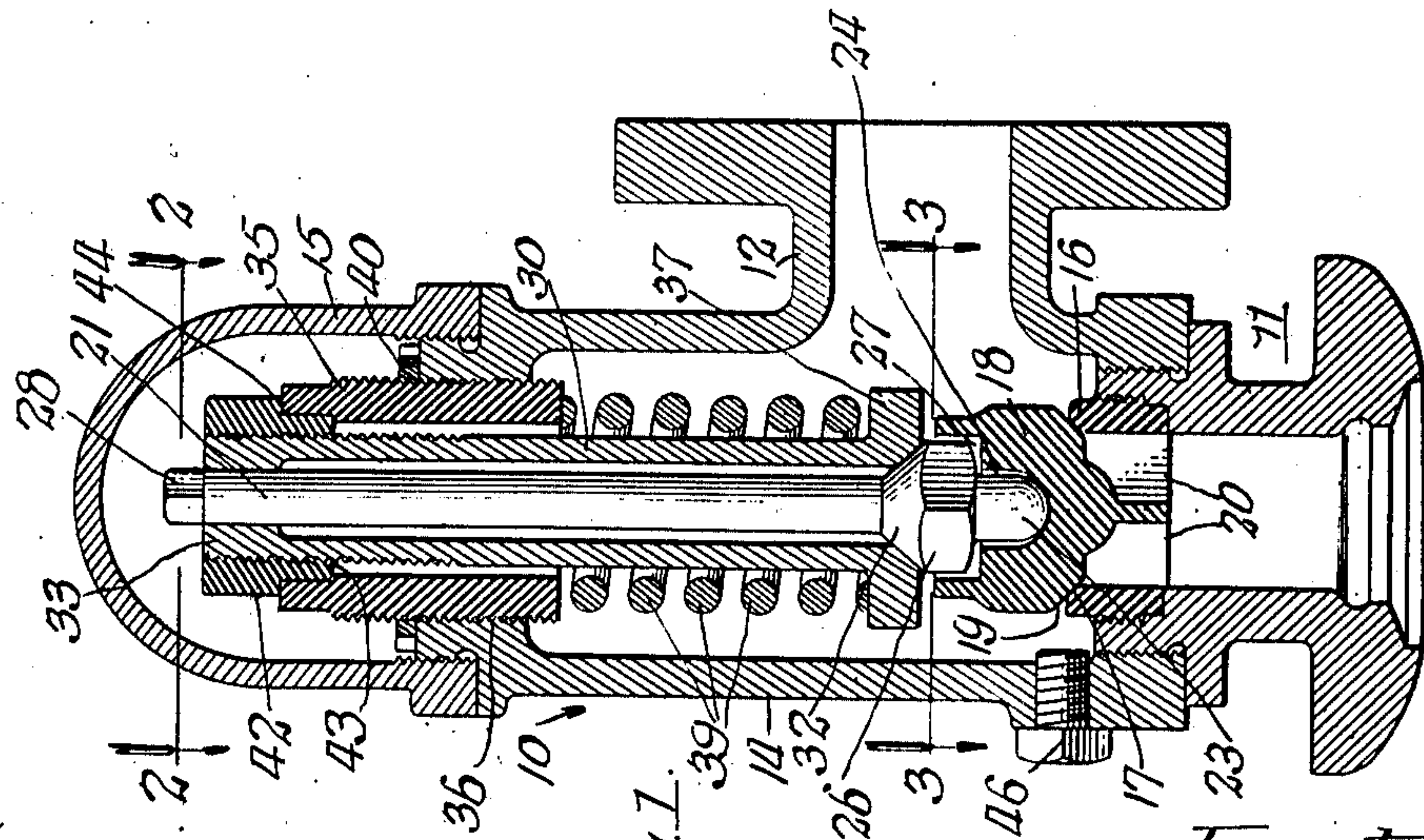
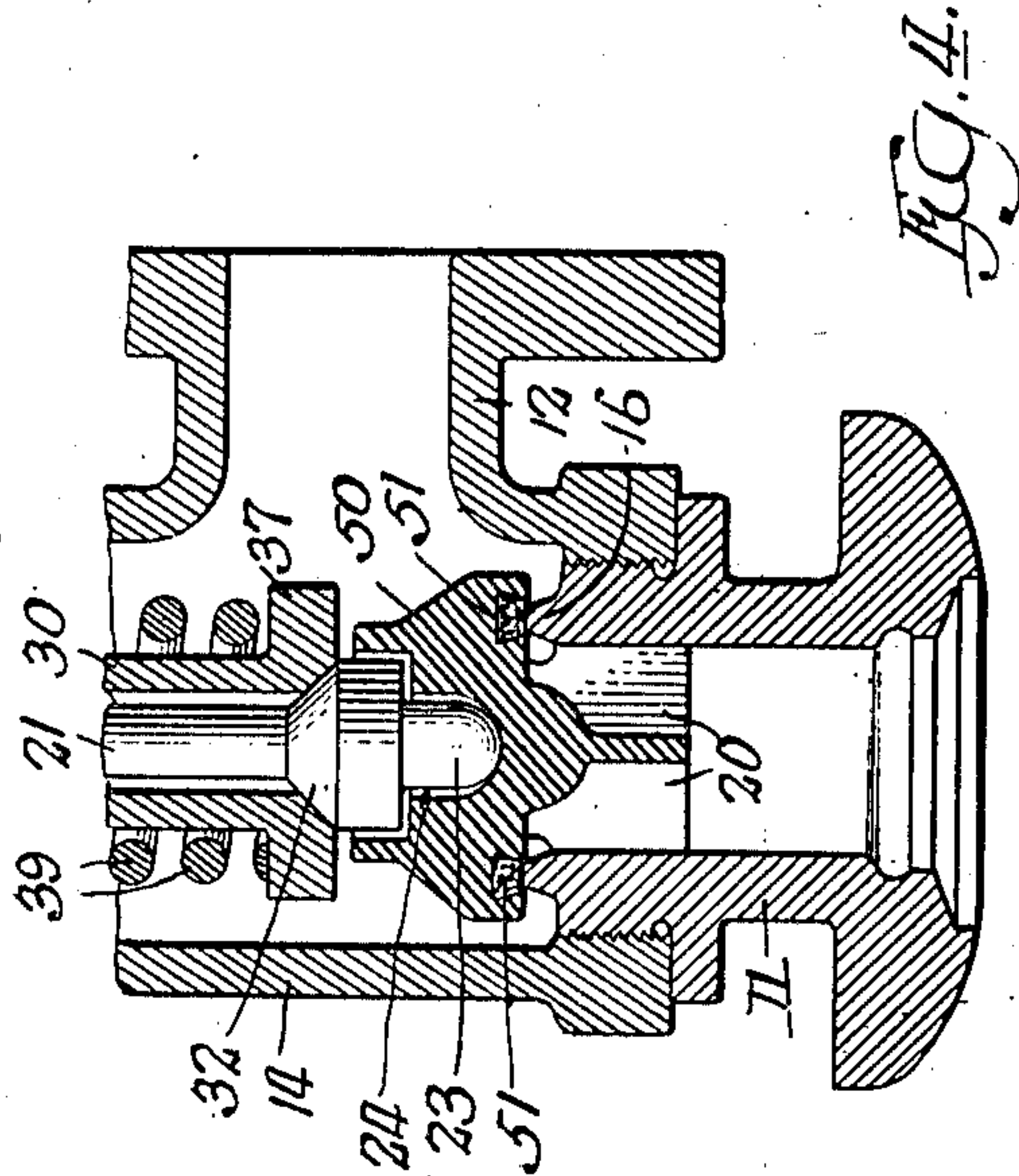
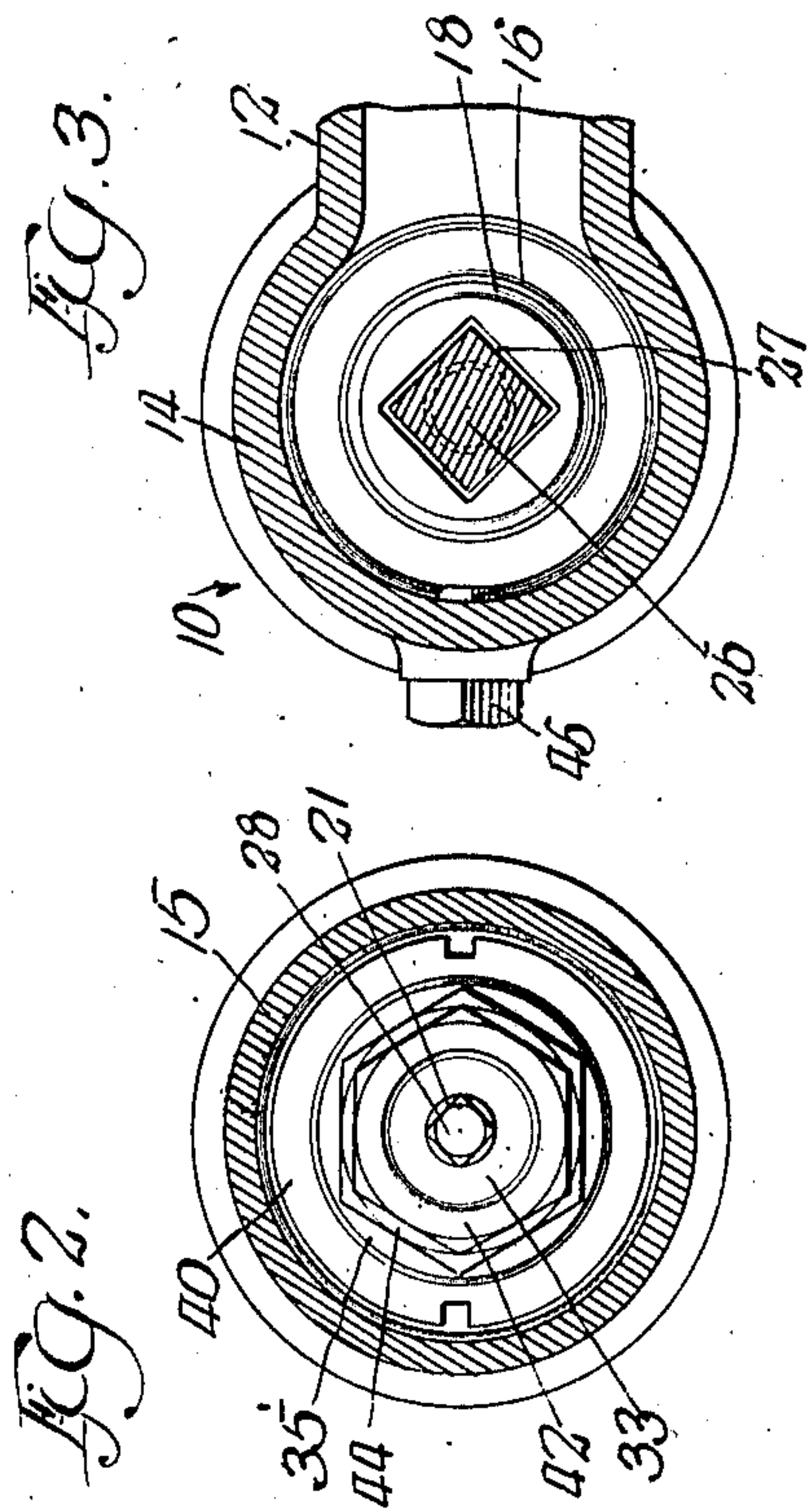


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RELIEF OR SAFETY VALVE.  
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970,348.

Patented Sept. 13, 1910.



Witnesses:  
W. Goldberger.  
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Fig. 1.

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Att'y.



# UNITED STATES PATENT OFFICE.

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## RELIEF OR SAFETY VALVE.

970,348.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed November 12, 1909. Serial No. 527,593.

*To all whom it may concern:*

Be it known that I, WILLIAM L. OSBORNE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Relief or Safety Valves; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to an improved relief or safety valve of that kind employing a spring for normally holding the valve upon its seat, and against the action of which the valve is lifted from its seat when pressure on the under side thereof exceeds a predetermined limit.

The invention consists of the matters hereinafter set forth and more particularly pointed out in the appended claims.

Among the objects of the invention is to provide means which permits the valve piece to be separated from its seat, either for the purpose of inspecting, repairing or cleaning the valve or for the purpose of grinding the valve seat, without losing the normal compression of the spring, thereby enabling the valve to be thereafter readily assembled or adjusted for use. In this manner the time required for assembling and adjusting the valve may be greatly reduced. Moreover there is thereby avoided liability of injuring the spring by allowing it to fully expand, as where the spring is released when the valve is disassembled. Such full or free expansion of the spring and its subsequent compression in adjusting the valve has the tendency to weaken the compression power of the spring and to render its subsequent operation uncertain.

In the drawings, Figure 1 is a central, vertical section of a relief valve embodying my invention. Figs. 2 and 3 are transverse sections on the lines 2—2 and 3—3, respectively, of Fig. 1, looking downwardly. Fig. 4 is a fragmentary vertical section of a slightly modified form of valve to which my invention may apply.

As shown in Figs. 1, 2 and 3 of the drawings, the casing 10 of the valve is provided with a flanged inlet branch 11 and a flanged outlet branch 12, each adapted to be connected in any suitable manner with the piping or fittings with which the valve is associated.

The said casing, as herein shown comprises a central or main body portion 14 into the lower end of which the branch 11 extends and with which it has screw-threaded connection, and a cap portion 15 which fits over and has screw-threaded connection with the upper end of the casing body 14. The upper end of the flanged branch 11 is countersunk and threaded to receive a ring 16 which is formed to provide an annular tapered valve seat 17.

18 designates a valve piece having a conical or tapered seating face 19 for engagement with the annular seat 17. Said valve piece is formed with guide wings 20 which fit closely within the passage of the inlet branch 11.

21 designates a stem extending upwardly from the valve piece into the chamber inclosed by the cap 15. The stem is provided with a rounded lower end 23 which extends loosely into an upwardly opening recess 24 of the valve piece. The said stem is provided just above its rounded bearing end with a thickened portion or head 26 of angular cross section which loosely fits in an angular socket 27 formed in the valve piece above the recess 24. The construction described affords an interlocking connection between the stem and valve piece by which the valve piece may be rotated through power applied to the stem. The stem is provided with an upper squared end 28, adapted for engagement by suitable implement to turn the same.

Loosely surrounding the valve stem is a sleeve 30. The lower end of the sleeve is provided with an annular tapered bearing surface that fits a conical seat 32 formed on the upper side of the head 26 of the valve stem, the engaging surfaces being such that the stem may turn in the sleeve. The upper end of the sleeve is reduced at 33 to provide a bearing for the upper end of the stem, and the stem is maintained by its upper and lower bearings in the axis of the sleeve.

35 designates an exteriorly screw-threaded, tubular nut which loosely surrounds the upper end of the sleeve 30 and extends into, and has screw-threaded connection with, the upper end of the main body portion of the casing as shown at 36. Between said nut 35 and a flange 37 at the lower end of the sleeve 30, and surrounding said sleeve, is interposed a spiral compression spring 39, the function of which is to



yieldingly and adjustably hold the valve piece upon its seat. The said spring 39 is compressed between the nut 35 and the flange 37 by screwing the nut downwardly into the casing and the compression of the spring is transmitted to the valve piece through the headed lower end of the stem to hold it against its seat. A joint nut 40, which surrounds and is screw-threaded to the tubular nut 35, bears against the upper end of the casing body and serves to lock the adjusting nut 35 in any position of adjustment.

Located above the adjusting nut is an interiorly screw-threaded spring locking nut 42 which fits over and has screw-threaded connection with the upper end of the sleeve above the adjusting nut 35. The said nut 42 bears at its lower end against the upper end of the adjusting nut 35. As herein shown the nut 42 is provided on its lower end with an annular flange 43 which fits into an annular rabbet in the upper end of the adjusting nut 35, and is provided with a downwardly facing shoulder 44 which bears against the upper end of said adjusting nut. Both the adjusting nut and the locking nut are formed with exteriorly polygonal upper ends, as shown in Fig. 2, to enable them to be readily engaged by wrench or like instrument to turn the same.

In the ordinary or usual use of the valve made as described, the spring 39 is maintained, through the action of the adjusting nut 35, under the proper tension to hold the valve upon its seat against a predetermined pressure beneath the same, and this compression may be varied through comparatively wide limits. When it is desired to release the valve piece from the compressive force of the spring in order that the valve piece may be readily separated from its seat preparatory to disassembling the valve or grinding the valve seat, the locking nut 42 is screwed downwardly on the sleeve 30 upwardly through the adjusting nut and thereby compress the spring 39 between the upwardly moving flange 37 and the fixed abutment or nut 35. A slight additional compression of the spring brought about in this manner is sufficient to ease the valve piece off its seat so that it may be turned on its seat for the purpose of grinding the seat, the arrangement being such that the valve piece and stem are movable independently of the valve stem. Moreover the casing may be dismantled and the seat removed away from the valve piece without releasing the compressive force of the spring 39. This is due to the fact that said spring is confined between the adjusting nut 35, that is screw-threaded to the casing, and the flange 37 of the sleeve, which flange is held up against

the spring through the action of the screw-threaded locking nut 42 which bears against the upper end of the adjusting nut. The valve piece and stem are free to be rotated when the spring is thus locked under compression so that the valve seat may be ground by rotating the valve piece thereon with an abradant between them. The casing is shown as provided with an opening adjacent to the valve seat, closed by a screw-threaded plug 46, and through this opening an abradant may be applied to the seat preparatory to grinding the same. After the valve seat has been ground, or after the valve piece has been replaced and the valve assembled in the event of a renewal or repairing of the valve, the locking nut 42 is screwed upwardly away from the adjusting nut, which permits the sleeve 30 to descend, under the action of the spring 39, and transmit the original compressive force of the spring, through the headed stem, to the valve piece and thereby hold the valve piece on its seat. If desired the force of the spring may be to some extent used to press the valve piece against its seat when grinding the seat.

My improvements are equally well adapted to other forms of valve, as for instance the form shown in Fig. 4 in which the valve piece 50 has a soft metal facing ring 51 adapted for engagement with the valve seat. Furthermore the various structural details of the valve may be varied within the spirit and scope of my invention, and the invention is not limited to such details except as hereinafter made the subject of specific claims.

I claim as my invention:

1. In a relief or safety valve, the combination with a valve piece, its seat and a spring for pressing the valve piece against its seat, of locking means for maintaining the seating force of the spring while permitting free separation or relative movement of the valve piece and seat.

2. In a relief or safety valve, the combination with the valve casing provided with a valve seat, a valve piece and a spring for pressing the valve piece against its seat, of means within the casing for locking the spring under higher than its normal compression, arranged to permit separation of the valve piece and seat without losing the compressive force of the spring.

3. In a relief or safety valve, the combination with a valve piece, its seat and a compression spring for pressing the valve against its seat, of means for increasing the compression of the spring to release the valve piece from its seat and for locking the spring under compression.

4. In a relief or safety valve, the combination with a valve piece, its seat and a spring for pressing the valve piece against



its seat, of screw threaded means for easing the spring away from the valve seat and for locking the spring under at least its maximum compression.

5 5. In a relief or safety valve, the combination with a valve piece, its seat, a spring for pressing the valve piece against its seat and adjusting means acting on the spring for varying the seating force of the spring,  
10 of means coöperating with said adjusting means for easing the spring away from the valve seat and for locking the spring under compression.

6. In a relief or safety valve, the combination with a casing provided with a seat, a valve piece engaging the seat, a spring for pressing the valve piece against its seat, and screw-threaded adjusting means carried by the casing for varying the seating force of  
20 the spring, of means coöperating with the adjusting means for easing the spring away from the valve seat, constructed to lock the spring compressed and permit the valve to be disassembled without losing the compressive force of the spring.  
25

7. In a relief or safety valve, the combination with the valve casing provided with a seat, a valve piece, a stem made separate from the valve piece and interlocked thereto, whereby the valve piece may be rotated  
30 by power applied to the stem for grinding the seat, and a spring acting through said stem to press the valve piece against its seat, of means for locking said spring under compression arranged to permit the valve  
35 piece to be eased away from its seat and to be separated therefrom without losing the compressive force of the spring.

8. In a relief or safety valve, the combination with a valve casing provided with a seat, a valve piece, a stem made separate from and bearing against the valve piece, a spring acting, through said stem, to press  
40 the valve piece against its seat, and adjusting means carried by the casing for adjusting the compression of said spring, of means coöperating with said adjusting means for easing said spring away from the valve piece and for holding said spring under  
45 compression.

9. In a relief or safety valve, the combination with a casing provided with a seat, and a valve piece engaging said seat, and provided with a stem, of a sleeve surrounding  
55 the stem and bearing at one end against a shoulder on the stem, a tubular adjusting nut surrounding the stem and having screw-threaded engagement with the casing, a spring interposed between said adjusting  
60 nut and a flange on said sleeve for pressing the valve piece against its seat and a nut having screw-threaded engagement with the

upper end of the sleeve and having rotative engagement with a shoulder on the adjusting nut.

65

10. In a relief or safety valve, the combination with a casing provided with a seat, and a valve piece engaging said seat, and provided with a stem, of a sleeve surrounding the stem and bearing at one end against  
70 a shoulder on the stem, a tubular adjusting nut surrounding the stem and having screw-threaded engagement with the casing, a spring interposed between said adjusting nut and a flange on said sleeve for pressing  
75 the valve piece against its seat, and a nut having screw-threaded engagement with the upper end of the sleeve and having rotative engagement with a shoulder on the adjusting nut, said stem being separable from  
80 the valve piece and arranged to be interlocked thereto so as to rotate the valve piece.

11. In a relief or safety valve, the combination with a casing provided with a seat, and a valve piece engaging said seat, and  
85 provided with a stem, of a sleeve surrounding the stem and bearing at one end against a shoulder on the stem, a tubular adjusting nut surrounding the stem and having screw-threaded engagement with the casing, a  
90 spring interposed between said adjusting nut and a flange on said sleeve for pressing the valve piece against its seat, a nut having screw-threaded engagement with the upper end of the sleeve and having rotative  
95 engagement with a shoulder on the adjusting nut, the casing being provided adjacent to said seat with an opening, and a removable plug for closing said opening.

12. In a relief or safety valve, the combination with a casing provided with a seat,  
100 and a valve piece engaging said seat, and provided with a stem, of a sleeve surrounding the stem, the stem being provided with a conical shoulder and the sleeve being provided at one end with an annular bearing  
105 adapted for rotative engagement with said shoulder, and the sleeve being restricted at its other end to provide a bearing for said stem, a tubular adjusting nut screw-threaded  
110 ed to the casing through which the sleeve extends, a locking nut screw-threaded to the sleeve and having rotative bearing engagement with the adjusting nut and a spring interposed between said adjusting nut and  
115 a flange on said sleeve.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 8th day of November A. D. 1909.

WILLIAM L. OSBORNE.

Witnesses:

WILLIAM L. HALL,  
GEORGE R. WILKINS.