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(54) Multilayer flat cable

(57) A multilayer flat cable (1), comprising a continuous strip of thin sheet (1a). The strip of thin sheet (1a) is provided with folding zones (A, B, C) extending lengthwise thereof, at which the strip of thin sheet (1a) is bent for the multilayer cable (1). In line with the folding zones (A, B, C) are weakenings (2, 2a) extending lengthwise of the cable (1).

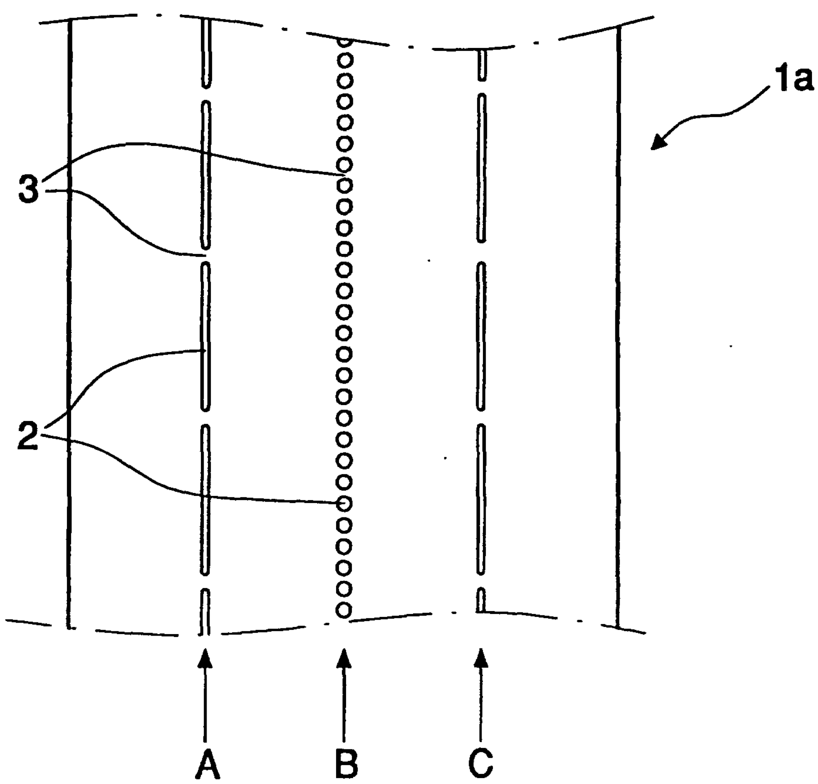

Fig.2

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Description

[0001] The present invention relates to a multilayer flat cable of the type defined in the preamble of claim 1.

[0002] Prior known are multilayer flat cables, comprising a continuous strip of thin sheet which is folded for a multilayer flat cable as shown in fig. 1. The folding zones present in the side edges of such cables tend to counteract the bending of a cable. As a result of sharp bends, the cable fractures easily at its folding zones, which on its part contributes to rupturing the plastic coating of a cable. In addition, the cable will have a bending arch which is discontinuous, as the bending occurs sharply at points of fracture.

[0003] An object of the invention is to provide a multilayer flat cable, which is more readily bendable and which is more durable as to its folding zones.

[0004] These objectives are achieved by means of a multilayer cable assembly as set forth in claim 1.

[0005] The non-independent claims disclose preferred embodiments of the invention.

[0006] The invention will now be described with reference to the accompanying drawings, in which

fig. 1 shows a multilayer flat cable,

fig. 2 shows a strip of thin sheet according to one embodiment,

fig. 3 shows a strip of thin sheet according to a second embodiment of the invention in an axonometric view, and

fig. 4 shows a cable according to a third embodiment of the invention in a cross-section.

[0007] A cable 1 is made from a continuous strip of thin sheet 1a, the material of which preferably comprises copper. The finished multilayer cable is coated with an insulation (not shown), the materials of which preferably comprise plastics generally used as a conductor insulation.

[0008] Fig. 2 depicts lengthwise folding zones A, B, C for the strip of thin sheet 1a, the number of which is three in the illustrated embodiment but the number of zones may range from one to five. The strip of thin sheet 1a is pleated at the folding zones A, B, C for the multilayer flat cable 1 of fig. 1, having a height H which is about quadruple with respect to the material thickness of the thin sheet 1a, as well as a width which is about 1/4 with respect to the width of the thin sheet 1a.

[0009] Prior to folding to its final shape, the strip of thin sheet 1a of fig. 2 is machined at the folding zones A, B, C for elongated weakenings 2 lengthwise of the strip of thin sheet 1a, which in this embodiment comprise elongated successive cut-outs driven through the strip of thin sheet 1a. The cut-outs 2 present in various folding zones A, B, C can be level with each other in the lateral direction of the strip of thin sheet 1a or staggered at different levels. Alternatively, the cut-outs 2 can be successive, substantially circular holes, as shown in the folding zone B. Between the successive cut-outs 2 present in the same zone A, B, C remain webs 3, having a width in the lengthwise direction of the strip of thin sheet 1a within the range of 0,3 mm - 1 mm, most preferably 0,5 mm.

[0010] This removal of material from the folding zones A, B, C assits in folding the strip of thin sheet 1a into the multilayer cable 1, while the webs 3 nevertheless maintain the cable 1 as an integral element. The removal of material eliminates or essentially reduces intra-material stresses normally created in folding, which cause fractures occurring at the folding zones A, B, C, and thus contributes to the durability of a cable.

[0011] In the embodiment shown in fig. 3 (the strip of thin sheet 1a having its material thickness exaggerated in relation to the width), the weakenings 2 comprise continuous recesses or grooves lengthwise of the cable 1 and in line with each folding zone A, B, C. The recesses or grooves 2 are made either by removing or displacing material. The thickness of sheet material at the recesses or grooves has been reduced by 30 - 90 % from the original thickness. The strip of thin sheet 1a is bent at each weakening 2 according to depicted curved arrows for the multilayer cable 1 of fig. 1. The benefit provided by the recesses 2 for the cable 1 is the same as in the preceding embodiment.

[0012] A corresponding removal or displacement of material can also be effected after the bending, whereby weakenings 2a depicted in fig. 4 are worked by grinding or an equivalent technique to be flush with each other, while reducing the material thickness at the weakenings 2a. The reduced thickness may vary between 70 - 10 % from the original thickness. This embodiment provides an improved fracture strength for the weakenings 2a.

[0013] It is obvious that the above embodiments can be combined in a single cable 1, as desired.

Claims

1. A multilayer flat cable (1), comprising a continuous strip of thin sheet (1a), said strip of thin sheet (1a) being provided with folding zones (A, B, C) lengthwise thereof, at which the strip of thin sheet (1a) is bent for the multilayer cable (1), **characterized** in that in line with the folding zones (A, B, C) are weakenings (2, 2a) extending lengthwise of the cable (1).

2. The cable (1) of claim 1, **characterized** in that the weakenings (2) comprise elongated cut-outs machined lengthwise of the strip of thin sheet (1a) prior to its bending.

3. The cable (1) of claim 1 or 2, **characterized** in that between the longitudinally successive cut-outs (2)

remain webs (3).

4. The cable (1) of claim 1, **characterized** in that the weakenings (2) comprise recesses or grooves lengthwise of the cable (1) and in line with each folding zone (A, B, C).

5. The cable (1) of claim 1, **characterized** in that the strip of thin sheet (1a) has a reduced material thickness which is substantially less at the weakening (2a) than elsewhere within the strip of thin sheet (1a).

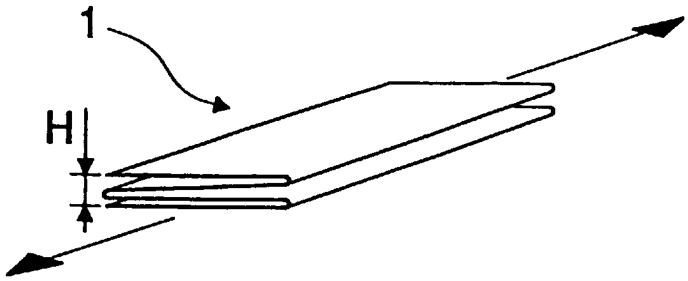

Fig.1

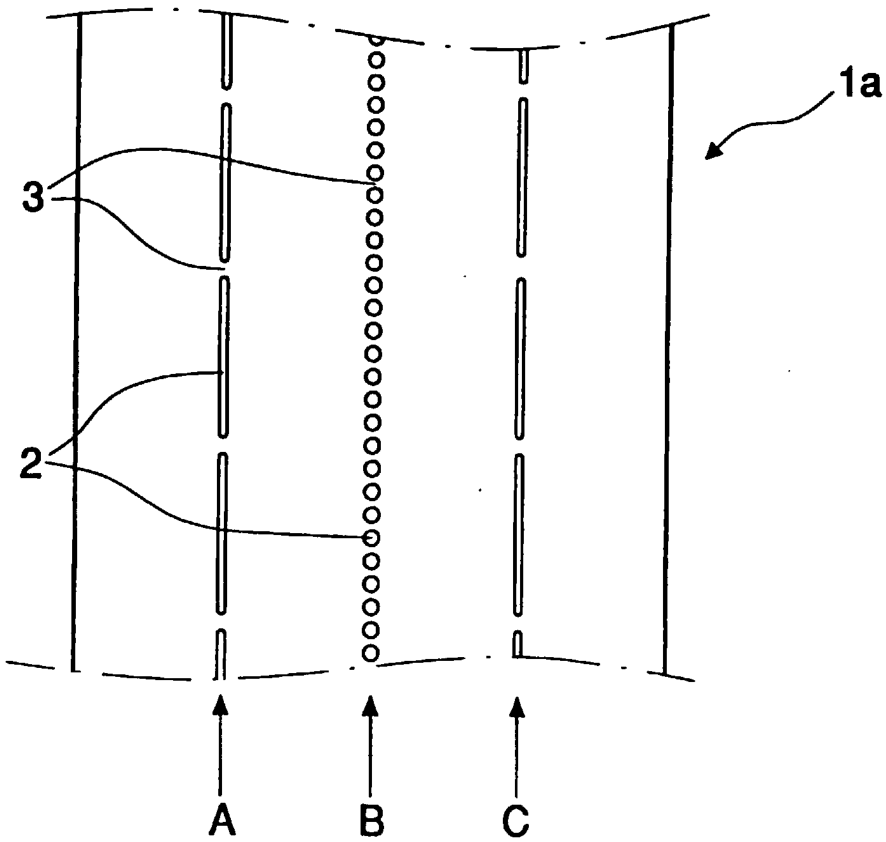

Fig.2

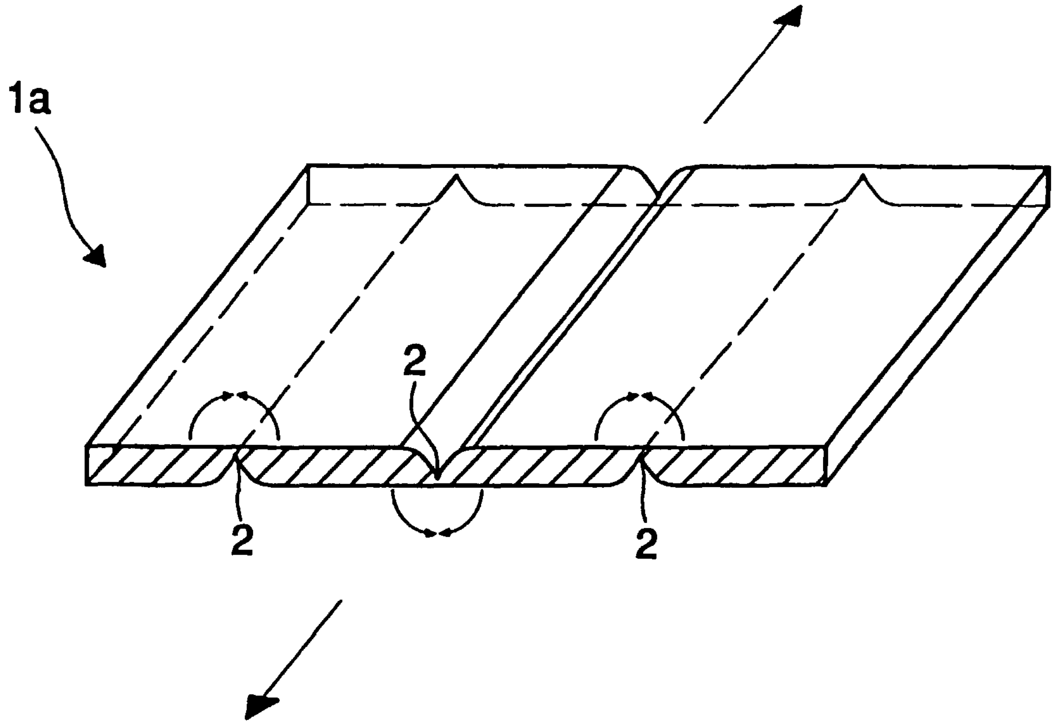

Fig.3

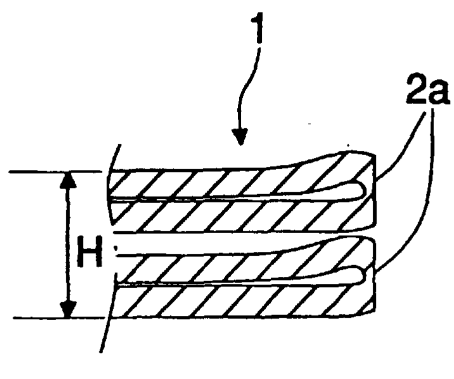

Fig.4