

No. 686,039.

Patented Nov. 5, 1901.

W. EDWARDS.
BALANCED SLIDE VALVE.

(Application filed Mar. 25, 1901.)

(No Model.)

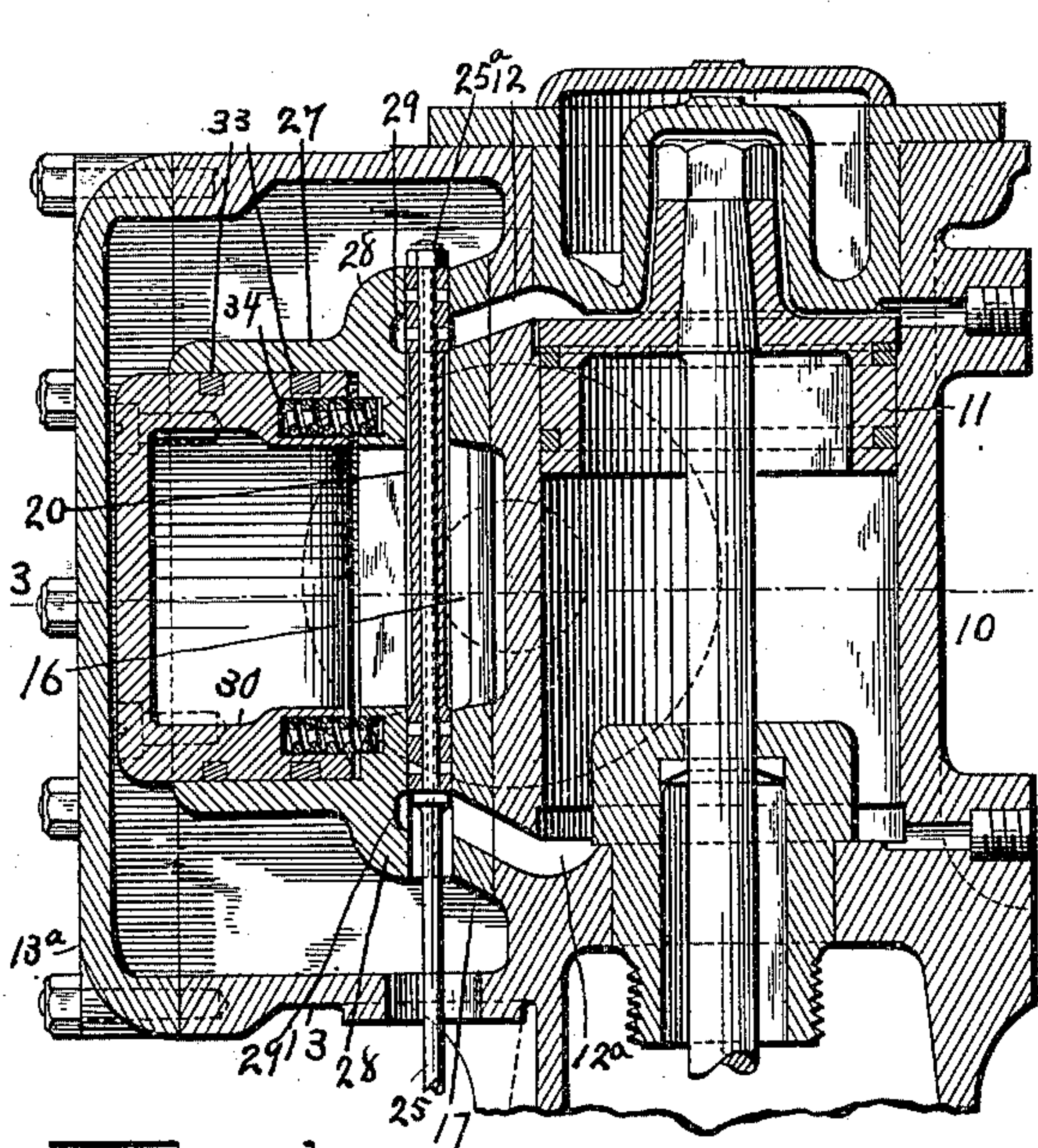


Fig 1

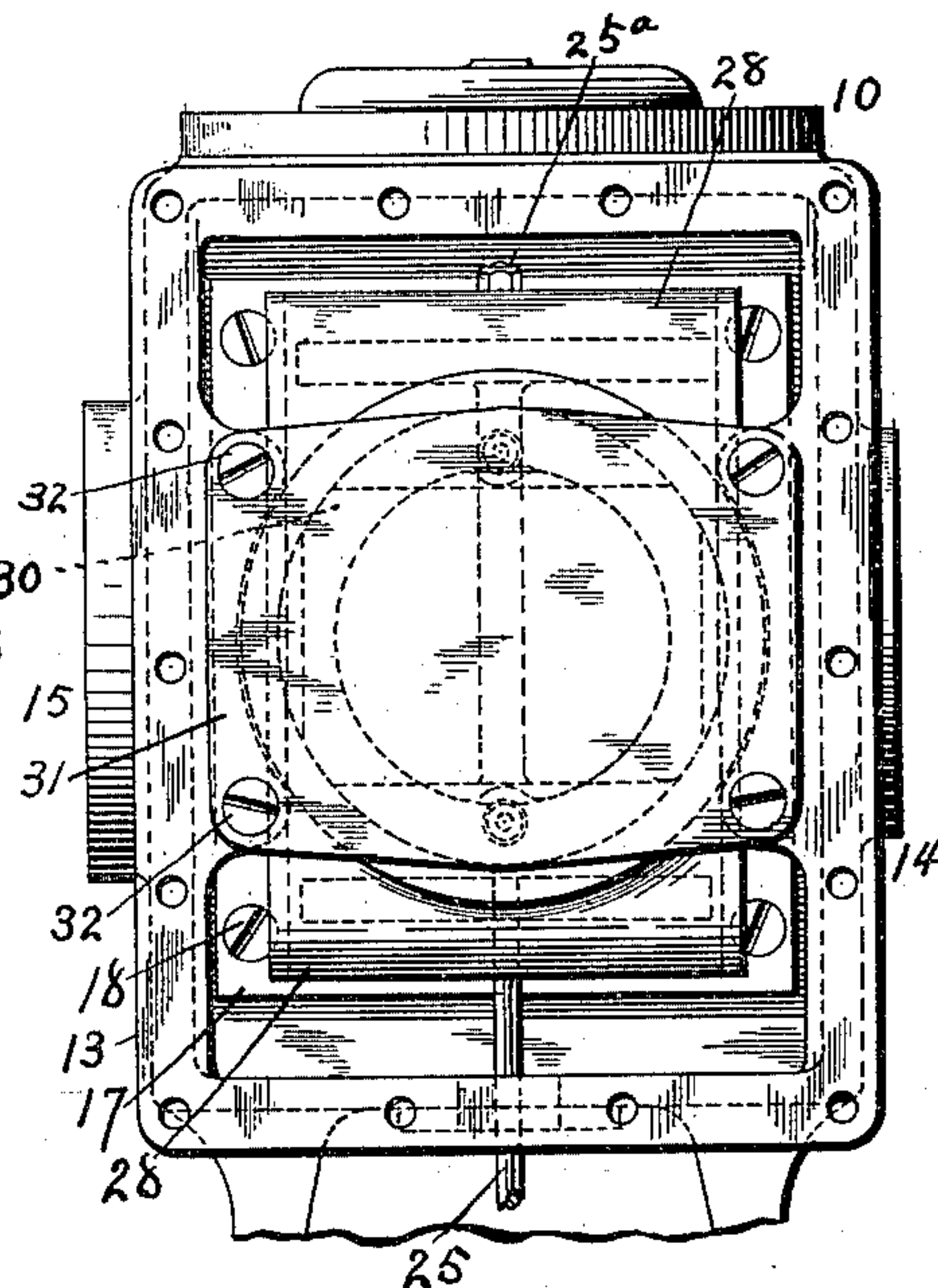


Fig 2

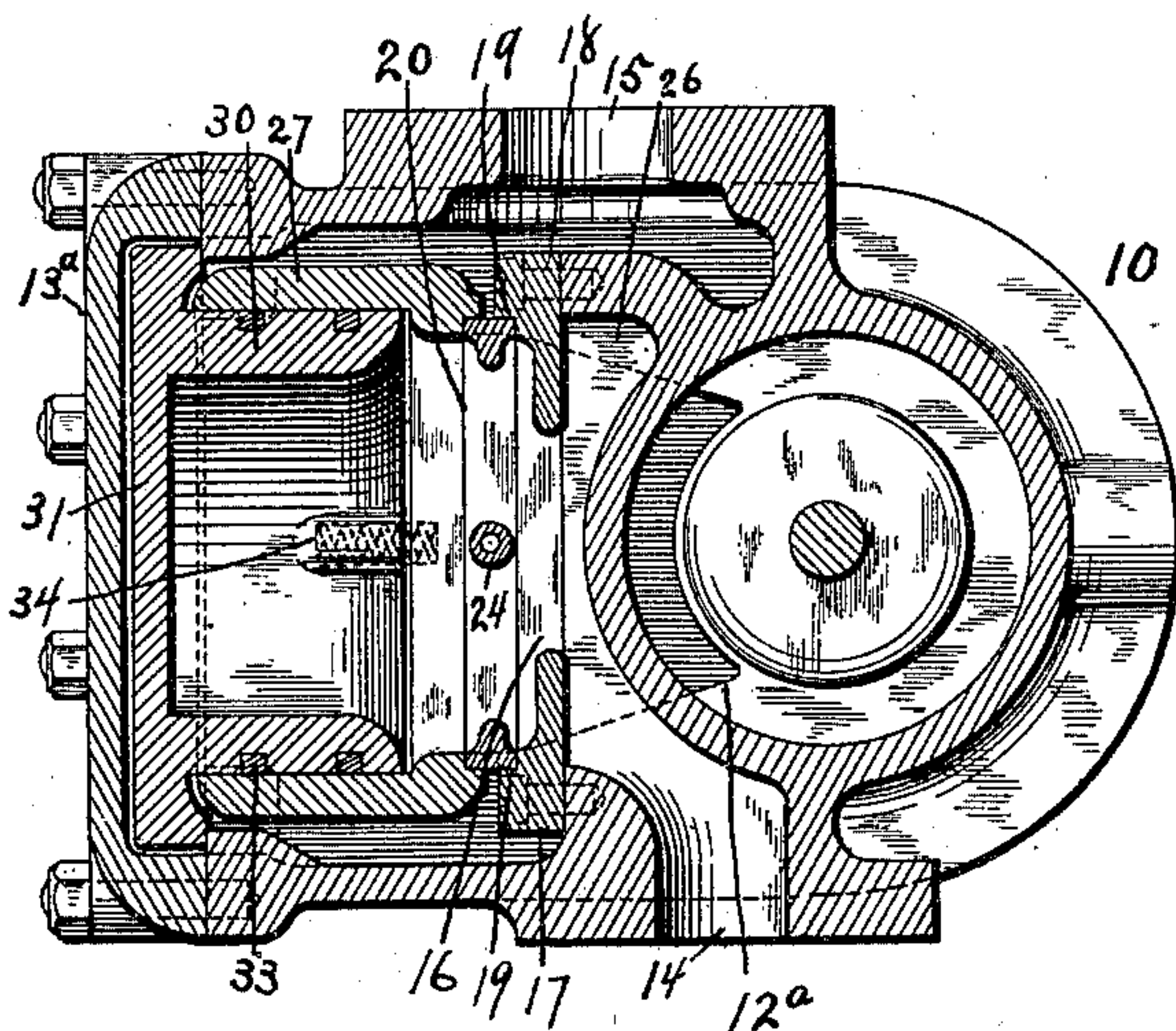


Fig 3

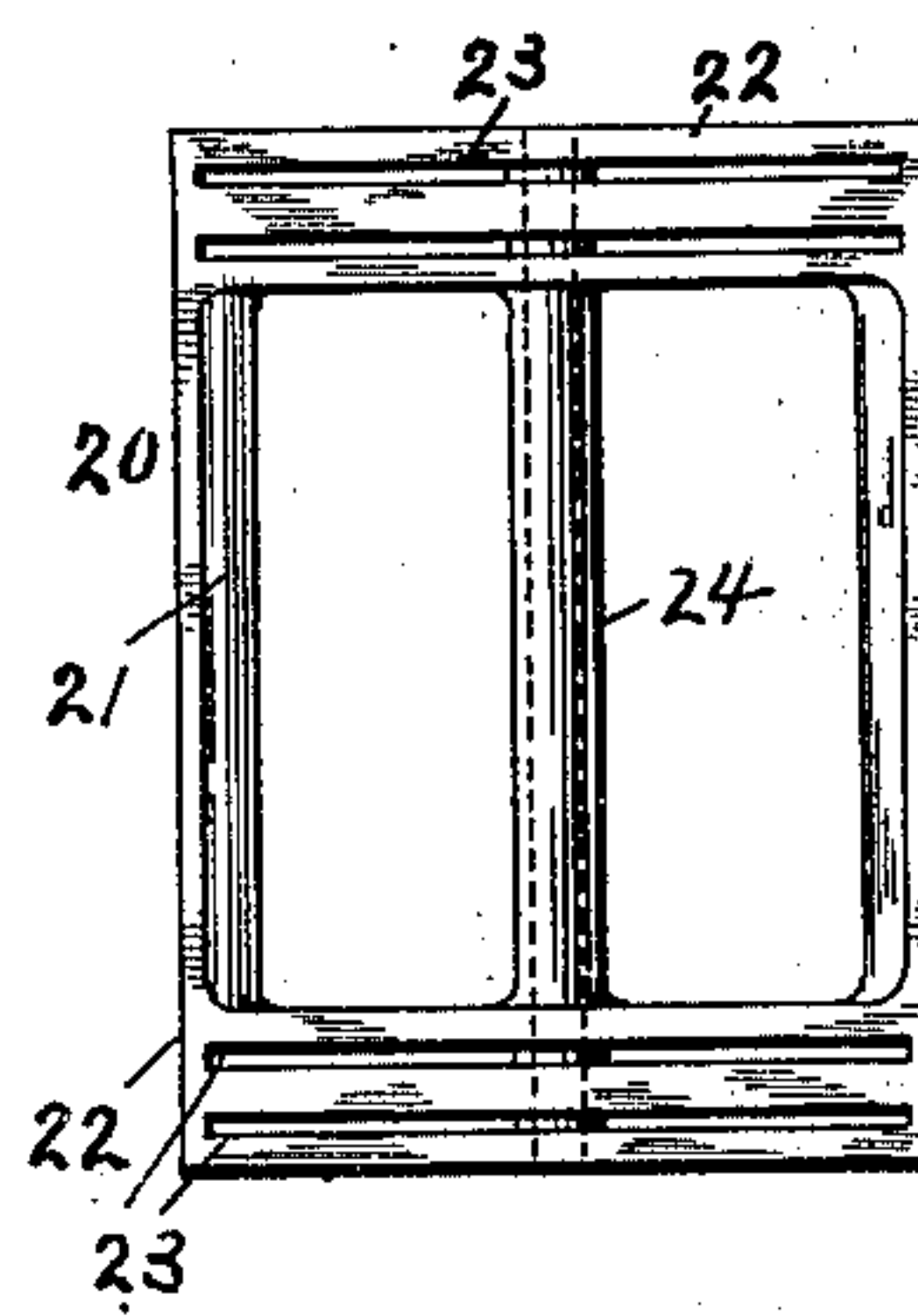


Fig 4

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BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 686,039, dated November 5, 1901.

Application filed March 25, 1901. Serial No. 52,780. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM EDWARDS, of Schenectady, county of Schenectady, New York, have invented certain new and useful
5 Improvements in Balanced Slide-Valves, of which the following is a full, clear, and exact description.

My invention relates to improvements in balanced slide-valves such as are used on
10 steam-engines to control the inlet and exhaust of steam, and particularly to improvements in that class of slide-valves in which the inlet and exhaust of steam are controlled by a single valve.

15 The object of my invention is to produce by simple mechanism a light-running valve which is quick and sensitive, which takes up automatically its own wear, which is nicely balanced, which has a plurality of port-openings for both steam and exhaust, which has
20 means for jacketing the live steam by the exhaust steam, which is provided with absolutely stable guiding mechanism and which yet has perfect freedom of movement—as, for
25 instance, under an excess of pressure, as a gush of water—which is held in such a way that lateral displacement is impossible, which is provided with direct ports and small clearance-spaces, and which in general affords a
30 cheap, light-running, and efficient valve.

With these ends in view my invention consists of certain features of construction and combinations of parts, which will be herein-
after fully described and claimed.

35 Reference is to be had to the accompanying drawings, forming part of this specification, in which similar figures of reference refer to similar parts throughout the several views.

40 Figure 1 is a vertical longitudinal cross-section of my improved mechanism as applied to an ordinary steam-cylinder. Fig. 2 is a face view of the device with the cap of the steam-chest removed. Fig. 3 is a cross-section on the line 3 3 of Fig. 1, and Fig. 4 is
45 a detail of the valve.

50 The steam-cylinder 10 may be of any usual type, and I have illustrated a common vertical cylinder in which a customary form of piston 11 reciprocates and which is provided with ports 12 and 12^a at opposite ends, these serving alternately as inlet and exhaust ports. The cylinder has the ordinary form of steam-

chest 13, which is shown with the usual removable cap 13^a, and the cylinder has also the inlet and exhaust ports 14 and 15, the former leading through the valve, as presently
55 described, to the interior of the steam-cavity and passing through the opening 16 in the valve-seat 17, while the exhaust-port leads directly from the steam-chest. The seat 17 is
60 shown as a separate piece from the cylinder 10, although obviously it can be integral with the cylinder, if desired, and, as illustrated, it is held in place by screws 18 or equivalent fastenings. The seat is provided with verti-
65 cal ways 19, on which reciprocates the valve 20, which is shown in detail in Fig. 4 and which is of the open gridiron type, having side ribs 21 to strengthen it, and the flat end portions 22, which are provided with a plu-
70 rality of slots or port-openings 23. The valve has also the central rib 24, which is bored out or cast hollow to receive the valve-stem 25, and this extends through the said part 24 and is fastened with a suitable nut 25^a; but obvi-
75 ously the connection with the valve-stem may be of any usual kind. The ports 12 and 12^a, above referred to, extend also through the seat 17, and the port-openings 23 are adapted to open and close the ports 12 and 12^a as the
80 valve reciprocates, and it will be understood that the valve may be reciprocated in any usual manner.

It will be noticed by reference to Fig. 3 that there is sufficient steam-space 26 provided
85 beneath the seat 16 and that there is ample clearance for the steam to pass inward through the port 14 and up through the valve-seat 16 and valve 20.

The valve 20 reciprocates between its seat,
90 above referred to, and the pressure ring or plate 27, which is at its upper part circular in cross-section and which is provided with the projecting flanges 28, these giving it sufficient area on the outer side for it to be pressed
95 to place against the valve, and it is also provided with suitable steam-cavities 29 opposite the ports 12 and 12^a. The pressure ring or plate 28 is adapted to move freely in and out on the hollow guide-flange 30, which is shaped
100 to fit the upper part of the ring 27 and which is fast to the body portion 31 of the plate, and this, as will be seen in Fig. 2, is held securely by screws 32 or equivalent fastenings to the

steam-chest. The ring or plate 27 slides against the packing-rings 33, which are of the ordinary split form and which are inserted in suitable grooves in the part 30 of the pressure or guide plate, and this pressure or guide plate is also provided with springs 34, which are held in suitable cavities and likewise in engagement with the pressure plate or ring 27, so as to cushion the same and assist in holding it in close contact with the valve 20.

It will be seen by the description above, with especial reference to the parts 27 and 30, that the pressure plate or ring 27 is held absolutely against lateral displacement or against movement which might be caused by reciprocation of the valve 20, while the pressure plate or ring is still free to move in and out when occasion demands. It will also be noticed that the valve is nicely balanced, so that it may slide freely, and that by reason of its connection with its seat and with the pressure plate or ring 27 lateral displacement is impossible. In this connection attention is called to Fig. 3, from which it will be seen that the valve is stepped into the pressure-plate in the same manner that it is stepped or shouldered into the seat 16, so that the connection is stable, and yet movement is free. It will be observed that several minor changes may be made in the structure without affecting the principle of the invention—for instance, in the stem connection with the valve, in the fact that the valve-seat may be made integral with the cylinder 10, and also that the spring connection between the parts 27 and 30 may be varied.

In operation it will be observed that when the valve is moved up, as in Fig. 1, the steam may pass from the interior of the pressure-plate and balance or guide plate through the cavity 29 and port-openings 23 to the port 12 and thence to the cylinder 10 and that this movement will have opened wide the port 12^a to permit the exhaust to enter the steam-chest 13, where it will jacket the parts above referred to and will pass out through the port 15, and when the valve is moved to opposite end of its stroke the reverse action takes place, the port 12^a being opened to live steam and the port 12 serving as the exhaust.

From the foregoing description it will be seen that the structure is very simple and positive, that it permits the valve to move with the greatest freedom while it is still held absolutely against displacement, and that its wear is compensated for by the constant pressure of the plate 27.

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

1. The combination with the cylinder having ports therein and provided with a suitable seat through which the ports pass, and a steam-chest, of the internal hollow guide rigid on the

chest, the valve having an open central portion and ported end portions to move across the cylinder-ports, a pressure ring or plate held to move freely on the guide and to abut with the valve, a steam-inlet controlled by the valve and delivering through it into the internal guide, and an exhaust-port opening from the steam-chest.

2. In an apparatus of the kind described, the combination with the ported cylinder having a seat through which the ports pass, the shoulders on the seat forming a way, of the valve movable on the said way, said valve having an open central portion and ported end portions to register with the cylinder-ports, a pressure plate or ring abutting with the valve with an enlarged portion to give it the necessary steam area, the said plate or ring being also shouldered to fit the sides of the valve; and a steam-containing guide or pressure plate held rigidly in the steam-chest and extending into the pressure ring or plate.

3. In an apparatus of the kind described, the combination with a reciprocating slide-valve arranged to control the inlet and exhaust of a steam-cylinder, and the steam-chest, of an internal steam-containing guide held rigid in the steam-chest, and a pressure plate or ring held to move freely on the guide perpendicular to the path of the valve, said plate being arranged to abut with and balance the valve.

4. The combination with the ported steam-cylinder and its steam-chest, of a slide-valve controlling the said ports, an internal steam-containing guide held rigid in the steam-chest, and a pressure plate or ring held to move freely on the guide, said ring or plate being cushioned on the guide and enlarged externally to give it sufficient area.

5. The combination with the ported steam-cylinder and its steam-chest, of the slide-valve controlling the ports of the cylinder, an internal steam-containing guide held rigid in the steam-chest, and a pressure ring or plate held to abut with the valve and to move freely on the guide in a plane perpendicular to the movement of the valve, the said internal guide and pressure ring or plate being arranged in the steam-chest so as to be jacketed by the exhaust-steam in the chest.

6. In a device of the kind described, the slide-valve being relatively thin and flat, said valve having an open central portion, flat end portions with port-openings therein, and a stem-tube extending through it from end to end, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM EDWARDS.

Witnesses:

CYRUS W. RAXFORD,
ROBERT WILSON.