

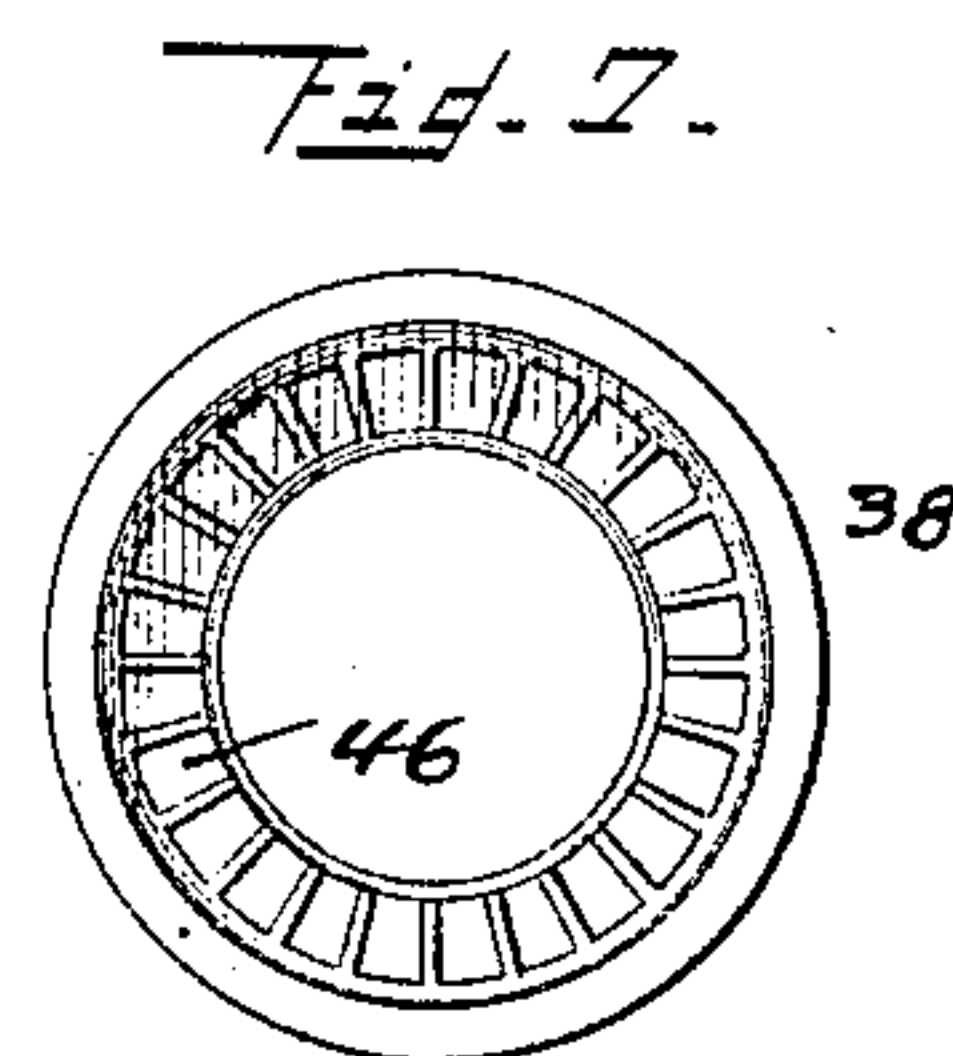
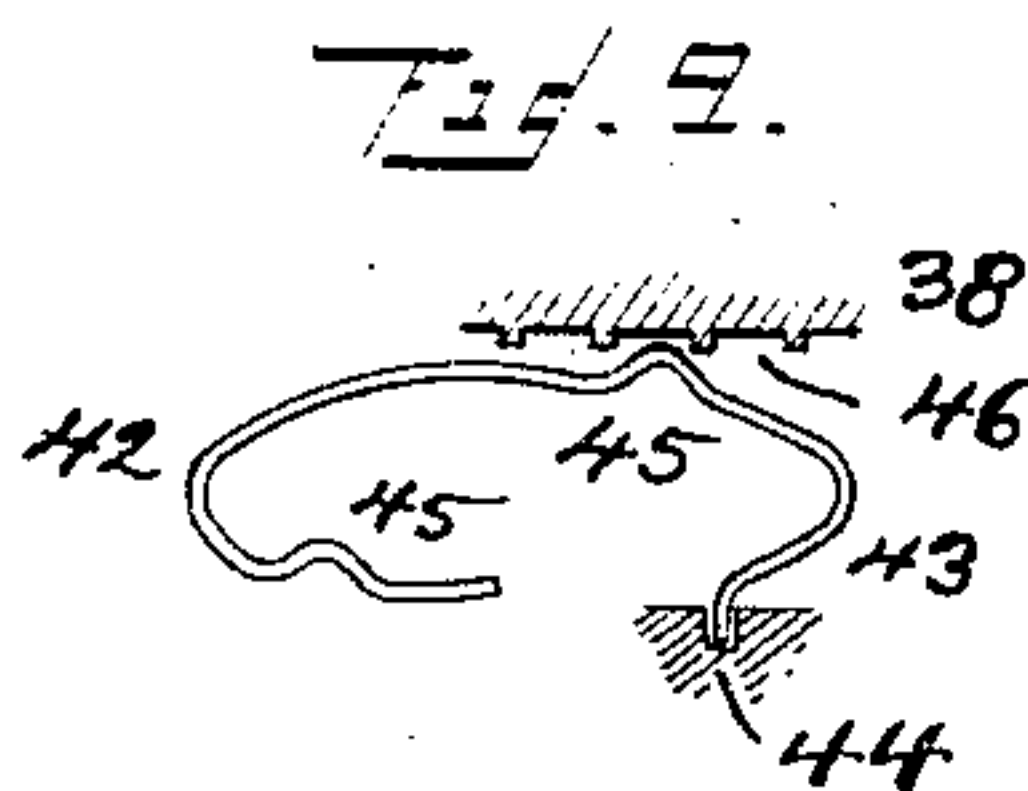
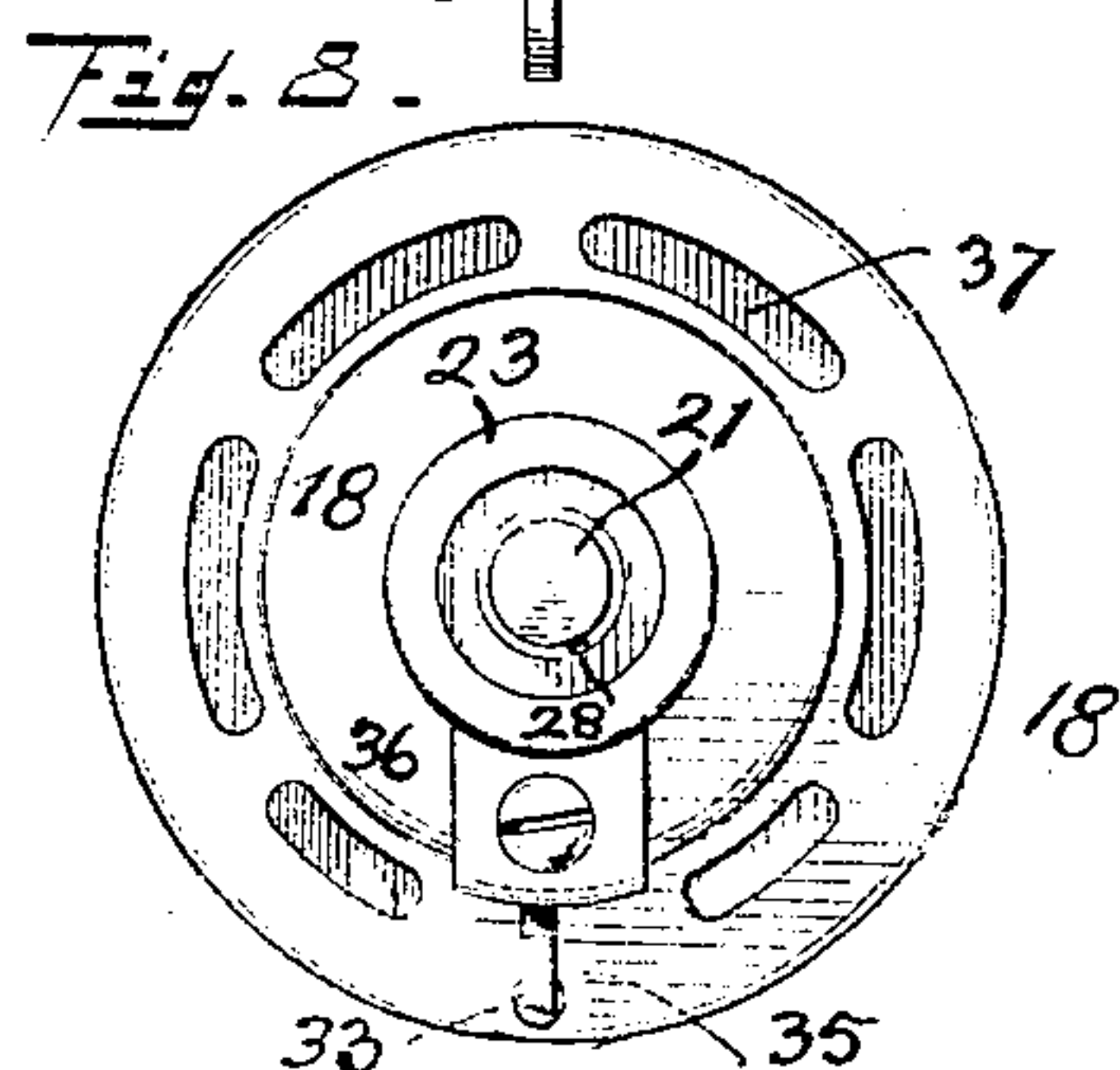
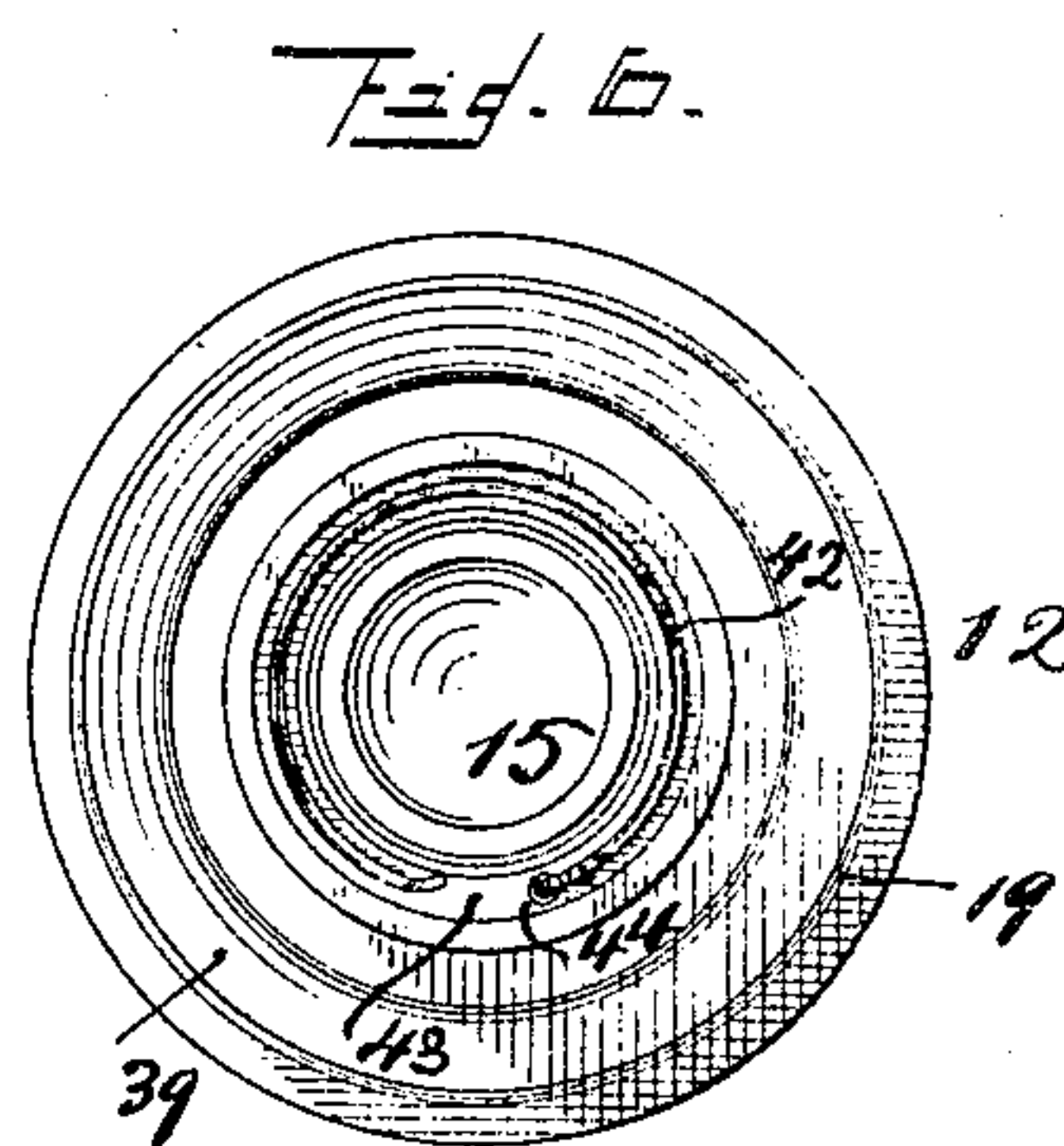
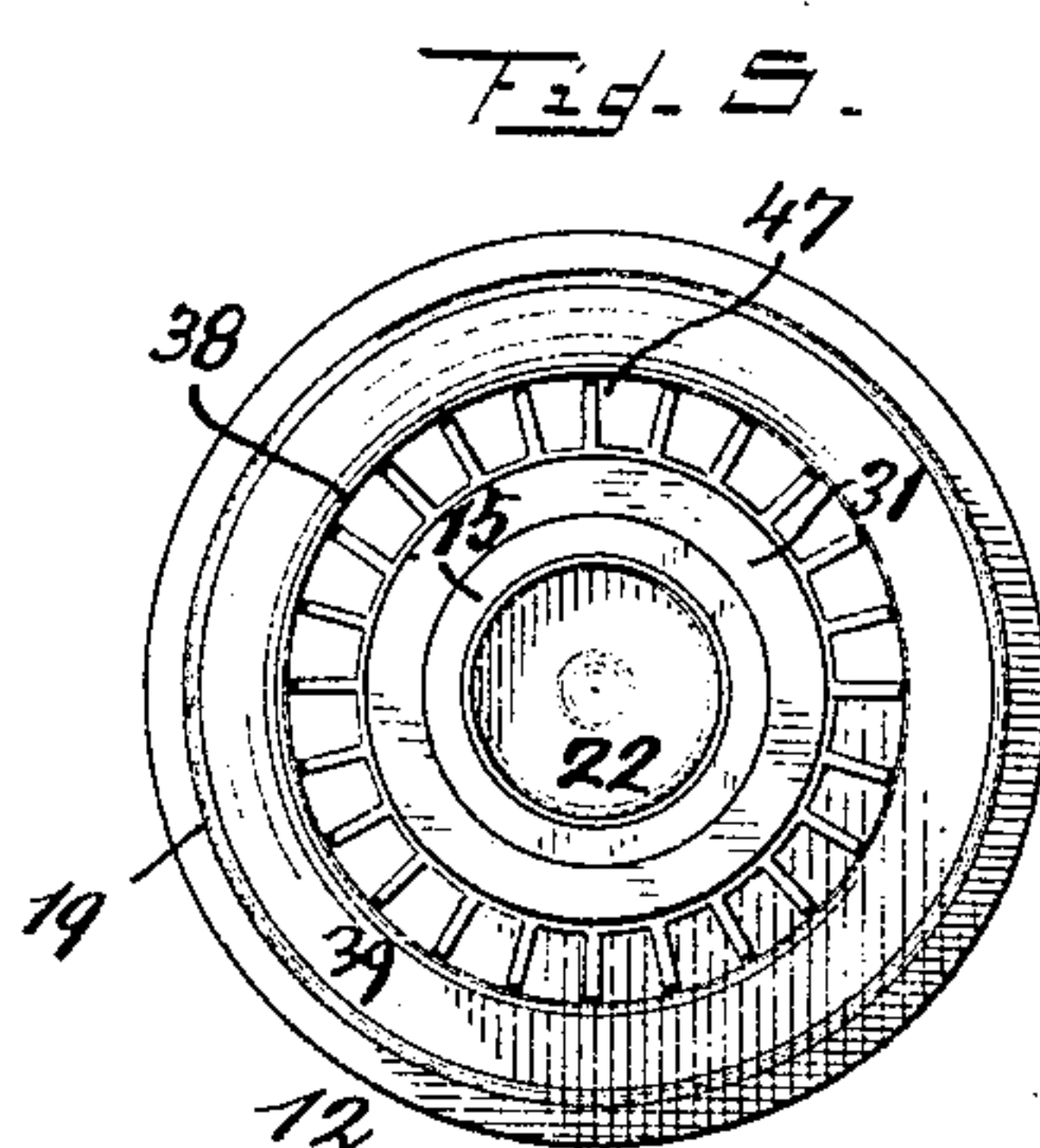
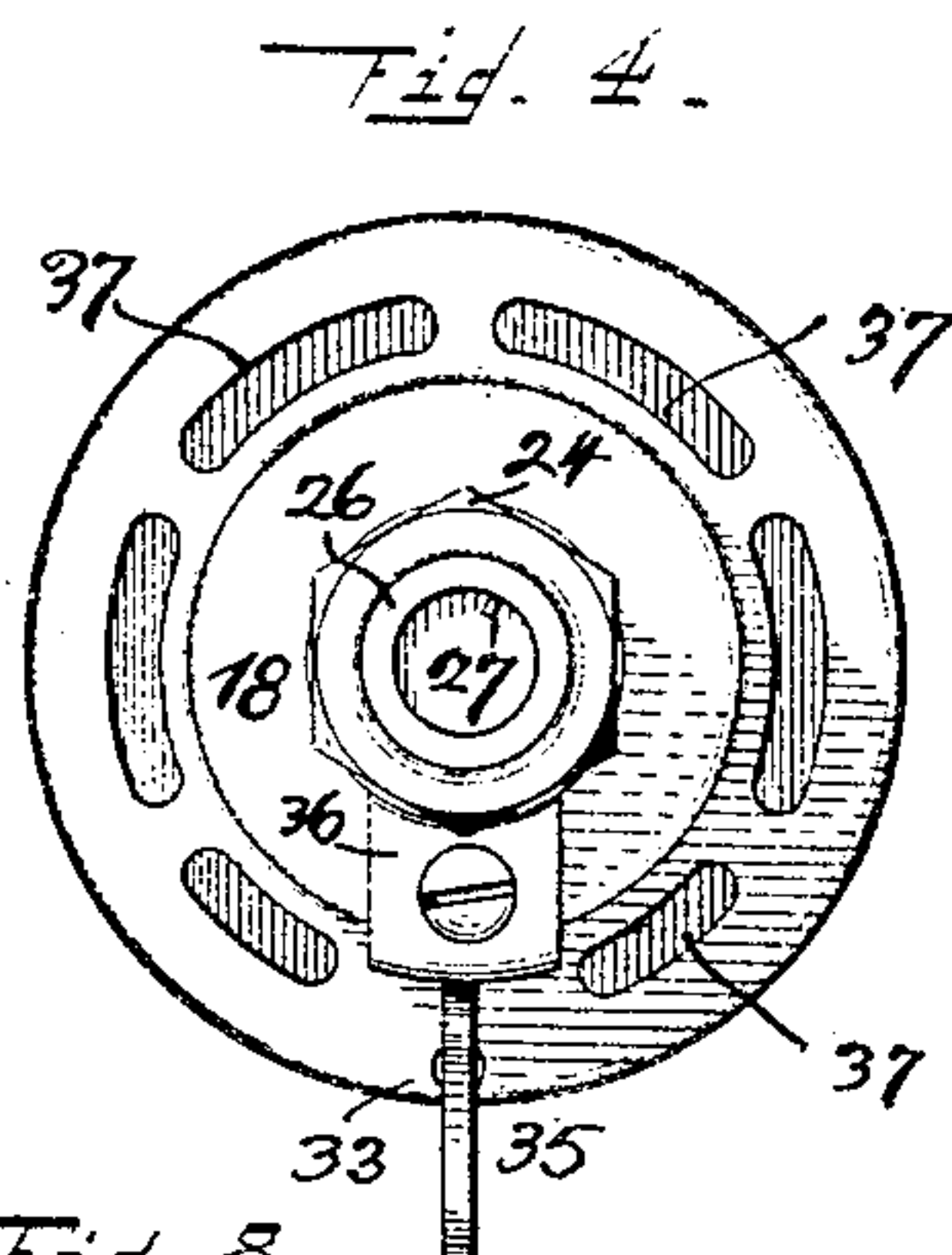
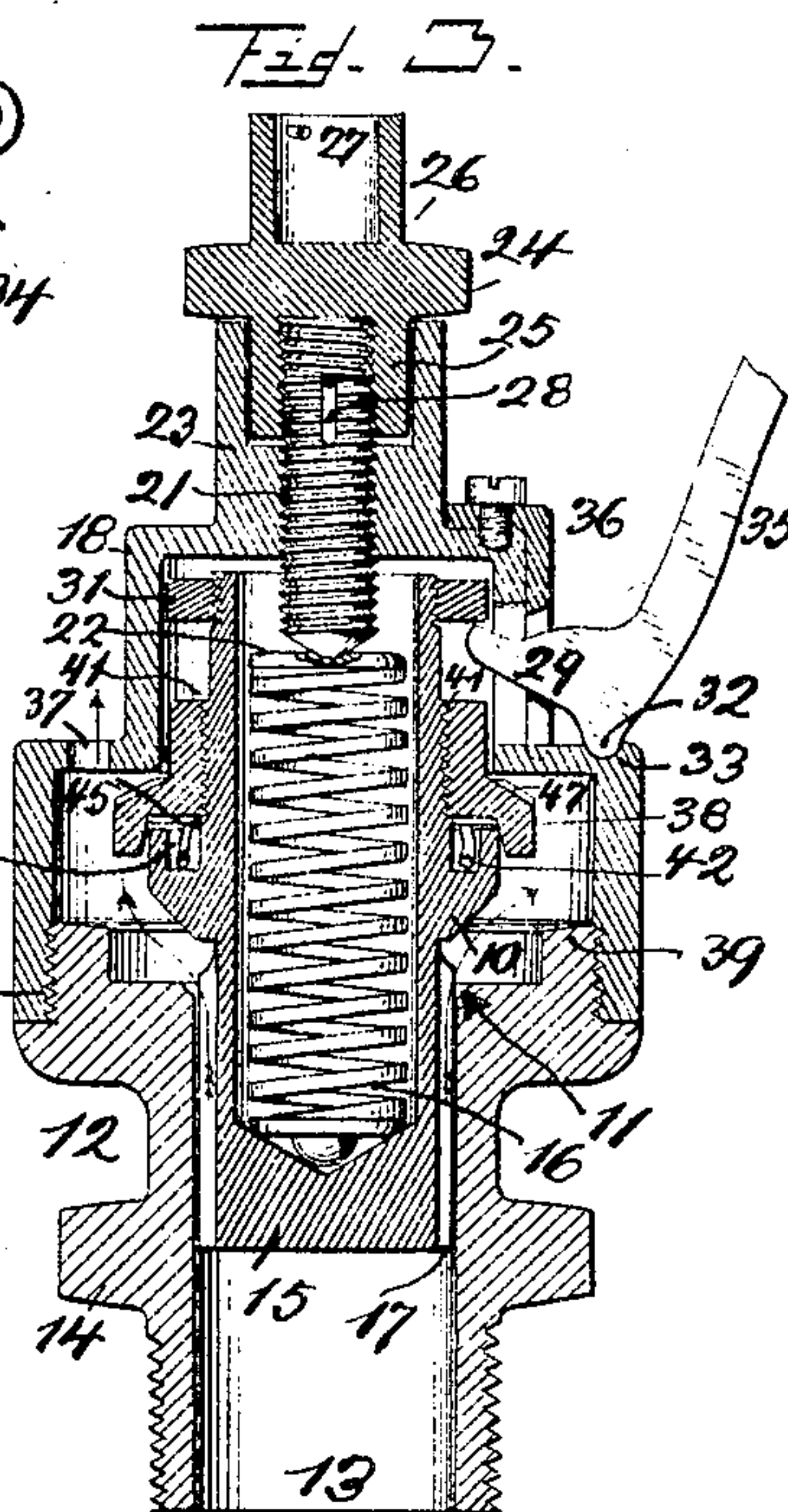
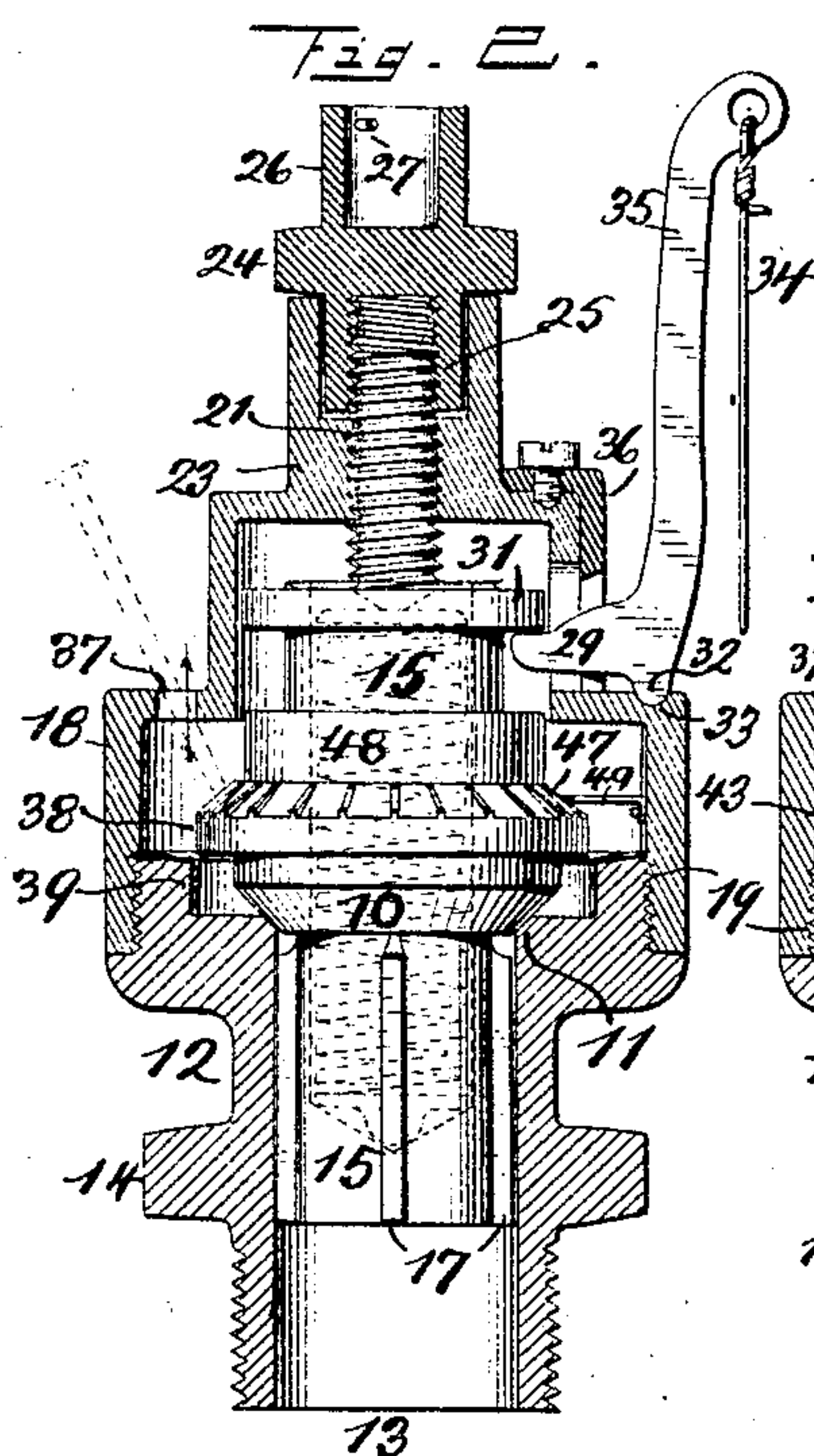
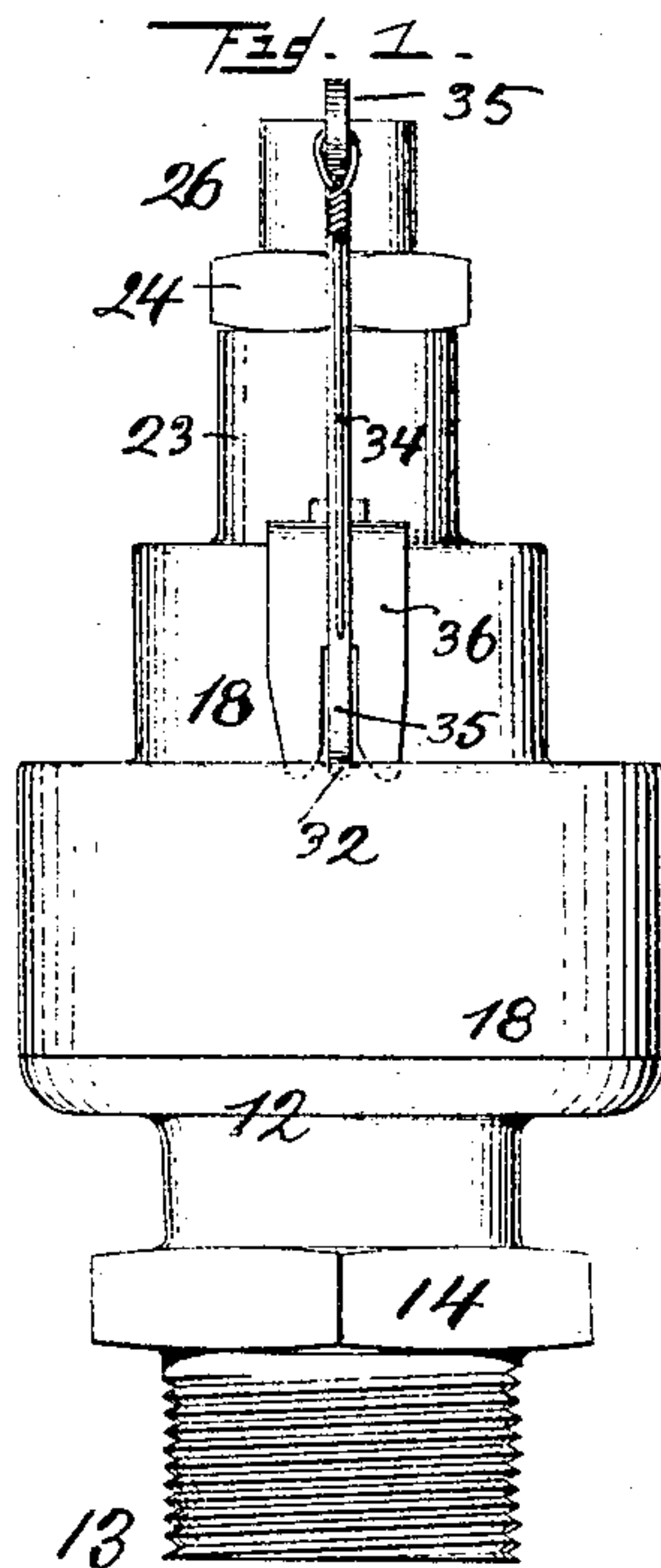
No. 773,589.

PATENTED NOV. 1, 1904.

J. POWELL.
SAFETY VALVE.

APPLICATION FILED FEB. 17, 1904.

NO MODEL.



Witnesses

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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 773,589, dated November 1, 1904.

Application filed February 17, 1904. Serial No. 193,002. (No model.)

To all whom it may concern:

Be it known that I, JAMES POWELL, a citizen of the United States, residing in the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Safety-Valves; and I do declare the following to be a clear, full, and exact description thereof, attention being called to the accompanying drawings, with the reference characters marked thereon, which form also a part of this specification.

This invention relates to safety-valves of the species called also "pop-valves" and in which the action is controlled by a spring.

The invention consists of certain improvements in the construction of such valves, being, first, a reduction of parts, and, further, a concentration of them, so that all the adjustable parts are combined and carried in one member, and all of which results in a simplification of the manufacture, and therefore in a better operation and more convenient manipulation for the purpose of adjusting and setting these valves so that they operate by blowing off at any desired pressure.

In the following specification, and particularly pointed out in the claims following, is found a full description of the invention, together with its manner of use, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 shows my improved safety pop-valve in side elevation. Fig. 2 is a similar view taken at right angles to Fig. 1 with the valve-housing in vertical section and valve normally seated. Fig. 3 is a view similar to the preceding one with the exception that the section is extended to also take in the valve and this latter is raised from its seat. Fig. 4 is a top view of Fig. 1. Fig. 5 is a top view of Fig. 2 with the upper part of the valve-housing removed. Fig. 6 is a top view of Fig. 3 and shows the parts as they appear in Fig. 5, but after the upper valve has also been removed. Fig. 7 shows an under side view of this removed part. Fig. 8 shows Fig. 4 with the lock-nut removed. Fig. 9 is a detail view of the friction-spring for locking the upper

valve, illustrating also diagrammatically the manner of its operation.

This species of safety-valves consists practically of two valves, one being the valve proper and the other being what, as best suited for present purposes, I call the "choke-valve." The first valve is the one which controls the pressure of the steam and is set so as to open at a certain predetermined pressure to permit escape of the excess. Its operation is controlled by a spring, whereby it is normally held to its seat. The other, or choke-valve, is a device which after the first valve is once open serves to hold the same in such open position for a certain length of time, the object being to obtain sufficient relief so as to prevent a too frequent or continuous operation of the valve. But for this provision the safety-valve would almost immediately close, but at once open again, causing a continuous vibration or so-called "popping" of the valve.

In the drawings, 10 is the safety-valve proper fitted to a seat 11, formed inside of the lower part 12 of the valve-housing, at the lower end of which there is a screw-threaded attaching-nipple 13, whereby the device is attached in position on a boiler, for instance, a nut 14 being formed above such nipple to facilitate manipulation for such purpose.

Valve 10 is formed around the outside of a hollow barrel 15, on which it forms an annular projection. This barrel contains the spring 16, whereby said valve is held to its seat. The lower part of this barrel has guide-wings 17 formed on its outside to hold the valve straight during its movements, such wings being fitted into the lower part of the valve-housing. The upper part of this barrel extends into the upper part 18 of the valve-housing, the movement of the valve when opening being into this part. These two parts of the housing are held to each other by a screw connection, as shown at 19, and when separated permit access to the interior and to the valve.

The action of spring 16 to suit a certain steam-pressure is regulated and adjusted by a screw 21, bearing against a washer 22, fit-

ted onto the upper end of this spring and seated in the upper contracted part or neck 23 of valve-housing 18. To prevent disturbance of the adjustment of this screw, I hold the same in its adjusted position by a lock-nut 24, which when screwed home bears against the upper edge of neck 23. This lock-nut has on each of its opposite sides—that is, extending axially up and down—two tubular extensions, each fitted into the upper enlarged bore of neck 23, one, 25, being internally threaded and adapted to engage the upper end of screw 21, thus forming the lock-nut complete. The other tubular extension, 26, is also fitted to receive the upper end of the screw; but it being without threads no screw engagement takes place. It has, however, an internal projection 27, which may engage a groove 28 in said screw, so that this latter may be rotated and moved in or out of its seat in neck 23 for the purpose of regulating and adjusting the pressure by which spring 16 holds safety-valve 10 down to its seat. The lock-nut will thus serve also as an adjusting-key, it being of course first disengaged from screw 21, reversed, and reinserted into neck 23.

In order to test from time to time the efficiency of the valve to be assured of its working condition, there is an angular lifting-lever, the inner branch 29 of which extends into the upper part of the valve-housing through a slot in the side thereof and engages under a flange 31 at the upper end of barrel 15. Its fulcrum is formed by a heel 32, loosely seated in a depression 33 without the use of a pivot-pin. When conditions as to access and position require it, a pull-cord 34 is attached to the end of the outer branch 35 of said lever. A slotted clip 36, screwed to the valve-housing, secures its position. Fig. 3 shows a position when the valve is raised, by means of said lever, for testing purposes, the opening movement being about the same as if the valve were raised by the steam-pressure, except that in this latter case the valve could not be lifted so high. When so opened in either way, the steam escapes through outlets 37.

Above valve 10 there is what I have before called the “choke-valve” 38, it being another annular projection concentric with valve 10, but of larger diameter. It acts in conjunction with the upper inner edge of a ring 39, which might be considered to form the seat for said valve, since the passage of steam takes place between the two, although, strictly considered, this valve is never bodily seated thereon. This ring is obtained by extending the upper end of the lower part of the valve-housing sufficiently above valve-seat 11. This valve being above valve 10 projects by reason of its larger lateral extension into the path of the steam, which escapes after valve 10 has been lifted, thereby retarding and choking

the free passage of steam through the outlets. Furthermore, the area of this valve being larger than the area of valve 10 the latter will be held suspended above its seat a longer interval and permit a more extended relief. Fig. 3 clearly illustrates this condition, although, as before stated, the valve would probably not always and rarely ever lift as high, the lift shown in said figure being the one caused by operation of the lever 35 for testing purposes. Thus, for instance, if valve 10 were set to blow off at one hundred pounds pressure it would by reason of choke-valve 38 not seat again until this pressure were reduced probably five pounds, since this lesser pressure would be enabled to longer hold up the larger valve. By thus reducing the pressure below the limit set by valve 10 the frequent opening of this latter is avoided and a sufficient relief is obtained. The amount by which the pressure is to be reduced at such times—that is, when valve 10 blows off—depends on the position of choke-valve 38 with reference to its seat 39. If closer to it, its function as obstructing free passage will be intensified, and it will raise valve 10 higher and also hold it longer away from its seat, thus allowing more steam to escape. If farther away, a freer passage will take place and the valve closes sooner. Since steam users prefer to regulate this excess of reduction, it is necessary that valve 38 be adjustable in position, for which purpose I connect it to the barrel 15 by means of a screw connection 41, as shown. To preserve this adjustment against accidental disturbance, I provide a friction-spring 42 in an annular recess 43 above valve 10 and held therein with one end in a hole 44. It has one or more abrupt bends 45, which bear into notches 46 on the under side of valve 38, and thus hold this latter in its adjusted position against accidental disturbance or such which the escaping steam might cause. While the pressure of this spring 42 is sufficient for this purpose, it does not prevent rotation of the valve for the purpose of its adjustment. This manipulation may be had without taking the valve-housing apart, a pointed implement (nail) being inserted through one of the outlet-openings 37 (see dotted lines in Fig. 2) and pushed in the desired direction against one of a number of ribs 47 on the upper side of valve 38. Instead of having these locking-notches 46 on the under side of valve 38 such notches may be on its outside, or the spaces between these ribs 47 may be used in place, or notches may be provided in the straight part 48 above them, operating in conjunction with a spring 49, attached in a fixed position inside of the valve-housing.

As shown, valve 38 projects down over the upper edge of valve 10, so as to close recess 43, thereby protecting the spring therein and

preventing also entrance of substances causing accumulation. By having outlets 37 in a position lower than the upper open end of barrel 15 the same protection is afforded to this latter and to spring 16 therein.

Having described my invention, I claim as new—

1. In a safety-valve, the combination of a valve-housing, a valve-seat formed therein, a valve fitted to it, a hollow barrel on which it forms an annular projection midway of the ends thereof, a spring in this latter whereby the valve is normally held to its seat, an additional or choke valve of larger size adjustably attached to the barrel by means of a screw connection and provided with notches, a complementary member or seat for it and a frictional locking-spring adapted to engage the notches mentioned to hold the valve in its adjusted position.

2. In a safety-valve, the combination of a spring-barrel, an annular valve formed around the outside of the same and projecting from between the ends thereof, an annular recess in the upper part of this valve, a choke-valve adjustably secured around said spring-barrel and above the valve first mentioned over which it projects so as to close the recess therein, a friction-spring secured in this latter, notches on the under side of the choke-valve adapted to be engaged by this friction-spring, seats for the valves, a spring in the barrel mentioned to hold the valves in normal position and a valve-housing which contains all these parts.

3. In a safety-valve, the combination of a spring-barrel, an annular valve formed around the outside of the same and projecting from between the ends thereof, a choke-valve adjustably secured around this spring-barrel and above the valve first mentioned, ribs 47 on the upper side of this choke-valve, a two-part valve-housing the lower part of it receiving the spring-barrel below the valves thereon, the upper part receiving the other part of the spring-barrel, steam-outlet openings in the upper part of the valve-housing and above

the choke-valve so that ribs 47 become accessible through these outlets, seats for the valves in the lower part of the valve-housing and a spring in the barrel to hold this latter in normal position.

4. In a safety-valve, the combination of a spring-barrel, two annular valves formed around the outside thereof and projecting from between the ends of the same, seats for these valves, a spring in the barrel to hold the valves normally to their seats, a valve-housing which contains all these parts, an angle-lever seated in a depression in the valve-housing, which depression forms its pivotal support, a flange at the upper end of the spring-barrel which one end of this lever is adapted to engage for the purpose of lifting the valves and a clip to hold this lever in position.

5. In a safety-valve, the combination of a spring-barrel around which the valve is formed, a seat for it, a valve-housing in which this seat is formed and which incloses the valve, a spring in the spring-barrel, an adjusting-screw adapted to engage the upper end of this spring to regulate the pressure by which the same holds the valve to its seat, a neck formed in the upper part of the valve-housing in which this screw is seated and the bore of which neck is enlarged above such screw-seat, a lock-nut having two cylindrical extensions projecting axially from opposite sides thereof, each adapted to enter the enlarged part of the neck, one of these extensions being tapped to engage the upper end of the adjusting-screw, a longitudinal groove in the side of this latter at such upper end and an internal projection in the other cylindrical extension of the lock-nut and adapted to engage said groove when this nut is reversed.

In testimony whereof I hereunto set my signature in the presence of two witnesses.

JAMES POWELL.

Witnesses:

C. SPENGEL,
W. W. REED.