# PATENT SPECIFICATION

Application Date: June 11, 1921. No. 16,134/21. **185,840**

Complete Accepted: Sept. 11, 1922.

COMPLETE SPECIFICATION.

## An Improved Device for Indicating Liquid Level in Tanks and the like.

I, GEORGE CONSTANTINESCO, of "Carmen Sylva", Beechwood Avenue, Oatlands Park, Weybridge, in the County of Surrey, a subject of the King of Great Britain and Ireland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to devices for indicating the level of liquids in tanks, and is especially applicable to devices for indicating in a suitable position the level of fuel in the fuel tanks of motor cars or aeroplanes.

The invention is also applicable to other purposes where it is desired to indicate at a moderate distance the level of a liquid in a tank.

The indicating device to which the invention relates is of the type in which air is compressed in a chamber in which there is situated a gauge tube dipping below the surface of an indicating liquid, this chamber being connected through a pipe to a point near the bottom of a tank in which it is desired to ascertain the liquid level so that the pressure holding up the column of liquid in the gauge tube is equal to the pressure at or near the bottom of the tank, a flexible member being provided for the purpose of obtaining the necessary air pressure.

The invention consists in an indicating device of the type described comprising a gauge tube combined with a casing forming an air chamber and arranged so that the column of liquid in the gauge is held up by the air pressure in the chamber which is in communication with a tank or with a vessel in which the liquid stands at the same level by way of a pipe opening near or below the general level of the bottom of the tank, the air pressure required to force the air from the chamber to the bottom of the pipe in the tank being obtained by pressing a flexible diaphragm or the like which forms part of the wall of the air chamber.

The invention further consists in a device of the type described applicable to a pressure tank having a pressure equalising connection between the top of the tank and the top of the gauge tube.

The invention also consists in arranging the apparatus so that the bottom of the pipe in or connected up to the tank is below the general level of the bottom of the tank so that the zero reading on the gauge may be situated above the bottom of the gauge tube.

The invention further consists in arranging the pipe which dips into the liquid, in a vessel independent of the tank so that the complete indicating device can be applied readily to existing installations.

The invention also consists in the improved means for indicating liquid levels hereinafter described.

Referring to the accompanying drawings;

Figures 1 and 2 are two sections at right angles of a gauge constructed according to the invention;

Figure 3 is a diagrammatic view showing the arrangement of the gauge in relation to the tank in which the liquid level is to be indicated;

Figure 4 is a diagrammatic view showing the application of the invention to a pressure tank, while

Figure 5 is a diagrammatic view of the

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construction in which a separate vessel is employed in which the liquid level is the same as that in the tank.

Referring to Figures 1 and 2, the gauge comprising a casting *a* into which the gauge tube *b* is inserted, the tube being held in resilient washers *c c* at the ends of an outer tube *d* which is held in position by the screw cap *e*. A curved metal diaphragm *f* is provided across the chamber in the casting *a*, this diaphragm having small apertures *g* below the liquid level. A rubber diaphragm *h* is clamped at its edges against the diaphragm *f*, and is adapted to be pressed up against the diaphragm *f* by a press button *k*. The indicating liquid, which may be coloured alcohol or other suitable liquid, about half fills the space in the chamber *a* on one side of the rubber diaphragm. For indicating the level in very deep tanks mercury may be employed.

The air chamber in the casting *a* is placed in communication with a vertical pipe *l*, opening close to the bottom of the tank *m*, by a pipe *n*. A suitable scale is provided on the gauge tube *b*. The top of the tank and the top of the gauge tube are both open to atmospheric pressure.

The operation of the above described apparatus is as follows:—

With the rubber diaphragm in the position illustrated, the level of the liquid in the pipe *l* is the same as the level in the tank, and the level in the gauge is the same inside and outside the gauge tube. On pressing a button *k* the rubber diaphragm *h* is forced up against the metal diaphragm *f* and the pressure in the chamber *a* and pipe *n* is increased. The second diaphragm serves as a stop for the flexible diaphragm and enables a steady pressure to be exerted and thus facilitates reading of the scale. The pressure in the chamber forces the gauge liquid up the tube *b*, and the pressure in the pipe *n* forces the liquid down the pipe *l* until the level of the liquid reaches the bottom of the pipe, when air bubbles escape from the bottom of the pipe. A state of equilibrium is produced with the rubber diaphragm held firmly against the metal diaphragm, and when this is the case the liquid level in the gauge tube will remain steady, and the height of the column in the gauge tube will indicate the depth of liquid in the tank independently of the relative levels of the tank and gauge tube. A suitable scale is provided on the gauge tube from which this depth can be directly read off.

In the form of the invention above described, both the gauge tube and tank are open to atmospheric pressure. If, however, it is desired to measure the depth of liquid in a pressure tank, all that is necessary is that the same pressure should be applied to the top of the tank and the top of the gauge tube, and for this purpose the two are connected by a pipe *p*, as diagrammatically indicated in Figure 4.

In order to make the device readily applicable to existing tanks and to arrange that the zero reading may be taken, the pipe *l*, instead of being inserted in the tank, may be inserted in a separate vessel *o*, as shown in Figure 5, and the pipe *l* may extend below the level of the tank. In such a case the zero reading will be brought up in the gauge tube by the distance through which the pipe *l* extends below the bottom of the tank. Or, instead of arranging a separate vessel, as shown at *o*, Figure 5, a small well may be formed in the bottom of the tank and the pipe *l* may extend below the bottom of the tank into this well.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An indicating device of the type described comprising a gauge tube combined with a casing forming an air chamber and arranged so that the height of the column of liquid in the gauge is determined by the air pressure in the chamber which is in communication with a tank or with a vessel in which the liquid stands at the same level as it stands in the tank by way of a pipe opening near or below the general level of the bottom of the tank, the air pressure required to force the air from the chamber to the bottom of the pipe in the tank being obtained by pressing a flexible diaphragm with its edges held between two parts of the casing so that it forms part of the wall of the air chamber, substantially as described.

2. A device as claimed in Claim 1 applicable to a pressure tank having a pressure equalising connection between the top of the tank and the top of the gauge tube, substantially as described.

3. A device as claimed in Claim 1 arranged so that the bottom of the pipe in or connected up to the tank is below the general level of the bottom of the tank, so that a zero reading may be taken, substantially as described.

4. A device as claimed in Claim 1 having the communicating pipe opening into a vessel whose bottom is below the general level of the bottom of the tank, such vessel being in communication with the tank so that the liquid level is the same in the tank and vessel, substantially as described.

5. A device as claimed in Claim 1 having a second diaphragm against which the flexible diaphragm rests when pressed in by the actuating device, substantially as described.

6. The improved device as claimed in Claim 1 for indicating levels of liquids in tanks hereinbefore described and illustrated in the accompanying drawings.

Dated this 11th day of June, 1921.

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Chartered Patent Agent.

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Fig.1.

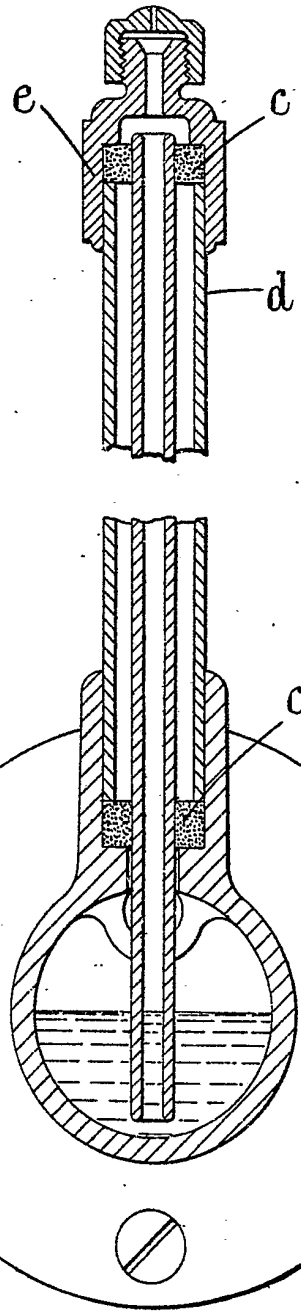
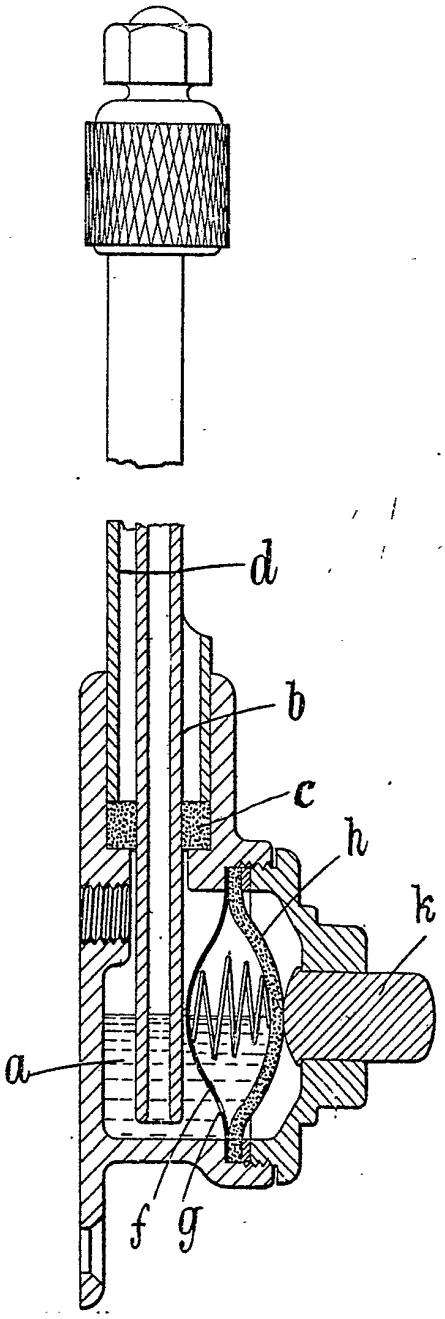



Fig.2.



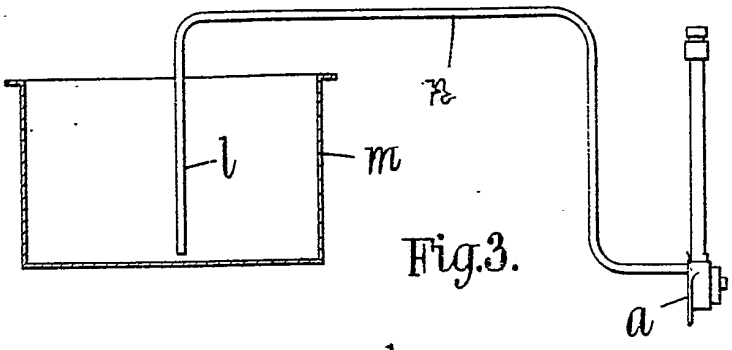



Fig.3.

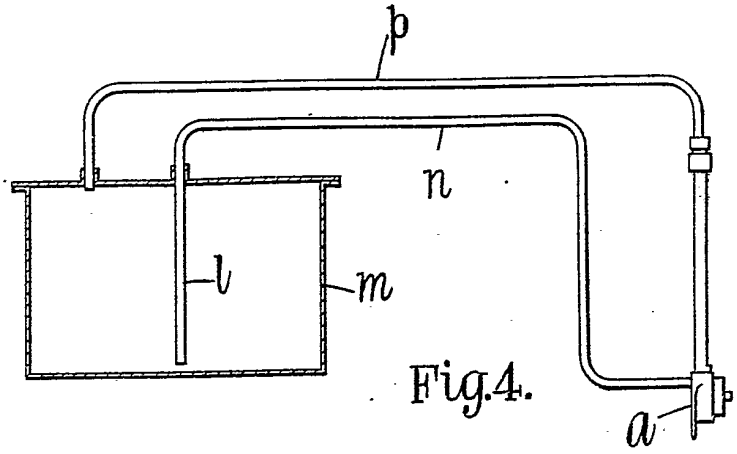



Fig.4.

d

b

c

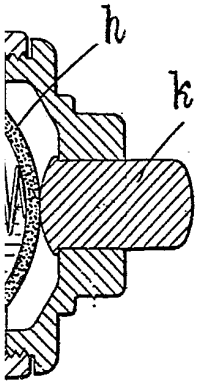
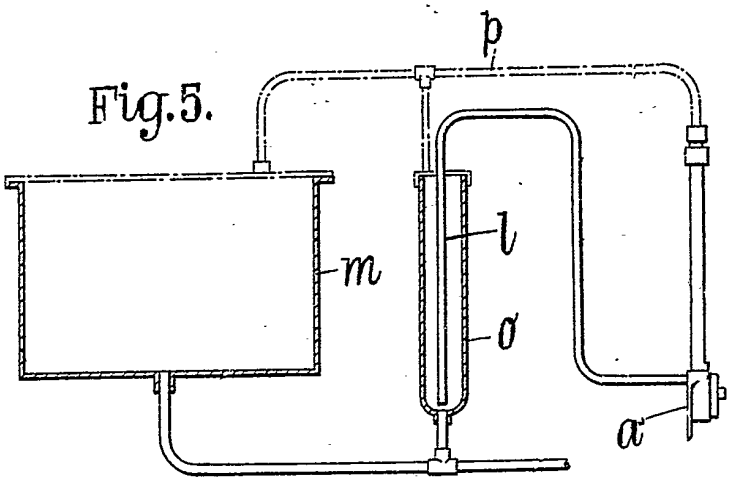



Fig.5.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig.1.

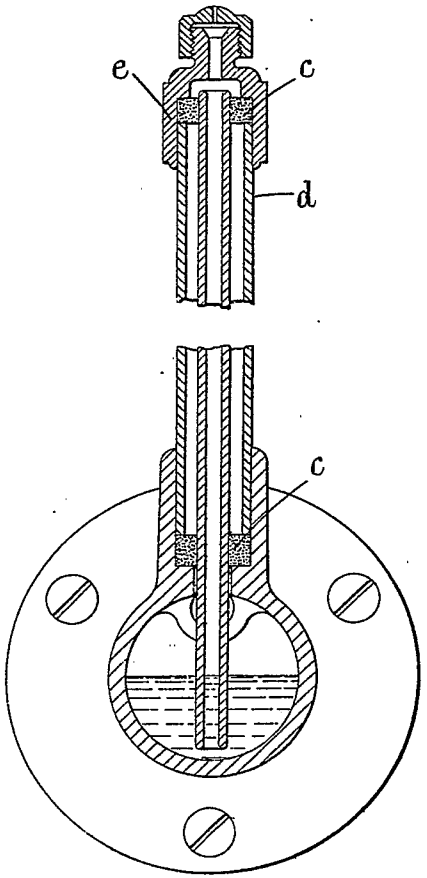
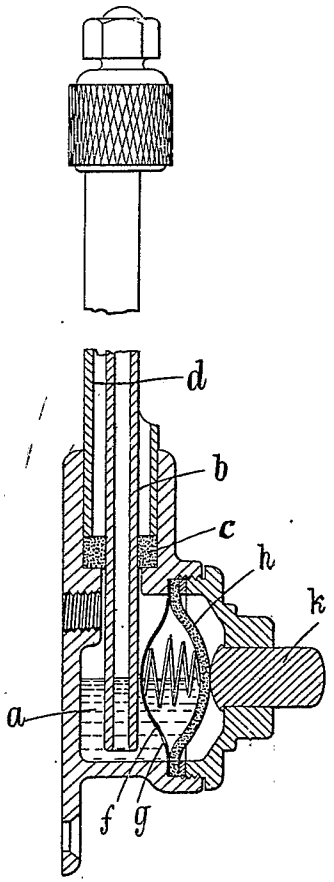



Fig.2.



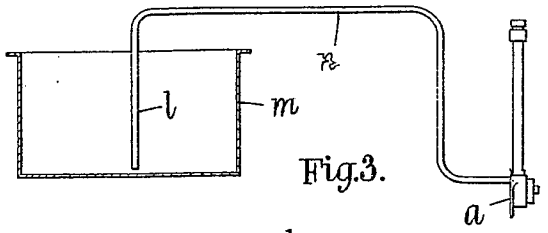




Fig.3.

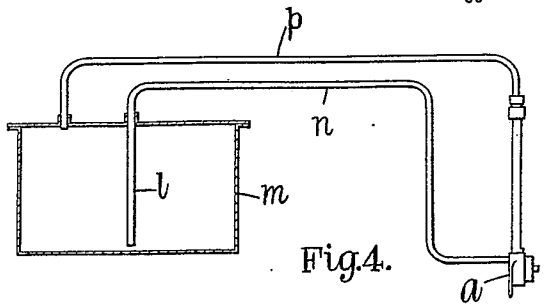



Fig.4.

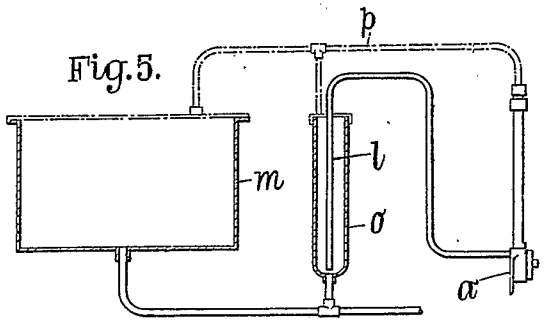



Fig.5.

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