Jan. 11, 1966 H. I. STANBACK ETAL 3,228,094

METHOD OF MAKING A NEUTRAL WIRE CONNECTOR

Filed Oct. 21, 1964

Fig. 1.

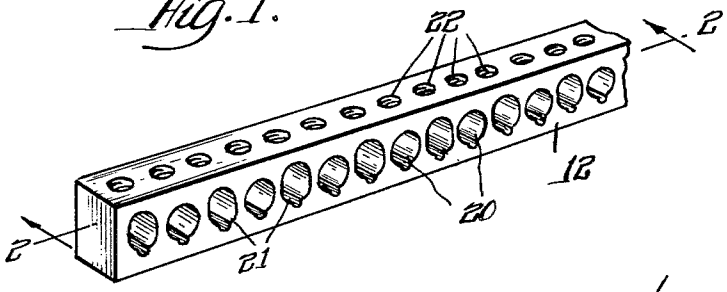


Fig. 2.

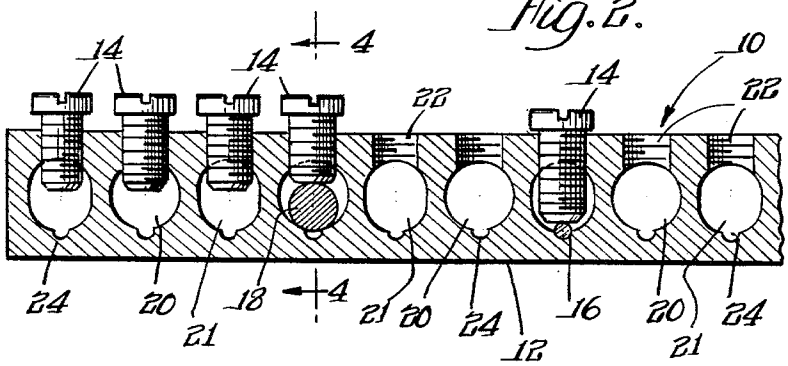
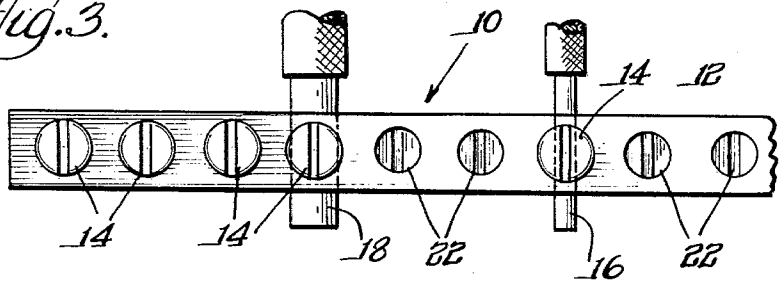


Fig. 3.



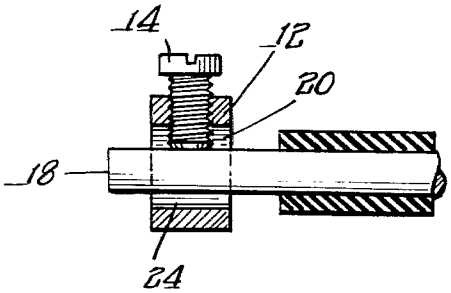


Fig. 4.

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METHOD OF MAKING A NEUTRAL WIRE CONNECTOR

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1 Claim. (Cl. 29—155.55)

This is a continuation-in-part of copending application, Serial No. 168,733, filed January 25, 1962, now abandoned.

This invention relates generally to connector means, and more particularly to an improved method of making an electrical connector for electrically connecting a plurality of electrical conductors to a common potential. The connector means is thus suitable for use as a neutral wire connector or so-called neutral bar.

Prior to this invention, neutral wire connectors were made by a variety of considerably more expensive methods. One of the prior methods comprised providing a solid bar, drilling a first set of holes in the bar for receiving wires to be clamped, and drilling a second set of holes in the bar for receiving clamping screws, the holes of the second set respectively intersecting the holes of the first set.

Another of the prior methods comprised providing a flat sheet, punching at least three rows of holes in the flat sheet, and forming the punched flat sheet into a generally rectangular tubular shape to dispose the outer two rows of holes in opposite side wall portions of the formed tube for receiving wires and to dispose the center row of holes in a third wall portion of the formed tube for receiving clamping screws.

These two prior methods thus teach that when the raw stock is a solid bar, the holes for the wires and clamping screws should be formed in the solid bar by drilling, and that when a process of punching holes in solid material is used, the raw stock should be a flat sheet which is formed into a tubular shape after the holes are punched therein. This invention departs from these teachings of the prior art.

An important object of the invention is to provide an improved method of making a connector means which may be used as a neutral wire connector and which is relatively easy and economical to manufacture.

A further object is to provide an improved method of making a neutral wire connector which is light, strong, rigid, and compact, and which can accommodate a relatively large number of wires per unit of length.

Another object is to provide an improved method of making a universal neutral wire connector adapted to receive a relatively large number of different sizes of wire and adapted to be cut from long stock lengths into suitable different shorter lengths for installation in different sizes of enclosed electrical panelboards accommodating different numbers of wires.

Other objects and advantages will appear upon consideration of the following description and accompanying drawings wherein:

FIG. 1 is a perspective view of a portion of a body member of a connector constructed in accordance with the invention;

FIG. 2 is a longitudinal sectional view of the connector in elevation taken in the direction of arrows 2—2 of FIG. 1 and showing some typical clamping screws and conductors clamped thereby;

FIG. 3 is a plan view of the connector of FIG. 2; and

FIG. 4 is a cross sectional view taken along lines 4—4 of FIG. 2.

In the drawings, a neutral wire connector **10** constructed in accordance with the invention includes a bar

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or body member **12** and a plurality of screws **14** adapted to clamp wires of various sizes such as a pair of illustrated wires **16** and **18**.

The body member **12** may be of aluminum, copper, or other suitable electrically conductive material, and in accordance with the invention, it is made from a solid bar generally rectangular in cross section with unequal cross sectional dimensions in directions parallel respectively to pairs of opposite side surfaces of the bar and adapted to be economically formed by an extrusion process. A plurality of relatively closely spaced wire-receiving holes **20** and **21** of predetermined size are first formed in the solid bar **12** by a punching process and extend completely through the bar **12** from one surface thereof to the opposite surface in the direction of the short cross sectional dimension. The holes **20** and **21** are closely spaced so that a relatively large number of wires may be accommodated per unit of length of the bar **12**. The predetermined thickness of material remaining between the holes **20** and **21** is considerably less than the width of the holes themselves and may actually be less than half the width of the holes. The holes **20** and **21** are alternately spaced, the holes **20** being larger and generally circular, and the holes **21** being slightly smaller and generally oblong. The smaller width of the holes **21** further increases the number of holes that can be punched in a given length of the bar **12**, and the holes **20** and **21** respectively accommodate two different maximum sizes of wires.

A plurality of holes **22** extending in the direction of the long cross sectional dimension of the bar **12** and smaller than the predetermined size of the holes **20** and **21** is then formed in the originally solid bar **12** also by a punching process, and the slugs formed during the punching of the holes **22** are removed respectively through the holes **20** and **21**. The holes **22** may be threaded to accommodate the screws **14**. The thickness of material remaining between the holes **22** is greater than the predetermined thickness of material remaining between the holes **20** and **21**. The holes **22** respectively intersect the holes **20** and **21** at right angles and extend from a third surface of the bar **12** to the holes **20** and **21** rather than extending all the way through the bar **12** as the holes **20** and **21** do. If desired, however, one or two of the holes **22** in the bar **12** may be made to extend all the way through the bar to accommodate fastening screws (not shown) for securing the bar **12** in place on a piece of insulating material (not shown), the respective cross holes **20** or **21** for the one or two holes **22** having bar fastening screws therein not then being able to accommodate a wire.

The holes **20** and **21** are adapted to receive relatively large wires such as the wire **18**, and means are provided for preventing excessive deformation of relatively small wires such as the wire **16**. Thus, the holes **20** and **21** are respectively shaped to provide a plurality of small groove portions **24** in the bar **12**, the grooves **24** being opposite the screw-receiving holes **22** and being adapted to partially receive the relatively small wires such as the wire **16**, excessive deformaion of which is prevented by engagement of the clamping screws **14** with the shoulders defining the groove portions **24**.

It will be seen that an improved method of making a neutral wire connector has been provided which includes providing a solid bar generally rectangular in cross section and punching wire-receiving and clamping screw-receiving holes therein at relatively closely spaced intervals, the simple rectangular solid cross section being adapted to economical extrusion of the bar and the punching of the holes being a relatively inexpensive process. Further, the bar of the connector is strong and rigid in spite of the

closely spaced holes, and the close spacing of the holes and the alternate spacing of the different sized holes result in ability to accommodate a relatively large number of wires per unit of length of the bar.

The invention is claimed as follows:

A method of making a neutral wire connector, said method comprising:

(a) providing an elongated generally rectangular electrically conductive solid bar having relatively long and short cross sectional dimensions defining the relative spacing respectively between two pairs of opposite side surfaces of said bar,

(b) punching a first plurality of holes of predetermined size completely through said bar in the direction of said short cross sectional dimension and in spaced relationship longitudinally of said bar leaving a predetermined thickness of material between adjacent holes of said first plurality of holes,

(c) punching a second plurality of holes smaller than said predetermined size partially through said bar in the direction of said long cross sectional dimension into axially intersecting relationship respectively with said first plurality of holes and in spaced relationship longitudinally of said bar leaving a greater thickness of material between adjacent holes of said second plurality of holes than said predetermined thickness,

(d) removing the slugs formed by the punching of said second plurality of holes from said bar respectively through said first plurality of holes, and

(e) threading a plurality of clamping screws respectively into said second plurality of holes.

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