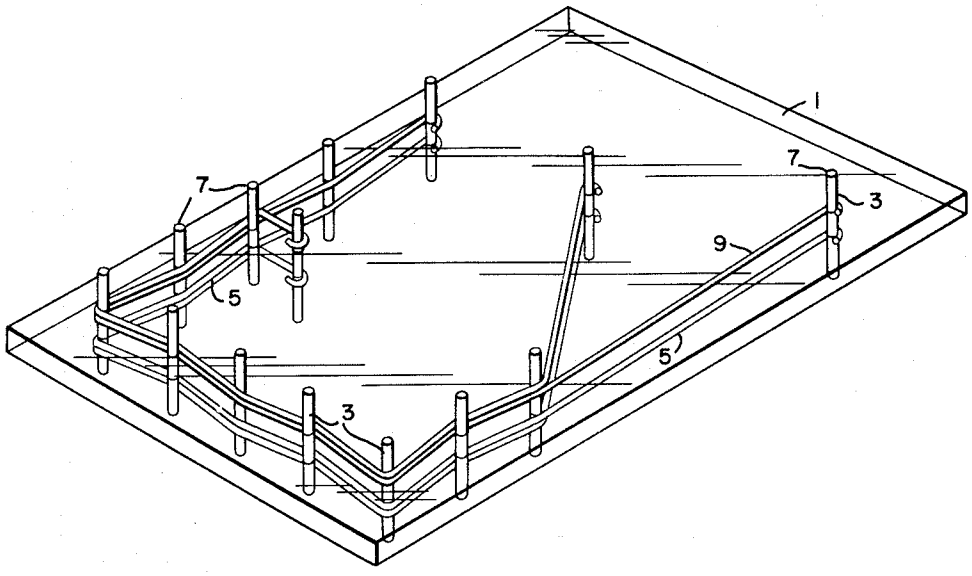
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METHOD AND APPARATUS FOR MAKING A HARNESS
FOR ELECTRICAL APPARATUS
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METHOD AND APPARATUS FOR MAKING A HARNESS FOR ELECTRICAL APPARATUS

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This invention relates to manufacturing and has particular relationship to the art of manufacturing cables or harnesses for electrical apparatus.

A harness for electrical apparatus consists of a plurality of wires of different length and of different disposition in the cable usually laced together to form a complete integrated unit. The wires in the harness are flexed or bent into highly irregular forms for the purpose of conforming to the form of the apparatus in which the harness is used and the harness itself is highly irregular in external form.

In accordance with the teachings of the prior art a harness is assembled on a lacing board which may be a plywood board having a plurality of pegs corresponding generally to the disposition and the lengths of the wires of the harness. The form that the wires are to take is usually indicated by crayon lines on the board or on a paper which is pasted or otherwise secured to the board.

The producing of a harness using a lacing board has proved highly time consuming and highly costly. The crayon lines indicate in a general way the lengths and forms of the wires that are to be placed on the board between the pegs but the precise disposition and length of the wires cannot be indicated. The operator must frequently consult the supervisor or refer to written instructions to assemble the harness properly. Frequently, errors occur which require removal of wires from the harness and replacement.

It is an object of this invention to overcome these disadvantages. Another object of this invention is to provide a method and apparatus for assembling high complex harnesses at a relatively low cost.

This invention provides facilities which enable an operator to follow in detail an actual cable instead of crayon lines. In accordance with this invention, a harness to be followed is prepared on a transparent harness plate which may be composed of plexiglass or of other clear acrylic plastic or even of ordinary glass or like material. This harness plate is provided with a plurality of pins or pegs which extend through the board and are positioned to correspond to the lengths and disposition of the wires of the harness. Wires each corresponding to a wire of the harness are positioned on one side of the plate between the pegs. A prototype harness corresponding to the harnesses to be produced is thus formed.

In accordance with one of the important aspects of this invention this prototype harness is unlaced so that its wires may be readily seen. In addition and in particular in situations where the harness has a large number of wires the wires may be coded. Such coding usually consists of strands of different colors through the insulation of the wires or of strands and dots of different colors or of dots of different colors. Each wire may be readily recognized by its strands.

In carrying out this invention the plate is positioned with the prototype harness downwardly or otherwise away from the operator. For large harnesses there should preferably be a substantial space between the downward face of the board and any base on which the board is placed. The operator then assembles each of the number of harnesses required by viewing the wires through the plate and placing each wire of the harness being assembled in a position similar to the corresponding wire under

the plate. Where the number of wires in the harnesses is so small that each of the wires of the prototype harness may be seen readily, the assembly of the wires of each harness can be accomplished by simply following each corresponding wire of the prototype harness. In situations where the harness has a large number of wires so that some wires may be partially obscured by others, the operator may assemble each wire of the harness by following the coding of the corresponding wire of the prototype harness. When the operator is uncertain as to the position of the prototype harness he may readily reach under the plate and move the obscuring wires away so as to determine precisely what the position of the wire being wound is. After a harness is completed the ends of the wires may be prepared in the usual manner and the harness laced.

The novel features considered characteristic of this invention are disclosed generally above. For a more thorough understanding of the invention both as to its organization and to its method of operation together with additional objects and advantages thereof, reference is made to the following drawing in which the single figure is a view in perspective of a harness board in accordance with this invention.

The harness board shown in the drawing includes a plate 1 of transparent material such as plexiglass through which pins 3 penetrate in positions corresponding to the lengths and dispositions of the wires of the harnesses to be produced. The pins 3 extend on both sides of the plate 1 with the pin heads preferably below the plate 1. Wires 5 of the prototype harness each corresponding to a wire to be produced extend between and around the pins 3. The wires 5 are of the same lengths, and are positioned the same as the corresponding wires of the harness to be produced. The terminals and stripped ends of the wires 5 are supported under the heads of the respective pins 3 at which the wires 5 terminate.

The prototype harness under the board is unlaced to facilitate the viewing of the individual wires 5 of this harness so that they may readily be followed.

The harness board shown in the drawing is placed with the prototype wires 5 downwardly and each to be produced as assembled by following the wires under the board and winding the wires of the harness to be produced around the projecting ends 7 of the pins 3. Each wire of the prototype harness may be readily seen and the produced harness is assembled in a short time. In actual practice use of this invention has reduced assembly time for typical cables by about 30%.

While a preferred embodiment of this invention has been disclosed herein many modifications thereof are feasible. This invention then is not to be restricted except insofar as is necessitated by the spirit of the prior art.

I claim as my invention:

1. The method of forming a harness for electrical apparatus, said harness including a plurality of wires, the said method comprising inserting pins in a transparent plate at positions corresponding to the respective lengths of said wires, said pins penetrating through said plate, extending wires between the ends of said pins on one side of said plate, each of said last-named wires corresponding to a wire of said harness and extending between certain of said pins in a manner corresponding to said last-named wire of said harness, each of said wires on said plate being visible along a substantial portion of its length from the side of said plate opposite to said one side, disposing said plate with said one side away from the operator and depositing said wires of said harness on said opposite side of said plate with each wire of said harness following and having the length of a corresponding wire on said one side of plate and terminating in

the portions of the terminating pins for said last-named wire extending through said plate.

2. Apparatus for forming a harness for electrical apparatus, said harness including a plurality of wires, said apparatus including a transparent plate, a plurality of pins extending through said plate at points corresponding to the lengths and disposition of said wires in said harness, and a plurality of wires extending between said pins, each of said last-named wires corresponding in length and disposition on said plate to a wire of said harness, said wires extending between said pins being visible through said plate substantially throughout their lengths.

3. The method of forming a harness for electrical apparatus, said harness including a plurality of wires, the said method comprising inserting pins in a transparent plate at positions corresponding to the respective lengths of said wires, said pins penetrating through said plate, extending wires between the ends of said pins on one side of said plate, each of said last-named wires corresponding to a wire of said harness and extending between certain of said pins in a manner corresponding to said last-named wire of said harness, each of said wires being color coded and being identifiable from the side of said plate opposite to said one side disposing said plate with said one side away from the operator and depositing said wires of said harness on the side of said plate opposite to said one side, with each wire of said harness following and having the length of a corresponding wire on said one side of said plate and terminating in the portions of the terminating pins for said last-named wire extending through said board.

4. Apparatus for forming a harness for electrical apparatus, said harness including a plurality of wires, said apparatus including a transparent plate, a plurality of pins extending through said plate at points corresponding to the lengths and disposition of said wires of said harness, and a plurality of wires extending between said pins on one side of said plate, each of said last-named wires

corresponding, in length and disposition on said plate, to a wire of said harness, and each of said wires on said one side of said plate being visible through said plate throughout their lengths, said length and disposition of each of said wires on said one side of said plate being determinable from the side of said plate opposite to said one side.

5. Apparatus for forming a harness for electrical apparatus, said harness including a plurality of wires, said apparatus including a transparent plate, a plurality of pins extending through said plate at points corresponding to the lengths and disposition of said wires of said harness, and a plurality of wires extending between said pins on one side of said plate, each of said last-named wires corresponding in length and disposition on said plate to a wire of said harness, and each of said wires on said one side of said plate being visible through said plate throughout their lengths each of said wires on said one side of said plate being color coded to permit a determination of the length and disposition of each of said wires on said plate from the side of said board opposite to said one side.

References Cited by the Examiner

UNITED STATES PATENTS

973,807	10/10	Orsoni	78—24
1,114,384	10/14	Prime	140—92.1
2,270,158	1/42	Baesgen et al.	22—174
2,295,903	9/42	Kennedy	83—520
2,440,950	5/48	Hill	83—520
2,720,475	10/55	Geiger	29—203
2,805,471	9/57	Lowden	29—155.5
2,906,016	9/59	Cannon et al.	29—407
2,959,848	11/60	Savitt	29—155.5
3,023,692	3/62	Crown	100—1

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