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FLUID METER

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The present invention relates to meters responsive to variations in a variable condition and it relates more particularly to meters for remote indication, recording and integration of a variable condition, such as, for example, fluid flow.

An object of the present invention is to provide means for accurate remote indication, recording and integration of rate-of-flow of a fluid.

Other objects and advantages of the present invention are apparent in the following detailed description, appended claims and accompanying drawings.

For the purpose of illustrating the invention, there is shown in the accompanying drawings one form thereof which is at present preferred, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangements and organizations of the instrumentalities as herein shown and described.

Referring to the accompanying drawings in which like reference characters indicate like parts throughout:

Figure 1 represents a schematic view of one embodiment of the present invention.

Figure 2 represents a view, on an enlarged scale, showing the magnetic switch mechanism of the embodiment of Figure 1.

Figure 3 represents a vertical cross-sectional view of the rotameter indicating and transmitting unit of the present invention.

Figure 4 represents an elevational view of the impedance bridge receiving unit of the present invention, parts being broken away better to reveal the construction thereof.

Figure 5 represents a wiring diagram illustrating the manner of connecting the transmitting and receiving coils of the impedance bridge.

In the embodiment shown in the drawings, a rotameter, indicated generally by the reference character 10, is adapted to indicate rate-of-flow of fluid through a pipe-line or the like and is also adapted electrically to transmit the rate-of-flow to a remote receiving unit shown in Figure 4 which is adapted continuously to record the rate-of-flow and also to indicate total flow of fluid passing through the rotameter during a predetermined period of time.

The rotameter 10, as shown in Figure 3, includes a vertical downwardly tapered transparent metering tube 12, a lower inlet fitting 13 adapted for connection to an inlet pipe-line or the like

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and an upper outlet fitting 14 adapted for connection to an outlet pipe-line or the like, the ends of the metering tube 12 being held in fluid-tight sealing relationship with stuffing boxes 15 and 16 of said fittings 13 and 14 respectively, by means of lower and upper packing rings 17 and 18 and lower and upper adjustable stuffing glands 19 and 20 respectively.

A metering float 21 includes an uppermost conical flow-constricting head portion 22 adapted for free up-and-down movement within said metering tube 12 and an elongated closed tube 23 extending downwardly from said head portion 22.

A well 24 of suitable corrosion-resistant non-magnetic material extends downwardly from the lower end of the metering tube 12 and through the inlet fitting 13, a drain valve 25 being provided in the lower end of the well 24.

The well 24 is open at its upper end, so that it is, at all times, filled with the fluid being metered. The extension tube 23 of the metering float 21 extends downwardly within the well 24, the tube 23 carrying a soft iron armature 26 within its lower end.

Outside the well 24 and around it are wrapped upper and lower sets of balanced impedance transmitter coils 27 and 28.

The position of the impedance coils 27 and 28 may be vertically varied by means of lowermost screw-threaded adjusting nuts 29 working against the uppermost coil spring 30.

A case 31 surrounds the impedance coils 27 and 28 and is provided with a box 32 from which the lead wires to the coils emerge.

An outer removable casing 33 having a window 34 therein surrounds the metering tube 12, a scale 35 being positioned alongside the tube 12 whereby the position of the metering float may be read off against the calibrations on the scale.

The impedance transmitter coils 27 and 28 are electrically connected to a pair of balanced impedance receiver coils 36 and 37 as shown in the wiring diagram of Figure 5.

The laterally-disposed receiver coils 36 and 37 are identical in construction, the coils being wound about cores 38 and 39 which are hard glass tubes having mirror-smooth cylindrical inner bores of extreme accuracy.

Soft iron armatures 40 and 41 are disposed for free up-and-down movement within the cores 38 and 39 respectively, the armatures 40 and 41 being supported from opposite ends of a balance beam 44 by flexible cords 42 and 43 respectively.

The ends of the beam 44 are formed as vertical arc segments 45 and 46, the cords 42 and 43