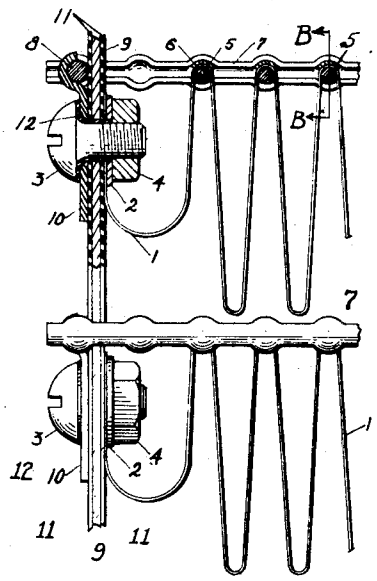
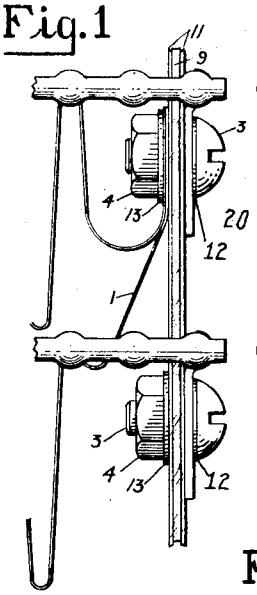
July 23, 1929. T. S. KEMBLE 1,721,910

ELECTRICAL RESISTANCE

Filed July 2, 1924

Fig. 1





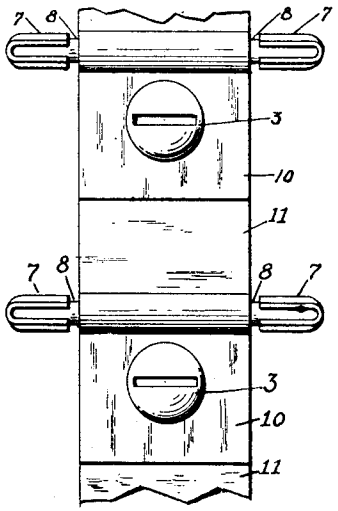


Fig. 3

Fig. 2

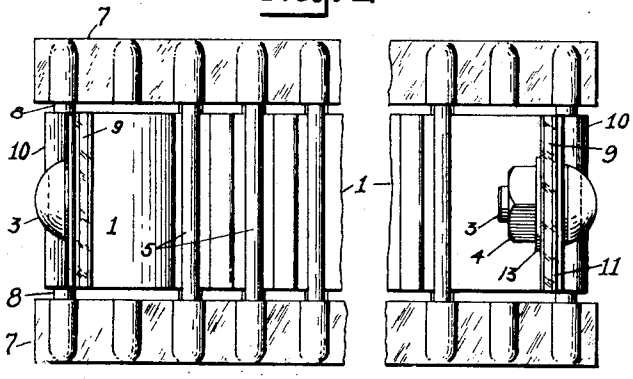
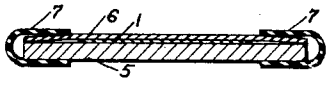


Fig. 4



Inventor

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By Attorneys Dodson & Rae

Patented July 23, 1929. 1,721,910

UNITED STATES PATENT OFFICE.

THOMAS S. KEMBLE, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNIVERSAL GAS ELECTRIC COMPANY, OF LAWRENCE, KANSAS, A CORPORATION OF DELAWARE.

ELECTRICAL RESISTANCE.

Application filed July 2, 1924. Serial No. 723,770.

Resistances which are commonly employed in electrical circuits are objectionable for many reasons, for example, cast iron grid resistances in ordinary use have great weight in proportion to their radiating surface; small wire has much less weight proportionately; thin ribbon has still less weight proportionately.

But either small wire or thin ribbon when thus used is customarily wound upon an insulator. This insulator is apt to be bulky and many times heavier than the resistance and when a considerable quantity of power is to be dissipated the cost and weight may become serious factors.

My invention has for its object to overcome these objectionable features. In order to accomplish this I propose to mount resistance ribbon between light metal carriers in such a way that the carriers shall be in general parallel to the resistance ribbon and discontinuous, so that the insulating material between the resistance and the carrier may be very moderate. It may even consist of a coat of enamel in certain cases.

I also propose to mount resistance between uninsulated local carriers, and to mount these local carriers in insulated carriers, so that no insulation can come in direct contact with the hot resistance.

The whole to be arranged to offer low resistance to the passage of air or other cooling medium and built up to resemble slightly, the effect presented by an automobile radiator.

My means for securing the foregoing objects may be more readily understood by reference to the accompanying drawings, in which:

One form of resistance mounting "between uninsulated local carriers" is shown in Figs. 1, 2, 3 and 4.

Fig. 1 is an elevation view, with the upper left hand corner of the view shown in partial section.

Fig. 2 is a plan view from the bottom.

Fig. 3 is an end elevation.

Fig. 4 is a section on the line B, Fig. 1.

As shown in the drawings and referring specifically to Fig. 1;

An end of the resistance ribbon 1 is secured to a terminal 2 by a bolt 3 and nut 4. It loops down and then up over the wire 5 where it is clamped between the sheet metal stampings 6 and said wire 5 which I term ribbon carriers. It then loops down and then up forming what I have termed cross-wise corrugations, the top of each loop being passed between and clamped between another wire 5 and the stamping 6 as described. This continues to where the other end 20 of the ribbon 1 is secured by another bolt 3 and nut 4 as shown in the upper right hand corner of Fig. 1. This end 20 is clamped in contact with an end of the ribbon of the lower tier causing the two ribbons to be in series electrically. The lower ribbon is carried similarly in a series of loops or crosswise corrugations to its end as shown at the lower left hand corner of Fig. 1 where its other end is secured to the terminal 2. As described, the wire 5 and the stampings 6 form uninsulated local carriers. These uninsulated local carriers are in turn mounted in the insulated discontinuous carriers 7 which are carried in turn by the rods 8 clamped to the frame 9 by the clamp 10. Insulation strips 11 on each side of the frame 9 insulate the frame from the rod 8, the clamp 10, and the resistance ribbon 1. A flanged insulation ferrule 12 insulates the bolt 3 from the clamp 10 and the frame 9. A plain washer 13 is used under the nut 4 wherever a terminal 2 is not required under the nut.

The above arrangement, provides minimum number of clamps for a given length of ribbon. The approximate triangular shape formed by the two legs of the crosswise corrugation or loop and the two supports of the loop give to the loop of resistance ribbon maximum rigidity between supports, close together enabling me to keep the sides of the loops rather close together and thus economize space.

This arrangement further permits economies in manufacture due to combinations of identical parts in various combinations. It will be obvious from the foregoing description that I have one primary sub-assembly consisting of one strip of crosswise corrugated resistance ribbon 1, any required number of pairs of uninsulated local carriers 5 and 6, two identical insulated carriers 7 and two identical rods B. Any number of these primary sub-assemblies may be brought together into resistance units using standard bolts 3, nuts 4, terminals 2, washers 13, clamps 10, insulator strips 11 and flanged resistance fer-

rules 12. The frame 9 may be of standard section and mounted on racks, not shown, to form any combination required.

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

1. An electrical resistance, comprising clamping means, means to insulate said clamping means, non-insulated carriers, and a resistance ribbon carried solely by said carriers and clamped at frequent intervals of its length between said carriers by said clamping means.

2. An electrical resistance, comprising clamping means, means to insulate said clamping means, non-insulated carriers, and a resistance ribbon carried solely by said carriers and clamped at frequent intervals of its length between said carriers by said clamping means, there being an unobstructed passageway for a cooling fluid to pass crosswise of said resistance ribbon over its entire surface except at the points where it is clamped.

3. An electrical resistance, comprising non-insulated resistance carriers, which form the only resistance support, a resistance ribbon looped over one carrier and below another, and means to clamp said ribbon at alternate loops, the loop between each two clamping points being free.

4. An electrical resistance, comprising non-insulated pairs of resistance carriers which form the only resistance support, a resistance ribbon looped over the one carrier and below another of a pair and means to clamp said ribbon at alternate loops, the loops between each two clamping points being free, there being an unobstructed passageway for a cooling fluid to pass crosswise of said resistance ribbon over its entire surface except at the point where it is clamped.

5. An electrical resistance, comprising non-insulated carriers, a crosswise corrugated resistance ribbon supported solely by said carriers, means to clamp alternate corrugations of said ribbon between said carriers, and means to insulate said clamping means.

6. An electrical resistance, comprising non-insulated carriers, a crosswise corrugated resistance ribbon supported solely by said carriers, means to clamp alternate corrugations of said ribbon between said carriers, and means to insulate said clamping means, there being an unobstructed passageway for a cooling fluid to pass crosswise of said resistance ribbon over its entire surface except at the points where it is clamped.

7. In combination, a resistance ribbon, said ribbon being bent alternately in opposite directions, carriers which solely support said resistance at frequent intervals of its length, means to clamp said ribbon between said carriers, and an insulation which supports said carriers.

8. In combination, a resistance ribbon, said ribbon being bent alternately in opposite directions, carriers which solely support said resistance at frequent intervals of its length, means to clamp said ribbon between said carriers, and an insulation which supports said carriers, there being an unobstructed passageway for a cooling fluid to pass crosswise of said resistance ribbon over its entire surface except at the points where it is clamped.

9. An electrical resistance, comprising a frame, a plurality of pairs of non-insulated carriers, a resistance ribbon looped over one of said carriers and below the other leaving a loop depending freely between said pairs of carriers, insulated means on said frame to clamp said resistance between said carriers.

10. An electrical resistance, comprising a corrugated resistance ribbon, a frame, a plurality of wires over which alternate corrugations are looped, said wires being the sole support for said resistance, a plurality of sheet metal stampings, means to clamp said ribbon between said wires and said stampings, and insulation between said clamping means and said frame.

11. An electrical resistance, comprising a corrugated resistance ribbon, non-insulated means to clamp said ribbon at alternate corrugations, the intermediate corrugations being free, and insulated means to support said clamping means, there being an unobstructed passageway for a cooling fluid to pass crosswise of said ribbon over its entire surface except where it is clamped.

THOS. S. KEMBLE.