April 26, 1932. H. R. GUINOT 1,855,959

AUTOMATIC SWITCH WITH MEMBRANE

Filed July 1, 1930 3 Sheets-Sheet 1

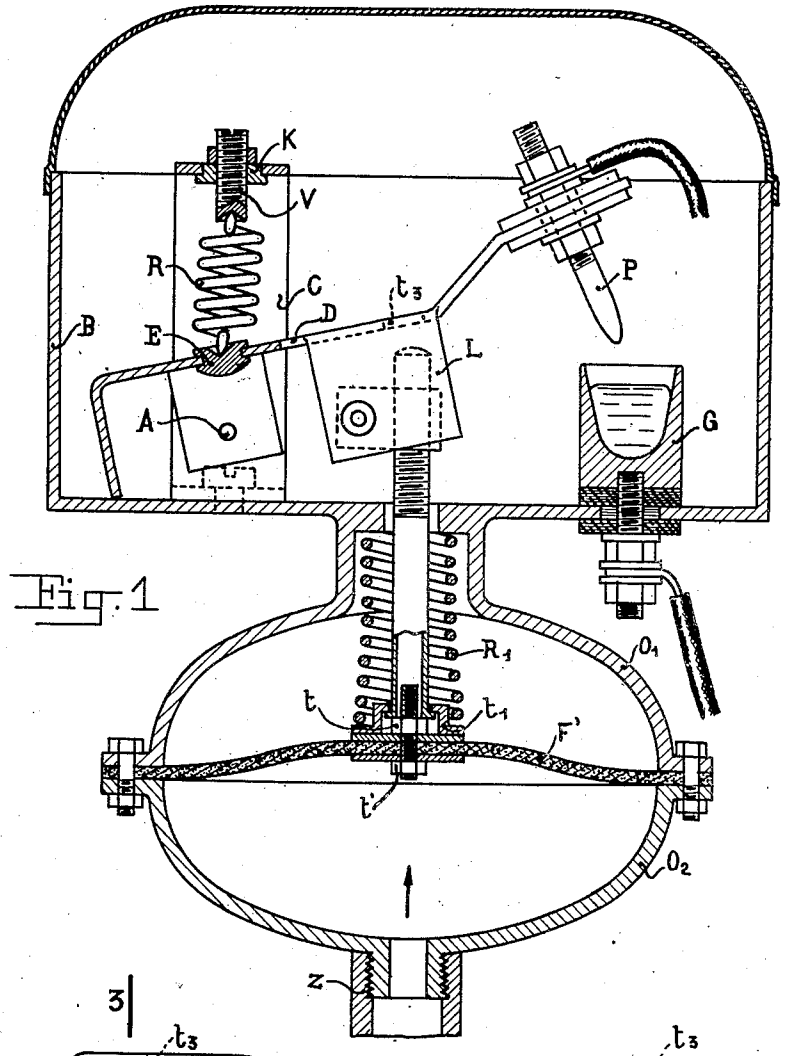


Fig. 1

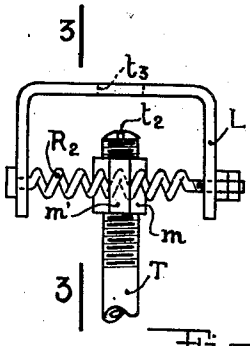


Fig. 2

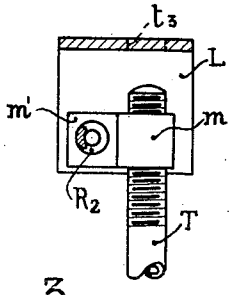


Fig. 3

Inventor
Henry Raphael Guinot
By B. Singer, Atty.

April 26, 1932. H. R. GUINOT 1,855,959

AUTOMATIC SWITCH WITH MEMBRANE

Filed July 1, 1930 3 Sheets-Sheet 2

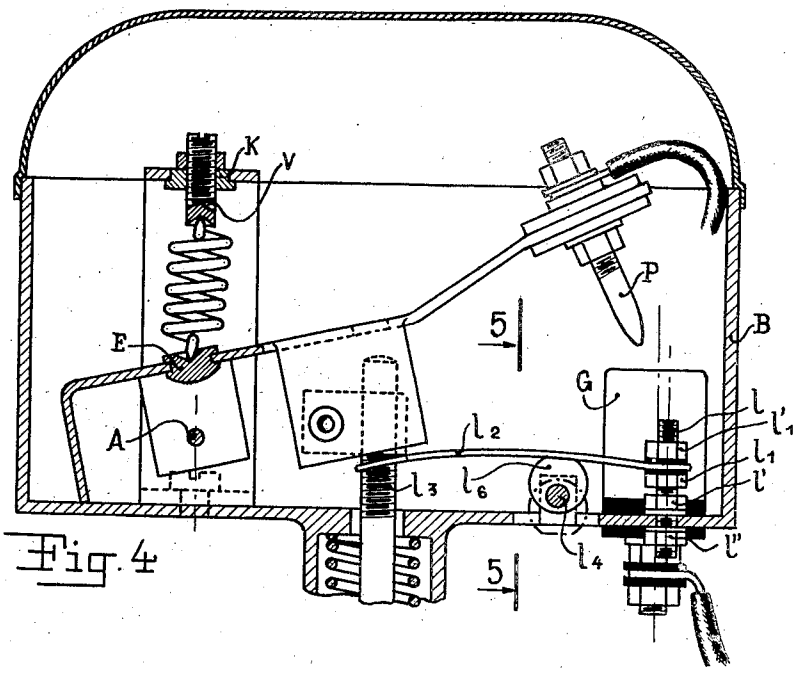
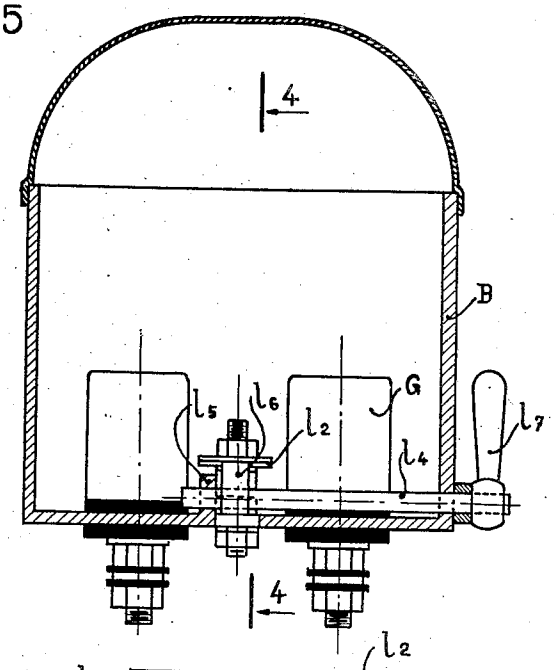


Fig. 4

Fig. 5



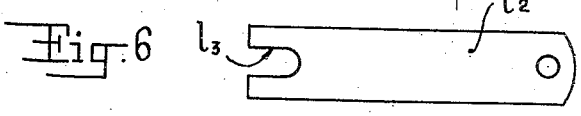


Fig. 6

Inventor
Henry Raphael Guinot
By B. Singer, Atty.

April 26, 1932. H. R. GUINOT 1,855,959

AUTOMATIC SWITCH WITH MEMBRANE

Filed July 1, 1930 3 Sheets-Sheet 3

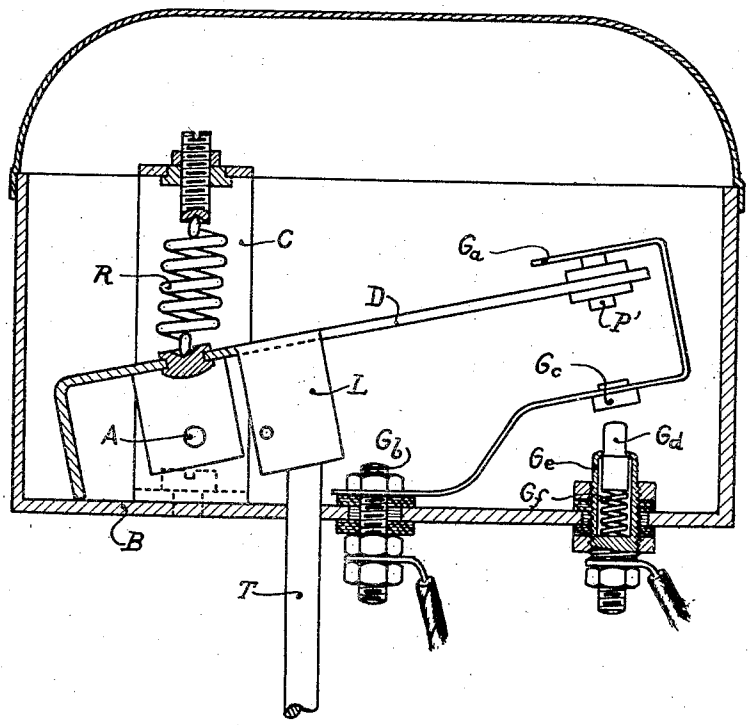


Fig. 7

Inventor
Henry Raphael Guinot
By B. Singer, Atty.

Patented Apr. 26, 1932

1,855,959

UNITED STATES PATENT OFFICE

HENRY RAPHAËL GUINOT, OF CIEL, NEAR VERDUN-SUR-LE-DOUBS, FRANCE

AUTOMATIC SWITCH WITH MEMBRANE

Application filed July 1, 1930, Serial No. 465,203, and in France January 11, 1930.

The present invention has for its object to provide an improved automatic switch with membrane operation by the pressure of any fluid and more particularly of a liquid.

The said switch comprises, an oscillating member carrying the connecting parts, mounted on an axis or knife edge and on which is applied an additional force adapted to hold said member in each of the two extreme positions assumed thereby when operated.

To obtain this result a spring bears on a first cup formed in a contact fast on the oscillating member and on a second cup provided at the base of a screw lodged eccentrically in a cylindrical block carried on a suitable support. The rotation of the cylindrical block has for effect to displace the upper bearing point of the spring in relation to the vertical axis on each side of which the oscillating member can then be held.

The oscillating member is actuated by a resilient membrane of rubber, metal, or other suitable material adapted to control the pressure of the fluid. It is directly connected to said membrane by a rod mounted on the oscillating member through the intermediary of an adjustable spring stretched between the cheeks of a stirrup arranged beneath said member.

Said connecting rod is adjustable in length to permit of rapidly regulating the action of the apparatus by reason of the pressure or vacuum produced thereby.

The oscillating member can, moreover, be rendered stationary by a locking device which prevents the closing of the circuits.

Finally, the contact members, generally in the form of cups containing mercury, are obtained by means of pistons with springs or blade springs contacting with a flexible blade displaced by the oscillating member.

The invention will be better understood by reference to the following description and accompanying drawings in which:

Fig. 1 is a central sectional view of the apparatus;

Fig. 2 is a detail front elevation of the junction arrangement for the membrane with the oscillating member;

Fig. 3 is a detail section of the same taken on the line 3—3 of Fig. 2;

Fig. 4 is a central sectional view of a modified form of the apparatus provided with means for holding the oscillating member, taken on the line 4—4 of Fig. 5;

Fig. 5 is a similar view of the same taken on the line 5—5 of Fig. 4;

Fig. 6 is a detail plan of the holding or locking fork;

Fig. 7 is another modified form of the sectional view of an apparatus provided with solid contacts.

My improved switch apparatus comprises a box or casing B to the bottom of which is secured a stirrup C through which passes the axis A for the oscillating member D. This latter carries the contact point P which plunges into the mercury cups G.

On the oscillating member D the coiled spring R bears, the ends of which rest in the cups of contact E and of the screw V traversing the cylindrical block K which is housed and held in the upper part of the stirrup C.

The spring R is mounted slightly eccentrically and the cup of the screw V likewise presents an eccentric part in such manner as to cause the direction of the effort of the spring to be in a vertical plane passing through the axis A.

The oscillating member D can swing very easily on said axis A and can only hold its lowered position either on one side or on the other by reason of the action of the spring R.

Under the casing B is cast therewith a shell O_1 with which is assembled a second shell O_2.

The lower shell O_2 of the casing has a screw-threaded boss on which is connected an inlet conduit z for fluid of any kind such as air, water and so on, under pressure.

Between the two shells O_1 and O_2 is securely held a membrane F′ of rubber, rubbered canvas, thin metal or any material capable of giving the required resiliency.

At the middle of the membrane F′ and secured by a locknut t' is secured a nut t. The nut t is fitted with a hood t_1 the wings of

which serve to support a spring R_1 adapted to equilibriate the pressure of the fluid for a determined value.

In the hood t_1 is expanded or flared the lower edge of the rod or tube T connected to the oscillating member D. The hood t_1 is held on the membrane F′ by the pressure of the spring R_1 and centred by the nut t. The tube T is, by reason of this fact, rendered movable with and by said membrane and can also turn in relation thereto.

According to the nature of the membrane F′ its movement can take place slowly instead of rapidly as may be desired.

For this reason, the rod or tube T has at its lower extremity a screw-threaded portion which engages a sleeve m (Figs. 2 and 3) an extension or lug of which m' is traversed by the spring R_2. The latter is secured by its ends to the sides of the stirrup L provided on the oscillating part D.

It is obvious that by means of this arrangement it is easy to vary the length of the rod T above the membrane F′ by appropriately screwing the said rod in the sleeve m.

To facilitate its screwing or unscrewing, the rod T has a slit t_a permitting the use of a screw-driver for the passage of which an opening t_3 is provided in the member D.

By screwing the rod T in the sleeve m the distance between the membrane and the part D is diminished and consequently the pressure must be stronger to act on the membrane F′ and cause the release of the part D.

On the other hand, the more the rod T is unscrewed from the sleeve m, the longer said rod becomes and the less pressure will be required on the membrane F′ to actuate the apparatus.

Hence it is easy to provide an exact regulation of the pressure at which the apparatus has to work.

In certain cases it is necessary to be able to throw the apparatus out of action. This result can be obtained in many ways.

By way of simple example, without unnecessary limitation, the locking of the apparatus may be effected in the following manner:

On the bottom of the casing B is mounted a screw-threaded rod l by means of nuts l' and l'' (Figs. 4 and 5).

On the rod l is secured at a suitable height by nuts l_1 and l'_1, a blade l_2 (Fig. 6) forming a spring and terminating at its free end in a fork l_3. This latter engages appropriately with the rod T and bears under the sleeve m which it can at will hold raised as well as the member D with which said sleeve is connected by the spring R_2.

To bring and secure the fork l_3 in its locking position an axis l_4 is provided, passing on the one hand through the casing B and carried on the other hand by a small bearing l_5 integral with the bottom of the casing, and carries a cam l_6 lifting the said fork or allowing it to fall back as will be understood.

The operation of the cam l_6 is effected by a handle l_7 secured fast at the end of the axis l_4.

It will be noted that if for any reason the locking of the switch in its open position becomes necessary, it is sufficient to bring, by means of the external handle l_7, the cam l_6 into the position shown in full lines on Figures 4 and 5.

If however it is desired to free the oscillating member D, the cam l_6 is placed in the position shown in dotted lines in Figure 4.

An inconvenience residing in the above apparatuses results from the use of mercury cups G. The transport of the apparatus is rendered difficult and emptying of the cups may occur even without their being shaken. It suffices in fact that the points P fall forcibly into the cups G to cause splashing. Moreover the points carry along, in leaving the cups, fine drops adhering thereto and hence the mercury gradually escapes from the cups.

All discharges of the mercury to the outside is avoided by providing on the mercury, a layer of oil, vaseline, or other fine oil of a thickness of about 5 mm.

Finally, to totally eliminate the use of mercury cups it suffices to use the arrangement of solid contacts such as shown by way of illustration as a simple example, in Figure 7.

In this form of construction the oscillating member D carries parts P′ insulated from the member D or made of insulating material.

These parts P′ abut in the two extreme positions of member D against the spring blades G_a in the form of a U and secured to the end of the casing B each by means of a terminal G_b, insulated from the casing B and to which one of the wires s of the motor is connected.

The spring blades G_a carry the contacts G_c which can each enter with a piston G_d housed in a contact G_e and constantly pushed back towards the top by a spring G_f. The contacts G_e are insulated from the casing B and receive the leads for the electric current.

The operation it is thought, will be readily understood. As soon as the member D swings upwardly, the spring blades G_a are struck violently by the upper part of the members P′. This action serves to briskly lift the spring blades G_a upwardly and to stop contact between them and the pistons G_d of the contacts G_e. Up to the moment where the parts P′ strike against the springs G_a it is obvious that the pistons G_d will have lifted the said springs and will have remained in close contact therewith.

The contact between the springs G_a and the pistons G_d will only be re-established when the member D swings downwardly and the parts P′ strike the springs G_a.

It will be understood that the pistons G_d

could be replaced by blade springs or by other appropriate means.

In all cases, the pistons or the spring blades must accompany the springs G_a in a part of their travel to ensure perfect contact between said parts.

The terminal G_e could moreover be placed above the springs G_a and produce the closing of the current only for the displacement of the oscillating member upwardly that is to say in a direction contrary to what has been previously described.

It is obvious that all modifications of shape and detail can be embodied in the apparatuses described by way of simple example within the scope of the appended claim.

What I claim is:

In an automatic switch, an oscillating member to support one of the contacts of the switch, horizontal pivotal support for said oscillating member, a casing, a membrane therein to be acted upon by a fluid, a rod connected with its one extremity to said membrane, a stirrup arranged beneath said oscillating member and a spring stretched between the cheeks of said stirrup, to support the upper extremity of said rod.

In witness whereof I affix my signature.

HENRY RAPHAËL GUINOT.