PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

An Automatic Electric Circuit-breaker Designed as an Electromagnetic Short Circuit Cut-out for Small Transformers.

We, BING WERKE, vorm. Gebruder Bing Aktiengesellschaft, of 215, Regensburgerstrasse, Nuremberg, Germany, a Joint Stock Company, registered under the Laws of Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to a switch designed as an electromagnetic short-circuit cut-out for small transformers. The essence of the invention consists in that the resilient back contact movably mounted on the switch is connected, by means of a spring, with an armature that is influenced by the magnetic fields generated by the transformer windings so that the back contact and the armature interlock both when the back contact is in the operative and the armature in the neutral position, and when the armature is in the operative and the back contact in the "off" position.

The result obtained by this method of interlocking the back contact with the armature is that the mechanical construction of the switch is substantially simpler than that of the known switches, in which toggle levers or a plurality of pawls are employed. The simplified construction of the switch according to the invention affords the further advantage that, after a short-circuit has occurred, the only way in which the switch can be turned on again is by moving the switch lever back into its "off" position, so that the transformer cannot continue to function until all the parts are in neutral position.

The invention will be clearly understood from the following description aided by the annexed drawings in which the switch is diagrammatically represented in Figures 1 and 2 mounted on a small transformer and in different operative positions.

In the drawing, the transformer is represented by way of example as a core transformer with separated primary and secondary windings in section between the coils and consists of an iron core 1 and the one visible coil 2. The switch consists of the switch lever 3, provided with a contact arm 4 and of a lever 5 which carries a contact spring 6. The lever 5 and its spring 6 constitute the back contact. The switch lever 3 and the lever 5 are mounted on pivots 7 and 8, in a support 9 of non-conductive material and are in electrical connection with terminals 10 and 11.

Mounted on a pivot 12 seated directly on the one arm of the iron core 1, is an armature 13 which is disposed between the primary and secondary coils so as to bridge over the two arms of the core 1. The armature 13 is connected with the lever 5 by means of a tension spring 14. The lever 5 and armature 13 are provided with noses 15 and 16, which interlock. The lever 5 is also provided with a connecting rod 17, of non-conducting material, which is guided on the switch lever 3, 4 by means of a slot 18 and stud 19.

So far as the method of operating is concerned it is immaterial whether the switch is situated in the primary or secondary circuit of the transformer. The off position of the several levers in normal working is indicated by continuous lines in Figure 1.

In normal working switching-on is effected by turning over the switch lever 3 from the position indicated by continuous lines, into that indicated by broken lines (Figure 1), the lever then coming into contact with the stop 20. In this position, the contact arm 4 bears against the contact spring 6, so that the circuit is completed by way of the conductors 21 and 22. The spring 14 is of such strength that in normal working, the magnetic fields set up in the transformer core are too weak to attract the armature 13. The interlocking of the lever 5 with the armature 13 by means of the noses 15 and 16 is therefore maintained. During the movement of the switch lever into the "on" or "off" position, in normal working the stud 19 moves freely in the slot 18, and therefore no change occurs in the position of the lever 5 and armature 13.

As a short-circuit cut-out the switch operates in the following manner:

In the event of a short-circuit or overload the magnetic fields occurring in the

secondary circuit are strong enough to overcome the tension of the spring 14 and attract the armature 13. In this way the tension on the spring 14 is increased until after the noses 15, 16 have disengaged it is suddenly released, and thus draws the lever 5 and its contact spring 6 into the position shown in Figure 2 in which the noses 15 and 16 are again interlocked. For switching-on again, the switch lever 3 is first turned over from the position indicated by continuous lines in Figure 2 into that indicated by broken lines. By this movement, the lever 5 is drawn along by means of the connecting rod 17, thus releasing the blocking effect, so that the armature 13 and lever 5 resume the normal position according to Figure 1. When the short-circuit has been remedied, the armature 13 and lever 5 remain in this position, but until that has been done, the circuit is again switched off, in consequence of the armature 13 being attracted directly the contact arm 4 touches the contact spring 6.

Since except for the handle of the switch lever 3, the transformer and the switch members are enclosed in a casing, as usual, it is also impossible to prevent the switching off (in the event of a short-circuit) intentionally, for example by holding the lever 3, inasmuch as the switching-off of the circuit takes place independently of the position of the switch lever 3.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. An automatic electric circuit-breaker designed as an electromagnetic short-circuit cut-out for small transformers, characterised in that the resilient back contact movably disposed on the switch is connected, by means of a spring, with an armature that is influenced by the magnetic fields generated by the transformer windings, so that the back contact and the armature interlock, both when the back contact is in the operative, and the armature in the neutral i.e. unattracted position, and when the armature is in the operative and the back contact in the "off" position.

2. Switch designed as an electromagnetic short-circuit cut-out according to Claim 1, characterised in that the re-setting of the switch, out of the "off" position resulting from a short-circuit, is effected by turning the switch lever back into its normal "off" position.

3. Switch designed as an electromagnetic short-circuit cut-out according to Claims 1 and 2 characterised in that in order to obtain the most favourable force of attraction, the armature is disposed between the primary and secondary windings of the transformer.

4. The switch designed as an electromagnetic short-circuit cut-out especially for small transformers constructed substantially as described with reference to the annexed drawings.

Dated this 22nd day of December, 1931.

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Fig.1

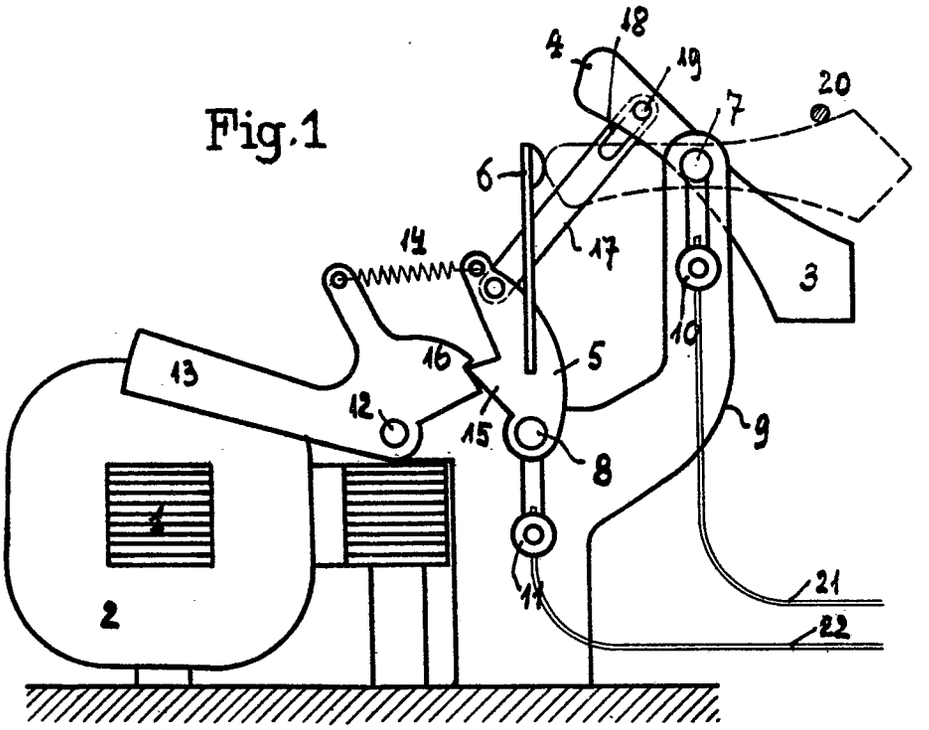
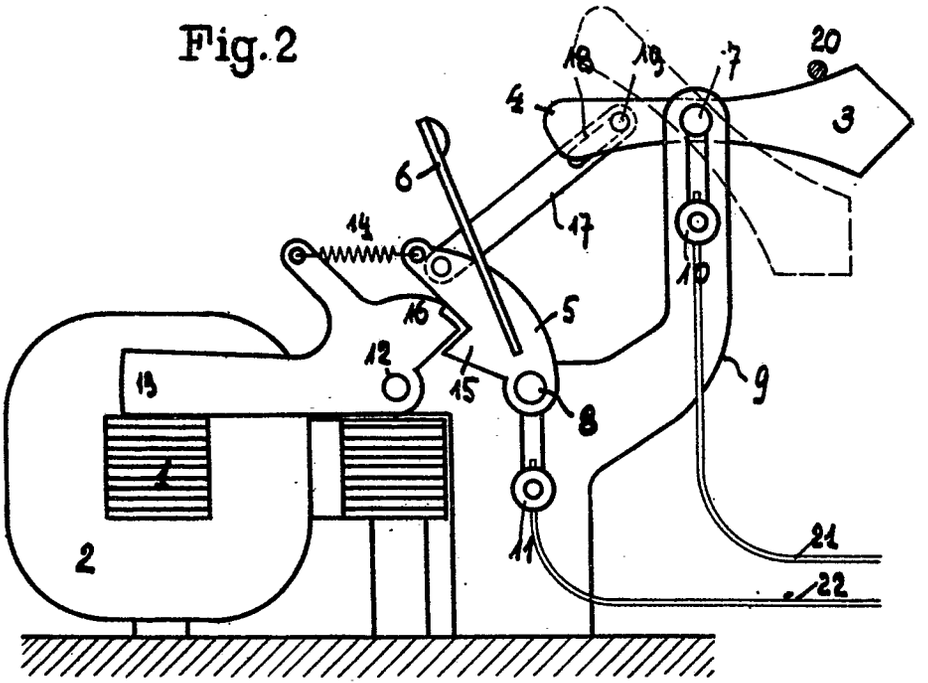


Fig.2



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