Nov. 22, 1938. C. H. LORENZ 2,137,919

ELECTRIC CIRCUIT CONTROLLING APPARATUS

Filed July 24, 1937 2 Sheets-Sheet 1

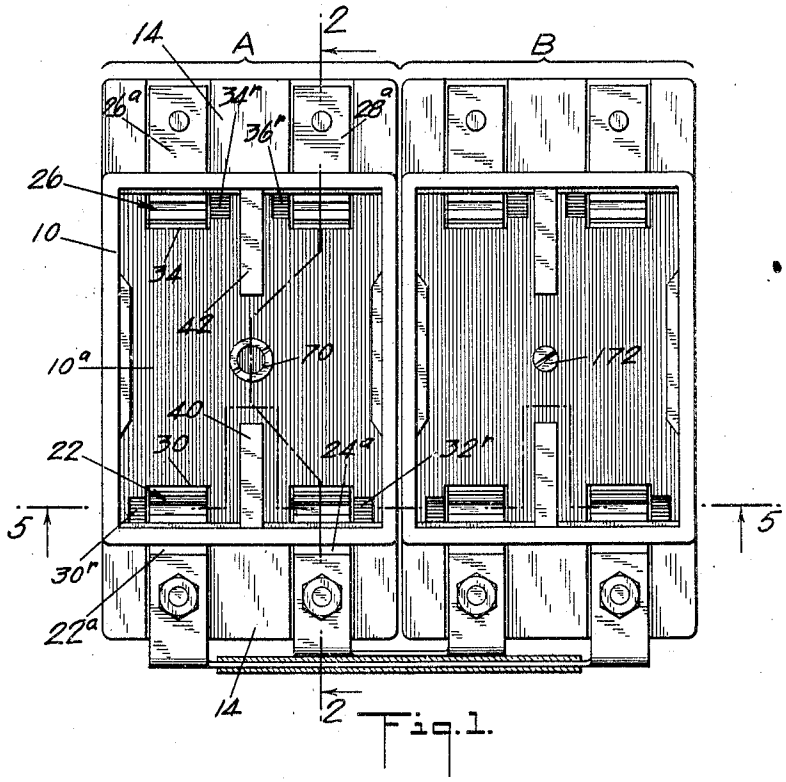


Fig. 1.

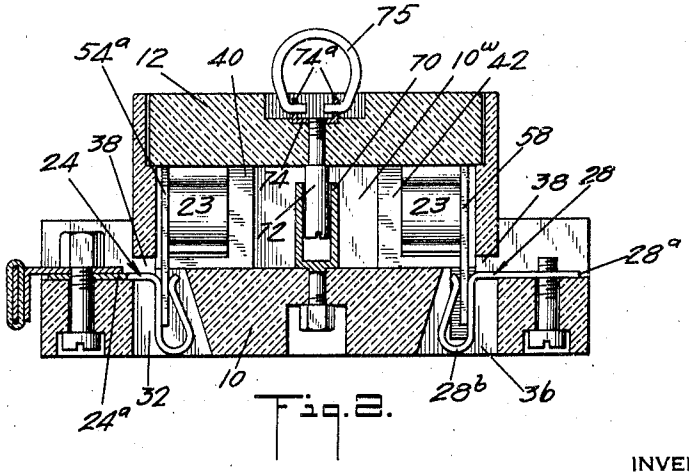


Fig. 2.

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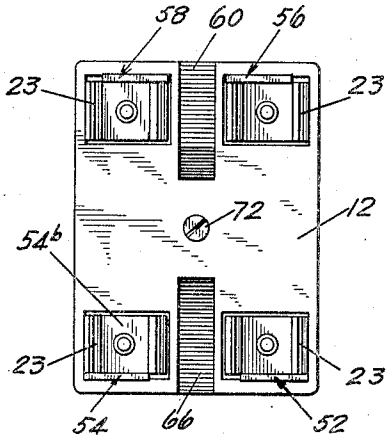


Fig. 3.

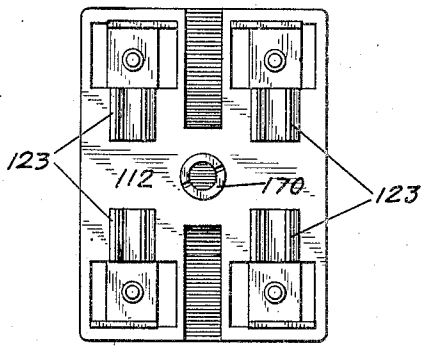


Fig. 4.

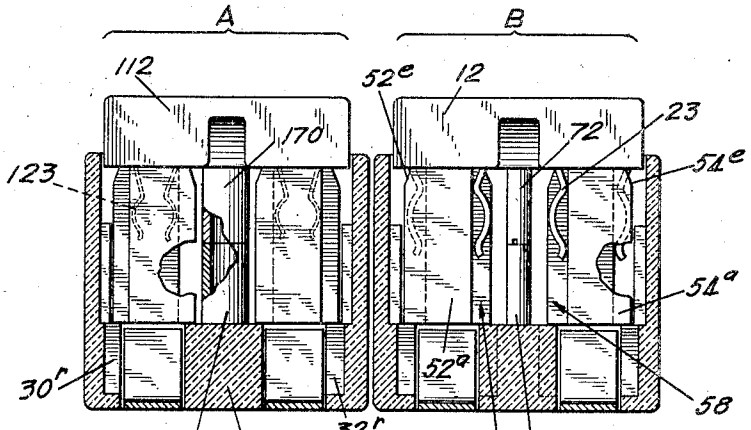


Fig. 5.

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Patented Nov. 22, 1938 2,137,919

UNITED STATES PATENT OFFICE

2,137,919

ELECTRIC CIRCUIT CONTROLLING APPARATUS

Charles Henry Lorenz, New Hartford, Conn., assignor to The Arrow-Hart & Hegeman Electric Company, Hartford, Conn., a corporation of Connecticut

Application July 24, 1937, Serial No. 155,561

4 Claims. (Cl. 200—119)

This invention relates to electrical apparatus for controlling circuits. More particularly it relates to electrical apparatus having fuses or other circuit controlling members mounted upon a removable plug or carrier, which has contacts for engaging with fixed contacts of a receptacle or base, whereby the fuses may be removed as a unit by removal of the plug from the receptacle portion of the device.

In an apparatus of this type it is often desirable to have two of the devices side by side, or in close proximity to one another. Economical manufacturing requirements dictate that these devices shall be identical in so far as possible so that both devices may be made from the same mold. Necessarily the parts therefore are interchangeable, in the absence of any provision to prevent interchangeability. When two or more such devices are located side by side the fuses or other circuit controlling means in each device will be of different current carrying capacity, depending on the load to be applied in the circuits which the devices protect. Due to the identity of the structures, it is essential that means be provided to prevent the carrier containing fuses of low current carrying capacity from being inserted in the device which normally must carry a large amount of current. Similarly, the carrier bearing heavy duty fuses must not be insertable in the device which normally would carry only light current. In the first case, the fuses would blow out before the current in the circuit reached its normal safe load, and in the second case the fuses would not blow out until the current in the circuit had gone beyond the maximum safe load.

It is an object of my invention to provide electrical apparatus of the above type, with means to prevent the interchangeability or substitution of the carriers of similar devices, one for the other. Another object of my invention is to prevent underfusing or overfusing adjacent circuits, controlled by devices having parts of similar shape, as might be occasioned by substitution of a part of one device for its equivalent in another neighboring device.

Other objects and advantages of my invention will become apparent as it is described in connection with the accompanying drawings.

Fig. 1 is plan view of the bases of two combined plug and fuse devices embodying the principles of my invention;

Fig. 2 is a vertical section view taken along line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of one of the plug devices which is to cooperate with the bases of Fig. 1;

Fig. 4 is a bottom view of the other plug device for cooperation with the bases in Fig. 1;

Fig. 5 is a transverse sectional view taken along line 5—5 of Fig. 1.

In the drawings are two similar circuit controlling devices A and B, each constructed substantially like the device in the Guett Patent 2,077,319, dated April 13, 1937, but differing in certain respects hereinafter pointed out. Since both devices are alike in size and in general principles of construction, a description of one will suffice for understanding. Referring to device A, an insulating body **10** forms the base portion of the device. The body may be in the form of a rectangular block of porcelain or other suitable insulting material which is hollowed out from the top surface to provide a well **10***w* into which may fit a plug device or carrier **12** hereinafter more particularly described. The base or receptacle portion **10** of the device may have at each end extensions **14** of less height than the main body of the block to which are secured the terminal portions **22***a*, **24***a*, **26***a* and **28***a* of receptacle contacts denoted generally by the numerals **22**, **24**, **26** and **28**. These contacts may be stamped in strip form from sheet metal and are identical in size and shape and each has a contact portion bent into U-shape (e. g. **28***b*) at right angles to the terminal portion of the contact (e. g. **28***a*). To accommodate the U or contact portions of the receptacle contacts, pairs of apertures **30**, **32** and **34**, **36** are formed in the floor of the well **10***w* at each end in the neighborhood of the corners of the well. These apertures are connected by passages **38** with wire terminal channels in which are seated the terminal portions of the contacts, (e. g. **24***a*).

Barriers **40** and **42** are provided in the longitudinal axis of the base **10** between the contacts **22**, **24** and **26**, **28** respectively, to prevent arcing between the contacts of each pair when the circuit is being broken.

Aligned channels **60** may be cut along the longitudinal axis of the carrier **12** on the bottom surface thereof for the reception of the top portions of the barriers **40** and **42**, thus making it impossible for an arc to jump between the finger contacts and the receptacle contacts at the same end of the device when the carrier is pulled away from the base portion.

In order to connect opposed contacts, such as contact **22** to contact **26**, and **24** to **28**, and at the same time provide a fuse or safety device in the

circuit, which device may be removed when the circuit is broken or replaced when desired or necessary, there is provided a fuse carrier **12** comprising a rectangular block of insulating material of any suitable composition, such as a phenolic condensation product. This block may have dimensions slightly less than the dimensions of the inside of the well **10***w* so that the carrier may fit snugly within the well. Preferably the thickness of the carrier will be less than the depth of the well in order to provide space for cartridge fuses within the well. The carrier has mounted upon it at each end pairs of finger contacts **52, 54** and **56, 58**. Opposing contacts at each end of the plug device are identical, that is to say contacts **52** and **56** are identical and contacts **54** and **58** are identical. Each contact is of L-shape, each having a contact portion, such as **54***a*, and an anchor portion as **54***b*, turned at right angles to the contact portion and provided with an internally threaded central aperture for the reception of a securing bolt passing through the carrier. Contacts **52** and **56** have endwise extensions from the left edge of the contact portion (e. g. **52***e*) and the contacts **54** and **58** have edgewise extensions from the right edge of the contact portion (e. g. **54***e*) (see Figure 5) so that the contact portions, (e. g. **54***a*) are of greater width than the anchor portions of the contacts.

To provide room for these edgewise extensions during the engaging of the finger contacts with the receptacle contacts, there are provided recesses **30***r*, **32***r*, **34***r* and **36***r* in the side walls of the apertures **30**, **32**, **34** and **36**, the recesses **34***r* and **36***r* being in adjacent walls of the apertures **34** and **36** and the recesses **30***r* and **32***r* being in opposite walls of the apertures **30** and **32**. The recesses **30***r*, **32***r*, **34***r*, **36***r*, like the apertures **30**, **32**, **34**, **36** are in the floor of the well. The reason for the opposite positioning of these recesses will become apparent when it is noted that the identical contacts **52** and **56** and **54** and **58** face oppositely when secured at their respective ends, thus positioning the edgewise extensions of the contacts **52** and **54** toward the outside of the plug device **12** and positioning the edgewise extensions with the contacts **56** and **58** adjacent one another toward the longitudinal axis of the plug device **12**. It will thus become apparent that when attempt is made to insert the carrier **12** in the well **10***w* with the finger contact **58** directly over the receptacle contact **28**, the plug device may be fully inserted in the well to bring contacts **52, 54, 56** and **58** into engagement with contacts **22, 24, 26** and **28** respectively.

Due to the opposite positioning of the edgewise extensions of the various finger contacts and the opposite positioning of the recesses in the sides of the contact apertures if attempt is made to reverse, that is to say, turn end for end, the carrier and insert it in its own well (or in the well of device B, as in Fig. 5), then the contact fingers will be unable to engage the receptacle contacts by reason of the ends of the fingers engaging at their edgewise extensions with the floor of the well.

In order to complete the circuit between the contact fingers **22** and **26**, and between contacts **24** and **28**, conventional fuse clips **23** may be provided and may be secured with their base portions in contact with the anchor portions of the contacts **52, 54, 56** and **58** by means of the same screws that secure these contacts to the plug device **12**. A cartridge fuse (not shown) may then be inserted in these clips and will complete the circuit as will be readily understood by those skilled in the art.

Preferably both the plug portion and the base portion of the device are symmetrical about the longitudinal axis thereof, thus making it possible to duplicate the form of many of the parts and thereby reduce the manufacturing cost of the invention.

Referring now to device B, for the purpose of illustration, I have shown the fuse clips **123** on this device as smaller and closer together than those on A, for reception of fuses of smaller capacity than those used in device A.

As hereinbefore set forth, it is desirable to prevent the interchange or substitution of the fuse carrier **12** of device A for the fuse carrier **112** of device B and vice versa. In order to prevent such substitution while retaining the practical advantage of the use of similar parts in the device as described, I mount in the center of the base of device A a socket member **70** having a tubular upper end and a screw threaded lower end extending through the floor of the base into a securing nut. And, I mount upon the fuse carrier a pin member **72** in such position that when the fuse carrier **12** of the device A is inserted in the well of the base of device A the pin **72** on the carrier will telescope within the tubular socket **70** on the base and will not interfere in any way with the normal cooperation of the carrier and its base nor with the engagement of the contact fingers of the fuse carrier with the receptacle contacts of the base.

A convenient way of attaching the pin **72** to the carrier is to provide a screw thread on the end of the pin which can thread into an aperture in a plate or handle holding member **74** having upturned lugs **74***a* carrying a bail or handle **75** for lifting the fuse carrier.

On the device B, I place in the center of the base a pin member **172** exactly like or similar to the pin on the fuse carrier of the device A, and I mount on the carrier **112** of the device B in central position a socket member **170** like that on the base of device A, so that it will receive the pin on the base of device B when the fuse carrier is inserted in the well of the base.

Although the use of the pin and socket members on the carrier and base of the devices A and B does not interfere with the normal operation or an engagement of the carrier and base of these devices, it will nevertheless prevent substitution of the carrier of device A for the carrier of device B and vice versa, for the reason that if an attempt is made to insert the carrier of device B in the well of the base of device A (as in Fig. 5) the socket **170** on the carrier of device B will engage with the socket **70** on the base of device A. Similarly, if an attempt is made to insert the carrier of the device A in the well of the device B (as in Fig. 5), the pin **72** on the carrier of device A will engage with the pin **172** on the base of device B. Thus insertion of either carrier in the well of the other device is simply and effectively prevented. For the sake of complete illustration of the several possible positions of the carriers in the bases the carrier **112** of device B is shown not only in the base of device A but also turned end for end therein.

It will be noted that the means I have invented for preventing this substitution can be economically manufactured and applied without difficulty to the devices after the remainder of their construction is wholly completed and that the means

may comprise identical parts mounted in reversed positions in the two devices.

From the foregoing it will be apparent that I have invented a simple and inexpensive means of preventing interchange of carriers in devices of the character described, so that under-fusing or over-fusing of adjacent devices is effectively prevented.

Many modifications within the scope of my invention will occur to those skilled in the art. Therefore, I do not limit my invention to the exact form of the parts as shown and described.

I claim:

1. In apparatus of the character described, a pair of substantially identical devices each comprising an insulating body having a well, receptacle contacts in the well, a carrier for a current-responsive device adapted to fit within said well, finger contacts on said carrier adapted to engage with said receptacle contacts when said carrier is inserted in said well in a predetermined position, and means permitting only partial insertion of said carrier in said well when said plug carrier is turned end-for-end from said predetermined position and preventing engagement of said finger and receptacle contacts and lateral movement of said carrier relative to its base, in combination with means preventing the insertion of the carrier of one device in the well of the other device, in position for the finger contacts on the carrier of said one device to engage the receptacle contacts within the well of said other device, said last-named means comprising a pin device cooperating with a socket device, the pin device being attached to the carrier and the socket device being attached to the base of one of said identical devices, while in the other of said identical devices the pin device is attached to the base and the socket device to the carrier.

2. Electrical apparatus comprising a plurality of devices for similar purpose each having an insulating body, receptacle contacts mounted on said body, a carrier having means thereon to mount a current-responsive device, finger contacts on said carrier adapted to engage with said receptacle contacts, insulating walls on said body engaging with said carrier and guiding it during movement into its operative position and shielding said contacts when the carrier is received in said body in an inoperative position, in combination with similar inter-engaging means on each base and carrier, said means on one base and carrier being in reversed position to their position on an adjacent base and carrier, said means permitting the contacts on each carrier to cooperate with the contacts on its base but preventing contact engagement when one carrier is applied to an adjacent base, said carriers being interchangeable save for said last mentioned means.

3. Electrical apparatus comprising a plurality of devices for similar purpose each having an insulating body, receptacle contacts mounted on said body, a carrier having means thereon to mount a current-responsive device, finger contacts on said carrier adapted to engage with said receptacle contacts, insulating walls on said body engaging with said carrier and guiding it during movement into its operative position and shielding said contacts when the carrier is received in said body in an inoperative position, in combination with similar telescoping members on each base and carrier, said means on one base and carrier being in reversed position to their position on an adjacent base and carrier, said means permitting the contacts on each carrier to cooperate with the contacts on its base but preventing contact engagement when one carrier is applied to an adjacent base, said carriers being interchangeable save for said last mentioned means.

4. Electrical apparatus comprising a plurality of devices for similar purpose each having an insulating body, receptacle contacts mounted on said body, a carrier having means thereon to mount a current-responsive device, finger contacts on said carrier adapted to engage with said receptacle contacts, insulating walls on said body engaging with said carrier and guiding it during movement into its operative position, in combination with interengaging means on said base and carrier permitting the contacts on each carrier to cooperate with the contacts on its base but preventing contact engagement when one carrier is applied to another base, said carriers being interchangeable save for said last mentioned means, and handle means held upon said carriers by said interengaging means.

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