March 8, 1938. F. J. RENNER 2,110,490

SPECIFIC GRAVITY COMPENSATING FLOAT FOR LIQUID LEVEL INDICATORS

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Fig. 3

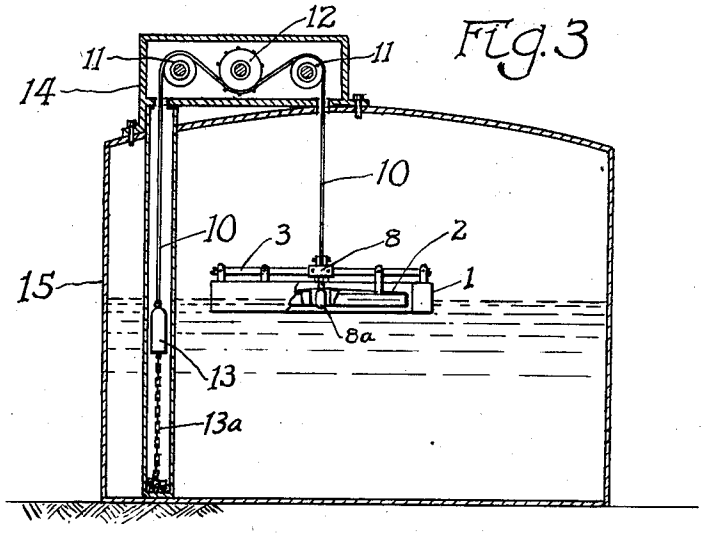


Fig. 1

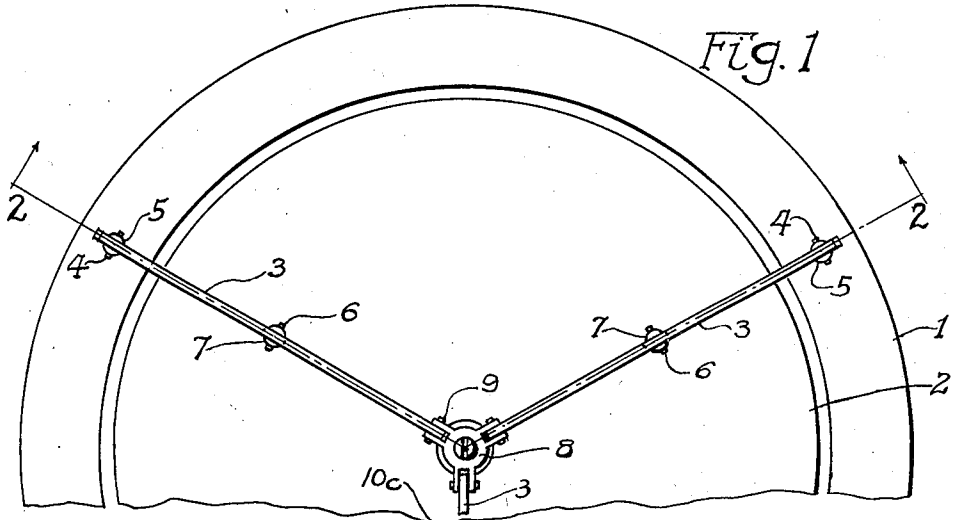
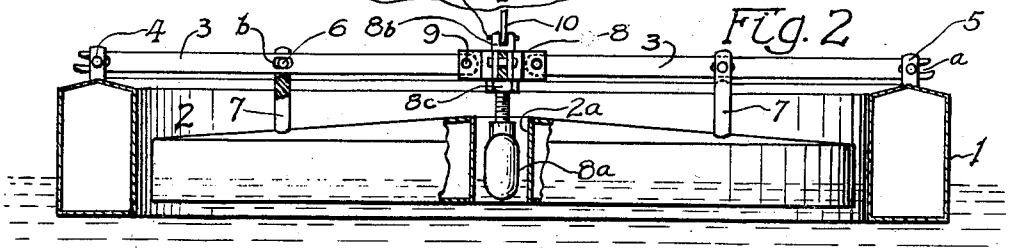


Fig. 2



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SPECIFIC GRAVITY COMPENSATING FLOAT FOR LIQUID LEVEL INDICATORS

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2 Claims. (Cl. 73—321)

This invention relates to buoyant devices, and particularly to compensating buoyant devices, used as the actuating unit for liquid level indicators, and particularly to a device of the character described, where such compensation may be required because of possible changes in depth of immersion due to certain changes in specific gravity in the liquids in which said buoyant devices are floated.

One object of the present invention is to provide an actuating device for a liquid level indicator through the use of a balanced flexible agent, when the said indicator is located remote from its actuating unit.

Another object of the invention is to provide a more stable form of actuating unit when such stability is greatly increased because of a novel arrangement whereby no part of said device is required to maintain said flexible agent balanced.

Another object of the invention is to provide a more positive means of actuating a balanced flexible agent that is being used as a motive force for a liquid level indicator.

Another object of the present invention is to provide a novel construction and arrangement for automatic adjustment of a buoyant device, when such adjustment is necessary due to certain changes in density in the liquid in which said invention is being used.

A further object of the invention is to provide a novel means of maintaining a certain part of the balanced flexible agent constant, when that part is operatively related to the buoyant device employed as its actuating unit.

A still further object of the invention is to improve devices of the character described, in sundry details hereinafter referred to, and particularly pointed out in the appended claims.

One embodiment of the present invention is shown for illustrative purposes in the accompanying drawing, in which:

Fig. 1 is a fragmentary view of the present invention as it would be seen from a point directly above it when the present invention would be floated in a liquid;

Fig. 2 is a fragmentary, elevational view of the structure illustrated in Fig. 1, and taken substantially as indicated by the lines 2—2 thereof;

Fig. 3 is a sectional, elevational view of a tank or container with the float immersed therein, illustrating a preferred method of mounting a tank unit therein together with operating devices forming a part of the present invention, and showing particularly the balanced flexible agent used in connection with the float.

Referring particularly to Fig. 1, the present invention contemplates an outer float, indicated as a whole by the numeral 1, and being shown in the present instance as a ring which completely surrounds another float, shown in the present instance as a disk, and designated by the numeral 2. (These floats are constructed preferably of a noncorrosive material.) The outer float 1 and the inner float 2 being joined by means of levers shown in the present instance as long arms 3, adapted to be mounted preferably on the top of both the outer float 1 and the inner float 2 by means of a pin 4, to a standard 5 shown in the present instance as an upright, rigidly mounted upon said outer float 1 and preferably slotted so as to better receive any of said levers. The same lever 3 being mounted upon the inner float 2 by means of a pin 6, to a standard, shown in the present instance as an upright 7, and slotted to contain said lever 3, which then continues to extend preferably to a center plate arrangement and shown in the present instance as a toggle 8 to which all the arms 3 converge and are joined, preferably pivotally by means of pins, one of which is designated by the numeral 9.

To provide further for the proper operation of the multiple levers 3, by means of the pins 4 and 6, the slots *a* and *b* in the levers 3 wherein these pins are contained, may be of such shape as to further insure a free movement of the levers 3, within the standards 5 and 7, at all times.

For insuring efficient operation of the levers 3, the uprights 5 and 7 should be of suitable height to allow the levers 3 to properly position at the point of convergence at the center plate 8 directly above the point of equilibrium of the inner float 2.

Referring to Fig. 2 it will be noted that if the outer float is so positioned that the center of the pin 4 will be on a direct horizontal line with the pin 6, then if this same line is continued, it will also pass through the center of the pin 9.

As previously mentioned, the present invention is intended to provide a device, whereby one certain point 8 is to be maintained constant, whenever any changes in density within a certain range take place in the fluid in which said device is floated.

In the present instance it will be noted that the point to be maintained constant, corresponds with the toggle 8.

Whereas the outer float 1, and the inner float 2 vary in position when some of their floating

characteristics are considered, then whatever change arises in the liquid, as for instance when the specific gravity of the liquid is greater or less, this change will affect the depth of immersion of each float to such a degree as may be affected, due to a difference in their respective characteristics. As an example, let us suppose that the outer float 1, and the inner float 2, are of the same weight, but the horizontal cross sectional area of the inner float 2 is twice as great as the horizontal cross sectional area of the outer float 1, then when both are floated in the same liquid, the depth of immersion of the outer float 1, will be twice as great as the depth of immersion of the inner float 2.

Now let us suppose that a change has taken place in the density of the liquid in which these floats are placed. When this occurs, we find the outer float 1 moving up or down in the liquid (depending upon the specific gravity) in a ratio of two to one, or twice the movement up or down of the inner float 2. It is understood that the ratio arms 3 are so pivoted in proportion, that point 8 remains constant, regardless of the up and down movement of the two floats.

In devising floats for the indication of liquid levels whereby the said liquid level is to be indicated by a receiving device remote from the container containing the float, we have found that considerable difficulty has been encountered in recording the proper liquid level, due to the varying specific gravities of the liquids in which the float rests. The present invention automatically compensates for changes in specific gravity when used in connection with said remote recording devices. Due to the novel arrangement of this compensating float point 8 previously mentioned, will always remain in an absolute, fixed position regardless of the nature of the liquid in which the float rests.

Obviously in any case when a float is employed in measuring liquid levels in containers, it is essential that a perforated tape or ribbon 10 be attached to said float at point 8, in order to register the rise or fall of the liquid level and operatively engage with a tank indicating unit 14 at top of tank 15.

In the present invention the said tape 10 is attached to toggle 8 by bolt 8b, pin 10c, and nut 8c. This tape 10 passes over two idlers 11 and under a pin wheel 12 of the indicating mechanism 14. The other end of tape 10 is attached to the bell-like member 13.

Inner float 2 has a vertical, cylindrical opening 2a in its center to allow for the suspension of a toggle weight 8a secured to toggle 8 by bolt 8b and nut 8c. Said toggle weight 8a is of such weight as to perfectly balance the weight of the bell-like member 13 which together with the tape 10 constitute what has been heretofore referred to, as the balanced flexible agent.

As the float unit moves up or down in the liquid, the tape 10 will always remain in tension due to the perfect balance of the toggle weight 8a and the bell-like member 13, and thereby the tape 10, being in perfect balance with the chain 13a attached to the bell-like member, will move up or down only insofar as it is propelled by the movement of the float unit, thus accurately operating the indicating device 14 at the top of the tank 15.

It will be observed from the foregoing description, that the present invention provides a novel construction and arrangement, whereby a balanced flexible agent that is being used in conjunction with a liquid level indicator, may be more positively motivated, and that it will also be maintained in a constant position in respect to the level of a liquid, irrespective of certain changes in density that may take place in the liquid, due to rise or fall occasioned by changes in specific gravity.

Obviously the present invention is not limited to the precise construction and arrangement shown and described, as the same may be variously modified in order to meet certain conditions where the ratio of the different units may have to differ due to certain requirements.

What I claim as new and desire to secure by Letters Patent is:

1. In a liquid level indicator, a float, said float comprising concentric annular members of different densities whereby variations in the specific gravity of the liquid cause relative movement between the floats, radially spaced arms interconnecting said members and movable in accordance with the relative movements of said floats, said arms extending from a common point at the center of said members, means interconnecting said arms at said common point, and indicating means including a tape, said tape being connected to said interconnecting means.

2. In a liquid level indicator, a compensating buoyant device comprising concentric annular floats of different densities whereby variations in the specific gravity of the liquid cause relative movement between the floats, means interconnecting said floats including radially spaced arms extending from a common point at the center of said annular members and a center plate at said common point, the arms being movable in accordance with the relative movements of the float in such a way that the level of the center plate remains constant, irrespective of any variations in the specific gravity of the liquid in which said device is floated, and indicating means attached to the center plate.

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