

No. 772,134.

PATENTED OCT. 11, 1904.

J. H. DERBY.
DRY PIPE VALVE.

APPLICATION FILED DEC. 27, 1899.

NO MODEL.

2 SHEETS—SHEET 1.

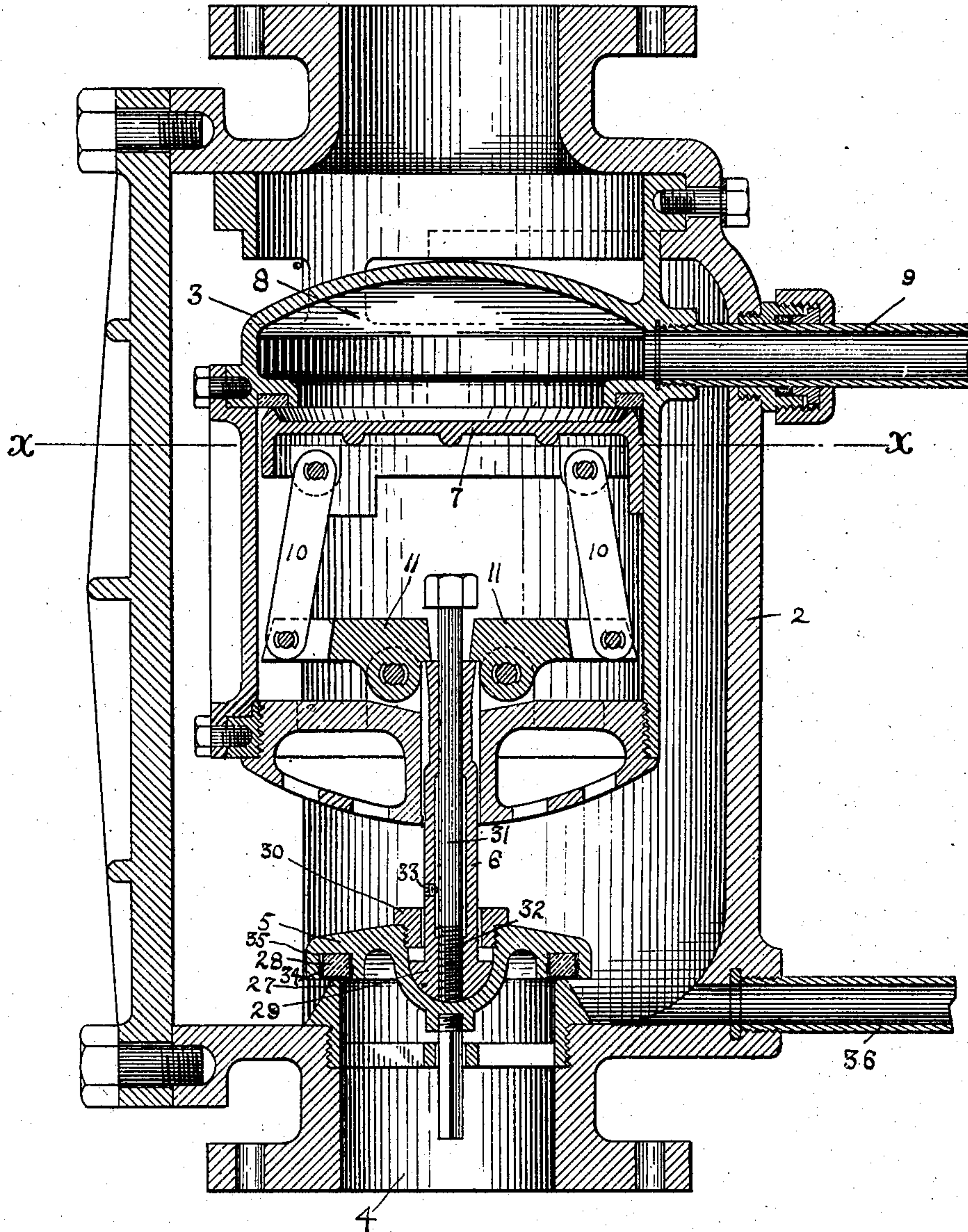


Fig. 1.

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2 SHEETS—SHEET 2.

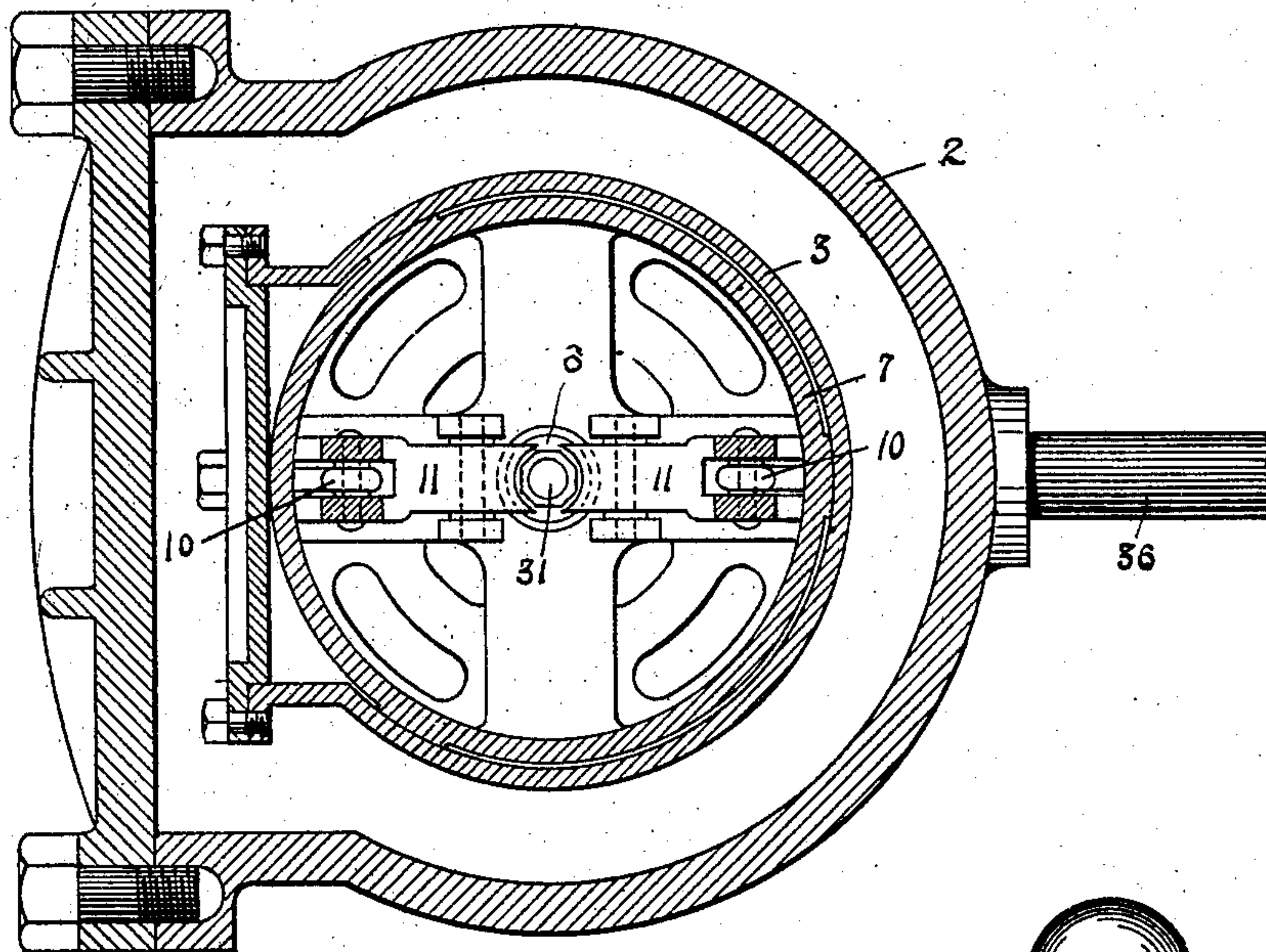


FIG. 2.

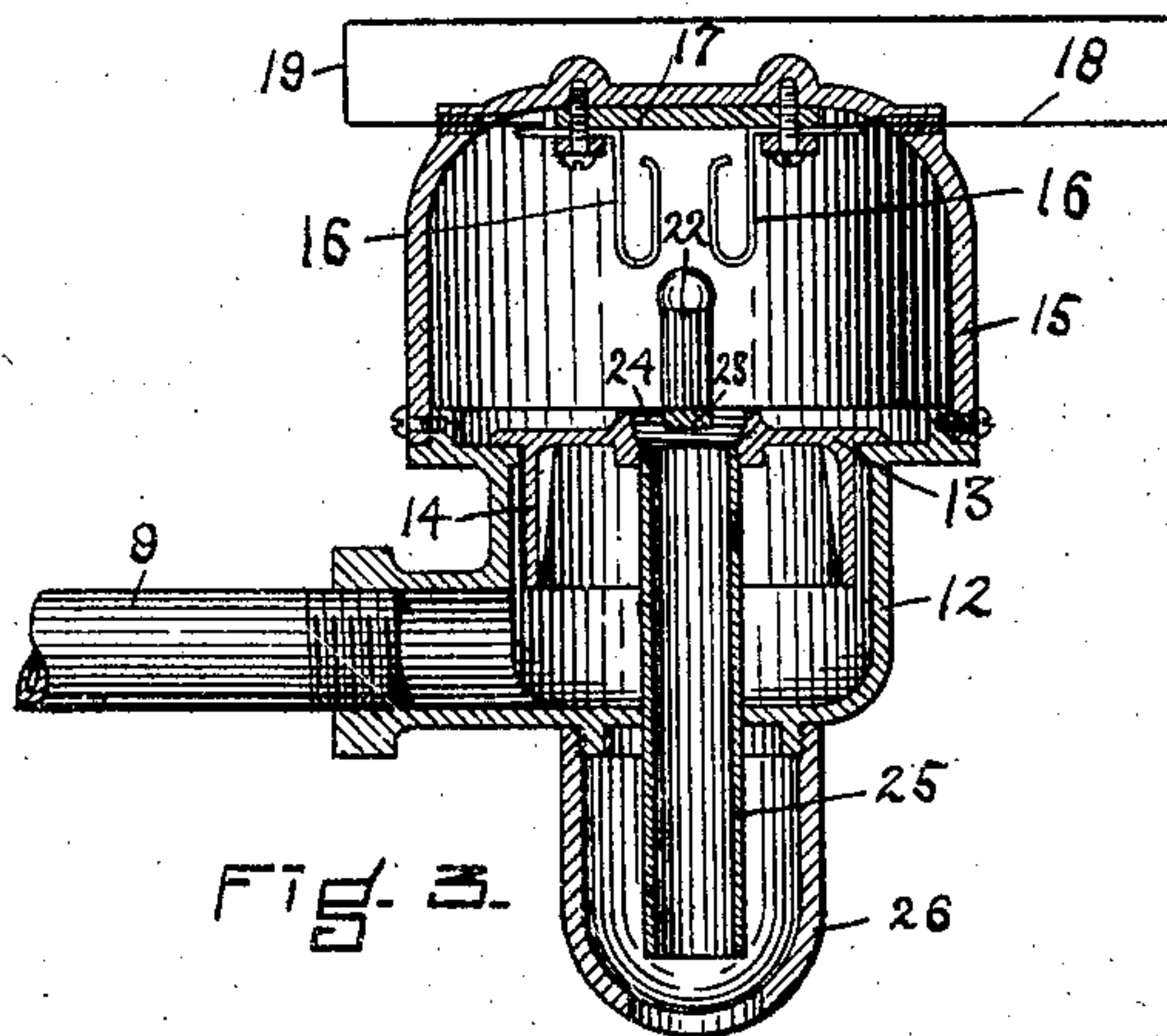


FIG. 3.

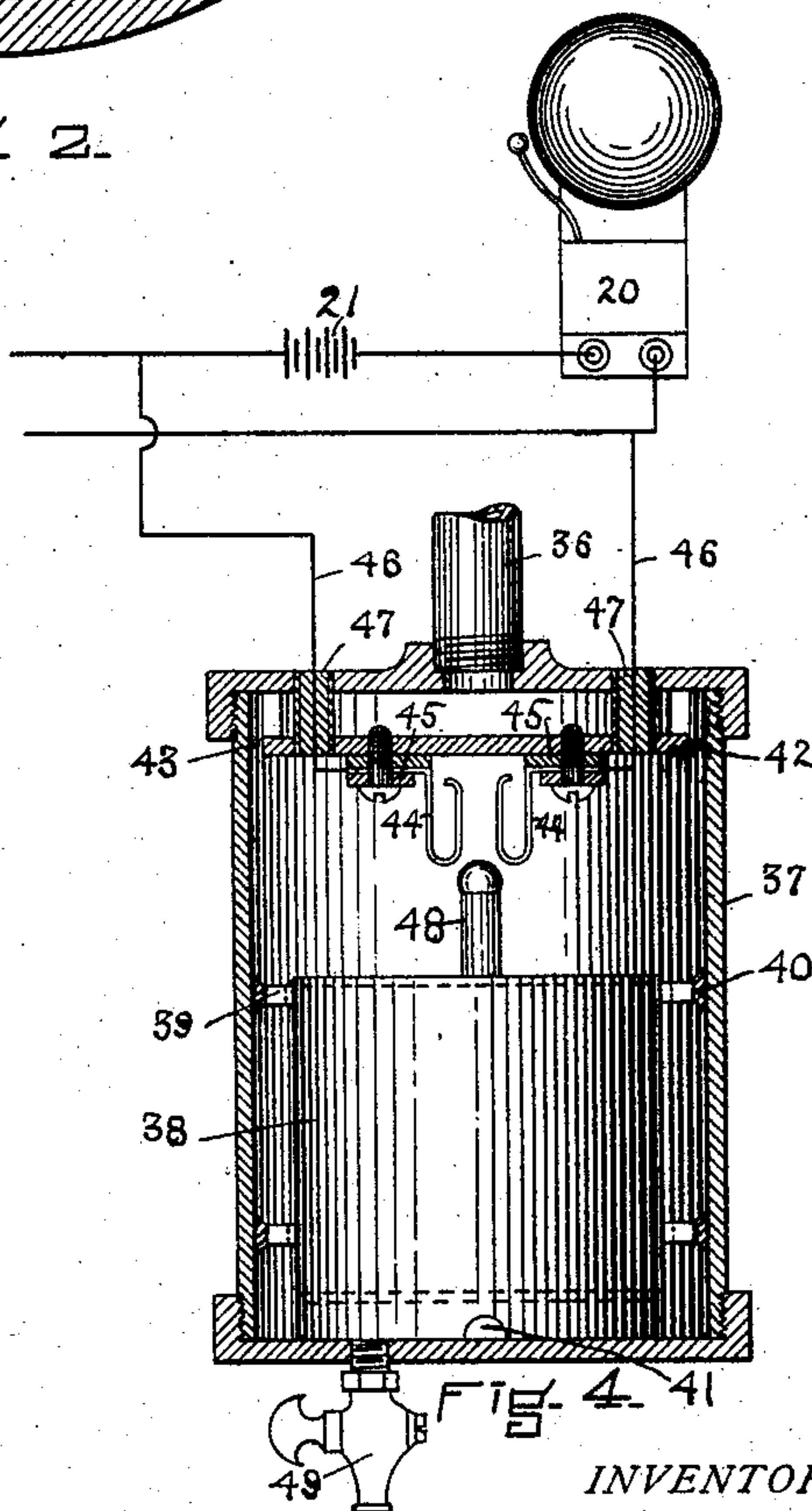


FIG. 4.

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DRY-PIPE VALVE.

SPECIFICATION forming part of Letters Patent No. 772,134, dated October 11, 1904.

Application filed December 27, 1899. Serial No. 741,714. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. DERBY, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Dry-Pipe Valves, of which the following is a specification.

My invention relates to dry-pipe valves for automatic fire-extinguishing systems, and may be described as an improvement upon the valve shown and described in Letters Patent of the United States No. 625,748, granted May 30, 1899, in respect to the means whereby said valve is caused to give an alarm when it opens. Valves of the class referred to are commonly so constructed that when opened, as by the occurrence of a fire, they will simultaneously give an alarm, and it is usually desirable that an alarm shall also be given by a predetermined amount of leakage past the valve proper or main valve. In the valve shown and described in the Letters Patent above referred to the air-pressure within the sprinkling-pipe system is exerted directly upon the valve proper, and hence any alarm mechanism which is to be operated by leakage past said valve must be so constructed that it will not be operated nor otherwise affected by said air-pressure; and my present invention is intended to provide, among other improvements, alarm mechanisms which will be effective under the above conditions.

A preferred form of my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section through the valve-casing and contained parts. Fig. 2 is a cross-section on the line $x-x$ in Fig. 1. Fig. 3 is a central vertical section of an alarm mechanism which is operated only when the valve opens, as in the case of fire; and Fig. 4 is a central vertical section through an alarm mechanism which operates when the valve opens and also when a predetermined amount of leakage past said valve has occurred.

The main features of the valve proper and the connected mechanism through which its operation is secured are shown and described in the aforesaid Letters Patent, and hence

need not be set forth at length herein. Briefly stated, they comprise an outer casing 2 and an inner casing 3, the latter casing being suspended within the former in such manner as to provide a passage between the two for the water to flow through when the valve is open. The water-inlet 4 is normally closed by a valve proper, 5, which is provided with a stem 6, extending upward into the inner casing. A plate 7, contained within said inner casing, forms one wall of a chamber 8 and is normally closed against a suitable seat, thereby cutting off all communication between the sprinkling-pipe system and said chamber, which is preferably subjected to the normal atmospheric pressure by means of a pipe 9, extending outward through the valve-casings. The air-pressure in the sprinkling-pipe system acts on the bottom of said plate 7 to hold it against its seat, and thereby through links 10 to hold the free ends of levers 11 against the top of the valve-stem 6, thus locking the valve to its seat against the water-pressure. In operation the escape of the compressed air from the sprinkling-pipe system causes the operative pressure on the plate 7 to be diminished until the water-pressure on the valve 5 is sufficient to force said valve open, whereupon it may be automatically locked open by means fully set forth in said Letters Patent.

It will be evident that by the opening of the valve 5 in the manner above described the plate 7 will be drawn away from its seat, thereby permitting some of the compressed air from the sprinkling-pipe system to escape around the edge of said plate into the chamber 8 and out through the pipe 9, and that since said plate is immediately forced back upon its seat by the water entering the casing below it said escaping air will emerge as a quick puff. It is this explosive puff of air which I employ for operating my main alarm mechanism, which, as shown in Fig. 3, comprises a casing 12, secured to the outer end of the pipe 9 and provided with a loosely-fitting cover 13, guided to move vertically by suitable means, such as a downwardly-projecting flange 14. Said casing is further pro-

vided with a cap 15, which carries two depending metallic contact-pieces 16 16, separately clamped to an insulating-block 17. Wires 18 and 19 are led from said contacts, respectively, through insulating-bushings to an electric bell 20 or similar device, a battery 21 being included in the circuit. The cover 13 carries a headed metallic pin 22, which is preferably attached to a narrow strip 23, screwed into a threaded perforation 24 in said cover, and extends upwardly directly beneath the contacts 16, being normally at a short distance therefrom. Preferably a pipe 25 is screwed at its upper end into the perforation 24 and passes loosely through a hole in the bottom of the casing 12, its projecting end being covered by a cap 26, detachably secured to said casing and perforated below the end of said pipe 25.

In operation the puff of air escaping through the pipe 9 into the casing 12, as above described, acts to force upward the loose cover 13, and thereby carry the pin 22 between the contacts 16 16, whereby an electric circuit through the bell 20 is completed and an alarm given. The contacts 16 16 when bent into the shape shown in Fig. 3 will act as springs to hold the pin 22 in the position of contact, from which it may be released by unscrewing the cap 26 and drawing the cover 13 downward by means of the pipe 25, which also serves to drain off any water which may reach the top of the cover 13 after the opening of the valve 5 and before the plate 7 has closed the chamber 8, and thus cut off the escape of water at that point. Any water which may reach the casing 12 below the cover 13 will escape through the hole through which the pipe 25 passes.

In view of the fact that the operation of the alarm mechanism above described is effected by the escape of air from the chamber 8 it is important that the connections between the valve 5 and the plate 7 shall be capable of accurate adjustment, so that said valve and plate may simultaneously make accurate contacts with their respective seats, and thus prevent the escape of any air past the plate 7 under normal conditions. I have therefore devised certain improvements in the construction of said valve 5 and in the adjusting mechanism therefor whereby these parts are better adapted for use in connection with my alarm mechanism to insure its proper operation and to provide against the giving of false alarms. To this end the seat of the valve 5 is tapered upwardly to a narrow rounded edge 27, adapted to bear against a rubber ring 28, confined in a groove formed in the valve 5, thus providing a yielding contact between said valve and its seat. The valve-stem 6 is made hollow and is provided at its lower end with a head 29, rounded to conform to a cup-shaped depression formed in the valve 5, so that the stem 6 can exert a downward pressure only on said

valve 5 and will have no tendency to tilt it or otherwise to impair its contact with its seat. Complete separation of the stem 6 and the valve 5 is prevented by means such as a collar 30, surrounding said stem above its headed end and screwed into the top of the valve 5, as shown. A bolt 31 passes through the stem 6, said parts being screw-threaded at any convenient point 32, so that by turning said bolt its lower end may be made to project beyond the lower end of the stem 6 and bear against the valve 5, whereby said stem may be adjusted accurately to make such contact with the levers 11 as is necessary to insure the simultaneous closure of the valve 5 and plate 7. A set-screw 33 may be used to lock the bolt 31 against accidental changes of adjustment. Since rubber and metal tend to adhere to each other after they have been in contact for some time, I prefer to interpose between the ring 28 and the edge 27 a strip or sheet 34 of very thin metallic copper of such softness and flexibility that it will not interfere with the compressibility of the ring 28. The edges of the strip 34 are turned upward and confined between the rubber ring 28 and the walls of the groove in which it is secured, and the upper part of said groove is preferably enlarged laterally, as at 35, to provide room for the lateral expansion of the ring 28 when compressed on its bottom face.

In order to cause an alarm to be given by a predetermined amount of leakage past the valve 5, I provide an attachment which is distinct from the alarm mechanism hereinbefore described, but coöperates with it when said valve 5 opens, and which, as shown in Fig. 4, is connected to the outer end of a pipe 36, leading from the outer casing 2. Said attachment comprises a vertical casing 37, preferably cylindrical in form, into the top of which the pipe 36 leads, so that said pipe and casing form, in effect, an extension of the casing 2 and are subject to the air-pressure therein. The casing 37 contains a suitable float, such as a closed cylindrical drum 38, of somewhat less diameter than the casing and guided to move vertically therein, preferably by means of two sets of three-point contact-guides 39, each secured to or made integral with a horizontal ring 40, attached to the inside of said casing 37. The sides of the float 38 should extend a short distance below its closed bottom and be provided with apertures 41, whereby water flowing into the casing 37 will flow freely around and beneath said float. A horizontal baffle-plate 42 is preferably hung below the top of the casing 37, leaving a space 43 at the edge of said plate, whereby water entering the casing will be deflected to its circumference and prevented from coming in contact with two metallic contacts 44 44, which are hung from the bottom of the baffle-plate and are electrically insulated therefrom and from each other by being separately clamped between

blocks 45 of suitable insulating material. These contacts 44 may be of the same form as the contacts 16 used in the air-alarm mechanism, and the wires 46, connected to said contacts 44, respectively, are led out of the casing 37 through two air-tight insulating-bushings 47 and may then be joined in parallel with the similar wires leading from the contacts 16, thus operating the same bell 20. A headed metallic pin 48 is secured to the top of the float 38 and whenever said float rises sufficiently is carried between the contacts 44, and thus completes an electric circuit through the bell 20. It will be apparent that although the casing 37 is normally filled with air under a considerable pressure yet such pressure will have no effect on the alarm mechanism contained in said casing. If, however, any leakage or by reason of the opening of the valve 5, it will at once flow through the pipe 36 into the casing 37, and when a sufficient quantity has collected in said casing it will raise the float 38, establish an electric circuit through the contacts 44, and cause the bell 20 to ring.

A cock 49 is provided in the bottom of the casing 37, through which water may be drained from said casing, thus allowing the float 38 to fall by its own weight and break the circuit through the contacts 44. It is an important feature of this device that said casing 37 may be drained at any time without disturbing the conditions existing in the valve-casing 2, because when the cock 49 is open no air can escape through it until the water in the casing 37 has first been forced out by the air-pressure above it, when the cock may be instantly closed. Thus said casing may be drained to stop a leakage-alarm without danger of causing the valve 5 to open.

It is desirable and customary so to construct dry-pipe valves that by opening or at practically the same instant they will cause an alarm to be given by two distinct means, to the end that if one of said means fails to operate an alarm will nevertheless be given by the other. My present invention satisfies this requirement and also provides for the giving of a leakage-alarm without requiring any additional apparatus for the purpose.

So far as I am aware, I am the first to provide a dry-pipe valve with an alarm mechanism adapted to be operated by compressed air admitted thereto from the sprinkling-pipe system upon the opening of the main valve whether or not in conjunction with a supplementary or leakage-alarm attachment, and hence I do not consider my invention to be limited to the precise constructions herein shown and described.

I claim as my invention—

1. In a dry-pipe valve, the combination with an alarm mechanism adapted to be operated by compressed air, of a valve-casing containing

a valve proper which is normally held closed by the air-pressure in the sprinkling-pipe system, normally closed pipe connections between said valve-casing and the alarm mechanism, and means operated by the opening of the valve proper for simultaneously opening said pipe connections.

2. In a dry-pipe valve, the combination of a valve-casing containing a valve proper and a chamber, a plate normally closing said chamber and thereby cutting off all communication between it and the sprinkling-pipe system, connecting mechanism between said plate and valve proper, an alarm mechanism adapted to be operated by compressed air, and pipe connections between said chamber and alarm mechanism.

3. In a dry-pipe valve, the combination of a valve proper, a casing provided with a movable plate or cover adapted to be operated by compressed air, means carried by said plate or cover for completing an electric circuit through an alarm, and means operative with said valve proper for admitting compressed air to said casing.

4. In a dry-pipe valve, the combination of a valve proper having a compressible ring adapted to bear against the valve-seat, a stem bearing loosely against the top of said valve proper and adapted to be engaged by valve-operating mechanism, and a bolt contained within said stem and adjustable with respect thereto, for the purpose set forth.

5. In a dry-pipe valve, the combination of a valve-casing in communication with the sprinkling-pipe system, a chamber contained within said casing and normally closed by a plate, a valve proper having a yielding engagement with its seat, connecting mechanism between said plate and valve proper, a casing connected with said chamber and provided with a loosely-fitting cover, and means carried by said cover for completing an electric circuit through an alarm.

6. In a dry-pipe valve, the combination of a valve proper and a seat therefor, one of said parts being provided with an annular groove of progressively-increasing width from its top to its bottom and containing a ring of compressible material, and a thin, flexible sheet of soft metal covering the outer face of said ring and forming a seating-surface, the edges of said sheet being turned inward at the sides of said ring and held between the same and the walls of the groove at its narrowest part, substantially as described.

7. In a dry-pipe valve, the combination with a valve-casing and a valve proper contained therein, of a supplementary casing connected at its top with the sprinkling-pipe system above the valve proper and containing a float, a baffle-plate suspended below the opening at the top of said casing, two insulated contacts secured to the bottom of said baffle-plate and forming part of an electric circuit through an

alarm, and a pin carried by said float and adapted to be moved thereby between said contacts, for the purpose set forth.

8. In a dry-pipe valve, the combination with
5 a valve proper, of two insulated contacts each bent over upon itself to form a spring end, as shown, and adapted to be connected with an electric alarm-circuit, a movable member carrying a headed metallic pin of sufficient
10 length to enable said head to be thrust be-

tween and beyond said spring ends, and means operative with said valve for admitting a fluid-supply to act upon said movable member.

In testimony whereof I have hereunto subscribed my name this 26th day of December, 15
1899.

JOHN H. DERBY.

Witnesses:

E. D. CHADWICK,
E. B. TOMLINSON.