

April 18, 1944.

E. CHALLET

2,346,730

SWITCH FOR ELECTRO-THERMAL APPARATUS

Filed Sept. 1, 1942

2 Sheets-Sheet 1

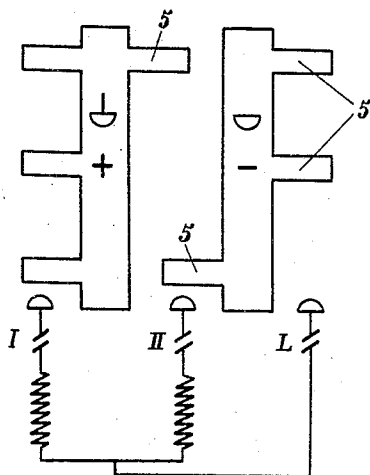
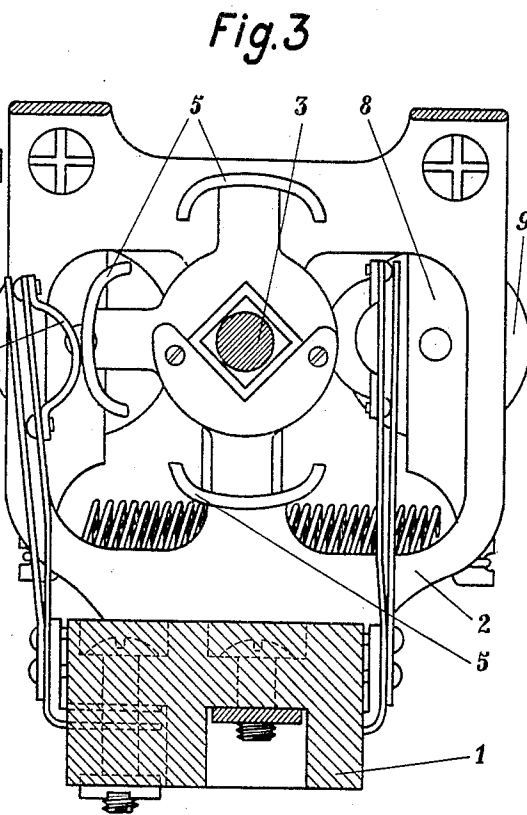
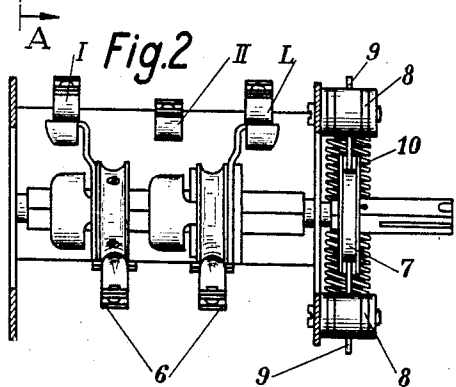
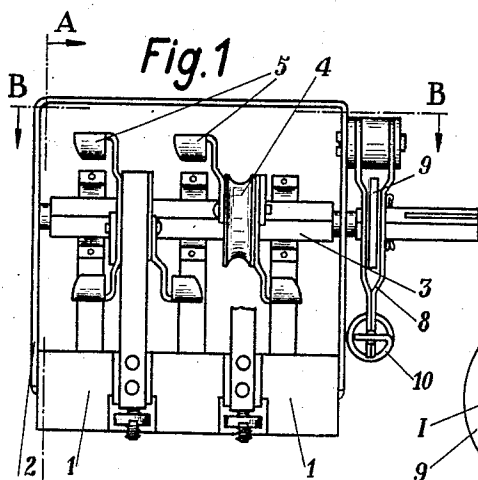


Fig. 4

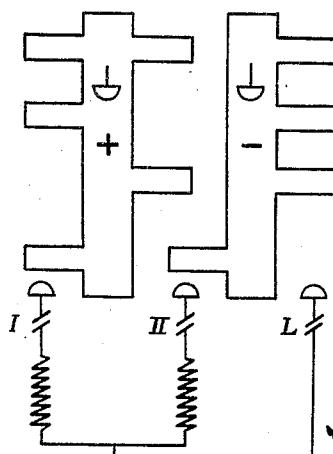


Fig. 5

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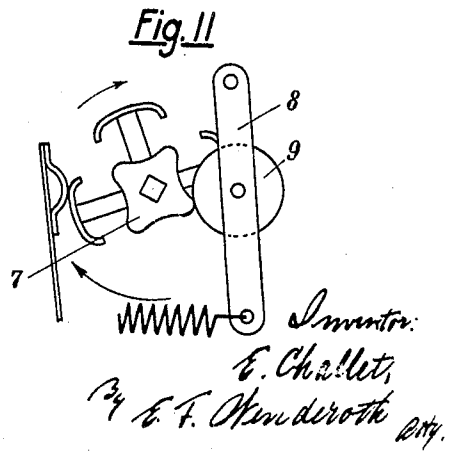
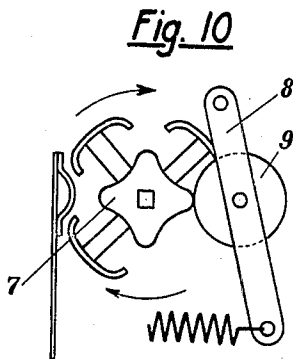
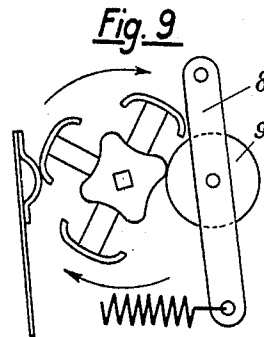
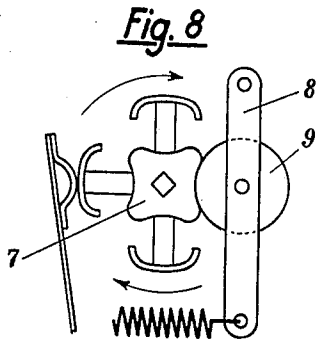
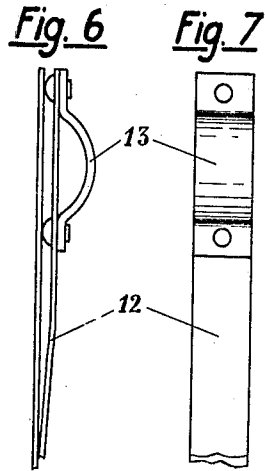
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SWITCH FOR ELECTRO-THERMAL APPARATUS

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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,346,730

SWITCH FOR ELECTROTHERMAL APPARATUS

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In Switzerland June 21, 1941

3 Claims. (Cl. 200—6)

The object of the present invention, due to Mr. Etienne Challet, is a switch for electro-thermal apparatuses, comprising fixed elastic brushes co-operating with contacts provided on a rotary shaft, which latter, in order to insure its working positions, carries an undulated cam cooperating with rollers bearing elastically on its periphery. This switch is characterized in that the shaft is provided with contacts presenting each one a segment, both ends of which are curved inwards, and which extends over an angle slightly smaller than that separating two consecutive tops of the cam, and in that the brushes cooperating with these contacts are set in such a way that they act on the curved parts of the segment a little before the rollers come to bear on the tops of the cam.

The annexed drawings represent, by way of example, an embodiment of the object of the invention.

Fig. 1 is an elevation view and Fig. 2 a horizontal section along the plane B—B of Fig. 1. Fig. 3 is a section in larger scale along the plane A—A of Fig. 1. Fig. 4 shows the wiring diagram of the switch according to the embodiment. Fig. 5 is an alternative of this diagram. Figs. 6 and 7 show a side view and an elevation view of a detail in larger scale. Figs. 8 to 11 represent another detail in four different working positions.

The embodiment shown comprises a base 1 in insulating material to which is attached a metallic U-shaped frame 2. Each one of the two vertical branches of this frame is provided with a bearing in which revolves a shaft 3 carrying two rings 4, of equal diameter, and contacts 5 mounted on both sides of each of the rings and constituted by segments having an outer diameter larger than the ring. The segment contacts on each side of the rings are displaced in respect with one another, this angular deviation being shown particularly in the diagram of Fig. 4. Two main elastic brushes 6, fixed to the base 1 on one of its sides parallel to the shaft 3, extend vertically and bear on both rings, while the elastic brushes I, II and L, mounted on the other side of the base, cooperate with the segment contacts 5. One of the ends of the shaft 3 extends beyond its bearing in the corresponding branch of the frame and carries, outside of the latter, an undulated cam 7 and an actuating knob or lever not shown.

On the branch of the frame 2 carrying the extension of the shaft 3, are mounted rotatively the upper ends of two arms 8, each of which

carries in its middle part a roller 9 cooperating with the undulated cam 7. The lower ends of these arms are linked by a spring 10 tending to bring them nearer together in such a way as to apply the said rollers constantly against the cam 7.

The three elastic brushes I, II and L, are each formed by an elastic blade 11, and by a conductive part presenting a convex portion intended to co-operate with the segment contacts 5 of the rotary shaft. The conductive part is made of a strip 12 fixed under the elastic blade, and of a U-shaped piece 13, attached by its branches on the strip and whose middle part constitutes the above mentioned convex portion.

This switch, whose diagram is represented in Fig. 4, operates in the following manner:

Both main brushes are always in contact with the two rings 4, whereas the elastic brushes, I, II and L, the first and the second one of which are connected with two equal resistances, establish an intermittent contact with the segments 5, in order to connect the said resistances in parallel or in series, or to disconnect one of these resistances, according to the angular position of the rotary shaft. The disposition of the segments and their angular deviation are chosen in such a way that there is always during these operations at least two breaks for each disconnection; this reduces considerably the breaking power and consequently avoids any spark formation.

The passage of the segment contacts from one position to the other, producing the break of the current, and the above mentioned changes of connection, are effected with a great facility, owing to the shape of the undulated cam and its disposition in relation with the segments. As it can be seen in Figs. 8 to 11, each segment contact extends over an angle slightly smaller than that separating two consecutive tops of the cam; and the two ends of the segments are curved inwards. The contacting positions between brushes and segments coincide with contacting positions between the rollers and the hollows of the cam.

In Fig. 8, one of the segments is in full contact with its brush and the two rollers (one of which only is represented) are in the hollows of the cam. If one turns the shaft in the direction of the arrow, this segment, when leaving the brush, will be pushed by the latter which will thus transmit to the rotary shaft a certain energy that helps it to pull the top of the cam under the rollers (see Fig. 9) without requiring a supple-

mentary effort from the operator. In the break position (Fig. 10) the cam is on the dead point and the rotation of the shaft goes on with the same facility. As soon as the cam is beyond the dead point, the rollers exert in their turn a strong torque on the cam, which will drive the shaft and thus greatly facilitate pushing the next segment under its brush (Fig. 11). There is therefore no unequal resistance between the segment contacts and their brushes tending to stop the rotary shaft in a half-way position, and the rotation movement of the latter is effected very quickly, owing to the successive pushing actions of the brush on the segment, at the start, and on the rollers on the cam, as soon as the latter has passed its dead point.

The extremely light construction of the elastic brushes facilitates this operation by permitting to utilize almost the whole strength of the spring blade to push the segment contact at the start and thus to pass the dead point of the cam; in addition, a very slight effort will be necessary to overcome the inertia of the brush when the segment contact is being pushed under the latter.

The rings 4 present a groove in which the ends of the brushes, in shape of sector of tore, come to bear. This disposition prevents the start 3 from sliding in its bearing and avoids the short circuit that would result therefrom.

The above described switch is not limited to the application given in the diagram of Fig. 4. It can also be constructed to realize four different connections without losing the advantage of having at least two breaks for each disconnection. This alternative, which will be realized by changing the number and the arrangement of the segment contacts 5, is shown schematically in Fig. 5. The elastic brushes I and II would be connected with two different resistances, each of which could be used singly, or which could be connected in parallel or in series.

The above description and the attached drawings are sufficient to make the object of the invention clearly understood by those acquainted with the art.

What is claimed to be new is:

1. In a combination-switch for electro-thermal apparatuses, comprising fixed elastic brushes cooperating with a contacting device mounted on a rotary shaft, which latter, in order to secure its working positions, carries an undulated cam cooperating with rollers bearing elastically on

its periphery, in combination, segment contacts mounted on said contacting device, curved inwards at both ends and extending over an angle slightly smaller than that separating two consecutive tops of the cam, the brushes cooperating with these contacts being set in such a way that they act upon the curved parts of the segment a little before the rollers come to bear on the tops of the cam.

2. In a combination-switch for electro-thermal apparatuses, comprising fixed elastic brushes cooperating with a contacting device mounted on a rotary shaft, which latter, in order to secure its working positions, carries an undulated cam cooperating with rollers bearing elastically on its periphery, in combination, segments contacts mounted on said contacting device, curved inwards at both ends and extending over an angle slightly smaller than that separating two consecutive tops of the cam, the brushes cooperating with these contacts being set in such a way that they act upon the curved parts of the segment a little before the rollers come to bear on the tops of the cam, each brush being made of an elastic blade and of a conductive part presenting a convex portion intended to cooperate with the contacts of the rotary shaft, this conductive part being constituted by a strip attached to the elastic blade and by a U-shaped piece fixed by its branches on the strip and whose middle part forms the above mentioned convex portion.

3. In a combination-switch for electro-thermal apparatuses, comprising fixed elastic brushes cooperating with a contacting device mounted on a rotary shaft, which latter, in order to secure its working positions, carries an undulated cam cooperating with rollers bearing elastically on its periphery, in combination, segment contacts mounted on said contacting device, curved inwards at both ends and extending over an angle slightly smaller than that separating two consecutive tops of the cam, the brushes cooperating with these contacts being set in such a way that they act upon the curved parts of the segment a little before the rollers come to bear on the tops of the cam, said contacting device comprising contacting rings whose periphery presents a groove in which the tore-sector-shaped contacting piece of the corresponding brushes comes to bear.

ETIENNE CHALLET.