

W. D. PICKELS.
RELIEF VALVE.

APPLICATION FILED FEB. 28, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

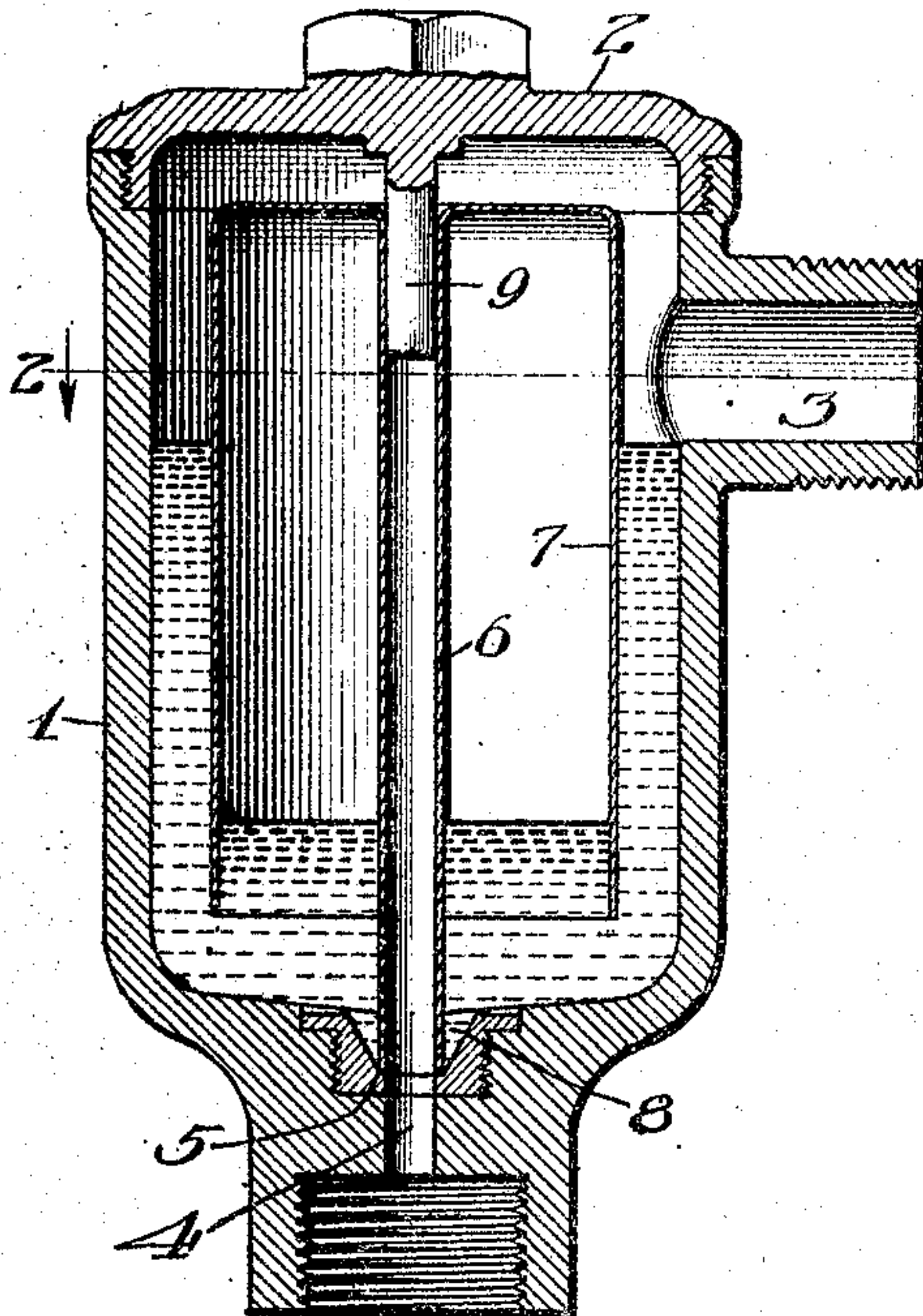


Fig. 3.

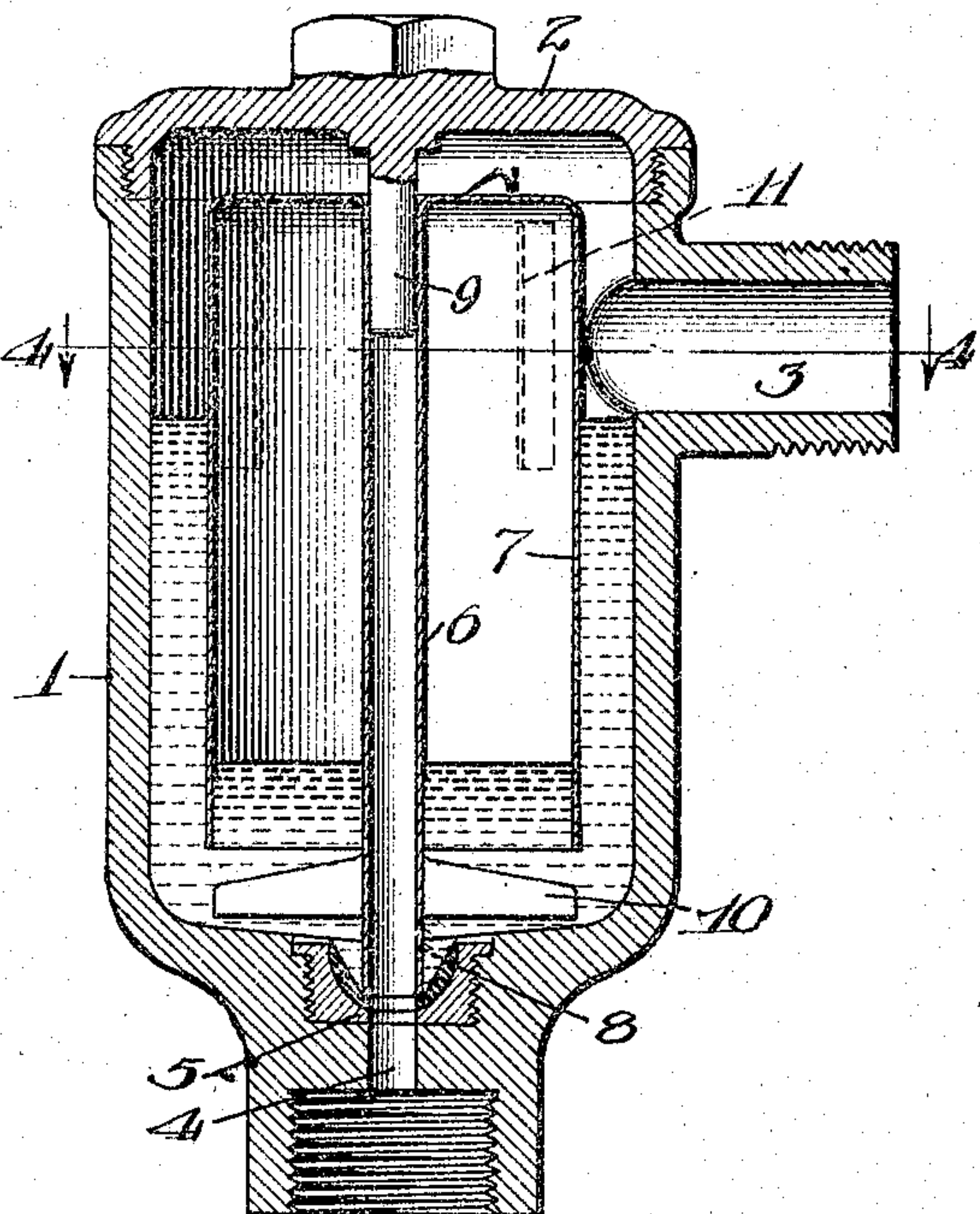


Fig. 2.

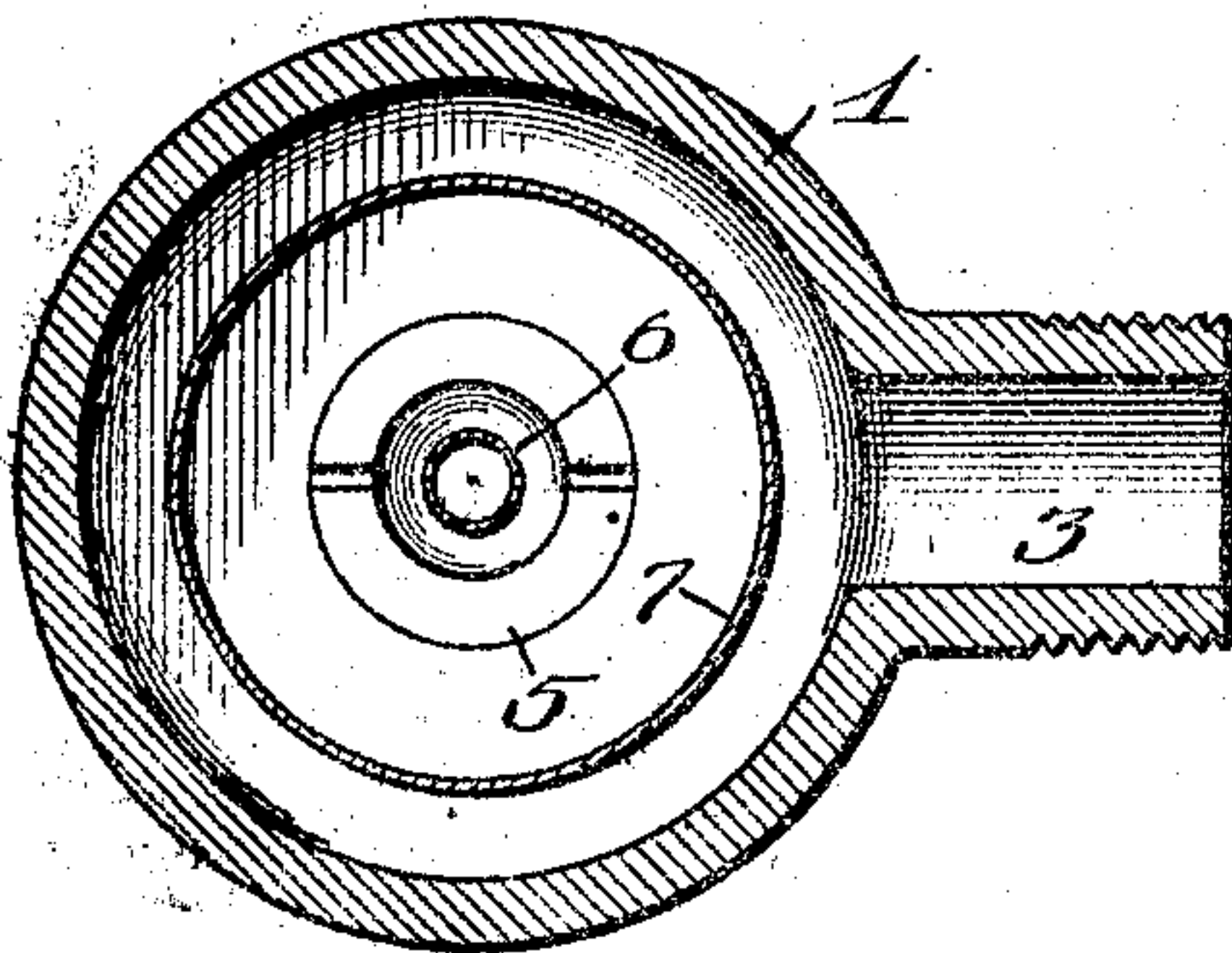
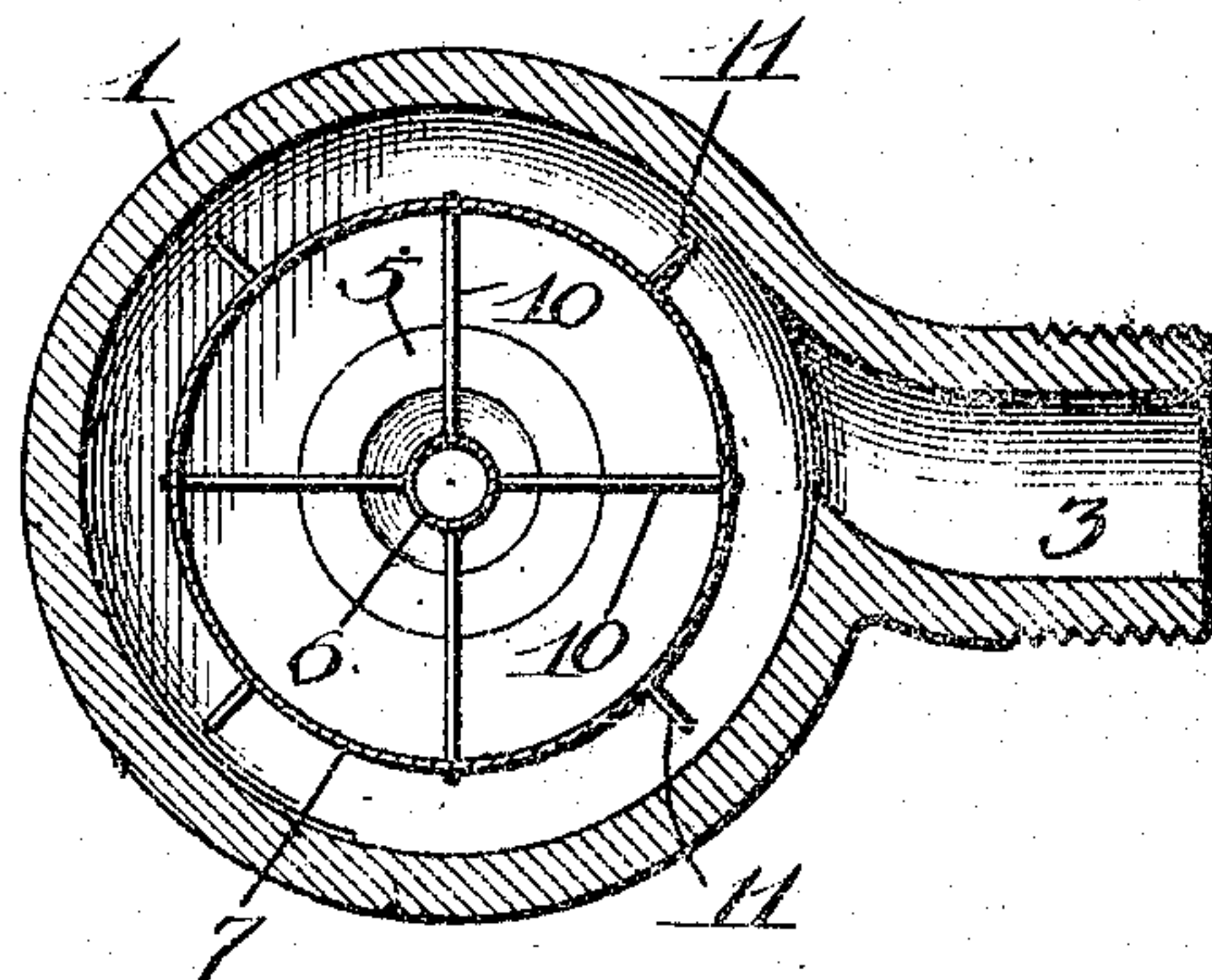


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

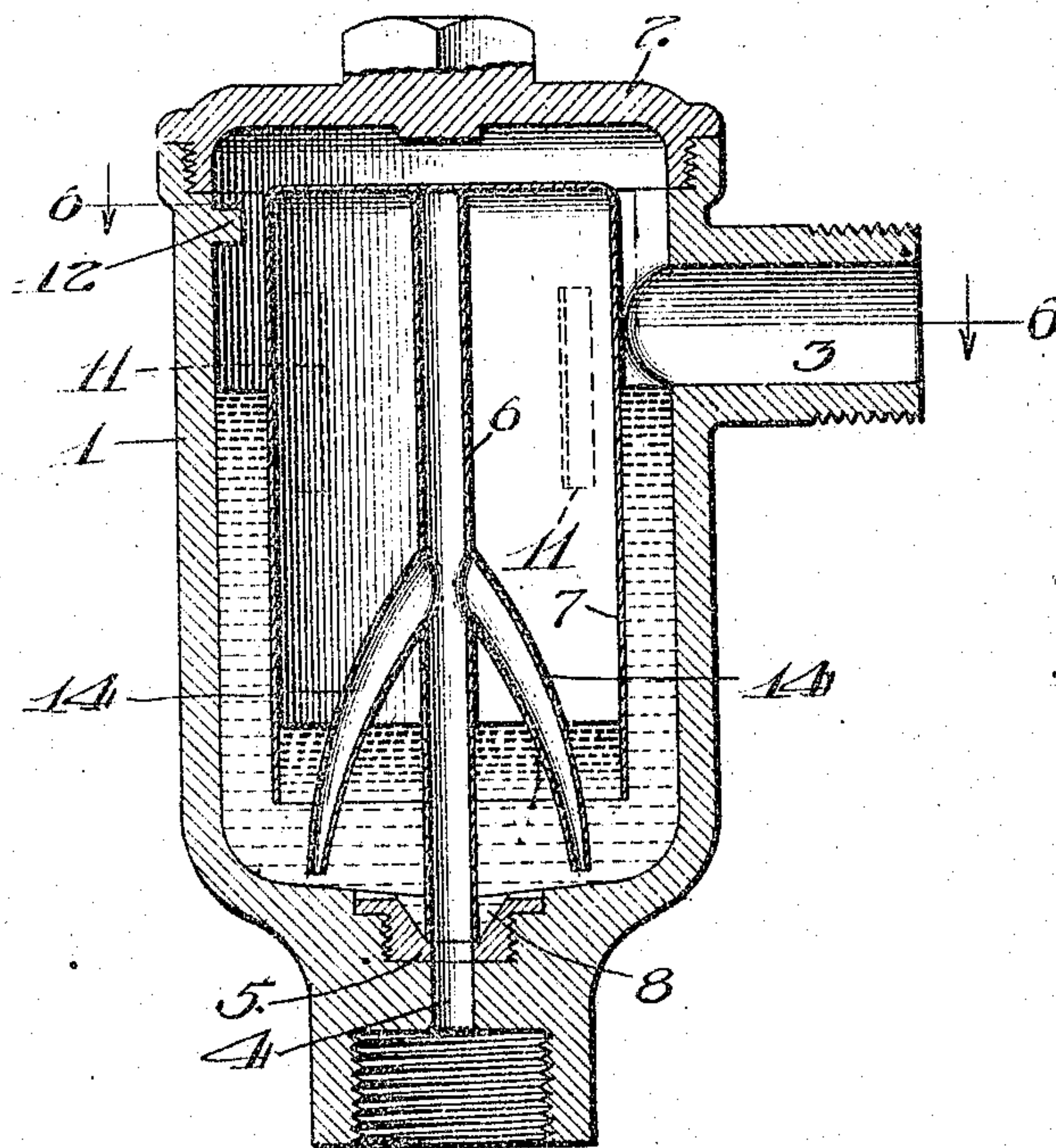
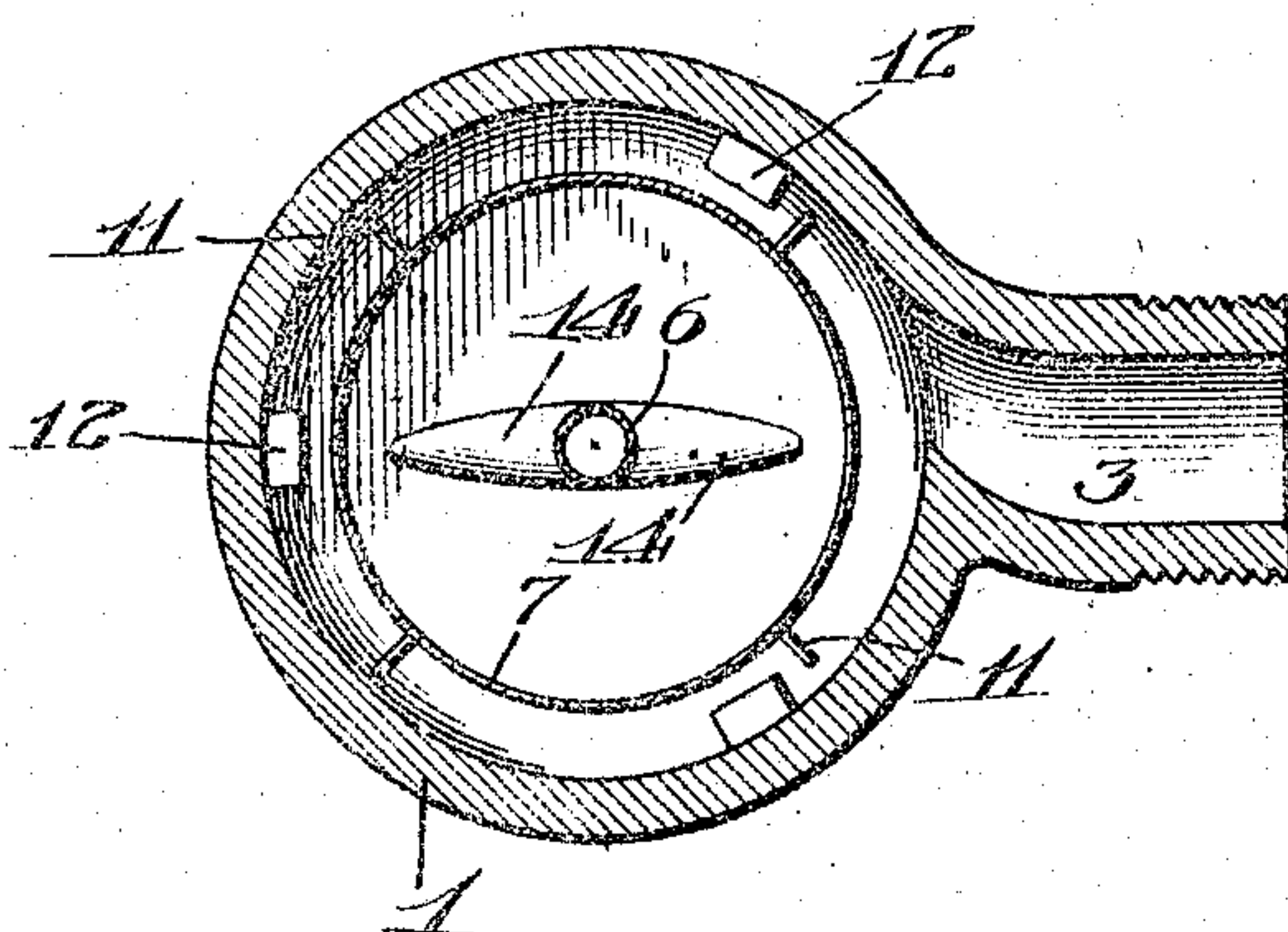


Fig. 6.



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UNITED STATES PATENT OFFICE

WILLIAM D. PICKELS, OF CHICAGO, ILLINOIS.

RELIEF-VALVE.

No. 840,583.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed February 28, 1906. Serial No. 303,508.

To all whom it may concern:

Be it known that I, WILLIAM D. PICKELS, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Relief-Valves, of which the following is a description.

My invention relates to that class of devices commonly known as "water-relief" valves or traps, principally employed upon steam systems to discharge the water of condensation or other entrained liquid from the various portions thereof without unnecessary waste of steam.

The object of my invention is to produce a simple and durable device of the kind described—one that is entirely reliable in operation and not liable to become clogged or inoperative when in use by incrustation or by the accumulation of foreign matter within the shell.

To this end my invention consists in the novel construction, arrangement, and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, wherein like or similar reference characters indicate like or corresponding parts, Figure 1 is a vertical substantially diametrical section of my device. Fig. 2 is a section taken substantially on line 2 2 of Fig. 1. Fig. 3 is a section similar to that shown in Fig. 1, showing a slight modification. Fig. 4 is a section taken substantially on line 4 4 of Fig. 3. Fig. 5 is a section similar to that shown in Figs. 1 and 3, showing another slight modification; and Fig. 6 is a section taken substantially on line 6 6 of Fig. 5.

In the preferred form of my device shown in the drawings, 1 is a suitable shell or casing provided with a removable cap 2 for affording convenient access to its interior. The shell 1 is adapted to form a part of a steam system and to be connected therewith by means of an inlet 3, preferably positioned near the top, and an outlet 4 at the bottom of the shell. Suitable means are also provided to control the escape of liquid from the shell 1. As shown, a valve-seat 5 of any suitable form is provided at the inner end of the outlet 4, and a tubular valve 6 is provided to cooperate with the valve-seat. A float 7 of

any preferred form or type is provided within the shell to control the position of the valve 6 by the amount of liquid in said shell.

Any suitable form of valve and valve-seat may be employed. As shown, the valve 6 consists merely of an open tubular member rigidly attached to the float 7, and the valve-seat 5 a suitably-formed shoulder at the bottom of a conical recess 8 in the bottom of the shell 1, both the recess and the shoulder being preferably concentric with the outlet-opening 4. In the forms shown in Figs. 1 and 3 the upper end of the tubular valve 6 is also open, and a pin 9, with a part of suitable size to snugly fit the opening, is rigidly mounted upon the cap 2, projecting downward into the valve, thus serving as a guide for the valve and to balance the same against any pressure in the shell 1 or vacuum in the outlet-opening 4. Obviously the distance the pin 9 extends downward within the tubular valve 6 is not of particular importance, provided it extends sufficiently far and is of suitable size to suitably guide the valve 6. In the form shown in Figs. 1 and 3 the pin 9 extends downward but a comparatively short distance, being intended to merely guide the top of the valve and float, while the conical recess 8, the depth of which is slightly greater than the possible movement of the valve, operates as a guide for the lower end of the valve.

In the preferred form the bottom of the shell 1 is slightly hopped toward the center and the walls of the recess are flush with the adjacent bottom of the shell, so that any small particles of scale, rust, or other foreign matter entering the shell will be carried at once to the conical recess and discharged at the outlet 4 when next the valve 6 is raised. In the form shown in Fig. 1 the natural wash of the liquid entering and leaving the shell is depended upon to carry all foreign matter to the outlet; but in Figs. 3 and 5 this operation is assisted by the movements of the parts within the shell.

In Figs. 3 and 4 any desired number of arms 10 are provided in proximity to the bottom of the shell, a plurality of wings or blades 11 are provided upon the float, and the inner end of inlet 3 is formed substantially tangent to the interior of the shell or preferably to a line about midway between the

side of the float 7 and shell, so that liquid entering the device will tend to impinge fairly against the blades 11, rotate the float and connected parts, thus causing the arms 10 to agitate the liquid in the shell, particularly near the bottom, and prevent particles suspended in the liquid from settling upon the bottom of the shell and possibly adhering thereto.

In Figs. 5 and 6 the upper end of the tubular valve 6 is permanently closed, and this portion of the valve and float is guided by a plurality of lugs or projections 12 upon the side of the shell positioned to engage the sides of the float. In this form the valve is partially unbalanced—that is, any pressure within the shell 1 or any vacuum in the outlet 4 will tend to hold the valve 6 more securely to its seat. To partially overcome this tendency and insure the proper air-venting of this form of valve, one or more vent or air tubes 14 are provided, connected to the body of the valve 6, with their free ends in proximity to the bottom of the shell, thus serving in place of the arms 10 to agitate the liquid in the shell 1, also to remove a portion of the liquid in the shell and to prevent air-locking. The tubes 14 also tend to partially equalize the pressure in the shell 1 and in the outlet 4, thus leaving the valve more sensitive to the action of the float.

In some cases the difference in pressure between the interior of the shell and in the outlet 4 is sufficient, with the above-described equalizing means, to hold the valve to the seat 5 with considerable force. To prevent this from interfering with the operation of the valve, considerable space is left between the ends of the lugs 12 and the walls of the float, so that the top of the valve may be moved about by the fluid entering the shell 1 from the inlet 3, thus rocking the valve upon its seat and completely releasing the same. Where the inlet 3 is formed as shown in Fig. 6 and the blades 11 are provided upon the float 7, the slight rotary tendency of the float and valve also assists in freeing the valve from the difference in pressure above referred to.

Where the movements of the valve and float, especially in the last-described form, tend to produce an undesirable amount of noise, the lugs 12 may be formed of any suitable composition and attached to the wall of the shell. Also a composition facing may be provided upon the recess 8 and valve-seat 5, as shown in Fig. 3, and, if found desirable, other contact-surfaces may be faced with composition or other suitable means employed to prevent metallic contact between the movable and stationary parts of my device. While in the foregoing specification and in the drawings the preferred forms of

my device are described, I do not wish to be understood as limiting myself to the exact form or construction shown, as various immaterial modifications may be made in my device without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet, and means for connecting said shell in a steam system, in combination with means for controlling said outlet, and means operated by the liquid as it enters said shell for agitating the liquid in said shell.

2. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet and means for connecting the same in a steam system, a valve-seat at the inner end of said outlet, a valve cooperating with said valve-seat to control said outlet, and a float controlling the operation of said valve, in combination with one or more members connected to said float and arranged in proximity to the bottom of said shell, and means for revolving said members about the valve to agitate the liquid in the shell.

3. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with a valve-seat positioned below the bottom of said shell at the inner end of said outlet, a valve cooperating with and terminating at said valve-seat positioned to control said outlet, and a float controlling the operation of said valve.

4. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with a conical recess positioned in the bottom of said shell about the inner end of said outlet, with a valve-seat forming the bottom of said recess, a valve cooperating with said valve-seat to control said outlet, and a float controlling the operation of said valve.

5. A device of the kind described, comprising an inclosing shell having a slightly-hoppered bottom, and provided with an inlet and an outlet and means for connecting the same in a steam system, in combination with a conical recess positioned in the bottom of said shell at the apex of said hopper and about the inner end of said outlet, with a valve-seat forming the bottom of said recess, a valve cooperating with said valve-seat to control said outlet and a float controlling the operation of said valve.

6. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with

a valve-seat at the bottom of said shell and the inner end of said outlet, a valve cooperating with said valve-seat to control said outlet, a float controlling the operation of said valve, and a conical guide-recess inclosing said valve-seat and controlling the transverse position of said valve.

7. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with a valve, a float to control the operation of said valve, a conical recess in the bottom of said shell about said outlet, to guide said valve to its seat, and a valve-seat at the bottom of said recess cooperating with said valve to control said outlet.

8. A device of the kind described, comprising an inclosing shell provided with an inlet and an outlet and means for connecting the same in a steam system, a valve controlling said outlet, and a float controlling said valve, in combination with a plurality of blades upon the exterior of said float, and means for directing the fluid entering said shell against said blades to rotate said valve and agitate the fluid in the shell.

9. In a device of the kind described, an inclosing shell provided with an inlet and an outlet, and a float positioned within said shell, in combination with a plurality of blades upon said float, extending longitudinally of said shell, the inner end of said inlet being substantially tangent to the shell, whereby liquid entering said shell will impinge upon said blades and tend to rotate said float.

10. In a relief-valve, an inclosing shell provided with an inlet the inner end of which is substantially tangent to the inner surface of the shell.

11. In a device of the kind described, an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with means

for controlling said outlet, and means for continuously discharging fluid from near the bottom of said shell into said outlet.

12. In a device of the kind described, an inclosing shell provided with an inlet and an outlet, and means for connecting the same in a steam system, in combination with a tubular valve arranged to control said outlet, and one or more tubular members extending from near the bottom of said shell into said tubular valve.

13. In a relief-valve, an inclosing shell provided with an inlet and an outlet and a removable part rigidly secured to said shell at the inner end of said outlet comprising a valve-seat and a conical guide-recess inclosing said valve-seat and adapted to direct a valve to said valve-seat.

14. In a device of the kind described, an inclosing shell provided with an inlet and an outlet, and a tubular valve arranged to control said outlet, in combination with one or more tubular members extending from a point near the bottom of said shell into said tubular valve and independent means for controlling the transverse position of each end of said valve.

15. In a device of the kind described, an inclosing shell provided with an inlet and an outlet, and a tubular valve arranged to control said outlet, in combination with one or more tubular members extending from a point near the bottom of said shell into said tubular valve, independent means for controlling the transverse position of each end of said valve, and means tending to rotate said valve to agitate the fluid near the bottom of said shell.

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

WILLIAM D. PICKELS:

Witnesses:

BURTON U. HILLS,
CHARLES I. COBB.