



(11) **EP 2 114 772 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
**15.09.2010 Bulletin 2010/37**

(51) Int Cl.:  
**B65B 11/42 (2006.01) B65B 25/14 (2006.01)**

(21) Application number: **08720229.7**

(86) International application number:  
**PCT/IT2008/000066**

(22) Date of filing: **04.02.2008**

(87) International publication number:  
**WO 2008/096386 (14.08.2008 Gazette 2008/33)**

(54) **MACHINE AND METHOD FOR PACKAGING GROUPS OF PRODUCTS WITH DUAL HEAT-SEALING SYSTEM**

MASCHINE UND VERFAHREN ZUR VERPACKUNG VON PRODUKTGRUPPEN MIT ZWEIFACHEM WÄRMEVERSIEGELUNGSSYSTEM

MACHINE ET PROCÉDÉ POUR EMBALLER DES GROUPES DE PRODUITS AVEC UN SYSTÈME DOUBLE ÉTANCHE À LA CHALEUR

(84) Designated Contracting States:  
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR  
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT  
RO SE SI SK TR**

(30) Priority: **07.02.2007 IT FI20070029**

(43) Date of publication of application:  
**11.11.2009 Bulletin 2009/46**

(73) Proprietor: **KPL Packaging S.p.A.  
40012 Calderara di Reno (BO) (IT)**

(72) Inventors:  
• **GUILIANI, Nicola  
40050 Castello di Serravalle (BO) (IT)**

• **MARTELLI, Roberto  
40050 Monte San Pietro (BO) (IT)**

(74) Representative: **Mannucci, Michele et al  
Ufficio Tecnico Ing.A. Mannucci S.r.l.  
Via della Scala 4  
50123 Firenze (IT)**

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**EP 2 114 772 B1**

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## Description

### Technical field

**[0001]** The present invention relates to improvements to packaging machines. More in particular, the present invention regards improvements to machines for packaging groups of products with heat-sealed thermoplastic sheets or films.

**[0002]** In particular, but not exclusively, the present invention relates to a packaging machine designed, for example, for packaging rolls of tissue paper or the like, such as toilet paper, paper wipes, etc.

### State of the art

**[0003]** In the packaging of paper products, for example rimes of sheets, rolls of toilet paper or paper wipes, and similar products, it is frequently envisaged to package a group of products within a sheet or film of heat-sealed thermoplastic material.

**[0004]** Described in EP-A-1227040 and in EP-A-1477404 are methods and machines for packaging rimes of paper or other groups of products in a packaging sheet that is wrapped around the group of products whilst this advances along a path of feed. In a first station, the group of products is wrapped on four sides thanks to the relative movement between the group itself and the packaging sheet. The dimension of the sheet in a direction transverse to the direction of feed of the group of products is greater than the width of the group itself, so that, at output from the wrapping station, the sheet projects from both sides of each group of products in a transverse direction with respect to the direction of feed. Provided downstream of the wrapping station is a folding station in which, with a system of folding bars, folding of two flaps is carried out on either side of the group of products along folding lines substantially transverse to the direction of feed. In a second folding station, folding of two further flaps is then carried out on each side of the group of products according to folding lines substantially parallel to the direction of feed of the packs. There is thus obtained at output from the second folding station a package wrapped by a sheet folded according to four flaps on each side face. When the package is to be closed by heat-sealing, the semi-finished product thus obtained passes between two heat-sealing assemblies set at the sides of the path of feed, which, with hot air or in some other known way, bring about joining by heat-sealing of the four flaps superimposed on one another of the packaging sheet on each side of the group of products.

**[0005]** In the production of packages of the type described above, there may arise the drawback of an insufficient heat-sealing of the superimposed flaps on each side of the group of products. This occurs above all, but not exclusively, in the case of packaging of rolls of tissue paper on account of the fact that; in the heat-sealing step, the products do not provide a uniform contrast. As a re-

sult, there are inadequately welded portions of film.

### Objects and summary of the invention

**[0006]** An object of the present invention is to provide a machine that will enable the drawbacks mentioned above to be overcome either totally or in part.

**[0007]** According to one particular embodiment, the object of the invention is to obtain a machine in which it is possible to achieve a more effective, uniform, and stable heat-sealing of the four superimposed flaps of the plastic film used for the packaging.

**[0008]** Basically, according to a first aspect, the invention envisages a device for packaging groups of products in a heat-sealable plastic film, comprising: a path for feed of the groups of products; and, in sequence along said path, folding members for folding in sequence four flaps of said plastic film projecting from said group of products in a direction transverse to the direction of feed of the group of products along said path of feed. Along the path of feed and on each side thereof, there develops a respective contrast element, which inserts itself between the group of products and at least one folded and superimposed pair of flaps. Furthermore, the contrast element co-operates with a sealing assembly that carries out mutual heat-sealing of said two superimposed flaps.

**[0009]** Further advantageous characteristics and possible embodiments of the invention are specified in the annexed dependent claims.

**[0010]** According to a further aspect, the object of the invention is to provide a method for packaging orderly groups of products within a heat-sealable film or sheet. According to the invention, a method is provided for packaging a group of products in a heat-sealable plastic film, wherein said group of products is wrapped in a portion of said plastic film, which projects laterally from said group of products, and wherein the projecting portions of plastic film are folded to form four folded flaps, superimposed on one another and heat-sealed on each of two opposed faces of the group of packaged products. The method according to the invention envisages interposition of a contrast element between two of said superimposed flaps, and a sealing assembly for carrying-out heat-sealing of said two superimposed flaps.

**[0011]** Further characteristics and possible embodiments of the invention are set forth in the annexed dependent claims.

### Brief description of the drawings

**[0012]** The invention will be better understood from the ensuing description and the attached drawings, in which practical non-limiting embodiments of the invention are shown. More in particular, in the drawings:

Figures 1A to 1 F show a sequence of the steps of folding of the sheet or film of plastic material around a package or group of ordered products, in the ex-

ample illustrated a group of rolls of tissue paper;  
 Figure 2 is a side view of a machine for carrying out the steps of folding illustrated in Figures 1A to 1F and corresponding steps of heat-sealing;  
 Figures 2A-2C is a sequence of operation of an enlarged detail of the machine of Figure 2;  
 Figure 3 is a schematic side view of the folding members of the first and second folding stations;  
 Figure 4 is a partial plan view of the folding members;  
 Figure 5 is an enlargement of the area of heat-sealing downstream of the two folding profiles of the second folding station;  
 Figure 6 is a schematic side view of a machine in a second embodiment; and  
 Figures 7A to 7G are the sequence of the steps of folding in the machine of Figure 6.

#### Detailed description of embodiments of the invention

**[0013]** Illustrated schematically in the sequence of Figures 1A to 1F are the steps of folding a thermoplastic film F or other sheet of suitable material for packaging a group G of products R (in the example, rolls of tissue paper). In the example illustrated, the rolls R are formed around tubular winding cores A that are in horizontal configuration and develop in a direction transverse to the direction of feed (arrow f) of the group G through the machine. It should be understood that the invention is not limited to the packaging of packs of rolls of paper, but rather the ideas underlying the invention can find application also in the packaging of other types of products, and also of rolls set differently, for example with the axis vertical, and possibly also of rolls without a central winding core. In general, the invention is aimed at devices for packaging articles having a wide range of shapes (cylindrical, prismatic, parallelepipedal, or others), in which the articles to be packaged, on account of their very shape or on account of their reduced external consistency, do not offer a sufficiently rigid or continuous contrast to the packaging members on the sides of the articles on which the packaging members act.

**[0014]** In Figure 1A, the group G of products R has been inserted within the sheet F that wraps the group G on three sides, projecting laterally with side portions or flaps F1 from the group G.

**[0015]** In the next step, the film F is folded under the group G of products R so that the group G itself is wrapped on four sides by the film F, which projects with side portions F1 from both side faces of the group of products G. The folding operations illustrated in Figures 1C-1F are then completed on both sides (side portions F1 in Figure 1B) of the group G. Illustrated in Figure 1C is the next step, in which first flaps L1 are folded about vertical folding lines P1 transverse to the direction of feed f of the group of products G through the machine along the path of feed. Illustrated in Figure 1D is the folding along folding lines P2 parallel to the lines P1 and transverse to the direction of feed f of second flaps L2.

**[0016]** In the subsequent step, the bottom flap L3 and the top flap L4 (see Figures 1E and 1F) are folded in sequence. Folding of the flaps L3 and L4 is executed along folding lines P3 and P4 parallel to the direction of feed f of the group of products along path of feed and substantially horizontal.

**[0017]** The above folding sequence is in itself known and is performed with a machine that will be described with reference to Figures 2 to 5. The flaps L1, L2, L3 and L4 are then heat-sealed to complete the package.

**[0018]** Illustrated schematically in Figure 2 is the machine that executes the steps of folding illustrated in Figures 1A to 1F. The machine comprises a wrapping station 1, in which wrapping of the group G of rolls R or other products previously ordered on a surface 3 of an elevator 5 is carried out on three sides (Figure 1A). According to one embodiment, with a movement in the direction indicated by the arrow f5 of the elevator 5 in a substantially vertical direction, the group of products G is pushed and inserted within the sheet of thermoplastic film F. Combs 7, 9, set at a suitable distance (substantially corresponding to the dimension in the longitudinal direction of feed of the group G of products along the packaging path), enable the group G of products R to be inserted within the film, bringing about wrapping of the front and rear surfaces of the group of products themselves. The combs 7, 9 can be mobile with a reciprocating motion (arrow f7) to transfer individual groups G of products from the elevator 5 to a conveyor belt or set of conveyor belts 11, 13 represented only schematically herein. For example, the comb 9 can lift up, leaving free transit for the groups G of products pushed by the comb 7 that moves in the direction indicated by the arrow f7. Or else, it may be envisaged that the combs 7, 9 pass through a pair of parallel belts that define the top conveyor 13. Or again, the top conveyor 13 can be shorter than the bottom conveyor belt 11 in such a way that the combs 7, 9 can accompany the group G of products, translating by one step towards the right (as viewed in the drawing) and then returning back after first being raised to be released from the products R.

**[0019]** Developing along the system of conveyors 11, 13, are the subsequent folding and heat-sealing stations that will now be described.

**[0020]** Provided in a first folding station 15 is a pair of front folders 17, represented schematically and in themselves known, having a movement of opening and closing that performs folding of the flaps L1 along the folding lines B1 (Figures 1B to 1D). Figure 2 shows, in the group G of products R set in the first folding station 15, the folded flap L1.

**[0021]** Set downstream of the front mobile folders 17 (which are located on either side of the path of feed of the group G of products R, as illustrated in Figure 4), on each side of the path of feed, are fixed folders 19. In once embodiment, the fixed folders 19 are represented by folding bars that develop longitudinally up to the heat-sealing station of the two outermost flaps of the package, which

will be described in what follows. The arrangement of the folders 17, 19 is symmetrical on the two sides of the path of feed of the groups G of products, as may be noted, in particular, in the plan view of Figure 4.

**[0022]** Illustrated in Figure 2 is a group G of products in the station 15 that has already advanced between the longitudinal fixed folding bars 19, which have carried out folding, along the vertical folding lines P2 of the side flaps L2.

**[0023]** Located downstream of the first folding station 15 is an intermediate station for transverse heat-sealing of the two end portions of the film F, designated by FA and FB. This intermediate station 21 has a bottom transverse heat-sealing bar designated as a whole by 23 and of a type in itself known. In one embodiment, the heat-sealing bar 23 is housed in a space obtained by deviating the path of the conveyor belt 11 over return rollers, as shown in Figure 2. To carry out heat-sealing of the edges FA, FB, these must be superimposed on one another, according to a modality that is in itself known and can be understood from the operating sequence of the part of machine illustrated in Figures 2A-2C. Illustrated in these figures is the initial part of the conveyor belt 11. The conveyor belt 11 is sent back over a pair of rollers 11A, 11 B, supported by a carriage 11C that can slide on a guide 11 D substantially parallel to the direction of feed f of the groups G of products R to be packaged. Fixed to the carriage 11C with respect to the axes of a pair of return rollers is an auxiliary belt 12. Provided between the belt 12 and the conveyor belt 11 is an empty space, in which the end FB of the sheet F can be inserted. Superposition of the flaps FA and FB on top of one another is obtained with a movement of the carriage 11C represented in the sequence of Figures 2A-2C.

**[0024]** The longitudinal folding bars 19 extend through and beyond the station 21 towards the second folding station, designated as a whole by 23.

**[0025]** The second folding station comprises second folding members on either side of the path of feed, which carry out, in sequence, folding upwards of the bottom flap L3 and folding downwards of the top flap L4 along the folding lines P3 and P4, as illustrated in the sequence of Figures 1E - 1F.

**[0026]** For greater clarity of the drawing, the folding members of the station 23 are not represented in Figure 2 and are illustrated separately in Figure 3. Basically, these second folding members comprise, on each side of the path of feed of the groups G of products, a first plate 25, which has a profile 27 inclined from the bottom upwards in the direction of feed f of the groups G of products R. The profile 27, which can be rectilinear or slightly curved, as in the figure, interferes gradually with the bottom flap L3 to lift it, folding it along the line P3.

**[0027]** Located at the top of the plate 25 and in a position staggered downstream thereof in the direction of feed of the groups G is a second plate 29. with a profile 31 inclined from the top downwards in the direction of feed f. The profile 31 starts in a position (downstream in

the direction f of feed) staggered with respect to the lowest point of start of the profile 27. It proceeds downwards as far as its bottom end and further downstream, developing on top of a second descending profile 27B of the plate 27.

**[0028]** With this arrangement, the profile 31 interferes with the flap L4, turning it over downwards, i.e., folding it along the folding line P4 and thus superimposing it on the flap L3 previously folded upwards by the profile 27. Downstream of the descending profile 31, then, the two flaps L3 and L4 are folded on top of one another, as illustrated in Figure 1F.

**[0029]** As may be noted in Figures 3 and 4, extending between each pair of plates 25, 29 and the path of the groups G of products R is the respective longitudinal folding bar 19 or a prolongation thereof. Then, on each side of the group of products G, in the area of the plate 29 and of the profile 31, the longitudinal folding bar 19 comes to be inserted between the flaps L3 and L4, folded along the longitudinal lines P3 and P4 and the rear flaps L1 and L2, which are folded by the bars 19 and by the folders 17 about the transverse folding lines P1 and P2.

**[0030]** In an advantageous embodiment, the longitudinal folding bars 19 extend up to the terminal edge 29B of the respective plates 29 and then also behind an opening or slit 29C made in each of the plates 29 in the final area thereof. Located in front of each opening 29C is a heat-sealing member 33, for example a heat-sealing pad, a sonotrode for carrying out ultrasound heat-sealing, or other suitable means.

**[0031]** Thanks to this arrangement, each heat-sealing member 33 works against the contrast formed by the respective longitudinal folding bar 19 with the flaps L3 and L4 of each group G of products R that travel in the folding station 23 set between the respective longitudinal folding bar 19 and the corresponding heat-sealing member 33. In this way, an effective mutual heat-sealing of the flaps L3 and L4 is obtained on each side of the group G of products.

**[0032]** Set downstream the folding station 23 is a further heat-sealing station 35 of a type in itself known and not shown (see, for example, WO-A-02/085712). In this further stations, heat-sealing over a wider surface is carried out between the four flaps L1, L2, L3, L4 of each side of the group G of products R, after the group G of products R has been slid out by the lateral folding bars 19.

**[0033]** In practice, then, each group G is packaged with a film F, which, on the two opposite faces on which the flaps L1-L4 are present; has undergone a dual process of heat-sealing, the first of which by means of the co-operation of the heat-sealing member 33 with a substantially rigid contrast (bar 19), which enables a heat-sealing to be obtained that is more effective than the one that is obtained traditionally with a single heat-sealing step carried out without other contrast than the one offered by the articles or products R themselves that are within the package in the packaging step.

**[0034]** A better, more uniform, and more complete

heat-sealing is thus obtained, and hence a more stable package that is likely to guarantee a better isolation of the product with respect to the outside environment.

**[0035]** Illustrated in Figure 5 is an enlargement of the slit or opening 29C of the plate 29 in a possible embodiment of the invention. In this embodiment, within the slit 29C, which has a development l in the direction of feed f of the group G of products R, there develops a band 39 made of suitable material, for example a plastic material with a low coefficient of friction, such as Teflon® or the like, or in any case a material with a low coefficient of friction and with high thermal conductivity. These characteristics enable heat-sealing to be carried out notwithstanding the interposition of the band 39, which has the purpose of preventing flapping of the folded flaps of the film F that pass in front of the slit 29C. The characteristics of the material of which the bands 39 are formed is such as not to jeopardize the effect of heat-sealing.

**[0036]** In a different embodiment, a slit 29C can be provided of smaller dimension in the direction of feed f of the groups of products to be packaged. In this case the presence of the band 39 might be superfluous. In particular, in this case, it is expedient to obtain heat-sealing of the flaps L3, L4 with a heat-sealing assembly 33 without stopping the group G of products R, but rather causing it to advance with a continuous motion in front of the opening or slit 29C, possibly with a reduced speed as compared to the speed with which it is fed through the other stations.

- In one embodiment, the heat-sealing member 33 can have a plane surface of contact and heating. In other embodiments, the heat-sealing member can comprise one or more rollers that can reduce the friction when there is a continuous contact between the heat-sealing assembly 33 and the group G of products R to be packaged.

**[0037]** In another embodiment, in particular by providing an opening 29C of length l equal to the longitudinal dimension of the heat-sealing that it is desired to obtain, the heat-sealing can be carried out with the group of products R stationary temporarily with the flaps L3, L4 set on top of one another arranged in a position corresponding to the slit 29C itself.

**[0038]** The invention can be implemented also in machines in which wrapping of the group G of products R is obtained with operations and members different from the ones described above. Figures 6 and 7A to 7F show a modified embodiment, in which the folding members are made in a way substantially according to what is described in EP-A-1227040 and that will hence not be described in particular detail herein. In brief, in the embodiment illustrated in Figure 6, the machine (once again represented schematically in side view) has a first conveyor 61 that conveys the groups C of products R (in this embodiment, rolls of tissue paper set in layers with the winding axes in a vertical position) inserting them within

a length or portion of heat-sealable film F that is pre-arranged in a substantially vertical configuration in a plane transverse to the direction of feed (once again designated by f) of the groups G of products R.

**[0039]** Downstream of the position in which the sheet or film F is located, there is provided a first folding station 63 and a second folding station 65. In the first folding station 63, each group G of products R is fed, for example with a pair of top and bottom conveyors 67, between a pair of folding members 69, set one on each side of the path of feed of the groups G of products R. The folders 69 carry out folding of the first flaps L1 about folding lines P1 substantially vertical and hence transverse with respect to the direction of feed of the groups G. The folders 69 are static.

**[0040]** Located downstream of the conveyors 67 and of the pair of folders 69 is a rotary drum 71 with a substantially horizontal axis of rotation B, transverse with respect to the direction of feed f of the groups G of products R. The drum 71 comprises a pair of sides joined by cross members 73 or in some other way and set between which are two conveyors 75, a top one and a bottom one. The purpose of the drum 71 is, as in itself known, to rotate the group G of packages R about the axis B so that the flaps L1 folded by the folders 69 that are in a more advanced position when the group G is inserted in the drum 71 come to be, at output from the drum itself, in a more retracted position. Provided downstream of the drum 71 are longitudinal folding bars 77 that are substantially equivalent, as regards arrangement and function, to the longitudinal folding bars 19 of the preceding embodiment. Provided within the drum 71 between the sides that form it are possible further means that prevent opening of the previously folded flaps L1.

**[0041]** By moving the group G of products R out of the drum 71 by means of the conveyors 75, the interference between the portions of film projecting laterally from the group G with the folding bars 77 causes folding of the flaps L2 about the folding lines P2. This sequence of wrapping and folding of the flaps L1 and L2 is shown in the diagram of Figures 7A to 7G.

**[0042]** The longitudinal folding bars 77 develop in the second folding station 65, where the plates 79 and 81 are located, which are substantially equivalent as regards shapes and functions to the plates 25 and 29 of the preceding embodiment. Designated by 83 and 85 are the folding profiles equivalent to the profiles 27 and 31.

**[0043]** The plate 81 has a terminal edge 81B and a slit or opening 81C directly upstream of this edge 81B. The opening 81C can be provided with a band 83 equivalent to the band 39 that develops through the opening 29C of the plate 29 of Figure 5. Each longitudinal folding bar 77 extends between the path of the group of products R and the respective plate 81 at least up to the opening 81C and preferably up to the edge 81B, so that a heat-sealing member or assembly, operating through the slit 81C, on the flaps L4 and L5 folded by the profiles 83 and 85, can carry out mutual heat-sealing between the edges

L3 and L4 co-operating with the contrast formed by the respective longitudinal folding bar 77, as already described in greater detail with reference to the example of embodiment of Figures 1 to 5.

[0044] It is understood that the drawings merely shows one example, provided purely by way of practical embodiment of the invention, given that the invention may vary in its forms and arrangement, without thereby departing from the scope of the idea underlying the invention itself. The possible presence of reference numbers in the attached claims has the purpose of facilitating reading of the claims with reference to the description and to the drawings, and in no way limits the sphere of protection represented by the claims.

## Claims

1. A device for packaging groups of products in a heat-sealable plastic film (F), comprising: a path of feed of the groups (G) of products (R); and, in sequence along said path, folding members (17, 19, 25, 29) for folding in sequence four flaps L1, L3, L4) of said plastic film (F) projecting from each side of said group of products in a direction transverse to the direction of feed of the group of products along said path of feed; **characterized in that:** along said path of feed and on each side thereof, a respective contrast element (19) develops, which inserts itself between the group of products and at least one pair of folded and superimposed flaps (L3, L4), and the respective folding members (25, 29) folding said flaps; and said contrast element co-operates with a sealing assembly (33) that carries out mutual heat-sealing of said two superimposed flaps acting against said contrast element.
2. The device according to Claim 1, **characterized in that**, set in sequence on each side of said path of feed, are first folding members for folding a first pair of flaps and second folding members for folding a second pair of flaps superimposed on one another and on top of said first pair of flaps, and **in that** said contrast element extends from said first folding members to said second folding member, in a position such that the flaps folded by said first folding members come to be inside said contrast element and the flaps folded by said second folding members come to be outside said contrast element.
3. The device according to Claim 2, **characterized in that** said contrast element forms the prolongation of the first folding members.
4. The device according to Claim 1, 2 or 3, **characterized by** including:
  - > a wrapping station (1), for wrapping a group
- (G) of products (R) in a sheet of heat-sealable film (F) leaving portions of film projecting from opposite side faces of the group (G) of products;
  - > downstream of said wrapping station (1), a path of feed (11, 13);
  - > along said path of feed, a first folding station (15) comprising, on each side of the path of feed, first folding members (17, 19) for folding a first pair of flaps (L1, L2) of each of said portions of film (F) about respective folding lines (P1, P2) substantially transverse to the direction of feed of the group of products, said first folding members (17, 19) comprising, for each side of the path of feed, at least one longitudinal folding bar; and
  - > along said path of feed, a second folding station (23) comprising, on each side of the path of feed, second folding members (25, 29), for folding according to folding lines (P3, P4) substantially parallel to the direction of feed and superimposing upon one another a second pair of flaps (L3, L4) of each of said portions of film; and wherein extending on each side of said path of feed, between the first (15) and second folding stations (23), is a respective contrast element (19); set between the respective second folding members (25, 29) and the path of feed of the group of products, said contrast element extending as far as in front of said heat-sealing assembly (33).
5. The device according to one or more of the preceding claims, **characterized in that** said contrast element comprises a portion of the respective longitudinal folding bar, which develops between the second folding members and the path of feed of the group of products.
6. The device according to one or more of the preceding claims, **characterized in that** said second folding members comprise, for each side of the path of feed, a first folding profile and a second folding profile, set in sequence in the direction of feed of the groups of products, for folding the flaps of each of said second pairs of flaps on top of one another.
7. The device according to Claim 6, **characterized in that** each of said contrast elements extends beyond the respective second folding profile, located downstream of which is said sealing assembly.
8. The device according to Claim 6 or 7, **characterized in that** said first and second folding profiles and said longitudinal folding bars are fixed.
9. The device according to one or more of Claims 6 to 8, **characterized in that** each of said second folding profiles has a slit, positioned behind which is said

contrast element and acting through which is the respective sealing assembly.

10. The device according to Claim 9, **characterized in that** each longitudinal folding bar extends behind the respective slit of the corresponding second folding profile. 5
11. The device according to Claim 9 or 10, **characterized in that** set in said slit is a retention member for withholding the flaps of said second pair of flaps. 10
12. The device according to Claim 11, **characterized in that** said retention member comprises a retention band with high thermal conduction. 15
13. The device according to Claim 11 or 12, **characterized in that** said retention member comprises a belt extending parallel to the direction of feed of the group of products along said path of feed. 20
14. The device according to Claim 11, 12, or 13, **characterized in that** said sealing assembly acts on the plastic film through said retention member. 25
15. The device according to one or more of the preceding claims, **characterized in that**, set downstream of said sealing assembly, is a further heat-sealing station, for welding together the four folded flaps on each side of the group of packaged products. 30
16. A method for packaging a group of products in a heat-sealable plastic film, wherein said group of products is wrapped in a sheet of said plastic film that projects laterally from said group of products and in which the projecting portions of plastic film are folded to form four folded flaps, superimposed on one another and heat-sealed on each of two opposed faces of the group of packaged products; **characterized by** interposing a contrast element between two of said superimposed flaps and arranging a sealing assembly for carrying out heat-sealing of said two superimposed flaps, said sealing assembly working against said contrast element with the superimposed flaps arranged between the sealing assembly and the contrast element. 35 40
17. The method according to Claim 16, **characterized by** the steps of: 45 50

- > wrapping a sheet of heat-sealable plastic film around a group of products, leaving portions of film projecting laterally on two sides of said group of products;
- > feeding the group of products wrapped in said length of plastic film along a path of feed;
- > folding a first pair of flaps of each portion of film on each side of the group of products along

folding lines substantially transverse to the direction of feed of the group of products along said path of feed, with at least one respective longitudinal folding bar;

- > on each side of the group of products, folding along folding lines substantially parallel to the direction of feed of the group of products and superimposing upon one another a second pair of flaps of each of said portions of film; and
- > on each side of the group of products, welding the flaps of said second pair together using said sealing assembly co-operating with said contrast element, set behind said second pair of flaps.

18. The method according to Claim 17, **characterized in that** the respective longitudinal folding bar extends at least up to said sealing assembly and forms said contrast element.
19. The method according to Claim 17 or 18, **characterized in that** the flaps of the first and second pairs on each side of the group of products are further heat-sealed to one another downstream of the step of mutual heat-sealing of the flaps of the second pair.
20. The method according to Claim 17, 18, or 19, **characterized in that** said second pair of flaps is folded, translating the group of products alongside a first folding profile and a second folding profile on each side of the path of feed, said contrast element extending between said path of feed and the respective second folding profile.
21. The method according to Claim 20, **characterized in that** said first and second folding profiles are set in sequence and **in that** said flaps of the second pair are heat-sealed together by means of the sealing assembly set downstream of the second folding profile.

#### Patentansprüche

1. Eine Vorrichtung zum Verpacken von Gruppen von Produkten in einer Heißsiegelfolie (F) aus Kunststoff, umfassend: einen Zufuhrpfad der Gruppen (G) von Produkten (R); und, sequentiell entlang besagten Pfades, Faltelemente (17, 19, 25, 29) zum sequentiellen Falten von vier von jeder Seite besagter Gruppe von Produkten in einer Richtung quer zu der Zufuhrrichtung der Gruppe von Produkten entlang besagten Zufuhrpfades herausragenden Laschen (L1, L2, L3, L4) besagter Kunststoffolie (F), **dadurch gekennzeichnet dass:** sich entlang besagten Zufuhrpfades und auf jeder Seite desselben ein jeweiliges Kontrastelement (19) herausbildet, das sich zwischen die Gruppe von Produkten und min-

destens ein Paar von gefalteten und überlagerten Laschen (L3, L4) und die jeweiligen besagte Laschen faltenden Faltelemente (25, 29) einfügt; und besagtes Kontrastelement mit einer Versiegelungsanordnung (33) zusammenwirkt, die gegen besagtes Kontrastelement wirkend eine wechselseitige Heißversiegelung besagter zwei überlagerter Laschen durchführt.

2. Die Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** erste Faltelemente zum Falten eines ersten Paares von Laschen und zweite Faltelemente zum Falten eines zweiten Paares von Laschen, die aufeinander und auf besagtem ersten Paar von Laschen überlagert sind, auf jeder Seite besagten Zufuhrpfades sequentiell gesetzt sind, und dass sich besagtes Kontrastelement von besagten ersten Faltelementen zu besagten zweiten Faltelementen erstreckt, in einer solchen Position, dass die von besagten ersten Faltelementen gefalteten Laschen innerhalb besagten Kontrastelementes zu liegen kommen und die von besagten zweiten Faltelementen gefalteten Laschen außerhalb besagten Kontrastelementes zu liegen kommen.

3. Die Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** besagtes Kontrastelement die Verlängerung der ersten Faltelemente bildet.

4. Die Vorrichtung gemäß Anspruch 1, 2 oder 3, **dadurch gekennzeichnet, dass** sie Folgendes beinhaltet:

- > eine Wickelstation (1) zum Wickeln einer Gruppe (G) von Produkten (R) in einen Bogen aus Heißsiegelfolie (F), wobei Folienteile von gegenüberliegenden Seitenflächen der Gruppe (G) von Produkten herausragend belassen werden;
- > besagter Wickelstation (1) nachgelagert, einen Zufuhrpfad (11, 13);
- > entlang besagten Zufuhrpfades, eine erste Faltstation (15), die auf jeder Seite des Zufuhrpfades erste Faltelemente (17, 19) zum Falten eines ersten Paares von Laschen (L1, L2) jedes besagter Folienteile (F) entlang jeweiliger Faltlinien (P1, P2) im Wesentlichen quer zu der Zufuhrrichtung der Gruppe von Produkten umfasst, wobei besagte erste Faltelemente (17, 19) für jede Seite des Zufuhrpfades mindestens ein Längsfaltschiene umfassen; und
- > entlang besagten Zufuhrpfades, eine zweite Faltstation (23), die auf jeder Seite des Zufuhrpfades zweite Faltelemente (25, 29) zum Falten gemäß im Wesentlichen zu der Zufuhrrichtung parallelen Faltlinien (P3, P4) und aufeinander Überlagern eines zweiten Paares von Laschen (L3, L4) jedes besagter Folienteil umfasst;

und wobei sich auf jeder Seite besagten Zufuhrpfades zwischen den ersten (15) und zweiten Faltstationen (23) ein jeweiliges zwischen die jeweiligen zweiten Faltelemente (25, 29) und den Zufuhrpfad der Gruppe von Produkten gesetztes Kontrastelement (19) erstreckt, wobei sich besagtes Kontrastelement bis vor besagte Heißversiegelungsanordnung (33) erstreckt.

5. Die Vorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** besagtes Kontrastelement einen Teil der jeweiligen Längsfaltschiene umfasst, der sich zwischen den zweiten Faltelementen und dem Zufuhrpfad der Gruppe von Produkten herausbildet.

6. Die Vorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** besagte zweite Faltelemente für jede Seite des Zufuhrpfades ein erstes Faltprofil und ein zweites Faltprofil, die sequentiell in der Zufuhrrichtung der Gruppen von Produkten gesetzt sind, zum Übereinanderfalten der Laschen jedes besagter zweiter Paare von Laschen umfassen.

7. Die Vorrichtung gemäß Anspruch 6, **dadurch gekennzeichnet, dass** sich jedes besagter Kontrastelemente über das jeweilige zweite Faltprofil hinaus erstreckt, dem besagte Heißversiegelungsanordnung nachgelagert ist

8. Die Vorrichtung gemäß Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** besagte erste und zweite Faltprofile und besagte Längsfaltschienen fixiert sind.

9. Die Vorrichtung gemäß einem oder mehreren der Ansprüche 6 bis 8, **dadurch gekennzeichnet, dass** jedes besagter zweiter Faltprofile einen Schlitz aufweist, hinter dem besagtes Kontrastelement positioniert ist und durch den die jeweilige Versiegelungsanordnung wirkt.

10. Die Vorrichtung gemäß Anspruch 9, **dadurch gekennzeichnet, dass** sich jede Längsfaltschiene hinter dem jeweiligen Schlitz des entsprechenden zweiten Faltprofils erstreckt.

11. Die Vorrichtung gemäß Anspruch 9 oder 10, **dadurch gekennzeichnet, dass** in besagtem Schlitz ein Rückhalteelement zum Zurückhalten der Laschen besagten zweiten Paares von Laschen eingesetzt ist.

12. Die Vorrichtung gemäß Anspruch 11, **dadurch gekennzeichnet, dass** besagtes Rückhalteelement ein Rückhalteband mit hoher Wärmeleitung umfasst.



13. Die Vorrichtung gemäß Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** besagtes Rückhalteelement einen sich parallel zu der Zufuhrriechung der Gruppe von Produkten entlang besagten Zufuhrpfades erstreckenden Gürtel umfasst. 5
14. Die Vorrichtung gemäß Anspruch 11, 12 oder 13, **dadurch gekennzeichnet, dass** besagte Versiegelungsanordnung durch besagtes Rückhalteelement auf die Kunststoffolie einwirkt. 10
15. Die Vorrichtung gemäß einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** eine weitere Heißversiegelungsstation zum Zusammenschweißen der vier gefalteten Laschen auf jeder Seite der Gruppe verpackter Produkte besagter Versiegelungsanordnung nachgelagert ist. 15
16. Ein Verfahren zum Verpacken einer Gruppe von Produkten in einer Heißsiegelfolie aus Kunststoff, wobei besagte Gruppe von Produkten in einen Bogen besagter Kunststoffolie gewickelt wird, der seitlich von besagter Gruppe von Produkten herausragt und in dem die herausragenden Kunststofffolienteile gefaltet werden, um vier gefaltete Laschen zu bilden, die aufeinander überlagert und auf jeder von zwei gegenüberliegenden Flächen der Gruppe verpackter Produkte heißversiegelt sind; **gekennzeichnet durch** Einfügen eines Kontrastelementes zwischen 20  
zwei besagter überlagerter Laschen und Anordnen einer Versiegelungsanordnung zum Durchführen von Heißversiegelung besagter zwei überlagerter Laschen, wobei besagte Versiegelungsanordnung mit den zwischen der Versiegelungsanordnung und dem Kontrastelement angeordneten überlagerten Laschen gegen besagtes Kontrastelement wirkt. 25  
30
17. Das Verfahren gemäß Anspruch 16, **gekennzeichnet durch** folgende Schritte: 35  
40  
  - > Wickeln eines Bogens von Heißsiegelfolie aus Kunststoff um eine Gruppe von Produkten, wobei Folienteile seitlich auf zwei Seiten besagter Gruppe von Produkten herausragend belassen werden;
  - > Zuführen der in besagter Länge von Kunststoffolie verpackten Gruppe von Produkten entlang eines Zufuhrpfades; 50
  - > Falten eines ersten Paares von Laschen jedes Folienteils auf jeder Seite der Gruppe von Produkten entlang Faltlinien, die im Wesentlichen quer zu der Zufuhrriechung der Gruppe von Produkten entlang besagtem Zufuhrpfad verlaufen, mit mindestens einer jeweiligen Längsfaltschiene; 55
  - > auf jeder Seite der Gruppe von Produkten, Falten entlang Faltlinien, die im Wesentlichen parallel zu der Zufuhrriechung der Gruppe von Produkten verlaufen, und aufeinander Überlagern eines zweiten Paares von Laschen jedes besagter Folienteile; und
  - > auf jeder Seite der Gruppe von Produkten, Zusammenschweißen der Laschen besagten zweiten Paares unter Verwendung besagter Versiegelungsanordnung, die mit besagtem hinter besagtes zweites Paar von Laschen gesetztem Kontrastelement zusammenwirkt.
18. Das Verfahren gemäß Anspruch 17, **dadurch gekennzeichnet, dass** sich die jeweilige Längsfaltschiene mindestens bis zu besagter Versiegelungsanordnung erstreckt und besagtes Kontrastelement bildet.
19. Das Verfahren gemäß Anspruch 17 oder 18, **dadurch gekennzeichnet, dass** die Laschen der ersten und zweiten Paare auf jeder Seite der Gruppe von Produkten ferner dem Schritt wechselseitigen Heißversiegelns der Laschen des zweiten Paares nachgelagert miteinander heißversiegelt werden.
20. Das Verfahren gemäß Anspruch 17, 18 oder 19, **dadurch gekennzeichnet, dass** besagtes zweites Paar von Laschen gefaltet wird, wobei die Gruppe von Produkten entlang eines ersten Faltprofils und eines zweiten Faltprofils auf jeder Seite des Zufuhrpfades verschoben wird, wobei sich besagtes Kontrastelement zwischen besagtem Zufuhrpfad und dem jeweiligen zweiten Faltprofil erstreckt.
21. Das Verfahren gemäß Anspruch 20, **dadurch gekennzeichnet, dass** besagte erste und zweite Faltprofile sequentiell gesetzt sind und dass besagte Laschen des zweiten Paares unter Verwendung der dem zweiten Faltprofil nachgelagerten Versiegelungsanordnung zusammen heißversiegelt werden.

## Revendications

1. Dispositif pour emballer des groupes de produits, dans un film plastique thermosoudable (F), comprenant :
- une trajectoire d'alimentation des groupes (G) de produits (R) ; et en séquence le long de ladite trajectoire, des éléments de pliage (17, 19, 25, 29) pour plier en séquence quatre rabats (L1, L2, L3, L4) dudit film plastique (F) faisant saillie de chaque côté dudit groupe de produits dans une direction transversale par rapport à la direction d'alimentation du groupe de produits le long de ladite trajectoire d'alimentation ; **caractérisé en ce que** : le long de ladite trajectoire d'alimen-

- tation et sur chacun de ses cotés, un élément de contraste (19) respectif qui se développe, s'insère de lui-même entre le groupe de produits et au moins une paire de rabats (L3, L4) pliés et superposés et les éléments de pliage (25, 29) respectifs pliant lesdits rabats ; et ledit élément de contraste coopère avec un ensemble de soudage (33) qui réalise le thermosoudage mutuel desdits deux rabats superposés agissant contre ledit élément de contraste.
2. Dispositif selon la revendication 1, **caractérisé en ce que**, placés en séquence de chaque côté de ladite trajectoire d'alimentation, on trouve des premiers éléments de pliage pour plier une première paire de rabats et des deuxième éléments de pliage pour plier une deuxième paire de rabats superposés l'une sur l'autre et sur la partie supérieure de ladite première paire de rabats, et **en ce que** ledit élément de contraste s'étend à partir desdits premiers éléments de pliage jusqu'auxdits deuxième éléments de pliage, dans une position de sorte que les rabats pliés par lesdits premiers éléments de pliage viennent à l'intérieur dudit élément de contraste et les rabats pliés par lesdits deuxième éléments de pliage viennent à l'intérieur dudit élément de contraste.
3. Dispositif selon la revendication 2, **caractérisé en ce que** ledit élément de contraste forme le prolongement des premiers éléments de pliage.
4. Dispositif selon la revendication 1, 2 ou 3, **caractérisé en ce qu'il comprend** :
- une station d'emballage (1), pour emballer un groupe (G) de produits (R) dans une feuille de film thermosoudable (F) en laissant des parties du film faire saillie à partir de faces latérales opposées du groupe (G) de produits ;  
 en aval de ladite station d'emballage (1), une trajectoire d'alimentation (11, 13) ;  
 le long de ladite trajectoire d'alimentation, une première station de pliage (15) comprenant, de chaque côté de la trajectoire d'alimentation, des premiers éléments de pliage (17, 18) pour plier une première paire de rabats (L4, L2) de chacune desdites parties de film (F) autour de lignes de pliage (P1, P2) respectives sensiblement de manière transversale par rapport à la direction de l'alimentation du groupe de produits, lesdits premiers éléments de pliage (17, 19) comprenant, pour chaque côté de la trajectoire d'alimentation, au moins une barre de pliage longitudinale ; et  
 le long de ladite trajectoire d'alimentation, une deuxième station de pliage (23) comprenant, de chaque côté de la trajectoire d'alimentation, des deuxième éléments de pliage (25, 29), pour plier selon les lignes de pliage (P3, P4) sensiblement parallèles à la direction d'alimentation et superposés l'un sur l'autre, une deuxième paire de rabats (L3, L4) de chacune desdites parties de film ;  
 et dans lequel s'étendant de chaque côté de ladite trajectoire d'alimentation, entre les première (15) et deuxième stations de pliage (23), on trouve un élément de contraste (19) respectif, placé entre les deuxième éléments de pliage (25, 29) respectifs et la trajectoire d'alimentation du groupe de produits, ledit élément de contraste s'étendant jusqu'en face dudit ensemble de thermosoudage (33).
5. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit élément de contraste comprend une partie de la barre de pliage longitudinale respective, qui se développe entre les deuxième éléments de pliage et la trajectoire d'alimentation du groupe de produits.
6. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** lesdits deuxième éléments de pliage comprennent, pour chaque côté de la trajectoire d'alimentation, un premier profil de pliage et un deuxième profil de pliage, placés en séquence dans la direction d'alimentation des groupes de produits, pour plier les rabats de chacune desdites deuxième paires de rabats sur le dessus l'un de l'autre.
7. Dispositif selon la revendication 6, **caractérisé en ce que** chacun desdits éléments de contraste s'étend au-delà du deuxième profil de pliage respectif, en aval duquel on trouve ledit ensemble de soudage.
8. Dispositif selon la revendication 6 ou 7, **caractérisé en ce que** lesdits premier et deuxième profils de pliage et lesdites barres de pliage longitudinales sont fixes.
9. Dispositif selon une ou plusieurs des revendications 6 à 8, **caractérisé en ce que** chacun desdits deuxième profils de pliage a une fente, derrière laquelle est positionné ledit élément de contraste et à travers laquelle on trouve l'ensemble de soudage respectif.
10. Dispositif selon la revendication 9, **caractérisé en ce que** chaque barre de pliage longitudinale s'étend derrière la fente respective du deuxième profil de pliage correspondant.
11. Dispositif selon la revendication 9 ou 10, **caractérisé en ce que**, placé dans ladite fente, on trouve un élément de retenue pour retenir les rabats de ladite deuxième paire de rabats.

12. Dispositif selon la revendication 11, **caractérisé en ce que** ledit élément de retenue comprend une bande de retenue avec une haute conduction thermique.

13. Dispositif selon la revendication 11 ou 12, **caractérisé en ce que** ledit élément de retenue comprend une courroie s'étendant parallèlement à la direction d'alimentation du groupe de produits le long de ladite trajectoire d'alimentation.

14. Dispositif selon la revendication 11, 12 ou 13, **caractérisé en ce que** ledit ensemble de soudage agit sur le film plastique par le biais dudit élément de retenue.

15. Dispositif selon une ou plusieurs des revendications précédentes, **caractérisé en ce que**, placée en aval dudit ensemble de soudage, on trouve une autre station de thermosoudage, pour souder ensemble les quatre rabats pliés de chaque côté du groupe de produits emballés.

16. Procédé pour emballer un groupe de produits dans un film plastique thermosoudable, dans lequel ledit groupe de produits est emballé dans une feuille dudit film plastique qui fait latéralement saillie dudit groupe de produits et dans lequel les parties en saillie du film plastique sont pliées afin de former quatre rabats pliés, superposés les uns sur les autres et thermosoudés sur chacune des deux faces opposées du groupe de produits emballés ; **caractérisé par** les étapes consistant à intercaler un élément de contraste entre deux desdits rabats superposés, et agencer un ensemble de soudage pour réaliser le thermosoudage desdits deux rabats superposés, ledit ensemble de soudage fonctionnant contre ledit élément de contraste avec les rabats superposés agencés entre l'ensemble de soudage et l'élément de contraste.

17. Procédé selon la revendication 16, **caractérisé par** les étapes consistant à :

envelopper une feuille de film plastique thermosoudable autour d'un groupe de produits, laisser des parties du film faire latéralement saillie de deux côtés dudit groupe de produits ;  
alimenter le groupe de produits emballés dans ladite longueur de film plastique le long d'une trajectoire d'alimentation ;  
plier une première paire de rabats de chaque partie de film de chaque côté du groupe de produits le long de lignes de pliage sensiblement transversales à la direction d'alimentation du groupe de produits le long de ladite trajectoire d'alimentation, avec au moins une barre de pliage longitudinale respective ;  
de chaque côté du groupe de produits, plier le

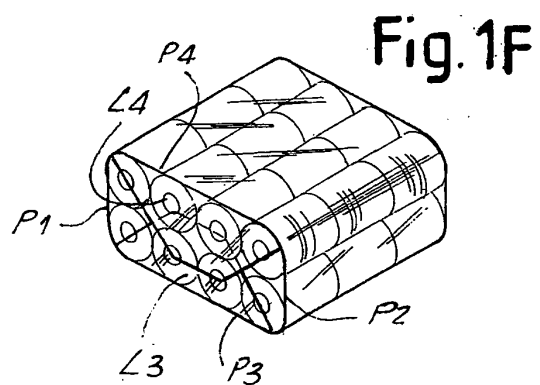
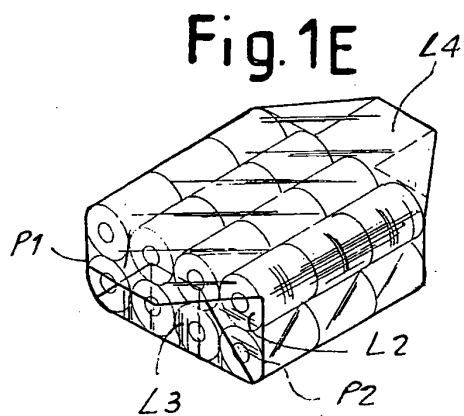
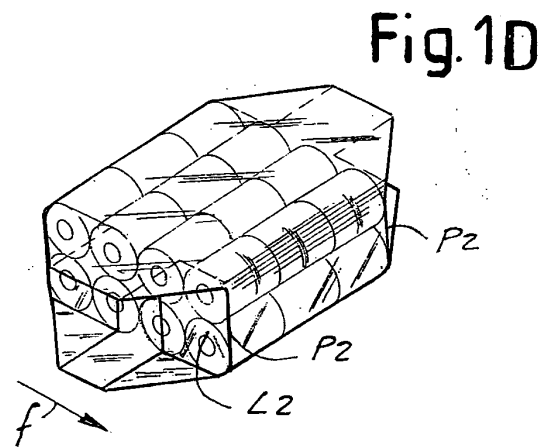
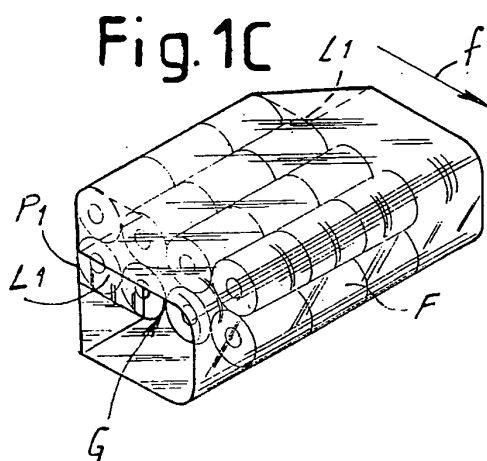
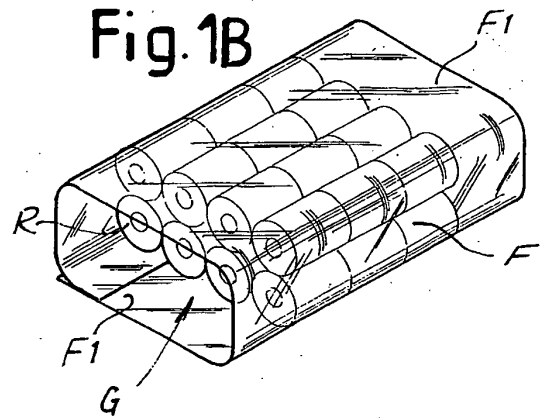
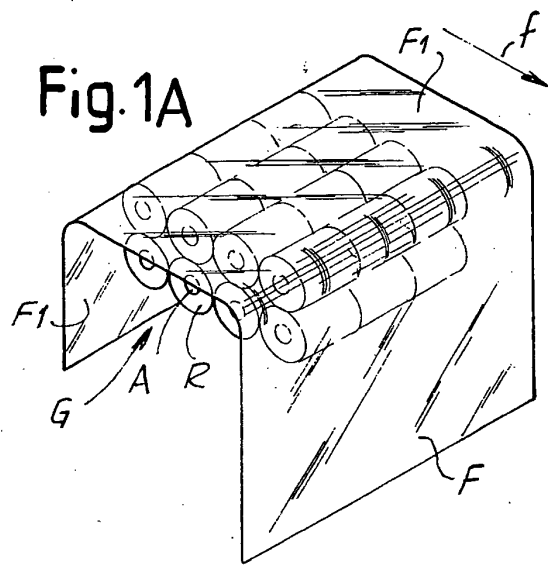
long de lignes de pliage sensiblement parallèles à la direction d'alimentation du groupe de produits et superposer une deuxième paire de rabats sur chacune desdites parties du film ; et de chaque côté du groupe de produits, souder les rabats de ladite deuxième paire ensemble, en utilisant ledit ensemble de soudage coopérant avec ledit élément de contraste, placé derrière ladite deuxième paire de rabats.

18. Procédé selon la revendication 17, **caractérisé en ce que** la barre de pliage longitudinale respective s'étend au moins jusqu'audit ensemble de soudage et forme ledit élément de contraste.

19. Procédé selon la revendication 17 ou 18, **caractérisé en ce que** les rabats des première et deuxième paires de chaque côté du groupe de produits, sont en outre thermosoudés l'un sur l'autre en aval de l'étape de thermosoudage mutuel des rabats de la deuxième paire.

20. Procédé selon la revendication 17, 18 ou 19, **caractérisé en ce que** ladite deuxième paire de rabats est pliée, effectuant une translation du groupe de produits le long du côté d'un premier profil de pliage et d'un second profil de pliage de chaque côté de la trajectoire d'alimentation, ledit élément de contraste s'étendant entre ladite trajectoire d'alimentation et ledit deuxième profil de pliage respectif.

21. Procédé selon la revendication 20, **caractérisé en ce que** lesdits premier et deuxième profils de pliage sont placés en séquence et **en ce que** lesdits rabats de la deuxième paire sont thermosoudés ensemble au moyen de l'ensemble de soudage placé en aval du deuxième profil de pliage.



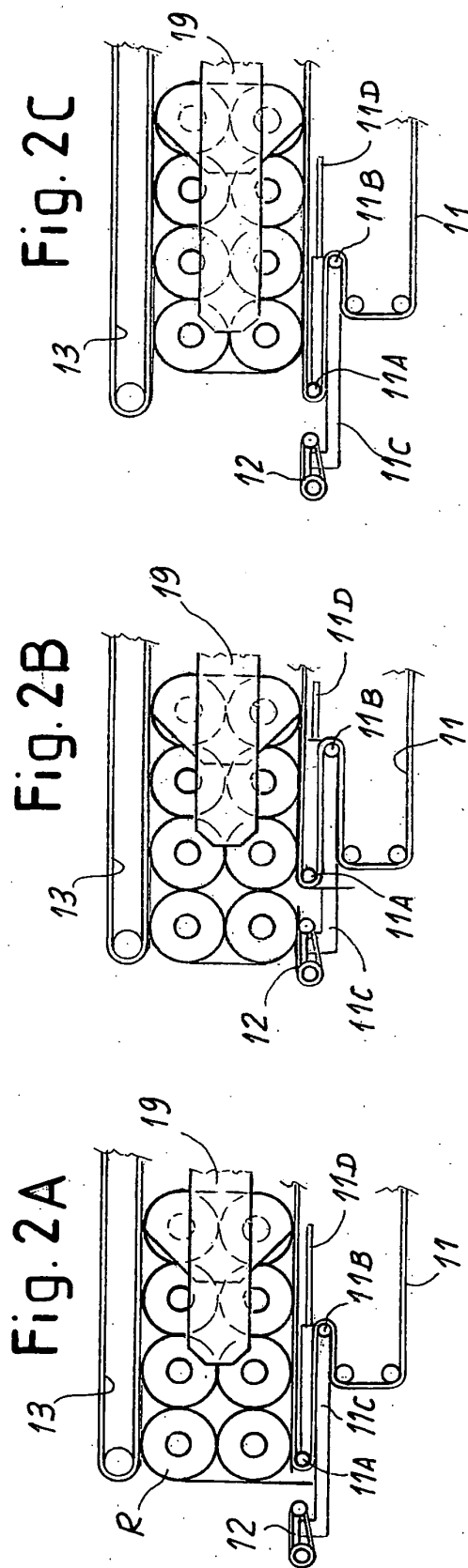
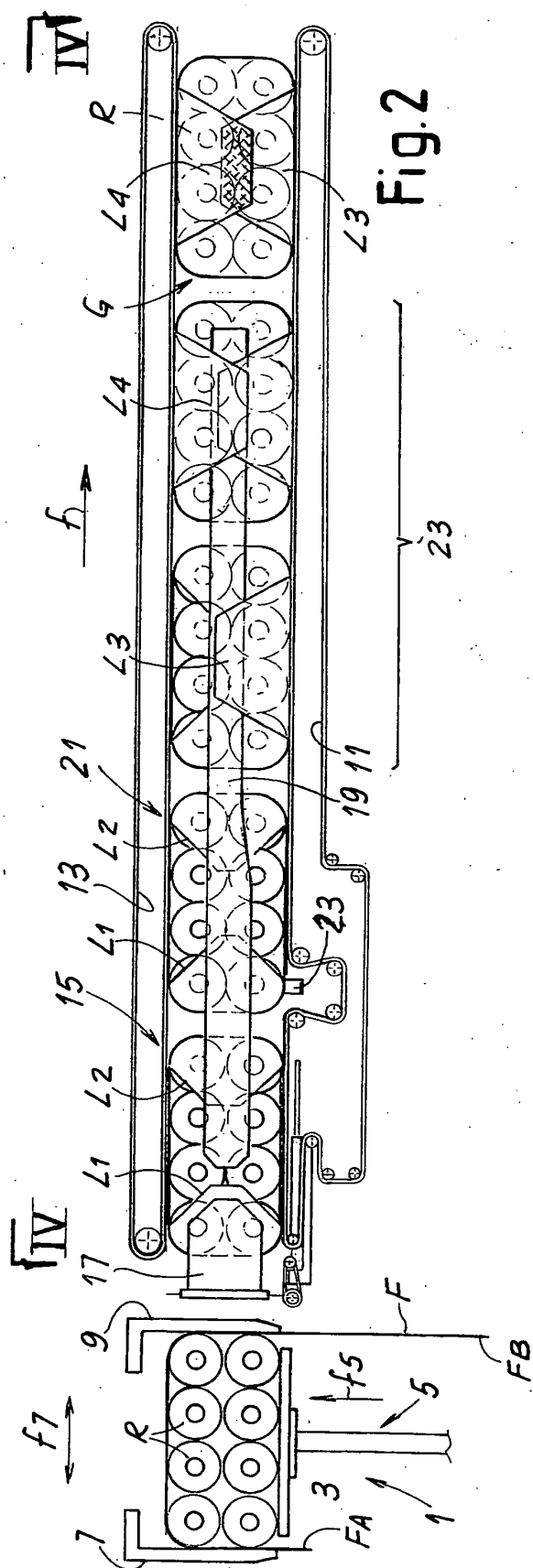


Fig. 3

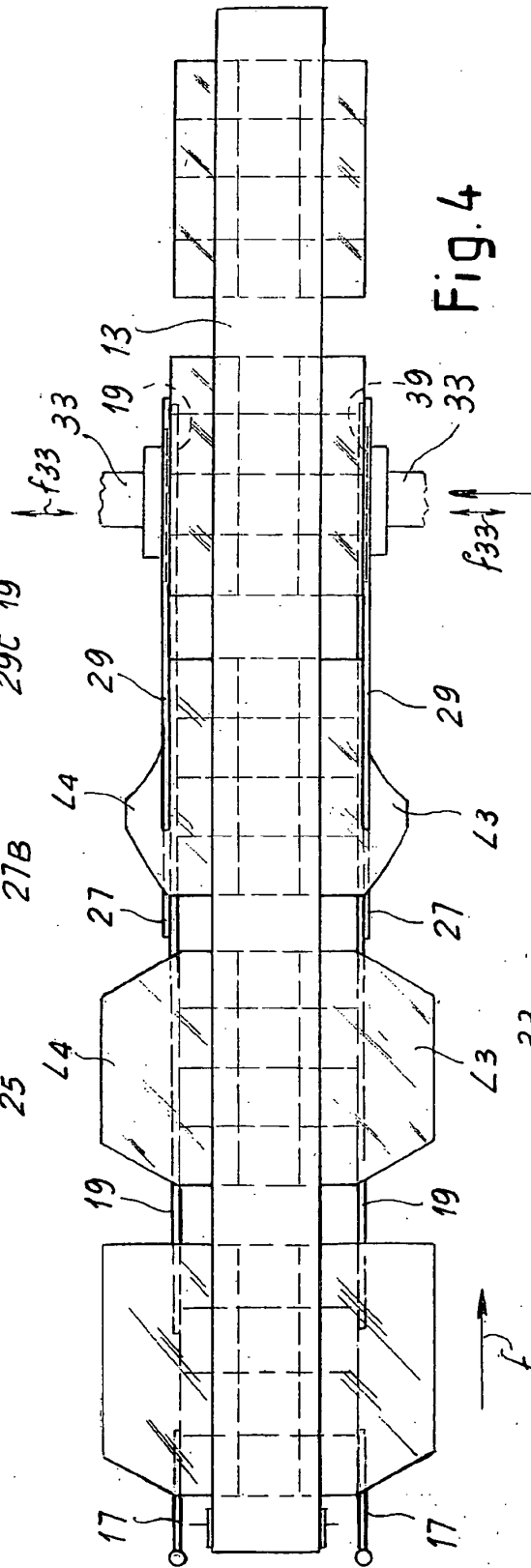
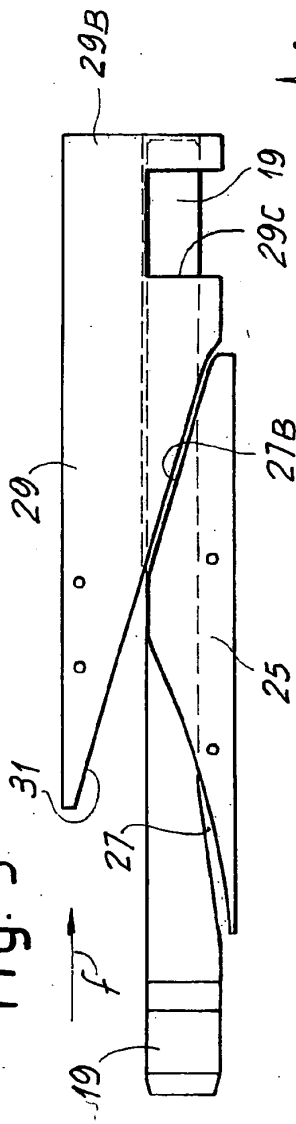


Fig. 4

Fig. 5

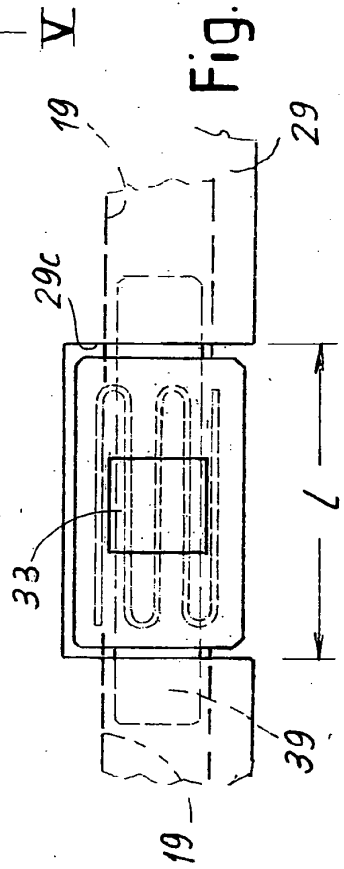


Fig. 6

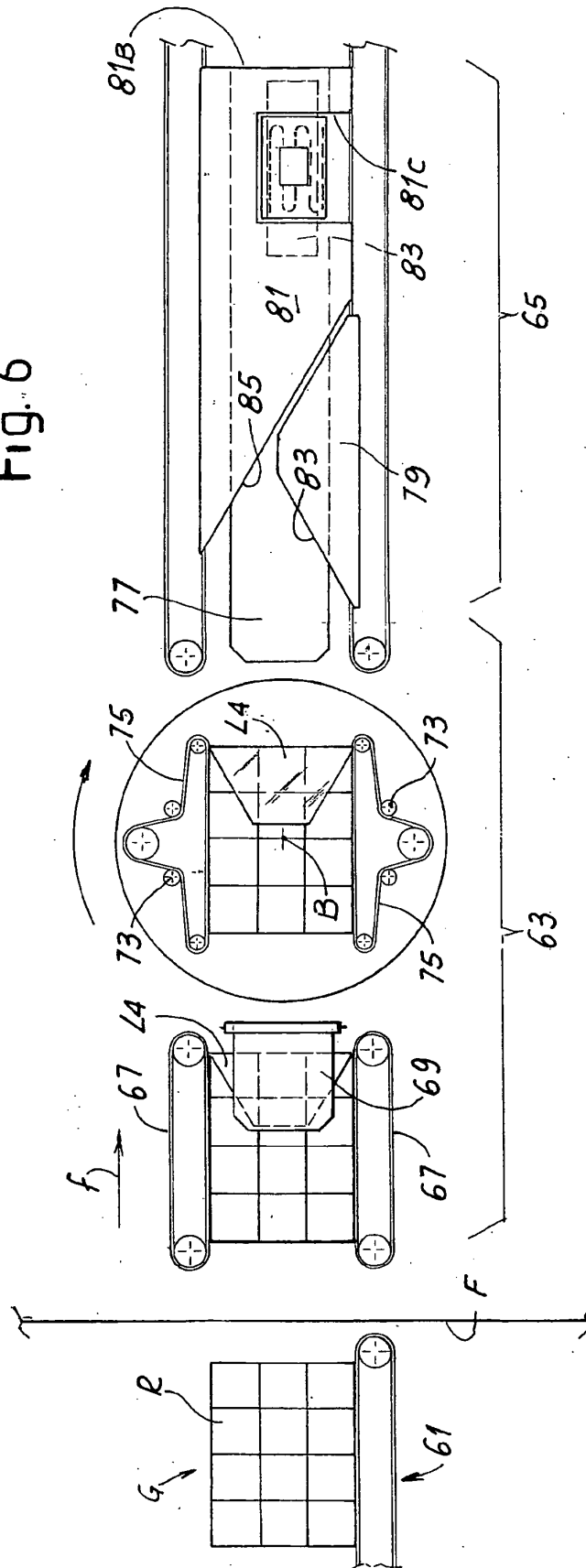


Fig.7A

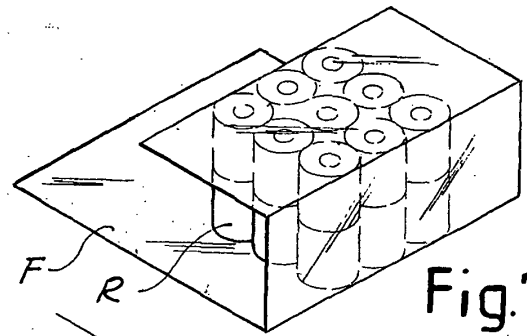
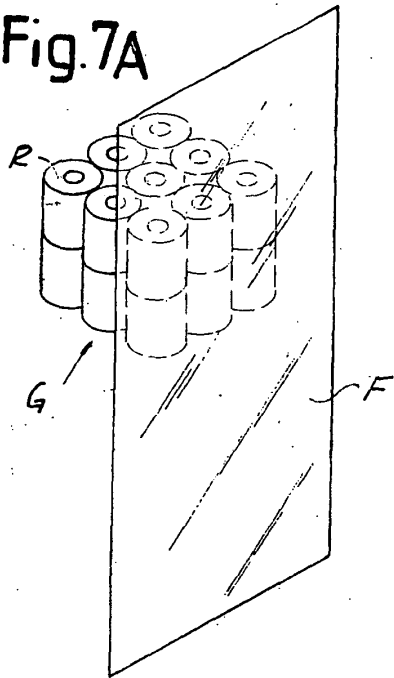


Fig.7B

Fig.7C

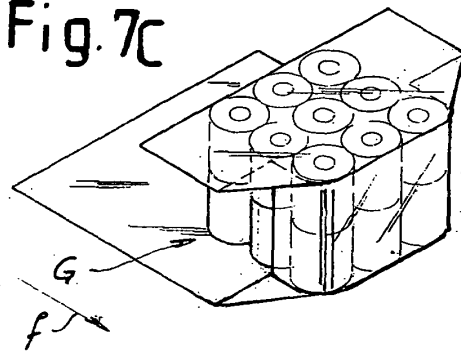


Fig.7D

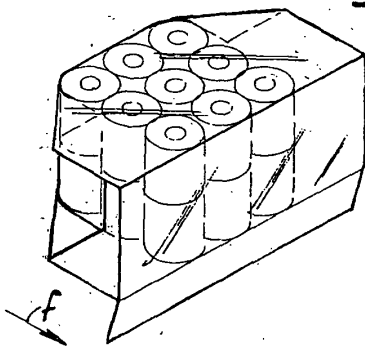


Fig.7E

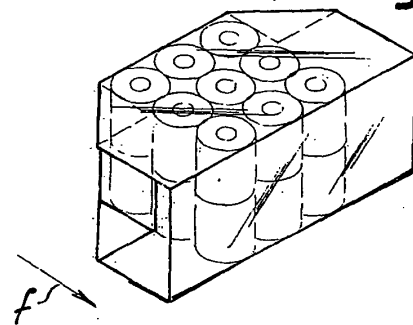


Fig.7F

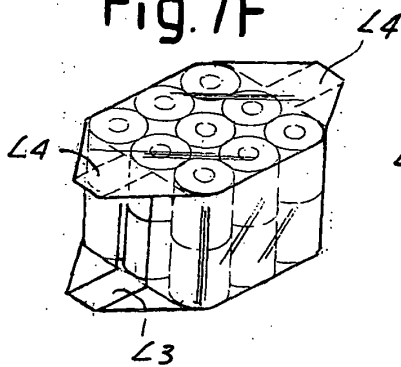


Fig.7H

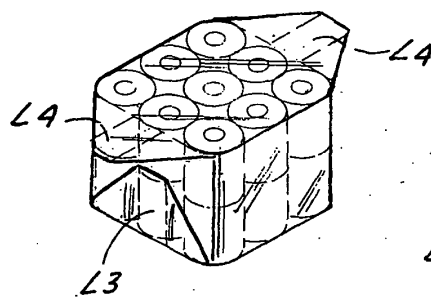
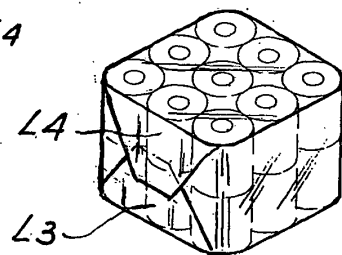


Fig. 7G





**REFERENCES CITED IN THE DESCRIPTION**

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