June 23, 1936. A. C. HOWARD 2,044,882

MERCURY TUBE ELECTRIC CIRCUIT CLOSER

Original Filed March 25, 1932

Fig. 1.

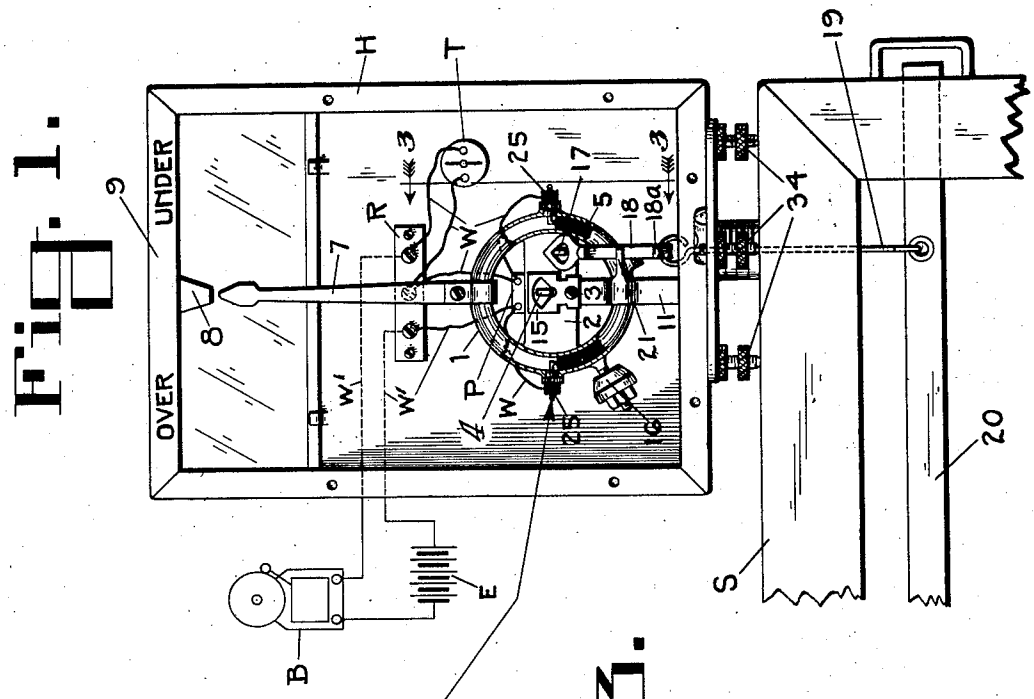


Fig. 2.

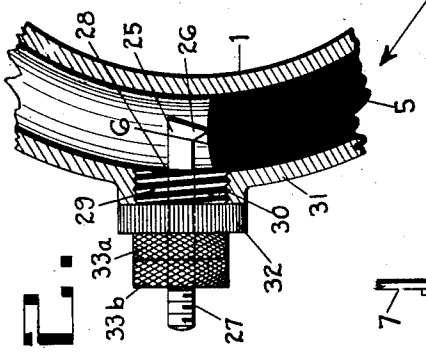


Fig. 3.

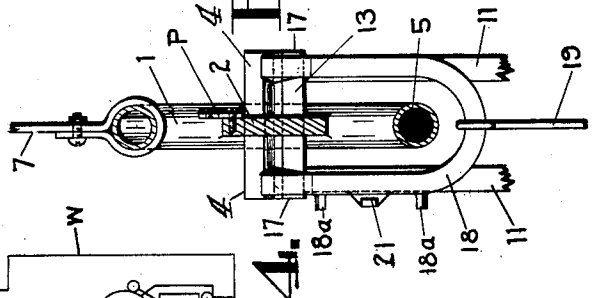
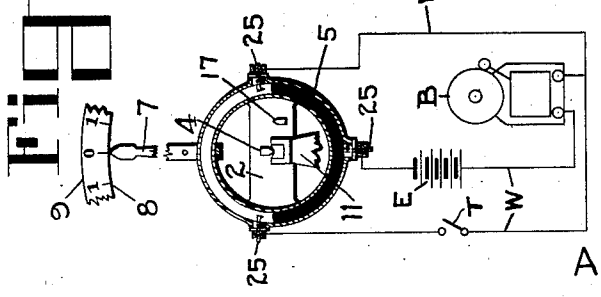


Fig. 4.



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MERCURY TUBE ELECTRIC CIRCUIT CLOSER

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Original application March 25, 1932, Serial No. 601,148, now Patent No. 2,014,282, dated September 10, 1935. Divided and this application October 20, 1933, Serial No. 694,457

1 Claim. (Cl. 200—52)

This invention relates to improvements in mercury tube electric circuit closers especially for use in conjunction with the mercury tube indicator control covered by my co-pending patent application Ser. No. 601,148, filed March 25, 1932, of which this application is a division now Patent No. 2,014,282 issued September 10, 1935.

The mercury tube indicator control referred to provides a structure consisting of one or more pivotally mounted annular tubes carrying an indicator, being partially filled with mercury and forming a mercury column therein and adapted thereby to dampen the oscillations of the indicator.

Therefore, the primary object of the present invention is to provide the mercury tube with electrical contact means designed to contact with the ends of the column of mercury in the tube and thereby energize an electrical circuit to operate a solenoid or other electrical mechanism as may be desired.

Another object is to provide the mercury tube with electrical spaced contact members extending within the tube, adjustably mounted therein and provided with means for locking the contact members in their adjusted position.

Still another object is to provide an insulated mounting for the contact members adapted to co-operate with the adjusting and locking means.

In the accompanying drawing there is illustrated a preferred embodiment of the invention, in which,—

Figure 1 is a vertical elevation of the indicator housing in position on the scale frame with the co-operating scale mechanism, showing the electric circuit closer in the mercury tube, partly in section, together with the electrical connections.

Figure 2 is an enlarged fragmentary view of a part of Fig. 2 indicated by the arrow point, showing the electric contact member and co-operating parts.

Figure 3 is an enlarged, fragmentary view on the line 3—3 of Fig. 1, showing the position of the mercury tube and its mounting.

Figure 4 is a detached view in vertical section of the mercury tube electric circuit closer, showing the control as applied to the tube for operation at a particular position to close the circuit at that point.

In the drawing 1 designates an annular tubular member made preferably of metal or other suitable material mounted on a cross-arm 2, integral therewith and mounted on a pivot 4 seated on a standard or support 3. The tube is partially filled with mercury forming a column 5, the ends 6 of which are level with the pivot 4, and the mercury tube 1 is also provided with an adjustable counterbalance weight 16. An indicator 7 is mounted on the mercury tube 1 and co-operates with the graduations of the chart 9, the whole mechanism being enclosed in the housing H mounted on the scale frame S.

The mercury tube electric circuit closer is designed for co-operation with a mercury column 5 carried in an annular tube 1 as described in the above referred to co-pending application, and is adapted to control the operation of a circuit for any special purpose desired, its operation varying in accordance with the location of the contact members in the wall of the mercury tube 1. The electric circuit closer comprises two spaced, longitudinally adjustable contact members 25, each provided on the inner end with a depending, pointed contact tip 26, whereby each tip may be adjusted and positioned longitudinally on the crest of each mercury column at the proper point to insure synchronous co-action of the opposed contact tips in closing the circuit at the proper moment. The outer end of each contact member 25 is provided with a threaded portion 27 inserted in a threaded opening 28 in an insulating member 29 mounted in a threaded opening 30 in the outer wall 31 of the metal tube 1. The insulating members 29 are provided for adjusting purposes with a knurled cap 32 and knurled lock and adjusting nuts 33a and 33b respectively, mounted on the outer end of the contact members 25, which serve to secure and hold the contact members fixedly in position. If so desired, adjustable leveling screws 34 may be used to adjust and maintain the housing H in a level position.

The electric circuit comprises wires W attached to each contact member 25 and leading to a circuit centralizing insulator plate P mounted on the cross arm 2 and hence to the central insulator plate R attached to the housing H above the tube 1. Wires W' lead from the central insulator plate R to the battery or other source of electrical energy E and to an electric bell B, for example, while wires W lead to a manually operated battery circuit switch T controlling the opening and closing of the main circuit from the battery E. The contacts 25 may be placed in the tube 1 at any point above the surface 6 of the mercury column 5, as shown in Fig. 4, so as to function at that particular point in closing the electrical circuit and operating such electrically operated mechanism as may be desired and hereinafter described.

In operating the mercury tube as an indicator control, when the beam 20 has been adjusted to weigh a given or predetermined weight, the mercury column 5 is adapted to flow around in the tube 1 as the indicator 7 and the tube 1 are turned in one direction or the other by the loop member 18 under the influence of the beam 20 in accordance with the load. As the proper weight of the load is reached with the consequent movement of the beam 20 to the balance or zero position the mercury column 5 gravitates to the under side of the tube 1, the indicator 7 returning to its balance or zero position, as shown in Figs. 1 and 4.

However, in the operation of the electric circuit closer, an exemplification of which as applied to an electric bell is illustrated in Fig. 1, the contact members 25 are arranged in contact with the upper surfaces 6 at each end of the mercury column 5, so that the bell will ring only when the indicator 7 comes to rest at the balance position of zero and thus, for example, indicating to an inspector or other official at a distance that the proper weight of the load has been placed on the scale.

The main battery circuit switch T is closed before the load is placed on the scale, thus closing the entire circuit. During the loading of the scale the indicator 7 moving to one side or other of the zero or balance position and the mercury column 5 flowing around in the tube 1, so as to free one end of the mercury column 5 from contact with its co-operating contact member 25, will open the circuit, which will be held open until the indicator 7 reaches the zero or balance position as previously described.

In this particular arrangement for use in connection with an over and under indicator (Fig. 1), the contact members 25, it will be noted, are in contact at each end of the mercury column 5 when the circuit is closed and the indicator is at zero and open when the indicator goes to either side of zero. Thus when closed the electric circuit, which is entirely insulated from the metal parts co-operating with the tube, passes through the mercury column 5, which then acts as a connecting medium with the electric source during a weighing operation in accordance with the position of the ends 6 of the mercury column 5.

However, when the mercury tube electric circuit closer is used on certain types of dial scales for the purpose of operating at a particular weight indication or various weight indications of the scale indicator, so as to close the circuit and thus energize the desired electrically operated mechanism such, for example, as a magnetic switch or relay to produce a desired result, or to light a lamp or otherwise effect a signal for the particular indicator position. In this application of the invention, as shown in Fig. 4, one contact member 25 is located in the base of the tube 1 and the other contact member or members 25 may be located at the desired position or positions so as to close the circuit at those particular points and operate the electrically operated mechanism associated therewith.

While I have shown a preferred embodiment of my invention it is evident that modifications of the invention may be made that will come within the scope of the invention and, therefore, I do not desire to limit the invention to the exact form of construction shown and described herein.

I claim:—

In a mercury tube electric circuit closer, an annularly disposed tube provided with an indicator and a cross arm concentrically mounted around a pivotal point of support, the tube being partially filled with mercury forming a mercury column therein and constituting connecting means with a source of electrical energy adapted to operate electric mechanism in circuit therewith, circuit closing means adapted to provide synchronous co-action of spaced longitudinally adjustable contact members disposed in the said electrical circuit and extending within the mercury tube and connected with the said circuit, one contact member being in contact with the mercury column and the other contact member moving with the tube until it contacts with an end of the mercury column to close the electrical circuit and thus operate the said electric mechanism, and a depending pointed contact tip on each contact member held in adjusted position by the contact member and adapted to engage the crest of the co-operating mercury column and thus close the circuit at the proper moment.

ALFRED COLQUITT HOWARD.