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J. E. WERTZ.
ELECTRIC PRESSURE INDICATOR.
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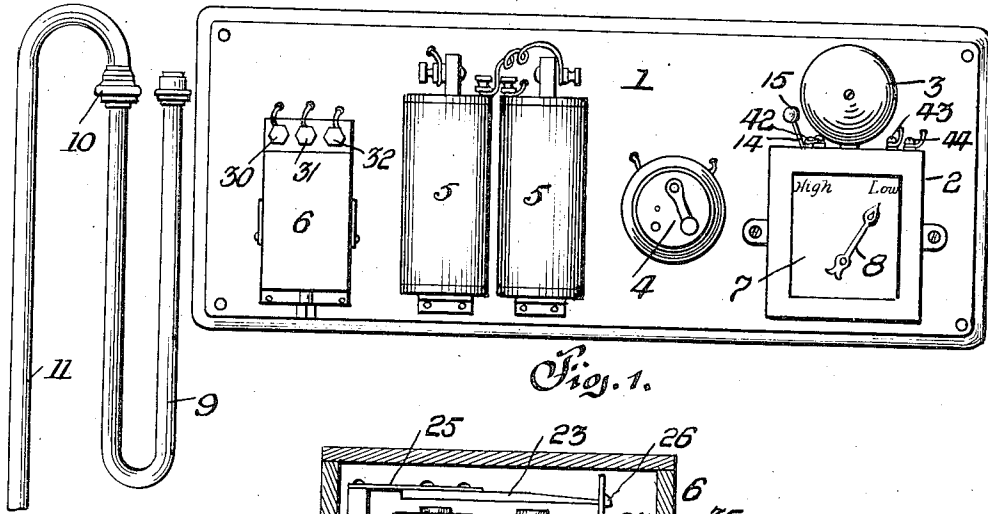


Fig. 2.

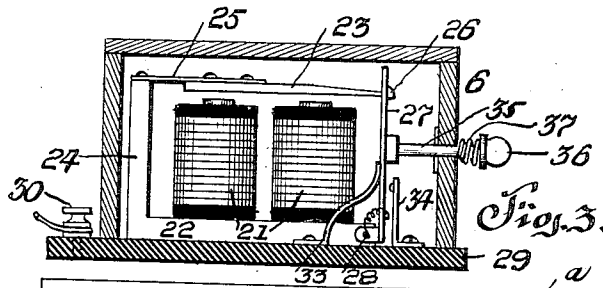


Fig. 3.

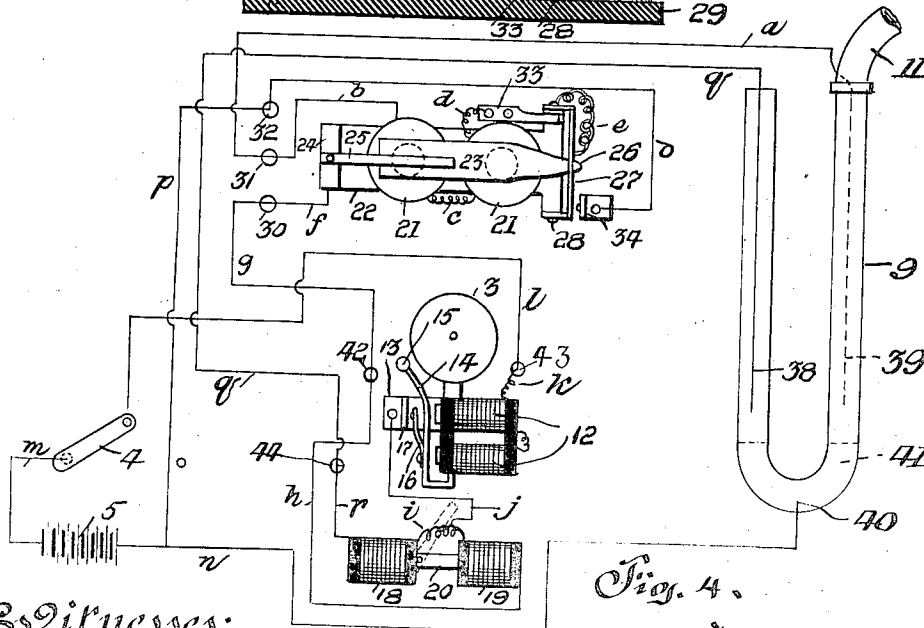


Fig. 4.

Witnesses:
J. N. Batten
E. E. Potter

Inventor.
Joseph E. Wertz.
by H. C. West Co.
Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH E. WERTZ, OF NEWHAVEN, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO W. E. DAY, OF CONNELLSVILLE, PENNSYLVANIA.

ELECTRIC PRESSURE-INDICATOR.

No. 816,407.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOSEPH E. WERTZ, a citizen of the United States of America, residing at Newhaven, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Electric Pressure-Indicators, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention has relation to electric pressure-indicators; and the object of the invention is to provide novel means whereby when the pressure of a fluid varies to a certain fixed maximum or fixed minimum extent an audible signal will be given and maintained and simultaneously an indicating device will be electrically operated to indicate whether the maximum or minimum pressure has been reached.

20 The invention is particularly adapted and designed to indicate variations in pressure of gas and to sound an alarm when the pressure of the gas reaches a fixed and predetermined maximum or minimum.

25 It frequently happens that where gas is supplied through pipes or mains from a reservoir or other source of supply that the pressure of the gas will vary to a considerable extent, and I provide means whereby should a predetermined maximum pressure be exceeded this fact will be indicated by a visual signal and an alarm sounded, and should the pressure of the gas decrease below a certain predetermined minimum pressure an alarm will be sounded and a visual signal displayed, indicating that the gas has decreased to the predetermined degree, as ordinarily the increase of pressure of gas is not apt to result in serious accidents.

40 My apparatus is so constructed that a visual signal will be displayed and an alarm sounded not only during the period when the gas remains at the predetermined maximum pressure, but as the gas may not only reach the predetermined minimum pressure, but the supply may wholly fail, thereby extinguishing the lights furnished with gas from such supply and permitting escape of gas through the burners when the supply was resumed, I have provided means whereby when the gas reaches the predetermined minimum pressure or the supply altogether fails, the visual signal indicating this fact will be operated and the audible signal will be maintained

in action until such time as the gas-supply has received attention, and the apparatus is set for renewed action by the person in charge.

The invention consists in the novel construction, combination, and arrangement of parts, which will be hereinafter described and claimed.

In the accompanying drawings, illustrating my improvement in the several figures of which like reference characters designate corresponding parts, Figure 1 is a plan view of my improved apparatus. Fig. 2 is an elevation of a gage which I employ in connection with my improved apparatus. Fig. 3 is a vertical sectional view of a circuit-controller employed in connection with the apparatus shown in Fig. 1, and Fig. 4 is a diagrammatic view illustrating the position of parts and the electrical circuits of my improved apparatus.

The operative parts of the apparatus, with the exception of the gage, (shown in Fig. 2,) are mounted on a board 1, which can be placed at any convenient place in a building, and upon the board 1 I mount a box 2, that contains the indicator and alarm operating mechanisms, a bell 3 being mounted on the board above the box 2, as shown. Adjacent the box 2 I arrange an electric switch 4, and upon the board I also mount an electric battery 5 and a circuit-controller casing 6. The front of the indicator-box 2 carries a plate 7, upon which the words "high" and "low" are imprinted, and a swinging hand 8 serves by its position to indicate whether the gas has reached the predetermined maximum or minimum pressure.

The gage (shown in Fig. 2) is of the ordinary and well-known character, being composed of a U-shaped glass tube 9, attached by a coupling 10 to a gas-pipe 11. This gage may be provided with the usual scales on the two legs of the glass portion thereof, and in the lower part of the glass portion of the gage a quantity of mercury is placed, which serves, as will be hereinafter described, to indicate the variations of pressure and which also serves to establish electrical connections in the circuits of the signaling and indicating apparatus when the gas reaches the predetermined maximum or minimum pressure.

The mechanism within the indicator-box 2 is of ordinary character, and its construction is shown in Fig. 4, this mechanism comprising an electromagnet 12, which is mounted

on a suitable base 13 and provided with a swinging armature-lever 14, that carries a tapper 15, adapted to contact with the bell 3, and which is also provided with a spring-contact 16, adapted to touch a back-stop or stationary contact 17, mounted on the base 13. Within the box 2 are also arranged two solenoids 18 and 19, which have a sliding core 20 common to both, and this sliding core is attached to the stem of the hand 8 and serves to swing the hand across the face 7 of the box.

The circuit-controller is shown in detail in Fig. 3 and is also shown in Fig. 4 of the drawings and comprises an electromagnet 21, which is mounted on a base 22 and is provided with an armature 23, attached to an upright 24 on the base 22 by a spring-tongue 25. The armature 23 has a hook 26 on its free end, and this hook when the parts are in the position shown in Fig. 3 projects through a hole in a plate 27, that is hinged at 28 to the base 22. The casing 6 is mounted on an insulating-base 29, which carries binding-posts 30 31 32, and upon the base 29 are mounted two spring contact-pieces 33 34, the contact-piece 33 contacting with the plate 27 when the latter is in a vertical position and the contact-piece 34 contacting with the plate when it is released from engagement with the hook 26 of the armature 23 and falls into an inclined position. A push rod or pin 35 extends through the end of the casing 6 and is provided with a knob 36 on its outer end and surrounded by a spiral spring 37, this push-pin being used to restore the plate 27 to its normal vertical position after the apparatus has been operated in the manner to be hereinafter described.

The gage 9 is provided with three conductors, one of which, numbered 38, will be hereinafter termed the "high-pressure" conductor, another of which, 39, will be hereinafter termed the "low-pressure" conductor, and the third of which, numbered 40, will be hereinafter called the "intermediate" conductor. The high-pressure conductor 38 extends through one leg of the gage from the top to a point near the surface of the mercury 41 in the bottom of the same. The low-pressure conductor 39 extends through the other leg of the gage to a point near the surface of the mercury 41, and the intermediate conductor 40 extends through the bottom of the gage and into the mercury 41, the amount of mercury in the gage being so regulated that when the pressure in the pipe 11 exceeds a predetermined maximum degree a circuit will be established from the high-pressure conductor 38 through the mercury 41 to the intermediate conductor 40, and when the pressure decreases below the predetermined minimum pressure electric contact will be established between the low-pressure conductor 39 and the intermediate conductor 40 through the mercury 41, it being understood, of course,

that the level of the mercury in the legs of the gage will vary according to the amount of pressure to which the mercury is subjected, such pressure being imposed upon the surface of the mercury in the leg of the gage which contains the low-pressure conductor.

While I have illustrated the conductors 38 and 39 as being arranged in the separate legs of the gage, it is obvious that the low-pressure conductor 39 might be brought through the same leg of the gage as the high-pressure conductor 38 and insulated where it passes through the mercury and then extended up into the other leg of the gage above the surface of the mercury.

The electrical circuits of the device will now be described, reference being had to Fig. 4 of the drawings, and in describing these circuits I will also describe the operation of the apparatus. Taking first the circuits connected with the low-pressure conductor 39 and beginning at the low-pressure conductor 39 the wire *a* leads to the post 31 of the circuit-controller. A wire *b* leads from this post to one coil of the electromagnet 21, which is connected to the other coil of the electromagnet by a wire *c*, and from the last-named coil a wire *d* leads to the contact-piece 33. This contact-piece being in contact with the pivoted plate 27, the current passing through the apparatus passes through the plate 27 into the base 22 of the electromagnet 21 through a wire *e*, and from the base a wire *f* leads to the binding-post 30, from which a wire *g* leads to a binding-post 42, carried by the indicator-box 2, and from the binding-post 42 a wire *h* leads to the coil of solenoid 19. The inner ends of the coils of the solenoids 18 19 are connected by a wire *i*, and the circuit which I have been tracing leads from the wire *i* by a wire *j* to the back-stop 17 and thence through the tongue of the electromagnet to and through the coils of the electromagnet 12, said tongue being connected to said coils, and from the electromagnet 12 a wire *k* to a binding-post 43, carried on the indicator-box 2, and from this binding-post 43 a wire *l* leads to the switch 4, and from this switch a wire *m* leads to the battery 5, and from the battery 5 a wire *n* leads to the intermediate conductor 40 at the lower end of the gage. When the pressure of the gas decreases to or below the predetermined minimum degree, circuit will be established between the conductors 39 and 40, and the electric current following the course above described will energize the electromagnet 21, which will attract its armature 23, this movement of the armature permitting the plate 27 to fall out of its vertical position, thereby breaking contact between said plate and the contact-post 33 and establishing contact between said plate and the contact-piece 34, and a short circuit will thereby be established through a wire *o*, that leads to binding-

post 32, and a wire leading from the binding-post 32 to the wire *n* and thence to the battery. This connection affords a short circuit or shunt that excludes the conductors 38 and 40 from the battery and indicator-circuit, and this circuit may be traced as follows: beginning at the right-hand side of the battery 5 through wire *p* to binding-post 32, through wire *o* to contact-piece 34, from contact-piece 34 to plate 27, to base 22, by wire *f* to binding-post 30, by wire *g* to binding-post 42, by wire *h* to solenoid 19, by wire *i* to wire *j*, by wire *j* to back-stop 17, thence through the armature-tongue to the coils of electromagnet 12, by wire *k* to binding-post 43, by wire *l* to switch 4, and by wire *m* to the battery. The circuit thus established will be maintained so long as the plate 27 is in contact with the contact-piece 34, and this regardless of whether or not the circuit is open between the mercury 41 and the low-pressure conductor 39. To break this circuit and replace the parts to their normal position, it is only necessary to push on the knob 36, which will restore the plate 27 to its vertical position, in which position it will be engaged by the armature-tongue 23, and the armature-tongue will only be released from the magnets when the pressure of the gas-supply has increased sufficiently to break the circuit between the conductors 39 and 40.

The high-pressure circuit is as follows: by a wire *q* from the high-pressure conductor 38 to a binding-post 44 and from this binding-post by a wire *r* to solenoid 18, by wire *i* to wire *j*, to the back-stop 17, thence through the armature-tongue 14 to and through the electromagnet 12, by wire *k* to binding-post 43, by wire *l* to switch 4, by wire *m* to the battery 5, and thence by wire *n* to the intermediate conductor 40. This circuit, it will be observed, does not pass through the controller contained in the casing 6, and the closing of the circuit between the high-pressure conductor 38 and the intermediate conductor 40 will not, therefore, affect the controller; nor is it necessary that it should be so, for the reason that if the high pressure should exceed the maximum and then decrease below the same, so as to break contact between conductors 38 and 40, no harm will result, as the light of the burners belonging to the system to which my apparatus is applied will not be extinguished by the increase of pressure above the desired maximum, and when the pressure reaches its normal degree the lights will continue to burn in the usual manner. The bell of the audible signal will accordingly when the apparatus is thrown into operation by the increase of pressure beyond the maximum degree only ring during such time as the pressure continues at or above the predetermined maximum.

From the foregoing description it will be observed that the high-pressure circuit

passes through the solenoid 18, while the low-pressure circuit passes through the solenoid 19, and accordingly the hand 8 will be turned in one direction or the other, dependent upon which circuit is completed.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a pressure-gage, containing a movable conducting material, a high-pressure conductor, a low-pressure conductor, and an intermediate conductor located in said gage, an electromagnetic signaling device arranged in a circuit normally closed between said high-pressure conductor and a battery, said battery, a circuit extending from said low-pressure conductor to said battery and normally closed between the low-pressure conductor and the battery and means for opening said last-named circuit.

2. The combination with a gage adapted to be connected with a source of supply of gas under pressure, a low-pressure conductor, arranged in said gage, a second conductor arranged in said gage, fluid-conducting material located in the gage, and constantly in contact with the second-named conductor and normally out of contact with the low-pressure conductor, an electromagnetic signaling apparatus connected in circuit with both said conductors, the circuit connecting both conductors to the signaling apparatus being normally closed at a point between the low-pressure conductor and the signaling apparatus, a battery, a circuit-controller adapted when circuit has been established between the said two conductors in the gage to open the circuit between the low-pressure conductor and the signaling apparatus, and to establish a short circuit including the battery and the signaling apparatus.

3. In an apparatus of the character described, the combination of a gage, three conductors arranged in said gage, each of said conductors being normally connected with a battery, a fluid-contacting material arranged in the gage and normally in constant contact with one of said conductors and normally out of contact with the two other of said conductors, electromagnetic signaling apparatus, a battery, a circuit-controller, and suitable electrical connections therebetween, said controller being in series circuit with the battery and two of the conductors in the gage and being adapted when the last-named two conductors in the gage are electrically connected, to establish circuit through the battery and the signaling devices and cut out the circuit through said two conductors.

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

JOSEPH E. WERTZ.

Witnesses:

K. H. BUTLER,
J. L. TREFALLER, Jr.