Aug. 18, 1925. 1,550,206

F. P. CHURCH

VARIABLE RESISTANCE CONDUCTOR TERMINAL

Filed May 1, 1922

Fig. 1.

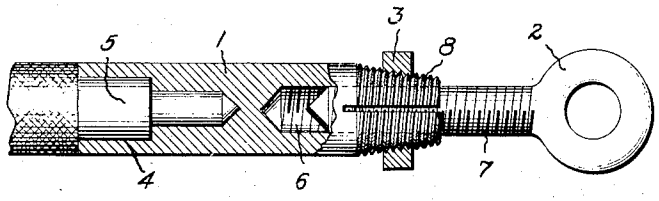
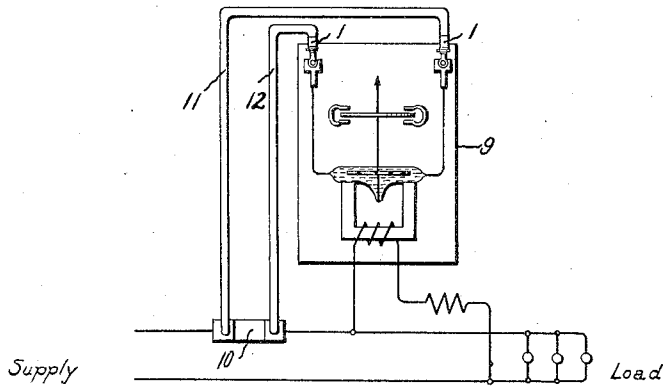


Fig. 2.



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by Albert G. Davis
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UNITED STATES PATENT OFFICE.

FREDERICK P. CHURCH, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VARIABLE-RESISTANCE CONDUCTOR TERMINAL.

Application filed May 1, 1922. Serial No. 557,604.

To all whom it may concern:

Be it known that I, FREDERICK P. CHURCH, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Variable-Resistance Conductor Terminals, of which the following is a specification.

My invention relates to conductor terminals or connectors and its object is to provide an electric cable terminal or connector, the impedance of which may be varied in a simple manner.

The utility of my invention will be apparent from the following illustration: An electric meter known as a shunted mercury meter has a current circuit made up of three parts, namely, the shunt, the shunt leads, and the meter. For a given meter and shunt the shunt leads must have a certain definite resistance. It is very difficult to make up a shunt lead of a given definite resistance due to variations in the cable of which the lead is made and variations in the usual soldered joints at its terminals. It is thus quite impossible to cut a length of cable and solder on the usual terminal clips and be sure in advance of attaining a shunt lead having a definite specific resistance. According to one form of my invention, I provide a variable resistance terminal clip or connector which may be soldered on to a cable in the usual way after which the resistance drop therein may be adjusted to the desired value in a manner now to be explained.

The features of my invention which I believe to be novel and patentable will be pointed out in the claims appended hereto. The preferred construction and use of my improved terminal clip will be understood from the following description taken in connection with the accompanying drawing in which Fig. 1 represents the details of construction of a cable terminal made in accordance with my invention and Fig. 2 illustrates the use of my improved terminal on meter shunt leads.

In Fig. 1, I show a cable terminal clip consisting of a cylindrical shank 1, a terminal eye 2, and a clamping nut 3. The shank portion has an axial opening 4 in one end adapted to receive and be soldered or otherwise secured to an insulated cable 5. In order to secure a good conducting joint between the cable 5 and the shank 1, their abutting surfaces may be stepped as illustrated. The other end of the shank is provided with a threaded opening 6 concentric with its axis into which a threaded extension 7 of the eye terminal 2 is adapted to be screwed. In order to secure a good electrical contact between the threaded contacting surfaces of the shank 1 and extension 7, the threaded end of the shank is split and is provided with an exterior conical threaded surface 8 cooperating with a clamping nut 3. The split end of the shank is caused to grip the threaded extension 7 of the eye terminal by screwing up the clamping nut 3 which is internally threaded to correspond to the threaded conical surface 8.

It will now be apparent that the length of the current path through the terminal clip may be lengthened or shortened by screwing the eye terminal 2 out or in with respect to the shank 1 and in so doing the resistance between the extremities thereof will be increased or decreased accordingly. The shank 1 and eye terminal 2 are made of metal having the required resistance to obtain the results desired. For shunt lead terminals I have found nickel steel to be very satisfactory. The nut 3 is preferably case hardened. I have found that the resistance of an ordinary shunt lead provided with my improved terminal clip may be varied over 10% in this manner which is more than enough to correct for any inequalities in the material of the shunt cable and variations in the resistance of the soldered joints at its end.

In Fig. 2, I have diagrammatically illustrated a mercury meter 9 connected to a shunt 10 by a shunt leads 11 and 12. The meter terminals of these leads are provided with my adjustable resistance terminal clips. After the shunt leads have been made up, they may be accurately adjusted to have the correct resistance drop for this particular meter and shunt by screwing the eye terminal 2 in or out of the shank 1. If at any time the meter 9 or the shunt 10 is replaced and the new conditions require a different resistance drop in the shunt leads, it will not be necessary to provide new shunt leads because my improved terminal clip permits their resistances to be accurately adjusted to any desired value within the limits of the

device. Some users of electricity have large numbers of shunted meters and insist on having the shunt leads interchangeable which means that the resistance of the leads should not vary above one per cent. The cut and try method of obtaining this accuracy is very expensive and is entirely unnecessary when my variable resistance terminal clip is used.

Although I have illustrated my invention as applied to a cable terminal clip, I do not wish to be limited thereto as it will be apparent that the same idea may be applied to a cable connector. Thus, I might provide a cable connector made up of two cable receiving shanks connected together by a right and a left-hand threaded bolt. Then by turning the bolt one way, the resistance of the connector will be increased and by turning it the other way, the resistance will be decreased.

In some instances where the device is to be used on alternating current circuits it may be desirable to obtain a variable reactance instead of a variable resistance or a suitable combination of these two characteristics, in which case I will so construct my improved connector as to form an adjustable reactance. For this purpose I might make the conducting portions of the connector of material having a high skin effect such as iron and vary its length in a manner already described.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. An adjustable rheostat in the form of an electric cable connector made of resistance metal such as nickel steel, comprising a cable connecting portion and a terminal clip portion, said parts being threaded one within the other in such a way that the length of the current path therethrough may be varied to appreciably vary the resistance.

2. An adjustable rheostat in the form of an electric terminal connector made of resistance metal comprising a cylindrical shank having an opening in one end for receiving a cable and a threaded opening in its opposite end, said threaded end being split and provided with an exterior conical threaded surface, a terminal clip threaded into the threaded end of said shank and a clamping nut on said conical threaded exterior surface.

3. A rheostat comprising a cable connector having a longitudinal shank adapted to be secured at one end to a cable and having an internally threaded opening in its opposite end, a terminal clip provided with a threaded extension adapted to be screwed into the threaded opening in said shank, said parts being made of a metal having a specific resistance appreciably above that of copper and arranged so that an appreciable variation in the resistance of the connector may be had by adjusting the position of the said threaded clip in said shank, and means for securing said parts in any such adjusted position.

4. A meter shunt lead provided with a terminal clip designed to be used as an adjustable rheostat, said clip comprising metallic parts having a specific resistance appreciably above that of copper, said parts being adjustably threaded together with the threaded portions forming an adjustable resistance in the circuit of the shunt lead.

In witness whereof, I have hereunto set my hand this 27th day of April, 1922.

FREDERICK P. CHURCH.