

No. 868,030.

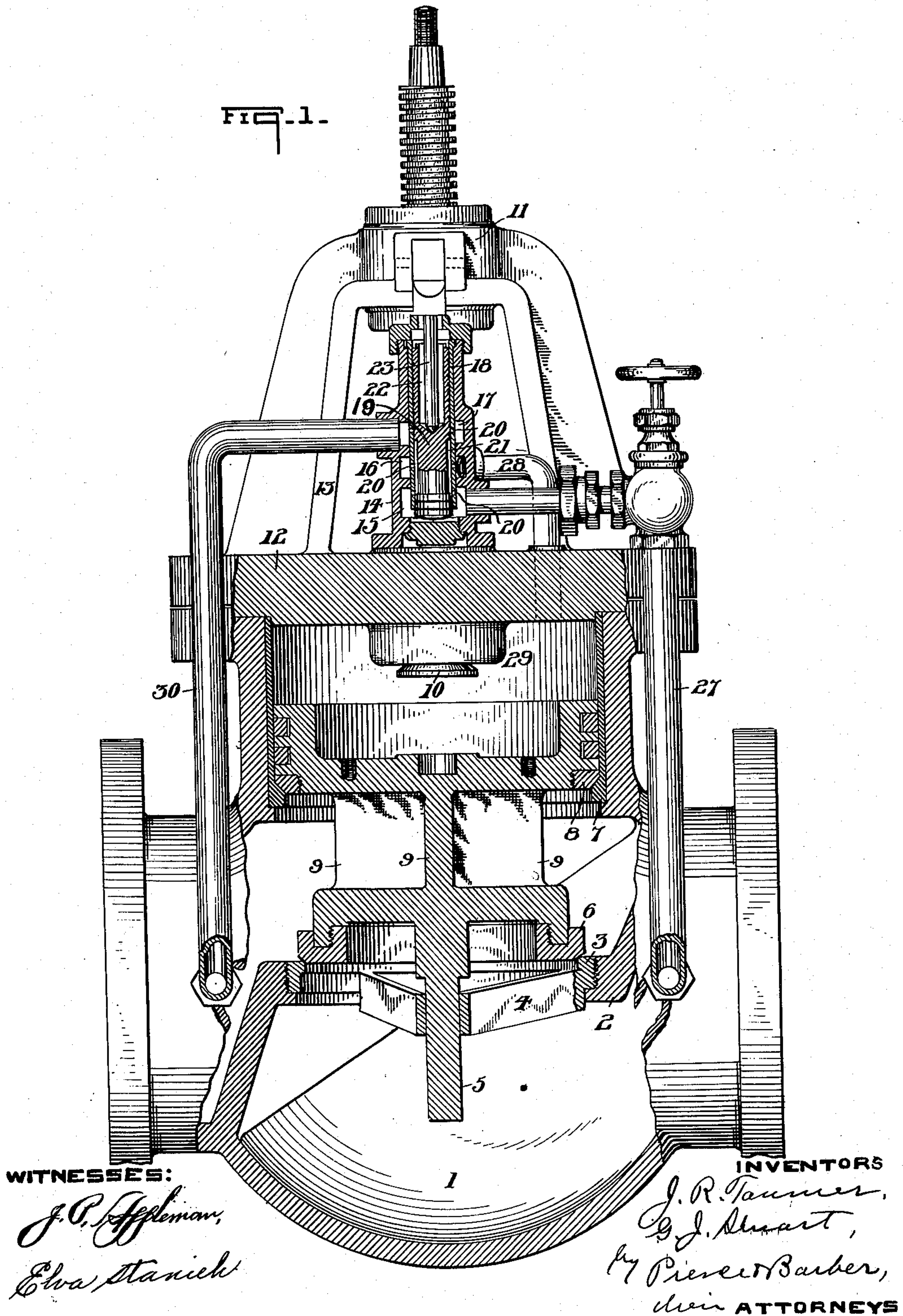
PATENTED OCT. 15, 1907.

J. R. TANNER & G. J. STUART.

VALVE.

APPLICATION FILED JUNE 20, 1906.

2 SHEETS—SHEET 1.



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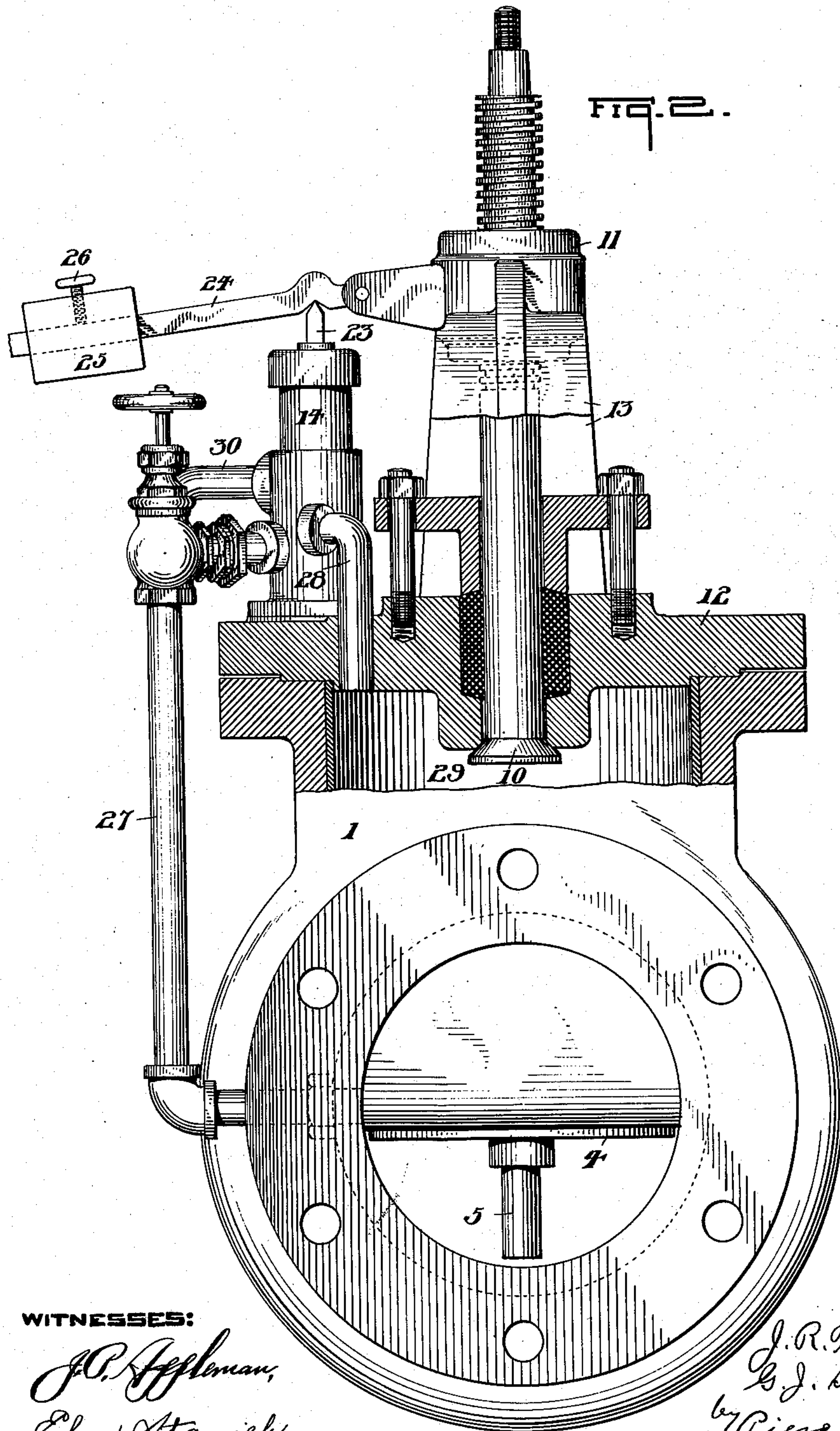
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2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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ASSIGNORS TO THE PITTSBURGH VALVE, FOUNDRY & CONSTRUCTION COMPANY, OF
PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

VALVE.

No. 868,030.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed June 20, 1906. Serial No. 322,517.

To all whom it may concern:

Be it known that we, JULIUS R. TANNER and GEORGE J. STUART, citizens of the United States, residing at Pittsburg and Bellevue, respectively, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Valves, of which the following is a specification.

Our invention relates to valves and its object is to provide means whereby the steam which is usually blown off through pop or safety valves may be saved and applied to a useful purpose, for example, to assist an engine having a lower maximum steam pressure. To illustrate, if two boilers A and B have their safety valves set at 120 and 185 pounds, respectively, we may by our improvements cause steam in the boiler B to pass into the boiler A when the pressure in the former exceeds 180 pounds, no steam escaping through the safety valve of the boiler B unless its pressure shall reach 185 pounds.

Referring to the drawings, Figure 1 is a vertical section taken through the center of the valve and the center of its controlling cylinder, parts being in elevation; and Fig. 2 is an elevation substantially at right angles to Fig. 1.

On the drawings, 1 represents a valve casing having therein the diaphragm 2, in which is secured the valve-seat ring 3 supporting the guide 4 for the projection 5 of the valve 6, adapted to the said seat ring. Above the valve-seat 3 is the seat 7, to which the piston 8 is adapted. The valve 6 and the piston 8 are connected together by the webs 9 and have their axes in alinement, the piston 8 having the larger area.

10 represents the valve stem, by which the valve 6 may be forced or held to its seat. This stem is threaded through the standard 11 supported on the valve casing cap 12 by the legs 13. On the said cap 12 is supported the valve casing 14, having its bottom closed and its interior provided with the three annular recesses 15, 16, and 17.

Within the casing 14 is fitted the lining 18 whose outer surface forms the inner walls of the recesses 15, 16, and 17 and whose inner wall contains the piston 19.

The lining 18 is provided with numerous openings 20 which furnish communications between the said annular recesses and the interior of said lining, which constitutes a cylinder for said piston. The lining 18 does not quite reach the bottom of the casing 14, whereby the recess 15 extends inwardly below the piston 19. The piston is provided with a wide annular recess 21 which can span the openings 20 of two consecutive recesses in the casing 14.

The piston 19 contains the opening 22 in which the stem 23 is seated, the upper end thereof supporting the

lever 24, pivoted to the said standard 11 and provided with the adjustable weight 25.

26 is a set-screw for holding the weight in any desired position on the lever 24.

A pipe 27 leads from the recess 15 to the interior of the valve casing 1 below the valve 6, or on that side thereof which normally has the higher steam pressure.

A pipe 28 connects the recess 16 to the chamber 29 above the piston 8.

A pipe 30 connects the recess 17 with the valve chamber above the valve 6 and below the piston 8.

Supposing the right hand end of the casing 1 is connected to the steam space of a boiler whose safety valve has been set to open at 185 pounds pressure and the left hand end is connected to the steam space of a boiler whose steam pressure is normally 120 pounds, and that the weight 25 has been set so as to be lifted when the steam pressure reaches 180 pounds, the operation of our invention is as follows: The steam in the chamber beneath the valve 6 has access by way of the pipe 27 and the recess 15 to the bottom of the piston 19, and by way of the recess 20, the recess 21 and the openings 20, the recess 16, and the pipe 28 to the chamber 29 above the piston 8. As the pressure above the piston 8 and below the valve 6 is the same per unit area and the area of the piston 8 is the greater, the valve 6 will remain on its seat, so long as the steam pressure does not reach 180 pounds. If the pressure reaches or exceeds 180 pounds, the piston 19 will be lifted whereby the openings 20 for the recess 15 will be closed and the openings 20 for the recess 17 will be opened and put in communication with the recess 21 in the piston. The pressure in the chamber 29 is now in communication with the chamber between the valve 6 and piston 8 through the pipe 28, the recess 16, the openings 20 for the recess 16, the recess 21, the openings 20 for the recess 17, the recess 17 and the pipe 30, whereby the pressure in the chamber 29 is reduced to 120 pounds. As the pressure in opposite directions on the valve is now equalized, and the pressure below the valve 6 is 180 pounds and above the same 120 pounds, the said valve 6 will rise and the steam from the high pressure boiler will pass through the valve seat ring 3 into the low-pressure boiler. This action will continue until the higher pressure is reduced below 180 pounds when the piston 19 will fall and the valve 6 close.

Our invention may be applied to other uses where it is desired to utilize the steam which in ordinary boilers would be blown off and wasted through the safety or pop valves. It is to be particularly noted that the operation of our valve depends wholly on the higher pressure. The lower pressure has no effect whatever in opening the valve, which readily distinguishes our invention from the check-valve or from a reducing valve.

We claim—

1. A valve separating chambers subjected to different pressures, a piston connected to the valve and having a larger area than said valve, a second valve external to the first valve, and pipes leading to said second valve from the higher pressure, the lower pressure, and one face of the piston, said second valve having a by-pass connecting the higher pressure with the piston when the pressure is not in excess of a predetermined amount and connecting the lower pressure with said piston when the pressure reaches said predetermined amount.
2. A valve casing, a valve therein having its opposite faces subjected to different pressures, a piston secured to said valve and having greater sectional area than said valve, said valve having one face always subjected to the higher pressure, and said valve and said piston having

each one face always subjected to the lower pressure, a chamber for the remaining face of said piston, a second casing having therein three chambers, means connecting the first chamber to the higher pressure, means connecting the second chamber to said piston-face chamber, and means connecting the third chamber to the lower pressure, a piston in said second casing, and means whereby the piston connects the higher pressure with the said piston-face chamber when the higher pressure is below a definite limit, but connects said piston-face chamber to the lower pressure when such higher pressure limit is reached.

Signed at Pittsburgh, Pa., this 18th day of June, 1906.
JULIUS R. TANNER.
GEO. J. STUART.

Witnesses:

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C. E. EGGERS.