PATENT SPECIFICATION (11) 1 559 351

1 559 351

(21) Application No. 19715/77 (22) Filed 11 May 1977 (19)

(31) Convention Application No. 2622005 (32) Filed 18 May 1976 in

(33) Fed. Rep of Germany (DE)

(44) Complete Specification Published 16 Jan 1980

(51) INT. CL.[3] F16L 11/18
B65H 75/36
H02G 11/00

(52) Index at Acceptance
F2P 1A1 1B5D 1B7
H2C CF

(54) IMPROVEMENTS IN OR RELATING TO CARRIERS FOR GUIDING ENERGY CONDUCTORS

(71) We, KABELSCHLEPP GmbH, a German Body Corporate, of 75 Marienborner Strasse, 5900 Siegen 1, 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 relates to a carrier for guiding energy conducting means between a movable consuming device and a stationary connection.

According to the present invention, there is provided a carrier for guiding energy-conducting means between a movable consuming device and a stationary connection, said carrier comprising a series of interlocking tubular members connected with adjacent axial end portions of adjacent members being disposed one within the other, in each pair of adjacent members the axial end portion of one member including a peripheral channel and the said axial end portion of said other member including projection means engaged within the channel whereby the maximum possible angular deflection between the two members is determined by the width of the channel, over substantially half of its periphery the axial length of each member being less than its axial length over the other half of the periphery by the width of the channel.

In one preferred embodiment the tubular members are produced from a thin-gauge metal sheet coated with a plastics material and comprise initially separate upper or outer portions and a lower or inner portions shorter than the upper portion by the width of the channel. It is possible to butt weld the upper and lower portions to each other or to incorporate lugs on the lower portion for spot or "hump" welding (buckelschweissung).

In another preferred embodiment the tubular members consist of plastics material are produced in one operation by injection moulding. The outer axial edges of the members are lightly chamfered externally so that they may be moved past each other upon insertion of two tubular members one into another and snap into engagement one behind the other in the assembled condition of the carrier.

Venting slots may be formed in the outer side of the tubular members to permit dissipation of heat from the internal space.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a perspective view of several interconnected tubular members of a self-supporting carrier in accordance with the invention;

Figure 2 is a longitudinal section, to a reduced scale, of the tubular members; and

Figure 3 shows schematically the carrier during use.

Each of the tubular members A, B, C, D ..... shown in Figures 1 and 2 comprises an upper portion 1 and a lower portion 2. As can be seen from Figure 3, each of the upper portions lies on the outer part of the path of the carrier and each of the lower portions lies on the inner part of the path. At one end portion of the members, both portions 1 and 2 have an outwardly opening channel 3 extending around the periphery of the member. The outer side of the channel 3 forms an internally situated stop 4. The upper and lower portions 1, 2 of each tubular member are identically formed at the end portion having the channel 3, but at the other end portion of the member the lower portion 2 is shortened axially by a distance corresponding to the width of the channel. At this other end portion, the upper portion 1 as well as the lower portion 2 have an inwardly-directed projection in the form of an inwardly bent edge which forms an external

stop 5. The adjacent stops 4 and 5 of adjacent tubular members co-operate to retain the members in their assembled condition.

In the extended, straight, portion of the chain as illustrated in the left-hand half of Figure 2, the internal and external stops 4, 5 bear against each other in the area of the lower portion 2, whereas they are spaced apart by the width of the trough 1 in the area of the upper portion 1. By contrast, in the curved portion of the chain which is illustrated in the right-hand half of Figure 2, the internal and external stops 4, 5 bear against each other in the area of the upper portion 1 whereas they are spaced apart by the width of the trough 3 in the area of the lower portion 2. The pivot points around which the tubular members A, B, C, D, may be displaced with respect to each other are, in each case, situated in the parting plane between the upper and lower portions 1, 2. The line connecting the pivot points defines the neutral line of the chain which thus lies approximately in the median plane.

As shown, the upper and lower portions 1, 2 are formed from sheet metal and the upper portion 1 and the lower portion 2 of each tubular member may be butt welded to each other. In the embodiment illustrated, lugs 6 are joined to the lower portion 2, which may be joined to the upper portions by spot or "hump" welding. The assembly of the tubular members with each other occurs when joining the upper and lower portions 1, 2. For this purpose, the upper and lower portions 1, 2 have their external stops 5 inserted into the channel 3 of the adjacent tubular member and are then joined to each other. Alternatively, the tubular members may be injection moulded from a plastics material, the outer surfaces of the stops 4 and 5 being chamfered to permit the stops to be snapped into engagement during assembly.

The maximum possible angular deflection between two adjacent tubular members is determined by the width of the channel 3, but it is possible to further reduce the possible angular deflection and thereby to increase the radius of curvature, by fastening a spacer 7 within the channel 3 of each tubular member.

Ventilation slots 8 may be incorporated in the outer side of the individual tubular members for venting the internal space of the carrier within which the energy conductors lie.

The carrier described above is intended for use between a stationary connection 9 and a movable energy consuming device 10, for example on the pedestal of a machine tool to carry energy conductors 11, for example cables or hoses for electricity, compressed air and/or coolant, in a protected manner. The carrier is self-supporting in its upper section 12 so that it does not sag and the energy conductors 11 are protected as far as possible. It should be possible to bend the power cable carrier towards the lower section 13 around a radius r which corresponds to the acceptable minimum radius of curvature of the weakest power conductor.

The tubular members of the carrier described when formed from sheet metal or when injection-moulded from plastics material, may be produced and assembled with each other wholly automatically. The neutral line of the carrier is situated approximately in the median plane so that the displacement of the individual tubular members with respect to the energy conductors housed therein, is very small. Further, the conductors are protected by the fact that they may rest on the inner side of the encircling channel. Since the maximum possible angular deflection, determined by the width of the channels, or the individual tubular members with respect to each other may be reduced by spacers inserted in the area of the lower portions into the channel the same tubular members may be used for the production of carriers having minimum radii of curvature of different magnitudes. The construction described also prevents the tubular members from becomming jammed.

WHAT WE CLAIM IS:

1. A carrier for guiding energy-conducting means between a movable consuming device and a stationary connection, said carrier comprising a series of interlocking tubular members connected with adjacent axial end portions of adjacent members being disposed one within the other, in each pair of adjacent members the axial end portion of one member including a peripheral channel and the said axial end portion of said other member including projection means engaged within the channel whereby the maximum possible angular deflection between the two members is determined by the width of the channel, over substantially half of its periphery the axial length of each member being less than its axial length over the other half of the periphery by the width of the channel.

2. A carrier according to claim 1, wherein a spacer which reduces the maximum angular deflection is engaged in the channel of each said member.

3. A carrier according to claim 1 or claim 2, wherein venting slots are incorporated in the tubular members.

4. A carrier according to any one of claims 1 to 3, wherein the two halves of the periphery of each member are defined by separate parts interconnected by welding.

5. A carrier according to any one of claims 1 to 4, wherein the tubular members are produced from a thin-gauge sheet metal and are coated with a plastics material.

6. A carrier according to any one of

claims 1 to 3, wherein the tubular members are injection moulded in one-piece from plastics material and are held in assembled relationship by snapping engagement of the projection means in the channels.

7. A carrier substantially as hereinbefore described with reference to the accompanying drawing.

MATHISEN, MACARA & CO.,
Chartered Patent Agents,
Lyon House, Lyon Road,
Harrow,
Middlesex, HA1 2ET.
Agents for the Applicants.

Printed for Her Majesty's Stationery Office,
by Croydon Printing Company Limited, Croydon, Surrey, 1980.
Published by The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.

1559351 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

Fig. 1

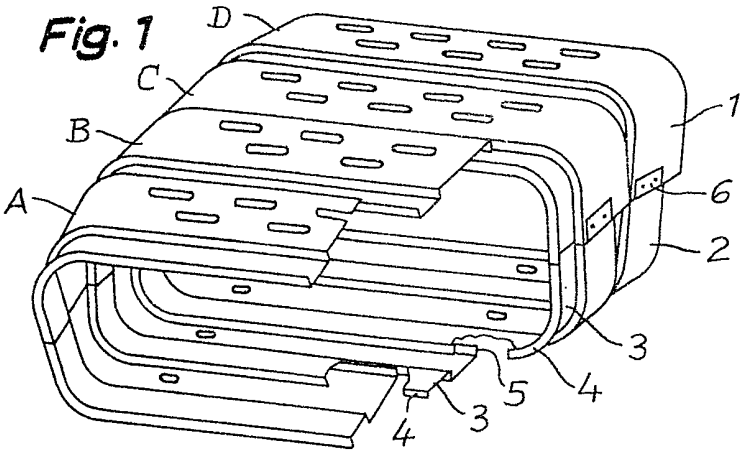

Fig. 2

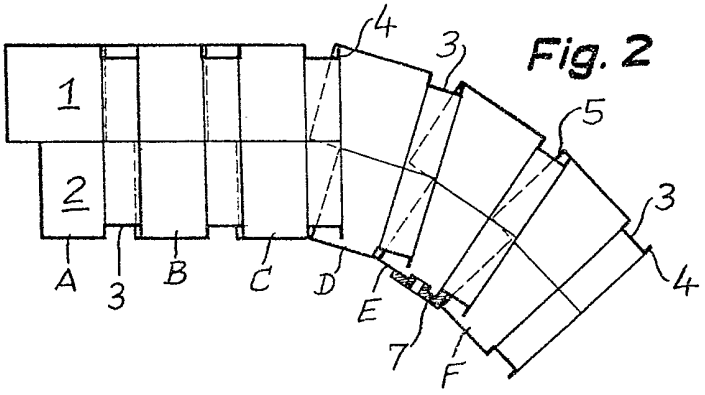

Fig. 3