

No. 715,706.

Patented Dec. 9, 1902.

H. P. TIPPETT.

BALANCED AUTOMATIC SAFETY VALVE.

Application filed Mar. 8, 1902.

(No Model.)

2 Sheets—Sheet 1.

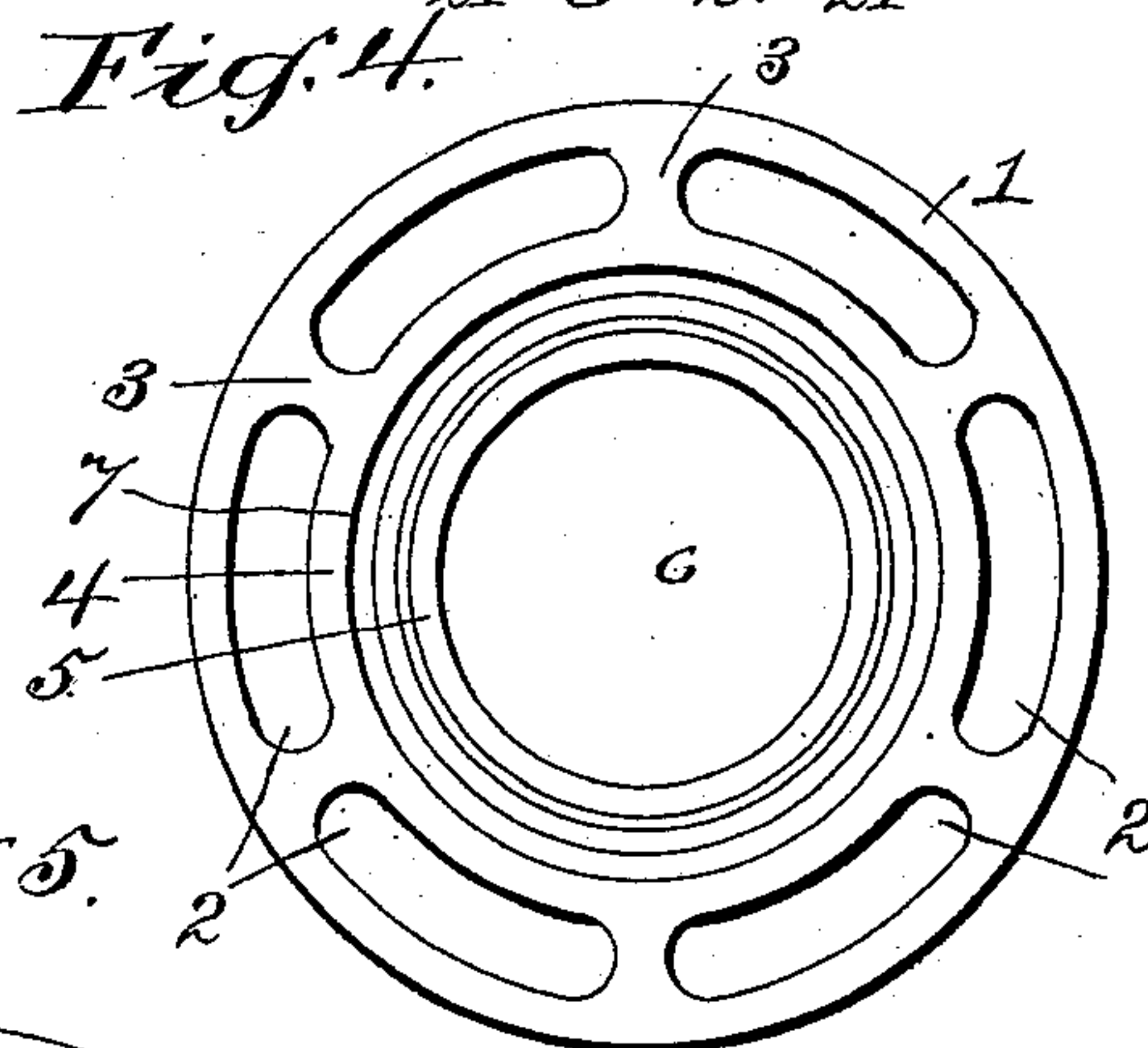
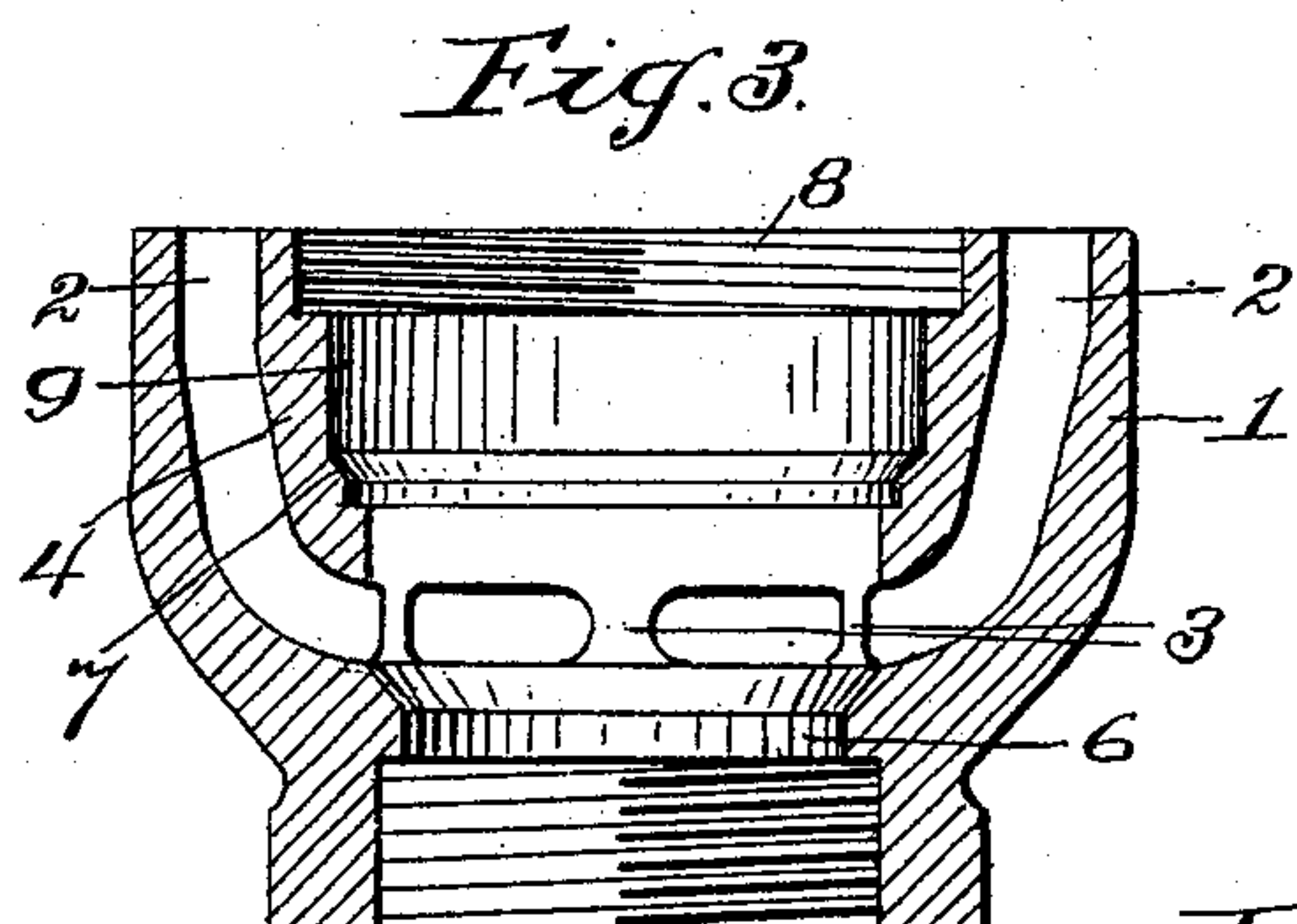
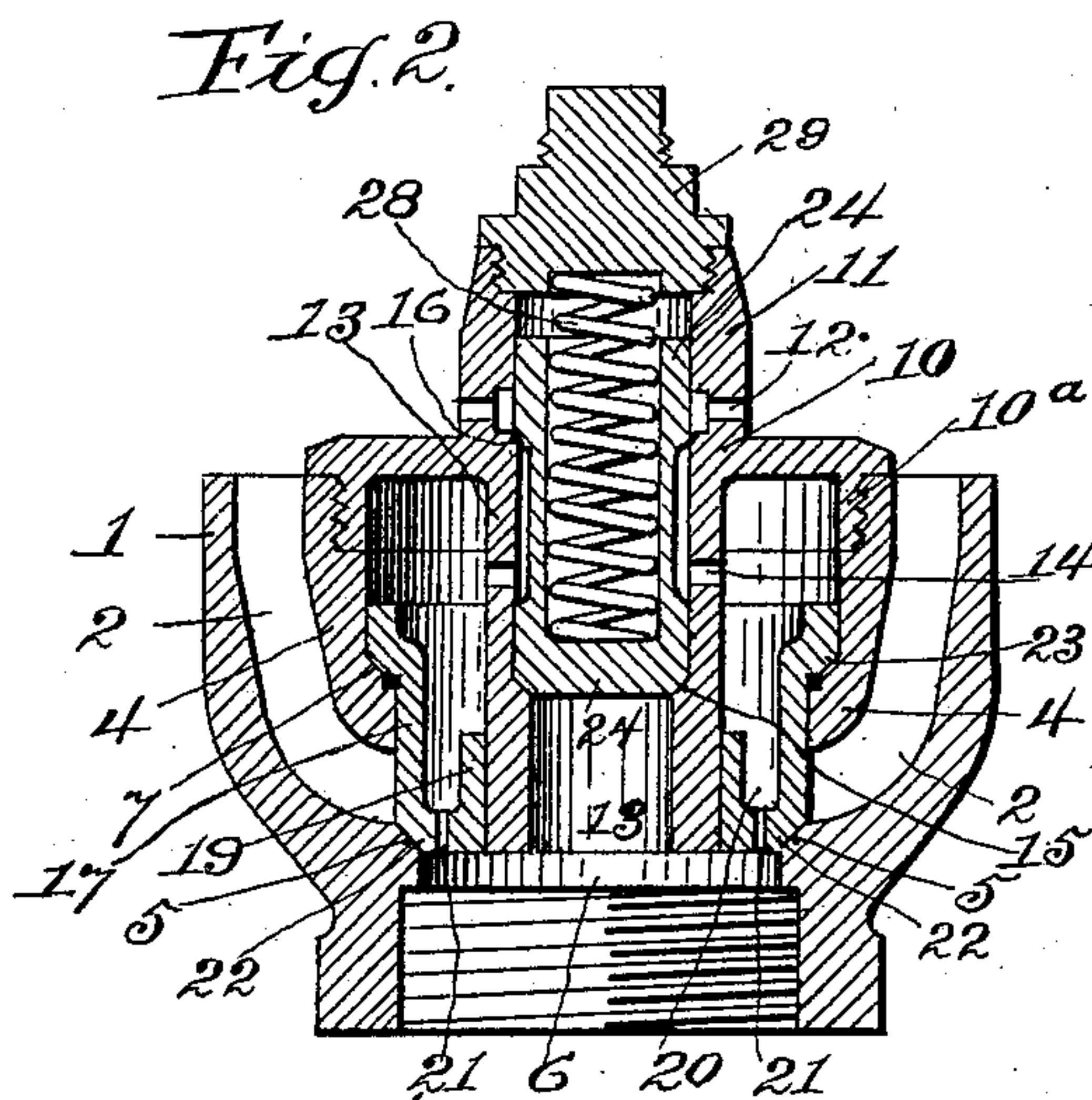
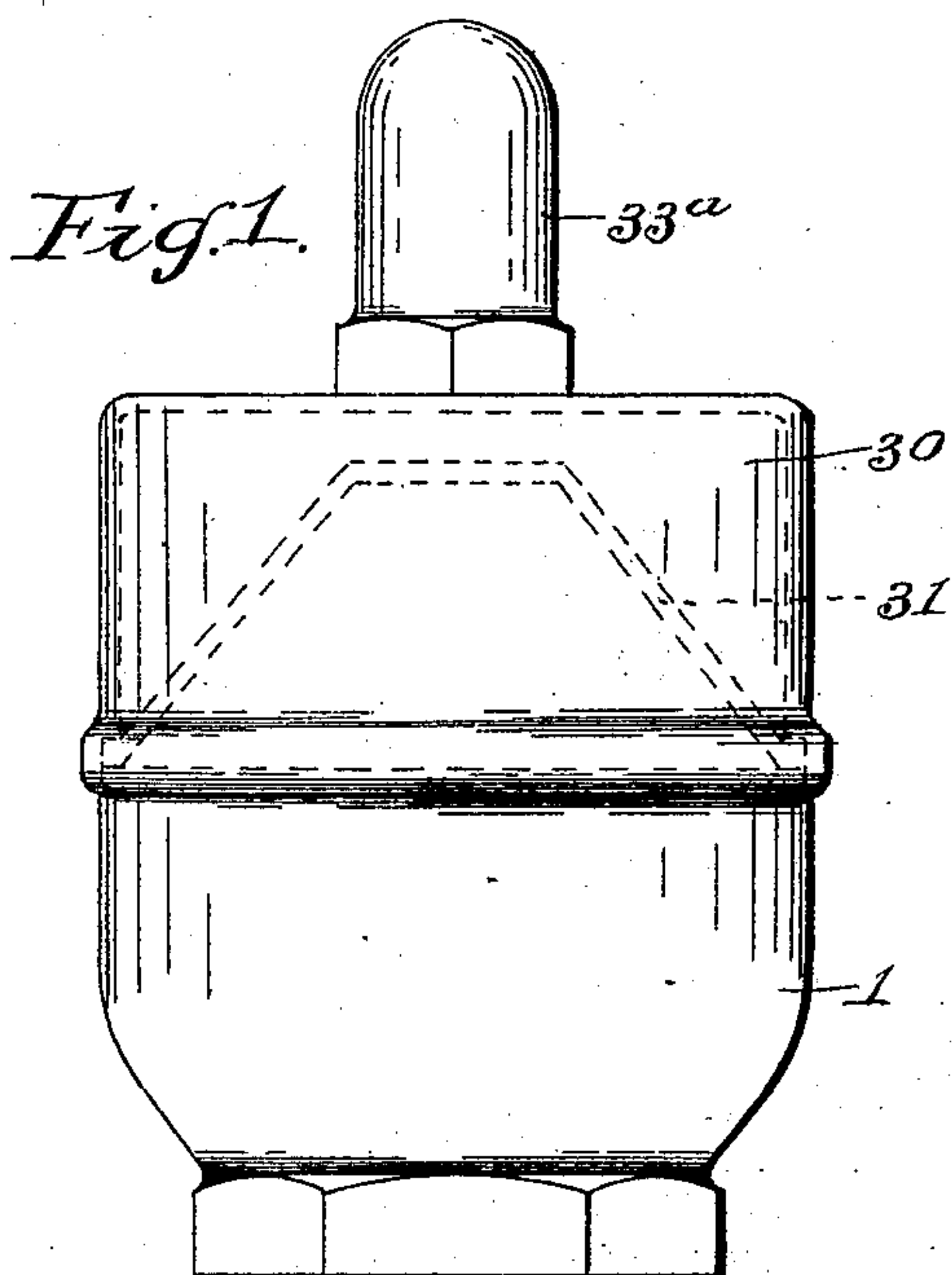
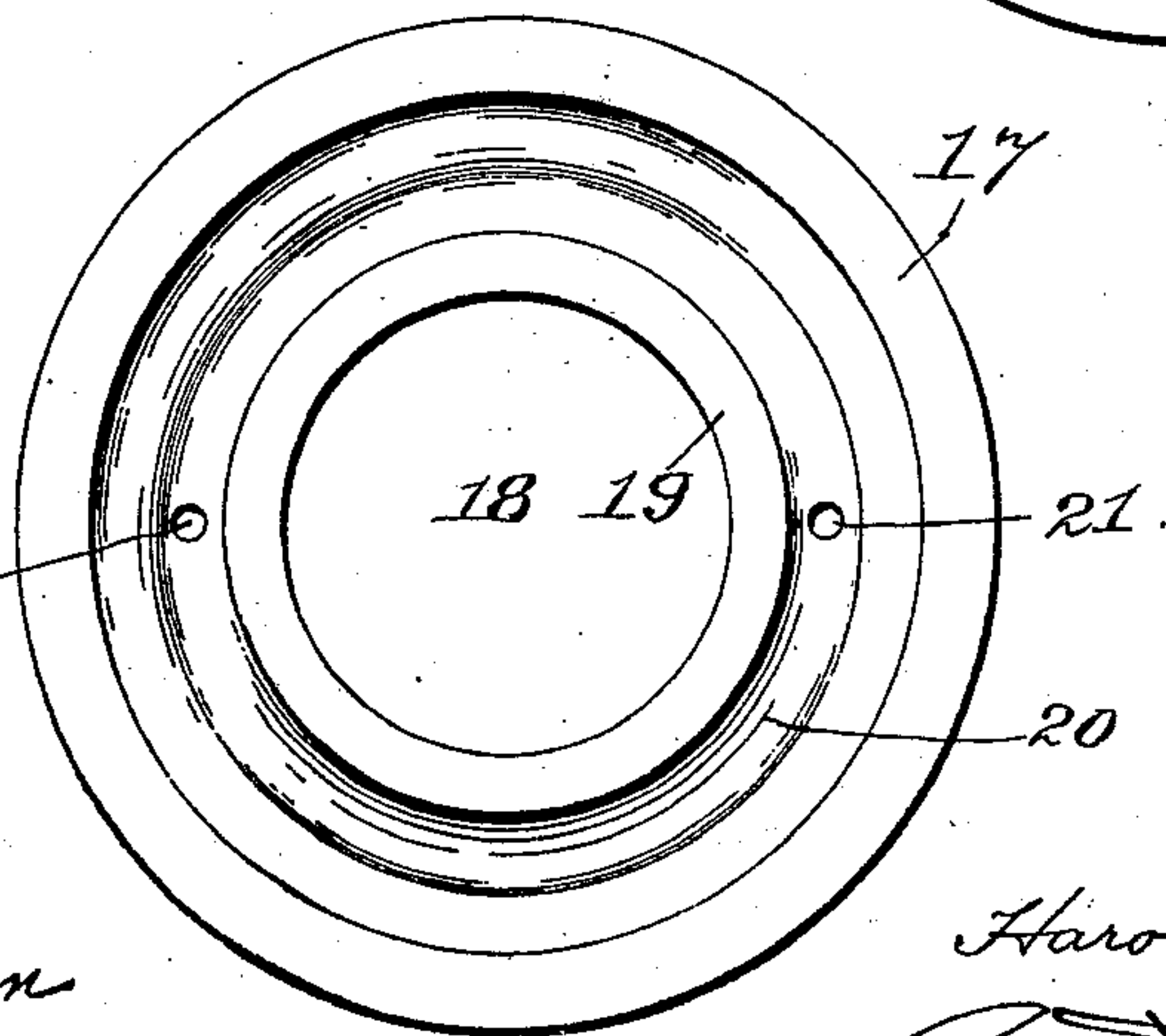
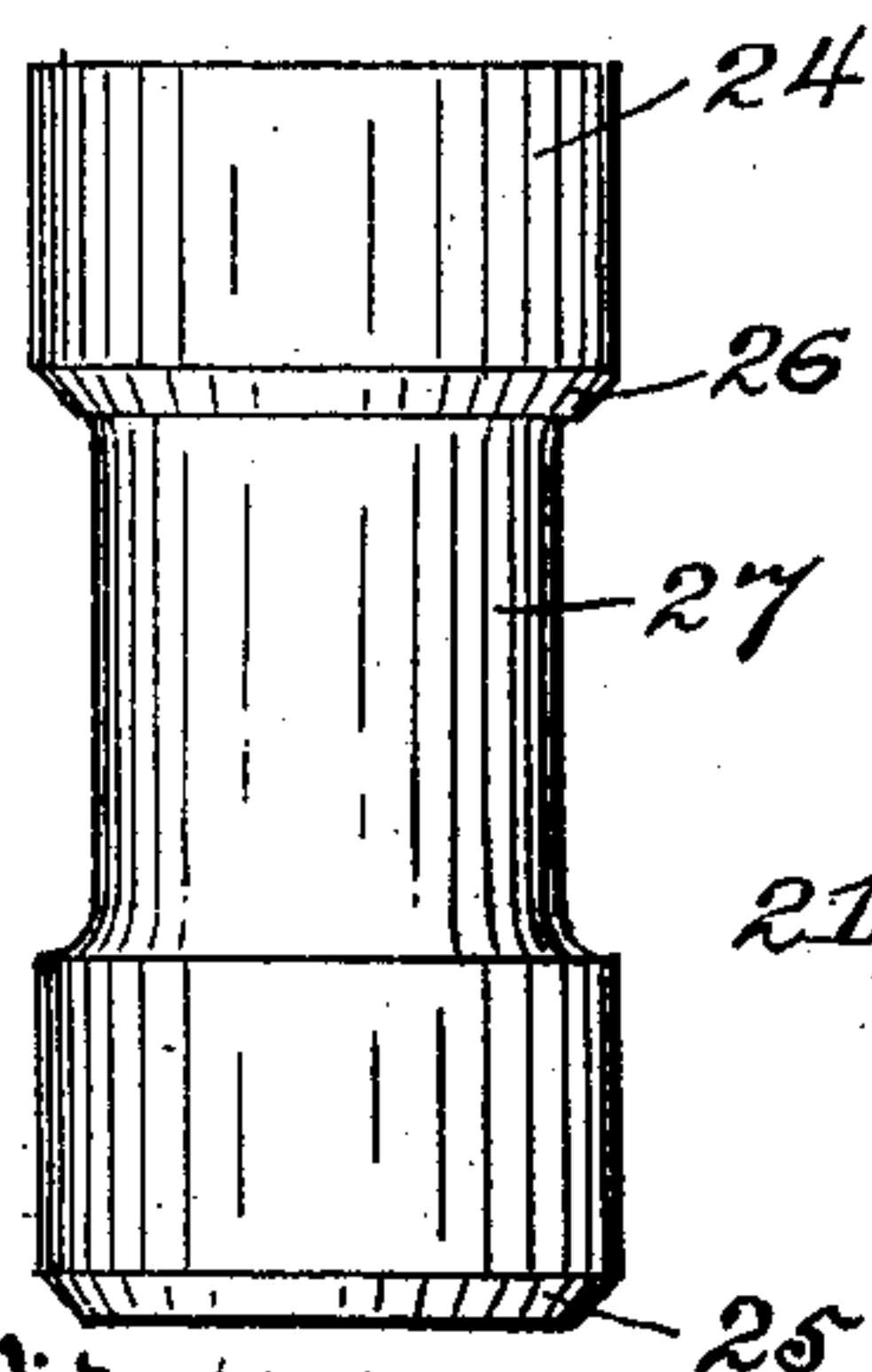


Fig. 6.



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2 Sheets—Sheet 2.

Fig. 7.

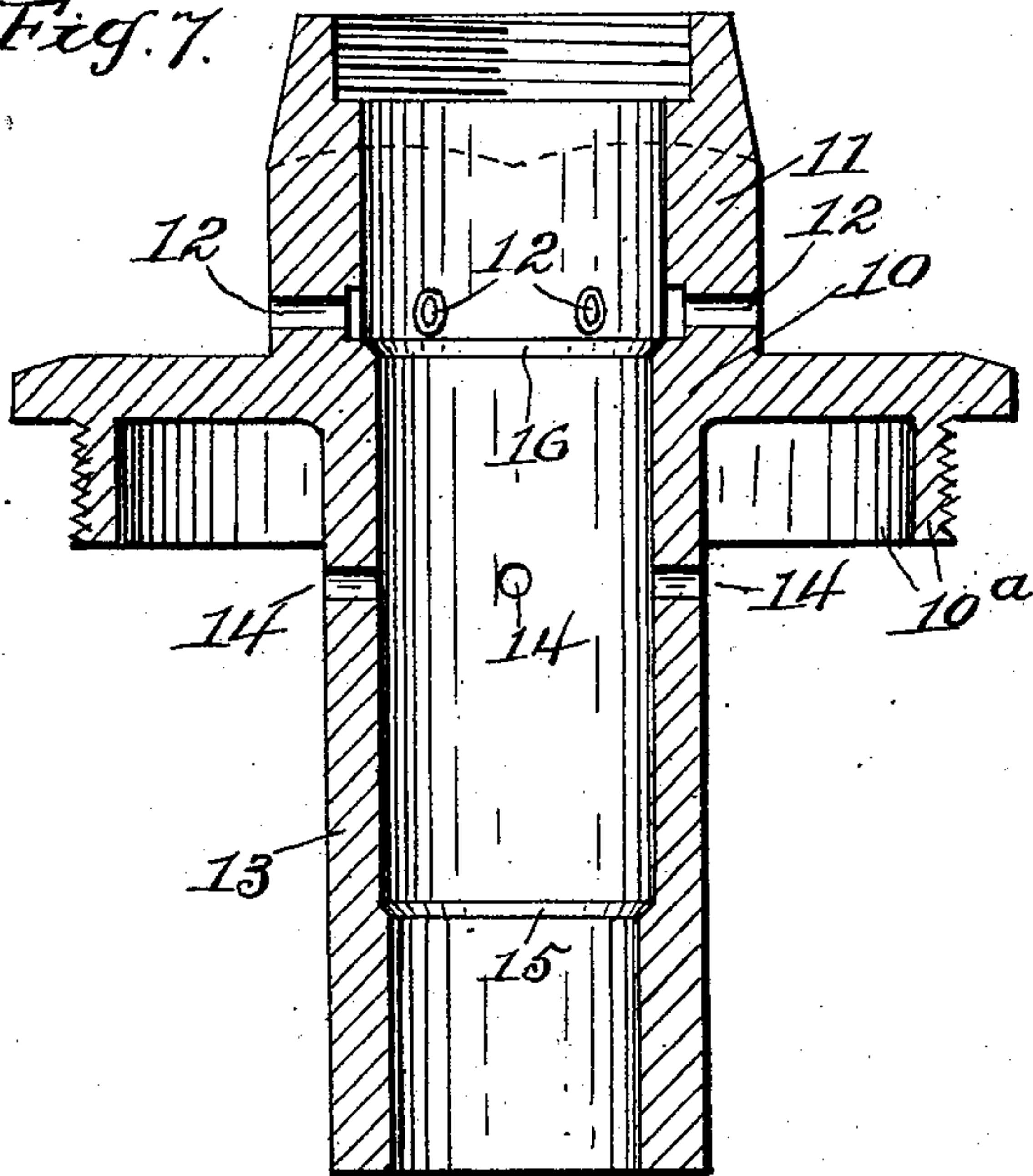


Fig. 9.

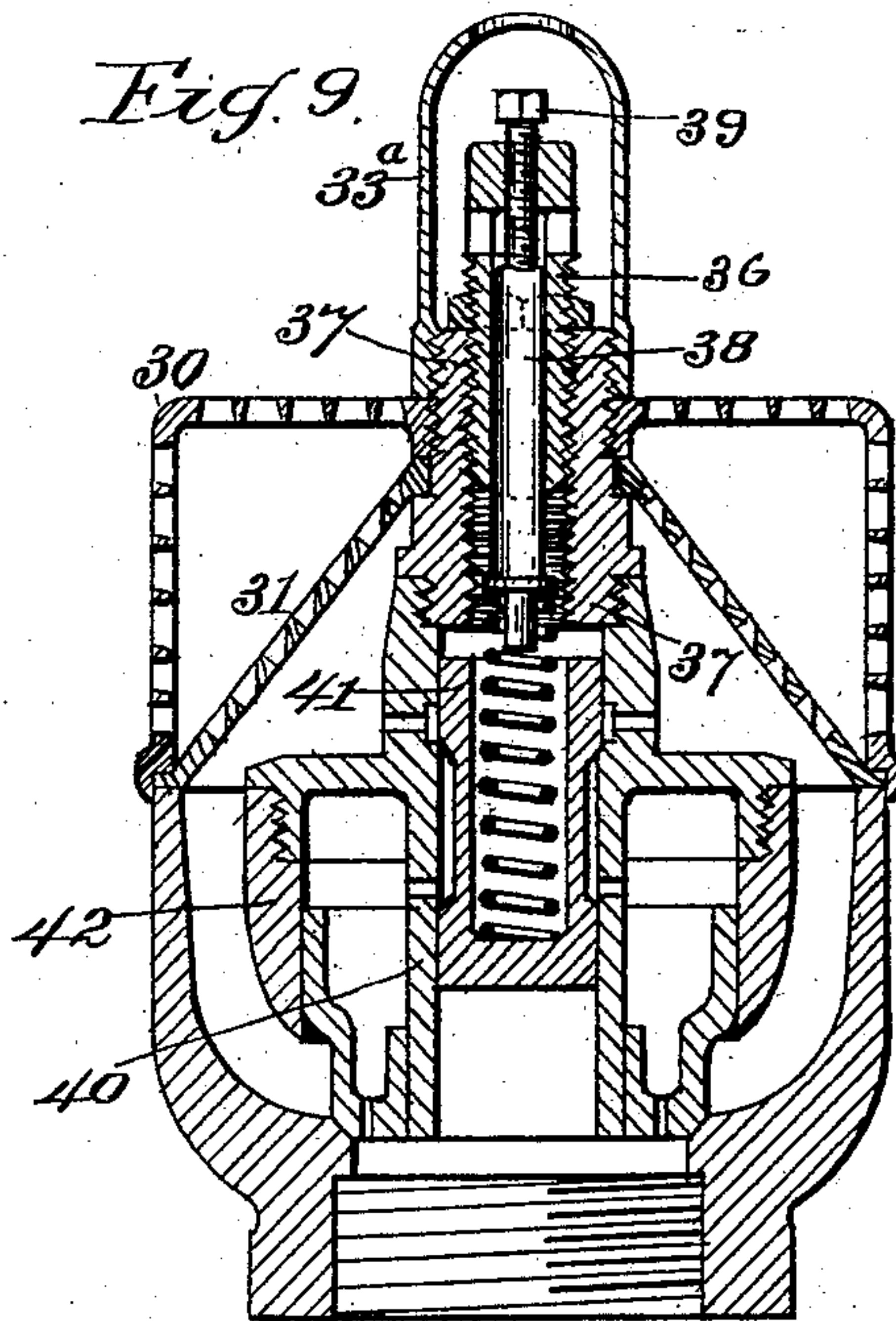


Fig. 8.

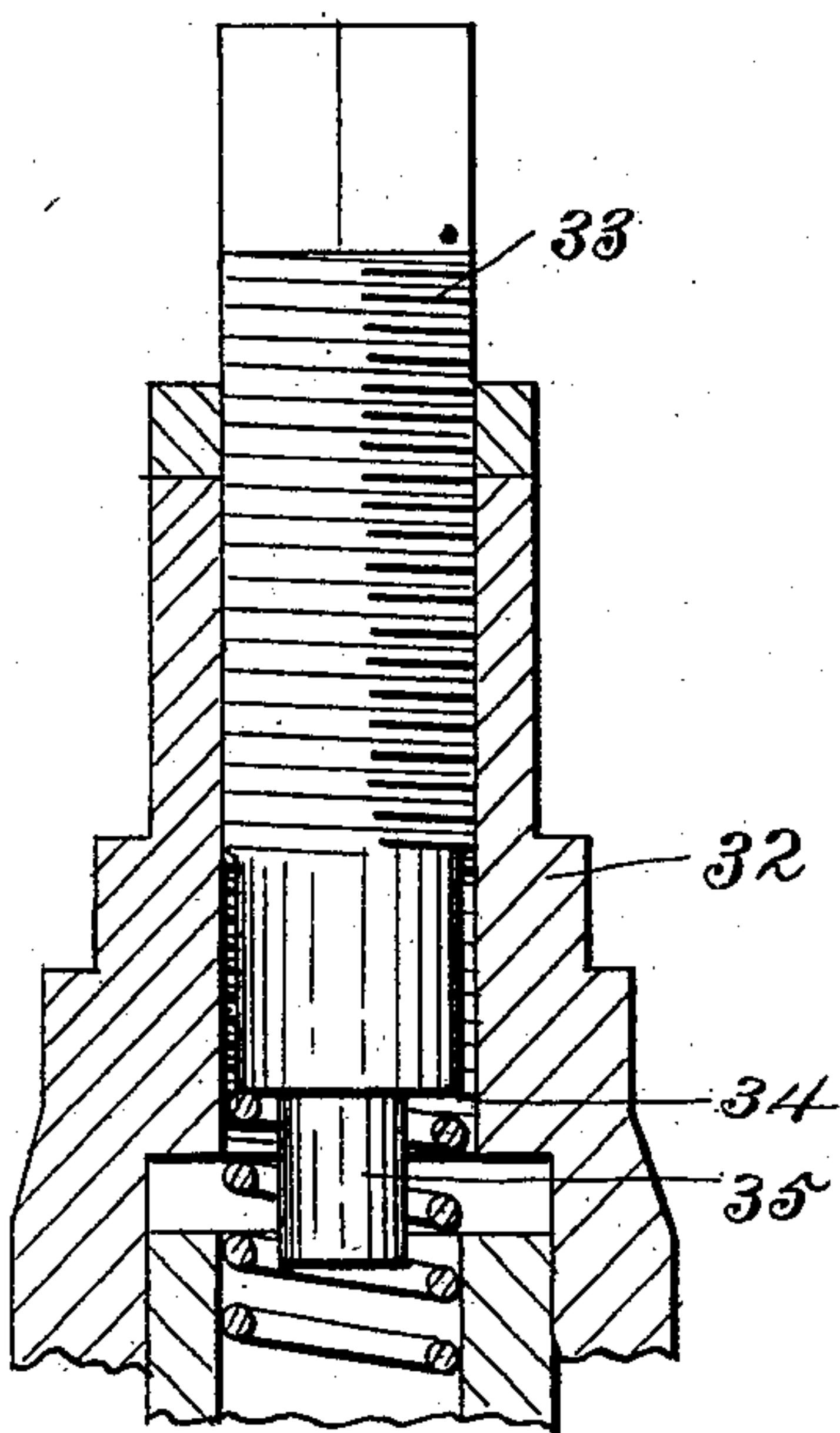
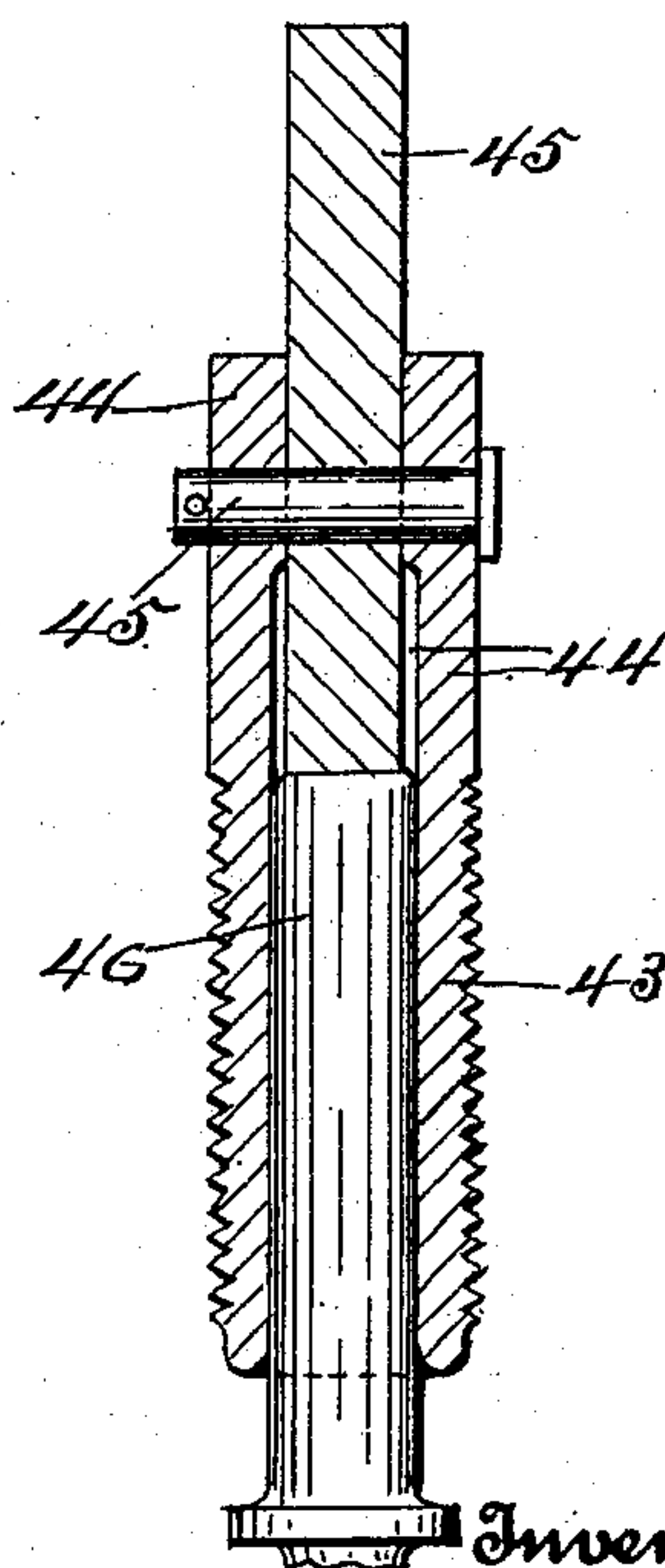


Fig. 10.



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UNITED STATES PATENT OFFICE.

HAROLD P. TIPPETT, OF COLUMBUS, OHIO.

BALANCED AUTOMATIC SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 715,706, dated December 9, 1902.

Application filed March 8, 1902. Serial No. 97,320. (No model.)

To all whom it may concern:

Be it known that I, HAROLD P. TIPPETT, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Balanced Automatic Safety-Valves, of which the following is a specification.

This invention relates to steam-engine valves, and particularly to a safety-valve for locomotive and other boilers.

The invention embodies various improvements in safety-valves, and especially in the safety-valve covered by Letters Patent issued to me May 11, 1897, No. 582,445.

The prime object of this invention is to provide an automatic balanced safety-valve of such peculiar construction that a less number of parts are used than is usually employed in this character of valves, that a promptness in opening without resistance is effected, and that its opening and closing is controlled exclusively by the boiler pressure.

A further object of the invention is to provide a valve-body having an upper and lower seat separated by exhaust-ports and a steam-operated vessel to engage said seats.

A further object of the invention is to provide in a safety-valve a vertically-slidable main valve actuated by steam and having a central bottom opening, a valve-cap having a neck provided with exhaust-ports and a hollow stem provided with induction-ports and engaging the said opening, and a spring plunger-valve operated in and between the said neck and the said stem.

A still further object of the invention is to provide in a safety-valve a simplified construction of parts, that they may be readily assembled, removed, and renewed, and to arrange and connect the parts in such compact manner that the valve will occupy much less space than and have the same capacity as any other valve of this character known to applicant.

Various other objects, advantages, and improved results attained by this valve will be disclosed in the specification and pointed out in the claims to follow.

In the accompanying drawings, forming part of this application, Figure 1 is an elevation of the valve in condition to be applied to

a boiler, showing the inner muffler in dotted lines. Fig. 2 is a central vertical section without the mufflers and hood. Fig. 3 is a central vertical section of the valve-body. Fig. 4 is a top view of the valve-body. Fig. 5 is a top view of the slidable main valve. Fig. 6 is a detail elevation of the plunger. Fig. 7 is a central vertical section of the valve-cap. Fig. 8 is a sectional view of means for adjusting the spring. Fig. 9 is a sectional view showing several modifications. Fig. 10 is a sectional view of a further modification of said means.

The same numeral references denote the same parts throughout the several views of the drawings.

The valve-body consists of an outer casing 1, adapted to be attached to a locomotive or other steam boiler and having a series of ports 2, separated by ribs 3, which join to the casing 1 an inner shell 4. A circular valve-seat 5 is formed at the intersection of the ports 2 and induction-port 6 of the casing 1. A circular seat 7 is made in the shell 4, and between the seat 7 and an internal screw-thread 8 of the shell is a bearing 9.

The valve-cap 10 comprises an externally-screw-threaded flange 10^a, fitting the thread 8 and having an upwardly-extended screw-neck 11, provided with ports 12, and a downwardly-extended hollow stem 13, provided with ports 14. The interior of the stem 13 is provided with a valve-seat 15 below the ports 14 and a like seat 16 at the ports 12.

The main valve 17 has an open top of larger area than the bottom, the latter having a central opening 18, surrounded by an inner rim 19, so as to leave a circular pocket 20, into which opens through the bottom of the valve 17 induction-apertures 21. This pocket receives steam from the ports or apertures 21. The bottom of the valve 17 has a valve-seat 22, and a like seat 23 is formed on the enlarged top portion of the valve. This valve slides vertically on the stem 13 under action of steam from the boiler, and its seats engage with the seats 5 and 7, so that a double seating of the valve 17 is effected.

The plunger-valve 24 is cup-like and has lower and upper valve-seats 25 and 26, respectively, between which is a reduced portion 27. These seats engage the valve-seats

15 and 16, according to the vertical sliding of the plunger by steam-pressure. The plunger contains a spring 28 of slight resistance for controlling the plunger, and the spring is 5 confined by a cap-nut 29, secured to the neck 11. A suitable muffler or mufflers completes the valve, and I prefer to use an outer muffler 30 and a conical inner muffler 31.

Various forms of means for adjusting and 10 regulating the plunger-spring may be employed, if found necessary; but the preferred form is shown in Fig. 8, and the structure is as follows:

The nut 32 has an internal screw-thread in 15 which a regulating-screw 33 works, having a shoulder 34 and projection 35 for the spring. A hook 33^a covers the adjusting means and secures the mufflers to the cap-nut.

In the modification shown in Fig. 9 an ex- 20 ternally-threaded sleeve 36 is secured in the nut 37, and a rod 38 is operated on the spring through the sleeve by a set-bolt screw 39. In this form of valve the cap-stem 40 has no valve-seat and the plunger 41 has only one 25 seat, while there is no seat in the inner shell 42.

Referring to the modification shown in Fig. 10, the screw-sleeve 43 has arms 44, in which is fulcrumed a relief-lever 45 to operate a rod 30 46, engaging the spring.

I wish it to be understood that in the practical application of this valve various other minor modifications producing substantially the same results may be effected without de- 35 parting from the spirit of my invention.

Taking the parts as shown in position Fig. 2, the operation is as follows: Steam-pressure on the bottom of main valve 17 is carried into said valve by its induction-ports 21, 40 so that the thus-carried steam acts on a greater area of the valve upon the inside than upon the bottom or outside and holds the valve seated. When steam-pressure on the plunger equals or is slightly greater than the 45 spring-pressure thereon, the plunger-valve is opened by pressure of steam and permits the steam in the pocket 20 and in the valve 17 to escape through the ports 12 and 14 faster than the said valve is supplied with steam 50 through the induction-ports 21, whereupon the valve is raised or opened by the pressure of steam on its bottom, caused by the opening of the plunger-valve, and the boiler-pressure is relieved. When the boiler-pres- 55 sure is reduced enough to permit the spring to close the plunger down, the steam-pressure of the valve is again confined above the valve 17 and closes it.

It will be observed that the peculiar con- 60 struction of the main valve 17, with its larger upper portion and bottom steam-ducts 21 of smaller size than the ports 12 and 14, produces a greater interior area for the action of steam therein than the exterior steam-actu- 65 ated surface or main-valve bottom, and hence the said valve is operated exclusively by the boiler-pressure.

It is obvious that the valve is not balanced by a spring on one side and steam-pressure on the other, but the steam-pressure direct 70 from the boiler balances and holds the main valve to its seat, and the force of the steam increases on the vessel as the steam rises through the valves until the release-point is reached. 75

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

1. In a safety-valve, a steam-operated main valve having an open top of larger area than 80 the bottom, said bottom having ducts therein and an opening therethrough forming a bearing for the main valve in its vertical movement, and a vertical slidable spring-plunger valve operated by steam from said opening. 85

2. The combination in a safety-valve, of a main valve having an open top and bottom, a cap or cover having a stem upon which the main valve works, and a spring-controlled plunger working in the stem and through the 90 cap.

3. A balanced automatic safety-valve, comprising a body having valve-seats, a valve-cap having a depending stem provided with valve seats and ports, a main valve having a 95 reduced bottom and provided with seats to engage the valve-body seats, said bottom having ducts and a central opening to permit the main valve to slide, and a spring-plunger having seats to engage the valve-cap seats. 100

4. The combination in a safety-valve, of a main valve having an inner bottom rim surrounding a central opening and forming a steam-pocket, induction-ports to the pocket, a cap or cover having a stem upon which the 105 main valve works, and a spring-controlled plunger working in the stem and through the cap.

5. The combination in a safety-valve, of a main valve having an open top and a cen- 110 trally-open bottom of smaller area than the top, a series of induction-ports in said bottom around the said opening, a cap or cover having a stem depending into said opening and provided with ports, and a spring-controlled 115 plunger operated in the stem and through the cap.

6. A balanced automatic safety-valve, comprising an outer casing having a valve-seat, an inner shell having a valve-seat, a valve 120 having upper seats to engage respectively the shell-seat and the casing-seat, the upper portion of the said valve being of larger area than the bottom thereof, the latter having ducts and a central opening, a valve-cap hav- 125 ing an upper neck and a lower stem provided with ports, said stem extending into said opening so that said valve will slide thereon, and a spring-plunger actuated by steam through the cap, stem and neck simultane- 130 ously with the working of the valve.

7. The combination, with the valve-body, and the cap covering a portion of said body and having a top neck provided with ports,

and a hollow bottom stem with ports, of a main valve slidable over the cap-stem by steam-pressure, and a spring-plunger or valve having a reduced portion and actuated by steam through the said cap.

5 8. The combination in a safety-valve, of a main valve having an open top and bottom, an inner rim surrounding the bottom opening to form a steam-pocket, induction-ports to the
10 pocket, a cap or cover having a stem provided with ports and depending into the said open-

ing, valve-seats on the cap, like seats in the stem, and a spring-controlled plunger having upper and lower seats to engage the cap and stem seats.

In witness whereof I hereunto set my hand in the presence of two witnesses.

HAROLD P. TIPPETT.

Witnesses:

CHARLES S. M. KRUMM,
NORMAN L. HAYDEN.