Nov. 25, 1941. A. J. GURNEY ET AL 2,263,804

CONTROLLER

Filed Oct. 5, 1938

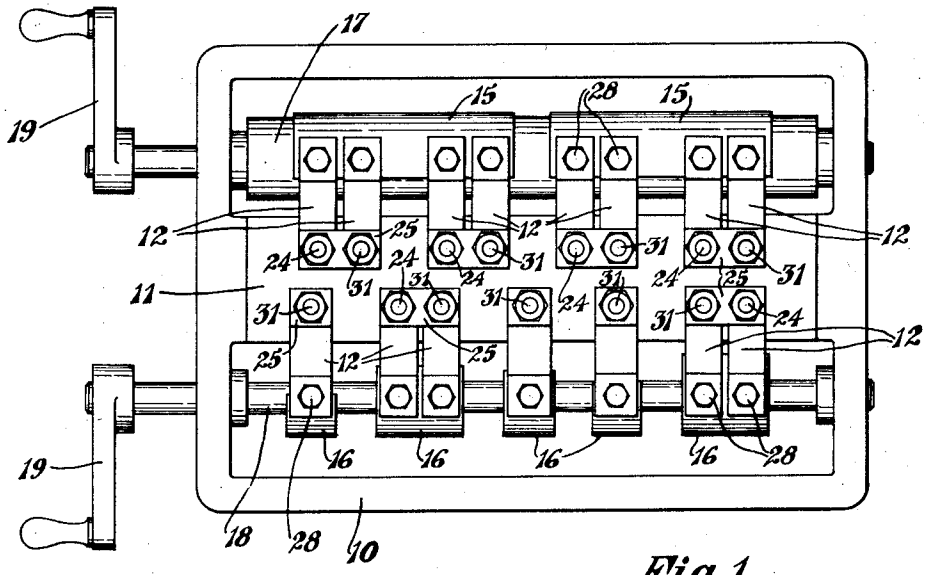


Fig. 1

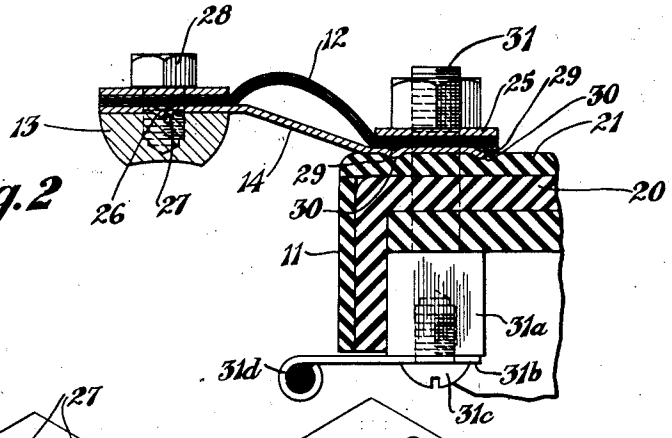


Fig. 2

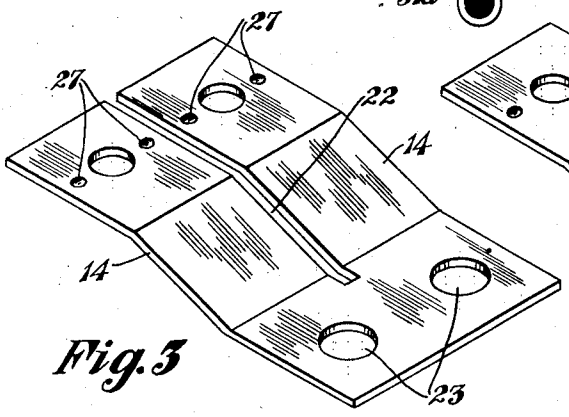


Fig. 3

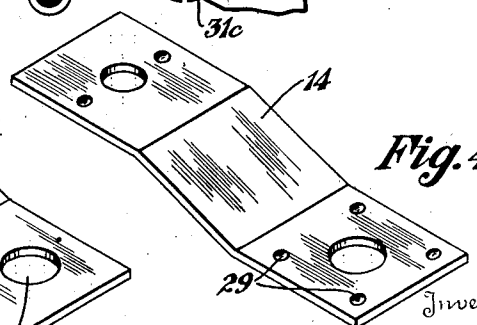


Fig. 4

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CONTROLLER

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Application October 5, 1938, Serial No. 233,399

2 Claims. (Cl. 200—166)

The invention relates to controllers for controlling the current to electric motors and the like, and more particularly to certain improvements in the finger board which comprises a box-like insulation support upon which are mounted the fingers which carry the conductors and contact shoes common in such devices.

Controllers of the general type to which the invention pertains include a fingerboard comprising an insulation base upon which are mounted metal fingers carrying conductors of copper or the like, and shoes of copper or similar conducting material arranged to contact with conductor rings upon rotatable drums located adjacent to said fingerboard, certain of the fingers being usually located in pairs and arranged to contact with a conductor ring of suitable width to accommodate the pair of shoes carried by the fingers.

Each of these fingers is ordinarily mounted upon the insulation support or base by means of a single bolt or screw, and each shoe is similarly attached to the corresponding finger, these bolts or screws being of copper or similar material of high electric conductivity, and a conductor formed of a plurality of thin plates of copper or the like is mounted upon each finger and attached thereto by said bolts or screws.

Since only one bolt or screw is used at each place, as above indicated, frequent trouble is caused by the fingers turning or twisting upon said insulation base, and by the shoes turning relative to the fingers.

Owing to the shoes making and breaking contact with the conductor rings upon the drums, frequent arcs are caused by the operation of such a controller resulting in damage to the insulation base or support.

An object of the improvement is to provide means for preventing the fingers from turning or twisting upon the insulation base or support.

Another object is to provide means for preventing the shoes from turning relative to the fingers.

A further object is to provide an insulation base or support so constructed that it will properly insulate the parts where high tension circuits are used and will at the same time be substantially immune to damage from arcing between the shoes and conductor rings.

A still further object is to form each pair of fingers from a single plate of metal whereby two bolts connect the integral pair of fingers to the insulation base, holding the pair of fingers rigidly in place thereon.

Another object of the invention is to provide projections upon each single finger adapted to be seated in cavities or depressions in the insulation base to prevent turning or twisting of the finger relative to the insulation base.

A still further object is to provide projections upon the outer end portion of each finger adapted to be seated in cavities or depressions in the corresponding shoe so as to prevent relative turning movement of the shoe.

A further object is to provide an insulation base so constructed that it will possess the necessary insulation qualities and will at the same time have an outer surface which will be substantially immune to damage caused by arcing between the conductor rings and shoes.

Another object is to provide a squared terminal post upon the under side of the fingerboard and provided with a threaded extension located through the insulation and adapted to carry a finger.

The above objects together with others which will be apparent from the drawing and following description or which may be later referred to may be attained by constructing the improved controllers in the manner illustrated in the accompanying drawing in which

Figure 1 is a plan view of a controller of the type referred to;

Fig. 2, an enlarged fragmentary sectional view through one finger and a portion of the insulation base or support;

Fig. 3, a detached perspective view of a pair of fingers made as a single unit; and

Fig. 4, a similar view of a single finger.

Similar numerals refer to similar parts throughout the drawing.

Controllers of the general type to which the invention refers include a fingerboard mounted within a housing **10** of cast iron or the like, and comprising a box-like base or support **11** of insulation material upon which are mounted metal fingers carrying conductors **12** which are electrically connected to shoes **13**, both the conductors and shoes being preferably formed of copper or similar material of high electric conductivity while the fingers indicated at **14** may be formed of some other material.

The shoes **13** are adapted to contact with conductor rings **15** or **16** mounted upon the rotatable drums **17** and **18**, respectively, which are journaled within the housing **10** and provided with controller handles **19** by means of which the drums may be manually rotated to the desired position.

In order to provide an insulation base or sup-

port which will have the greatest insulating qualities and will at the same time be substantially proof against damage caused by arcing between the conductor rings and shoes, the improved insulation base is preferably formed of a phenol formaldehyde plastic, such as is ordinarily known to the trade as Bakelite, indicated at 20, the same being covered upon its outer surface with substantially heavy sheets 21 of an arc resisting material formed of asbestos and cement attached to the outer surface of the plastic structure 20 as by cement or the like.

The phenol formaldehyde plastic has a much greater insulating capacity than this asbestos and cement composition, but is easily damaged by a flame or extreme heat such as caused by an electric arc.

Thus, by covering this plastic structure with sheets of the asbestos and cement composition the electrical parts are properly insulated by the plastic material, which in turn is protected from the arcs by the asbestos and cement composition.

For the purpose of preventing the pairs of fingers from turning or twisting relative to the insulation base, each pair of fingers 14 is formed from a single plate or sheet of metal as shown in Fig. 3, the two fingers 14 being separated longitudinally at their outer portions as by cutting away the central longitudinal portion of the plate as indicated at 22, while the inner end portion of the plate is left uncut except for the two spaced apertures 23 through which two bolts as indicated at 24 and 31 are located, clamping the copper plate 25, the copper conductor sheets 12 and the pair of fingers 14 upon the insulation base or support 11.

The bolts 24 are solely for the purpose of attaching the fingers rigidly to the insulation support, but the bolts 31 are conductors and are preferably in the form of threaded extensions upon the squared terminal posts 31*a* located within the box-like insulation support and against one side wall thereof so as to be held against rotation. A terminal clip 31*b* is attached to each post 31*a* as by a binding screw 31*c*, and a cable 31*d* is connected thereto.

For the purpose of preventing each shoe 13 from movement relative to the finger 14 to which it is connected, the shoe may be provided in its upper surface with cavities or depressions 26 into which the projections 27 formed on the under side of the finger are received, the parts being clamped together as by a screw 28.

For the purpose of preventing the single fingers 14 from turning relative to the insulation base, each finger may be provided at its inner end with a plurality of depending projections 29 adapted to be seated within similar cavities or depressions 30 in the top surface of the insulation base, the parts being clamped together as by the threaded extension 31 of a terminal post 31*a*, as above described relative to the double fingers.

From the above it will be seen that a suitable insulation base or support is provided for the fingers which properly insulates the parts and at the same time protects the plastic insulation material from damage caused by arcs.

It will also be seen that the fingers which carry the conductors and shoes are rigidly held against movement relative to the insulation base and the shoes are rigidly held against movement relative to the fingers, thus overcoming the objections to the usual type of controller now in general use.

It will also be obvious that the above described arrangement of the fingerboard makes it possible to remove or replace a complete finger, or a shoe, without taking the fingerboard from the casing or housing, which cannot be done on any fingerboard such as now in general use.

We claim:

1. In a controller, a fingerboard including an insulation support, a finger mounted at its inner end upon said support, a laminated conductor having flat end portions mounted upon opposite end portions of the finger and having an intermediate curved portion spaced from the intermediate portion of the finger, a bolt located through the inner end portions of the conductor and the finger for attaching said conductor and finger to the support, spaced projections upon the under side of the outer end portion of the finger, a conductor shoe having corresponding cavities to receive said projections, and a screw located through the outer end portions of the conductor and the finger for clamping the conductor shoe to the conductor and finger.

2. In a controller, a fingerboard including an insulation support, a finger mounted at its inner end upon said support, a laminated conductor having flat end portions mounted upon opposite end portions of the finger and having an intermediate curved portion spaced from the intermediate portion of the finger, spaced projections upon the under side of the inner end portion of the finger, the support having corresponding cavities to receive said projections, a bolt located through the inner end portions of the conductor and the finger for attaching said conductor and finger to the support, spaced projections upon the under side of the outer end portion of the finger, a conductor shoe having corresponding cavities to receive said last named projections, and a screw located through the outer end portions of the conductor and the finger for clamping the conductor shoe to the conductor and finger.

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