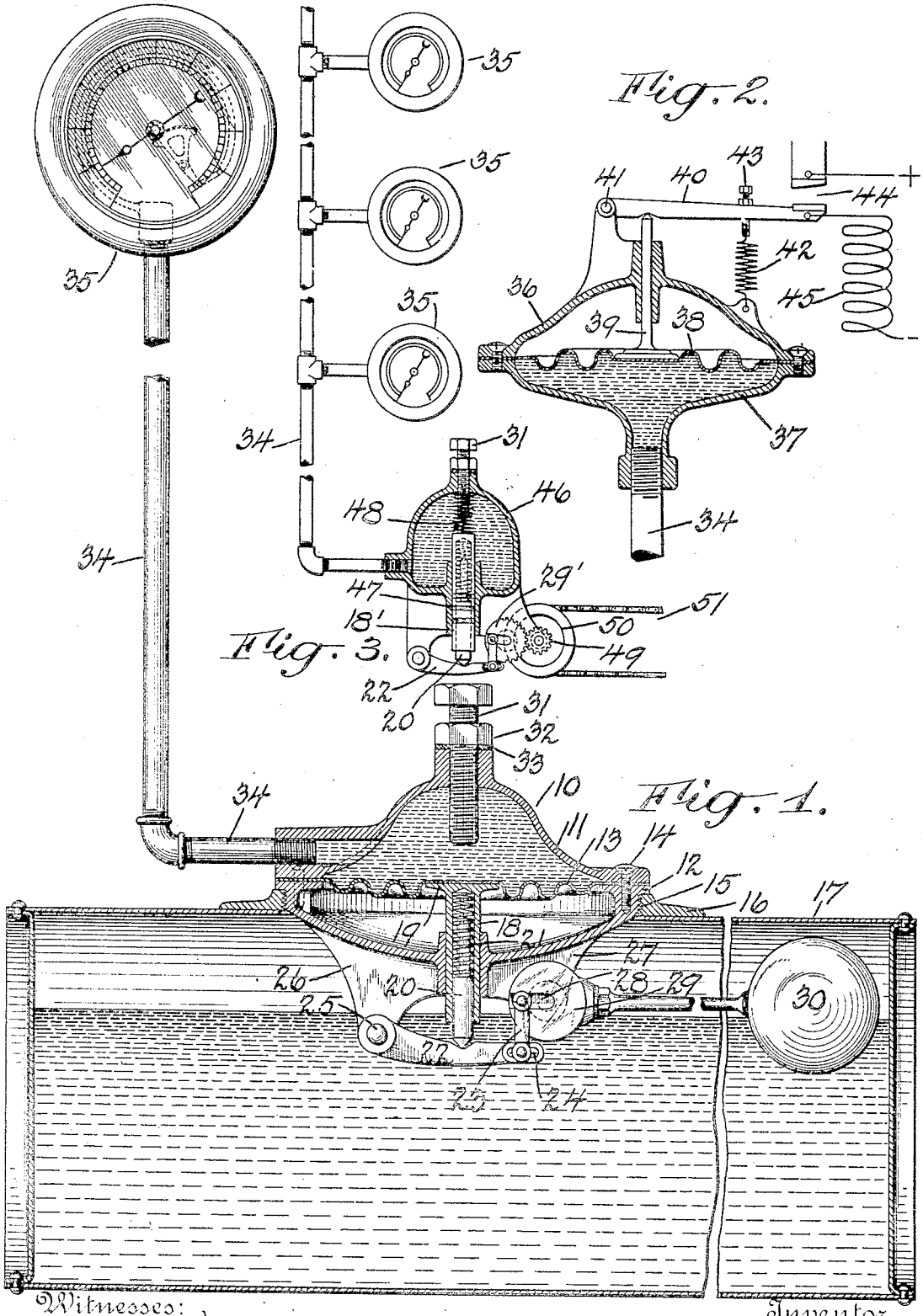
A. SUNDH.

INDICATOR.

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INDICATOR.

1,159,609. Specification of Letters Patent. Patented Nov. 9, 1915.

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To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States, residing at Hastings-upon-Hudson, in the county of Westchester and State of New York, have invented a new and useful Improvement in Indicators, of which the following is a specification.

My invention relates to indicators arranged to be operated by means of fluid pressure, and one of its objects is the provision of a device for operating an indicator at a distance, such, for example, as a tank indicator.

Another object of the invention is to provide an indicating mechanism that is simple in construction, strong, durable, comparatively inexpensive to manufacture, highly efficient in its operation, and adapted to a wide field of usefulness.

With the foregoing and other objects in view, the invention consists in the novel combination and arrangement of parts to be hereinafter more fully described, and specifically pointed out in the claims.

In describing the invention in detail, reference is had to the accompanying drawing, forming a part of this specification, wherein like reference characters indicate corresponding parts throughout the several views, and in which—

Figure 1 is a sectional elevation view of my invention applied to a tank or fluid container and adapted to indicate the height or amount of fluid therein; Fig. 2 is a modification of my invention showing a circuit controlling device which may be substituted for the gage or indicator illustrated in Fig. 1; Fig. 3 is an illustration of my invention adapted to indicate at each floor landing the position and direction of movement of an elevator car.

Referring to Fig. 1, 10 designates a fluid pressure device comprising an upper and lower section 11 and 12, respectively, between which is located a corrugated diaphragm 13 made of copper or other flexible non-porous material. Screws 14 clamp these parts together so as to form a fluid tight joint therebetween. The lower section is screw-threaded at 15 into a flange plate 16, which latter is secured by means of rivets or other suitable fastening to the top of a tank 17. In the bottom of the lower section 12 is a cylindrical hole through which a sleeve 18 freely passes, sufficient metal being provided at the bottom of this section to form a substantial bearing for the sleeve. The upper part of the sleeve is flanged at 19 and is adapted to bear against a corresponding flattened portion of the diaphragm 13. A pin 20 pointed at its lower end is contained in the sleeve and is adapted to move freely therein against the action of a compression spring 21. The lower pointed end of the pin 20 bears against a notch cut into the lever 22 which is pivoted at 25 to an extension 26 of the lower casing 12. The opposite end of the lever 22 is slotted at 24 and is connected by means of a link 23 to a radial slot 28 cut in the disk 29. The latter is pivoted to an extension 27 of the lower section 12 and is connected to a weighted float ball 30 floating in the liquid in the tank 17. By means of the slotted connection existing between the link 23 and the lever 22 and disk 29, respectively, it is possible to vary the position of this link with respect to the disk 29 and lever 22, thereby affording a ready means for altering or adjusting the leverage system so as to secure the desired results. The upper section 11 of the fluid pressure device is completely filled with a liquid such as oil, glycerin, or other suitable fluid, into which extends a threaded bolt or plug 31 which may be screwed up or down into the fluid and then locked against movement by a lock nut 32, a rubber or leather washer 33 being provided for the purpose of making a fluid tight joint at this point. 35 designates a common type of Bourdon pressure gage or indicator and is connected by means of the piping 34 with the upper section 11 of the pressure device.

The operation of the device just described is very simple and may be stated as follows:—The float ball 30 will always follow the rise or fall of the liquid in the tank 17 and by so doing it rotates the disk 29 upon its pivot. The motion of the disk is communicated through the link 23 to the lever 22 which in turn effects an up or down movement of the pin 20. Now any movement of the latter effects a variation in the

tension of the spring 21 which produces a varying pressure upon the sleeve 18 and diaphragm 13 in contact therewith, and, since the fluid contained in the section 11 above the diaphragm is non-compressible, any pressure exerted upon the diaphragm is communicated through the fluid to the gage or indicator 35. Thus it is seen that any variation in the height of liquid in the tank is faithfully recorded or indicated by the gage. In this particular instance it is desirable to graduate the dial of the gage so that the latter will indicate directly the number of gallons contained in the tank, or if so desired, the height of the liquid in inches, this being purely a matter of choice. The adjustment afforded by the adjustable link 23 is such that the leverage system may be increased or decreased as desired, thereby varying the amplitude of the gage hand. The plug 31 may be screwed down so as to displace some of the fluid, thereby insuring that the pressure system will be completely filled with fluid at all times. As shown in Fig. 1 as the liquid is drawn from the tank and the float ball drops the pressure on the diaphragm will increase and the gage hand will move in a clockwise direction. In some instances I connect the float ball to the opposite side of the disk 29 and the float ball will then be over toward the left hand end of the tank, so that, as the liquid is drawn off and the level in the tank drops, the pressure on the diaphragm decreases and the indicator hand moves to the left or counter-clockwise.

It is evident that the gage may be located at any desired distance from the pressure device 10, all that is necessary is to supply sufficient piping to connect the two together and have all of the joints absolutely tight against leakage.

The device shown in Fig. 2 is intended to be substituted for the indicator or gage 35 and operates to close a circuit containing an electro-responsive device of any desired character or electric lamps. This device comprises a casing having an upper and lower section 36 and 37 respectively, between which is a corrugated diaphragm 38. A rod 39 has a flange on one end in contact with the diaphragm, the other end of the rod is pointed and bears against lever 40 pivoted at 41 to an extension of the upper section of casing. A tension spring 42 is connected to the lever 40 and to the casing 36 and is arranged to have its tension varied by means of the adjustment 43. The right hand end of the lever 40 carries an electrical contact which is adapted to be carried upwardly into electrical engagement with a corresponding fixed contact directly above, these contacts being designated by the numeral 44. It will be seen that as the liquid in the tank of Fig. 1 is lowered and the pressure in the fluid in the pressure device 10 is increased, this increase of pressure will act upon the diaphragm 38 of the device shown in Fig. 2 and the rod 39 will be lifted, thereby raising the lever 40 and closing the contacts 44. While I have shown an electro-responsive device 45 controlled by the contacts 44 as a magnet winding, I contemplate using instead an electric motor which may be connected to a pumping device arranged to supply the tank with liquid, this arrangement not being illustrated since it is well known in the art. In this manner the tank can never run dry as the motor and pump will automatically keep the same full.

The device illustrated in Fig. 3 embodies the same principle of operation as that shown in Fig. 1, but as before pointed out is particularly adapted to indicate at each floor landing the position and direction of travel of an elevator car. This arrangement comprises a number of gages such as 35 one of which is located at each floor landing of an elevator system. These gages are all connected together and to my fluid pressure device. The latter is in many respects similar to that shown at 10 in Fig. 1 and comprises a fluid tight casing 46 provided with a hollow plunger 18′ closed at the top and provided with packing 47 so as to form a fluid tight sliding joint with the cylindrical extension of the casing in which it is contained. The pin 20 fits loosely in the hollow plunger 18′ and bears against a compression spring as already described in connection with Fig. 1. A compression spring 48 is arranged inside the casing 46 and bears against the inner wall of the latter and the top of the hollow plunger, tending to move the same downwardly. The disk 29′ is provided with gear teeth on a portion of its periphery, which teeth mesh with a pinion 49 carried by a sprocket wheel 50. A sprocket chain 51 leads over the wheel 50 and around a small sprocket wheel which is connected to and rotated by some moving part of the hoisting machine such as the drum shaft, the ratio of gearing being such that the disk 29′ makes no more than a half revolution during the time the elevator car makes a trip from top to bottom.

The operation of the device illustrated in Fig. 3 just described is as follows: As the elevator car moves up or down in the hatchway the toothed disk is given a rotary movement, thereby effecting an up or down motion of the pin 20. Should the pin move upwardly, the spring in the hollow plunger is placed under greater tension and it transmits this increased pressure to the plunger 18′ which tends to move upwardly into the fluid contained in the casing 46, and thus set up a pressure in the latter which pressure extends throughout the system and is recorded by the gages or indicators 35, which

are preferably graduated according to the number of floors. Thus it is seen that any movement of the elevator car will effect a variation of pressure throughout the fluid system and this pressure is a positive and convenient means for operating an indicator of other fluid pressure responsive device. It is to be understood, of course, that the fluid pressure system is absolutely tight against leakage, otherwise the efficiency and accuracy of the device would become impaired. In Fig. 3 the pipe 34 should be plugged above the top gage, the pipe being left open in the illustration so as to indicate that additional gages and piping may be added as desired.

It will be readily seen by those skilled in the art, that various changes in the details and arrangement of parts may be made without departing from the spirit and scope of my invention as defined in the appended claims, and I desire, therefore, not to be limited to the precise construction herein disclosed.

What I claim as new and desire to have protected by Letters Patent of the United States is:—

1. In an indicator, the combination of two closed receptacles each having a flexible wall, a conduit connecting said receptacles, a fluid confined in said receptacles and conduit, means for effecting pressure on the flexible wall of one of said receptacles including a resilient member, and an indicating device operated by fluid pressure transmitted to the flexible wall of the other receptacle.

2. In a tank indicator, the combination of a float ball, a lever operated by the rise and fall of said ball, a closed receptacle having a flexible wall or diaphragm, a yielding connection between said lever and diaphragm, a pressure gage connected to said closed receptacle by a conduit or pipe, and a fluid confined in said receptacle, conduit, and gage.

3. In a tank indicator, the combination of a tank adapted to contain a fluid, a float ball controlled by said fluid, a closed receptacle containing fluid having one wall in the form of a deflector, mechanism controlled by said float ball for exerting a variable yielding pressure on the deflector and thereby effecting a variable pressure in the fluid contained in said receptacle, means for removably connecting said mechanism to said tank, means for removably connecting said receptacle to said mechanism, and a gage arranged to indicate the variable pressure in said closed receptacle to indicate the height of fluid in the tank.

4. In a tank indicator, the combination of a tank adapted to containing a fluid whose height is to be measured, a fluid receptacle removably secured to said tank, a diaphragm separating the fluid in the receptacle from the fluid in the tank, and forming a closure for the tank, a float and adjustable levers connected thereto located in the tank and adapted to effect a variable pressure on said diaphragm, and a fluid pressure responsive device connected to said receptacle for indicating the height of fluid in said tank.

5. The combination of a tank containing fluid, an indicator for registering the height of said fluid, a fluid pressure receptacle applied directly to the tank and forming a closure therefor, a float ball and intermediate connections arranged to vary the pressure in said receptacle, and fluid connections between said receptacle and indicator.

6. In a tank indicator, the combination of a float ball, a member carrying said ball, a lever operated by the rise and fall of said ball, an adjustable link connection between said member and said lever, a closed receptacle having a diaphragm or flexible wall, a yielding connection between said lever and diaphragm, a fluid responsive device connected to said closed receptacle by a conduit or pipe, and a fluid confined in said receptacle, conduit, and fluid responsive device.

7. In a tank indicator, the combination of a fluid responsive device, a closed receptacle containing fluid, means connecting the fluid with said device, a tank adapted to receive fluid, a float ball in said tank, a lever operated by said float ball, means forming an operating connection between said lever and float ball, a spring adapted to be compressed by said lever, and means for transmitting the pressure upon said spring to the fluid contained in said receptacle.

8. In a tank indicator, the combination of a pressure gage, a fluid tight receptacle having a flexible wall or diaphragm, pipe connections between said gage and receptacle, a fluid contained in said gage, pipe and receptacle, a tank adapted to receive liquid, a pivoted float ball in said tank, a lever adapted to transmit a yielding pressure upon the flexible wall of said receptacle, and a connection comprising an adjustable link between said pivoted float ball and lever.

9. In a tank indicator, the combination of a tank adapted to receive a liquid, a float ball in said tank, a lever operated by the movement of said float ball corresponding to the rise and fall of liquid in the tank, means between the lever and float ball including an adjustable connection whereby their relative amplitude of movement may be varied at will, a closed receptacle containing a fluid, means associated with said lever whereby the movement of the latter will vary the pressure on the fluid in said receptacle, and a fluid responsive device arranged to be operated by said varying pressure.

10. The combination with a tank adapted to containing a liquid, of a device forming a

closure therefor and comprising a closed receptacle containing a fluid, means within the tank to vary the pressure in said receptacle in response to variation in the height of liquid in the tank, and an indicator controlled and operated by the pressure in said receptacle.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST SUNDH.

Witnesses:
JAMES G. BETHELL,
J. F. RULE.