

No. 755,996.

PATENTED MAR. 29, 1904.

S. O. BRUNE.  
RELIEF VALVE.

APPLICATION FILED SEPT. 11, 1903.

NO MODEL.

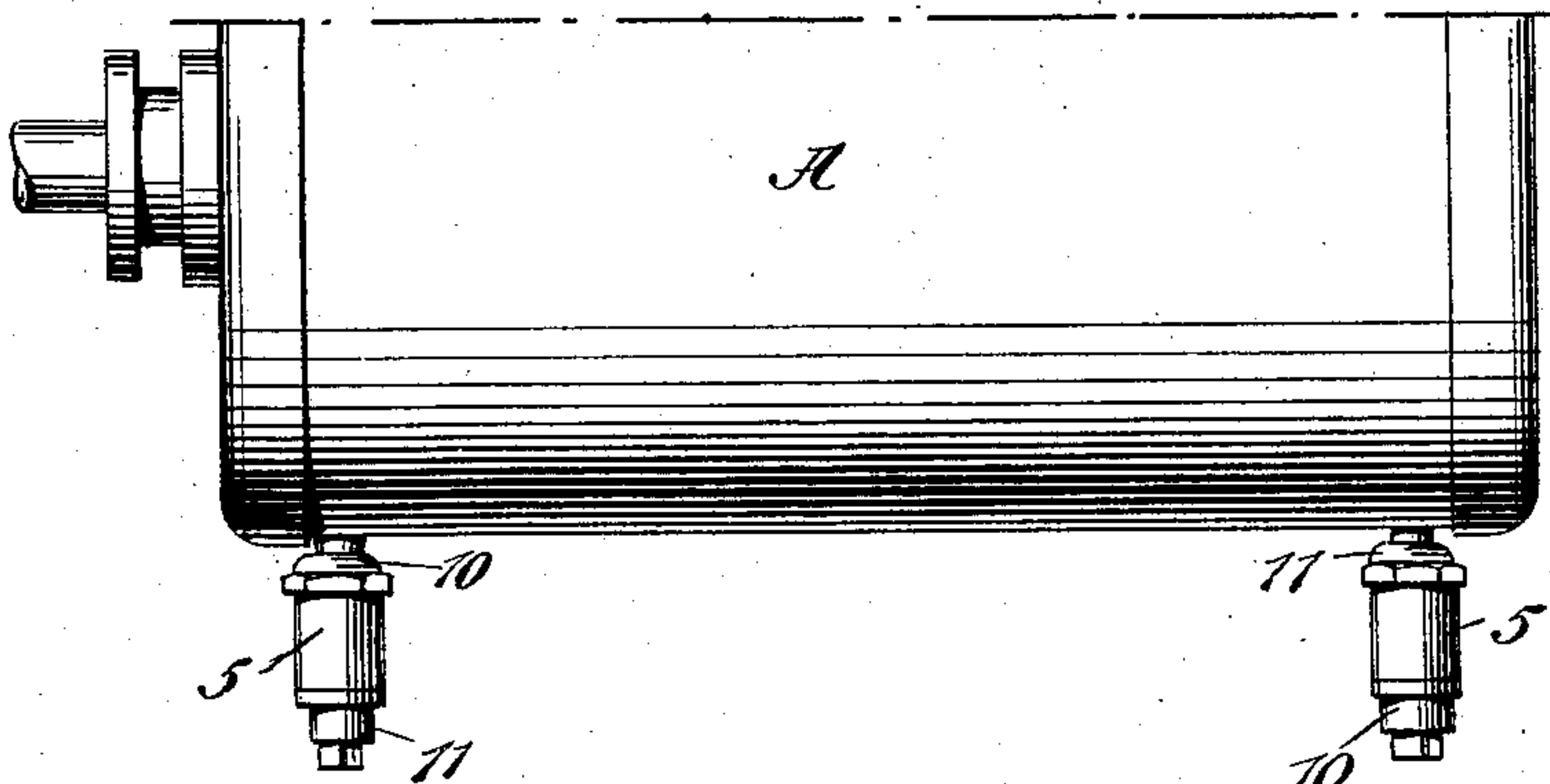


Fig. 1

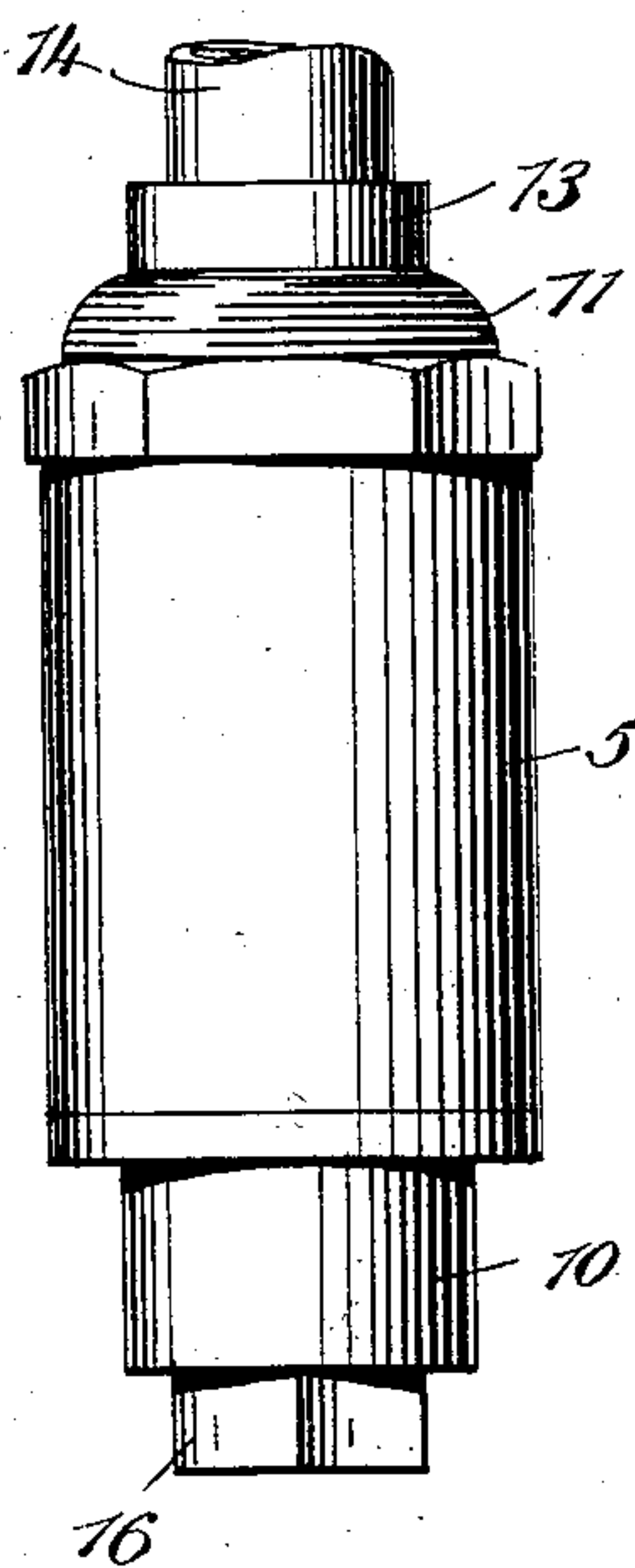


Fig. 2

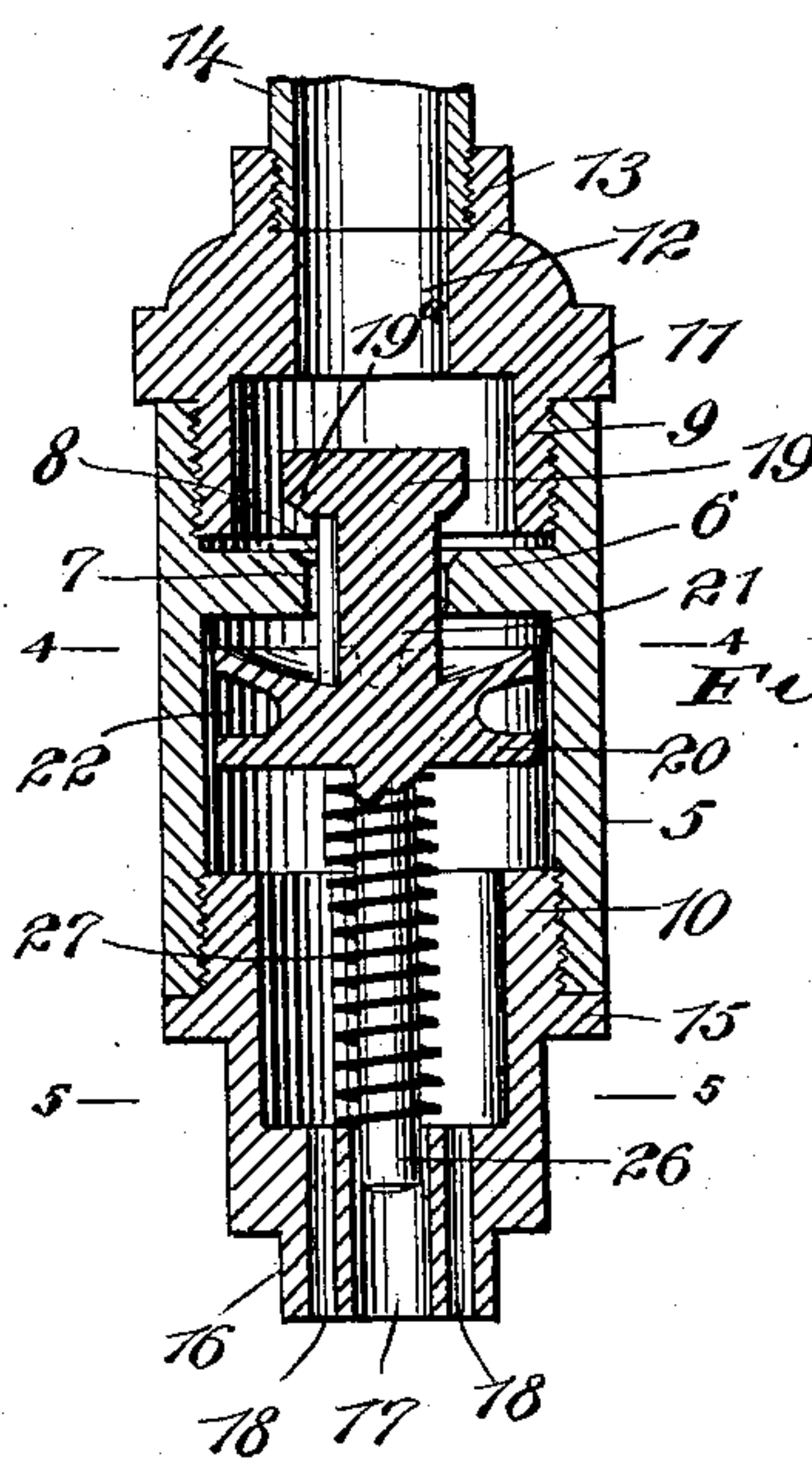


Fig. 3

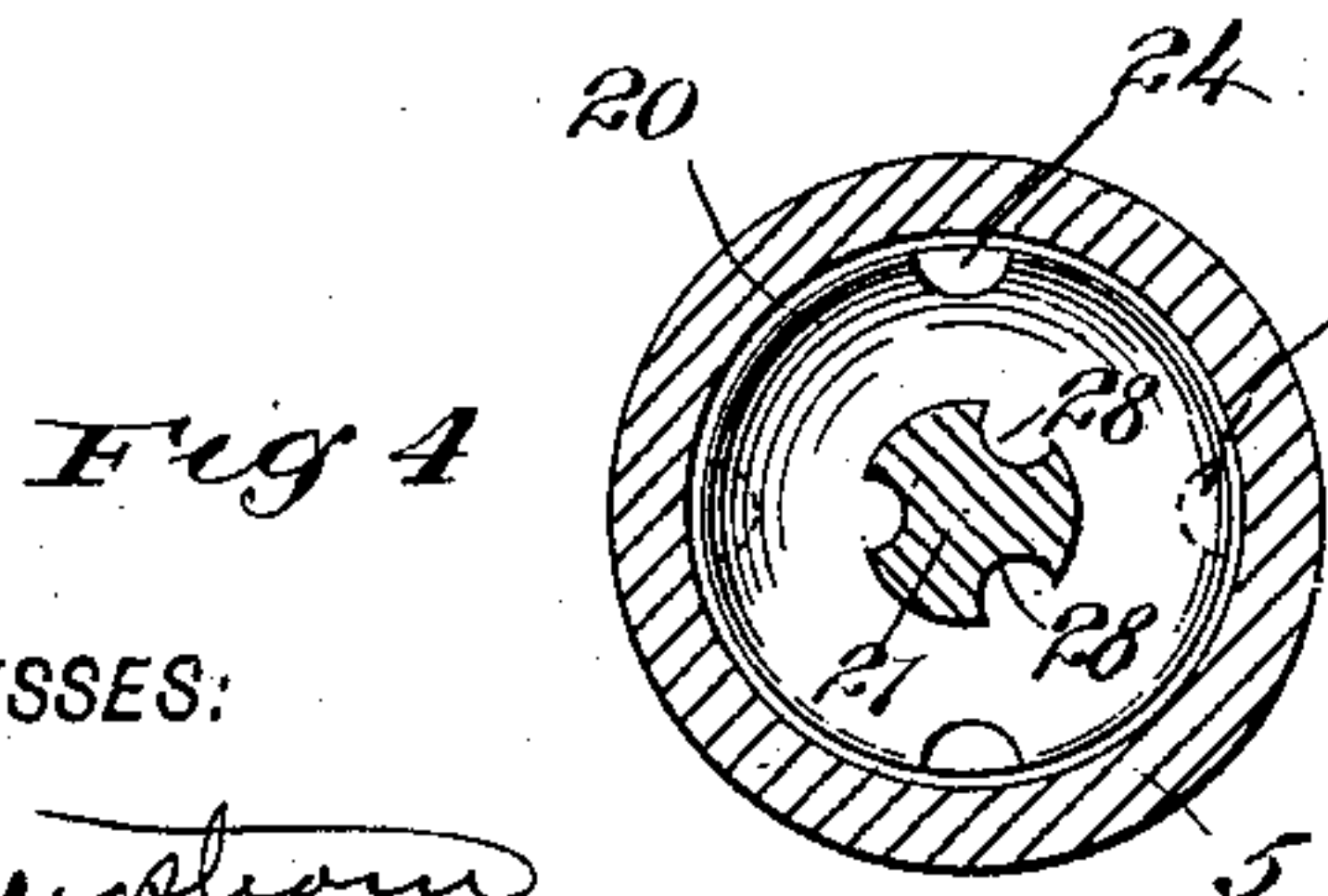


Fig. 4

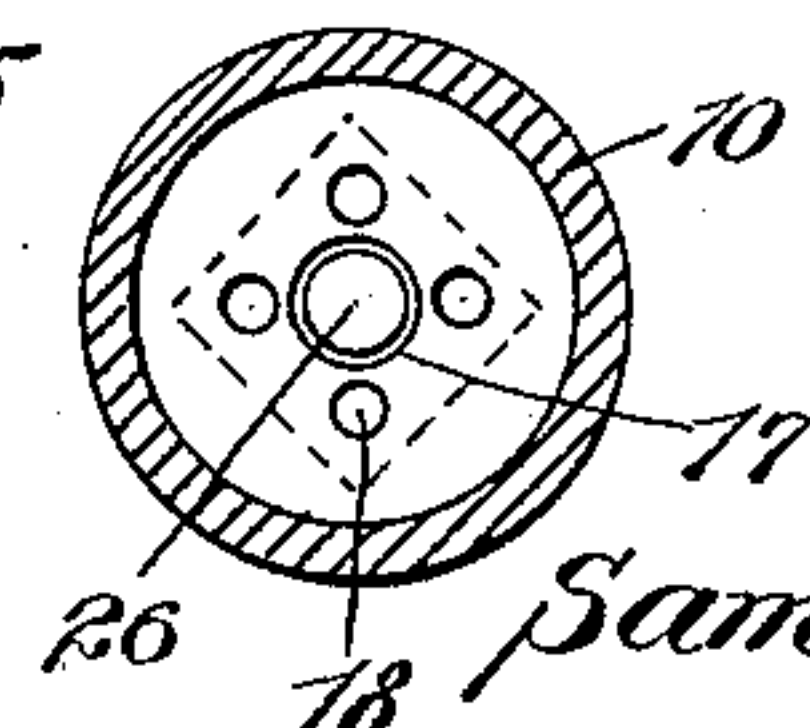


Fig. 5

WITNESSES:

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# UNITED STATES PATENT OFFICE.

SAMUEL OLSEN BRUNE, OF MINE CENTRE, CANADA.

## RELIEF-VALVE.

SPECIFICATION forming part of Letters Patent No. 755,996, dated March 29, 1904.

Application filed September 11, 1903. Serial No. 172,767. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL OLSEN BRUNE, a subject of the King of Great Britain, and a resident of Mine Centre, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Relief-Valve, of which the following is a full, clear, and exact description.

My invention relates to improvements in relief-valves, the same being especially adapted for use in connection with cylinder-engines and steam-pipes for the purpose of discharging water of condensation automatically without substantial waste of steam under pressure.

The object of the invention is to produce a simple, efficient, and reliable device adapted to be easily and quickly applied, capable of a quick action when pressure is admitted, so as to minimize leakage of steam, and susceptible of regulation to adjust itself to different steam-pressures.

Further objects and advantages of the invention will appear in the course of the subjoined description, and the actual scope thereof will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an elevation illustrating my improved relief-valves applied to the respective end portions of a steam-cylinder. Fig. 2 is an enlarged view, in side elevation, of the relief-valve removed from the cylinder. Fig. 3 is a vertical central section through the improved relief-valve. Figs. 4 and 5 are horizontal cross-sections on the planes indicated by the dotted lines 4 4 and 5 5, respectively, of Fig. 3.

My improved relief-valve contemplates the employment of a casing 5, which is cylindrical in shape and open at its respective ends. This casing is provided with a transverse partition or bridge 6, the same being integral with said casing, and in this partition is formed a central opening or passage 7, the upper extremity of which is flared, so as to produce a valve-seat 8. The open ends of the cylindrical shell or casing 5 are provided with female threads adapted to receive the inner threaded ends of the upper and lower heads 9 10. The upper

head 9 is provided with an annular flange 11, which is adapted to be seated against the end portion of the cylindrical casing 5 when said head is screwed tightly into place, and this head is furthermore provided with an axial opening 12 and a female threaded attaching-nipple 13, the latter being adapted to receive a short length of pipe 14, as shown by the drawings. The lower head 10 of the valve-casing is provided with an annular flange 15, which may bear against the end face at the lower extremity of the cylindrical casing, and this lower head is provided with an axial boss or stud 16; in which is produced a central guide-passage 17 and a plurality of drain-passages 18, the latter being formed in the central boss 16 at suitable intervals around the guide-passage 17.

The important feature of my invention consists in the employment of a double valve, the same consisting of heads 19 20 and a shank 21. The head 19 of the double valve is of less area than the head 20, and the shank 21 of said valve passes through and plays in the opening 7 of the bridge or partition 6, whereby the valve-heads 19 20 are disposed within the chambers of the valve-casing so as to lie on opposite sides of said bridge or partition 6. The valve-head 20 of enlarged area lies in the lower chamber of the cylindrical casing, and this valve-head is provided with an annular groove 22, thereby forming the lower valve-head into upper and lower portions, as shown by Fig. 3. The upper portion of the low-pressure valve-head 20 is provided with notches 24, as shown by full lines in Fig. 4, while the lower portion of said annularly-grooved valve-head 20 is formed with other notches 25, (indicated by dotted lines in Fig. 4,) the two sets of notches 24 25 being out of alinement or registration vertically with each other. The valve-head 19 at the extreme upper portion of the double valve is provided with a beveled lower edge 19<sup>a</sup>, forming a face adapted to fit snugly to the seat 8 in the bridge or partition 6 of the cylindrical casing, and when this valve-head 19 is seated on said bridge the passage of steam or water through the relief-valve is effectually cut off.

The double valve is furthermore provided



with a guide-stem 26 which depends centrally from the low-pressure member 20 of the double valve. Said stem is fitted slidably in the guide-passage 17 of the lower head 10, so as to limit the valve to endwise movement within the casing, and around this stem is loosely fitted a coiled spring 27, which acts against the double valve in a way to raise the latter, whereby the head 19 of said double valve is lifted above the partition 6. The shank 21 between the valve-heads of different area is provided with a series of longitudinal passages or grooves 28, as shown by Fig. 4, and on the elevation of the double valve under the action of the spring 27 the grooves 28 form exit-passages through which the water is free to pass from the upper chamber into the lower chamber.

My improved relief-valve may be used in connection with the cylinders of steam-engines, or said relief-valve may be applied to a steam-pipe for the purpose of automatically discharging the water of condensation from said pipe or from the cylinder. In Fig. 1 of the drawings a portion of a steam-engine cylinder is indicated at A, and to the under side of this cylinder is adapted to be secured one or more of the relief-valves, although in Fig. 1 I have shown valves embodying my invention applied to the lower portion of the cylinder at the intake and exhaust end portions thereof.

When the engine is at rest and steam is shut off, the spring 27 becomes effective in raising the valve to the position shown by Fig. 3, wherein the head 19 is lifted above the bridge 6 for the water of condensation to pass through the passage 7 and the passages 28, thus allowing the water to escape from the upper chamber into the lower chamber of the valve-casing. The water lodges upon the lower head 20 of the double valve and escapes through the ports 24, the annular passage 22, and the ports 25 of said valve-head 20. This water is free to escape from the lower chamber of the valve-casing through the drain-passages 18. When steam is admitted to the cylinder A, it is free to pass around the valve-head 19 and through the passages 28 in the shank, so as to act against the lower member 20 of the valve; but an increase in the steam-pressure acts on the head 19, which is exposed directly to the full pressure, as well as upon the head 20, whereby the valve is quickly forced endwise to overcome the tension of the spring 27 and cause the valve-head 19 to occupy the seat 8, thus cutting off the continued escape of steam through the relief-valve. The valve is kept in its closed position by the pressure of steam in the working cylinder of the engine; but when the steam is cut off for the purpose of stopping the engine the spring 27 again becomes effective in moving the valve to its opened position, thus providing means for the escape of the water of condensation.

The lower head 10 of the relief-valve casing is screwed adjustably to the member or cylinder 5, and this lower head forms a support or bearing for the spring 27, whereby the tension of the spring may be regulated by adjusting the head 10 in a way to make the valve respond to different pressures in the working chamber of the engine-cylinder.

My improved valve possesses many practical advantages because it is simple and cheap of construction, employs a single spring, and is readily attached to a cylinder or a steam-pipe. The employment of the double valve having heads of different area is advantageous in that the sensitiveness of the valve to steam-pressure is increased, the lower head 20 responding to comparatively low pressure of steam which is initially admitted to the engine-cylinder, whereas the valve-head 19 is exposed to the direct full pressure of the steam. The improved valve may be attached to the cylinder in a way to be accessible at all times, thus allowing convenient inspection and repairs.

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

1. A relief-valve comprising a casing having a partition, a valve-stem slidably fitted in the partition, valve-heads of different area on the stem and on opposite sides of the partition, one of said heads being solid and the other head having drain-ports, and a spring impelling the valve-stem to hold the solid valve-head off its seat.

2. A relief-valve comprising a casing having a partition, and an opening for the drainage of water, a slidable valve-stem having two heads, one of which is solid and the other has drain-ports, and a spring acting to normally unseat the solid valve-head.

3. A relief-valve comprising a casing having a partition, a slidable double valve having heads of different area connected by an intermediate shank, one of said valve-heads being provided with a groove and with disaligned ports, and a spring for moving said valve in one direction.

4. A relief-valve comprising a casing having a bridge or partition, a double valve having heads of different diameter connected by an intermediate grooved shank, a stem depending from said valve, and a spring acting against the valve, said casing being provided with a head which has drain-ports and is attached adjustably to a shell of the casing for regulating the tension of the spring.

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

SAMUEL OLSEN BRUNE.

Witnesses:

CHAS. J. HOLLANDS,  
D. J. KEATING.