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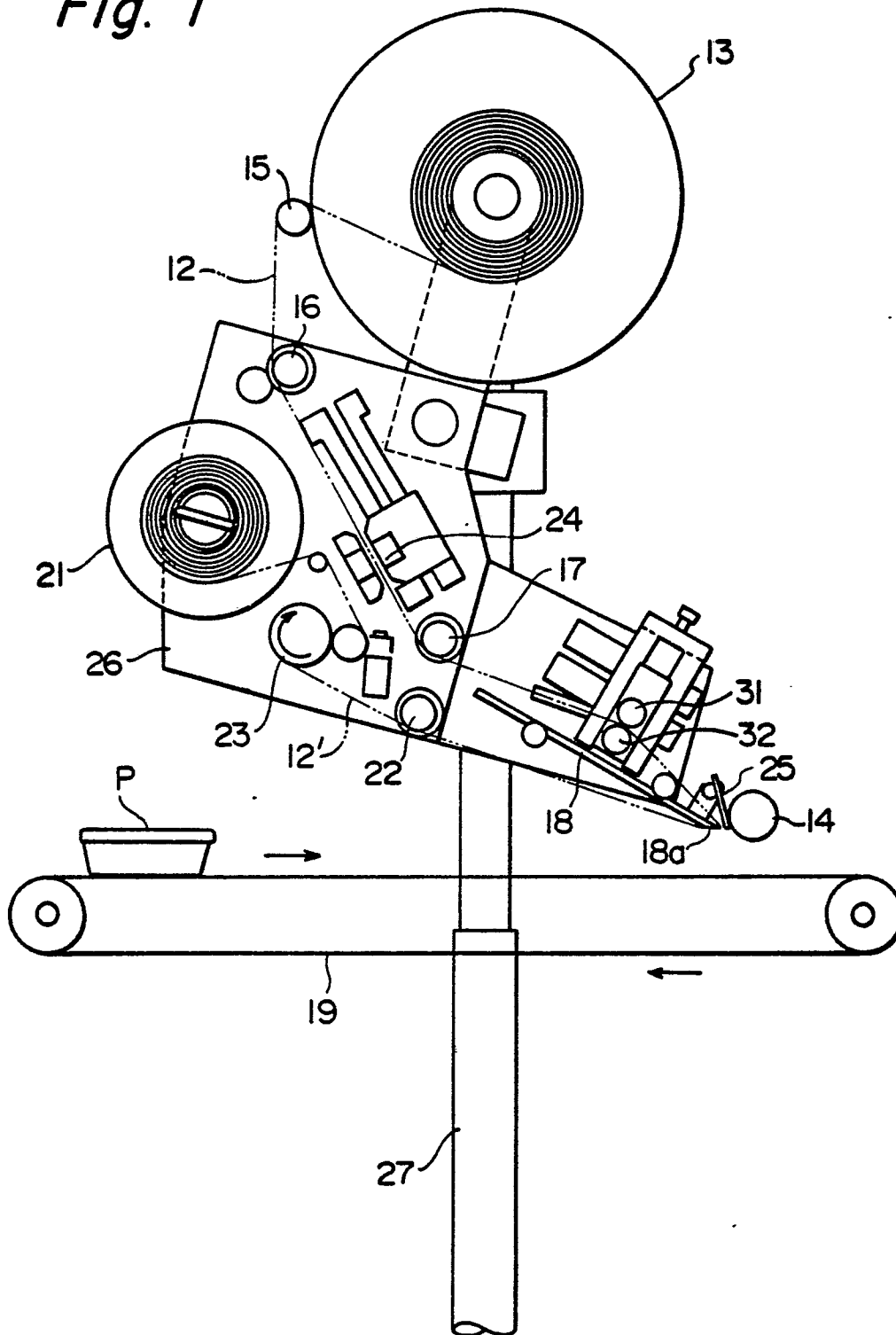
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(54) Automatic labelling apparatus.

(57) An automatic labelling apparatus comprising (A) a pay-off section (13) for delivering a label-holding sheet (12) having labels (11) provisionally attached strippably to its surface, said labels containing pressure-sensitive microcapsules (4) and having the function of handling time and temperature upon rupture of the micro-capsules, (B) a first guide means - (17) for guiding said sheet, (C) a pressure applying means (31, 32) for applying pressure to both surfaces of said sheet (12) guided by the first guide means (17) in order to rupture the micro-capsules in the labels, (D) a stripping means (18, 18a) for stripping the labels from said sheet, (E) a label applicator means (14) for applying each of the labels to an object (P), (F) a second guide means (22) for guiding said sheet stripped on the labels (12'), and (G) a wind-up section (21) for winding up said sheet guided by the second guide means (22).

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Fig. 1



AUTOMATIC LABELLING APPARATUS

1. Field of the Invention

This invention relates to an automatic labelling apparatus for applying labels to objects to be labelled from a label-holding sheet to which they are provisionally attached in succession. Particularly, it relates to an automatic labelling apparatus for applying color-changeable labels which contain a pressure-sensitive microcapsular layer and have the function of changing in color depending upon temperature-time-relations after rupture of the microcapsules.

2. Description of the Prior Art

A conventional automatic labelling apparatus is adapted to deliver by a guide roller a label-holding sheet having labels provisionally attached thereto, wrap the sheet around a front end portion of a stripping plate which is positioned immediately before an applicator roller and reverse it, allow it to travel in an opposite direction, strip the labels automatically from the sheet during the reversing of the sheet, and in the meantime, lower the applicator roller and press the labels onto articles to be labelled which have been transferred to a position immediately beneath the applicator roller.

In the distribution chain of fresh perishable foods, food packs are generally preserved at predetermined low temperatures. However, the retailers or consumers, for example, cannot easily determine the propriety of the handling of such chilled foods in the individual steps of the whole distribution chain, and have no way but to rely upon the suppliers.

Color-changeable labels which can accurately display and record temperature changes in the distribution chain have been developed and gained commercial acceptance for labelling perishable food packs which require chill preservation. As shown in Figure 4 of the accompanying drawings, a color-changeable label is comprised of a base sheet 1, a developer layer 2 containing a developer 2a, a spacer layer 3 for controlling the developing time and a microcapsular layer 5 containing pressure-sensitive microcapsules 4 holding a dye-precursor and a substance having a predetermined melting point (the contents of the capsules are indicated by 4a) formed in this order on the surface of the base sheet 1, and a pressure-sensitive adhesive layer 6 on the back of the base sheet 1. The color-changeable label is provisionally attached strippably to a separable layer 8 on a label-holding sheet 7. The developer 2a and the dye precursor

do not react at a temperature below the melting point of the aforesaid substance having a predetermined melting point, and unless the microcapsules are ruptured, no color forming reaction occurs. When the microcapsules 4 are ruptured and the label is exposed to a temperature above the melting point of the aforesaid substance, the substance melts, and the liquid containing the melted dye precursor passes through the spacer layer 3 over a predetermined time and reaches the developer layer 2. In the developer layer 2, the developer 2a and the dye precursor react to form a color. This color reaction permits simple and convenient indication of improper temperature control. Hence, in applying the color-changeable labels, it is necessary to activate them by rupturing the microcapsules 4 prior to application to commodity packs. It has been desired therefore to develop an automatic labelling apparatus equipped with microcapsule rupturing mechanism.

SUMMARY OF THE INVENTION

It is an object of this invention to provide an automatic labelling apparatus equipped with a pressure applying mechanism for rupturing microcapsules contained in labels.

Another object of this invention is to provide an automatic labelling device equipped with a rupturing mechanism which can uniformly press the surface of a label entirely or partially and rupture microcapsules in the label easily and accurately without degrading the appearance of the label itself.

Further objects of this invention along with its advantage will become apparent from the following description.

According to this invention, the above objects and advantages of this invention are achieved by an automatic labelling apparatus comprising

(A) a pay-off section for delivering a label-holding sheet having labels provisionally attached strippably to its surface, said labels containing pressure-sensitive microcapsules and having the function of handling time and temperature upon rupture of the microcapsules.

(B) a first guide means for guiding said sheet delivered from the pay-off section,

(C) a pressure applying means for applying pressure to both surfaces of said sheet guided

ed by the first guide means in order to rupture the microcapsules in the labels,

(D) a stripping means for stripping the labels from said sheet sent via the pressure applying means when the sheet is wrapped around, and reversed past, the front end portion of the strippable means,

(E) a label applicator means for applying each of the labels to an object at a position corresponding to the front end of the stripping means,

(F) a second guide means for guiding said sheet stripped of the labels and advanced past the front end portion of the stripping means, and

(G) a wind-up section for winding up said sheet guided by the second guide means.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

Figures 1 and 2 are rough side sectional views of different embodiments of the automatic labelling apparatus of this invention;

Figure 3 is a rough perspective view showing the state of a label-holding sheet having labels provisionally attached thereto as it is reversed at the front end portion of the stripping means and the labels are stripped from it; and

Figure 4 is a section view of a label used in the labelling apparatus of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be described in detail with reference to Figures 1 to 4.

With reference to Figure 1, the illustrated apparatus includes a pay-off section 13 for holding a roll of a label-holding sheet 12 having labels 11 provisionally attached thereto strippably and an applicator roller 14 (labelling section) for applying the label 11 to an object P to be labelled. Between the pay-off section 13 and the applicator roller 14 are disposed a tension roller 15, a holding roller 15 and a first guide roller 17. A stripping plate 18 having a front end portion 18a shaped at an acute angle is provided in front of the applicator roller 14, and the

front end portion 18a is located immediately before the applicator roller 14. The applicator roller 14 is adapted to move (descend in the drawings) freely toward an object P to be labelled which has been conveyed by a conveying means 19 such as a belt conveyor.

The apparatus also includes a wind-up section 21 for winding up the sheet 12' which has been wrapped around the front end portion 18a of the stripping plate 18 and reversed, and stripped of the labels 11. The sheet 12' is wound up via a second guide roll 22 and a pinch roller 23. The labels 11 are provisionally attached strippably to a separable layer of the sheet 12 via an adhesive layer formed on the back of the labels 11. Hence, when the sheet 12 is reversed after it has been turned at the front end portion 18a of the stripping plate 18, the labels 11 are automatically stripped off from the board 12 by the force of reaction at the time of reversing (see Figure 3), and applied to the object P by the pressing action of the applicator roller 14. If desired, a compression air nozzle, for example, may be used instead of the applicator roller 14.

The automatic labelling apparatus of this invention further includes a mechanism for applying pressure to the labels and thus rupturing the microcapsules therein. The rupturing mechanism is comprised of a pair of press rollers 31 and 32 for holding and pressing the labels 11 on the travelling sheet 12. The pair of press rollers 31 and 32 are disposed on the sheet pay-off side of the front portion 18a of the stripping plate 18. During passage of the sheet 12 between the press rollers 31 and 32, the microcapsules in the labels are ruptured by the pressing action (application of a linear pressure of at least 100 kg) of the press rollers 31 and 32. The time of rupture is the starting point for the temperature handling function of the color-changeable labels. The labels then perform the function of color changing for ascertaining the state of temperature handling of the labelled object (for example, a labelled commodity pack) in the whole distribution chain. The apparatus additionally includes a label position detecting section 24 (photoelectric device), a plate 25 for preventing adhesion of labels to the applicator roller 14, a machine frame 26, and a mounting stand 27.

Another embodiment of the apparatus of this invention is shown in Figure 2. In Figure 2, the same reference numerals as in Figure 1 have the same meanings as in Figure 1.

The apparatus of Figure 2 differs from the apparatus of Figure 1 in that a stamper 33 and a stamping stand 35 are used instead of the pair of press rollers in the apparatus of Figure 1. Specifically, the microcapsule rupturing mechanism is

comprised of the stamper 33 (metal stamp 34) for stamping the labels 11 on the sheet 12 and the stamping stand 35. The stamper devices 33 and 35 are disposed on the sheet pay-off side of the front end portion 18a of the stripping plate 18. During passage between the stamper devices 33 and 35, the microcapsules in the labels undergo stamping pressure and ruptured by the resulting impact.

In the apparatus of this invention, the color-changeable labels having the function of changing in colors are pressed by pressing means, for example a pair of press rollers or stamper means, to rupture the micro-capsules in the labels. Accordingly, the labels can be uniformly pressed over their entire surfaces during the travelling of the label-holding sheet. The microcapsule rupturing effect is high, and the shape of the labels can be maintained in good condition without damaging the labels. In the embodiment including the stamper means, only a wanted portion of each label can be pressed, and stretching, warping, zigzag movement, etc. of the label-holding sheet can be reduced to a minimum. Furthermore, the rupturing mechanism comprised of a pair of press rollers or stamper means can be easily incorporated into existing automatic labellers at low cost without the need for any special remodelling, and therefore, is of great utilitarian value.

Claims

1. An automatic labelling apparatus comprising

(A) a pay-off section (13) for delivering a label-holding sheet (12) having labels (11) provisionally attached strippably to its surface, said labels (11) containing pressure-sensitive microcapsules (4) and having the function of handling time and temperature upon rupture of the microcapsules,

(B) a first guide (17) means for guiding said sheet (12) delivered from the pay-off section - (13),

(C) a pressure applying means (31, 32) for applying pressure to both surfaces of said sheet guided by the first guide means (17) in order to rupture the microcapsules in the labels (11).

(D) a stripping means (18, 18a) for stripping the labels (11) from said sheet (12) sent via the pressure applying means when the sheet is wrapped around, and reversed past, the front end portion (18a) of the strippable means,

(E) a label applicator means (14) for applying each of the labels to an object (P) at a position corresponding to the front end (18a) of the stripping means (18),

(F) a second guide means (22) for guiding said sheet stripped of the labels (12') and advanced past the front end portion of the stripping means, and

(G) a wind-up section (21) for winding up said sheet (12') guided by the second guide means - (22).

2. An automatic labelling apparatus according to claim 1 which comprises a pay-off section (13) for delivering a label-holding sheet (12), a first guide roller (17), a pair of press rollers (31 and 32), a label stripping plate (18), a label applicator roller (14), a second guide roller (22) and a wind-up section (21) for winding up said sheet stripped of labels (12').

3. An automatic labelling apparatus according to claim 1 which comprises a pay-off section (13) for delivering a label-holding sheet (12), a first guide roller (17), a set of a stamper (33) and a stamping stand (35), a label stripping plate (18), a label applicator roller (14), a second guide roller (22), and a wind-up section (21) for winding up said sheet stripped of labels (12').

Fig. 1

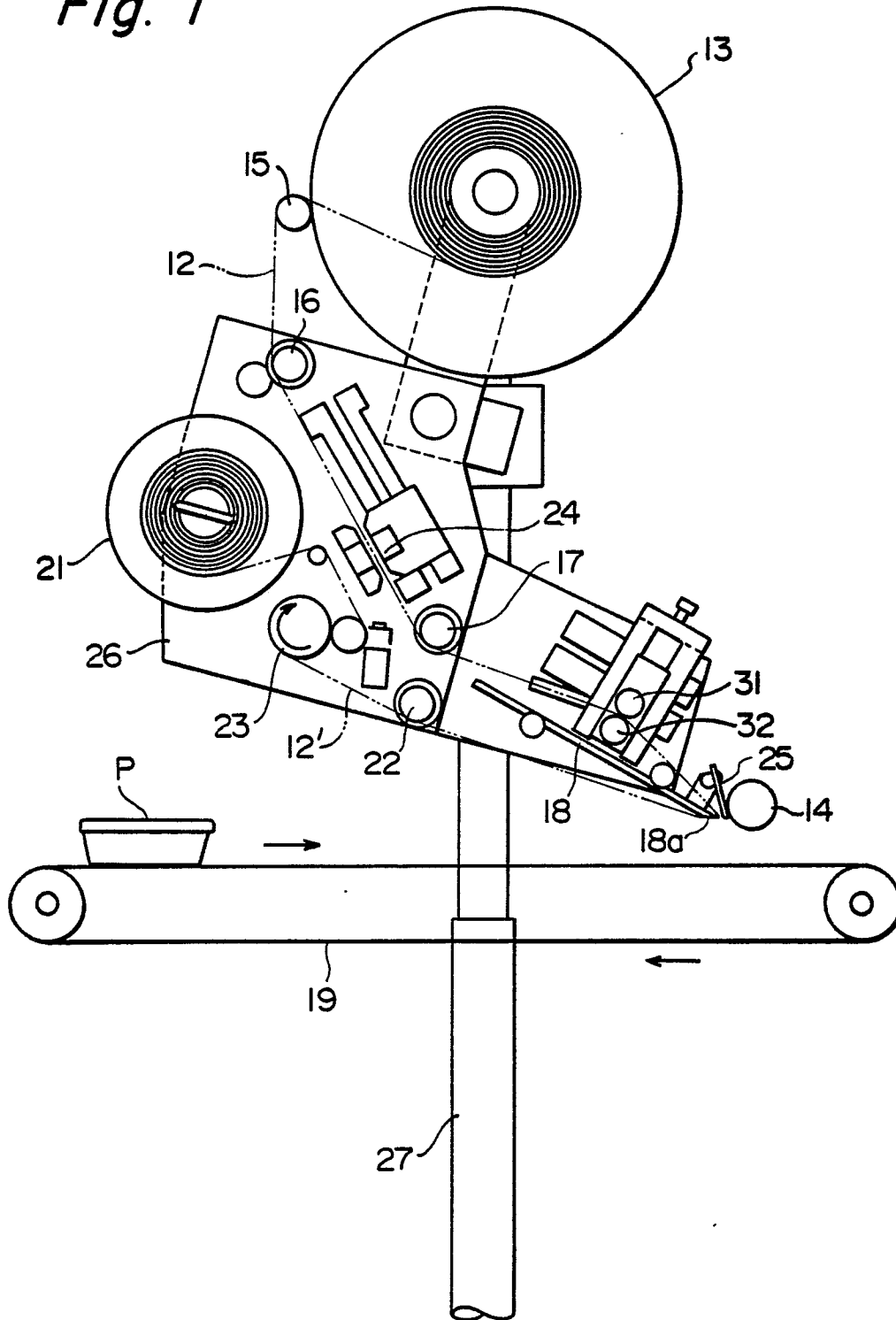


Fig. 2

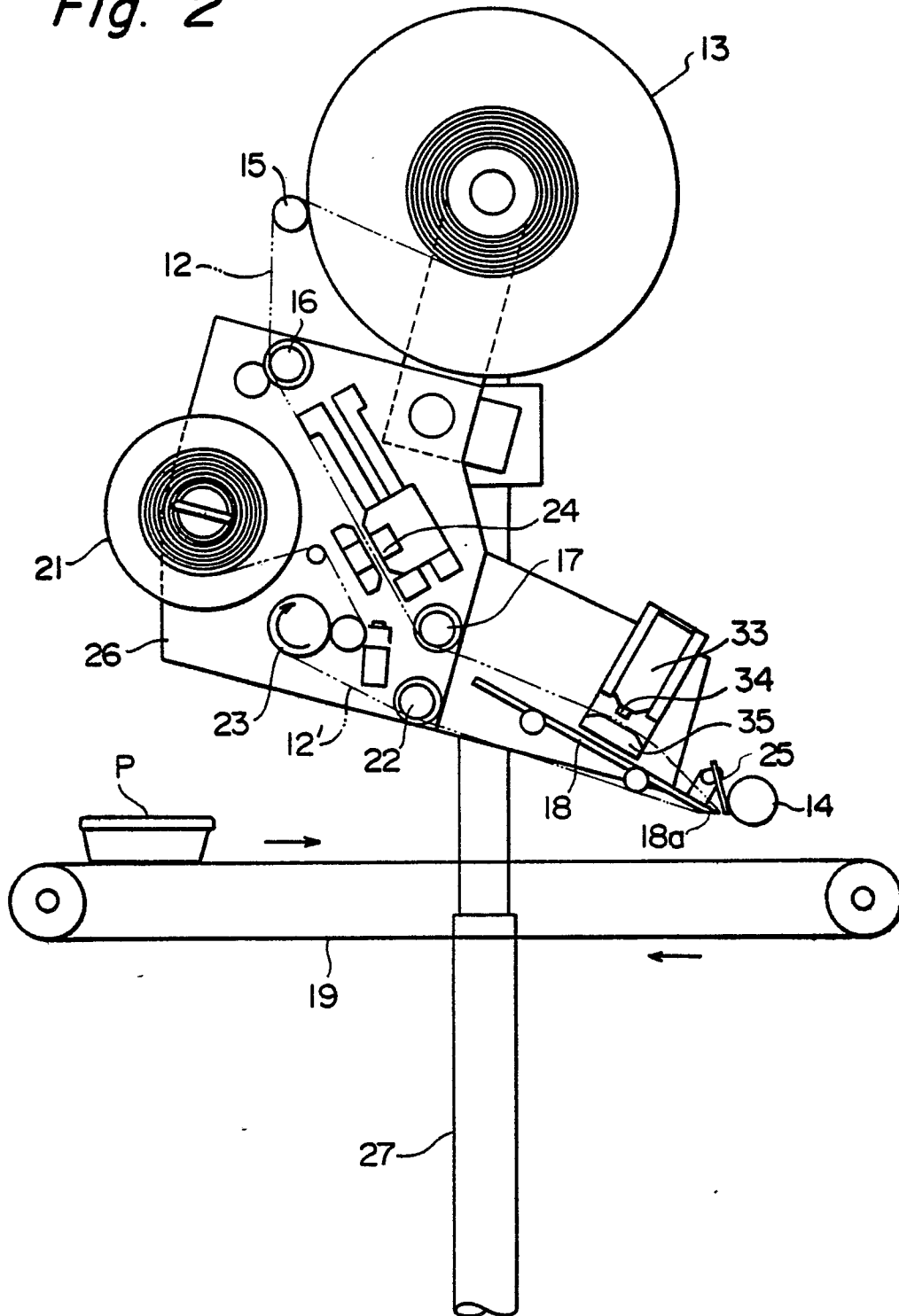


Fig. 3

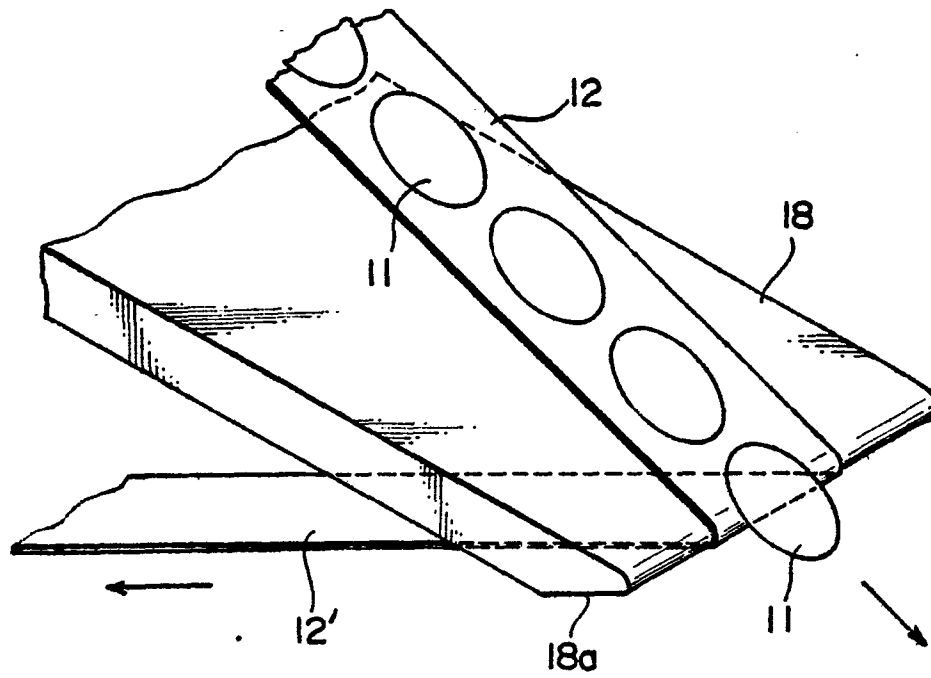
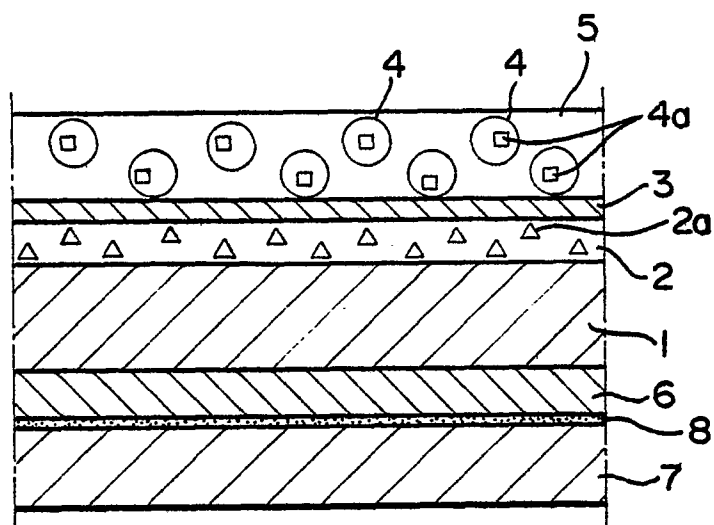


Fig. 4





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	FR-A-2 176 422 (TIMM)		B 65 C 9/18 B 65 C 9/00 G 09 F 3/02 G 09 F 3/10
A	EP-A-0 124 360 (KOGYO)		
A	EP-A-0 103 652 (WERNER)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 C G 09 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-08-1986	Examiner VROMMAN L.E.S.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	