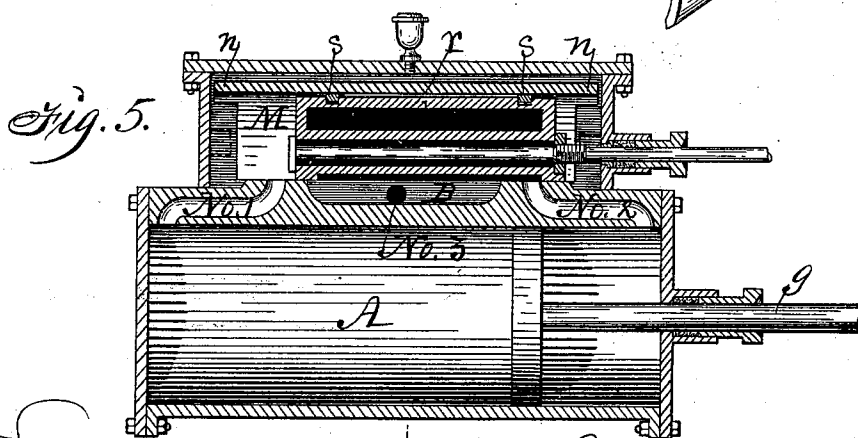
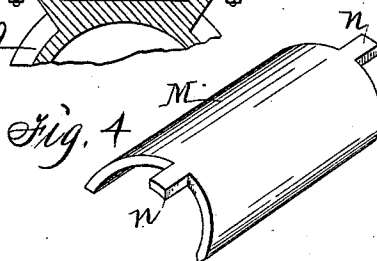
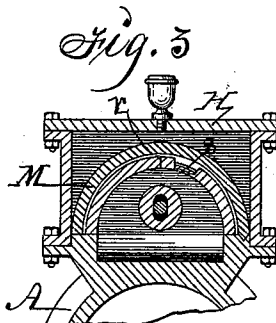
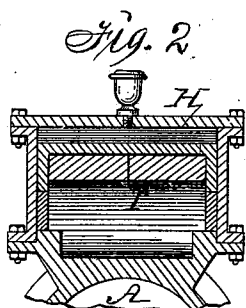
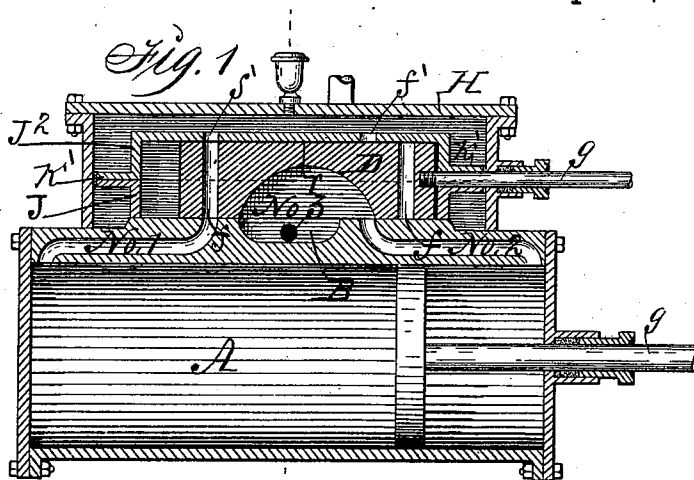


(No Model.)

W. F. GOULD.
BALANCED VALVE.

No. 545,478.

Patented Sept. 3, 1895.



Witnesses: *W. J. Sankey,*
R. W. Drury, } Inventor: *William F. Gould,*
Thomas C. Orwig, Attorney,

UNITED STATES PATENT OFFICE.

WILLIAM F. GOULD, OF DES MOINES, IOWA.

BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 545,478, dated September 3, 1895.

Application filed February 23, 1892; Serial No. 422,559. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GOULD, a citizen of the United States of America, residing at Des Moines, in the county of Polk and State of Iowa, have invented a new and useful Improvement in Balanced Valves for Steam-Engines, of which the following is a specification.

Heretofore boxes have been placed in steam-chests to inclose valves, with the boxes rigidly fastened to the chests. Valve-covers within a steam-chest have also been normally retained in contact with a valve by means of springs.

My object is to prevent the friction and strain incident to the vertical or lateral pressure of a valve in reversing the motion of an engine and to dispense with the use of springs; and my invention consists in the construction, arrangement, and combination of a valve cover or box, with a valve and a cylinder and a steam-chest, as hereinafter set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view showing the valve-box formed in two mating parts and in position within a steam-chest, as required, to cover a sliding valve on the valve-seat of a cylinder. Fig. 2 is a transverse sectional view through a central line of the top portion of Fig. 1. Fig. 3 is a view corresponding with Fig. 2 in every respect excepting in the form of the valve and the box over the valve. Fig. 4 is a perspective view of the modified form of box shown in cross-section in Fig. 3. Fig. 5 is a view corresponding with Fig. 1 excepting in the modified form of the valve and cover.

A represents a cylinder, which has steam-ports Nos. 1 and 2 leading from the valve-seat at its top to the ends of the cylinder. No. 3 is an exhaust-port leading outward from a chamber B in the top and central portion of the valve-seat.

D is a slide-valve of angular shape, as shown in Figs. 1 and 2, fitted to the valve-seat. It has steam-ports *f* extending vertically through its end portions and adapted to be alternately brought into coinciding position with the ports Nos. 1 and 2 in the cylinder as the valve is reciprocated by means of a valve-stem *g* fixed to the end of the valve.

H is a steam-chest fixed on top of the cylinder.

A box adapted to cover the valve D, as shown in Figs. 1 and 2, is formed in two mating parts. The lower part J is open at its top and bottom and has an extension K at the top and center of each end adapted to engage the end walls of the steam-chest and to restrict the longitudinal movement of the box.

J² is the upper part of the box fitted on top of the part J. It has a closed top and steam-ports *f'* in the top coinciding in position with the ports Nos. 1 and 2 in the cylinder. A chamber in the under and central portion of the valve D is large enough in length to be in constant communication with one of the ports Nos. 1 and 2 of the cylinder and also constantly in communication with the exhaust-port No. 3.

L represents a steam-supply pipe connected with the steam-chest H.

The valve shown in Figs. 3, 4, and 5 is semi-circular in its cross-section, and the box or cover M corresponds therewith in shape, as required, to engage the top surface of the valve, and the ends of the cover have projections *n* to engage the end walls of the steam-chest. The ends of the cover M are open and allow steam in the chest to come into direct contact with the ends of the valve in place of passing through ports in the valve and box-cover, as shown in Fig. 1; but the functions of the modified forms of the valve and the cover, as shown in Figs. 1, 2, and 3, are the same as those of angular form and shown in Figs. 1 and 2. Each valve is provided with a small vent *r* at its top and center to allow steam that may enter between the valve and box or cover to escape into the exhaust-chamber and pass through the port No. 3. Vertical motion is allowed to the angular valve D by the separable parts J and J² that compose the box that incloses the valve and by the flexibility of the valve-stem. In the valve shown in Figs. 3 and 6 the valve-stem is extended through a bore of larger diameter that allows vertical motion to the valve relative to the valve-stem. By thus making the bore in the valve larger than the valve-stem, and preferably elliptical in cross-section, as clearly shown in Fig. 3, a vertical self-adjustment of the valve relative to the stem is provided for, as required, to com-

pensate for the wear of the valve and the valve-seat. It is obvious that when no provision is made for such self-adjustment of the valve relative to the stem the weight of the valve would be supported by the stem after the valve and valve-seat became worn and make the valve inoperative.

In the practical operation of my invention the steam admitted into the steam-chest presses equally upon all portions of the valve-cover and the ends of the valve, as required, to balance the slide-valve, and whenever the engine is reversed and the piston resists the pressure of the steam in the cylinder and in the port in communication with the live steam in the cylinder to press upward against the valve the valve and valve-cover will rise jointly and sufficiently to relieve the operative parts of the engine from strain and damage, and the instant such resistance to the movement of the piston and the upward pressure against the valve is relaxed the valve and its cover will, by means of the provision made to allow longitudinal as well as vertical motion to the cover and the balancing force of the steam-pressure upon the cover, be actuated, as required, to resume their normal positions on the valve-seat. The restricted longitudinal motion allowed to the valve box or cover will cause it to wear on its lower edges and also wear on the surface of the valve-seat, but such wear will not effect the efficiency of the device and needs no provision for compensating for such wear, because the box or cover will be self-adjusting relative to the worn surfaces.

s (shown in Figs. 3, 5, and 6) represents packing on the valve.

In place of the extension on the ends of the valve-cover to restrict longitudinal movement of the valve projections may be formed on or fixed to the walls of the steam-chest, as indicated by dotted lines in Figs. 1 and 2, to ex-

tend inward to engage the ends of the box or cover.

I am aware a cover has been fitted in a steam-chest and over a valve in such a manner that the cover had no longitudinal play and could not be lifted at either end thereof, as contemplated by my invention and as required, to relieve the valve from strain in reversing the engine by allowing one end of the cover to rise.

It is obvious that the longitudinal movement of the valve-cover thus provided for will produce wear on its seat, and the wear thus effected corresponds with the wear occasioned on the valve-seat, and consequently the valve-cover is automatically adjusted to the valve and the joints between the valve-cover and its seat automatically ground, as required, to maintain steam-tight joints.

I claim as my invention—

1. In a steam chest, an automatically adjustable valve cover adapted to inclose the top and sides of a valve and to alternately rise and fall at its end portions and also adapted to move longitudinally, in combination with a slide valve, for the purposes stated.

2. In a steam engine having a cylinder, a reciprocating pinion within the cylinder and provided with a valve seat, induction and exhaust ports extending through the valve seat, a steam chest inclosing said valve seat and ports, a valve fitted to the valve seat, a sliding valve cover fitted to said valve adapted in length relative to the steam chest as required to move longitudinally and grind its seat and to allow either end of the cover to rise from the valve seat while the other end remains in contact with the valve seat, in the manner set forth for the purposes stated.

WILLIAM F. GOULD.

Witnesses:

J. RALPH ORWIG,
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