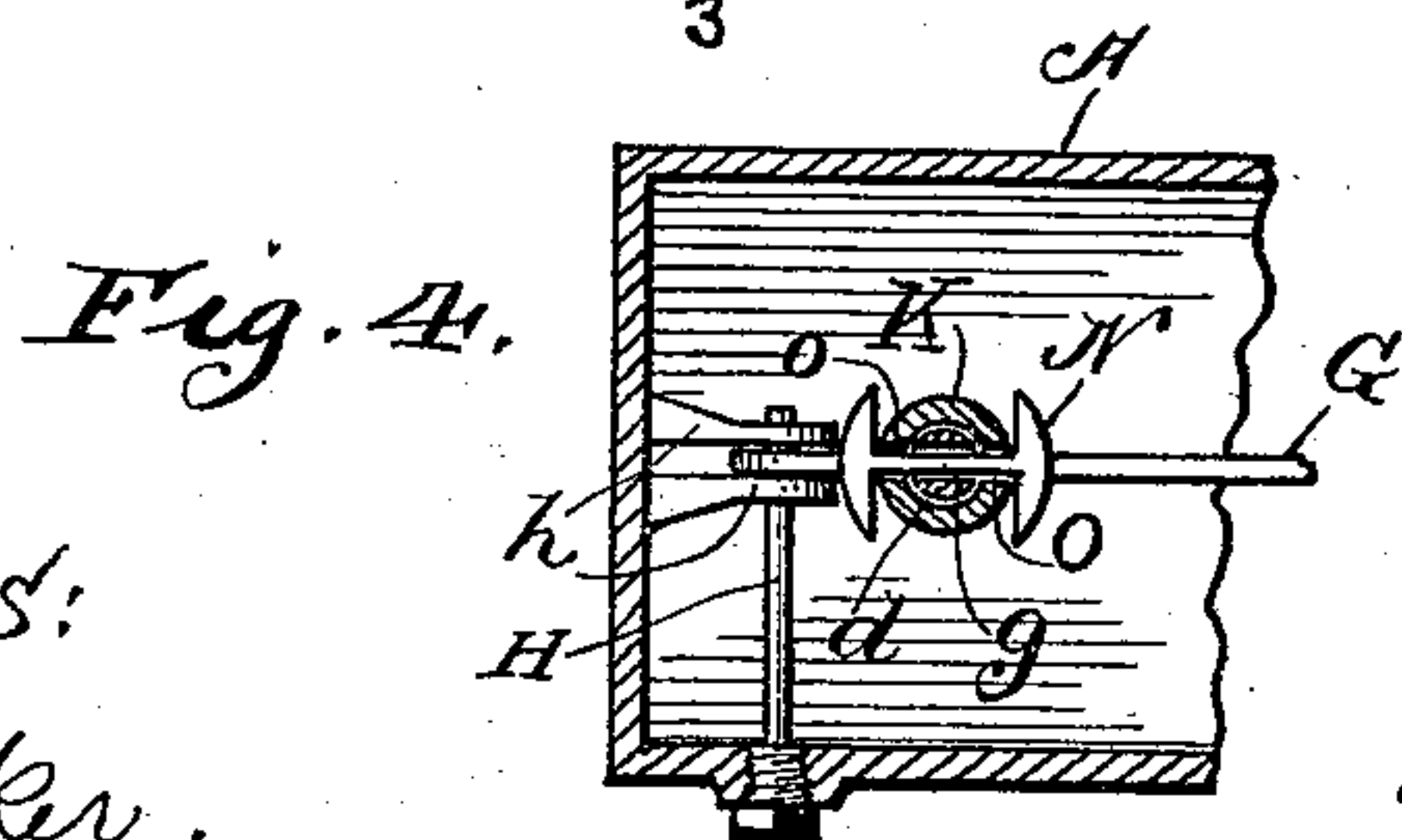
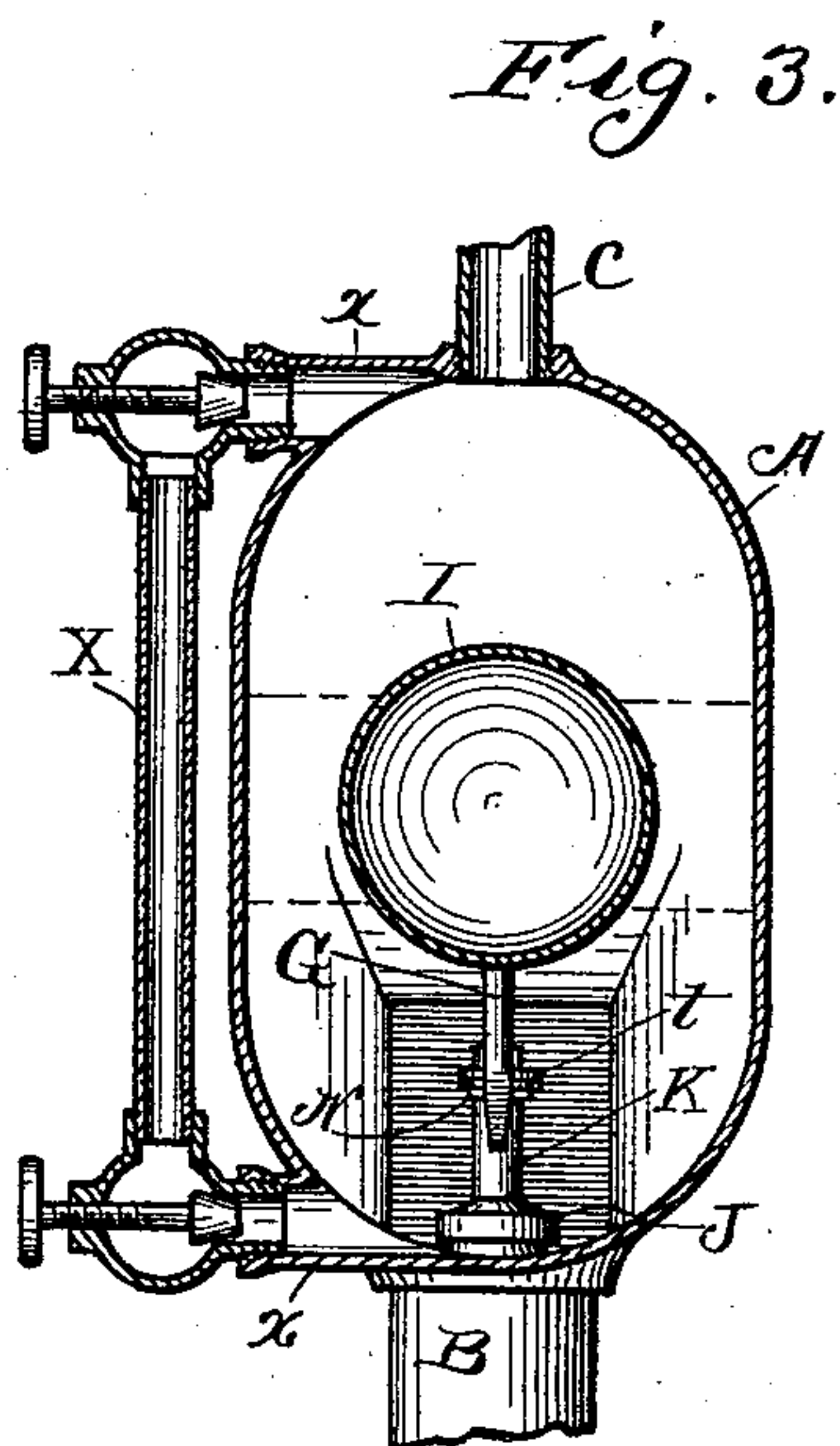
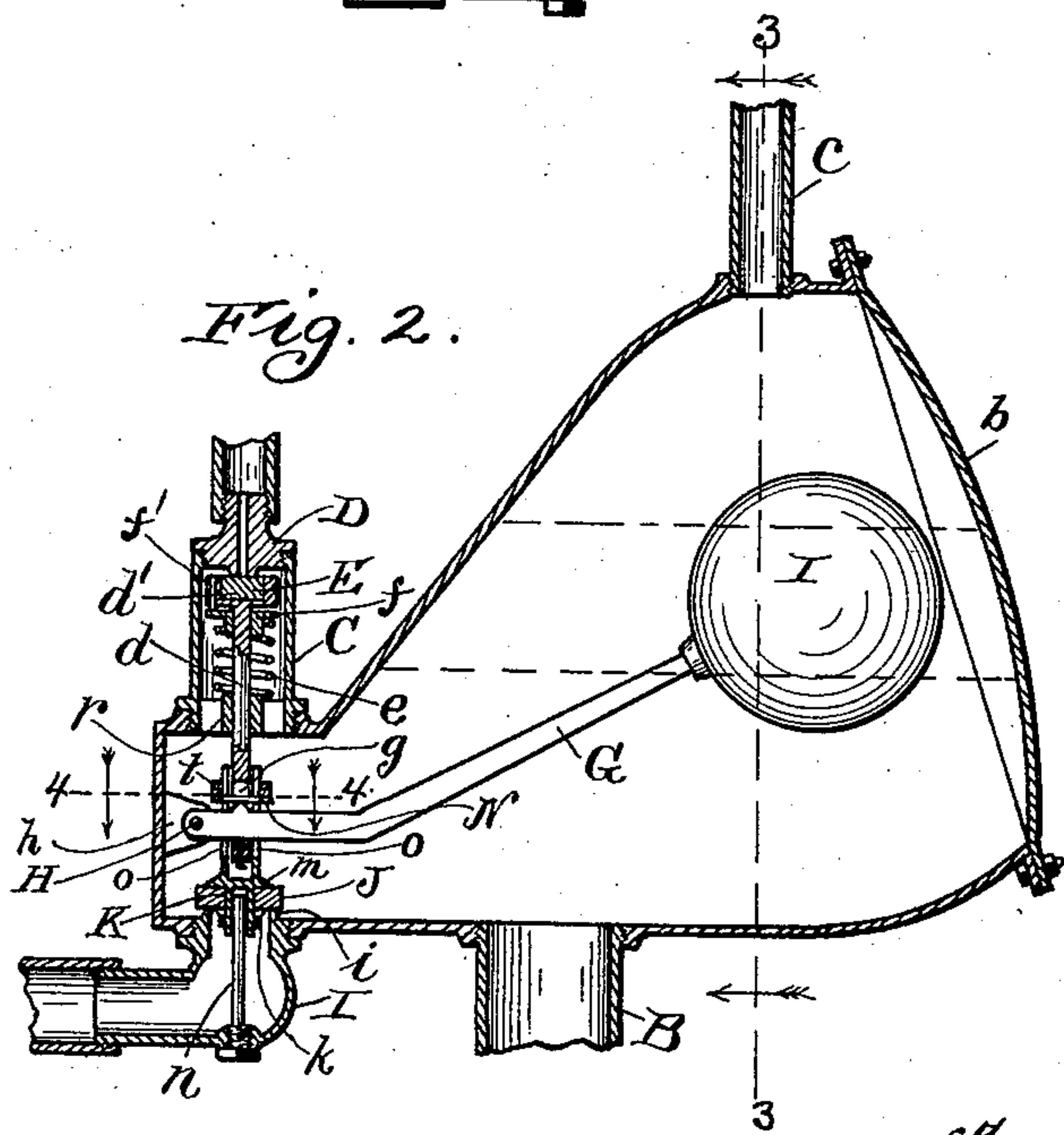
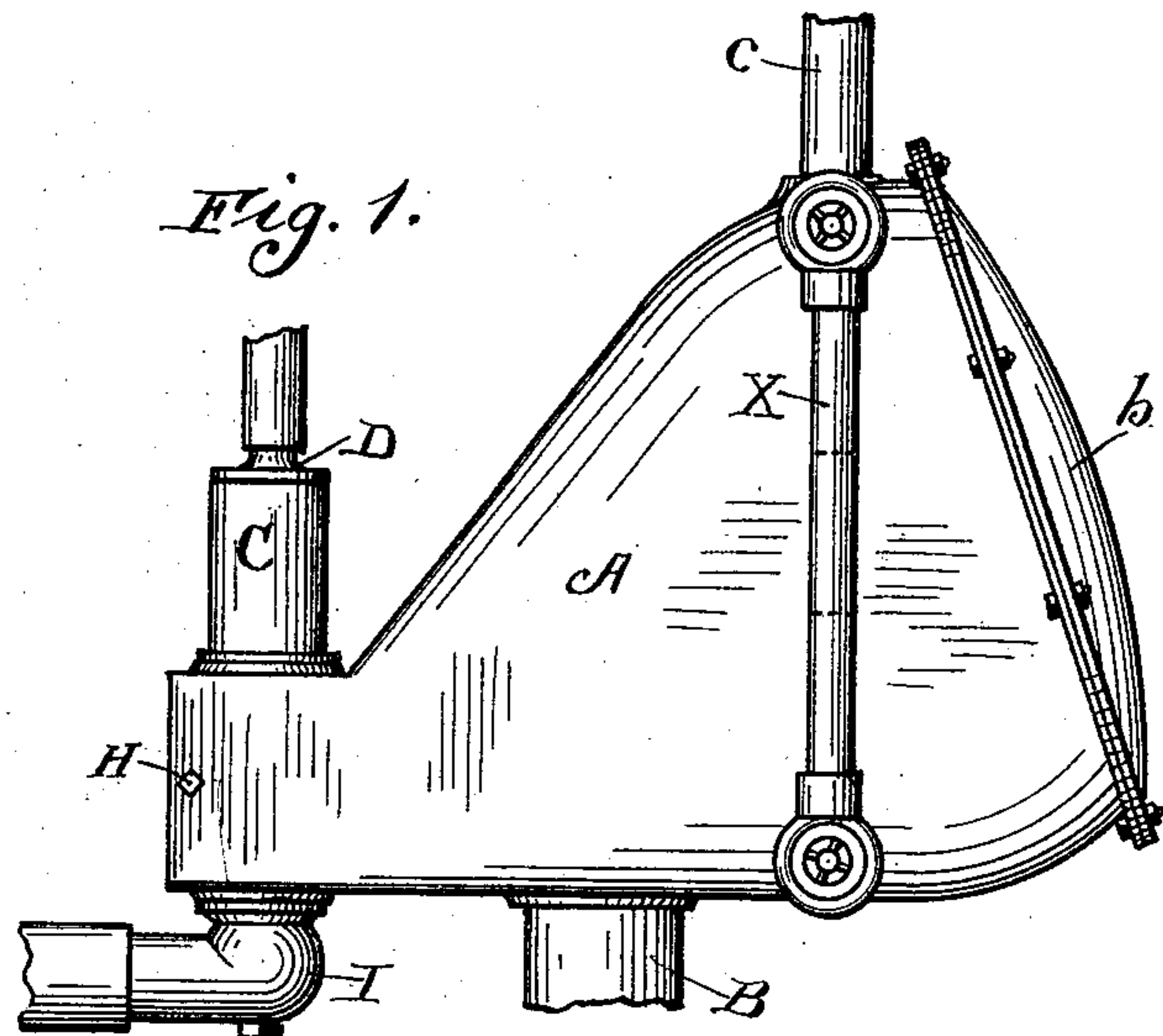


(No Model.)

E. W. LONG.
AUTOMATIC WATER REGULATOR.

No. 543,034.

Patented July 23, 1895.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

EBEN W. LONG, OF CHICAGO, ILLINOIS.

AUTOMATIC WATER-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 543,034, dated July 23, 1895.

Application filed April 8, 1895. Serial No. 544,946. (No model.)

To all whom it may concern:

Be it known that I, EBEN W. LONG, 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 Automatic Water-Regulators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The object of my invention is to provide a simple but most effective automatic water-regulator for low-pressure boilers, receiving-tanks, feed-water heaters, and wherever water-regulation is required.

My invention consists of a suitable tank, a spring-controlled supply-valve capable of adjustment to suit different pressures and conditions, a safety-valve to guard against flooding the system or boiler or tank, as the case may be, with which said regulator is used, and the usual float and lever so connected as to operate both the supply and safety valves, substantially as hereinafter fully described, and as illustrated in the drawings, in which—

Figure 1 is a perspective view of my invention. Fig. 2 is a vertical central section through the tank and regulator. Fig. 3 is a vertical section taken on a plane at a right angle to that shown in Fig. 2 on dotted lines 3 3, Fig. 2; and Fig. 4 is a horizontal transverse section taken on dotted line 4 4, Fig. 2, showing the fulcrum-pin of the float-lever.

In the drawings, A represents a suitable tank, which is sort of pear-shaped, the small end being rectangular in cross-section and having its under side on the same horizontal plane as the under side of the tank, and having its side walls, as distinguished from its end wall, formed by a continuation of the side walls of the body of the tank. The body of the tank is preferably somewhat elliptical in cross-section, as shown in Fig. 3, and its end is cast open and is normally closed by a cover *b*, which can be removed when access is desired. In the uppermost portion or top of the tank is an equalizing-pipe *c*, leading from the pressure-chamber of the system, to which the regulator is applied, whether air or steam, and in the bottom of the tank a pipe B, leading to the water-reservoir or source from which the water is distributed for use. On

one side of this tank, preferably on a vertical plane intersecting its greatest axis, are two stubs *x x*, located one above the other, for the connections of a suitable water-gage X, which may be located on either side of the tank, or if desired may be dispensed with altogether.

In the top and in the bottom of the small end of tank A, in vertical alignment to each other, are two screw-threaded openings. Screwed into the upper opening is a short cylinder C, in the lower end of which is a central guide-boss *r*, supported by radiating arms, between which and the sides of said cylinder the water can freely pass, and in the upper female screw-threaded portion of this cylinder is a head D, having a central opening therethrough. The upper end of this head is connected to the inlet-pipe of my improved regulator, and the marginal edges of the lower end of its central opening are preferably projected downward, so as to form a valve-seat for the valve E. This valve consists of the cup-shaped upper end of a vertical spindle *d*, which extends down through the guide-boss *r*, as shown, and in the bowl of this cup-shaped upper end of the spindle I place a suitably-shaped block of vulcanized rubber *d'* or other suitable packing material, which normally presses up against said valve-seat. This upward pressure of the valve E is created by the coil-spring *e*, surrounding said spindle between the under shoulders of the cup-shaped valve E thereof and said boss *r*. If desired, the pressure of this spring may be regulated by putting a collar *f* on said spindle immediately under said valve, up against which the upper end of said spring presses, and then having a set-screw *f'* screwed down through said valve, as shown, and bearing upon said collar in such manner as to depress the spring *e* to obtain the pressure thereof desired.

The lower end of spindle *d* is slotted or provided with a vertically-elongated opening *g* therein, through which the horizontally-disposed adjacent portion of the float-lever G passes. This float-lever G is fulcrumed at its rear end, between suitable lugs *h*, projecting forward from the rear vertical wall of the small end of the tank, by the fulcrum-pin H, which is extended laterally to and through the side wall of the tank and has its head por-

tion screw-threaded, so as to screw into the tapped opening in said tank. While this construction of the fulcrum-pin H is not absolutely necessary, I prefer it because of its ease of manufacture. The lever G extends horizontally forward from its fulcrum through the elongated opening in spindle *d* and a short distance forward from the same is bent obliquely upward and has the spherical float I on its end.

Screwed up through the lower end of the spindle *d* is a gage-screw, which is of sufficient length to enter the opening *g* and bears against the under side of the float-lever G. Now when the water in the tank falls below a given level the lever moves downward and depresses spindle *d* and opens the valve E and permits the water to flow from the inlet-pipe into the tank. Should the water in the tank accidentally rise above the safety-level, by reason of the water in the system being under an abnormal pressure, or otherwise, the tank is provided with means to automatically permit the escape of water therefrom until the water in the system equalizes itself and returns to its normal condition. I therefore screw into the opening in the floor or lower wall of the small end of tank A a pipe, or, preferably, a pipe-elbow I, which drains into the sewer or other suitable out-take. The edges of the mouth of this elbow I, entering the tank, are provided with an annular beveled flange, so as to provide a valve-seat *i*, which is normally closed by the valve J. Valve J consists of a suitable ring or washer of vulcanized rubber or other suitable insulated material, which surrounds the lower narrower end of a sleeve K, said sleeve having a circumferential flange *m* immediately above the valve J, whereby said valve J is rigidly held to said sleeve K by means of a suitable washer, and nut *k* screwed into the lower screw-threaded end of said sleeve, as shown. The upper portion of said sleeve above the valve is greater in diameter than the lower portion, as hereinbefore intimated, and the sleeve is provided with a diaphragm on the same horizontal plane as the flange *m*, so as to prevent leakage therethrough. In order to aid in guiding the reciprocal movement of valve J, I extend centrally up through the bend of said elbow a post *n*, the upper end of which enters the bore of the lower end of the sleeve, as shown. This post may be dispensed with, if desired, however, and other means employed for this purpose. The bore of the upper part of sleeve K above the valve is of sufficient diameter for the lower end of the spindle (which is concentric thereto) to the same, and its upper end is provided with longitudinally-extending slots *o o*, stuck diametrically through the same, which extends from its upper end to a point on a plane with the limit of the lower movement of the lever G, which latter passes through said slots. Above said lever is screw-threaded, and screwed thereon are nuts *t*, which keeps in place the

I-shaped or double T-shaped block N. The connecting web of this block passes through the slots *o* of the sleeve and the elongated opening in the spindle, and when the lever G moves upward above the normal it bears against this block and lifts the sleeve and valve J. The water-pressure within the tank is sufficient to keep this valve J on its seat and close the drain, except when the float is above the safety water-level, whereupon the valve is lifted and the water escapes from the tank until the normal condition of the water in the system is re-established.

There are details of construction in connection with my invention which I have not heretofore referred to, which can be changed. These I desire to be understood as comprehending as coming within the spirit and scope of my invention.

What I claim as new is—

1. The combination with a tank having an inlet, an outlet drain in the bottom of said tank opposite said inlet, and a distributing pipe, of a valve normally closing said inlet, having a vertical spindle depending therefrom, and a valve closing said drain having a sleeve projecting upward into the bore of which the lower portion of said spindle extends, and a float-lever and float, said float-lever extending through elongated opening and slots in said valve spindle and sleeve and opening the drain valve when moving upward, and opening the inlet valve when moving downward.

2. The combination with a suitable tank having an inlet, an outlet drain in the bottom of the same opposite said inlet, and a distributing outlet, of a valve normally closing said inlet having a vertical spindle depending therefrom that has a longitudinally elongated opening, a valve for closing said drain and a sleeve arising therefrom into which said spindle extends and having longitudinal slots therein, an adjustable block connected to said sleeve and extending through said slots and through the elongated opening in said spindle, a float, a float-lever passing through said elongated opening in said spindle and the slots of the sleeve, as set forth.

3. The combination with a suitable tank having an inlet therein, an outlet in the bottom thereof opposite said inlet and a distributing outlet, of a valve normally closing said inlet having a vertical spindle depending therefrom which is provided with a longitudinally elongated opening in the lower portion thereof, a valve for closing said drain which has a sleeve having longitudinal slots therein into the bore of which said spindle extends and having a portion of said sleeve depending below said valve, a post arranged below said valve and projecting into the depending portion of said sleeve, a float and float-lever, said float-lever extending through the slots and elongated opening of said sleeve and spindle, as set forth.

4. The combination with a tank having an

inlet, an outlet drain in the bottom of the tank opposite said inlet, and a distributing pipe, of a valve normally closing said inlet having a vertical spindle depending there-
 5 from, having an elongated opening in its lower portion, a spring for keeping said valve normally closed, and a valve closing said drain having a sleeve projecting upward into the bore of which the lower portion of said
 10 spindle extends, and a float lever and float, said float-lever extending through elongated openings and slots in said valve spindle and sleeve and opening the drain valve when moving upward, and opening the inlet valve
 15 when moving downward.

5. The combination with a tank having an inlet, an outlet drain in the bottom of the tank opposite said inlet, and a distributing pipe, of a valve normally closing said inlet
 20 having a vertical spindle depending therefrom having an elongated opening in its lower portion, a spring for keeping said valve normally closed, devices for regulating the pressure of said spring, and a valve closing said
 25 drain having a sleeve projecting upward into the bore of which the lower portion of said spindle extends, and a float-lever and float, said float-lever extending through elongated openings, and slots in said valve spindle and
 30 sleeve and opening the drain valve when moving upward, and opening the inlet valve when moving downward.

6. The combination with a tank having an inlet, an outlet drain in the bottom of the
 35 tank opposite said inlet, and a distributing pipe, of a valve normally closing said inlet

having a vertical spindle depending therefrom having an elongated opening in the lower portion, a spring for keeping said valve normally closed, devices for regulating the pressure of said spring, a valve for closing said
 40 drain and a sleeve arising therefrom into which said spindle extends and having longitudinal slots therein, an adjustable block connected to said sleeve and extending
 45 through said slots and through the elongated opening in said spindle, a float, a float-lever passing through said elongated opening in said spindle and the slots of the sleeve, as set forth.
 50

7. The combination with a suitable tank having an inlet, an outlet drain in the bottom of the same opposite said inlet, and a distributing outlet, of a valve normally closing
 55 said inlet having a vertical spindle depending therefrom that has a longitudinally elongated opening, a valve for closing said drain and a sleeve arising therefrom into which said spindle extends and having longitudinal slots therein, an adjustable block
 60 connected to said sleeve and extending through said slots and through the elongated opening in said spindle, a float, a float-lever passing through said elongated opening in said spindle and the slots of the sleeve, and
 65 a fulcrum-pin extending from the end of said tank and the end of the lever pivoted between said lugs, as set forth.

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Witnesses:

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