

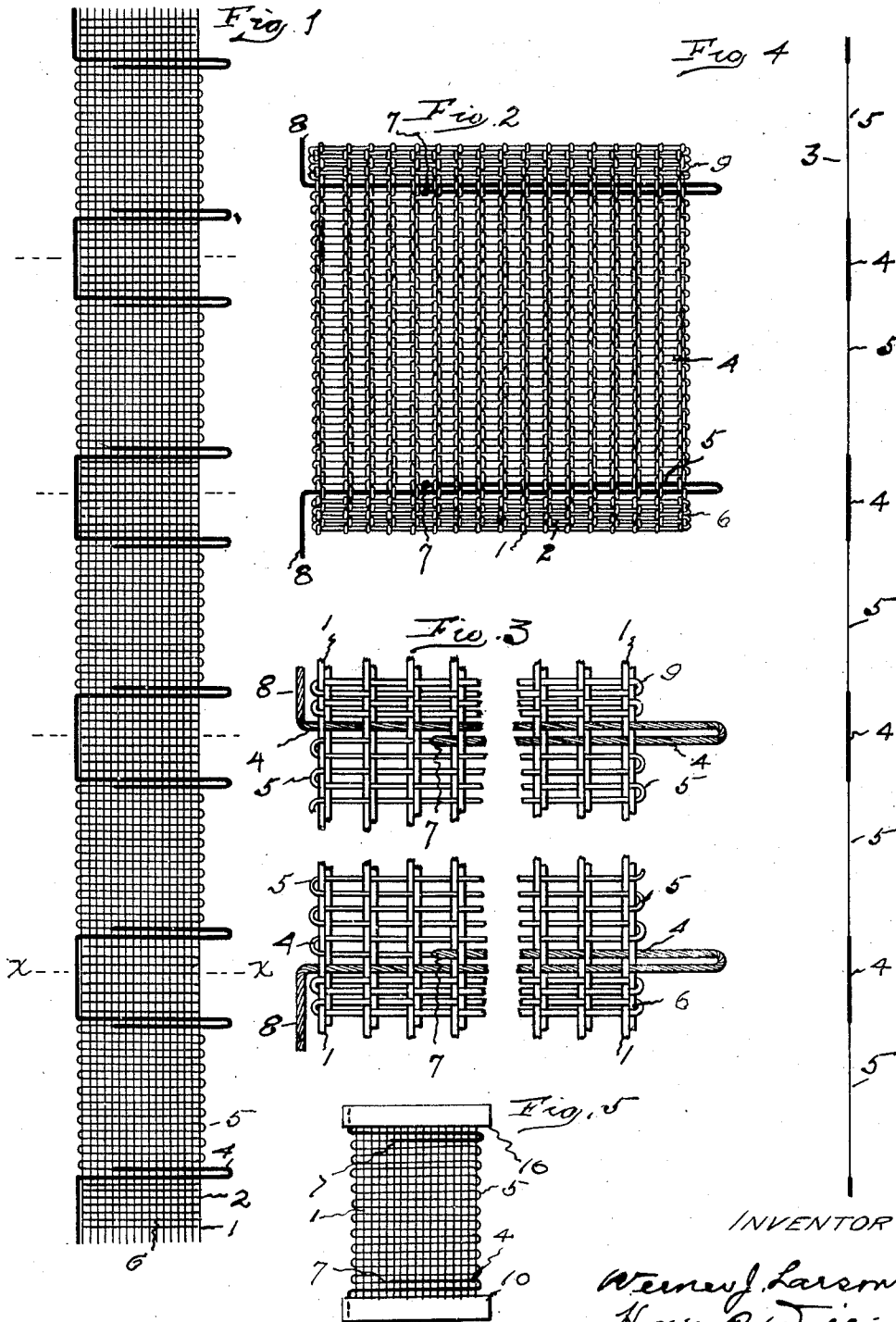
May 15, 1945.

W. J. LARSON

2,375,997

METHOD OF MAKING WOVEN RESISTANCE UNITS

Filed June 3, 1944



INVENTOR
Werner J. Larson
Harry R. Williams
att.

UNITED STATES PATENT OFFICE

2,375,997

METHOD OF MAKING WOVEN RESISTANCE
UNITS

Werner J. Larson, West Hartford, Conn.

Application June 3, 1944, Serial No. 538,610

8 Claims. (Cl. 219-46)

This invention relates to the method of making woven fabric resistance units that are usable in radio circuits and in connection with electric heating devices and implements, etc., the object being the provision of units that can be rapidly made on simple machines, such as hand looms, and which will be robust and have the exact desired degree of calibration.

In attaining this object the units are composed of warp strands of fibrous insulating material— asbestos or cotton, either or both—and marginal woof strands of wire or insulating material, also conducting woof strands of robust lead or terminal wire and fine or delicate resistance wire, the conducting woof strands being continuous and formed of prejoined alternate sections of lead wire and resistance wire of such relative lengths and so woven into the warp that the joints between the lead and resistance wires will be concealed within and protected by the body of the fabric, with the lead wire ends only extending beyond the edges of the fabric.

Fig. 1 of the accompanying drawing is a view of a strip of units produced by the method herein described.

Fig. 2 on larger scale shows a single unit.

Fig. 3 is a fragmentary diagrammatic view of a unit, the center being cut away, illustrating the weave and the points of junction between the ends of the resistance wire and ends of the lead wire woven within the body of the fabric.

Fig. 4 is a representation of a continuous conductor woof that is composed of joined sections of fine resistance wire and sections of heavier lead wire.

Fig. 5 illustrates a unit with its severed edges protected by binding strips.

In carrying out this improvement insulation warp strands 1 of indefinite length, are strung from a supply roll through the heddles and packer or evenner to a fabric roll. A woof strand 2 of insulation or wire is wound on a spool and placed in a shuttle, and a conducting woof strand 3 of indefinite length of pre-joined alternate sections of lead wire 4 and resistance wire 5, is wound on a spool and placed in a shuttle. As the loom is operated and the warp strands are alternately raised and lowered the shuttle carrying the insulation or wire woof strand is first thrown from side to side to produce an end selvage 6, then the shuttle carrying the conducting lead and resistance woof strand is thrown from side to side until the required amount of resistance is woven in. The loom elements are not shown as they are common and well known to users of hand

looms, to which the hereindescribed method is particularly adaptable.

The picks of the shuttle carrying the conducting wire are so timed that an end of a lead wire section is first woven into the fabric and then the following attached resistance wire section is woven in so that it will begin a short distance in from one edge of the fabric and will terminate a short distance in from the other edge of the fabric. The end of the following attached lead wire section is then woven into the fabric. This leaves the joints 7 between the delicate resistance wire section and robust lead wire section a distance in from the edges of the fabric and provides strong terminals 8 for the connection of other units or implements, beyond the edges of the fabric.

The resistance sections of the conducting woof strand are cut before being joined to the lead sections so that they will offer exactly the same amount of resistance. As a result of slight variations in the diameter of the resistance wire or of the alloy of that wire, there may be variations of the length of the resistance sections. If the resistance wire sections should appear to be of such length that they will not terminate within the edges of the woven fabric, or near the desired side of the units, the loom operative may make such fractional picks as will cause the joints between the lead and resistance sections to come in from the edges and on the correct side of the fabric. After a resistance wire and lead wire section is woven into the fabric the weaving of the insulation or wire warp is resumed to provide an end selvage 9.

Between each pick of the shuttles carrying the marginal and conducting woof strands, those strands are by the picker pushed back into the decussation angles formed by the alternate movements of the warp strands in the usual manner, thus ensuring an even weave.

The weaving is continued until the desired number of connected units are produced. The fabric is then cut into convenient lengths and these lengths are put into a stretcher and while there coated with a protecting compound, such as heat resisting ceramic cement. After the cement has hardened the coated lengths are severed across the middle of the selvage sections, as on lines X—X, to divide the strips into the several units. The severed edges of the units may, if desired, be protected by strips 10, that can be of conducting material, and have the lead wire ends connected thereto, as shown in Fig. 5.

All of the resistance wire sections of the woof

are cut before being united to the lead wire sections, into such lengths that they will have exactly the correct required ohmic resistance, and all of the lead wire sections are cut before being united to the resistance wire sections into such lengths that when the woof comprising the joined alternating resistance and lead sections is woven into fabric, as above described, the leads will project the required distance on the correct side and the joints between the sections will be embedded within the fabric and thus completely protected from breakage, and robust leads provided for the connection of other units or implements.

The preformation of the conducting woof strand of alternate joined sections of resistance wire and lead wire, not only ensures obtaining exact uniformity of the ohmic resistance of the resistance sections but also contributes to the speed of weaving.

The invention claimed is:

1. The method of forming a resistance unit which comprises weaving warp strands of insulating material and a woof strand composed of a continuous length of alternately prejoined sections of resistance wire and sections of the lead wire woven into the body of the fabric.

2. The method of forming a resistance unit which comprises weaving insulating warp strands and conducting woof strand, said woof strand consisting of prejoined sections of wire of relatively high resistance and wire of relatively low resistance, with the joints between the resistance wire and lead wire woven into the body of the fabric.

3. The method of forming woven resistance units which comprises arranging a series of warp strands, forming a woof strand of alternating joined sections of relatively high resistance wire and relative low resistance lead wire, and weaving said woof strand into the warp strands.

4. The method of forming woven resistance

units which comprises arranging a series of warp strands, cutting a wire of relatively high resistance into sections of uniform ohmic resistance, cutting a wire of relatively low resistance into sections, joining said sections together into a continuous length of alternating high resistance and low resistance wire, and weaving said joined wires into said warp strands.

5. The method of forming resistance units which comprises arranging a series of warp strands of insulating material, providing a woof strand of joined alternating sections of relatively high resistance wire and sections of relatively low resistance wire and weaving said woof strand into said warp strands in such manner that the high resistance wire sections and the ends of the low resistance wire will be woven into the body of the fabric.

6. The method of forming a plurality of resistance units which comprises arranging a series of insulating warp strands, weaving a woof strand composed of alternating sections of relatively high resistance wire and relatively low resistance lead wire at spaced intervals into said warp strands in such manner that a high resistance wire section and the ends of low resistance wire sections will be woven into the warp at spaced intervals, severing the warp strands between each woven section, and applying binding strips to the severed warp ends.

7. A woven resistance unit comprised of warp strands of insulating material, and a woof strand composed of sections of relatively high resistance wire and sections of relative low resistance wire, said high and low resistance wires being joined together before being woven into the fabric.

8. A woof strand for a woven resistance unit, comprised of alternate sections of fine high resistance wire and heavier low resistance wire joined into a continuous strand.

WERNER J. LARSON.