C. W. STANCLIFFE.

INDICATOR.

APPLICATION FILED JULY 15, 1915.

1,268,292.

Patented June 4, 1918.

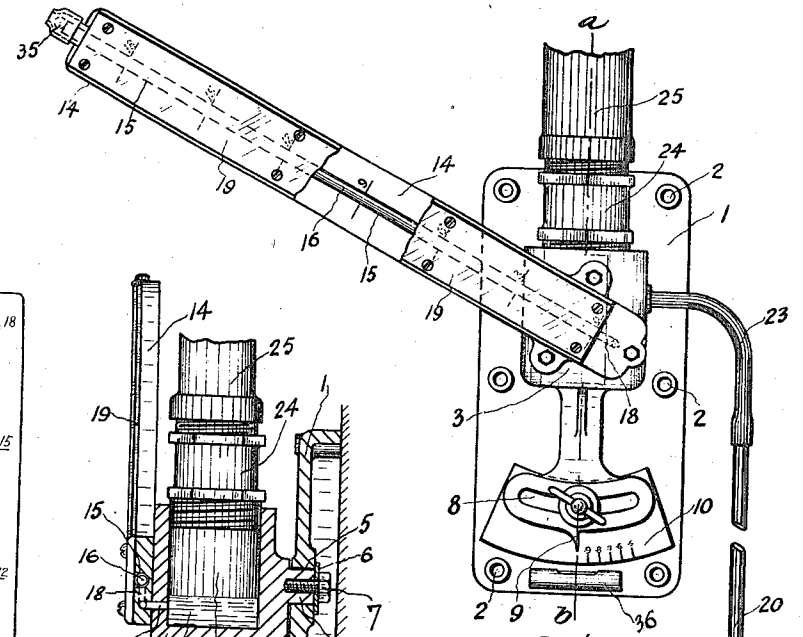
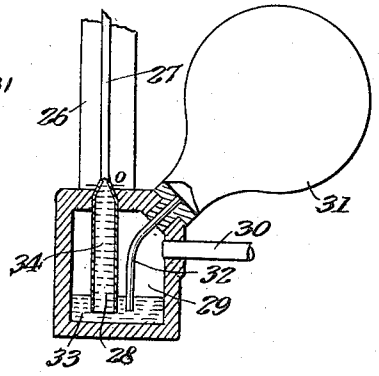


Fig. 1

Fig. 2

Fig. 3

Fig. 4



WITNESSES.

J. Summerfield

Isobel D. Orr.

INVENTOR.

CECIL WHEATLEY STANCLIFFE

BY Fetherstonhaugh & Co.

Attys

UNITED STATES PATENT OFFICE.

CECIL WHEATLEY STANCLIFFE, OF TORONTO, ONTARIO, CANADA, ASSIGNOR TO MILTON A. FESLER, OF OAKLAND, CALIFORNIA.

INDICATOR.

1,268,292. Specification of Letters Patent. Patented June 4, 1918.

Application filed July 15, 1915. Serial No. 40,087.

To all whom it may concern:

Be it known that I, CECIL WHEATLEY STANCLIFFE, a subject of the King of Great Britain, and a resident of the city of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Indicators, of which the following is a specification.

My invention relates to improvements in indicators, with more particular reference to indicating or measuring the height of water, oil or other fluids of known specific gravity in storage tanks, and the object of my invention is to devise a simple and inexpensive means whereby the height of such fluids in a tank may be found at will in a quick, easy and convenient manner without having to go to the tank itself to sound same, as is the common practice at the present time, and which means is capable of being adapted, with equal facility for use with fluids having different specific gravities.

I attain this object by the construction illustrated in the accompanying drawings in which—

Figure 1 is an assembled view of my device.

Fig. 2 is a sectional side elevation of my device taken on the line *a*—*b* in Fig. 1.

Fig. 3 is a modification of the device, shown in part section.

Fig. 4 is a view showing a modified arrangement of the pressure creating means indicated in Fig. 3.

Similar figures of reference indicate similar parts throughout the several views.

1 indicates the stationary portion or base of the device, formed preferably as shown in Figs. 1 and 2, and provided with the bolt or stud holes 2, by means of which it may be secured in any approved situation. On the face of this base 1 is mounted a swingable cup shaped member 3, which member is pivotally secured to the base by means of the spigot 4 which passes rotatably through an opening 5 in the base, the spigot being retained therein by means of the washer 6 and set screw 7. The lower end of the member 3 is extended and provided with an arc-shaped slot 8 concentric with the center of swing of the member, as hereinafter described, which slotted portion is provided with an index finger 9 and co-acts with an arc-shaped graduated scale 10 inserted in or mounted on the base 1. The swingable member 3 is held in any position to which it may be swung by means of a stud 11 provided with a washer 12 and wing nut 13, as shown in Fig. 2, or by any other suitable means.

Secured to the face of the cup shaped member 3 at a suitable inclination is a scale piece 14 provided with graduations as indicated in Fig. 1, and a groove 15, in which groove is disposed a glass tube 16, which tube is open at both ends. The lower end of the groove 15, and therefore, the lower end also of the tube 16, is in communication with the chamber or cup 17 of the member 3 by means of a bore 18 as shown in Figs. 1 and 2. The upper end of the tube 16 is open to the atmosphere, being fitted, however, with a ball valve 35, which permits the escape of air while preventing the exit of mercury under excess of pressure caused by exerting undue force on the pump, and the tube is covered for its entire length by a strip of glass 19 through which the graduations on the scale piece 14 are clearly visible.

The cup 17 is provided with an opening at a suitable height from the bottom, from from which opening a pipe 20 is led to the tank, a portion of the tank being indicated by 21 in Fig. 1. The lower end of the pipe inside the tank, 22 in Fig. 1, is carried close to the bottom of the tank while its upper end is formed of flexible tubing, as indicated at 23 in Fig. 1, to allow of the swinging movement of the member 3 when the device is being adjusted to measure fluids of different specific gravities, as hereinafter explained.

The upper end of the cup 17 is threaded internally for the attachment of a suitable non-return valve and hand pump attached thereto, 24 and 25 respectively, but it will, of course, be clearly understood that any suitable means of creating pressure in the cup 17 and of preventing its return therefrom may be employed.

A spirit level 36 is supported on the base 1, as shown in Fig. 1, in order that the device may be accurately set in a vertical position.

Having thus indicated the principal parts of my invention I will now describe the manner in which it operates.

In the practical application of my device it is assembled as shown in Fig. 1, the base 1 being in the vertical position and the cup 17 then containing a sufficient amount of a suitable indicating fluid, such as mercury by itself or mercury and a lighter fluid floating on the surface thereof, such as glycerin, as will be referred to hereinafter. When it is desired to find the height of fluid in the tank, air is pumped thereinto through the chamber 17 and the pipe 20 by a few strokes of pump 25, the air pressure thus created forcing the fluid out of the pipe 22 and causing the air to bubble up through the fluid until the air pressure in the cup 17 is equal to the head of fluid in the tank, that is to say, the ultimate pressure in the cup 17 will be equivalent to the head or depth of the fluid in the tank, since when this pressure is reached, it cannot be increased, as the excess air then escapes through the vent hole common to all such tanks. The indicating fluid 35 in the cup will be forced by the pressure along the tube 16 as the pressure increases, and as the scale piece 14 is graduated in feet and inches corresponding to different air pressures, the height marked on the tube opposite the level of the mercury or the gylcerin, as already mentioned, when the ultimate pressure is reached will be the height of the fluid in the tank.

The manner in which the device is applicable to fluids of different specific gravities may be described as follows: If the device were always to measure the same fluid the tube 16 and cup 17 could be made stationary, the length of the tube, the graduations, and the inclination of the scale piece 14 being then in accordance with the known specific gravity of the fluid. However, where one such device is installed to serve a number of tanks containing fluids of different specific gravities, it will be apparent that a scale the graduations of which would be suitable for the fluid having one specific gravity would not be feasible for a fluid having a different specific gravity. By providing for varying the inclination of the tube, however, so that the rise of mercury therein will be uniform, irrespective of the specific gravity of the fluid being measured, the same graduated scale may be used for the different fluids. This will be clear from the following explanation:—Starting with a specific gravity of 1, a constant is obtained by experiment for a rise of mercury in the tube which will correspond to one foot depth of fluid in the tank with the tube inclined at an angle of 30° from the vertical. This constant is then used to obtain the various angles at which the tube must be inclined for the constant to be applicable to the different specific gravities of the fluids. This constant is found to be 1.765 inches at an angle of 30°, that is to say, the mercury will rise in the tube 1.765 inches for every foot depth in a tank of a fluid having a specific gravity of 1. In the same way it will rise 1.765 inches for every foot depth in a tank of a fluid having a specific gravity of .9, the inclination of the tube being 26° 45′;—1.765 inches per foot depth, specific gravity of .8, and tube inclination 23° 35′, and so on. The graduated scale 10 being prepared accordingly, it will be seen that, in order to measure various fluids having different specific gravities, all that is necessary is to slacken off the wing nut 13 and swing the member 3 to the required angle corresponding to the specific gravity of the fluid, as per graduated scale 10, and apply the air pressure in the manner already described.

It will be noted that earlier in the foregoing description, I have referred to the indicating fluid as consisting of either mercury by itself or mercury and a lighter fluid such as glycerin, floating on the surface thereof. Now, in any tube, the height to which the mercury can be forced depends on the head of the fluid in the tank, and it is often hard to utilize a suitable vertical length of scale, owing to the fact that, when mercury alone is used, it will only rise .88 inches per foot depth of water in a tank. This difficulty, I overcome by constructing my device with an inclined scale in accordance with Figs. 1 and 2 and the foregoing description relating thereto.

However, in some cases, particularly in motor car use, the vertical scale is more applicable and suitable than the inclined scale and, therefore, to obtain an equivalent result in accordance with the conditions of use, I construct my gage in the modified form as shown in Fig. 3.

This construction consists of a graduated scale piece 26 carrying a tube 27 the lower end of which is enlarged, as at 28, and inserted in the cup 29, and immersed in the indicating fluid, which cup is connected to the tank by means of the pipe 30 and is provided with a suitable air pump 31 and non-return valve 32, all as shown in Fig. 3. The pump may be simply a rubber bulb and the non-return valve similar to those in common use in bicycle tires.

The indicating fluid in this case consists of mercury 33 and glycerin 34 which floats on the surface of the mercury. On pumping up, as hereinbefore described, the mercury rises slightly, but in so doing it displaces a determined quantity of the glycerin, which runs up the glass to the proper graduation. Such movement of the glycerin is decided by the proportion which the diameter of

the enlarged end 28 of the tube has to the diameter of the smaller portion of the tube.

It may be here mentioned, that although a non-return valve is indicated throughout this specification, this does not imply that it is absolutely necessary to use a non-return valve of a mechanical type, as, for tanks holding small depths of fluid, the non-return valve can simply consist of letting the delivery end of the air pump be below the mercury, which in this case forms the seal or non-return valve.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention, within the scope of the claims, constructed without departing from the spirit or scope thereof, it is intended that all matter contained in the accompanying specification and drawings shall be interpreted as illustrative and not in a limiting sense.

What I claim as my invention is:—

1. In a device of the class described, the combination with a tank of liquid, of a pivotally adjustable chamber containing suitable liquid and having a scale tube extending outwardly therefrom, said chamber being provided above the liquid therein with a tubular connection the lower end of which extends below the surface of the liquid in the tank, and means for creating air pressure in the chamber above the surface of the liquid contained therein.

2. In a device of the class described, the combination with a tank of liquid, of a pivotally adjustable chamber containing suitable liquid and having an inclined scale tube extending outwardly therefrom, said chamber being provided with a flexible tubular connection above the liquid therein the lower end of which extends below the surface of the liquid in the tank, means for creating air pressure in the chamber above the surface of the liquid therein, and means for holding the chamber in any pivotally adjusted position.

3. In a device of the class described, the combination with a tank of liquid, of a chamber containing suitable liquid, provided with an inlet opening and having a tube extending outwardly therefrom, a tubular connection above the liquid therein and extending from said chamber to below the surface of the liquid in the tank, means connected to the said inlet opening for creating air pressure in the chamber above the surface of the liquid therein, and means whereby the angle at which said chamber is normally supported may be varied.

4. In a device of the class described, the combination with a tank of liquid, of a chamber containing suitable liquid and having a tube extending outwardly therefrom, said chamber being provided with a tubular connection above the liquid therein and extending from the chamber to below the surface of the liquid in the tank, means for creating air pressure in the chamber above the surface of the liquid contained therein, and automatic valve means for preventing discharge of liquid from the upper end of the tube, said valve means being adapted to be raised by excessive air pressure within the tube.

5. A tank of liquid to be measured and a gage therefor comprising, in combination, a complete scale tube having a light liquid contained therein, a chamber for said tube secured to the side thereof, the lower end of the tube having a communicating passage to the chamber, mercury contained in the chamber adapted to seal the passage to the tube whereby the light liquid in the tube is supported by the mercury, and manual means for creating a pressure upon the mercury equal to the head of the liquid to be measured in the tank.

6. In a device of the class described, the combination with a tank of liquid, of a chamber supported for angular adjustment and containing suitable liquid, said chamber having an inlet opening and an extension the lower end of which is provided with an arc-shape slot concentric with the center of swing of the chamber, a suitably supported graduated scale with which the slotted portion of the said extension co-acts, means for securing said chamber in any position to which it may be swung, a tube extending outwardly from the chamber, means connected to the inlet opening of the chamber, for creating air pressure in the chamber above the surface of the said liquid, and a tubular connection extending from the chamber to below the surface of the liquid in the tank.

7. In a device of the class described, the combination with a tank of liquid, of a chamber supported for angular adjustment and containing suitable liquid, said chamber having an inlet opening and an extension the lower end of which is provided with an arc-shape slot, a suitably supported graduated scale with which the slotted portion of the said extension co-acts, means for securing the chamber in any position to which it may be swung, a graduated scale member secured to said chamber and extending outwardly therefrom, a tube carried by said scale member having its lower end communicating with said chamber, means connected to the inlet opening of said chamber for creating air pressure therein above the surface of the said liquid, and a tubular connection above the liquid therein and extending from said chamber to below the surface of the liquid in the tank.

8. In a device of the class described, the

combination with a tank of liquid, of a pivotally adjustable chamber containing suitable liquid and having a scale tube extending outwardly therefrom, said chamber being provided with a flexible tubular connection above the liquid therein the lower end of which extends below the surface of the liquid in the tank, means for creating air pressure in the chamber above the surface of the liquid therein, and means for holding the chamber in various pivotally adjusted positions.

Dated at Toronto, Ont., this 13th day of July, 1915.

CECIL WHEATLEY STANCLIFFE.

Witnesses:
M. EGAN,
D. RICE.