R. AMBERTON.

ELECTRIC CIRCUIT CONTROLLER.

APPLICATION FILED MAR. 3, 1920.

1,395,886. Patented Nov. 1, 1921.

Fig. 1.

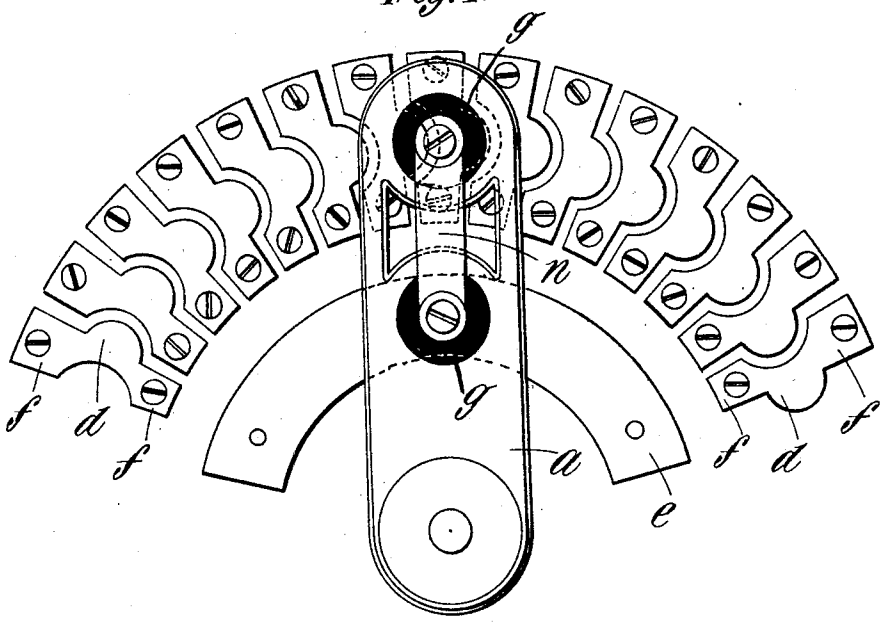


Fig. 3.

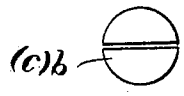
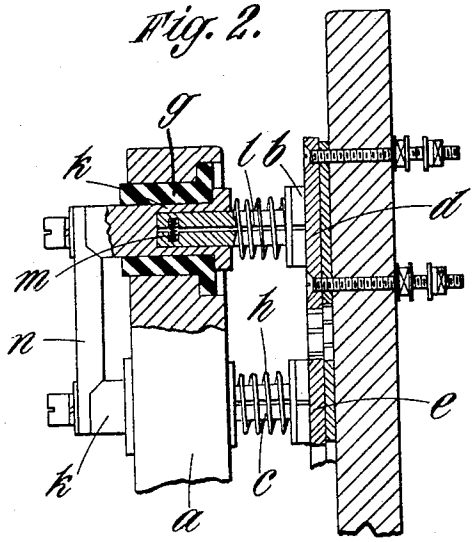


Fig. 2.



INVENTOR:-
Richard Amberton
By Hubert A. Gill
Attorney

UNITED STATES PATENT OFFICE.

RICHARD AMBERTON, OF LONDON, ENGLAND.

ELECTRIC-CIRCUIT CONTROLLER.

1,395,886. Specification of Letters Patent. Patented Nov. 1, 1921.

Application filed March 3, 1920. Serial No. 362,948.

To all whom it may concern:

Be it known that I, RICHARD AMBERTON, a subject of the King of Great Britain, and residing at Vauxhall Works, South Lambeth road, London, S. W. 8, England, have invented certain new and useful Improvements in Electric-Circuit Controllers, of which the following is a specification.

This invention relates to electric circuit controllers, and in particular to the brushes and contacts used in controllers of the type employed as motor starters, rheostats, and so forth. It is the object of the invention to improve the form of the brushes and the contact members, to facilitate the manufacture, fitting and insulation of the brushes, and incidentally to render it easy to manufacture a controller, the operating lever of which does not carry current.

The invention is illustrated in the accompanying drawing, wherein:—

Figure 1 shows the contacts and contact-making arm of a motor starter, according to the invention.

Fig. 2 is a sectional detail view showing the method of mounting the brushes in the arm.

Fig. 3 shows the contact surface of the contact brushes.

The contact arm *a* in the motor starter shown in Fig. 1, carries two contact-making studs *b* and *c*, of which stud *b* works over a set of plates *d* of a particular form, while stud *c* works over a sector *e*. The arm *a* may be operated directly or indirectly by hand, or mechanically in any suitable manner. The contact pieces or plates *d* are stamped out in such a form that on each side they have a curved edge of circular curvature over nearly a semi-circle, leaving end lugs *f* for attaching purposes. Such contact plates can be stamped out successively from a bar of metal with the outer curved surface of the one corresponding with the inner curved surface of the next, so that there is little or no waste in scrap material. The contact plates *d* are spaced apart as is usual in a controller, with the steps of resistance connected between the successive contacts. The brushes *b* to work over such contacts consist of circular heads on the ends of plain stems which can be held or supported in any convenient way in the arm or brush lever *a*. The radius of curvature of the head of the brush *b* should correspond with the radius of curvature of the edges of each contact member *d*, so that as the brush approaches or leaves a contact member the make or break will take place simultaneously around almost half the circumference of the brush, avoiding the risk of any heavy local current such as would quickly burn away any small area remaining in contact after a break in contact elsewhere. The brushes are preferably rotatably mounted in insulating sockets *g* and pressed toward the contacts by springs *h*, between the brush heads and the sockets, so that the turning of the brushes which results automatically to a certain extent from their movements over the contacts *d*, will tend to present different portions of their circumference to the contacts at different times, whereby the burning or wearing away of the edges of the brushes is evenly distributed around the same.

The stems of the brushes *b c* may slide in tubular metal sockets *k*, and in order to insure good contact the stems may be split as at *l* and springs *m* may be fitted between the split portions so that the stems will be pressed against the sockets *k* with certainty over one or more areas for contact purposes.

With brushes made in this way it is easy to arrange for the complete insulation of the brushes from the operating levers *a*. All that is necessary for this purpose is to drill out two holes in the operating lever, to fit annular insulating ferrules or washers *g* therein of a size such as to receive the sockets *k* in which the stems of the brushes are mounted to slide, and to form these sockets so that the parts thereof which project beyond the insulating ferrules *g* can be interconnected for example by a plain conducting bar *n*. In this way the brushes are interconnected without any current passing through the lever *a* by which they are carried.

Contact plates *d* as shown, with sides of substantially circular curvature, coöperating with studs with substantially circular faces, can be used in rheostats or circuit controllers for any purpose.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In an electric circuit controller the combination comprising a plurality of contact plates each of said contact plates being formed with sides, one of which is outwardly

curved and the other inwardly curved, the curvature of both sides being approximately circular, said contact plates being placed side by side so that the outwardly curved side of one contact plate fits into the inwardly curved side of the next contact plate but without contacting therewith, and a circular brush, the circumferential outline of the brush being of similar curvature to the outwardly curved side of the contact plates.

2. In an electric circuit controller, the combination comprising a set of contact plates having end lugs for attachment purposes, and intermediate portions, one side of which is curved inwardly and the other outwardly to an approximately circular curvature, said contact plates being placed side by side so that the outwardly curved portion of one plate fits into the inwardly curved portion of the next plate but without contacting therewith, a brush arm, and a circular brush carried thereby, the circumferential outline of the brush being of similar curvature to the outwardly curved intermediate portion of the contact plates, the brush arm and contact plates being so arranged that when the brush arm moves in one direction the brush carried thereby will make contact around substantially one half of its circumference with the contact plate with which it is brought into engagement.

3. In an electric circuit controller, the combination comprising a set of contact plates, each of said contact plates being formed with sides one of which is outwardly curved and the other inwardly curved, the curvature of both sides being approximately circular, said contact plates being placed side by side so that the outwardly curved side of one contact plate fits into the inwardly curved side of the next contact plate but without contacting therewith, a brush arm, and a circular brush rotatably mounted in said arm, said brush being free to turn in said arm automatically in its movements over the contacts thus presenting different portions of its edges to the contacts and preventing localization of the burning away of its edges.

4. In an electric circuit controller, the combination comprising a set of contact plates, each of said contact plates being formed with sides one of which is outwardly curved and the other inwardly curved, the curvature of both sides being approximately circular, said contact plates being placed side by side so that the outwardly curved side of one contact plate fits into the inwardly curved side of the next contact plate but without contacting therewith, a brush arm, metal sockets in said arm, longitudinal split brushes mounted in said sockets so as to be free to turn therein, and spring means for pressing the brushes outwardly into good contact with the sockets.

5. In an electric circuit controller, the combination comprising a set of contact plates, each of said contact plates being formed with sides one of which is outwardly curved and the other inwardly curved, the curvature of both sides being approximately circular, said contact plates being placed side by side so that the outwardly curved side of one contact plate fits into the inwardly curved side of the next contact plate but without contacting therewith, a brush arm, a plurality of insulating members in said brush arm, a plurality of metal sockets, a metal socket being mounted in each insulating member, a plurality of brushes each rotatably mounted in a metal socket, and electrical connections between the metal sockets.

6. In an electric circuit controller, the combination comprising a plain contact plate, a set of separate contact plates each having curved sides, one side being curved inwardly and the other outwardly, said contact plates being placed side by side so that the outwardly curved side of one contact plate fits into the inwardly curved side of the next contact plate but without contacting therewith, a brush arm, two insulating members mounted in said brush arm, two metal sockets, one being mounted in each insulating member, means electrically connecting the two sockets, two brushes having circular faces and mounted rotatably, so as to be free to turn, one in each socket, one of said brushes being adapted to contact with the plain contact plate and the other with the set of separate contact plates, and spring means for pressing the brushes into contact with the contact plates.

7. In an electric controller the combination comprising a curved contact plate, a plurality of separate contact plates arranged radially around the curved contact plate, each of said radial contact plates having curved sides, one side being curved inwardly and the other outwardly, while the contact plates are arranged side by side so that the outwardly curved side of one radial contact plate will fit into the inwardly curved side of the next radial contact plate but without contacting therewith, a radial brush arm, two insulating members mounted in said brush arm, two metal sockets, one being mounted in each insulating member, and means electrically connecting the metal sockets, the brush arm being adapted to be moved over the radial contact plates so that the brush will be brought successively into contact with the radial contact plates around substantially one half of its circumference.

RICHARD AMBERTON.