

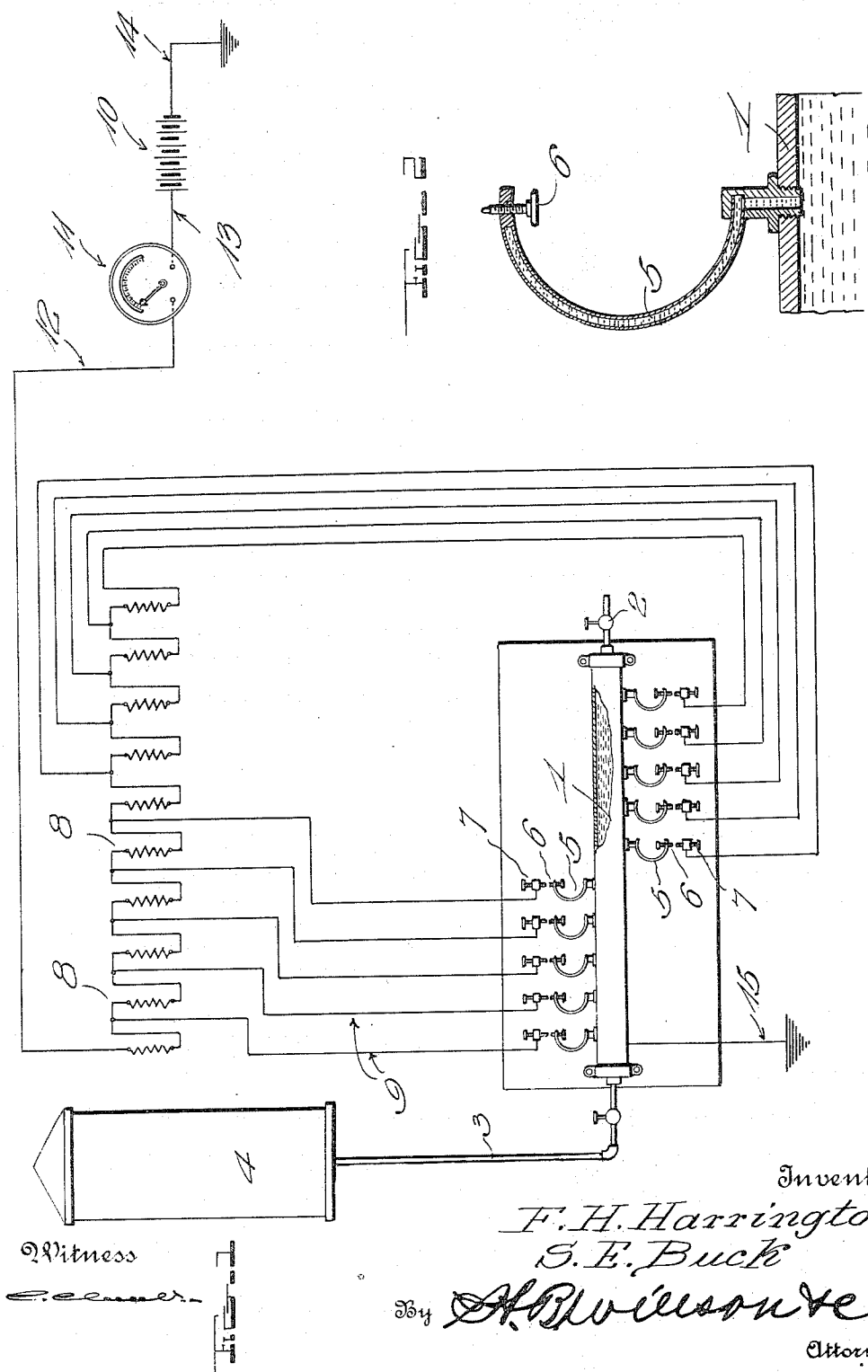
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INDICATOR.

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Patented Nov. 19, 1918.

1,285,145.



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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, FRED H. HARRINGTON and STEPHEN E. BUCK, citizens of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Indicators; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates generally to indicators and more particularly to devices for indicating the amount of liquid or other fluid contained in a tank or receptacle.

The primary object of the invention is to provide a device of this character wherein the indicator proper may be disposed at any distance from the tank or receptacle containing the liquid or fluid to be measured.

Another object of the invention is to provide an electrically operated indicator including a substantially constant potential source of current, an ammeter, a plurality of resistance units, and a plurality of switch members for controlling the resistance units and operated successively by the static pressure of a liquid contained in a receptacle or by other pressure medium; the ammeter being designed to register the amount of current which is governed by the resistance of the circuit as controlled by the pressure of the liquid.

A further object of the invention is to generally improve upon devices of this class by the provision of a comparatively simple, strong, durable and inexpensive construction, one which will be efficient and reliable in operation, and well adapted to the purpose for which it is designed.

With these and numerous other objects in view the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of the application, and in which similar reference characters are used to designate like parts throughout the several views:—

Figure 1 is a diagrammatical illustration of the indicator;

Fig. 2 is a detail longitudinal section through one of the spring tubes.

Referring more particularly to the drawings, the reference numeral 1 designates a

hollow trunk member or closed pressure chamber which preferably partakes of the nature of a cylindrical tube having a pet cock 2 at one end thereof, being connected at its other end to a pipe 3 which communicates with a fluid receptacle, here shown in the form of a water tank 4.

The opposite sides of the trunk member or tube 1 are provided with openings, and secured to the same in any suitable manner is a plurality of closed spring tubes 5, commonly known as "Bourdon" tubes. The free ends of these tubes 5 are closed and carry adjustably mounted electric contact elements in the form of set screws 6, which engage relatively fixed but adjustable contact elements or set screws 7 and these tubes are in open communication with the tube 1 through the medium of the said openings.

All of the parts above mentioned may be suitably secured upon a base and arranged in a casing in which is also mounted a plurality of resistance units 8 which are connected in series and have electric connection, by means of conductors 9, with the set-screws 7, respectively; and any appropriate number of these resistance units may be included in the electric circuit, according to the amount of variation of water pressure at the bottom of the tank 4.

The circuit includes a battery 10 having a substantially constant potential, an ammeter 11, a conductor 12 connecting one terminal of the ammeter 11 with one of the terminal resistance units 8, a conductor 13 connecting the other terminal of the ammeter with one terminal of the battery, a conductor 14 leading from the other terminal of the battery to a ground connection, and a conductor 15 running from the tube 1 to a ground connection.

The set screws 6 and 7 are set so that the contacts of one of said series are in such relation to the contacts of the other series that each complementary pair of contacts 6 and 7 requires a different pressure, to close its circuit, from the pressure required to close the circuit of each of the other complementary pairs; and, therefore, as the pressure of the water increases and widens the curvature of the tubes 5 so that their set screws 6 make contact successively with the corresponding set screws 7, and hence, the resistance in the circuit will be decreased in proportion to the number of contacts thus made. This obviously changes the reading of the am-

meter, and the static pressure of the water in the tube 1 may be determined by the various ammeter readings.

As the variation of this static pressure is in direct proportion to the depth of water in the tank 4, it is possible to so accurately adjust the screws or contacts 6 and 7 that the depth of water in the tank may be accurately registered on the ammeter or registering device 11.

Considering the set of contacts 6 above the tube 1 as being complementary to the set of contacts 7 above the tube 1, it is seen that this device comprises two complementary sets of contact elements above the tube 1; and the same is true regarding the sets of contacts 6 and 7 below the tube 1.

Assuming that the tank 4 is full, the pressure in the tube 1 is holding all the contacts 6 against the contacts 7, and the aggregate of the conductors 9 is effective to conduct the current to the conductors 14 and 15 and the ground connections; but when the water level is lowered, the pressure in the pipe 1 is reduced accordingly, and this reduction of pressure allows the spring action of one of the tubes 5 to break the connection between the corresponding one of the contacts 6 and its contiguous complementary contact 7. This reduces the effective aggregate of cross section of the conducting wires 9 and effects a corresponding change in the reading of the ammeter 11. The other complementary pairs of contacts 6 and 7 remain in closed circuit until a further lowering of the water level effects a further lessening of pressure in the tube 1, whereupon another complementary pair of contacts 6 and 7 break their connection; and so on, according to the predetermined setting of the set screws or contacts 6 and 7.

From the foregoing description taken in connection with the accompanying drawings, the construction, use and operation of the device will be readily understood without a more extended explanation.

As numerous changes in form, proportion, and in the minor details of construction, may be resorted to without departing from the spirit of this invention, it is to be understood that we do not wish to be limited to the precise construction herein shown and described.

We claim:

1. In a pressure registering device, an electric circuit comprising in combination, a pressure chamber, a plurality of Bourdon tubes, a plurality of electric resistance elements, an ammeter, electric conductors, and complementary sets of contact elements, said resistance elements being electrically connected together and each connected to one

of said contact elements through the medium of one of said conductors, said Bourdon tubes being in open communication with said pressure chamber and each carrying a contact element of one of said sets, the normal arrangement of the contact elements being such that they successively close circuit with the respective resistance elements in accordance with the variation of pressure in said pressure tube.

2. In a device for registering the height of water in a tank, an electric circuit comprising in combination a horizontal closed tubular member, means for conducting water to said tubular member from the tank, a plurality of Bourdon tubes in open communication with said tubular member, an ammeter, a plurality of resistance elements electrically connected to said ammeter, complementary sets of electric contacts, and electric conductors each connecting one of said resistance elements with a contact of one of said sets, each contact of the other set being carried by one of said Bourdon tubes and movable thereby into closed circuit with the corresponding contacts.

3. In a pressure registering device, an electric circuit comprising in combination, a horizontally disposed tubular member, means whereby fluid pressure is variably applied within said tubular member, a series of pressure-actuated elements in open communication with said tubular member through its horizontal wall, a series of contacts carried respectively by said pressure-actuated elements, a series of contacts each of which is complementary to one of the contacts of the first said series, electric conductors connected respectively to the contacts of the second said series of contacts and adapted to be electrically connected to said tubular member, a source of electric energy, an ammeter, and electric conductors connecting the first said conductors with said ammeter and said tubular member and said source of electric energy, the contacts of one of said series being normally adjusted in such relation to the contacts of the other said series that each complementary pair requires a different pressure to close its circuit from the pressure required to close the circuit of each of the other complementary pairs.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

FRED H. HARRINGTON.
STEPHEN EDWARD BUCK.

Witnesses:

HARRY LUNDQUIST,
CHAS. J. MATTSO.