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(71) Applicant: TRANSKRIT CORPORATION
P.O. Box 500
Brewster New York 10509(US)

(72) Inventor: Erber, Alfred J.
16 Hamlett Court
Wappinger Falls, N.Y. 12590(US)
Inventor: Neale, Arthur
11 Alden Terrace
Millbrook, N.Y. 12545(US)

(74) Representative: Füchsle, Klaus, Dipl.-Ing. et al
Hoffmann . Eitle & Partner Patentanwälte
Arabellastrasse 4
D-8000 München 81(DE)

(54) Apparatus and method for the manufacture of mailers.

(57) The invention relates to a method and apparatus for forming mailers from continuous webs (2A, 3A) of materials, wherein knurls or impressions (26) are provided along the length of the widthwise glue lines (23) used to form the continuous webs (2A, 3A) into closed envelopes (9) defining the mailers so as to inhibit "tenting".

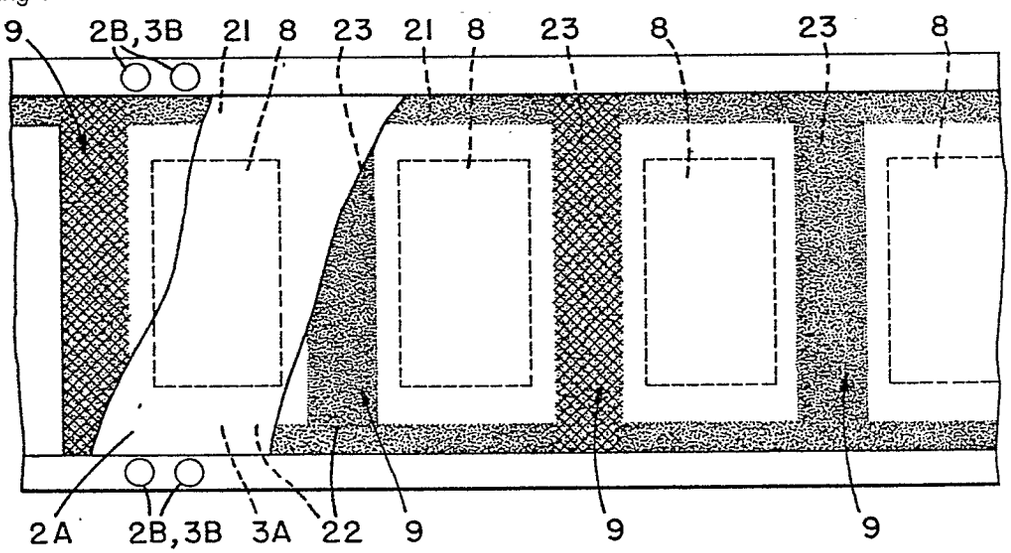

FIG. 4

EP 0 400 316 A2

APPARATUS AND METHOD FOR THE MANUFACTURE OF MAILERS

Background of the Invention

This invention relates to apparatus and method for the manufacture of mailers and, in particular, to an apparatus and method for the manufacture of mailers which avoid the so-called "tenting" which occurs in the production of mailers in use today.

Mailers are generally formed from top and bottom webs or sheets of material which are glued together along their top and bottom widths and along their sides to form a closed envelope. Inside the envelope, the mailer carries contents to be mailed. This may include simple sheet or multiple sheet materials or combinations of these materials which are cut or otherwise configured to fit within the mailer envelope. Mailers can also be manufactured with plies or sheets external of the mailer envelope.

The mailer envelope is also provided with a perforation line inward of the glued area, usually along one of its sides. This perforation line may also have a tab area. By holding the body of the envelope and the side of the envelope outward of the perforation line, the side including the glued area can be separated from the envelope. The top and bottom sheets of the envelope thus become detached at this side, thereby allowing entry into the envelope for removal of its contents.

In the manufacture of mailers of this type, continuous outer webs of material for forming the top and bottom sheets of the mailers are brought together with inner continuous webs of material for forming the desired contents of the mailers. The inner continuous webs are cut and, if need be, selectively glued, to produce individualized contents for the mailers as the sandwich of webs is brought together. At or prior to this time, one of the outer webs is provided with glue lines along the sides of the web and widthwise of the web at spaced positions along its length to define the mailer envelopes or pockets.

When the webs are then brought together, each individualized set of contents comes to be situated between the side glue lines and a set of widthwise glue lines. The outer webs become secured together along these glue lines so that the webs form the defined individualized mailer envelopes with the individualized sets of contents therein. Gluing of the webs may be facilitated by applying pressure to the webs along the glue lines using rollers or other pressure inducing members.

The webs, after being joined in the gluing operation, are then perforated along the middle of each widthwise glue line, so as to permit the individual mailers to be separated from each other. Also, a perforation line possibly having a tab area is placed inward of one of the side glue lines, so as to permit opening of the mailer envelope as previously described. After this processing, the continuous web of interconnected mailer envelopes is usually zig-zag folded along selected widthwise or cross perforations (e.g., at every cross perforation, at every second cross perforation, at every third cross perforation, etc.) for storage and subsequent printing on the face of the envelopes.

The aforesaid procedure of forming mailers from webs of material is desirably carried out at high speeds. As a result, the zig-zag folding of the webs may occur before the glue securing the side and widthwise glued areas fully dries. This frequently causes the outer webs to shift during the zig-zag operation. Shifting of the webs, in turn, results in so-called "tenting", i.e., the creation of non-flat envelopes or envelopes with a buldge, when the mailer envelopes are subsequently unfolded. This "testing" is most pronounced at the cross perforation areas where the mailers have been folded.

The "tenting" exhibited by the mailer envelopes often causes problems when the unfolded mailers are subsequently passed through the high speed printer used to carry out the aforementioned printing operation. In particular, the "tenting" of the individual envelopes at the fold cross perforations can prevent the mailer from being received in the printer or, if received, can jam the printer which must then be cleared so that printing can be continued. This slows down the printing process and wastes both time and manpower. The overall efficiency of the operation thereby decreases and costs increase.

It is, therefore, a primary object of the present invention to provide a method and apparatus for the manufature of mailers which can significantly reduce "tenting".

Summary of the Invention

In accordance with the principles of the present invention, the above and other objectives are realized by further adapting the mailer manufacturing practice discussed above. More particularly, in accordance with the invention, this practice is modified so as to create or provide knurls or impressions in the outer joined webs along the length of the widthwise glue lines forming the mailer envelopes. These knurls or impressions in the webs

act to more positively lock the webs together. As a result, the webs are restricted from shifting during subsequent processing and the "tenting" caused by such shifting is substantially avoided.

In the embodiment of the invention to be disclosed hereinafter, the knurling of the webs is carried by a hardened knurled bar carried by a rotating cylinder. The bar is in facing relationship to an anvil cylinder and the webs are carried between the two cylinders such that the knurled bar presses the webs against the anvil at the desired widthwise glue lines of the webs.

Brief Description of the Drawings

The above and other features and aspects of the present invention will become more apparent upon reading the following detailed description in conjunction with the accompanying drawings, in which:

FIG. 1 shows pictorally an apparatus for producing mailers in accordance with the principles of the present invention;

FIG. 2 shows the interconnected mailer envelopes produced by the apparatus of FIG. 1 prior to the knurling operation;

FIG. 3 shows the interconnected mailers of FIG. 2 after the perforation operation, but without the knurling operation.

FIG. 4 illustrates the interconnected mailers of FIG. 2 after the knurling operation; and

FIG. 5 shows an assembly usable as the knurling assembly in the FIG. 1 apparatus.

Detailed Description

FIG. 1 shows an assembly 1 for producing mailers in accordance with the principles of the present invention. The overall configuration and operation of the assembly 1 is conventional in nature and may be provided by the collator assembly manufactured by Harris Graphics under model number HP-950.

Because the general configuration and operation of the assembly 1 is known, only so much of the assembly as believed necessary for an understanding of the present invention has been shown pictorally in FIG. 1. As will be explained below, the present invention resides in adapting such known assembly to include a knurling mechanism 61.

As shown, the assembly 1 comprises first and second rollers 2 and 3 which supply continuous webs of material 2A and 3A which are to be used to form the outer sheets or webs of the mailers. The apparatus also includes a plurality of further rollers, shown as three rollers 4, 5 and 6, which also supply continuous webs of material 4A, 5A and 6A. These webs of material are to be used to form the contents to be carried by the mailers.

The webs 4A, 5A and 6A are each fed to a die cut and forming assembly 7 which acts to cut the webs 4A, 5A and 6A to form individualized contents 8. These contents are enclosed by corresponding mailer envelopes 9 (see, FIG. 2) formed when the webs 2A, 3A are brought together at the assembly 7 output. More particularly, the web 2A, prior to being brought adjacent the web 3A, first passes through a gluing assembly 11 in which glue lines are provided along the sides of the web as well as along the width of the web at equally spaced longitudinal positions. When the webs 2A and 3A are then brought together, the glue lines join the webs to form the aforementioned mailer envelopes 9.

FIG. 2 shows the resultant joined webs 2A, 3A and individualized contents 8 in the so formed envelopes 9. As can be seen, side glue lines 21, 22 along with widthwise glue lines 23 join the webs to form interconnected envelopes 9 containing the contents 8. In the case shown, the webs 2A and 3A also have corresponding apertures 2B and 3B which are provided in the webs to facilitate moving the webs along in the assembly 1.

In the conventional operation of the assembly 1, without the knurling assembly 61, the joined webs 2A, 3A are moved from the assembly 7 to a perforation assembly 12. The assembly 12 provides cross perforations 24 centrally of the widthwise glue lines 23 as well as perforations 25 with tabs 25A inward of the side glue line 21. The former perforations 24 permit the envelopes 9 to be detached one from the other to form individual mailers. The latter perforations 25, in turn, permit the side edge of each envelope inward of the corresponding glue line 21 to be detached. This allows entry into the mailer to obtain the contents 8. FIG. 3 shows the joined webs 2A, 3A after passage through the perforation assembly 12 to provide the aforementioned perforations. In this case also, perforation lines 26 and 27 inward of the holes 2B, 3B are also provided for removal of the line hole margins from the completed mailers.

Once the joined webs 2A, 3A have been perforated, the webs are fed through a folding assembly 13. The assembly 13 zig-zag folds the webs along the cross perforations 24 for storage and subsequent printing. Ths folding may occur at every cross perforation 24 or at selected cross perforations such as, for example, every second cross perforation, every third cross perforation, etc. In the case shown, it is assumed that folding occurs at every other cross perforation.

In the operation of the assembly 1, the speed of the assembly may be such that some of the glue lines are not fully dry when the joined webs 2A, 3A are passed through the perforation and folding assemblies 12 and 13. As a result, the webs 2A, 3A may shift relative to one another. This shifting, if it occurs, often causes "tenting", i.e., bulging, of the webs 2A, 3A, forming the individual envelopes 9. This "tenting" evidences itself when the envelopes 9 are unfolded and is most pronounced in the envelopes which have been folded particularly at the cross perforation fold line areas. "Tenting", as above-discussed, is undesirable because it can cause the envelopes 9 to disturb the printing operation when they are latter introduced into printing equipment for printing on the web 3A which forms the front surface of the mailers.

In order to substantially inhibit the occurrence of "tenting", the apparatus 1 is adapted to include the knurling assembly 61. The assembly 61 is arranged to receive the webs 2A, 3A after they have been joined to form the envelopes 9 containing the contents 8. In accordance with the invention, the assembly 61 is adapted to create or provide knurls or impressions in the webs 2A, 3A along the length of selective ones of the widthwise glue lines 23. In the case shown, the knurling operation is carried out at every other widthwise glue line, i.e., where the envelopes are to be folded and thus would otherwise likely exhibit "tenting".

FIG. 4 shows the joined webs 2A, 3A after the knurling operation, but prior to the perforation assembly operation. As can be seen, knurls or impressions 26 are now provided along alternate widthwise glue lines 23. When the cross or widthwise perforations 24 are then provided in the joined webs by the assembly 12, there will be knurls or impressions on both sides of the perforations. Each resultant envelope 9, when detached from the other envelopes 9, will have knurls along at least one widthwise edge.

By knurling of the webs 2A, 3A, as above-described, it has been found that the shifting of the webs in the subsequent processing is substantially restricted. As a result, substantially little "tenting" in the envelopes 9 results and the subsequent printing of the envelopes can be carried out with little or no difficulty.

The knurling assembly 61 can take on a variety of forms. FIG. 5 shows one form of the assembly in which a rotatable cylinder 41 is provided across its width with a hardened knurled rod or gibb 42. The gibb 42 is, preferably, convex in design and cooperates with a rotatable, hardened anvil in the form of a second cylinder 43. With this configuration of the assembly 61, the joined webs 2A, 3A are fed between the cylinders 41 and 43 and the knurled gibb 42 contacts the web 3A to develop the desired impressions or knurls 26 in the web 3A which penetrate into the web 3B.

It should be noted that, while the knurling mechanism 61 has been shown as developing impressions or knurls along the entire length of the selected widthwise glue lines 23, it is within the contemplation of the invention to form the knurls over only selected lengths of the lines. Whether the entire length or only selected lengths of the glue lines are knurled will depend, of course, on the material of the webs and the other system parameters and can be empirically determined for different conditions.

Furthermore, in the present illustrative case, knurls have been provided at every other widthwise glue line 23 because the envelopes are to be folded at these glue lines. However, if the folds were to be spaced at some other interval of the glue lines, the knurling positions could be similarly spaced to be at these glue lines. Also for maximum locking of the envelopes, knurling may be placed along each and every glue line 23, regardless of whether the envelopes are to be folded along such lines.

In all cases, it is understood that the above-identified arrangements are merely illustrative of the many possible specific embodiments which represent applications of the present invention. Numerous and varied other arrangements can readily be devised in accordance with the principles of the present invention without departing from the spirit and scope of the invention.

Claims

1. Apparatus for use in forming mailers from first and second continuous webs of material, each mailer being a closed envelope, comprising:
means for forming glue lines along the sides of said first web and widthwise of said first web at spaced positions along the length of said first web;
means for bringing said first and second webs together such that said webs are joined by said side and widthwise glue lines to form interconnected envelopes along the length of said webs; and
means for forming knurls in said webs along one or more of the widthwise glue lines.

2. Apparatus in accordance with claim 1 wherein;
said knurl forming means includes a knurled surface which contacts one of said webs.

3. Apparatus in accordance with claim 2 wherein:
said one of said webs is said first web.

4. Apparatus in accordance with claim 2 wherein:

said one of said webs is said second web.

5. Apparatus in accordance with claim 1 wherein:
said knurl forming means forms knurls in said webs at selected widthwise glue lines.

6. Apparatus in accordance with claim 1 wherein:
said knurl forming means comprises: a first rotatably mounted cylinder, a knurled bar mounted across the width of said first cylinder; a second rotatably mounted anvil cylinder situated in spaced relationship to said first cylinder.

7. Apparatus in accordance with claim 6 wherein:
said kurl forming means further includes: means for bringing said joined webs through the space between said cylinders with said first web facing said first cylinder.

8. Apparatus in accordance with claim 1 further comprising:
means for perforating said webs along the lengths of said widthwise glue lines so as to permit detachment of said envelopes one from the other.

9. Apparatus in accordance with claim 8 wherein:
said perforation of said webs along the lengths of said widthwise glue lines is such that there are knurls on either side of said perforations.

10. Apparatus in accordance with claim 9 wherein:
said perforation of said webs along the lengths of said widthwise glue lines is such that said perforations are central of said widthwise glue lines.

11. Apparatus in accordance with claim 8 wherein:
said means for perforating said webs also perforates said webs inward of one of said side glue lines.

12. Apparatus in accordance with claim 11 further comprising:
means for introducing between said webs, prior to joining said webs, individual ccntents such that each envelope contains such contents.

13. A mailer comprising:
first and second sheets which are glued together along their sides and along top and bottom widths to form a closed envelope, said first and second sheets being knurled along one of said top and bottom widths.

14. A mailer in accordance with claim 13 further comprising:
a perforation line inward of one of said glued sides.

15. A mailer in accordance with claim 14 further comprising:
contents within said envelope.

16. A method for use in forming mailers from first and second continuous webs of material, each mailer being a closed envelope, comprising:
forming glue lines along the sides of said first web and widthwise of said first web at spaced positions along the length of said first web;
bringing said first and second webs together such that said webs are joined by said side and widthwise glue lines to form interconnected envelopes along the length of said webs; and
forming knurls in said webs along one or more of the widthwise glue lines.

17. A method in accordance with claim 16 wherein;
forming said knurls includes bringing a knurled surface into contact with one of said webs.

18. A method in accordance with claim 17 wherein:
said one of said webs is said first web.

19. A method in accordance with claim 18 wherein:
said one of said webs is said second web.

20. A method in accordance with claim 16 wherein:
said knurls are formed in said webs at selected widthwise glue lines.

21. A method in accordance with claim 16 further comprising:
perforating said webs along the lengths of said widthwise glue lines so as to permit detachment of said envelopes one from the other.

22. A method in accordance with claim 21 wherein:
said perforation of said webs along the lengths of said widthwise glue lines is such that there are knurls on either side of said perforations.

23. A method in accordance with claim 21 wherein:
said perforation of said webs along the lengths of said widthwise glue lines is such that said perforations are central of said widthwise glue lines.

24. A method in accordance with claim 21 wherein:
said step of perforating said webs includes perforating said webs inward of one of said side glue lines.

25. A method in accordance with claim 24 further comprising:
introducing between said webs, prior to joining said webs, individual contents such that each envelope contains such contents.

26. A method in accordance with claim 16 wherein said webs are to be folded at selected ones of said widthwise glue lines and wherein:
said step of forming comprises forming knurls along each of said selected ones of said widthwise glue lines.

27. A method in accordance with claim 16 wherein:
said step of forming knurls in carried out by forming knurls in said webs along all of said width-

wise glue lines.

28. Apparatus in accordance with claim 1 wherein said webs are to be folded at selected ones of said widthwise glue lines and wherein:
said knurl forming means forms knurls in said webs along each of said selected ones of said widthwise glue lines.

29. Apparatus in accordance with claim 1 wherein:
said knurl forming means forms knurls in said webs along all of said widthwise glue lines.

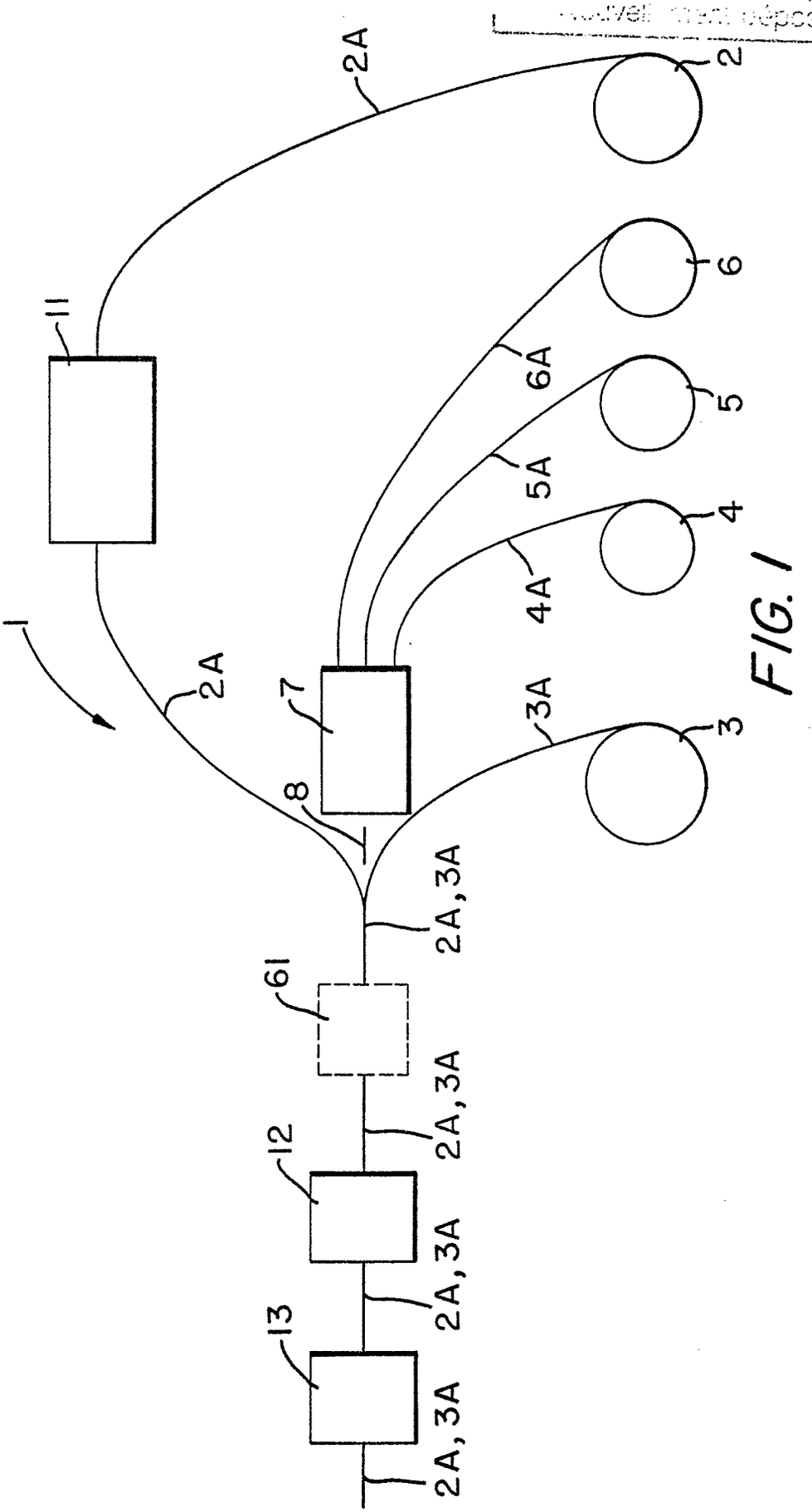

FIG. 1

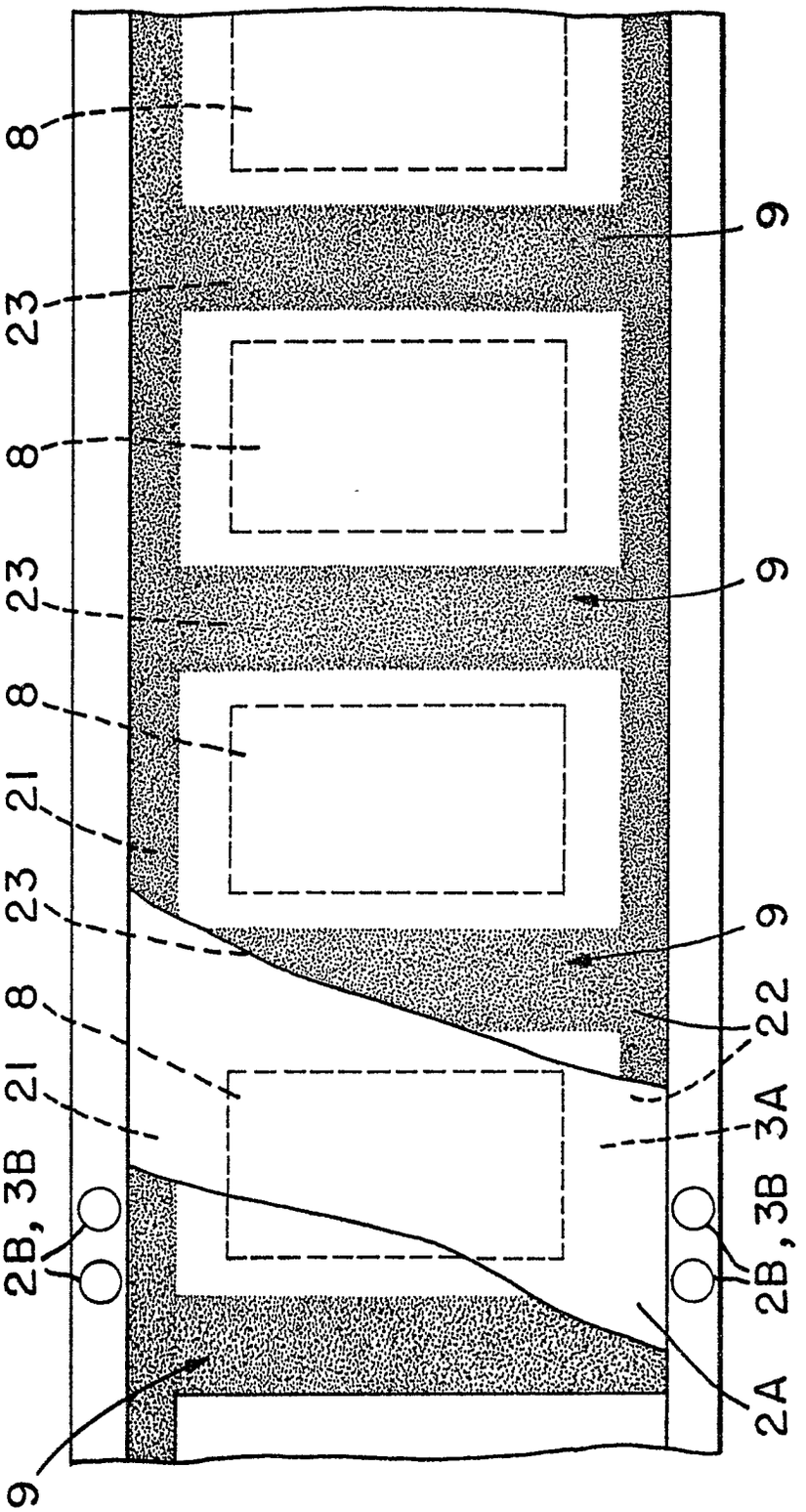

FIG. 2

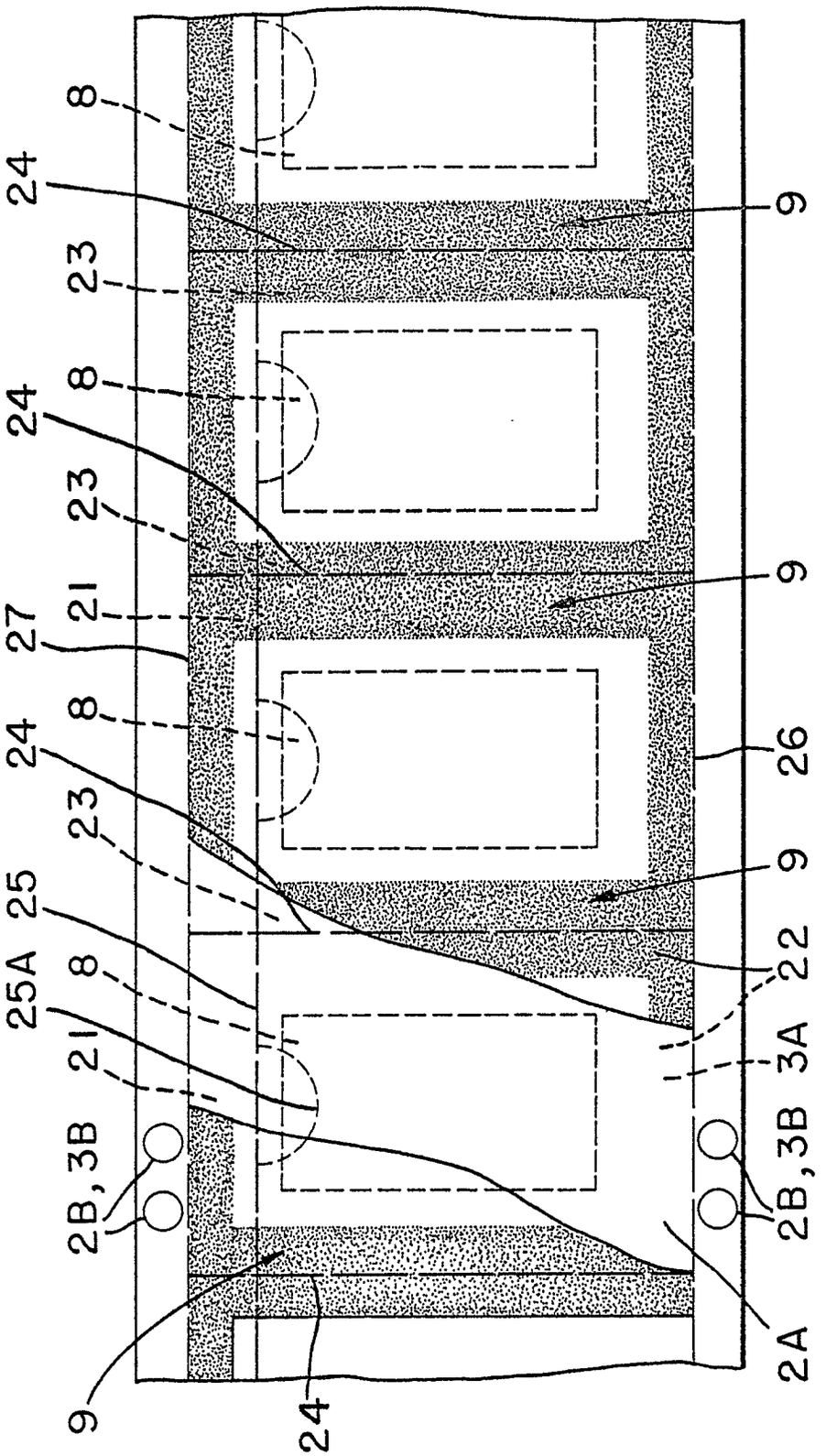

FIG. 3

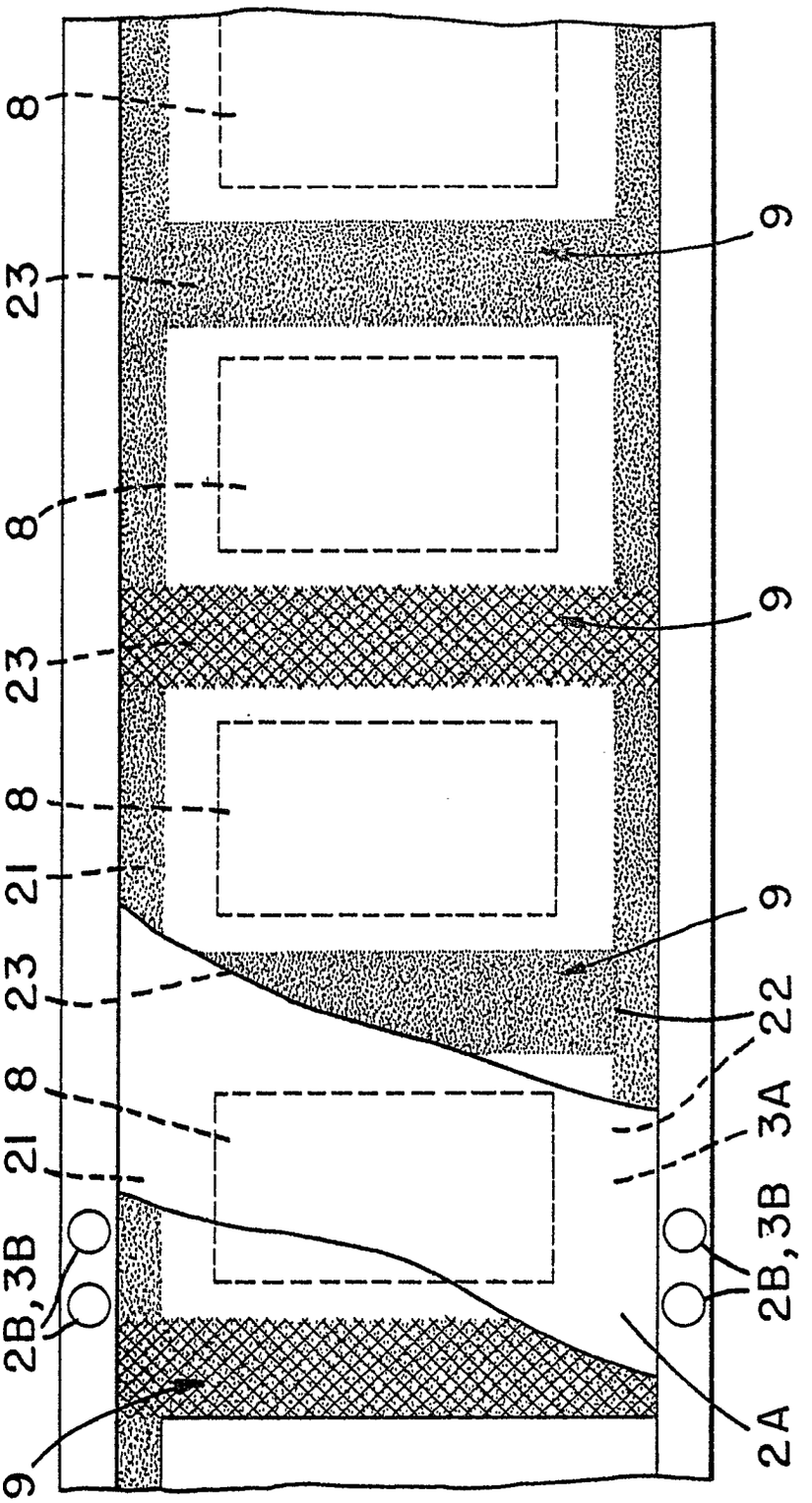

FIG. 4

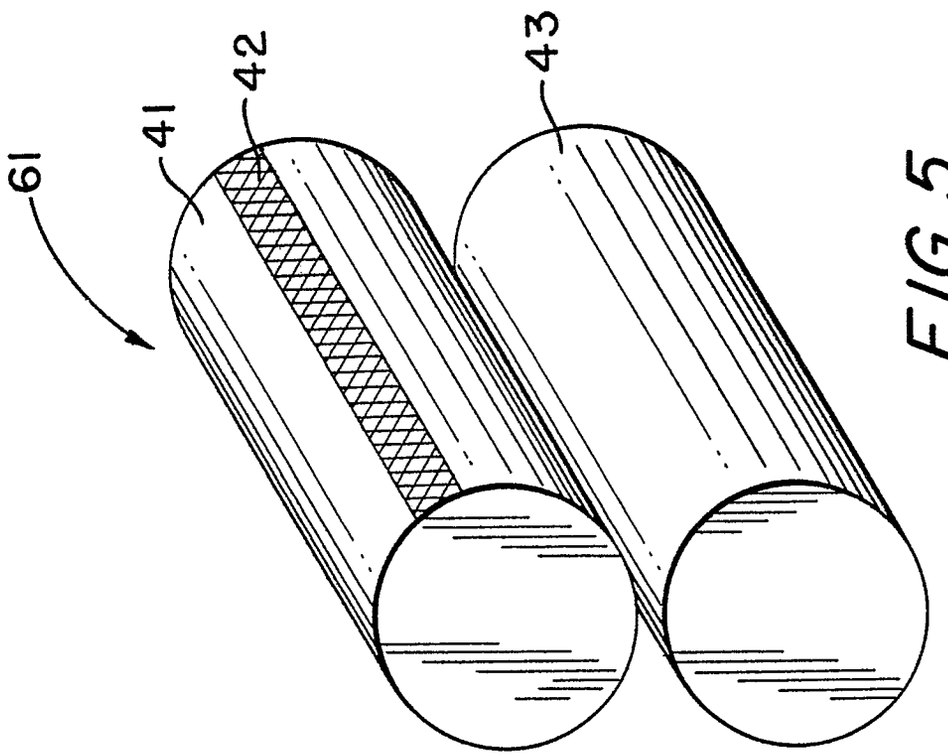

FIG. 5