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(54) Printed markers

(57) Printed markers for identifying electrical cables are formed by winding an elongate strip or flattened length of tubing 19 onto a reel 30, which is then mounted for rotation to a thermal transfer printer 25. The printer

then prints markings onto the strip or tubing 19 as it advances past a print head 36 of the printer. The strip or tubing 19 may be formed with transverse lines of weakness at intervals along its length, to define successive markers.

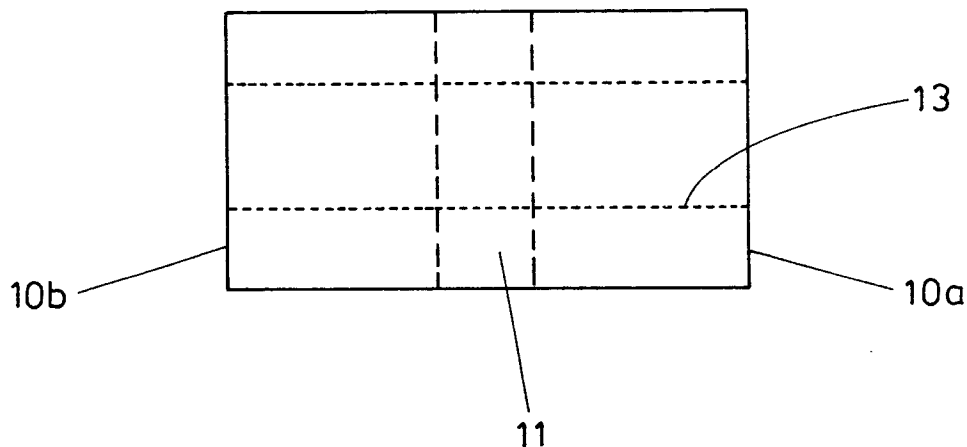


FIG. 3

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Description

The present invention relates to printed markers for identifying electric cables, for example.

It is a common practice to provide tubular printed markers which are slipped onto individual cables. These tubular markers may be heatshrinkable or non-heatshrinkable. It is also common to provide markers as flat strips, which are attachable to individual cables. The known types of markers are supplied either supported on a ladder-type of bandolier or on a paper backing, and are fed through the printer transversely: the markers are accordingly restricted to predetermined lengths.

We have now devised arrangements which offer significant advantages relative to the arrangements which have been provided hitherto.

In accordance with the present invention, there is provided a thermal transfer printer arranged to receive a wound length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

Preferably the printer is arranged to receive a wound length of strip or tubing of selected width. Preferably the printer is arranged to receive two or more wound lengths of strip or tubing, side-by-side.

The strip or tubing may be wound onto a reel, which is then mounted for rotation. The guiding means in this case comprises a pair of elongate guides which extend from the reel towards the print head, the elongate guides having inwardly-facing edges which are formed with longitudinal grooves in which the opposite edges of the strip or tubing are slidably received. These elongate guides may comprise two separate members which can be engaged, either side of the reel, onto a spindle on which the reel is fitted. Instead, the elongate guides may be mounted to the reel, so that the reel and guides form a single unit for fitting into the printer. The strip or tubing may be printed on one side, and rewound onto the same or different reel, which is inserted into the printer for printing onto the opposite side of the strip or tubing.

In another embodiment, the elongate strip or tubing may be wound within a cassette, having an exit slot through which the feedstock passes. In this case, preferably the cassette includes a portion which projects radially outwardly and includes the exit slot at its outer end, so that opposite side walls of this projecting portion constrain the strip or tubing against transverse displacement as it advances towards the print head. Preferably the cassette is arranged so that it can be reversed, to enable the strip or tubing to be printed on either side: in particular, the strip or tubing can be printed on one side, then rewound into the cassette, for the cassette then to be turned over to enable printing on the opposite side of the strip or tubing. Preferably therefore, the cassette is symmetrical about a plane which contains its exit slot

and the axis around which the strip or tubing is wound.

Also in accordance with the present invention, there is provided a thermal transfer printer in combination with a length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

The strip or tubing is preferably preformed with transverse lines of weakness at intervals along its length, to define successive markers. The lines of weakness may be provided by a line of perforations or by a partial cut through the thickness of the material: however, the lines of weakness may be formed at any desired intervals, so forming markers of any desired lengths.

Preferably, the strip is semi-rigid. Preferably, the strip comprises an adhesive backing.

In use, as the strip or tubing advances through the printer, the position of the perforations or lines of weakness between successive markers needs to be determined, so that the printer can determine where to position each successive print on each successive marker.

Thus, in accordance with this invention, there is provided a printer in combination with a length of elongate strip or flattened tubing, formed with transverse lines of weakness at intervals along its length to define successive markers, datum markings being formed at regular intervals along the strip or tubing, the spacing between each marking being related to the length of each marker, the printer comprising a sensor arranged to sense the position of each marker as the strip or tubing is advanced through the printer and control means arranged to control the position at which successive prints are formed on successive markers of the strip or tubing, in accordance with the output of the sensor.

In use, the sensor detects the position of the datum markings, so that the printer knows when it can start printing each successive marker.

Preferably a datum marking is provided on each of the successive markers. However, it is envisaged that datum markings may not be provided on every marker, in which case the printer is preferably arranged to calculate the position at which each successive marker is to be printed.

Preferably the markings are transparent and thus do not affect the appearance of the markers on which they are provided.

Preferably the markings are formed of a UV reflective material such as ink.

Preferably, the printer comprises a UV light source which irradiates the strip or tubing, the sensor being arranged to detect said UV light reflected from the datum markings.

A disadvantage of cutting or tearing markers from a length of markers is that the length of markers becomes fragmented, with the result that some markers can become lost. This is a particular problem where is

each marker is printed differently and selected markers are then cut at random from the length.

In order to overcome this problem, the strip or tubing is preferably joined to an axially extending carrier which keeps the remaining markers together once markers have been cut or torn from the length.

In one embodiment, the edge of the strip or tubing is connected to the edge of the carrier. Preferably, two lengths of strip or tubing are mounted side-by-side to respective opposite side edges of the carrier. Preferably, the or each length of strip or tubing is frangibly connected to the carrier.

In an alternative embodiment, the strip or tubing is mounted on an elongate carrier of sheet material such as paper, the strip or tubing being disposed between opposite side edges of the carrier. Preferably, a plurality of strips and lengths of tubing coextend along the carrier. This format aids alignment, since the carrier can be tractor-fed, say by means of perforations extending along the length of the carrier.

Also in accordance with the present invention, there is provided a method of forming printed markers, comprising advancing an elongate strip or length of flattened tubing longitudinally of itself through a thermal transfer printer and printing indicia at successive longitudinal intervals onto said strip or tubing.

The strip or tubing may be formed with transverse lines of weakness after it has been printed.

Further in accordance with the present invention, there is provided feedstock for forming individual markers, comprising an elongate strip or a flattened length of tubing, formed with transverse lines of weakness at intervals along its length, to define successive markers.

Yet further in accordance with the present invention, there is provided a series of markers formed on an elongate strip or length of flattened tubing, said strip or tubing being formed with transverse lines of weakness at intervals and carrying printed indicia between the adjacent pairs of lines of weakness.

Embodiments of the present invention will now be described by way examples only and with reference to the accompanying drawings, in which:

FIGURE 1 is a plan view of a first embodiment of feedstock in the form of flattened tubing;

FIGURE 2 is sectional view through a second embodiment of feedstock in the form of two lengths of tubing mounted side-by-side to a carrier;

FIGURE 3 is a plan view of the feedstock of Figure 2;

FIGURE 4 is a plan view of a third embodiment of feedstock in the form of lengths of strip or flattened tubing mounted on a carrier;

FIGURE 5 a plan view of a fourth embodiment of feedstock in the form of elongate strip;

FIGURE 6 is a schematic side view of an embodiment of thermal transfer printer in accordance with the invention;

FIGURE 7 is a plan view of a guide arrangement of the printer;

FIGURE 8 is a view of a cassette in accordance with the invention;

FIGURE 9 is a view of the cassette fitted into the thermal transfer printer of Figure 6;

FIGURE 10 is a schematic sectional view of a portion of an alternative embodiment of thermal transfer printer in accordance with the invention.

Referring to Figure 1, there is shown a portion of a length of tubing 10 which has been flattened by being passed between a pair of rollers under moderate heat. The tubing may be heatshrinkable or non-heatshrinkable, and comprises a plastics material e.g. PVC or a polyolefin. The tubing is semi-severed across its width at periodic intervals, as indicated at 12, so that individual markers, once printed, can be torn from it, as indicated at 14.

Referring to Figures 2 and 3 of the drawings, two lengths of flattened tubing 10a, 10b are arranged side-by-side and are interconnected by a solid carrier 11. The lengths of tubing 10a, 10b can be printed simultaneously using a single printer.

Once printed, the lengths of tubing 10a, 10b can be detached from the carrier 11 using a simple tearing action. Both lengths of tubing 10a, 10b are semi-severed across their width at periodic intervals, as indicated at 13, so that selected individual markers can be detached from various points along the printed length: the carrier 11 keeps the remaining portions of the tubing 10a, 10b together, so that they do not get lost and so that further individual markers can easily be selected.

Referring to Figure 4 of the drawings, one or more lengths of strip and/or tubing 15 can be supplied adhered to a paper carrier 16 and presented on a roll. The carrier 16 comprises a longitudinally extending series of perforations 17 which can be engaged by a toothed drive wheel on the printer, so as to advance the carrier and strip or tubing through the printer. The lengths of strip or tubing are severed across their width, as indicated at 18, so that individual printed markers can be selected at random from the carrier 16, whilst keeping the remaining markers conveniently together.

Figure 5 shows a portion of a length of flat strip 20 which is also semi-severed at intervals along its length, as indicated at 22, to define successive markers. The strip is pre-punched to form each such marker with a pair of rectangular apertures 24 (or alternatively with a single aperture) adjacent each of its opposite ends, for attaching the marker, typically using cable ties, to a cable etc. to be marked.

Feedstock 19 of any of the types shown in Figures 1 to 5 may be wound onto a reel 30, which is then fitted into a thermal transfer printer 25 as shown in Figures 6 and 7, for the feedstock 19 to pass the print head 36, where it is printed on as required. The printer 25 comprises a spindle 32 projecting from a side wall of the ap-

paratus, and the reel 30 is received on this spindle. The feedstock 19 passes from the reel 30, through a pair of closely-spaced guide plates 34, then over a roller 35 which is positioned under the thermal print head 36, and finally out through a slot 37 in the front of the printer. A printer ribbon 38 is advanced past the thermal print head, over the feedstock 19, from a reel 39 to a reel 40.

In order to prevent the feedstock 19 wandering sideways as it passes from its reel 30 to the print head 36, a guide arrangement is provided, comprising a pair of elongate guide members 42. At one end, the guide members 42 engage over the spindle 32 either side of the reel 30 and are secured in position by tightening respect screws 43: at their opposite ends, the guide members 42 engage in a slot 34a in a downwardly-bent rear portion of the lower guide plate 34. As shown in Figure 7, there is a gap between the two guide members 42: the inwardly facing edges of the two guide members 42 are formed with longitudinally-extending grooves (one of which is shown at 42a in Figure 6). The opposite edges of the feedstock 19 are received in the longitudinal grooves 42a of the two guide members 42.

In the example shown in Figures 6 and 7, the two guide members 42 are separate from the reel 30 and independently fitted in place, at one end in the slot 34a of the lower guide plate 34 and at the other end on the spindle 32. Instead, the two guide members 42 may be mounted to the reel 30, enabling the reel and guide members to be fitted as a single unit into the printer 25: for example, the two guide members 42 may fit together through the centre opening in the reel.

Two or more reels 30, with their respective guide members, may be mounted side-by-side on the spindle 32, such that their feedstock advance side-by-side past the print head 36. In this way, the corresponding number of feedstock (tubes or strip) may be printed simultaneously.

The feedstock used in the printer may be of a wide range of different widths, the reel 30 being of corresponding width. Where the feedstock is preformed with transverse lines of weakness at regular intervals along its length, then use is made of a graduated support 44 projecting from the front of the printer 25: thus, the feedstock is pulled through until its leading end is aligned with one of the graduations, appropriate for the distance between the successive lines of weakness of that particular feedstock; this ensures that the printing process will be synchronised to the successive markers.

The feedstock may be formed to a profile in cross-section, instead of being flat. In this case, the guide plates 34 and roller 36 may be formed with a correspondingly profiled cross-section.

Instead of being wound on a reel, the feedstock may be wound into a cassette as shown in Figures 8 and 9. The cassette comprises a body part 50 having a flat base formed with an upstanding peripheral wall 51 and with an upstanding core 52: the cassette further comprises a flat cover 53 which fits across the open top of

the body part 50 and is secured in place by a screw 54 which passes through the cover 53 and into the core 52. The cassette comprises a generally circular main portion, with the core 52 at its centre, from which a tapered portion projects: the end of the latter portion is provided with a slot 55. The feedstock 19 is wound around the core 52 within the cassette and its free end passes outwardly through the slot 55. The core 52 and fastening screw 54 are formed with a through-hole so that the cassette can be mounted on the spindle 32 of the printer, alongside one or more additional cassettes. In passing to the print head, the feedstock 19 is guided by the opposite sides of the cassette and so prevented from wandering sideways. As shown in Figure 9, when the cassette is fitted into the printer, its tapered end terminates a short distance from the entrance to the passageway between the two guide plates 34: the cassette remains free to turn on the spindle 32, and to adopt its own position as the feedstock is drawn past the print head.

It will be noted that the cassette is symmetrical in shape about a plane which contains the exit slot 55 and the axis of the core 52. Thus, its feedstock 19 can be printed on one side, then rewound into the cassette, and the cassette can then be turned over for the feedstock to be printed on its opposite side.

It will be appreciated that the printer can print any desired indicia on the feedstock: the printing may run either lengthwise or transversely of the feedstock. The printing may also include graphics. Further, the printing may be formed to any selected colour, by appropriate choice of the printer ribbon. The feedstock can be of any desired colour, and the printing may be white (or other light colours) onto black (or other dark colour) feedstock.

The printer may be adapted to accepted large-diameter reels of feedstock, carried on a spindle mounted outside the printer casing. The feedstock may then enter the printer through its rear wall, pass over the spindle 32 of the printer and then be guided by a pair of guide members 42 (as previously described) to the passageway between the guide plates 34.

The flattened tubing feedstock 10 of Figure 1 may be preformed with its successive transverse lines of weakness 12 prior to printing, as shown: alternatively, these lines of weakness may be formed subsequent to the printing. Similarly, the strip 20 of Figure 5 may be formed with its transverse lines of weakness 22 and fixing apertures 24 prior to printing, or subsequent to the printing. Alternatively, the feedstock (particularly the strip 20 of Figure 5) may be supplied in its printed form, without its transverse lines of weakness, for the user to cut individual markers from it.

In embodiments where the strip or tubing is preformed with transverse lines of weakness defining successive markers, the lines of weakness may be overprinted with a band of transparent UV ink, in order to define datum marks 90, as shown in Figures 1, 3 and 5.

Referring to Figure 10, the printer is arranged to detect these datum marks 90 between successive mark-

ers, so that it can determine where to form the prints on successive markers. In order to achieve this, the printer comprises a UV light source 91 which illuminates the strip or tubing 10/20 with UV light through a window 93. UV light is reflected from the strip or tubing 10/20 through a window 94 onto a UV sensor 92 disposed adjacent the light source 91.

The output of the sensor 92 is connected to a print control unit via a level detector. In use, a greater amount of UV light is reflected by the strip or tubing 10/20 when the datum marks 90 pass the sensor 92. The level detector is arranged to detect the increased output level of the sensor 92 and in this manner the print control circuit can control the position of successive prints to correspond with the position of the successive markers as the strip or tubing advances through the printer.

A particular advantage of using a thermal transfer printer is that the print formed on the feedstock is resistant to touch (in contrast to the print formed by dot matrix printers, which requires "fixing", for example under UV light). Further, the print is itself resistant to UV light, and will therefore not fade over time.

It will further be appreciated that the printer avoids wastage. The reels and cassettes can be re-used. Further, the feedstock is free of contamination: the reels of feedstock can be enclosed in a wrapper until use, whilst the cassettes are enclosed and ensure protection for the feedstock.

Claims

1. An assembly comprising a thermal transfer printer in combination with a length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.
2. An assembly as claimed in claim 1, in which the strip or tubing is preformed with transverse lines of weakness at intervals along its length, to define successive markers.
3. An assembly as claimed in claim 2, in which the lines of weakness may be provided by a line of perforations through the thickness of the material.
4. An assembly as claimed in claim 2, in which the lines of weakness may be provided by a partial cut through the thickness of the material.
5. An assembly as claimed in any preceding claim, in which the strip is semi-rigid.
6. An assembly as claimed in any preceding claim, in which the strip comprises an adhesive backing.

7. An assembly as claimed in any preceding claim, in which the strip or tubing is joined to an axially extending carrier.
8. An assembly as claimed in claim 7, in which the edge of the strip or tubing is connected to the edge of the carrier.
9. An assembly as claimed in claim 8, in which two lengths of strip or tubing are mounted side-by-side to respective opposite side edges of the carrier.
10. An assembly as claimed in claims 8 or 9, in which the or each length of strip or tubing is frangibly connected to the carrier.
11. An assembly as claimed in claim 7, in which the strip or tubing is mounted on an elongate carrier of sheet material, the strip or tubing being disposed between opposite side edges of the carrier.
12. An assembly as claimed in claim 11, in which a plurality of strips and/or lengths of tubing coextend along the carrier.
13. An assembly as claimed in any preceding claim, in which the strip or tubing is wound onto a reel, which is mounted for rotation.
14. An assembly as claimed in claim 13, in which the guiding means comprises a pair of elongate guides which extend from the reel towards the print head, the elongate guides having inwardly-facing edges which are formed with longitudinal grooves in which the opposite edges of the strip or tubing are slidably received.
15. An assembly as claimed in claim 14, in which the elongate guides comprise two separate members which are engaged, either side of the reel, onto a spindle on which the reel is fitted.
16. An assembly as claimed in claim 14, in which the elongate guides are mounted to the reel, so that the reel and guides form a single unit for fitting into the printer.
17. An assembly as claimed in claim 14, in which the elongate strip or tubing is wound within a cassette, having an exit slot through which the feedstock passes.
18. An assembly as claimed in claim 17, in which the cassette includes a portion which projects radially outwardly and includes the exit slot at its outer end, opposite side walls of the projecting portion being arranged to constrain the strip or tubing against transverse displacement as it advances towards

the print head.

19. An assembly as claimed in claims 17 or 18, in which the cassette is arranged so that it can be reversed.

20. An assembly as claimed in claim 19, in which the cassette is symmetrical about a plane which contains its exit slot and the axis around which the strip or tubing is wound.

21. A thermal transfer printer arranged to receive a wound length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

22. A thermal transfer printer as claimed in claim 21, arranged to receive a wound length of strip or tubing of selected width.

23. A thermal transfer printer as claimed in claim 22, arranged to receive two or more wound lengths of strip or tubing, side-by-side.

24. A method of forming printed markers, comprising advancing an elongate strip or length of flattened tubing longitudinally of itself through a thermal transfer printer and printing indicia at successive longitudinal intervals onto said strip or tubing.

25. A method as claimed in claim 24, in which the strip or tubing is formed with transverse lines of weakness after it has been printed.

26. A method as claimed in claims 24 or 25, in which the strip or tubing is printed on one side, and re-wound onto the same or different reel, which is then inserted into the printer for printing onto the opposite side of the strip or tubing.

27. Feedstock for forming individual markers, the feedstock comprising an elongate strip or a flattened length of tubing, formed with transverse lines of weakness at intervals along its length, to define successive markers.

28. A series of markers formed on an elongate strip or length of flattened tubing, said strip or tubing being formed with transverse lines of weakness at intervals and carrying printed indicia between the adjacent pairs of lines of weakness.

29. An assembly comprising a thermal transfer printer in combination with a length of elongate strip or flattened tubing, formed with transverse lines of weakness at intervals along its length to define succes-

sive markers, datum markings being formed at regular intervals along the strip or tubing, the spacing between each marking being related to the length of each marker, the printer comprising a sensor arranged to sense the position of each marker as the strip or tubing is advanced through the printer and control means arranged to control the position at which successive prints are formed on successive markers of the strip or tubing, in accordance with the output of the sensor.

30. An assembly as claimed in claim 29, in which a datum marking is provided on each of the successive markers.

31. An assembly as claimed in claim 29, in which datum markings are not be provided on every marker, the printer being arranged to calculate the position at which each successive marker is to be printed.

32. An assembly as claimed in any of claims 29 to 31, in which the markings are transparent.

33. An assembly as claimed in claim 32, in which the markings are formed of a UV reflective material.

34. An assembly as claimed in claim 33, in which the printer comprises a UV light source which irradiates the strip or tubing, the sensor being arranged to detect said UV light reflected from the datum markings.

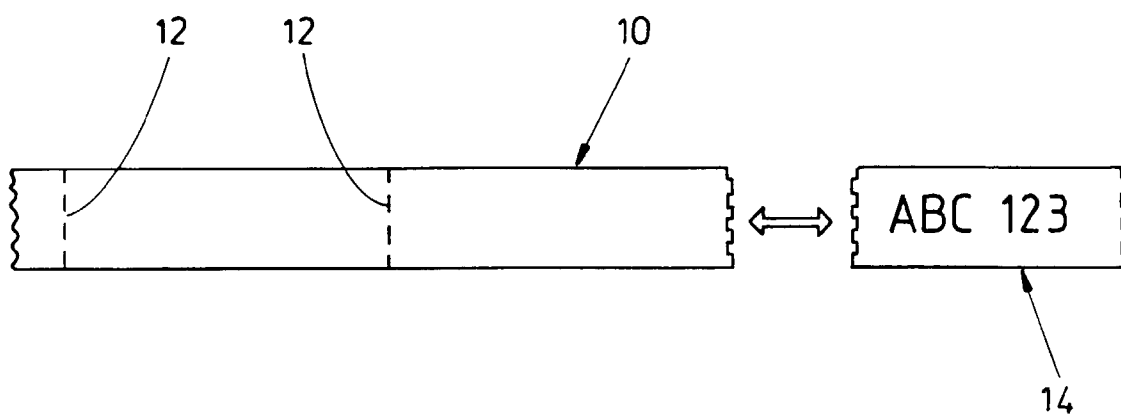


FIG. 1

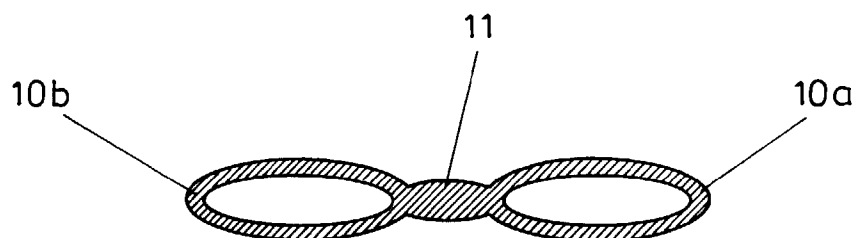


FIG. 2

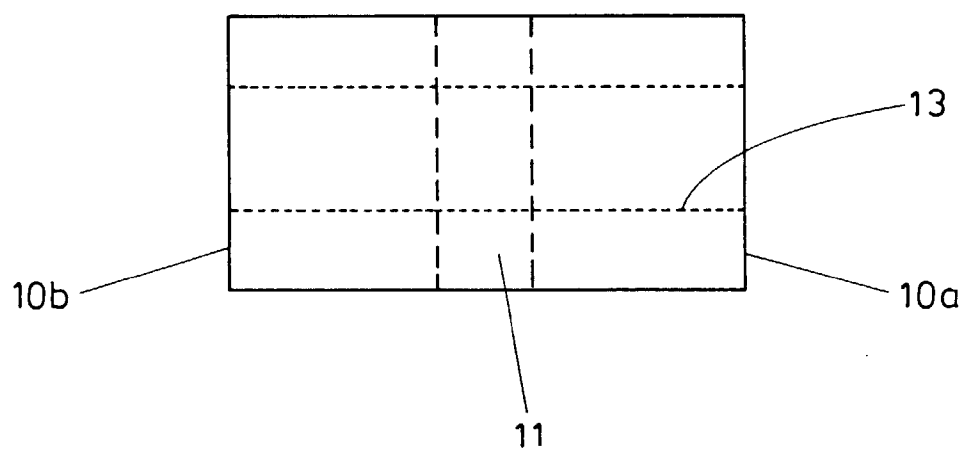


FIG. 3

