

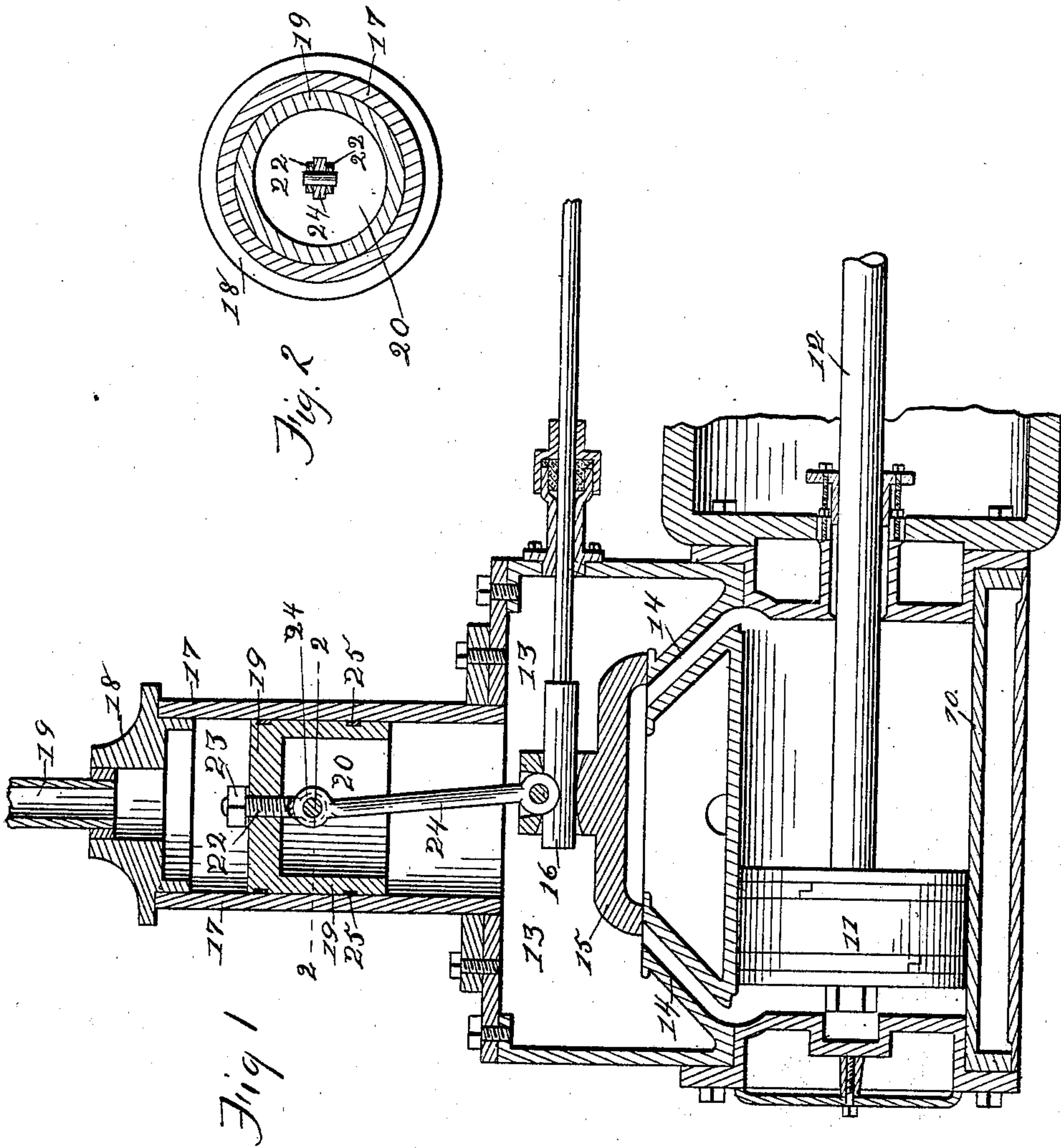
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Patented Aug. 6, 1901.

J. A. JOHNSON & E. O. HENDERSON.  
BALANCED VALVE.

(No Model.)

(Application filed Apr. 2, 1900.)



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOHN A. JOHNSON AND ELMER O. HENDERSON, OF OKOBOJI, IOWA.

## BALANCED VALVE.

SPECIFICATION forming part of Letters Patent No. 679,755, dated August 6, 1901.

Application filed April 2, 1900. Serial No. 11,075. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN A. JOHNSON and ELMER O. HENDERSON, citizens of the United States, residing at Okoboji, in the county of Dickinson and State of Iowa, have invented certain new and useful Improvements in Balanced Valves, of which the following is a specification.

This invention relates to that class of balanced slide-valves in which the steam-pressure within the steam-chest which operates to hold the slide-valve against its seat with great force is balanced by means of a piston or pressure-plate, against which the steam presses in a direction opposite from that of its pressure upon the sliding valve, and which piston or pressure-plate is connected with the slide-valve. Heretofore in devices of this class it has been found necessary to provide the balancing-piston with some sort of a guide to prevent the lateral pull of the slide-valve upon the balancing-piston from causing the piston to cut into the cylinder, and former devices of this class have been objectionable, further, on account of the inability to adjust the position of the balancing-piston within the cylinder. Hence when the cylinder has become worn at one point by the travel of the piston the entire device is rendered useless.

Our objects are, first, to provide a device of this class in which a piston in the form of a hollow cylinder is used and the piston is connected with the slide-valve by means of a link pivotally connected with a bolt that is adjustably secured to the end of the piston, whereby the said pivotal point may be placed in any desirable position with relation to the transverse center of the piston that may be found most favorable for preventing lateral movements of the piston, and, further, in this connection, to provide a device of this class in which the path of travel of the piston may be transferred from one point to another throughout the cylinder at the will of the operator.

Our objects are, further, to provide a device of this class of simple, strong, durable, and inexpensive construction, and, further, to provide means whereby the balancing-piston or pressure-plate will not bind in its movement against the cylinder which supports it, and, further, to provide means whereby wear

upon the parts connecting the slide-valve with the piston or pressure-plate will be automatically compensated for, so that the device will work effectively after considerable wear upon said parts, and, further, to provide a device of this class in which the back pressure from the engine-cylinder upon the valve may readily throw the valve from its seat without interfering in any manner with the operation of the balancing devices.

Our invention consists in certain details in the construction, arrangement, and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in our claim, and illustrated in the accompanying drawings, in which—

Figure 1 shows a vertical sectional view through an ordinary steam-engine and through our improved balancing device connected with the engine as in practical use. Fig. 2 shows a horizontal sectional view through the indicated line 2 2 of Fig. 1.

Referring to the accompanying drawings, the reference-numeral 10 is seen to indicate an ordinary steam-engine cylinder having therein the piston 11, connected with the piston-rod 12. At its top is an ordinary steam-chest 13, having connected therewith the steam passage-ways 14 to provide for the ingress and egress of steam between the steam-chest and the cylinder. All of these parts are of the ordinary construction. Hence a description of their specific construction and operation is omitted. Within the steam-chest 13 is a slide-valve 15, also of the ordinary construction. To the said slide-valve 15 a valve-rod 16 is pivotally connected in such a manner that the ends of the valve may be permitted to move from the valve-seat a slight distance.

In the top of the steam-chest we have mounted a cylinder 17, with one end communicating with the interior of the steam-chamber and provided with a cap 18 at its other end, from which a small pipe communicates with the outside atmosphere. Within the cylinder 17 is a hollow piston 19, the top of said piston being flat and the lower end thereof being open, so as to provide a chamber 20 on the interior of the piston. A bolt 22 is passed through the top of said piston to



the interior of the piston to a point above the center of the hollow chamber 20. This bolt is screwed into the piston, and a nut 23 on its top serves to hold it in place. A link 24 is pivotally connected with the said bolt at a point above the center of the hollow chamber 20, and said link is also pivotally connected at its lower end with the central portion of the sliding valve 15. Packing-rings 25, of the ordinary construction, are placed in the outer surface of the piston 19.

In practical use the area of the piston 19 is made slightly less than the area of the valve, so that the steam-pressure in an upward direction upon the piston will be only slightly less than the steam-pressure in a downward direction upon the sliding valve. It is obvious that by the construction shown the piston 19 will move vertically within the cylinder 17 during the reciprocating movements of the slide-valve, and the upward pressure upon the slide-valve caused by its connection with a piston will be the same when the slide-valve is at any point within its limit of movement. It is obvious by constructing the cylinder 17 of suitable length that the piston 19 therein will work equally effectively when it is at any point within the cylinder. Hence when the connections of the link 24 have become worn the device will work in balancing the slide-valve as well as when these parts fit tightly. Furthermore, by connecting the link 24 with a bolt 22, that is vertically ad-

justable in the pistons, the operator may readily determine by experiment the exact point at which the piston reciprocates without a tendency of cutting the cylinder, and he may then set it at that point. He may also vertically adjust the piston on the bolt, so that the piston may work on different portions of the cylinder-surface.

Having thus described our invention, what we claim, and desire to secure by Letters Patent of the United States therefor, is—

An improved balanced slide-valve, comprising in combination a steam-chest, a slide-valve in the steam-chest, a cylinder projecting from the steam-chest and communicating therewith, a hollow cylindrical piston capable of longitudinal movement within the cylinder, and having its end farthest from the steam-chest closed, a bolt adjustably secured in the central portion of the closed end of said piston and projecting toward the steam-chest, and a connecting-link pivotally attached to the slide-valve, and also pivotally attached to the said bolt within the cylindrical piston, whereby the position of the cylindrical piston in the cylinder may be adjusted, for the purposes stated.

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