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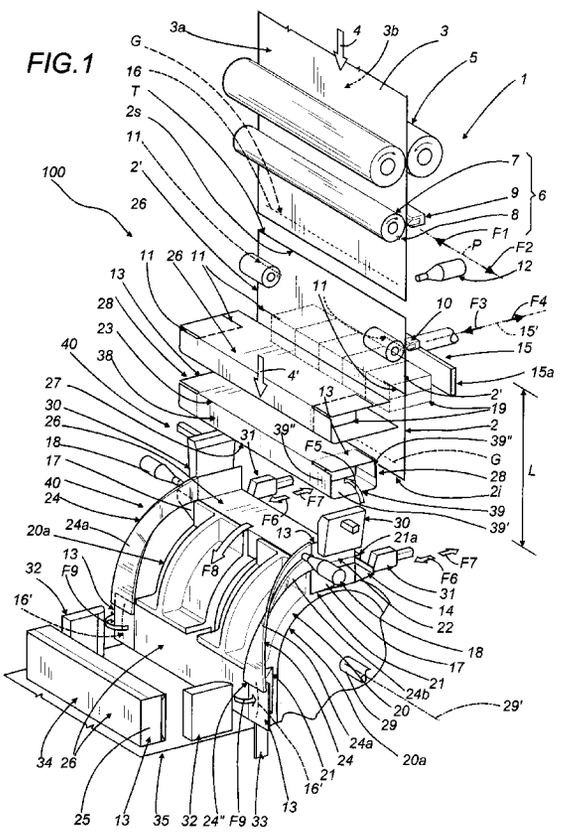
(54) A method and a device for wrapping groups of products, in particular packets of cigarettes

(57) To envelop a group (19) of products completely in a wrapper (23) of parallelepiped appearance with two end faces (25), a wrapping material (3) is decoiled and divided up cyclically along transverse cutting lines (T) to generate single sheets (2) each with transverse edges (2i, 2s) of which one receives a coating of gum (16) dispensed along a transverse line (G), parallel to the cutting line (T), by a first applicator (12); the sheet (2) is then passed around a relative group (19) of products, its two edges (2i, 2s) joining to form a tubular wrapper (23) with open ends (28) each consisting in a set of projecting folds (13, 39). The wrapper (23) and its contents are transferred toward a folding unit (40) where more gum (16') is applied to at least one of the two end folds (13, 39) by a second applicator (18), whereupon the folds (13, 39) are flattened to close up the end faces (25).

FIG.1



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Description

The present invention relates to a method for wrapping groups of products, in particular packets of cigarettes.

The present invention is applicable advantageously within the field of cigarette wrapping machines, to which reference is made explicitly in the following specification albeit with no limitation in general scope implied.

In machines of the type in question, a continuous strip of wrapping material is decoiled from a roll, then fed through a gumming station and a cutting station toward a wrapping station at which a group of products is formed into a pack.

The steps carried out on the continuous strip of material at the gumming station generally include one transverse gumming pass, made by applicators capable of movement in relation to the strip, and a series of longitudinal gumming passes made by fixed applicators from which adhesive is dispensed as the wrapping material decoils and advances.

The transverse gumming pass is positioned such that when the wrapping material is divided into single sheets, the edges of each sheet can be joined to fashion a wrapper of tubular appearance.

The longitudinal gumming passes are applied along lateral areas of the wrapping material in which transverse incisions will then be made so as to create flaps and end folds, these being flattened subsequently to close up the ends of the pack.

This is a process that presents certain drawbacks.

In the first place, the incisions are made after the gumming passes, so that the blades utilized for the purpose can pick up the adhesive deposited on the strip.

The blades in their turn, fouled by the adhesive, can then stick to the wrapping material and impede or even arrest its passage. Moreover, should there be a pause in the operation of the wrapping machine for whatever reason, such as an interruption in the flow of products, any material gummed but still not formed into wrappers must be discarded due to the fact that the adhesive will inevitably dry during a significant pause in the work cycle. Conversely, it is difficult to make the gumming passes after the wrapping material has been cut, and especially the longitudinal passes, due to the lack of available space in which to accommodate the applicators.

The object of the present invention is to provide a method of wrapping products such as will allow of eliminating the drawbacks described above.

The stated object is realized in a method according to the invention for wrapping groups of products, in particular packets of cigarettes, in completely enclosed wrappers of substantially parallelepiped shape each presenting first and second main faces, two flank faces and two end faces, characterized in that it comprises the steps of advancing a wrapping material along a predetermined feed line; cutting the wrapping material cyclically along a transverse cutting line in such a way that each cut produces a single sheet affording respective transverse edges; applying adhesive material to the wrapping material in such a way that the adhesive is distributed near to one of the two transverse edges of the sheet along a transverse line substantially parallel to the cutting line; wrapping each sheet around the relative group of products in such a manner that the two edges are joined to form a tubular wrapper of which the relative longitudinal open ends appear as respective folds projecting from the products; applying adhesive material to the inner face of at least one end fold, and flattening the end folds to cover the end faces and obtain a finished and fully enclosed wrapper.

The present invention also relates to a device for wrapping groups of products.

In accordance with the present invention, groups of products, in particular packets of cigarettes, are wrapped in fully enclosed wrappers of substantially parallelepiped shape each presenting a first and a second main face, two flank faces and two end faces by a device characterized in that it comprises a unit by which a wrapping material is advanced along a predetermined feed line, a first cutting unit designed to divide the wrapping material cyclically along a transverse cutting line into single sheets each affording respective transverse edges, a first applicator, located following the cutting unit in the feed direction, by which adhesive material is applied to the wrapping material along a transverse line in such a way that each sheet will be gummed near to one of the two transverse edges, a wrapping station disposed and embodied in such a way as will cause each sheet to envelop the relative group of products and form a tubular wrapper of which the opposite longitudinal open ends appear as respective end folds projecting beyond the products, also, a folding unit following the wrapping station in the feed direction, by which successive tubular wrappers are taken up cyclically and transferred between a receiving position and a release position, equipped with second applicators disposed and embodied in such a manner as to apply adhesive material to at least one of the folds afforded by each open end of the wrapper, and with folding means disposed and embodied in such a way as to flatten the end folds and thus close up the end faces.

The invention will now be described in detail, by way of example, with reference to the accompanying drawings, in which:

- fig 1 illustrates a preferred embodiment of a device for implementation of the method of wrapping groups of products in accordance with the present invention, seen schematically in perspective and with certain parts omitted for clarity;
- fig 2 illustrates a detail of fig 1, represented schematically and with certain parts omitted for clarity;
- fig 3 shows certain parts of fig 2 in an enlarged fragmentary view, illustrated in a first operating step and with other parts omitted for clarity;

- fig 4 illustrates the parts of fig 3 in a further operating step.

With reference to fig 1 of the drawings, 1 denotes a device for wrapping groups of products 19, in its entirety, associated with a portion of a wrapping machine 100 along which a wrapping material 3 is caused to advance, following a predetermined feed line 4. The wrapping material 3, which presents a front face 3a and a rear face 3b, is drawn along by a set of pinch rolls 5 and directed forward to a first cutting unit 6. In the example illustrated, the cutting unit 6 comprises a rotating cylinder 7 fitted with a blade 8 that interacts with a further fixed blade 9 offered to the rear face 3b of the wrapping material 3. The cutting unit 6 divides up the wrapping material 3 cyclically into sheets 2, severed along a cutting line denoted T, as a result of which each sheet exhibits respective transverse edges identifiable, considered in relation to the predetermined feed line 4, as a bottom edge 2i and a top edge 2s.

The single sheet 2 must be of a length L, measured along the feed line 4 between the top edge 2s and the bottom edge 2i, such as will enable it to pass entirely around a group 19 of products, consisting for example in packets of cigarettes, at a wrapping station 15 positioned following the aforementioned cutting unit 6 along the feed direction.

The device 1 comprises an applicator 12 located beyond the cutting unit 6 in the feed direction and capable of motion in a predetermined direction P substantially transverse to the feed line 4 followed by the wrapping material 3, describing a forward movement F1 and a return movement F2, which is designed to coat the rear face 3b of the wrapping material 3 with a layer of adhesive material 16 applied along a transverse gumming line G parallel to the cutting line T.

Following the applicator 12 along the feed direction are two second cutting units 10 by which lateral incisions 11 are made cyclically in each successive sheet 2, departing from the longitudinal side edges and substantially parallel with the cutting lines T.

The lateral incisions 11 combine in pairs to create cut transverse portions 2', referred to hereinafter as flaps 13, each of which unattached on three sides and with one side hingedly attached to the sheet 2.

At the wrapping station 15, successive groups 19 of products are directed forward by the action of a first push rod 15a which advances from an at-rest position along a predetermined feed line denoted 15' and in a direction denoted F3, each impinging in turn on a relative sheet 2 which is thus caused to fold around the products and assume a "U" profile. Once the push rod 15a has completed a stroke in the forward direction F3 and returned in the opposite direction F4 to regain its initial at-rest position, the top edge 2s and bottom edge 2i of the sheet 2 are joined together: more exactly, the edge coated on the inside with adhesive material 16, applied along the gumming line G, is offered in overlapping contact to the remaining edge in such a way as to create a wrapper 23 of tubular appearance exhibiting a first face 26, a second face 27 and two opposing flank faces 38; the two longitudinal ends 28 of the wrapper 23 remain open at this stage, projecting a given distance beyond the group 19 of enveloped packets. The means employed to bring about this step of the wrapping cycle are conventional in embodiment and not illustrated.

Following the wrapping steps described above, the tubular wrapper 23 is advanced along a predetermined feed line 4' parallel with and displaced forward in the aforementioned direction F3 from the original feed line 4 followed by the wrapping material 3, and transferred to a folding unit 40 located beyond the wrapping station 15 in the feed direction, by which the two open ends 28 of the wrapper 23 are closed up.

Each of the open ends 28 of the wrapper 23 appears as a continuous U-shaped end fold 39, also a flap 13 divided from this end fold 39 by the aforementioned lateral incisions 11 and afforded by the portion 2' produced in the sheet 2 by the cutting units 10. The end fold 39 comprises a central portion 39' extended from the second face 27 of the tubular wrapper 23, and two lateral portions 39" extending respectively from the two flank faces 38, whilst the flap 13 is extended from the first face 26 of the wrapper 23 and occupies substantially the same plane as the face in question.

As illustrated in figs 1 and 2, the folding unit 40 comprises a drum 20 keyed to a relative shaft 29 and affording a plurality of radial pockets 21 separated one from the next by an identical angular distance, each proportioned to accommodate one wrapper 23. The shaft 29 is designed to rotate intermittently about its axis 29', causing the drum 20 to rotate in the direction denoted F8 (anticlockwise, as viewed in the drawings) in such a way that the pockets 21 are indexed successively through two positions: first, a position at which the wrapper 23 is received from the wrapping station 15, and thereafter, a position at which the same wrapper 23 is released to a runout conveyor 35.

In the example of figs 1, 2 and 4, the drum 20 is embodied with four pockets 21 spaced apart at 90° one from the next, each fashioned with an opening 37 in the bottom face of which the dimensions are less than those of a corresponding face presented by the tubular wrapper 23.

When stationed to take up the wrapper 23 in the receiving position, the pocket 21 is disposed in vertical alignment, along the relative feed line 4', with a pair of first fixed folders denoted 30, lying between the wrapping station 15 and the pocket 21 and coinciding with the two opposite longitudinal ends 21a of the pocket.

As discernible from figs 1, 2 and 4, each of the two fixed folders 30 is positioned so as to engage one corresponding open end 28 of a wrapper 23 advancing along the feed line 4' and entering the respective pocket 21, in such a way that when the wrapper 23 is fully inserted into the pocket, the aforementioned central por-

tion 39' of each continuous end fold 39 will be bent in the direction of the arrow denoted F5 in fig 1 and flattened against the respective end face of the group 19 of products, and the relative flap 13 bent vertical and essentially perpendicular to the first face 26 of the wrapper 23, its inner face 22 directed toward and partly in contact with the fixed folder 30. In particular, the action of each fixed folder 30 on the central portion 39' of the relative end fold 39 results in the creation of two smaller lateral folds exhibiting a substantially trapezoid outline, identifiable as a trailing fold 14 and a leading fold 17 related to the direction of rotation F8 of the drum 20, and is designed also to maintain the flap 13 in the aforementioned position substantially perpendicular to the first face 26 of the wrapper 23, at least during the pause of the drum 20 at the receiving position.

Also forming part of the folding unit 40 is a pair of movable folders 31 located following the fixed folders 30 in the feed direction, one alongside each longitudinal end 21a of the pocket 21 occupying the receiving position, which are designed to flatten the trailing lateral folds 14 of each successive wrapper 23 during the pause in the movement of the drum 20. Departing from an at-rest position, the two movable folders 31 first make a forward stroke in the direction denoted F6, during which each trailing lateral fold 14 is engaged and bent over the central portion 39' of the end fold 39 flattened previously against the end face of the group 19 of products, then a return stroke in the direction denoted F7 to regain the at-rest position.

The folding unit 40 further comprises fixed helical folders 24 disposed adjacent to the two longitudinal end faces 20a of the drum 20, extending between the positions in which the wrapper 23 is received and released, respectively, through an angular distance substantially equivalent to one rotational step of the drum 20.

Geometrically, each fixed helical folder 24 appears as approximately one quarter part of a cylindrical tubular ring, which in turn is twisted along its own longitudinal axis through an angle of 90°.

In practice, the single folder 24 consists in a pair of helical elements 24a and 24b, respectively outer and inner, extending parallel one with another and associated in such a way as to afford a gap 24c that will accommodate a part of the wrapper during the operation of the device 1, and more exactly during the rotation of the drum 20, when the flap 13 of the corresponding end fold exhibited by each successive wrapper 23 is caused to slide along the gap 24c with its inner face 22 offered to the inner element 24b.

As discernible from fig 2, each helical folder 24 is associated with the drum 20 in such a way that one of its endmost edges 24' will lie in close proximity to one corresponding longitudinal end 21a of a first pocket 21 stationary at the receiving position, and the remaining endmost edge 24" in close proximity to one corresponding longitudinal end 21a of a second pocket 21 stationary at the release position; the position of the one edge 24' is substantially radial in relation to the drum 20, so that the flap 13 can be guided correctly into the gap 24c, whilst the remaining end 24" is disposed substantially parallel to the rotational axis 29' of the drum 20.

As illustrated to advantage in fig 3, the width h1 of the outer helical element 24a is greater than the width h2 of the parallel inner element 24b, in such a way that the flap 13, once located in the gap 24c, will project beyond the inner element 24b with a part of its inner face 22 exposed.

The folding unit 40 is equipped further with a pair of fixed applicators 18 positioned adjacent to the respective fixed folders 30, one alongside each end face the drum 20, and directed toward the respective outer helical folder elements 24a.

Beyond the helical folders 24 and coinciding with the position at which the wrapper 23 is released, the folding unit 40 comprises a pair of second fixed folders 33 by which the leading lateral folds 17 are engaged and flattened over the central portion 39' of the end fold.

Finally, the folding unit 40 comprises a pair of third fixed folders 32 positioned along the runout conveyor 35, substantially in alignment with the end faces of the drum 20 and positioned to flatten the two flaps 13 over the lateral folds 14 and 17.

More exactly, as illustrated in fig 2, the flaps 13 are flattened against the lateral folds 14 and 17 in the position at which the wrapper 23 is released, bending in the direction of the arrows denoted F9, when a second push rod 36 of conventional embodiment advances through the opening 37 in the pocket 21 of the drum 20 and distances the wrapper 23 from the pocket, causing it to advance along the conveyor 35 in the direction denoted F10.

With the two end faces 25 thus completely closed up, the wrapper, now denoted 34, can be transferred towards and taken up by further means conventional in embodiment and not illustrated.

In operation of the device 1, a continuous strip of wrapping material 3 is caused to advance along the predetermined feed line 4, which forms part of a machine 100 by which products such as packets of cigarettes are wrapped in groups 19, and divided up cyclically along transverse cutting lines T by the first cutting unit 6 to generate single sheets 2 each presenting a bottom edge 2i and a top edge 2s.

A layer of adhesive material 16 is spread by the movable applicator 12 onto the rear face 3b of the wrapping material 3, along a gumming line G disposed substantially parallel to the cutting line T and adjacent to the bottom edge 2i of the sheet 2.

To prepare the sheet 2 for formation into a wrapper such as will envelop a group 19 of products, lateral incisions 11 are made by the second cutting units 10 in the longitudinal edges of the sheet 2 at a point beyond the applicator 12, and the sheet 2 is brought into alignment with the products at the wrapping station 15 where the push rod 15a proceeds to direct the products along

the relative feed line 15' in the direction denoted F3 and thus against the sheet 2, which as a result folds into a U shape around the group 19 of products; the top and bottom edges 2s and 2i of the sheet are then overlapped, the bottom edge 2i over the top edge 2s, so as to fashion a tubular wrapper 23 with two open ends 28.

On completion of these initial steps, the tubular wrapper 23 assumes the shape illustrated in fig 1, presenting a first and a second face 26 and 27 and two flank faces 38. The two longitudinal ends 28, still open, each consist in a continuous U-shaped end fold 39 and a flap 13 compassed by the lateral incisions 11. The continuous end fold 39 in turn is composed of a central portion 39' and two lateral portions 39".

At this point the tubular wrapper 23 advances along a predetermined feed line 4' displaced along the aforementioned direction F3 from the original feed line 4, and is directed forcibly into a pocket 21 of the drum 20 waiting at the receiving position.

As illustrated in fig 1, and in fig 4, the central portions 39' of the end folds 39 are intercepted by the first fixed folders 30 as the wrapper 23 enters the respective pocket 21, bending in the direction denoted F5 toward the wrapper 23 and into contact with the end faces of the group 19 of products, and in the process generating the leading and trailing lateral folds 14 and 17. In the same movement, the flaps 13 are also intercepted and bent to a position substantially perpendicular to the first face 26 of the wrapper 23.

With the wrapper 23 now accommodated internally of the respective pocket 21, and the flap 13 maintained by the folders 30 in the position perpendicular to the first face 26, the trailing lateral folds 14 are flattened by the movable folders 31, as indicated in fig 2.

Next, the drum 20 begins turning in the direction of the arrow denoted F8, indexing one step equivalent to the angular distance between two pockets 21, and as a result constraining each flap 13 to locate in the relative gap 24c between the respective helical folder elements 24a and 24b.

As discernible from figs 1, 2 and 3, the flaps 13 are caused by the rotation of the drum 20 about its own axis 29 to slide along the relative gaps 24c, whereupon the wrapper 23 is brought into the release position and another empty pocket 21 (not indicated) occupies the receiving position in readiness to take up the next wrapper 23. As the drum 20 rotates, the two flaps 13 are gradually flattened, moving from the substantially perpendicular position to occupy the same plane substantially as the first face 26 of the wrapper 23 by the time that this is brought into the release position. At the same time, each flap 13 will pass across the relative fixed applicator 18, by which a layer of adhesive material is applied to the inner face 22 of the flap 13 as a dab 16' in the shape substantially of an arc to a circle.

As the drum 20 rotates approximately 90° about its own axis 29 to bring the group 19 of products and the relative wrapper 23 into the release position, the leading lateral folds 17 are intercepted and flattened by the second fixed folders 33; finally, the wrapper 23 is distanced from the pocket 21 by the push rod 36 (fig 2), passing thence onto the conveyor 35 and between the third fixed folders 32, by which the two flaps 13 are engaged, bent in the direction denoted F9 and thus flattened against the lateral folds 14 and 17 and central portion 39' of the corresponding end fold 39.

With the end faces 25 now closed up and the tubular wrapper 23 transformed into a finished wrapper 34, the process of wrapping the group 19 of products is completed.

Importantly, it will be appreciated that with the fixed applicators 18 positioned adjacent to the end faces of the drum 20, the space required along the feed line 4 followed by the wrapping material 3 is no more than in prior art solutions where the step of gumming the edges longitudinally is implemented along the feed line before the step of folding the wrapper 23.

Moreover, the gumming step in question takes place only at the moment when the flaps 13 are folded, so that a possible interruption of the wrapping cycle will not cause the adhesive material to dry if none has yet been deposited on the flaps 13.

Claims

1. A method for wrapping groups of products, typically packets of cigarettes, in completely enclosed wrappers (34) of substantially parallelepiped shape each presenting first and second main faces (26, 27), two flank faces (38) and two end faces (25),
characterized
in that it comprises the steps of:

- advancing a continuous wrapping material (3) along a predetermined feed line (4);
- cutting the wrapping material (3) cyclically along a transverse cutting line (T) in such a way that each cut produces a single sheet (2) affording respective transverse edges (2i, 2s);
- applying adhesive material (16) to the wrapping material (3) in such a way that the adhesive (16) is distributed near to one of the two transverse edges (2i, 2s) of the sheet (2) along a transverse line (G) substantially parallel to the cutting line (T);
- wrapping each sheet (2) around the corresponding group (19) of products in such a manner that the two edges (2i, 2s) are joined to form a tubular wrapper (23) of which the relative longitudinal open ends (28) appear as respective folds (13, 39) projecting from the products;
- applying adhesive material (16') to the inner face (22) of at least one end fold (13, 39), and flattening the end folds (13, 39) to close up the end faces (25) and obtain a finished and fully

enclosed wrapper (34).

2. A method as in claim 1, comprising the further steps, implemented after the steps of cutting the wrapping material (3) transversely into sheets (2) and applying the adhesive material (16), of making lateral incisions (11) in each sheet (2), departing from the lateral edges, extending substantially parallel to the cutting lines (T) and creating cut transverse portions (2'); folding each sheet (2) about the relative group (19) of products at a wrapping station (15) and joining the transverse edges (2i, 2s) to fashion the tubular wrapper (23), of which the two longitudinal open ends (28) appear as end folds (13, 39) consisting respectively in a flap (13) afforded by the cut transverse portion (2') and a continuous end fold (39) composed of a central portion (39') and two lateral portions (39"); folding the central portion (39') in such a way as to generate two lateral folds (14, 17) from the lateral portions (39") and flatten the central portion (39') substantially into contact with the end face of the group (19) of products; flattening the lateral folds (14, 17) over the central portion (39'); applying an adhesive material (16') to the inner face (22) of each flap (13); and flattening the flaps (13) over the outer faces of the relative central portion (39') and lateral folds (14, 17) to close up the tubular wrapper (23), thus completing the end faces (25) to obtain a finished and fully enclosed wrapper (34).

3. A method as in claim 2, comprising the further steps, implemented beyond the wrapping station (15) in the feed direction, of advancing the tubular wrapper (23) along a predetermined feed line (4') toward a folding unit (40) equipped with folding means (30, 31, 32, 33, 24) disposed and embodied in such a way as to flatten the end folds (39) and the flaps (13) to close up the end faces (25), and of applying adhesive material (16') to the inner face (22) of each flap (13) whilst the wrapper (23) is within the compass of the folding unit (40).

4. A method as in claim 3, wherein the folding unit (40) comprises a drum (20) affording a plurality of pockets (21) each proportioned to admit a single wrapper (23) accommodated with the relative end folds (39) and flaps (13) projecting from the longitudinal ends (21a) of the pocket (21), which is rotatable intermittently about its own axis in a predetermined direction (F8) in such a way as to transfer the pockets (21) successively through positions at which the wrappers (23) are first received and thereafter released; and wherein the step of closing up the end faces (25) comprises the subsidiary steps of bending the central portions (39') of the end folds (39) and the flaps (13) by means of first fixed folders (30) positioned to engage the central portions (39') and the flaps (13) as the wrapper (23) enters the pocket (21) and maintain each flap (13) in a position whereby the relative inner face (22) is offered to a respective applicator (18); applying the adhesive material (16') to the inner face (22) of each flap (13); transferring the pocket (21) with the relative wrapper (23) to the release position; pushing the wrapper (23) from the pocket (21) toward a runout conveyor (35) and against third fixed folders (32) by which each flap (13) is engaged and bent in such a way that the respective inner face (22) will be flattened against the outward facing surfaces of the relative central portion (39') and lateral folds (14, 17).

5. A method as in claim 4, wherein each flap (13) is made to bend at first into a position substantially perpendicular to the first face (26) of the wrapper (23), and the step of closing up the end faces (25) comprises the further subsidiary steps of bending each lateral fold (14) on the trailing side of the relative end fold, as considered in relation to the predetermined direction (F8) of rotation of the drum (20), through the agency of a relative movable folder (31) positioned in close proximity to each longitudinal end (21a) of the pocket (21) when stationary in the receiving position; bending each flap (13) through approximately 90° into a position substantially occupying the same plane as the first face (26) of the wrapper (23) and simultaneously applying the adhesive material (16') to the inner face (22) of the flap (13); bending each remaining lateral fold (17) through the agency of second fixed folders (33) by which the selfsame folds (17) are engaged as the wrapper (23) is brought into the release position by the rotation of the drum (20); and flattening the flaps (13) against the outward facing surfaces of the relative central portion (39') and lateral folds (14, 17).

6. A method as in claim 5, wherein the subsidiary step of bending the flaps (13) through 90° is effected by means of corresponding helical folders (24) associated with the drum (20), extending between the receiving position and the release position through a distance equal to the rotational step indexed by the drum, each of which consists in an outer folder element (24a) and an inner folder element (24b) affording a gap (24c) designed to accommodate the relative flap (13).

7. A device for wrapping groups of products, typically packets of cigarettes, in fully enclosed wrappers (34) of substantially parallelepiped shape each presenting a first and a second main face (26, 27), two flank faces (38) and two end faces (25),
characterized
in that it comprises:

- a unit (5) by which a wrapping material (3) is

advanced along a predetermined feed line (4);

- a first cutting unit (6) designed to divide the wrapping material (3) cyclically along a transverse cutting line (T) into single sheets (2) each affording respective transverse edges (2i, 2s);
- a first applicator (12), located following the cutting unit (6) in the feed direction (4), by which adhesive material (16) is applied to the wrapping material (3) along a transverse line (G) in such a way that each sheet (2) will be gummed near to one of the two transverse edges (2i, 2s);
- a wrapping station (15) disposed and embodied in such a way as will cause each successive sheet (2) to envelop the relative group (19) of products and form a tubular wrapper (23) of which the opposite longitudinal open ends (28) appear as respective end folds (13, 39) projecting beyond the products,
- a folding unit (40) following the wrapping station (15) in the feed direction, by which successive tubular wrappers (23) are taken up cyclically and transferred between a receiving position and a release position, equipped with second applicators (18) disposed and embodied in such a manner as to apply adhesive material (16') to at least one of the folds (13, 39) afforded by each open end (28) of the wrapper (23), and with folding means (30, 31, 32, 33, 24) disposed and embodied in such a way as to flatten the end folds (13, 39) and thus close up the end faces (25).

8. A device as in claim 7, further comprising two second cutting units (10) disposed and embodied in such a manner as to make lateral incisions (11) cyclically in the sheets (2), departing from the longitudinal side edges and substantially parallel with the cutting lines (T), which combine to create transverse portions (2') delineating the end folds (13, 39) afforded by the open ends (28) of the wrapper (23).

9. A device as in claim 7, of which the folding unit (40) comprises a drum (20) keyed to a respective shaft (29), affording a plurality of angularly equispaced radial pockets (21) each exhibiting respective open longitudinal ends (21a) and an opening (37) in the bottom face, inside which the wrapper (23) is accommodated with the relative end folds (13, 39) projecting beyond the longitudinal ends (21a), wherein the drum (20) is rotated by the shaft (29) about its axis (29') intermittently and in a predetermined direction (F8) in such a way as to index each pocket (21) in succession through the positions in which the wrapper (23) is received and released, the wrapper (23) is distanced from the pocket (21) at the release position through the agency of a push rod (36) passing through the bottom opening of the pocket (21) and directed toward a runout conveyor (35), the end folds (13, 39) consist in a flap (13), and a continuous end fold (39) composed of a central portion (39') and two lateral portions (39"), and the folding means (30, 31, 32, 33, 24) are associated with the drum (20).

10. A device as in claim 9, wherein folding means (30, 31, 32, 33, 24) comprise a pair of first fixed folders (30) located in close proximity to the two opposite longitudinal ends (21a) of the pocket (21) when stationary in the position at which the wrapper (23) is received, and designed during operation to engage the central portions (39') and the flaps (13) as the wrapper (23) enters the pocket (21), in such a manner that each central portion (39') is flattened against the respective end face of the group (19) of products, generating two further lateral folds (14, 17) of substantially trapezoid outline identifiable as a trailing fold (14) and a leading fold (17), relative to the direction of rotation (F8) of the drum (20); a pair of movable folders (31) disposed adjacent to the respective longitudinal ends (21a) of the pocket (21) when stationary at the position in which the wrapper (23) is received, designed to make a forward stroke in a first direction (F6), during which each trailing lateral fold (14) is engaged and flattened over the central portion (39') of the end fold (39), and a return stroke in a second direction (F7) to regain an at-rest position; also a pair of second fixed folders (33) positioned alongside the longitudinal ends (21a) of the single pocket (21) when in the position at which the wrapper (23) is released, and designed to engage the two leading lateral folds (17) as the drum (20) rotates through one step, and a pair of third fixed folders (32) positioned along the runout conveyor (35) in such a way as to engage the two flaps (13) during operation when the wrapper (23) is directed onto the conveyor (35).

11. A device as in claim 10, wherein each flap (13) is rotated by a corresponding first fixed folder (30) into a position substantially perpendicular to the first face (26) of the wrapper (23) and maintained in this same position, with the inner face (22) directed toward the respective second applicator (18), while the pocket (21) occupies the receiving position.

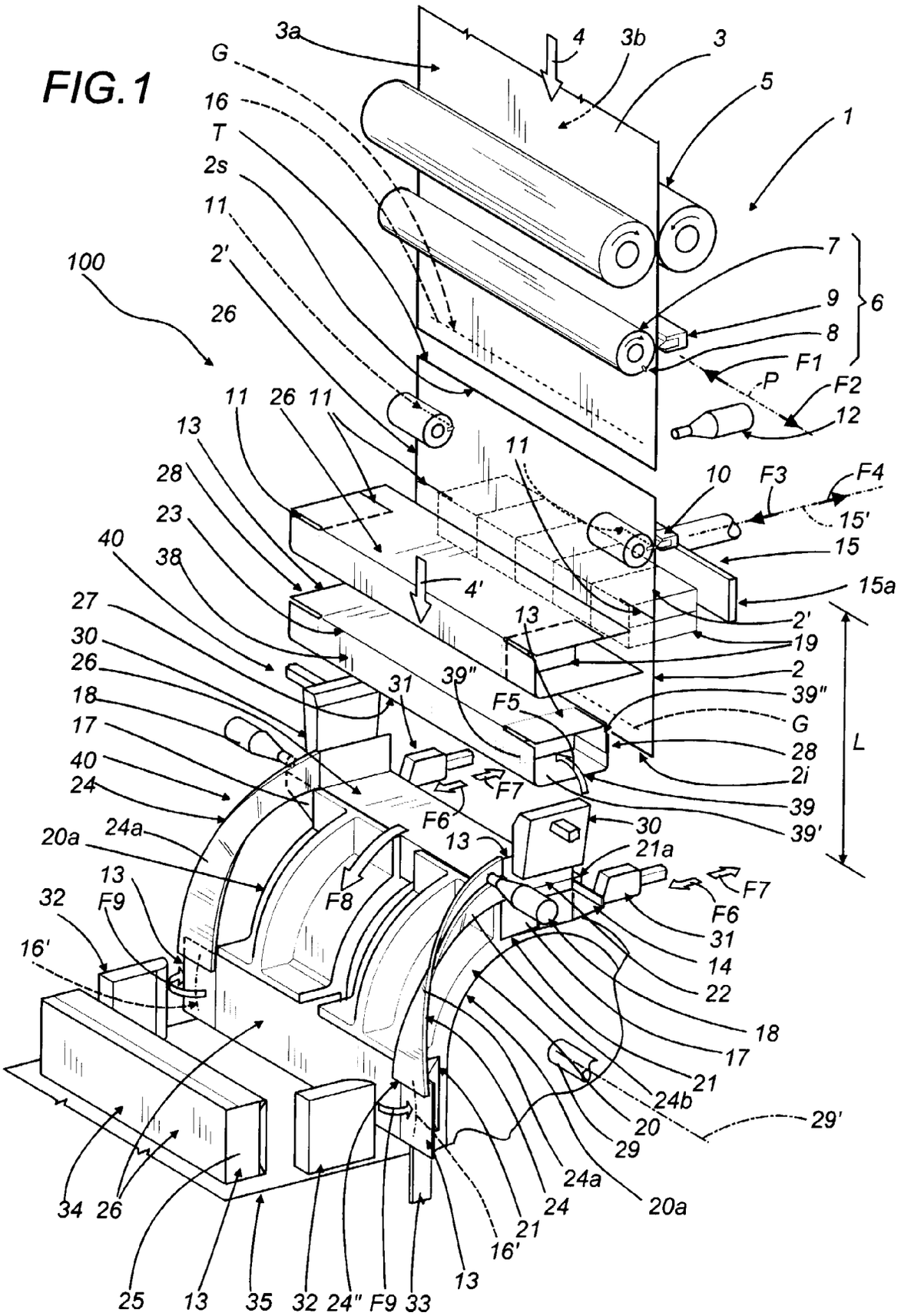
12. A device as in claim 11, wherein folding means (30, 31, 32, 33, 24) comprise fixed helical folders (24) located adjacent to the longitudinal end faces (20a) of the drum (20) and extending between the receiving position and the release position through a distance approximately equal to one rotational step of the drum (20), disposed and embodied in such a way as to bend the flaps (13) during the rotation of the drum (20) from their position substantially perpendicular to the first face (26) of the wrapper (23) to a position substantially in the same plane as the

selfsame first face (26).

13. A device as in claim 12, wherein the single helical folder (24) is identifiable geometrically as one quarter part approximately of a cylindrical tubular ring twisted along its longitudinal axis through an angle of approximately 90°, and consists in a pair of helical folder elements, one outer (24a) and one inner (24b), breasted together and affording an open gap (24c) along which the flap (13) advances during the rotational step of the drum (20).

14. A device as in claim 13, wherein the width (hl) of the outer helical element (24a), located nearer the wrapper (23), is greater than the width (h2) of the breasted inner element (24b), in such a way that the flap (13), once accommodated by the gap (24c), will project beyond the inner element (24b) with a part of its inner face (22) exposed to and thus gummable by the second applicator (18).

FIG.1


3a
4
3b
3
5
1
G
16
T
2s
11
2'
100
26
7
9
8
6
F1
P
F2
12
11
26
11
13
28
23
40
38
27
30
26
18
17
40
24
20a
24a
13
F9
32
16'
34
26
25
13
35
32
24"
F9
33
13
16'
21
24
24a
20a
29
20
24b
21
17
18
22
14
31
F6
F7
30
21a
13
F6
F8
F7
39'
39
2i
28
G
39"
2
19
2'
15a
15
15'
F4
F3
10
11
4'
13
39"
F5
31
L

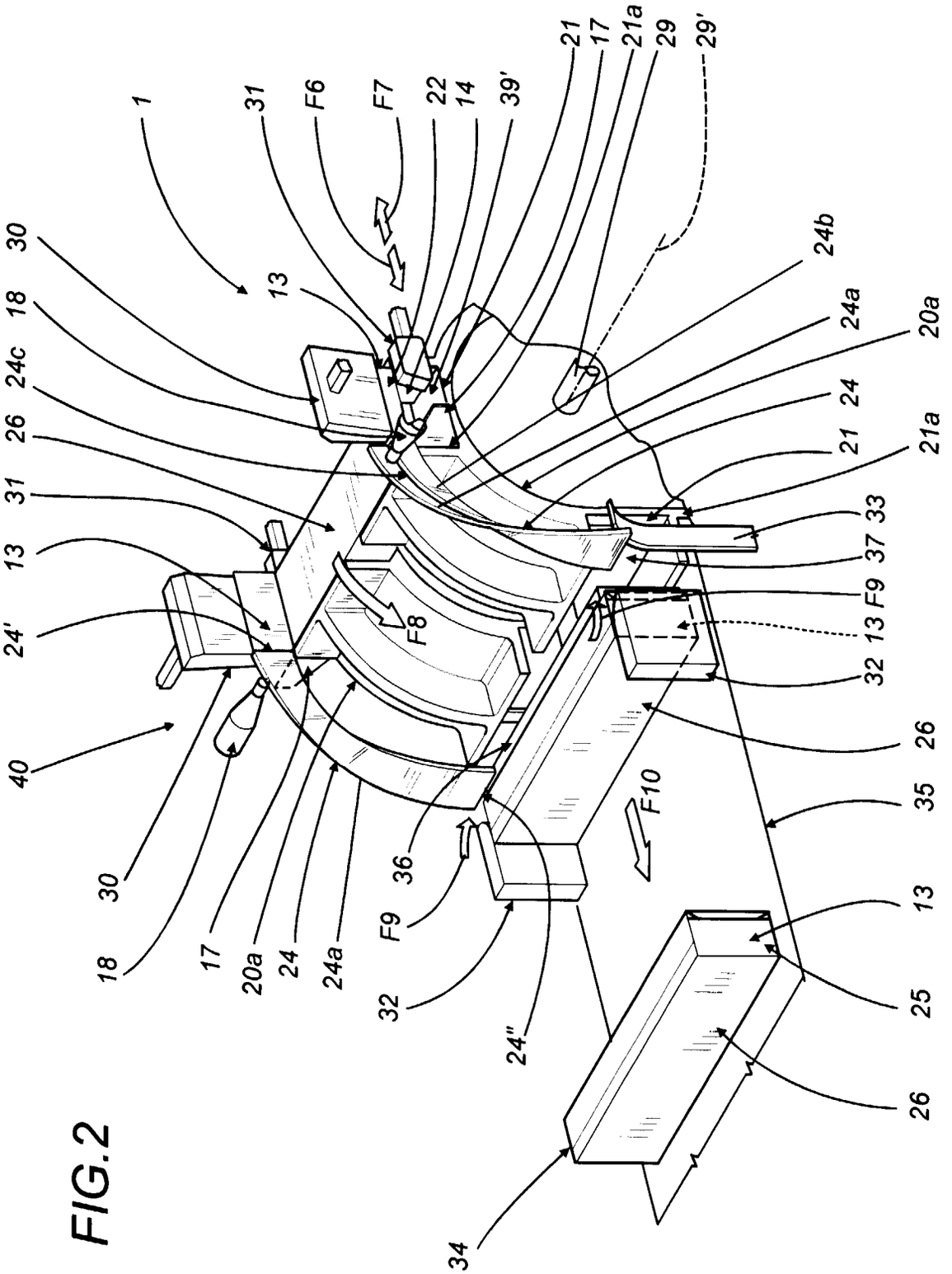

1
31
F6
F7
22
14
39'
21
17
21a
29
29'
30
13
18
24c
26
31
13
24'
40
30
18
17
20a
24
24a
F8
F9
36
32
24"
F10
34
24b
24a
20a
24
21
21a
33
37
F9
13
32
26
35
13
25
26

FIG.2

FIG.3

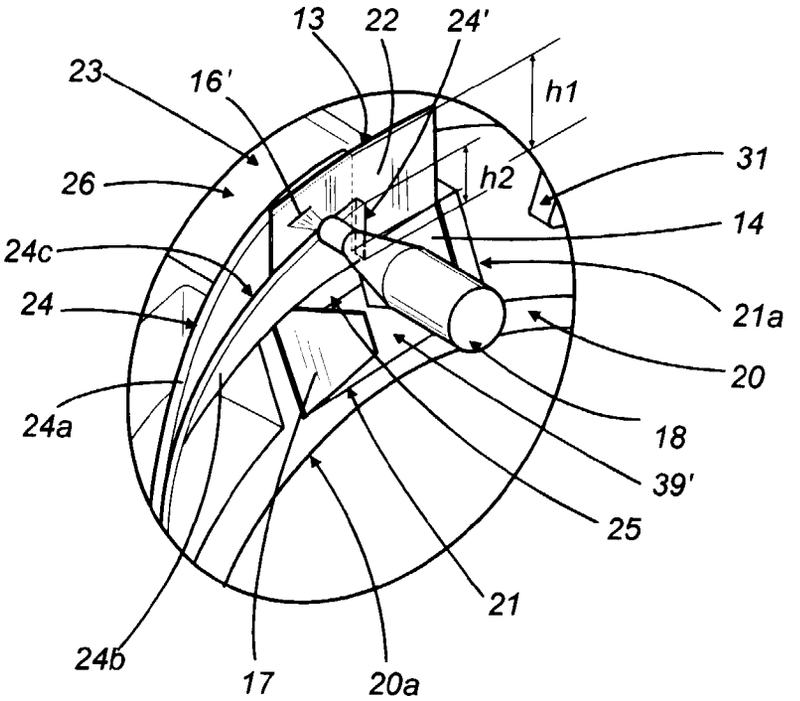
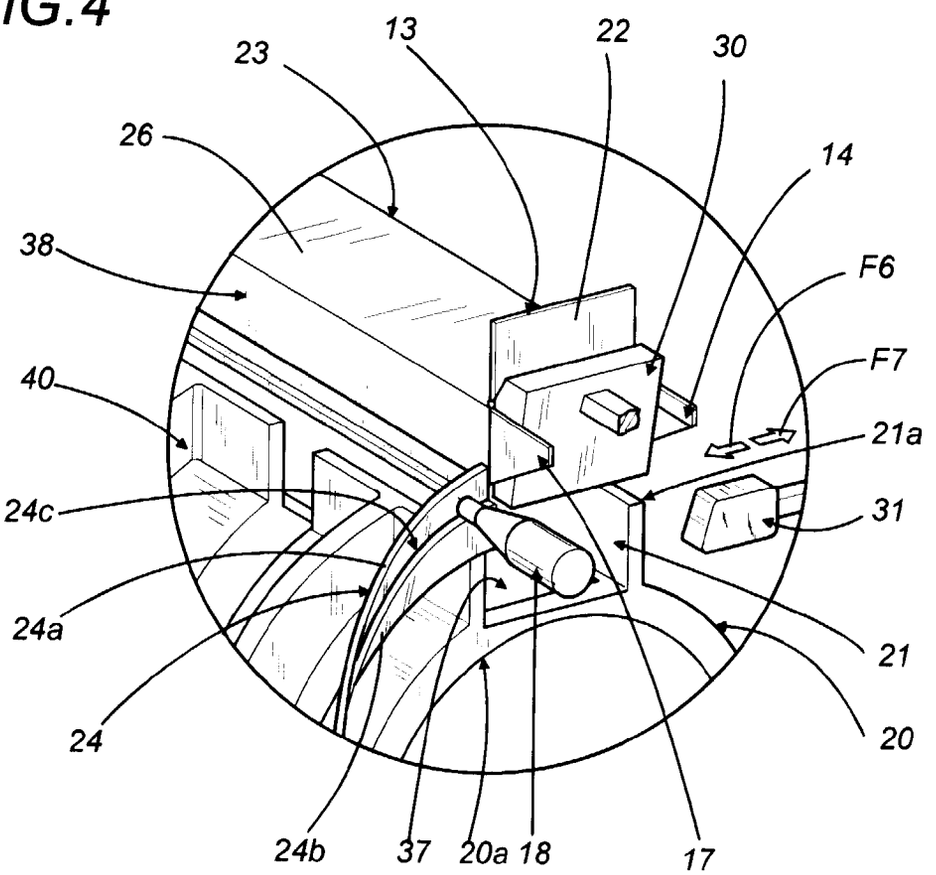

13
22
24'
23
16'
h1
31
26
h2
14
24c
21a
24
20
24a
18
39'
25
21
24b
17
20a

FIG.4


13
22
30
23
26
14
38
F6
F7
40
21a
24c
31
24a
21
20
24
24b
37
20a
18
17

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0052

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.6)
Y	GB 2 151 577 A (MOLINS) * the whole document *	1-3,7,8	B65B11/42
Y	DE 14 61 761 A (MAULINI) * page 18, paragraph 3; figures 11,12 *	1-3,7,8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 May 1998	Claeys, H

CATEGORY OF CITED DOCUMENTS

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