PATENT SPECIFICATION (11) 1 581 595

(21) Application No. 21186/77 (22) Filed 19 May 1977 (19)

(31) Convention Application No. 2 622 766 (32) Filed 21 May 1976 in

(33) Fed. Rep. of Germany (DE)

(44) Complete Specification published 17 Dec. 1980

(51) INT. CL.³ H05K 3/04

(52) Index at acceptance

H1R 19 AE

F4R 376 FG

1 581 595

(54) IMPROVEMENTS IN OR RELATING TO THE PRODUCTION OF ELECTRICAL CONDUCTOR ARRANGEMENTS

(71) We, WESTFALISCHE METALL INDUSTRIE KG HUECK & Co., of 4780 Lippstadt, Federal Republic of Germany, a company organised according to the laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The invention concerns a method of producing electrical conductor arrangements in which a base of electrically insulating material carries a plurality of metal conductor strips initially interconnected by web elements but being electrically separated from each other by severing the web elements after application to the base.

In a known manufacturing method for such a conductor arrangement, parts of the conductor strips extend laterally beyond the base, formed by a plate of insulating material, for the purpose of facilitating the severing of the connecting web elements, and carry the connecting web elements in this region overlapping the plate. After the conductor strips have been fixed to the plate, the parts of the strips extending beyond the plate are severed. This is a complicated process, which consumes a large amount of raw material.

Previously published DT-OS 1, 961,127 disclose a vehicle light with a conductor arrangement in which the individual conductor strips, interconnected by web elements, are formed by injection moulding into a synthetic plastics plate and the connecting web elements are separated from one another by a subsequent stamping operation. Both the web element which interconnects a pair of conductor strips, and the plate which carries the strips, are severed in the vicinity of the web element. Because there are at the severance point two materials whose hardness differs very considerably, it is difficult to obtain a clean, burr-free cut edge.

According to the invention, there is provided a method of producing an electrical conductor arrangement comprising a base of electrically insulating material having metal conductor strips applied to it while the strips are interconnected by web elements, the individual conductor strips being electrically disconnected from each other by subsequently severing the web elements, the base having at least one opening in the regions of the web elements utilised as a cutting die or dies in the severance of the connecting web elements by a cutting punch or punches.

The method according to the invention can be so carried out that the connecting web elements are severed without creating waste cuttings or scraps, by a knife punch, and are bent over the edge of the opening lying opposite the cutting edge. This process affords the advantage that no residue or waste is produced when the connecting webs are severed. Such waste material could stick in the cutting die, and if it is later loosened a current bridge could be formed between two conductor strips. Also, this method of manufacture affords the further advantage that, if the intended cutting clearance between cutting punch and cutting die is not precisely observed, the deleterious results will be less pronounced than would be the case where stamping takes place with the formation of waste scraps.

Advantageously, the bending of the severed web elements takes place simultaneously with the step of severing the elements and is effected by the cutting punch which, after severing the web elements, travels further into the opening or openings in the insulating base and bends over the web elements which have been severed on one side.

Preferably, the or each opening in the insulating base serving as a cutting and bending die is formed as a blind hole, the avoidance of through passages allowing the arrangement to serve simultaneously, at

least on one side, as a dust- and water-tight cover for the conductor strips.

The accompanying drawing illustrates the invention by way of example. In the drawing:

Fig. 1 is a plan view of a conductor arrangement with web elements interconnecting the conductor strips, both before and after the severing of the web elements in accordance with the method of the present invention, and

Fig. 2 illustrates the severing and bending process in accordance with one particular form of the method according to the invention, and also the structure of the severing and bending punch.

The conductor strips 1, 2, 3, which have been stamped out of a sheet-metal plate, are interconnected by thin web portions 4 (as seen between the strips 1, 2, in Fig. 1) so as to increase their strength and thus facilitate and improve their application to a base plate 5 of electrically insulating material. These web portions 4 must be severed after the conductor strips 1, 2, 3 have been applied to the plate 5, so as to ensure that the individual conductor strips will be mutually electrically separated.

The plate of insulating material has openings 6 close to the web portions 4. These openings 6 serve as cutting holes of a cutting die. Fig. 2 shows a cutting punch 7 constructed as a knife punch and aligned with edge 8, serving as cutting edge of the opening 6 in the plate 5 of insulating material. The punch 7 thus, in each instance, severs the web element 4 and sinks a sufficient distance in the opening 6 to cause the web element, which has been severed on one side of the opening 6, to be bent round edge 9 of the opening, opposite the cutting edge 8. By thus bending the web elements 4 it is ensured that the severed web elements will not establish electrical connection between two adjacent conductor strips.

It is possible to arrange that the conductor strips are so interconnected by the web elements that all the connecting elements can be severed in a single operation, and so that the severing device can be constructed and manipulated in a very simple and inexpensive way.

The openings 6 are formed as blind holes, so that they will not provide passages leading to the rear face of the insulating plate 5 carrying the conductor strips 1, 2, 3.

A conductor plate of this kind is particularly suitable for use with vehicle lamps constructed as multichamber lights. The insulating plate 5, which receives the conductor strips, can simultaneously serve as a dust- and water-tight rear cover for the lights.

WHAT WE CLAIM IS: —

1. Method of producing an electrical conductor arrangement comprising a base of electrically insulating material having metal conductor strips applied to it while the strips are interconnected by web elements, the individual conductor strips being electrically disconnected from each other by subsequently severing the web elements, the base having at least one opening in the regions of the web elements utilised as a cutting die or dies in the severance of the connecting web elements by a cutting punch or punches.

2. Method according to Claim 1 wherein each web element is severed by a knife punch without the removal of a waste portion thereof and is bent over an edge of its opening forming the cutting die.

3. Method according to Claim 2 wherein each web element is bent over by its cutting punch which, after severing the element at one side of the associated opening in the base, moves further into the opening and bends over said web element.

4. Method according to any one of Claims 1 to 3 wherein the or each said opening is formed as a blind hole in the base.

5. Method of producing an electrical conductor arrangement substantially as described herein with reference to the accompanying drawing.

6. An electrical conductor arrangement when produced by the method of any one of the preceding claims.

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Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1980.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

1581595 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

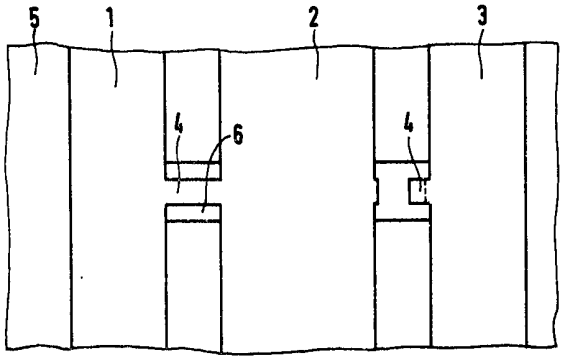


FIG.1

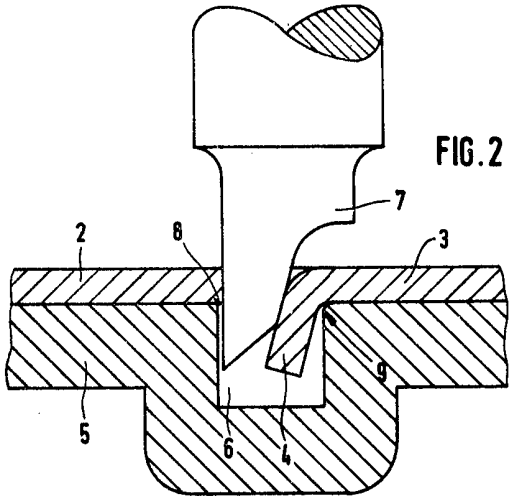


FIG.2