



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**22.07.2009 Bulletin 2009/30**

(51) Int Cl.:  
**B65B 11/12 (2006.01)**

(21) Application number: **08100650.4**

(22) Date of filing: **18.01.2008**

(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**  
Designated Extension States:  
**AL BA MK RS**

(72) Inventors:  
• **Suokas, Jouni**  
**31300 Tammela (FI)**  
• **Heikkilä, Kari**  
**30100 Forssa (FI)**  
• **Rämö, Jouni**  
**31640 Humppila (FI)**

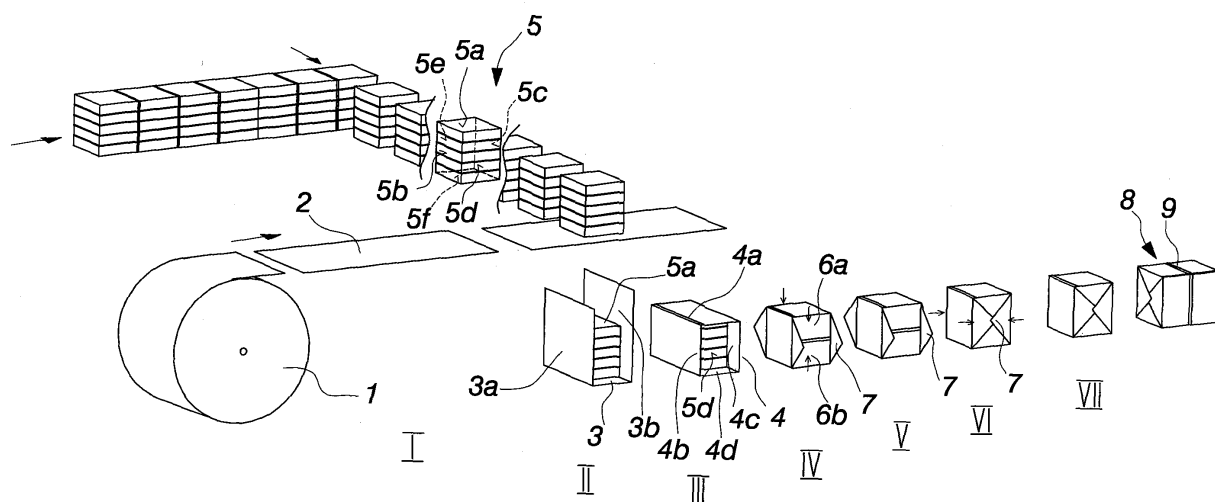
(71) Applicant: **Jomet OY**  
**30100 Forssa (FI)**

(74) Representative: **LEITZINGER OY**  
**Tammasaarenkatu 1**  
**00180 Helsinki (FI)**

(54) **Method and packaging machine for automatic packaging self-supporting articles or article packages**

(57) The invention relates to a method for automatic packaging self-supporting articles or article packages, said method comprising arranging articles or article packages in substantially rectangular packaging blocks, around which is wrapped a package wrapper of flexible material for a substantially sealed shipping and/or storage parcel. The method comprises providing the package wrapper as a certain size one-piece sheet (2), which is placed to rest on the packaging machine's receiving elements (24), after which the sheet is worked into a substantially U-shaped cover (3) and further into a closed

sleeve element (4) and the protruding ends of the sleeve element's top and bottom surfaces are folded against the packaging block's (5) end surfaces (5d, 5e) to configure the sleeve element's side surfaces into triangular formations (7) which are pressed against the end surfaces for providing a closed wrapping. The method comprises flattening the triangular formations prior to pressing the same against the end surfaces. In order to uphold the package together, several steps involve the use of an adhesive. The invention relates also to an automatically operated packaging machine (20) for packaging self-supporting articles or article packages.



**Fig. 1**

## Description

**[0001]** The invention relates to a method for automatic packaging self-supporting articles or article packages, said method comprising arranging articles or article packages in substantially rectangular packaging blocks, around which is wrapped a package wrapper of flexible material for a substantially sealed shipping and/or storage parcel. The invention relates also to an automatically operating packaging machine for packaging self-supporting articles or article packages.

**[0002]** Sheets of paper and consumer packages formed thereby have been traditionally packed in various cardboard cases, providing a supporting structure which allows for stacking such cases on top of each other. Such cardboard cases are relatively expensive and present problems in terms of the reuse and/or disposal thereof. Shipping and/or storage parcels, which are made of paper sheets or article packages formed thereby and provided with a package wrapper of flexible material, are known e.g. from the present Applicant's earlier Finnish utility model registrations FI6540 and FI6717, describing various designs for such shipping or storage parcels in view of providing the same with handling elements. The present Applicant's prior utility model registration FI6541 describes a shipping or storage parcel, comprising a package wrapper of flexible material and provided with a tear-off tab. However, these solutions do not present any means by which this type of shipping and/or storage parcel could be manufactured automatically with a packaging machine for a tight parcel which is tidy in appearance and easy to transport and store in stacks. If the parcel remains slack, its untidy appearance will be compounded by the problem that articles or article package within the parcel may shift relative to each other, whereby the stacking of parcels on top of each other can be awkward because of inconsistent parcel shapes and the packaged articles may also become damaged as a result of such shifts.

**[0003]** It is an objective of the present invention to provide a solution, whereby the wrapping of such self-supporting articles or article packages in a wrapper of flexible material is possible in automated operation with a packaging machine to provide a tight parcel capable of eliminating the above problems. In order to achieve this objective, a method according to the invention is characterized by what is presented in the characterizing clause of claim 1. On the other hand, a packaging machine according to the invention is characterized by what is presented in the characterizing clause of the independent claim 5.

**[0004]** In the context of this application, the term self-supporting article or article package is used in reference to a material to be packaged, which constitutes the load-bearing support structure of a shipping and/or storage parcel, the package wrapper providing protection against dirt, moisture, etc. and holding the material to be packaged in place. Such a self-supporting material to be packaged may comprise e.g. sheets of paper or consumer

packs formed thereby, the latter usually holding one ream of paper sheets. The self-supporting material to be packaged may also comprise various boxes or cases, for example.

**[0005]** The invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 shows various steps in a method of the invention in a schematic view of principle,

Fig. 2 shows one embodiment for a packaging machine of the invention in a schematic view of principle, and

Fig. 2A shows a portion of the packaging machine of fig. 2 in a plan view.

**[0006]** In one preferred embodiment shown in fig. 1 for a method of the invention, a web-like wrapping material, which may comprise e.g. a fibrous web, such as paper, is supplied from a roll 1 to a sheet forming step I for cutting a one-piece sheet of package wrapper 2 out of the web. This cutting operation can be arranged upstream of the actual packaging machine as a separate cutting apparatus or it may constitute an integrated part of the packaging machine. The cut-off sheet 2 is then conveyed onto the receiving elements of a packaging machine and a block 5 of articles to be packaged is placed on top of the sheet in step II. In the present example, the articles to be packaged are sheets of paper, which have been packed in smaller consumer packs containing a ream of sheets, said consumer packs having been assembled for packaging blocks 5 of five consumer packs. The sheet 2 and the packaging block 5 thereon are then lowered by means of the receiving elements into a forming unit of a substantially U-shaped cross-section, which is adapted to travel between various steps along a track in the form of a closed loop. During the descent, the sheet 2 is bent by the receiving elements for a substantially U-shaped cover 3 against a bottom part 5f and side surfaces 5b, 5c of the packaging block 5. The U-shaped cover 3 features a first leg member 3a and a second leg member 3b, said first and second leg members extending vertically above the packaging block's 5 top surface 5a and longitudinally beyond the packaging block's end surfaces 5d, 5e.

**[0007]** Next, said forming unit, along with the U-shaped cover 3 and the packaging block 5 present therein, is advanced to a sleeve forming step III by means of said conveyor elements. The sleeve forming step comprises bending a top portion of the U-shaped cover's first leg 3a firmly against the packaging block's top surface 5a by means of bending elements and a top portion of the U's second leg 3b is engaged by gripping tools so as to enable the wrapper sheet to be tightened by means of the gripping tools against the packaging block's 5 side surfaces 5b, 5c and bottom surface 5f while bringing said second leg 3b of the U against the packaging block's 5 top surface 5a for an overlapping relationship with an

external surface of the top portion of the U's first leg 3a bent against the packaging block's 5 top surface 5a. The gripping tools used for engaging the leg 3b comprise preferably vacuum-operated tools, such as a suction pipe or a set of suction pipes, extending essentially over the entire length of the leg 3b. Prior to setting up the overlapped relationship, the U has the external surface of its first leg 3a and/or the internal surface of its second leg 3b provided with a strip of adhesive extending substantially over the entire axial length of the overlapping portion, whereby, upon bringing the overlapping surfaces to a contact against each other, said surfaces adhere to each other as a result of the adhesive to provide a joint portion 4a, the cover thus becoming a sleeve element 4 in a firm contact with the packaging block's 5 side surfaces 5b, 5c and top surface 5a, as well as its bottom surface 5f.

**[0008]** In line with a section of the joint which extends beyond the packaging block 5, at each axial end thereof, are provided movable auxiliary supports prior to said attachment of the overlapping joint. The auxiliary supports settle themselves substantially flush with the packaging block's 5 top surface 5a, thus enabling the sleeve element 4 to be firmly pressed substantially over the entire length of its joint portion against the packaging block's top surface and said auxiliary supports.

**[0009]** This is followed by advancing the forming unit, along with the sleeve element 4 and the packaging block 5 present therein, to a bending step IV. Prior to said advancing process, during or after said advancing process, the sleeve element 4 has its side surfaces 4b, 4c, the internal face thereof in locations near the sleeve element's axial ends, applied with an adhesive to provide a substantially vertical strip of adhesive. The bending step comprises folding the sleeve element's protruding top and bottom surfaces 4d against the packaging block's end surfaces 5d, 5e by means of bending elements, whereby the sleeve element has its side surfaces 4b, 4c, intermediate the end surfaces, folding in the same process on top of themselves, resulting in substantially triangular formations 7. The triangular formations 7 are then flattened by means of said bending elements and separate flattening elements for a compact assembly, such that the adhesive strip which, when the side surfaces are in a folded condition, is located essentially on a normal extending from the triangle apex to the triangle base, forms an adhesive joint holding the triangular assembly together. The result of flattening is that the folded edges of a triangular formation 7 become sharp.

**[0010]** From the bending step, the forming unit is advanced through a step V to a closing step VI, whereby, prior to said advancing process, during or after said advancing process, the triangular formations 7 have an internal surface thereof applied with an adhesive, and the closing step VI comprises pressing the triangular formations 7 by means of press elements to a firm contact with those sections of the sleeve element's top and bottom surface 4d which had been folded earlier against the packaging block's end surfaces and against which the

triangular formations 7 adhere by means of the adhesive to provide a substantially closed, tight wrapping around the packaging block. After the closing step, the parcels are delivered to an unloading step VII. Concurrently with the unloading step or in a separate handling element forming step subsequent thereto, the parcel is provided with a strap 9 extending around it and constituting the handling element in this exemplary case. A finished parcel equipped with a handling strap is indicated by reference numeral 8.

**[0011]** Said bending step (IV) of the end portions comprises preferably the use of upper and lower bending elements, which begin bending the sleeve element's 4 top and bottom surfaces down- and respectively upward towards the packaging block's end surfaces at a zone substantially narrower than the packaging block's width. The bending elements are adapted to spread structurally sideways while proceeding towards the midpoint of an end surface and/or to effect a spreading movement sideways, such that the top and bottom surfaces 4a and 4d to be folded against each of the end surfaces become sharp-cornered at the junction between each of the packaging block's side surfaces 5b, 5c and end surfaces 5d, 5e, resulting in a sealed wrapping which adapts itself firmly against all surfaces of the packaging block. This folding of a bendable section of the top and bottom surface firmly against the end surface across the entire width of the packaging block, as achieved by the bending elements, enables the formation of a tight wrapping. Should the bending be started straightaway over the entire width, the result would be wrinkling of the wrapping material in corner regions and a slack wrapping.

**[0012]** For example, paper sheets and/or consumer packs formed thereby may change the dimensions thereof in varying moisture conditions, whereby the height of a packaging block may fluctuate considerably, even up to tens of millimeters. In order to prevent the wrapping from being left slack as a result of this, the method of the invention preferably makes use of measuring elements for measuring a true height of the packaging block 5 delivered to the packaging machine and, based on the obtained measuring result, there is conducted a vertical adjustment of the packaging block 5 and its enveloping U-shaped cover 3 in the forming unit for bending the cover 3 for a tight sleeve element 4 around the packaging block. The vertical adjustment can be effected e.g. by having the immediate vicinity of conveyor elements, e.g. the space between the conveyor chains of a chain conveyor, provided with a raisable support platform extending longitudinally of the track and being adjustable in terms of its vertical position relative to the forming units in such a way that the packaging blocks, along with the package wrappers thereof, presently within the forming unit, can be raised relative to the upper actuating means for producing first a sleeve element set in a desired tightness and then for providing a final wrapped parcel.

**[0013]** The material used in the method for a package wrapper is preferably a fibrous web, such as paper or

board, plastics, metal foil or a combination thereof.

**[0014]** Figs. 2 and 2A illustrate in a schematic view of principle a packaging machine of the invention in one exemplary embodiment. Next to a packaging machine 20 is provided a cutting apparatus 10 for cutting a packaging wrapping web W, supplied from a roll 1 of packaging material, by means of cutting tools 11 to provide sheets 2, which are conveyed by means of a transfer device, implemented e.g. as a vacuum belt conveyor 21, to the packaging machine's receiving and lowering elements 24 (step I). The articles to be packed, assembled as packaging blocks 5, are brought to the packaging machine by means of feeding elements (not shown) and received between positioning plates 22 operated by hydraulic cylinders 23, said positioning plates setting the packaging block 5 on top of the sheet 2 to rest upon the lowering elements 24. The lowering elements descend the sheet and the packaging block present thereon into a space internal of a forming unit 25 connected to a chain conveyor 26, the sheet folding into a U-shape (step II) around the packaging block. The chain conveyor 26 comprises preferably two conveyor chains 26a, 26b (Fig. 2A), which are spaced apart in cross-machine direction, resulting in mutually parallel closed loops proceeding in synchronization with each other. The forming unit 25 is preferably implemented by means of two U-shaped brackets, which are disposed on the conveyor chains 26a, 26b in line with each other in cross-machine direction so as to travel along with the conveyor chains for jointly defining a substantially U-shaped reception space, within which the sheet 2 folds into a U-shape while descending downwards.

**[0015]** Step II is preferably provided with first adhesive applicator means 28 for applying the top surface of a packaging block with an adhesive required for forming a joint in the sleeve element. After the adhesive has been applied, the unit 25 proceeds to the next step (step III) in a machine 20, being advanced by the chain conveyor 26. In this step, a top portion of the U's first leg is folded by side surface bending elements 31 firmly against a top surface of the packaging block, and a top portion of the U's opposite second leg is grabbed by a gripping tool 32, implemented e.g. as a suction pipe, displacing it towards the first leg's external surface and tightening at the same time the wrapping material firmly against the packaging block's side surfaces and bottom surface, as well as finally pressing said second leg's top portion firmly against the packaging block's top surface and the first leg's external surface, said second leg's internal surface being secured by way of the adhesive against the first leg's external surface so as to result in a closed sleeve element of the wrapping material. In order to make the joint portion continuous even along a section extending beyond the packaging block 5 at each axially directed end, the packaging machine is provided with movable auxiliary supports (not shown), which are positioned in line with the joint, substantially flush with the packaging block's top surface, prior to said attachment of the overlapping joint.

The auxiliary supports may comprise e.g. elements, which feature a substantially planar support face and which are hydraulically driven or mounted to the ends of lever arms. The machine 20 is provided, especially in association with step III, with second adhesive applicator means 40 (Fig. 2A) for applying adhesive to the sleeve element's side surfaces, to the internal face thereof at locations near the sleeve element's axial ends, so as to form a substantially vertical strip of adhesive. Next, the unit 25 is advanced to the bending step IV, which includes bending elements 33 capable of bending the sleeve element's protruding top and bottom surfaces against the packaging block's end surfaces, such that the sleeve element's side surfaces, intermediate the end surfaces, fold at the same time on top of themselves to provide substantially triangular formations. The triangular formations are flattened between said bending elements and separate flattening elements 41 (Fig. 2A) for a compact assembly, such that the adhesive strip, which is located on a normal extending essentially from triangle apex to triangle base, establishes an adhesive joint which holds the triangular formation together and at the same time the folded edges become sharp. Subsequent to bending, the unit 25 is advanced to the adhesive application step V, which includes third adhesive applicator means 34 for applying adhesive to the triangular formations' internal surface. After step V, the units are advanced to the closing step VI, in which the triangular formations are pressed by means of press elements 35 to a firm contact with those sections of the sleeve element's top and bottom surface which had been bent earlier against the packaging block's end surfaces, the triangular formations bonding against those by means of the adhesive, thus providing a substantially closed, tight shipping and/or storage wrapping for the packaging block. The resulting wrapped parcel is advanced to step VII, in which it is hoisted out of the unit 25 by means of lifting elements 39. In the up-lifted position, the parcel is advanced by a pusher element 36 onto an unloading conveyor 37. Concurrently with or subsequent to step VII, the parcel can be encircled by a strap constituting a handling element.

**[0016]** In the exemplary embodiment of fig. 2, reference numeral 12 indicates an optionally included tear-off tape installation device. Such a package with a tear-off tape has been described e.g. in Utility model registration FI 6541.

**[0017]** In the exemplary embodiment of fig. 2, the packaging machine is provided, in an area between the conveyor chains 26a, 26b of the chain conveyor, with a raisable support platform 27 extending longitudinally of the track, which can be adjusted in terms of its vertical position relative to the forming units 25 in such a way that the packaging blocks, along with the package wrappers thereof, presently within the forming units, are liftable with respect to overhead actuating means for providing a sleeve element set to a desired tightness, as well as a final wrapped package.

## Claims

1. A method for automatic packaging self-supporting articles or article packages with a packaging machine (20), said method comprising arranging articles or article packages in substantially rectangular packaging blocks (5), around which is wrapped a package wrapper (2) of flexible material for a substantially sealed shipping and/or storage parcel, **characterized in that** the method comprises conducting the following steps of:
  - I) providing the package wrapper as a certain size one-piece sheet (2), which is placed to rest on the packaging machine's receiving elements (24),
  - II) placing the packaging block (5) on top of the package wrapper sheet (2) to rest on said receiving elements, and lowering the package wrapper sheet and the packaging block thereon into a forming unit (25) of a substantially U-shaped cross-section, which is adapted to travel by means of conveyor elements (26) along a track in the form of a closed loop, during which descent the package wrapper sheet is folded by means of the forming unit for a substantially U-shaped cover (3) against the packaging block's (5) bottom portion (5f) and side surfaces (5b, 5c) in such a way that the U-shaped cover (3) has a first leg member (3a) and a second leg member (3b), said first and second leg members (3a, 3b) extending vertically above the packaging block's (5) top surface (5a) and longitudinally beyond the packaging block's end surfaces (5d, 5e),
  - III) advancing said forming unit, and the U-shaped cover (3) and the packaging block (5) present therein, to a sleeve forming step by means of said conveyor elements (26), in which sleeve forming step a top portion of the U's first leg (3a) is bent firmly against the packaging block's top surface (5a) and a top portion of the U's second leg (3b) is grabbed by gripping tools (32) for tightening the wrapper sheet against the packaging block's (5) side surfaces (5b, 5c) and bottom surface (5f) while at the same said second leg (3b) of the U is brought by means of the gripping tools against the packaging block's (5) top surface (5a) for setting it in an overlapping relationship with the top portion of the U's first leg (3a) bent against the packaging block's (5) top surface (5a), whereby the U has the external surface of its first leg (3a) and/or the internal surface of its second leg (3b), prior to bringing the same in an overlapping relationship, provided with a strip of adhesive which extends substantially over the entire axial length of the overlapping zone, whereby, upon bringing the overlapping surfaces against each other, said surfaces bond to each other by way of the adhesive, providing a joint portion (4a), and at the same time the cover becomes a closed sleeve element (4) lying firmly against the packaging block's (5) side surfaces (5b, 5c) and top (5a) as well as bottom surface (5f), and in which method, prior to said attachment of the overlapping joint, a movable auxiliary support is placed in line with a joint section extending beyond the packaging block (5), said auxiliary support settling substantially flush with the packaging block's (5) top surface (5a), thus enabling the sleeve element (4) to be jointed substantially over its entire length,
  - IV) advancing the forming unit, and the sleeve element (4) and the packaging block (5) present therein, to a bending step, whereby prior to said advancing process, during or after said advancing process the sleeve element (4) has its side surfaces, the internal face thereof at locations near the sleeve element's axial ends, applied with an adhesive to provide a substantially vertical strip of adhesive, and the bending step comprises folding the sleeve element's protruding top and bottom surfaces (4d) against the packaging block's end surfaces (5dd, 5e) by means of bending elements, the sleeve element's side surfaces (4b, 4c) folding at the same time on top of themselves to provide substantially triangular formations (7), said triangular formations (7) being flattened by means of said bending elements (33) and separate flattening elements (41) for a compact assembly so as to be held together by the adhesive and at the same the triangular formation's (7) folded edges become sharp,
  - V) advancing the forming unit to a closing step, whereby prior to said advancing step, during said advancing step or in said closing step said triangular formations (7) have an adhesive applied to the internal surface thereof,
  - VI) pressing the triangular formations (7) in the closing step by means of press elements (35) to a firm contact with those portions of the sleeve element's top and bottom surface (4d), which had been folded earlier against the packaging block's end surfaces and against which the triangular formations adhere by means of the adhesive to provide a substantially closed, tight wrapping around the packaging block.
2. A method as set forth in claim 1, **characterized in that** said bending step (IV) comprises the use of bending elements (33), which begin bending the sleeve element's (4) top and bottom surfaces downward towards the packaging block's end surfaces at a zone substantially narrower than the packaging block's width, said bending elements being adapted to spread sideways and/or to effect a spreading movement sideways, such that the top and bottom

surfaces (4a) and (4d) to be folded against each of the end surfaces become sharp-cornered at the junction between each of the packaging block's side surfaces (5b, 5c) and end surfaces (5d, 5e), resulting in a sealed wrapping which adapts itself firmly against all surfaces of the packaging block.

3. A method as set forth in claim 1 or 2, **characterized in that** the method comprises the use of measuring elements for measuring a true height of the packaging block (5) to be delivered to the packaging machine and, based on the obtained measuring result, there is conducted a vertical adjustment of the packaging block (5) and its enveloping U-shaped cover (3) in the forming unit for bending the cover (3) for a tight sleeve element (4) around the packaging block.

4. A method as set forth in any of the preceding claims, **characterized in that** the material used in the method for a package wrapper is preferably a fibrous web, such as paper or board, plastics, metal foil or a combination thereof.

5. A packaging machine for automatic packaging self-supporting articles or article packages for shipping and/or storage parcels, said machine (20) including means for wrapping a packaging material around a packaging block (5) consisting of a rectangular arrangement of articles or article packages to be packaged, **characterized in that** the machine (20) comprises:

- receiving and lowering elements (24) for receiving a package wrapper cut to the form of a one-piece sheet (2), and means (22, 23) for placing the packaging block (5) on top of said sheet and for lowering the sheet as well as the packaging block downward,
- a forming unit (25) of a substantially U-shaped cross-section for receiving the sheet (2) and the packaging block (5) thereon and for bending the sheet for a substantially U-shaped cover (3) around the packaging block (5),
- conveyor elements (26) for advancing the forming unit along a track in the form of a closed loop,
- sleeve element forming tools, including bending (31) and gripping (32) tools, movable auxiliary supports, as well as first adhesive applicator elements (28) for making the U-shaped cover into a closed sleeve element (4), which encloses the packaging block (5) firmly against its side surfaces (5b, 5c) as well as top (5a) and bottom (5f) surface, said sleeve element featuring an axially directed joint (4a) along the packaging block's top surface (5a),
- second adhesive applicator elements (40) for applying an adhesive to the sleeve element's (4) side surfaces (4b, 4c), to the internal face thereof

in locations near the sleeve element's axial ends, for a substantially vertical strip of adhesive,

- bending elements (33) for bending those sections of the top (4a) and bottom (4d) surfaces, which extend beyond the packaging block (5) in the sleeve element's axial direction, against the packaging block's end surfaces (5d, 5e) and for configuring at the same time the sleeve element's side surfaces (4b, 4c), intermediate said sections, for triangular formations (7),
- flattening elements (41) for flattening the triangular formations (7),
- third adhesive applicator elements (34) for applying an adhesive to the internal surface of said triangular formations (7),
- press elements (35) for pressing the triangular formations (7) against the folded sections of the sleeve element's top (4a) and bottom (4d) surfaces, against which the triangular formations (7) adhere by means of the adhesive to establish a substantially closed, tight wrapping around the packaging block.

6. A packaging machine as set forth in claim 5, **characterized in that** in association with the machine is provided a cutting apparatus (10) for cutting the package wrapping material into one-piece sheets (2).

7. A packaging machine as set forth in claim 5 or 6, **characterized in that** in association with the machine is provided a tear-off tape installing device (12).

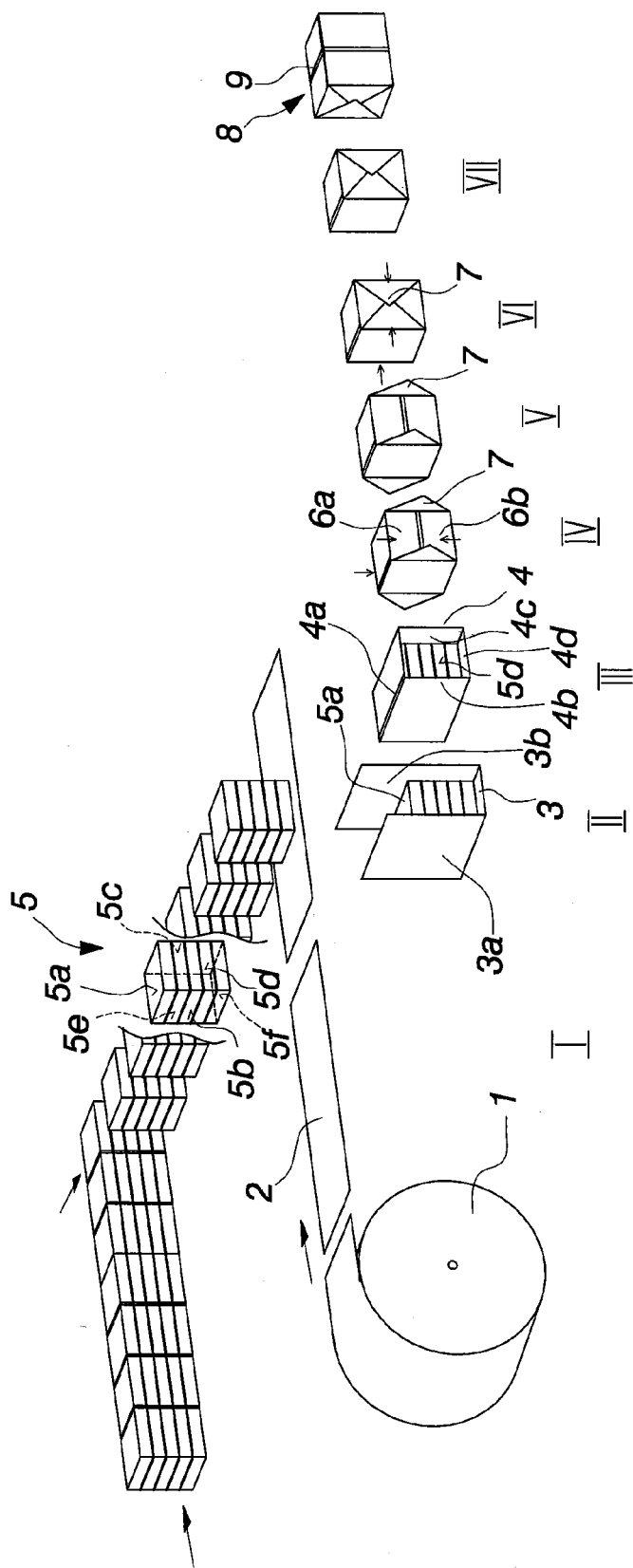
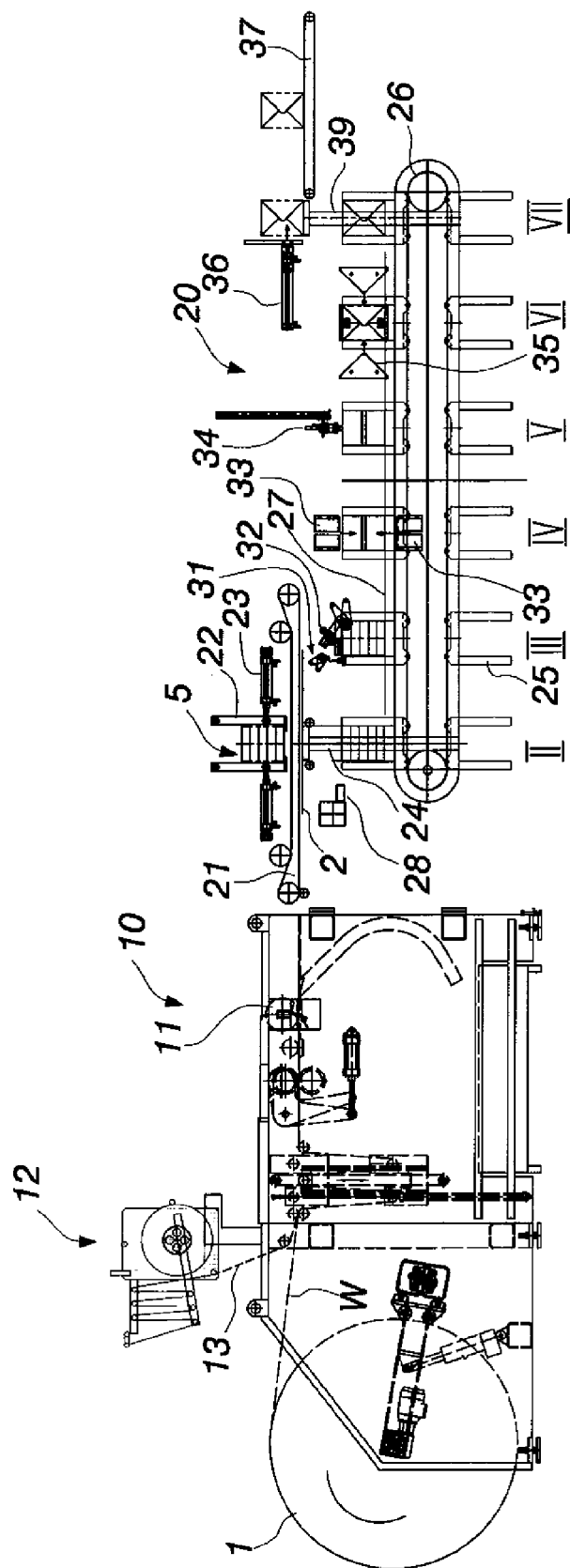


Fig. 1



I  
Fig. 2

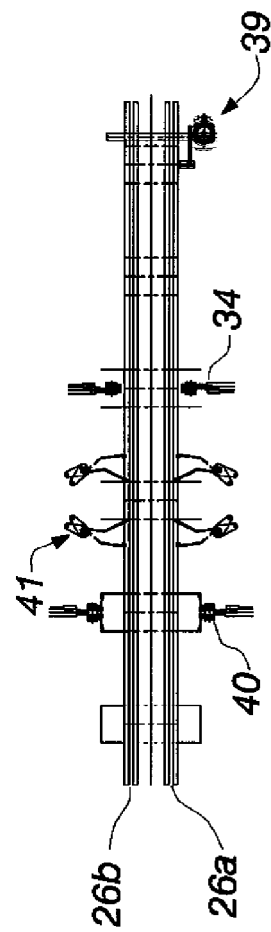


Fig. 2A



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 08 10 0650

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 1 770 014 A (FUJIFILM CORP [JP]) 4 April 2007 (2007-04-04) * abstract * * figure 1 * * figures 3a-3c *	1-7	INV. B65B11/12
A	US 3 078 633 A (ERIK STROMBERG NILS ET AL) 26 February 1963 (1963-02-26) * claim 1 * * figures 1-4 *	1-7	
A	DE 21 30 868 A1 (SCANDIA PACKAGING MACH) 11 January 1973 (1973-01-11) * the whole document *	1-7	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 June 2008	Examiner Damiani, Alberto
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons &amp; : member of the same patent family, corresponding document</p>			

4  
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 10 0650

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-06-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1770014	A	04-04-2007	JP 2007098629 A	19-04-2007
US 3078633	A	26-02-1963	DE 1151462 B	11-07-1963
DE 2130868	A1	11-01-1973	NONE	

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- FI 6540 [0002]
- FI 6717 [0002]
- FI 6541 [0002] [0016]