Dec. 25, 1945. L. SATCHWELL 2,391,744

ELECTRIC RESISTANCE GRID

Filed May 15, 1943

Fig. 1.

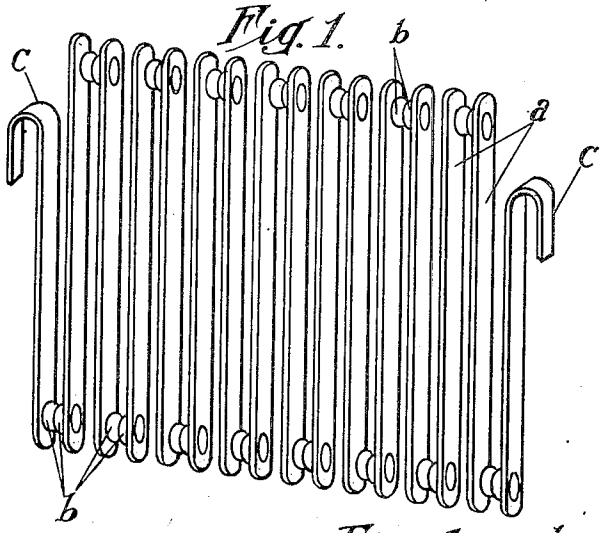


Fig. 2. Fig. 3.

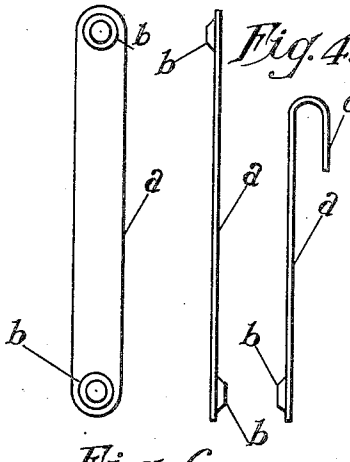


Fig. 4.

Fig. 5.

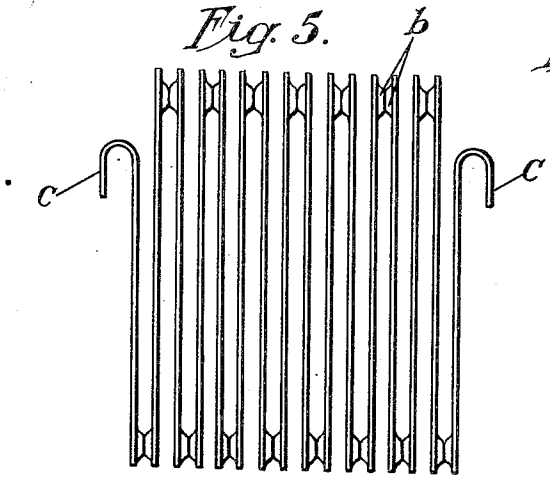


Fig. 6.

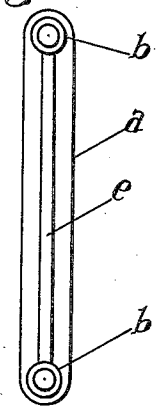
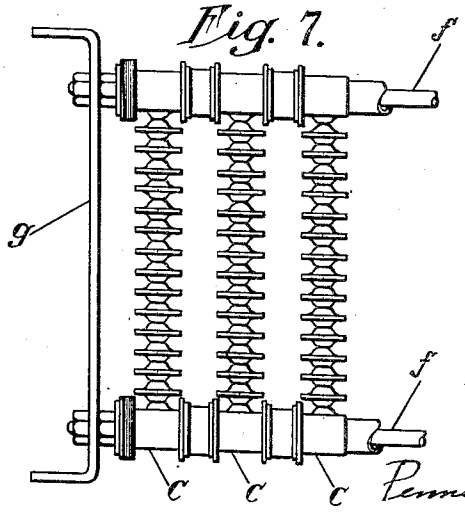


Fig. 7.



INVENTOR
LEONARD SATCHWELL
BY
Pennie, Davis, Marvin & Edmonds
ATTORNEYS

Patented Dec. 25, 1945

2,391,744

UNITED STATES PATENT OFFICE

2,391,744

ELECTRIC RESISTANCE GRID

Leonard Satchwell, Marlow, England

Application May 15, 1943, Serial No. 487,142
In Great Britain June 2, 1942

6 Claims. (Cl. 201—69)

The present invention relates to improvements in and connected with electric resistance grids.

Due to the inherently low specific resistance of common metals it has always been necessary to construct resistances by dividing or rolling metals into long paths and finally bending such long paths of metal into a series of coils or convolutions known as grids in such manner as to include a sufficient length of metal within a compact cubic form, while preserving air spaces between parallel lying portions of the path so that heat produced in the resistance may be readily dissipated by convection to the surrounding air.

It is well known that mechanical weakness is a consequential result of the mode of construction referred to and acts to limit the minimum spacing of the turns or convolutions of the metal if touching together of such turns or convolutions is to be avoided.

The necessity for lengthy paths of relatively thin material also tends to render difficult the process of manufacturing resistance grids in certain types due to the necessity for the wire or strip commonly used having to be bent into a series of zigzags or convolutions or other form providing a long path within a small space, and consequently presenting an unwieldy and sometimes delicate mass of metal which tends to become tangled as it is being made.

An object of the present invention is to provide an improved construction of resistance grid which largely avoids the above mentioned defects in that it provides relative rigidity in at least two of the three directions in which flimsiness may occur in a grid. A further object of the invention is to provide a more simple and efficient mode of manufacturing resistance grids than has obtained in previous practice, having regard to the multitudinous combinations of ohmic values and current carrying capacities which are demanded, which mode of manufacture avoids the difficulties of handling long sinuous strips of material.

In accordance with the present invention an electric resistance grid is made up of individual grid bars welded together or brazed or soldered together to provide a zigzag form. The individual grid bars are formed at fixed locations with bosses which present surfaces to be welded or brazed or soldered and also act as a spacing means for the individual bars.

The invention is illustrated in the accompanying drawing in which Fig. 1 is a perspective view of one form of an improved grid comprising separate stampings welded together. Fig. 2 is a front view and Fig. 3 a side elevation of intermediate component bars of the grid shown in Fig. 1, and Fig. 4 is a side view of one terminal of the grid shown in Fig. 1. Fig. 5 is a front view of Fig. 1. Fig. 6 a view similar to Fig. 2 of a modified form of grid bar and Fig. 7 a view of a resistance unit built up of a number of such grids and showing their assembly.

As shown particularly in Figs. 1 to 5 the improved resistance grid is formed by a plurality of individual flat metal grid bars *a* formed by stamping with oppositely extending bosses *b* adjacent their ends, the bosses of successive bars being welded, brazed or soldered together to form a grid of substantially zigzag form. The terminal bars at each end are suitably hooked as at *c* for a purpose hereinafter explained. As is clear particularly from Figs. 1 and 5 the combined heights of the bosses *b* provide a suitable distance apart of the flat bars.

The construction as shown provides a resistance grid which has inherent rigidity in two directions. In the first place the bar at one end of the grid is relatively immobile to the bar at the opposite end of the grid if forces are applied in opposite vertical directions to those bars respectively. Secondly a twisting action applied to those bars in opposite directions meets with great resistance due to the twisting action operating through material which is arranged edgewise so far as the bars are concerned, each bar being connected to its neighbour by the rigidity of the welding together of the bosses which welds do not permit movement between the adjacent bars in the two directions referred to.

In the modified form of grid bar shown in Fig. 6 the bar is stamped with a web or corrugation *e* for the purpose of stiffening each bar of the grid and so achieving increased rigidity of the whole grid structure.

Such grids may be arranged for mounting on insulated rods in a commonly known manner as shown in Fig. 7, the hooks *c* provided at either end permitting of assembly on insulated tie rods *f* secured rigidly in the framework *g* of the complete resistance a definite distance apart. This arrangement provides a measure of rigidity in the third direction to some extent preventing the movement of adjacent bars of the grid one to another if the length of the grid is not too great. Such an arrangement is of course common to existing resistances.

The resistance grid described is well suited as a device for dissipation of heat, the convected air currents being only slightly impeded by the junctions between the bars of the grid as will be seen

in Figs. 5 and 7. The improved resistance grid is able to satisfy the largely varying demand in respect to ohmic value and current carrying capacity by the possibility of producing stampings of different sizes and different metals.

The construction of the grid is relatively simple in view of the fact that small stampings can be produced in large quantities at low cost and with suitable fixtures the bars of the grid may be readily located, one to the other, for the welding process to be carried out.

The invention is not limited to stampings of the forms illustrated in the accompanying drawings as many other forms are available within the scope of the invention and the locations for welding, brazing or soldering may be provided by bending the bars in crank, L-shape, or other formation as may be found convenient. It is not intended that the invention should be limited to the welding of the bars by any particular welding process. As indicated above, in certain cases a form of brazing or soldering may be used instead of welding.

I claim:

1. An electric resistance grid comprising a plurality of individual straight substantially flat metal bars each provided intermediate the ends with spacing means struck from the bars, such spacing means presenting welding surfaces, such surfaces welded one to another to provide a substantially zigzag form unsupported except at its ends.

2. An electric resistance grid comprising a plurality of individual straight metal bars each provided intermediate the ends with spacing means struck from the bars, such spacing means presenting welding surfaces, such surfaces brazed one to another to provide a substantially zigzag form unsupported except at its ends.

3. An electric resistance grid comprising a plurality of individual straight metal bars each provided intermediate the ends with spacing means struck from the bars, such spacing means presenting welding surfaces, such surfaces soldered one to another to provide a substantially zigzag form unsupported except at its ends.

4. In an electric resistance grid, a unit therefor comprising a straight metal bar of substantial width compared to its thickness, said bar being formed with a longitudinally-extending rib and with a boss as a spacing means adjacent each end, each boss projecting from the plane of the bar in a direction opposite from that of the other boss.

5. In an electric resistance grid, a unit therefor comprising a straight metal bar of substantial width compared with its thickness, said bar being formed with a projecting boss as a spacing means adjacent each end, each boss projecting from the plane of the bar in a direction opposite to that of the other boss.

6. An electric resistance grid comprising a plurality of individual straight substantially flat metal bars each formed with a longitudinal rib and provided intermediate the ends with spacing means struck from the bars, such spacing means presenting welding surfaces, such surfaces welded one to another to provide a substantially zigzag form unsupported except at its ends.

LEONARD SATCHWELL.