

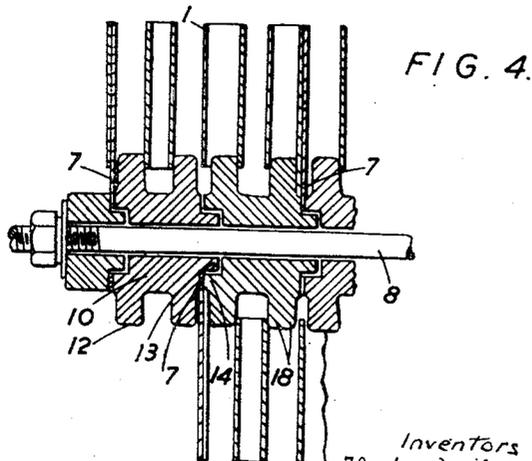
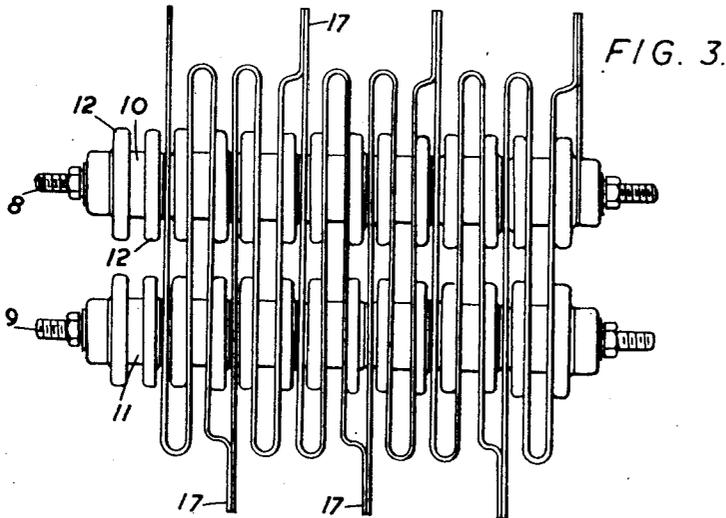
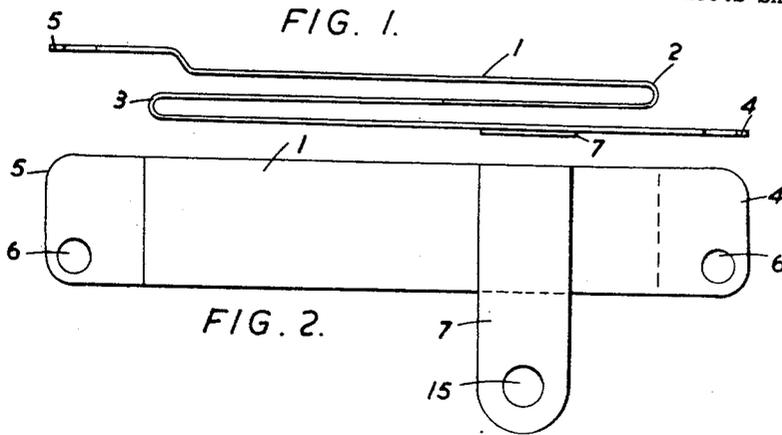
Dec. 15, 1953

T. N. FLIGHT ET AL
ELECTRICAL RESISTANCE UNIT

2,662,958

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2 Sheets-Sheet 1



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FIG. 5.

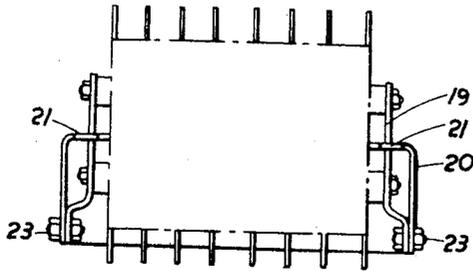
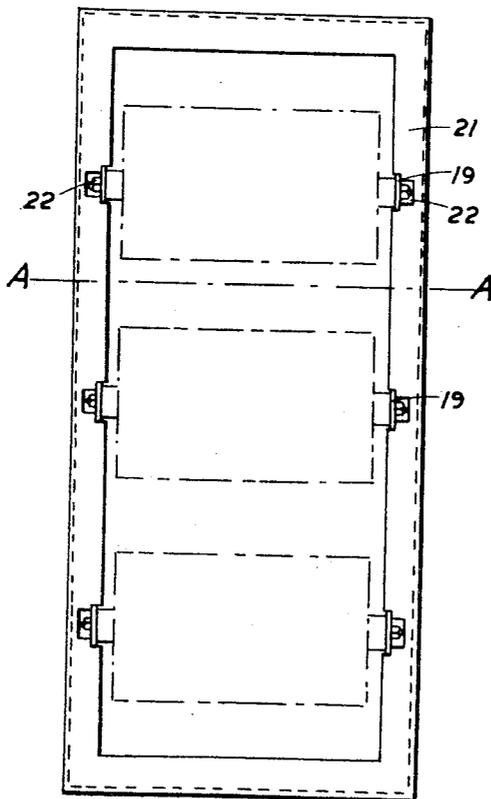


FIG. 6.



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UNITED STATES PATENT OFFICE

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ELECTRICAL RESISTANCE UNIT

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5 Claims. (Cl. 201—74)

1

This invention relates to electrical resistances formed from strip material.

An object of this invention is to provide an electrical resistance unit with a strip resistance form which will enable variations of resistance value and current carrying capacity to be made economically in various steps of a resistance and to provide a maximum number of adjustment tapings.

Another object is to form a strip by simple bending operations into convenient, easily handled elements capable of being welded together to form a continuous resistance grid.

Another object is to provide a strip resistance bank as a compact easily replaceable unit.

The improved resistance unit of the invention comprises a plurality of resistance elements of strip material bent to S form, each element having a support strip welded thereto and each element being welded to its neighbour to form a continuous electrical path and interlocking ceramic bobbins on a pair of metal tie rods to support the resistance elements, with flanges on the ceramic bobbins projecting between the convolutions of the elements to give support against vibration.

The invention is illustrated in the accompanying drawings in which Figures 1 and 2 show one strip element, Figure 3 is the elevation of an assembly of 12 such elements into a bank, Figure 4 is a sectional plan of a part of one bank (enlarged), and Figure 5 is an elevation of one bank in the resistance frame of Figure 6 cut across line A—A. Figure 6 shows three such banks mounted into a complete resistance frame.

Referring to Figure 1, a strip of resistance material 1 is bent twice at 2 and 3 so as to leave the ends 4 and 5 pointing in opposite directions. One end 4 is left straight while end 5 is cranked to the same dimension as the width of bends 2 and 3. The end 5 is then in line with the straight end of the commencement to the next element. Each end of the strip element is pierced by a tapping or terminal hole 6. Strip 7 is attached to the resistance strip by spot welding and forms in known manner the support for the element.

Referring to Figs. 3 and 4 two tie rods 8, 9 pass through the centre of cylindrical insulators 10, 11, on each of which flanges 12 are formed. Each insulator interlocks with the next on the rod by projecting pieces 13 locating in recesses 14 in the opposite end of the next insulator. This is shown in section in Figure 4 which also shows the bank arrangement of two groups of elements one on each side of the pair of tie rods.

This sectioned view also illustrates the fixing

2

means for each element by strip 7 clamped between adjacent insulators and supported out of contact with tie rod 8 by the projecting portion 13 of the insulator which passes through the hole 15 in the support strip 7. Terminals or tapping points 17 occur at each element junction, each element being spot welded to the next adjacent element at this point thus making each grid a continuous unit from end to end.

The flanges 12 formed on insulator 10 project slightly into the bends of the strip element as shown at 18 and give support against vibration to the individual turns of the element at these points.

For mounting into a complete resistance frame, Figs. 5 and 6, the two tie rods 8, 9 are joined by a strip 19 which is cranked at one end as shown. In the cranked end is a fixing hole which aligns with the corresponding hole in the frame member 20. This frame has a turned over flange 21 formed with recesses 22 shaped to pass the fixing nut on the tie rod end and to give support to the strip 19 as shown.

Any one bank can thus be removed from a complete resistance frame by first disconnecting any electrical connection, removing the fixing bolts 23 and dropping the complete bank out of the supporting frame 20.

We claim:

1. An electrical resistance unit comprising a series of interconnected resistance elements forming a resistance grid, each element formed from a strip of resistance material bent flatwise so as to form an S-shaped strip viewed edgewise of this strip, the adjacent ends of adjacent S-shaped resistance elements being welded together to provide a continuous electrical path, a support strip welded to each element and projecting from the plane of the grid, a metal tie-rod extending through the support strips, interlocking cylindrical insulators mounted on the tie-rod for insulating the rod from the support strips associated therewith, and spaced flanges on the insulators between which the convolutions of the resistance elements extend for supporting said elements against vibration, said tie-rod extending parallel to the resistance grid in a direction opposite to that of the convolutions of the elements.

2. An electrical resistance unit comprising a series of interconnected resistance elements forming a resistance grid, each element formed from a strip of resistance material bent flatwise so as to form an S-shaped strip viewed edgewise of this strip, each S-shaped element being reversed with respect to adjacent S-shaped ele-

3

ments so that adjacent ends of adjacent elements are on the same side of the grid, said ends being welded together to provide a continuous electrical path, two rows of support strips on one side of the unit projecting from the plane of the grid, one support strip being welded to each element, a metal tie-rod extending through each row of support strips, and interlocking cylindrical insulators mounted on said rods for insulating the rods from the support strips associated therewith, said tie-rods extending parallel to each other and to the resistance grid in a direction opposite to that of the convolutions of the elements.

3. An electrical resistance unit as claimed in claim 2, in which the ends of each S-shaped element extend beyond the bends of the element, and in which the adjacent welded ends of adjacent elements are formed to provide electrical taps.

4. An electrical resistance unit comprising a series of interconnected resistance elements forming a resistance grid, each element comprising a flattened S-shaped member formed from a strip of resistance material bent flatwise and having two bends, the adjacent ends of adjacent S-shaped resistance elements being welded together to provide a continuous electrical path, a support strip welded to each element and projecting from the plane of the grid, a metal tie-rod extending through at least some of said support strips, and a series of interlocking cylindrical insulators mounted on the rod for insulating the rod from the support strips associated therewith, each insulator including an axial recess on one side and an axial projection on its other side fitting in the recess of the adjacent insulator, each support strip having an opening through which an insulator projection extends, said tie-rod extending parallel to the resistance grid in a direction opposite to that of the convolutions of the elements.

4

5. An electrical resistance unit comprising a series of interconnected resistance elements forming a resistance grid, each element formed from a strip of resistance material bent flatwise so as to form an S-shaped strip viewed edgewise of this strip, each S-shaped element being reversed with respect to adjacent S-shaped elements so that adjacent ends of adjacent elements are on the same side of the grid, said ends being welded together to provide a continuous electrical path, two rows of support strips on one side of the unit projecting from the plane of the grid, one support strip being welded to each element, a metal tie-rod extending through each row of support strips, interlocking cylindrical insulators mounted on said rods for insulating the rods from the support strips associated therewith, said tie-rods extending parallel to each other and to the resistance grid in a direction opposite to that of the convolutions of the elements, a main frame for supporting the resistance unit, a strip on the main frame, and a flat strip extending from the main frame and connected to the two tie-rods, said flat strip also engaging with said strip on the main frame.

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