

Feb. 1, 1938.

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2,107,045

ELECTRIC CONTROLLER CONSTRUCTION

Filed March 4, 1935

2 Sheets-Sheet 1

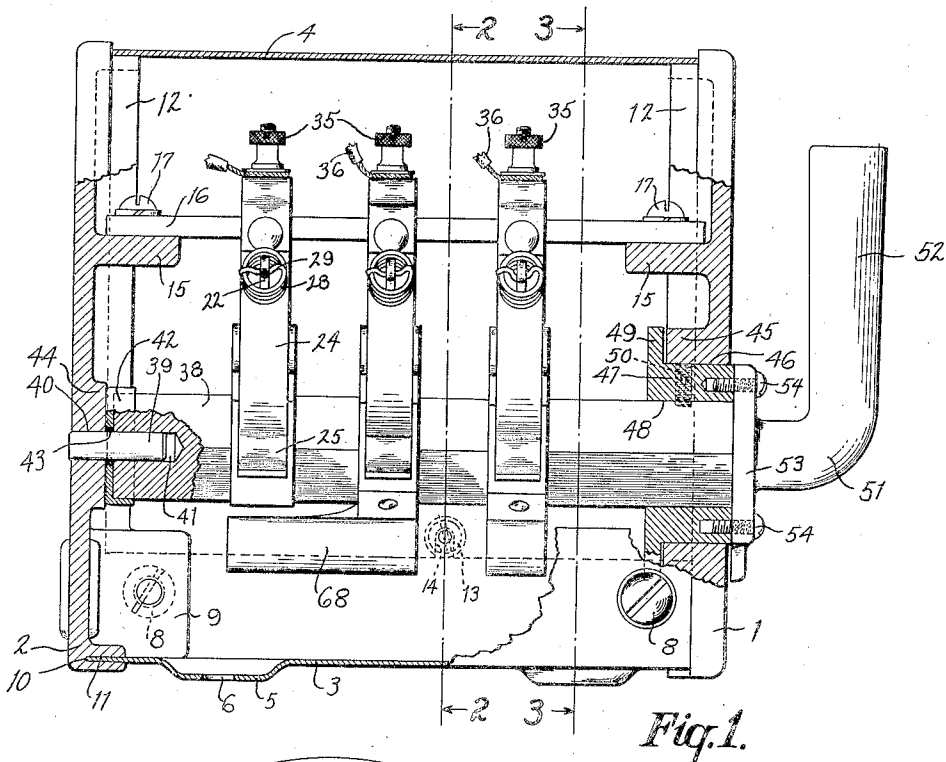


Fig. 1.

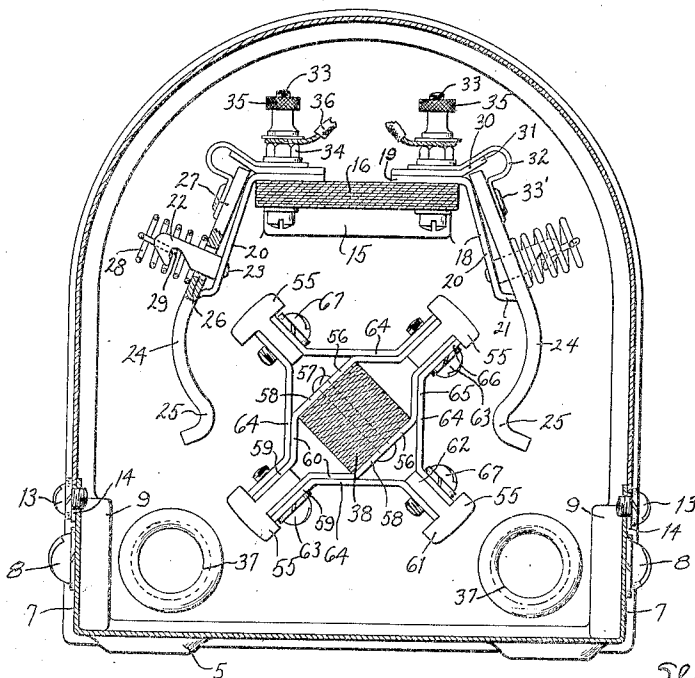


Fig. 2.

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2 Sheets-Sheet 2

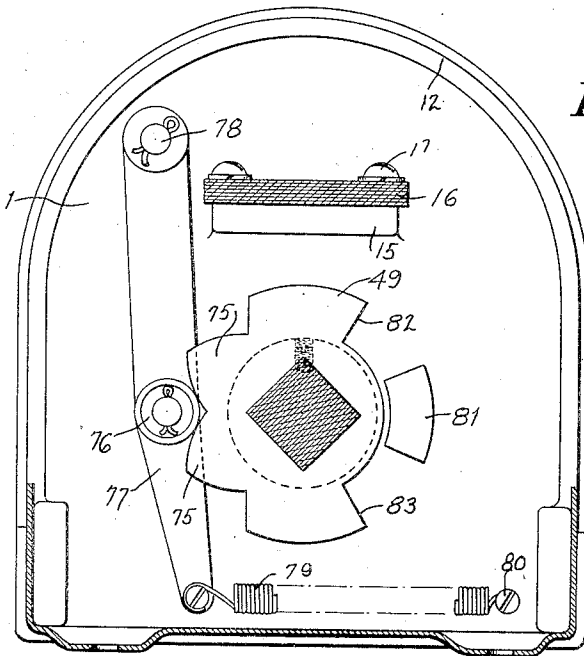


Fig. 3.

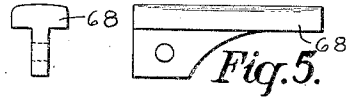


Fig. 5.

Fig. 6.



Fig. 4.

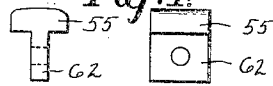


Fig. 7.

Fig. 8.

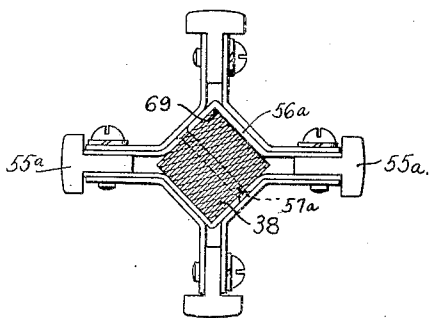


Fig. 11.

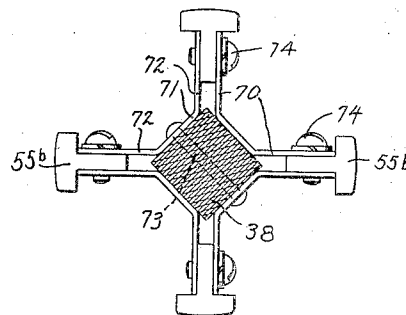


Fig. 12.

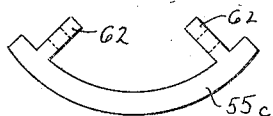


Fig. 9.

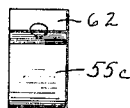


Fig. 10.

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2,107,045

ELECTRIC CONTROLLER CONSTRUCTION

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Application March 4, 1935, Serial No. 9,243

5 Claims. (Cl. 200—6)

This invention relates to electric controllers and more particularly relates to the construction of controllers of the so-called "drum" type, which comprise generally a rotatable element having an electric contact or a plurality of electric contacts rotatable in a generally cylindrical path into and out of electrical engagement with a corresponding stationary contact or a plurality of contacts.

Among the objects of the invention are:

To provide generally an improved electric controller;

To provide an improved electric controller of the drum type;

To provide a drum type controller of improved construction providing increased durability; simplification of parts and convenience of manufacture; improved facility of assembling and disassembling; and improved construction of supporting frame or enclosing housing of the working parts.

Other objects will be apparent to those skilled in the art to which my invention appertains.

My invention is fully disclosed in the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of a controller embodying my invention;

Fig. 2 is a cross-sectional view taken from the plane 2—2 of Fig. 1, with parts back of the section plane omitted for simplicity;

Fig. 3 is a cross-sectional view taken from the plane 3—3 of Fig. 1;

Figs. 4, 5 and 6 are respectively top, side and end views of one form of electric contact which I may employ;

Figs. 7 and 8 are respectively side and end views of another form of electric contact;

Figs. 9 and 10 are respectively side and end views of another form of electric contact;

Fig. 11 is a fragmentary view similar to a part of Figs. 1 and 2 illustrating a modification;

Fig. 12 is a view illustrating still another modification.

Referring to the drawings, I have shown a main frame or housing for the controller comprising opposite end members 1 and 2 which may conveniently be made from cast metal, a bottom 3 preferably made from sheet metal, and a cover 4 preferably made from sheet metal.

The bottom 3 as shown in Fig. 2 comprises a generally flat floor with bosses 5 pressed therein to serve as feet and having perforations 6 therein by which the bottom and therefore the housing generally may be bolted to a support.

The bottom has sides 7—7 bent upwardly therefrom, bolted as at 8—8 to lugs 9—9, formed on the end members and extending inwardly. The lower portion of the end of each end member 1 and 2 is grooved as at 10 and the end edges of the bottom 3 as at 11 are projected into the groove 10; and by the construction above described, the bottom 3 is rigidly joined to the end members 1 and 2.

The end members 1 and 2 are rounded in their upper portion and the sheet metal cover 4 is bent to conform thereto and rests upon shoulders 12—12 and may be secured on the end members 1 and 2 to cover the interior of the housing in any suitable manner convenient for its removal to give access to the interior, for example by screws 13 threaded in the sides 7—7 and projected through downwardly open notches 14 in the lower edges of the cover 4 whereby the heads of the screws 13 may clamp the engaged portions of the cover upon the sides 7—7.

Inwardly extending brackets 15—15 are provided preferably formed integrally with the end members 1 and 2 and a contact-supporting panel 16 of insulating material is supported on the brackets 15—15 and secured thereto for example by screws 17—17. A plurality of contacts, preferably arranged in pairs, are mounted on the panel 16, and preferably these contacts are all identical in structure.

The contacts comprise each a support 18 comprising a base portion 19 secured to the panel 16 and a depending arm 20 terminating at its lower end in an outwardly extending finger 21. A hook member 22 is riveted as at 23 to the arm 20. A contact finger 24 is disposed generally depending from the panel 16 and has on its lower end an inwardly convex portion of relatively short radius, 25, adapted to engage movable contacts to be described, and is provided with a perforation 26 telescoped over the hook member 22 with the main body portion 27 of the contact finger superposed on the arm 20 of the contact support 18.

A wire spring 28 of generally helical form is telescoped over the hook member 22, abutting at one end on the body 27 of the contact finger, and at its other end formed with a loop 29 engaging the hook member 22. The spring 28 thus reacts by its resilience to exert resilient thrust inwardly on the contact finger 24 to normally engage it with the support finger 21; and upon engagement of movable contacts to be described with the contact portion 25, the contact finger 24 will have a yielding hinging movement around

the upper end of its body portion 27 resting upon the arm 20 of the contact support 18.

A clip member 30 rests upon the base 19 of the contact support 18 and has a finger 31 projecting outwardly therefrom to suitably position a flexible connector of metal ribbon 32, one end of which is riveted as at 33 to the contact finger 24 and the other end of which is superposed upon the clip element 30. Connector bolts 33—33 are projected through the panel 16 and successively through the base 19, the clip member 30 and the ribbon 32, and these parts are clamped together by a nut 34 to rigidly secure them to the panel 16. Terminal nuts 35 on the screws 33 provide for connecting electrical conducting wires 36 to the bolts 33 and therefore electrically to the contact finger 24, through the connector ribbons 32.

As shown in Figs. 1 and 2 there may be three pairs of contact fingers 24 and wires 36 may lead therefrom to the electrical apparatus to be controlled. The wires 36 may be carried out of the housing through relatively large perforations 37—37 in the end member 2 of the housing, the wires 36 being indicated in Fig. 2 but omitted from Fig. 1 for simplification of the drawings.

The contact fingers 24 above described and the mechanism described in connection therewith form no essential part of the instant invention. The movable contacts and the means of mounting the same will now be described.

A drum shaft 38 is provided preferably formed from laminated insulating material and preferably square or otherwise rectangular in cross-section. To rotatably support the shaft 38 at the left end as viewed in Fig. 1, a pivot bearing is provided comprising a pin or the like 39 extending inwardly from the end member 2 and rigidly secured thereto in any suitable manner, for example as by driving it into a perforation 40 in the end member 2. The shaft 38 has a recess 41 coaxially thereof into which the pin 39 projects, and a metal ferrule 42 is fitted on the end of the shaft 38 and has a perforation 43 telescoped over the pin 39.

The shaft 38 may thus rotate on the pin by its recess 41 but preferably the bearing support of the shaft 38 is taken on the perforation 43 of the metal ferrule. End thrust of the shaft 38 toward the left is taken by the ferrule 42 abutting upon a boss 44 formed on the end member 2.

To support the right-hand end of the shaft 38 as viewed in Fig. 1, a relatively large diameter boss 45 is provided on the end member, having a relatively large diameter bore 46 therein coaxial with the shaft 38; a bushing 47, externally cylindrical to rotatably fit the bore 46 has a rectangular or square hole 48 therein by which the bushing 47 may be driven or otherwise fitted on the end of the shaft 38; and the bushing 47, inwardly of the boss 45, has an enlarged flange or collar 49 rigidly connected thereto or formed integrally therewith. If desired, a set screw 50 may be provided in the sleeve 47 to rigidly secure the sleeve to the shaft 38 against longitudinal shifting. End thrust of the shaft 38 toward the right may be taken by the flange 49 on the boss 45.

An operating handle 51 is provided having a hand grip portion 52, preferably extending radially with respect to the shaft 38, and having a flange 53, which may be substantially of the same diameter as the sleeve 47, secured to the sleeve by a plurality such as four screws 54 pro-

jected through suitable perforations in the flange 53 and threaded into the sleeve 47.

By this construction it will be apparent that upon oscillating the handle 51 by the hand grip portion 52, the shaft 38 will be rotated on the bearings above described and the shaft will be prevented from moving longitudinally in either direction.

To remove the shaft 38 from the housing or to assemble it therewith together with the movable contacts mounted thereon and to be described hereafter, the handle 51 may first be removed by removing the screws 54, and then the end member 1 may be removed by removing the screws 8 and the screws 17; whereupon the shaft 38 may be removed with the ferrule 42 on one end and the sleeve 47 on the other; and the assembling of the shaft may be performed in the reverse order.

The construction of the movable contacts or drum contacts will now be described. As shown in Figs. 1 and 2, the contact fingers 24 may be disposed in pairs, the finger of each pair on opposite sides of the shaft 38, three such pairs being indicated in Fig. 1. Cooperating with each pair of fingers 24 is a plurality of contacts 55 mounted on the shaft 38 and disposed to make engagement with the contacting portion 25 of the fingers 24 when the shaft is rotated.

In the preferred construction of mounting the contacts 55, a pair of sheet metal arms 56—56 are clamped upon opposite flats of the rectangular shaft 38 by a through bolt or rivet 57 projected through perforations in the arms 56 and in the shaft, the arms comprising corresponding flat portions 58—58 engaging the shaft, end portions 59—59 extending in opposite directions from the flat portions 58 and parallel thereto, the portions 59 being joined to the portions 58 by inclined connecting portions 60—60 whereby the adjacent portions 59 of the two arms 56—56 may be disposed relatively closely together.

The contacts 55 are preferably of T-form in cross-section, being produced by cutting short lengths from an extruded copper or the like bar of T-section. The contacts 55, therefore, each comprise a head portion 61 and a stem portion 62. The arm portions 59 above described are disposed so that the stem portion 62 of the contact may be disposed and clamped therebetween by screws 63—63 in a manner to be more fully described. Four supplemental arms 64 are provided from sheet metal strips, preferably the same size strip as the arms 56, generally of divergent U-form, comprising flat intermediate portions 65 and opposite leg portions 66 diverging from each other at an included angle of approximately 90°. One of the divergent legs 66 of each supplemental arm 64 is laid flat upon each of the outer arm portions 59 of the arms 56, thus disposing the other divergent legs 66 of the supplemental arms in pairs parallel to each other and relatively closely adjacent; and between each of the pairs, the stem 62 of a contact 55 is placed.

The clamping screws 63 referred to are now projected through perforations in the contact stem 62, arm portions 59 and one of the divergent legs 66 and threaded into the other divergent leg to clamp the parts together and clamp the contact stem 62 to position and support it. Screws 67 are projected through the remaining two contact stems 62 and correspondingly through one of the adjacent divergent arms 66 and threaded in the other pair of arms 66 to

clamp the corresponding contacts and support them on the supplemental arms.

In this manner all four contacts are supported with the outer surfaces of their heads 55 substantially on the surface of a cylinder to equally and suitably engage the contact fingers 24 when the shaft is rotated. Furthermore, the contacts are rigidly connected to the shaft and move in unison therewith without yielding or lost motion.

The construction of the contact support just described will be seen to admit of cheap, simple manufacture from sheet metal strips and at the same time to provide a rigid structure; and the structure will be seen to consist of only two different kinds of bent metal parts such as an arm 56 and an arm 64. It is a further distinct advantage of this construction that either one of the contacts 55 may be removed without disturbing the other contact 55. Preferably the contacts 55 are symmetrically formed with respect to the stem 62 so that when the contact has worn at one edge of the head it may be removed by loosening and removing the screw holding it and may be turned around to present the other edge of the head 55 for wear. Or, in like manner, either contact may be completely removed and replaced when that becomes necessary without disturbing any of the other contacts.

One form of contact 55 which may be employed is shown in Figs. 4, 5 and 6 and when this type is used, contact connection is made from one contact finger 24 directly through to the opposite finger. In Figs. 7 and 8 is illustrated another type of contact, one of which is shown at 68 in Fig. 1, and this form may be used when it is desired to bridge two of the fingers 24 on the same side of the drum.

In Figs. 9 and 10 is illustrated another form of contact comprising two stem portions 62 and a circumferentially extended head 55c for continuously engaging a stationary contact upon rotation of the drum through a predetermined angle.

In the modification of the contact support illustrated in Fig. 11, provision is made to dispose contact 55a opposite the edges of the rectangular shaft 38 instead of opposite the flat portions thereof as in Fig. 2, and this arrangement may be employed for engagement with some of the fingers 24 together with the arrangement of Fig. 2 when it is desired to engage fingers 24 at each angular movement of the shaft 38 of 45° instead of 90° as in Fig. 2; or the arrangement of Fig. 9 may be used alternatively with that of Fig. 2 if desired. Substantially the only difference between the two forms is that the inner arms 56a of Fig. 9 conform to the angular edges or corners, such as 69 of the shaft, instead of conforming to the flats thereof. In this form it may be desirable to countersink the ends of the rivet or bolt 57a as illustrated.

In the modification of Fig. 12, a simplified form is shown which disposes the contacts 55b opposite the angular edges of the shaft 38 as in the form of Fig. 9. In this form the inner arms are dispensed with. Four similar or identical U-shaped arms 70 are provided having flat intermediate portions 71 and opposite diverging legs 72, diverging at an angle of 90° with each other. The intermediate portions 71 of two of the arms are disposed on opposite flats of the shaft 38 and rigidly secured thereto by a bolt or rivet 73. The other arms 71 have their intermediate portions 72 resting upon the other two flat faces of the shaft 38 and may likewise be secured rigidly to the shaft 38 by a bolt or rivet but need not be so

secured, being held in position by the arms which are secured by the bolt 73 in the following manner.

The stems of the contacts 55b are disposed between the adjacent pairs of divergent legs 72 and secured therebetween by screws 74 projected through one of the legs 72 and through the stems of the contacts and threaded into the other divergent leg. This means of securing contacts is followed around the drum for each of the four contacts and thus all of the arms and all of the contacts are supported, although only two of the arms need be secured to the shaft.

Again, in the form of Fig. 12, either contact may be removed without disturbing the other contacts.

In order to stop or "center" the shaft in the several positions in which the contacts on the drum are in engagement with the contact fingers 24, the flange 49 which, as above described is secured to the shaft, is provided with teeth 75. A roller 76 on a lever 77 pivoted to the end frame member 1 at 78 is spring-pressed into engagement with the teeth by a spring 79 secured at one end to the lever 77 and at the other end to the frame member 1 as at 80. Upon turning the shaft 38, the roller 76 will ride up out of the space between adjacent teeth and permit the shaft to turn and will ride down on the other side of the tooth over which it has ridden, and thus predetermine exact rotative positions for the shaft 38. Any number of positions may be provided by a corresponding number of teeth. To stop rotative movement of the shaft 38 in extreme positions in each direction, when this is desired, a stop 81 may be formed on the end frame member 1 engageable with shoulders 82 and 83 on the flange 49.

My invention is not limited to the exact details of construction shown and described inasmuch as changes and modifications may be made therein without departing from the spirit of my invention or sacrificing its advantages and within the scope of the appended claims.

I claim:

1. In a controller drum construction, a shaft, a plurality of contact carrying arms extending laterally from the shaft comprising a like plurality of identical sheet metal elements bent into divergent channel form with the web of the channel disposed adjacent to the shaft and each flange of one element disposed adjacent to and generally parallel to a flange of the next adjacent element around the shaft, the generally parallel pairs of flanges constituting the said arms, contact elements each having a portion disposed between a corresponding pair of flanges respectively and means to clamp them therebetween, and means to mount the plurality of sheet metal elements on the shaft.

2. In a controller drum construction, a shaft, a plurality of contact carrying arms extending laterally from the shaft comprising a like plurality of identical sheet metal elements bent into divergent channel form with the web of the channel disposed adjacent to the shaft and each flange of one element disposed adjacent to and generally parallel to a flange of the next adjacent element around the shaft, the generally parallel pairs of flanges constituting the said arms, contact elements each having a portion disposed between a corresponding pair of flanges respectively, contact connecting means detachably rigidly connecting the contact portions to the pairs of flanges respectively, and means to mount the sheet metal

elements on the drum, comprising means to rigidly connect some of the said channel portions to the said shaft.

3. In a controller drum construction, a shaft,
5 a plurality of contact carrying arms extending laterally from the shaft comprising a like plurality of identical sheet metal elements bent into divergent channel form with the web of the channel disposed adjacent to the shaft and each flange
10 of one element disposed adjacent to and generally parallel to a flange of the next adjacent element around the shaft, the generally parallel pairs of flanges constituting the said arms, contact elements each having a portion disposed between
15 a corresponding pair of flanges respectively, contact connecting means detachably rigidly connecting the contact portions and the pairs of flanges together respectively, and means to mount the sheet metal elements on the drum comprising
20 a pair of sheet metal elements embracing the shaft therebetween and rigidly secured thereto and having end portions extending laterally from the shaft and rigidly secured to corresponding ones of the first named sheet metal elements.
25 4. In a controller drum construction, a shaft, a plurality of contact carrying arms extending laterally from the shaft comprising a like plurality of identical sheet metal elements bent into divergent channel form with the web of the channel disposed adjacent to the shaft and each flange
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of one element disposed adjacent to and generally parallel to a flange of the next adjacent element around the shaft, the generally parallel pairs of flanges constituting the said arms, a plurality of contact elements, and contact connecting means
5 detachably rigidly connecting each contact element to a corresponding pair of flanges respectively, and means to mount the sheet metal elements on the shaft.

5. In a controller drum construction, a shaft,
10 a plurality of contact carrying arms extending laterally from the shaft comprising a like plurality of identical sheet metal elements bent into divergent channel form with the web of the channel disposed adjacent to the shaft and each flange
15 of one element disposed adjacent to and generally parallel to a flange of the next adjacent element around the shaft, the generally parallel pairs of flanges constituting the said arms, a plurality of contact elements, contact connecting means detachably rigidly connecting each contact element
20 to a corresponding pair of flanges, respectively, and means to mount the sheet metal elements on the drum, comprising a pair of sheet metal elements embracing the shaft therebetween and rigidly secured thereto and having end portions extending oppositely laterally from the shaft and connected to corresponding ones of the first named sheet metal elements.
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