key, to control and regulate the pressure of the valves against their seats, in opposition to the pressure of the steam in the chest, as herein more fully described.

That others may understand the construction and operation of my invention, I will particularly describe it.

A A are the walls of the steam-chest, secured to the steam-cylinder in the usual way. In the opposite sides of this steam-chest are ports B B and exhaust-port C. The faces of wall A, in which are the ports B and C, are planed true, so that the valve-face may form a steam-tight joint therewith.

The two valve-plates D and D′ are fitted to the seats in the ordinary way. They are each provided with a recess, E, for the exhaust. The plates D and D′ are connected by arms F F, which are disposed so as to pass each other in the manner shown in Figs. 1, 2, and 4.

At the back of each plate, opposite to each arm F from the opposite plate, is a recess, G, and within this recess is a spring, H. The ends of the arms F project into the recesses G slightly, and the springs H are designed at all times to be slightly compressed. They act in the direction of the steam-pressure, and their office is to keep the plates D D′ always in the desired position, whether there is any steam present or not.

The lower edges of the arms F are provided with notches I, as shown in Figs. 1, 2, 3, and 4. When the springs H are not compressed these notches will be in position, as shown in Fig. 4. The valves D and D′ are then thrown farther apart than they can ever be when in position within the steam-chest.

The taper key J is placed within the notches I, as shown in Figs. 1, 2, 3, 6, and 7, and by its presence prevents the plates D and D′ from separating more than a certain distance. This is accomplished because the outer edge of the notches I are brought against the inclined sides of the key by the action of the steam or the springs H; and as the arms F from one side are moved in a direction opposite to the direction of the movement of the arms F from the other side, it follows that the movements of both are equally arrested by the presence of the key J, which brings said movements in opposition to each other.

It is evident that the taper key J will cause the plates D D′ to approach, or permit them to recede from each other, according as the wider or narrower part of it is brought within the notches I, and in this way the distance between the faces of the valves may be regulated with the utmost nicety. If the key J was not present the steam would force the valves against their seats with all the power

due to the boiler-pressure; but when the key is present, then, as the steam forces the valve-plates D D′ in exactly opposite directions, the resistance to that force is in said key, and the pressure of the valves is transferred from the valve-seat to the key.

The valve-stem K does not pass uninterruptedly through the valve and steam-chest. It is attached to the yoke L, as shown in Figs. 1 and 2, which incloses the arms F of the valves D D′, and causes the valve to slide back and forth, in obedience to the movements of the valve-stem. Attached to the other end of this yoke, and in line with the valve-stem K, is the hollow stem M, which runs through a box, N, secured to the end of the steam-chest, and serves to guide the valve-stem and support that end of the yoke. The hollow stem M passes through the box N, and is projected into the case O, which is provided with a screw-cap, as shown, so that the end of the stem M may be reached by removing said cap.

The taper key J is supported in the yoke L, its smaller end being provided with a stem, P, which projects through the end of the yoke and into a recess drilled in the end of the valve-stem, and its wider end being supported by two pins, *p p*, which rest in holes through that end of the yoke.

The taper key J is moved back or forth, as desired, by the adjusting-screw Q, the stem of which lies within and passes through the hollow stem M, and is retained immovably in the desired position by a jam-nut at the end of the stem of the screw Q.

Operation: When from any cause it is necessary to remove the valve from the steam-chest, it may be done without removing the valve-stem or the key J, as it will be observed by reference to Fig. 3 the valves are only secured to the yoke L by the cover R, which is secured to the yoke by screws. When the valve is to be removed the steam-chest cover S is removed, and the valve is then exposed. The screws which fasten the cover R may then be removed, and the plates D D′ lifted from off the key and removed from the chest. In very large valves it might be necessary to use some suitable instrument which would counteract the action of the springs H when removed from the key and keep plates D D′ from being jammed against the valve-seats.

By the operation of the taper key J the engineer is at any time, and when the valve is under pressure, enabled to regulate the friction of the valves against their seats, and thus reduce the loss of power due to this cause to the lowest point.

When the valve-plates D and D′ are removed from the steam-chest they may be separated, and if an accident shall have happened to one of them it may be replaced with another.

Friction-rollers may be placed beneath the edges of the valves, and in that way reduce to a still lower point the power required to operate the valve.

The two parts D and D′ are constructed with exactly the same form and quantity of metal, and will consequently expand under the influence of the heated steam to exactly the same degree. Perfect balance is attained in this way without the admission of steam under the valve, and the degree of balance does not depend simply upon the difference of pressure in two directions, but upon mechanical means which can withdraw the valves from their seats entirely if required, and in opposition to the power of the steam.

In valves of very large size, as are used in some marine engines, it may be that one set of arms, F, and one key, J, will not prove sufficient, and in that case they may be duplicated and two keys used, as indicated by the red lines in Figs. 5 and 6; or, in case very long cylinders are used, and it is deemed desirable to use short ports and a double valve, as is shown in Fig. 5, it will only be required to mount two of my valves upon a single stem.

The keys may be operated by a single screw or by separate screws, as desired.

It will be perceived that the notches I are broader than the key J, because the movements of the key must be accommodated. This construction also enables the two faces of the valve to be brought toward each other and removed from the face of the valve-seat without disturbing the key. This latter capacity is required to relieve the back-pressure which sometimes occurs in the cylinder.

The arms F may be cast with the valve-plates D D′, or they may be made of wrought-iron or steel.

A method of employing two keys is illustrated in Figs. 6 and 8.

In Fig. 6 is represented a lug, F, with notches on both sides to accommodate two keys. In this case they are represented as moved in opposite directions by separate screws, which are operated by one influence through the medium of the gear-wheels N N.

In Fig. 8 a method of arranging the upper key so that it may be removed from its notches when the valves are to be taken out is shown. The screw Q is jointed at R′, so that when the key is to be removed it is simply turned up on said joint. When the key is in position the screw-collar T is screwed over the joint, and it is thus rendered stiff.

In Fig. 7 a method is shown in which the key J is passed through mortises in the lugs or arms F. With this arrangement the key would necessarily be removed with the valves.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The valve-plates D D′, provided with the arms F, in combination with the taper key J, substantially as described.

2. The valves D D′, provided with the arms F and taper key J, in combination with the springs H, to keep the valves in position when steam is not present, and to permit the valves to yield to back-pressure in the cylinder.

3. In combination with the taper key J, the adjusting-screw Q, substantially as and for the purpose set forth.

4. The valves D D′, in combination with the yoke L and hollow stem M, substantially as and for the purpose set forth.

5. The taper key J, in combination with the steady-pins *p p* P′, substantially as described.

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Witnesses:

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