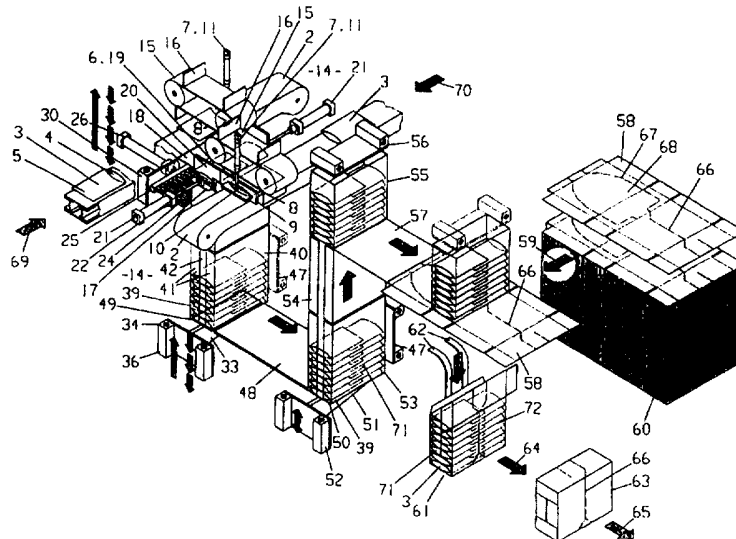




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>B65B 5/06, 35/50</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 97/42079</b></p> <p>(43) International Publication Date: 13 November 1997 (13.11.97)</p>
<p>(21) International Application Number: PCT/SE97/00767</p> <p>(22) International Filing Date: 9 May 1997 (09.05.97)</p> <p>(30) Priority Data: 9601784-3 8 May 1996 (08.05.96) SE</p> <p>(71) Applicant (for all designated States except US): DALWELL AB [SE/SE]; P.O. Box 51, S-668 02 Bäckefors (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): HANSEN, Finn, R. [NO/NO]; Indre Løkkavei 19B, N-3500 Hønefoss (NO). SAXRUD, Ole, Petter [NO/NO]; Urdveien 10, N-3500 Hønefoss (NO).</p> <p>(74) Agent: SIEBMANN S, H.; Gotapatent AB, P.O. Box 154, S-561 22 Huskvarna (SE).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: METHOD AND APPARATUS FOR PACKAGING SERIES OF ARTICLES IN DIFFERENT FORMATIONS



## (57) Abstract

The invention concerns a method and an apparatus (1) for packaging series of articles (3) in different formations (71). According to the invention, articles for each formation (71) are fed in mutually opposite directions (69, 70) by longitudinal conveyors (2) towards a common receiving zone (6) for collecting and stacking of articles (3), where first articles are stopped and transferred laterally by lateral conveyors (15) to a first collecting means (25) for collecting part of a stack (72) of two formations (71) of articles, whereupon a so collected part is released to a second collecting means (34) for collecting the remainder of a complete stack (72) by way of stopping and transferring second articles. The complete stack (72) is then moved onwards for further handling and packaging, and the latter movement is provided to be carried out during the first collecting step.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<b>AL</b>	Albania	<b>ES</b>	Spain	<b>LS</b>	Lesotho	<b>SI</b>	Slovenia
<b>AM</b>	Armenia	<b>FI</b>	Finland	<b>LT</b>	Lithuania	<b>SK</b>	Slovakia
<b>AT</b>	Austria	<b>FR</b>	France	<b>LU</b>	Luxembourg	<b>SN</b>	Senegal
<b>AU</b>	Australia	<b>GA</b>	Gabon	<b>LV</b>	Latvia	<b>SZ</b>	Swaziland
<b>AZ</b>	Azerbaijan	<b>GB</b>	United Kingdom	<b>MC</b>	Monaco	<b>TD</b>	Chad
<b>BA</b>	Bosnia and Herzegovina	<b>GE</b>	Georgia	<b>MD</b>	Republic of Moldova	<b>TG</b>	Togo
<b>BB</b>	Barbados	<b>GH</b>	Ghana	<b>MG</b>	Madagascar	<b>TJ</b>	Tajikistan
<b>BE</b>	Belgium	<b>GN</b>	Guinea	<b>MK</b>	The former Yugoslav Republic of Macedonia	<b>TM</b>	Turkmenistan
<b>BF</b>	Burkina Faso	<b>GR</b>	Greece			<b>TR</b>	Turkey
<b>BG</b>	Bulgaria	<b>HU</b>	Hungary	<b>ML</b>	Mali	<b>TT</b>	Trinidad and Tobago
<b>BJ</b>	Benin	<b>IE</b>	Ireland	<b>MN</b>	Mongolia	<b>UA</b>	Ukraine
<b>BR</b>	Brazil	<b>IL</b>	Israel	<b>MR</b>	Mauritania	<b>UG</b>	Uganda
<b>BY</b>	Belarus	<b>IS</b>	Iceland	<b>MW</b>	Malawi	<b>US</b>	United States of America
<b>CA</b>	Canada	<b>IT</b>	Italy	<b>MX</b>	Mexico	<b>UZ</b>	Uzbekistan
<b>CF</b>	Central African Republic	<b>JP</b>	Japan	<b>NE</b>	Niger	<b>VN</b>	Viet Nam
<b>CG</b>	Congo	<b>KE</b>	Kenya	<b>NL</b>	Netherlands	<b>YU</b>	Yugoslavia
<b>CH</b>	Switzerland	<b>KG</b>	Kyrgyzstan	<b>NO</b>	Norway	<b>ZW</b>	Zimbabwe
<b>CI</b>	Côte d'Ivoire	<b>KP</b>	Democratic People's Republic of Korea	<b>NZ</b>	New Zealand		
<b>CM</b>	Cameroon	<b>KR</b>	Republic of Korea	<b>PL</b>	Poland		
<b>CN</b>	China	<b>KZ</b>	Kazakstan	<b>PT</b>	Portugal		
<b>CU</b>	Cuba	<b>LC</b>	Saint Lucia	<b>RO</b>	Romania		
<b>CZ</b>	Czech Republic	<b>LI</b>	Liechtenstein	<b>RU</b>	Russian Federation		
<b>DE</b>	Germany	<b>LK</b>	Sri Lanka	<b>SD</b>	Sudan		
<b>DK</b>	Denmark	<b>LR</b>	Liberia	<b>SE</b>	Sweden		
<b>EE</b>	Estonia			<b>SG</b>	Singapore		

**METHOD AND APPARATUS FOR PACKAGING SERIES OF ARTICLES IN DIFFERENT FORMATIONS**

The present invention relates to a method of packaging series of  
5 articles in different formations and is more closely defined in  
the preamble of claim 1. The invention furthermore concerns an  
apparatus for carrying out the method according to any method  
claim and is more closely defined in the preamble of the first  
apparatus claim.

10

The invention aims at packaging particularly bag-like packages  
containing e.g. instant soup ingredients, potato chips, instant  
tea and many other products, not only those belonging to the  
foodstuff sector, but to virtually any kind of products, and not  
15 only bags and packages, but also boxes and any other shape of  
articles and/or wrappings. The articles are being packed in two  
formations abutting and/or overlapping each other within an outer  
wrapping or package, preferably a carton which may be torn apart  
into two parts, each of which is holding one of said formations  
20 of articles, which thus won't have to be rearranged upon opening  
said carton or the like, but are ready for display, sale and use  
in this fashion.

A carton with packages as described above is previously known by  
25 EP-A-0 704 386. It will be appreciated, that this way of packa-  
ging saves a lot of space and thus packing material, as the one  
end portions of the packages are very thin and the packages are  
packed with these thin portions of two formations of packages  
facing and overlapping each other (Fig 3), whereby such over-  
30 lapping does not affect the total extension of either formation  
in stacking direction, as only the thinner portions overlap each  
other.

While such way of packaging generally is considered desirous and  
35 convenient as far as for instance use of available volume and  
outer packing material, transport, storage and display are con-  
cerned, little thought has been given so far to an advantageous  
mode of and apparatus for carrying out such packaging. A great  
problem is the practical adaption to the need for continuous  
40 change of the direction, in which the articles are to be stacked

in two different kinds of formation, the counting and grouping of both single articles and formations and the transport of such formations to packaging. In particular, so far there is no packaging machine or any suggestion or solution to achieve both high  
5 packing pace and safety for such way of packaging articles.

It is therefore an object of the present invention to provide a method and an apparatus for packaging series of articles in different formations. It is furthermore a particular object of  
10 the present invention to provide means for high packing speeds and simultaneously great safety and reliability of operation. It is, finally, an object of the present invention to improve known techniques in this field in various aspects.

15 These objects are achieved, according to the present invention, by a method of the initially defined kind being carried out as mentioned in the characterizing clause of claim 1. These objects are also achieved, according to the present invention, by an apparatus of the initially defined kind showing features as men-  
20 tioned in the characterizing clause of the first apparatus claim.

Further features of and advantages with the present invention are revealed by the following description with reference to the accompanying drawings, in which

25

Fig 1 shows a diagrammatical perspective view of a main part of a method or an apparatus according to the present invention, Fig 2 shows, in greater detail, a corresponding view as Fig 1 of the overall concept of a preferred embodiment of the inven-  
30 tion,

Fig 3 is a magnified partial perspective view of part of Fig 2 and

Fig 4 is a side elevational view of the parts shown in Fig 3.

35 In the drawings, the entire apparatus according to the present invention is designated by 1. It comprises two longitudinal conveyors 2, preferably endless belt conveyors, which are located on the same level, in parallel relation to but spaced apart from each other and are feeding packages 3 with bottom ends 4 and top  
40 ends 5 towards a receiving zone 6 common to both longitudinal

conveyors. A conveyor 2 is provided for each formation 71 of articles. An actuating means 7 is located across each conveyor establishing a stop zone 8 for stopped packages.

5 Each actuating means comprises a stop plate 9, which preferably is suspended from an actuating rod 10 forming part of an actuator 11, e.g. a pneumatic cylinder. The exact position of each stop plate is, of course, adjustable in a way as known per se, so that the length of travel of the packages on each conveyor and thereby  
10 the longitudinal distance between the planes of both stop plates can be adjusted, primarily for adaption to different sizes of articles to be handled. For certain special applications, the angles of each stop plate in vertical and/or lateral direction may also be adjustable to deviate from the ordinary 90° in relation  
15 to the conveyor plane and axis, respectively. The actuating means 7 are linked to sensors 12, e.g. photo cells, associated to each conveyor and linked to a computer unit 13 for detecting any misfeed, either concerning the orientation of the packages in general or in relation to each other. In case of misfeed, the actua-  
20 ting means of the conveyor in question will pull up its stop plate, so that the misfed package(s) will pass across said stop plate on the conveyor to a collecting zone 14 for misfed packages.

25 In front of each stop plate 9, i.e. upstreams each conveyor, there is provided at right angle across and above the latter a lateral conveyor 15, preferably an endless belt conveyor, having carrier plates 16. The lower part of these conveyors moves towards said collecting and stacking zone 6 between the two longitudinal conveyors, whereby said carrier plates are provided to  
30 transfer the articles travelling in longitudinal direction and stopped by said stop plates in lateral direction on to a horizontal receiving plate 17 adjacent each longitudinal conveyor and each stop zone 8 ahead of each stop plate 9.

35 Both receiving plates 17 are preferably located on the same level, which is slightly lower than the level of the upper part of the longitudinal conveyors. The difference between these two levels may correspond to approximately the maximum thickness of  
40 articles to be handled. Between each upper conveyor part and each

receiving plate 17, there is provided an angled guide plate 18, the one leg of which lies roughly within the same plane as said upper conveyor part, while the other leg is turned down. Both these latter legs define a duct 19 for collected and stacked  
5 articles. The width of said receiving plates 17 corresponds to somewhat less than the width of said duct, while the length of these plates, particularly if located on the same level, is roughly equal to or less than the length of each package. It is considered sufficient to have the plates carry part, e.g. 40 -  
10 80%, of the length of packages only. Even a coverage of 40% only will retain a bag-like package on said plate, as the bottom part is considerably thicker and thus heavier than the top part.

The lateral conveyors 15 are in parallel relation to and may  
15 overlap each other slightly, while their lateral extension and thus the lateral extension of the carrier plates 16 preferably amounts to part of the length of packages only, for instance 20 - 90%, particularly approximately 60%.

20 Downstreams of each receiving plate 17, there is arranged, roughly in a vertical plane transverse to the receiving plate, a positioning plate 20, the exact position of which may, of course, be adjusted. In operation, the positioning plate 20 is stationary, while the receiving plate is movable, firstly in a direction  
25 downstreams the respective adjacent conveyor and then back again to the extended position below the one end of the respective lateral conveyor above zone 6. The movement is effected by an actuator 21, e.g. a pneumatic cylinder with a rod 22 attached to the receiving plate in question. Each plate 17 may be withdrawn  
30 individually, i.e. as soon as an article has been dropped on to same or may both plates be withdrawn simultaneously, i.e. as soon as an article has been dropped on to each of them, so that by such a simultaneous movement, two articles are released at a time, which is particularly applicable in case of a considerable  
35 overlap between two formations of articles.

The duct 19 is laterally limited by said angled guide plates 18, one vertical leg of one plate is, however, not covering the entire side in question, but is reduced to vertical strips 23, between  
40 which the free ends of the horizontal bars 24 of a gridlike

upper collecting means 25, e.g. a step lift, are insertable. This lift, which also may be called lowering means, is provided adjacent said duct on its one side and is movable, with its bars 24 forming an intermediate platform for received and stacked packages, into and out of said duct by means of an actuator 26, e.g. a pneumatic cylinder, with an actuating rod 27. Simultaneously with the receiving of articles, the upper step lift is movable downwards in steps 37 from an upper level 28 to a lower level 29, each step corresponding roughly to the thickness of a received package, with the aid of an actuating means 30 incorporating e.g. a pneumatic cylinder (not shown). Apart from said steps 37, the upper step lift travels transversely in one engagement step 43 in the upper position into said duct and in one disengagement step 44 in the lower position out of said duct and, finally, in one big step 45 from the latter position up to the upper (standby) position preceding step 43.

The lateral parts of the head ends of said duct 19 are enclosed by angled continuations 31 of said guide plates leaving a vertically throughgoing slot 32 in the centre for a bearing arm 33 of a lower collecting means 34, e.g. a step lift, which also may be called lowering means, and which can be lowered in steps 38 from an upper level coinciding with the lower level 29 of the upper step lift 25 down to a lower level 35 by means of an actuating means 36 incorporating e.g. a pneumatic cylinder (not shown). The steps 38 of the lower step lift are provided to continue from an upper position within said duct 19 downwards out of said duct and into a formation holder 39 of roughly corresponding form as said duct, i.e. with lateral surfaces 40, angled continuations 41 and a slot 42 at the head ends. In this case, there are, preferably, two uninterrupted surfaces 40, as there is no need for any horizontal penetration. Apart from lowering steps 38, the lower step lift is liftable from its lower level 35 up to its upper level 29 in one major single step 46 to its upper standby position.

While the said duct 19, apart from any adjustability, is stationary, the said formation holder 39 is movable in transverse direction away from both step lifts by means of an actuating means 47, whereby the formation holder passes over a sliding surface 48, which is located adjacent and between a platform 49 carried

by said bearing arm 33 and a dito platform 50 carried by a bearing arm 51, which belongs to an actuating means 52 of a transfer unit 53.

5 Above said unit 53, there is provided a stationary guide channel 54 of similar shape as the formation holder 39, above which channel 54 there is provided a transfer means 55, which has a similar form as the formation holder 39, but may be closed all around apart from the lower end, which is provided to receive a  
10 double formation of articles, as indicated in the drawings.

The transfer unit 53 is suspended from an actuating means 56, by means of which it is provided to travel above an annexed sliding surface 57, in a direction further away from both step lifts on  
15 to e.g. a carton blank 58, which is fed in position in the direction of an arrow 59 from a carton stack 60, e.g. with the aid of suction means (not shown) as known per se.

A carton blank with e.g. a double formation with mutual overlap  
20 is then sucked down to a folding unit 61, only one side of which is shown in the drawings, which side consists of e.g. curvedly converging bars 62 bringing about automatic folding of the blank around the double formation along with other folding means, which are known per se and not shown here. A thus folded and sealed  
25 carton 63 is then moved on to further handling in the direction of the arrows 64 and 65.

All ducts, transfer units, holders etc may, of course, be designed adjustable and/or exchangeable for various sizes of articles.  
30 The said packages include, preferably, as known per se, a central tear apart line 66 and a window line 67 surrounding a window 68. Firstly, the window is torn away and then the package is broken apart by bending the two package halves around said line or a part of said line e.g. 180°, whereby the two formations are separated, each to stay in its own half, which functions as a display (see fig 1 a), b) and c)). Lines 66 and 67 consist, preferably, of suitable perforations. Mere folding lines may consist of embossed grooves. The drawings also reveal several cuts as known  
35 per se delimiting various flaps.

40



While figures 2-4 show most features in great detail, fig 1 shows a simplified and somewhat modified embodiment, where the upper step lift may be withdrawn in a direction away from the lower step lift, i.e. the lower step lift extends below a double formation of articles from one bottom end formation, while the upper step lift is insertable from the other bottom end formation. The receiving plates do each hold one article and are, preferably simultaneously, released, so that two articles overlapping each other fall down on to either a stack 72 of packages during build-up or on to the upper step lift as first packages. The purpose of the upper step lift is to receive part of a stack 72 of packages. During the time it takes to build up this part, the lower step lift is provided to move, preferably transversely, with a complete stack 72 of packages, usually two formations, on to a carton blank or to other means for holding and/or further handling. All of these features are, of course, also applicable on the embodiment shown in figures 2-4 or any other embodiment within the framework of this invention.

In either case, it is not mandatory to have the articles, single packages or the like overlap each other. Two formations may also abut each other bluntly, so that even articles, packages or the like having the shape of parallelepipeds may be covered by the present invention. On the other hand, there may be up to a 100% overlap or alteration of articles of any kind. Particularly in such a case, only one receiving plate for the articles coming from both lateral conveyors may be sufficient.

The apparatus 1 shown in figures 2 - 4 functions as follows:

On the longitudinal conveyors 2, articles 3 travel in a first direction 69 and in a second direction 70, respectively, with their bottom ends 4 first towards the receiving zone 6. Their travel is monitored by sensors 12 and computer unit 13, as mentioned before. Thanks to the concept of the invention, relatively high speeds are possible, for instance an article per second on each conveyor, which means a packaging pace of two articles per second.

The articles are stopped by the respective stop plate 9. At high travelling speeds, an accurate positioning of the stopped arti-

cles is often not possible. Particularly airfilled packages tend to bounce slightly backwards, may be even slightly diagonally. The stopped articles are in this, often non-accurate, position taken away from the respective longitudinal conveyor in trans-  
5 verse direction by the respective lateral conveyor 15 by one of its carrier plates 16 and are thrown into the upper end of duct 19 on to the respective receiving plate 17.

As mentioned before, the two receiving plates may be withdrawn  
10 alternately or simultaneously thus dropping the articles one by one or two at a time. The dropping is not just a simple withdrawal of the plate, but also an accurate positioning manoeuvre, as the article resting on its plate is drawn by the latter towards and against its positioning plate 20, whereby any space between  
15 the article bottom 4 and plate 20, due to non-accurate feeding or whatever further reasons there may be, is eliminated, so that a very accurate mutual positioning of both article formations is possible, usually at reduced speed, as the relatively high speed of the longitudinal conveyors partly is due because of the space  
20 between the articles travelling on same. An inaccurate mutual positioning of articles may cause either a concave hangdown or a convex buildup of the overlap zone of both formations, whereby deformations, damages and even breakdowns may be caused. Such inconveniences can easily be avoided by adjusting the positioning  
25 plate 20 appropriately.

When starting to collect and stack articles, the upper step lift  
25 is inserted into duct 19 at the upper level 28. For each article or each pair of overlapping articles, the lift is lowered by  
30 one step 37, until the lower level 29 is reached, where the lower step lift 34 is waiting with its platform 49. Now, the upper step lift is withdrawn transversely by step 44 and upwardly by step 45 to the upper standby position annexed to duct 19, while the lower step lift is lowered in steps 38 down to level 35 corresponding  
35 to the pace of collection/stacking of articles. When the latter level is reached, the upper step lift is pushed into duct 19 again to receive part of the articles of a stack 72 in double formation, e.g. 4-12 articles altogether of a complete stack 72 of 8-50 articles. At that stage, the formation holder is filled  
40 with articles and will be withdrawn laterally by actuating means

47, above sliding surface 48 and on to platform 50 of transfer unit 53. Then, actuating means 52 will be lifted up through guide channel 54 and into transfer means 55 to the level of sliding surface 57, where actuating means 56 will move said transfer unit  
5 with a collected stack 72 of articles across sliding surface 57 and on to a carton blank 58, which then is e.g. sucked down into folding unit 61, where i.a. converging bars 62 will fold the blank to surround said collected stack 72 as a closed and sealed carton 63, which is fed to further handling and/or transport etc.

10

As soon as platform 50 has been lifted up above formation holder 38, the latter is returned by actuating means 47 to its starting position right below duct 19. Then platform 49 is lifted up again to upper level 29 awaiting receipt of a new part of stacked articles released by the upper step lift, which accordingly fills  
15 the time gap it takes for the lower step lift to complete its task and the formation holder to transfer a complete stack 72 and return to its starting position.

20 All this enables high speed performance and greatest accuracy of all components.

The invention is not limited to the embodiments as described hereinbefore and shown in the accompanying drawings. Arbitrary  
25 modifications are, of course, possible within the scope of the inventive idea as outlined by the following claims. The lifts 25 and 34 may also be lowered continuously instead of stepwise.

30

35

40

## C l a i m s

1. Method of packaging series of articles (3) in different formations, characterized in that articles for  
5 each formation (71) are being fed longitudinally in mutually opposite directions (69,70) towards a common receiving zone (6) for collecting and stacking of articles (3), where first articles are stopped and transferred laterally to a first collecting step (25) for collecting part of a stack (72) of two formations (71)  
10 of articles, whereupon a so collected part is released to a second collecting step (34) for collecting the remainder of a complete stack (72) by way of stopping and transferring second articles, that said complete stack (72) then is moved onwards for further handling and packaging, and that the latter movement is  
15 being carried out during the said first collecting step.
2. Method according to claim 1, characterized in that, in the receiving zone (6), the articles (3) firstly are stopped by stop means (7-11), then are transferred laterally to  
20 said receiving zone (6), then are stopped and adjusted in their position by receiving and positioning means (17-22), then are released individually or pairwise to said first collecting step (25), and then are handed over to and are completed to a stack (72) in said second collecting step (34).
- 25
3. Method according to claim 1, characterized in that, during and upon said second collecting step (34), the articles (3) forming a complete stack (72) are held together and transferred by transfer means (53-55) on to a carton blank or the  
30 like (58) and are enclosed by same by means of a folding unit (61).
4. Apparatus (1) for carrying out the method according to any of claims 1-3, comprising means for packaging series of articles (3)  
35 in different formations (71), characterized in that articles for each formation (71) are provided to be fed in mutually opposite directions (69,70) by longitudinal conveyors (2) towards a common receiving zone (6) for collecting and stacking of articles (3), where first articles are provided to be  
40 stopped and transferred laterally by lateral conveyors (15) to a

- first collecting means (25) for collecting part of a stack (72) of two formations (71) of articles, whereupon a so collected part is provided to be released to a second collecting means (34) for collecting the remainder of a complete stack (72) by way of
- 5 stopping and transferring second articles, that said complete stack (72) then is provided to be moved onwards for further handling and packaging, and that the latter movement is provided to be carried out during the first collecting step.
- 10 5. Apparatus according to claim 4, characterized in that the two longitudinal conveyors (2) are located on the same level, in parallel relation to but spaced apart from each other and are provided to feed articles (3) with bottom ends (4) first towards said common receiving zone 6, that an actuating
- 15 means (7) is located across each conveyor establishing a stop zone (8) for stopped articles, that each actuating means comprises a stop plate (9), which preferably is suspended from an actuating rod (10) forming part of an actuator (11), e.g. a pneumatic cylinder, and that the exact position of each stop plate
- 20 is, adjustable in a way as known per se, so that the longitudinal distance between the planes of both stop plates is adjustable, primarily for adaption to different sizes of articles to be handled.
- 25 6. Apparatus according to claim 4 or 5, characterized in that the actuating means (7) are linked to sensors (12), e.g. photo cells, associated to each conveyor and linked to a computer unit (13) for detecting any misfeed, either
- 30 concerning the orientation of the packages in general or in relation to each other, and that in case of misfeed, the actuating means of the conveyor in question is provided to pull up its stop plate to allow any misfed package(s) to pass across said stop plate on the conveyor to a collecting zone (14) for misfed packages.
- 35 7. Apparatus according to claims 4-6, characterized in that in front of each stop plate (9), upstreams each conveyor, there is provided at right angle across and above the latter a lateral conveyor (15) having carrier plates (16), the
- 40 lower part of which conveyors is provided to move towards said

collecting and stacking zone (6) between the two longitudinal conveyors with said carrier plates transferring the articles travelling in longitudinal direction and stopped by said stop plates in lateral direction on to said first collecting means, preferably via a horizontal receiving plate (17) adjacent each longitudinal conveyor and each stop zone (8) ahead of each stop plate (9).

8. Apparatus according to claim 7, characterized in that both receiving plates (17) are located on the same level, which is slightly lower than the level of the upper part of the longitudinal conveyors, that between each upper conveyor part and each receiving plate (17), there is provided an angled guide plate (18), the one leg of which lies roughly within the same plane as said upper conveyor part, while the other leg is turned down, that both these latter legs define a duct (19) for collected and stacked articles, that the length of these plates, particularly if located on the same level, is roughly equal to or less than the length of each package, e.g. 40-80% of the length of articles only.

9. Apparatus according to any of claims 4-8, characterized in that downstreams of the or each receiving plate (17), there is arranged, roughly in vertical plane transverse to the receiving plate, an adjustable positioning plate (20), that the receiving plate is movable, firstly in a direction downstreams the respective adjacent conveyor and then back again to the extended position below the one end of the respective lateral conveyor above zone (6), and that each plate (17) is individually withdrawable or are both plates simultaneously withdrawable to release two articles at a time.

10. Apparatus according to claim 8 or 9, characterized in that one vertical leg of one guide plate (18) is not covering the entire side in question, but is reduced to vertical strips (23), between which the free ends of the horizontal bars (24) of a gridlike upper collecting means (25), e.g. a step lift, are insertable, which means is provided adjacent said duct on its one side and is movable, with its bars (24) forming an intermediate platform for received and stacked packages, into

and out of said duct by means of an actuator (26), e.g. a pneumatic cylinder, with an actuating rod (27), that the upper step lift is movable downwards in steps (37) from an upper level (28) to a lower level (29), each step corresponding roughly to the thickness of a received package, with the aid of an actuating means (30) incorporating e.g. a pneumatic cylinder, that apart from said steps (37), the upper step lift is provided to travel transversely in one engagement step (43) in the upper position into said duct and in one disengagement step (44) in the lower position out of said duct and in one big step (45) from the latter position up to the upper (standby) position preceding the afore-mentioned step (43).

11. Apparatus according to any of claims 8-10, characterized in that the lateral parts of the head ends of said duct (19) are enclosed by angled continuations (31) of said guide plates leaving a vertically throughgoing slot (32) in the centre for a bearing arm (33) of said lower collecting means (34), which is lowerable in steps (38) from an upper level coinciding with the lower level (29) of the upper step lift (25) down to a lower level (35) by means of an actuating means (36) incorporating e.g. a pneumatic cylinder, that the steps (38) of the lower step lift are provided to continue from an upper position within said duct (19) downwards out of said duct and into a formation holder (39) of roughly corresponding form as said duct with lateral surfaces (40), angled continuations (41) and a slot (42) at the head ends, which surfaces (40) are, preferably, uninterrupted surfaces (40), and that the lower step lift is liftable from its lower level (35) up to its upper level (29) and standby position there in one major single step (46).

12. Apparatus according to claim 11, characterized in that the said duct (19), apart from any adjustability, is stationary, while the said formation holder (39) is movable in transverse direction away from both step lifts by means of an actuating means (47), whereby the formation holder is provided to pass over a sliding surface (48), which is located adjacent and between a platform (49) carried by said bearing arm (33) and a ditto platform (50) carried by a bearing arm (51), which belongs to an actuating means (52) of a transfer unit (53).

13. Apparatus according to claim 12, characterized in that above said unit (53), there is provided a stationary guide channel (54) of similar shape as the formation holder (39), above which channel (54) there is provided a transfer means (55), which has a similar form as the formation holder (39), but which, preferably, is closed all around apart from the lower end, which is provided to receive a double formation of articles.

14. Apparatus according to claim 13, characterized in that the transfer unit (53) is suspended from an actuating means (56), by means of which it is provided to travel above an annexed sliding surface (57), in a direction further away from both step lifts on to e.g. a carton blank (58), which is fed in position from a carton stack (60), e.g. with the aid of suction means.

15. Apparatus according to claim 14, characterized in that a carton blank or the like with e.g. a double formation with mutual overlap of articles is provided to be sucked down to a folding unit (61) comprising e.g. curvedly converging bars (62) bringing about automatic folding of the blank around the double formation along with other folding means, and that a thus folded and sealed carton (63) is provided to be moved on to further handling.

16. Apparatus according to any of claims 4-15, characterized in that the upper step lift is withdrawable in a direction away from the lower step lift, which is provided to extend below a double formation of articles from one bottom end formation, while the upper step lift is insertable from the other bottom end formation, that the receiving plates each are provided to hold one article and are, preferably simultaneously, releasable.

17. Apparatus according to any of claims 8-16, characterized in that when starting to collect and stack articles, the upper step lift (25) is provided to be inserted into duct (19) at the upper level (28), that for each article or each pair of overlapping articles, the lift is lowerable by one step (37), until the lower level (29) is reached, where the lower step



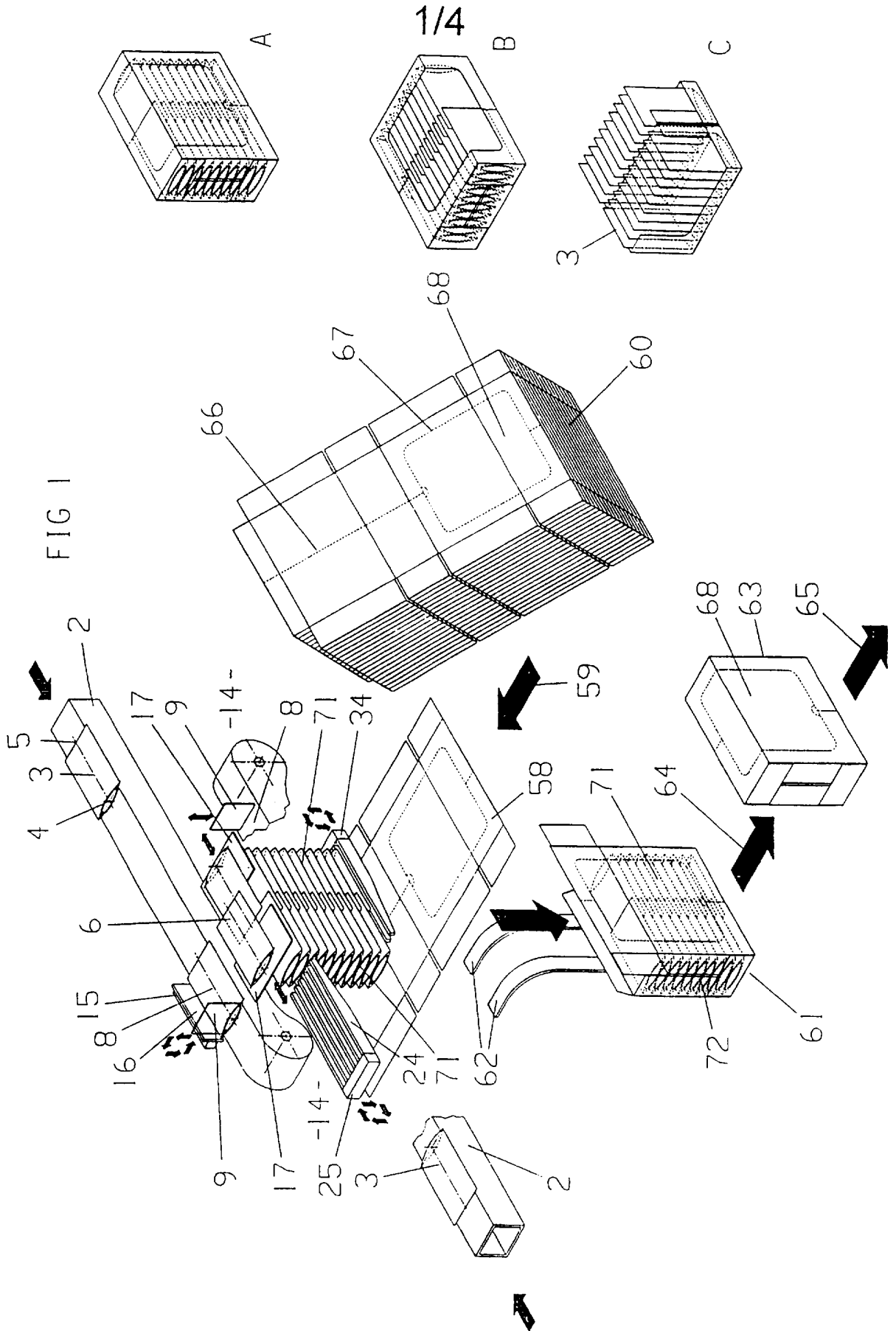
lift (34) is provided to be waiting with its platform (49), that the upper step lift is withdrawable transversely (by step 44) and upwardly (by step 45) to the upper standby position annexed to duct (19), while the lower step lift is lowerable in steps (38) 5 down to said level (35) corresponding to the pace of collection/stacking of articles, that, when the latter level is reached, the upper step lift is provided to be pushed into duct (19) again to receive part of the articles of a stack (72) in double formation, that the formation holder, when filled with articles, it is pro- 10 vided to be withdrawn laterally by actuating means (47), above sliding surface (48) and on to platform (50) of transfer unit (53), that the actuating means (52) is provided to be lifted up through said guide channel (54) and into transfer means (55) to the level of sliding surface (57), where actuating means (56) are 15 provided to move said transfer unit with a collected stack (72) of articles across sliding surface (57) and on to a carton blank (58), which then is provided to be sucked down into said folding unit (61).

20 18. Apparatus according to any of claims 8-17, c h a r a c t e - r i z e d i n t h a t as soon as platform (50) has been lifted up above formation holder (38), the latter is provided to be re- turned by actuating means (47) to its starting position right be- low duct (19), that then said platform (49) is provided to be 25 lifted up again to upper level (29) awaiting receipt of a new part of stacked articles released by the upper step lift, which is provided to fill the time gap it takes for the lower step lift to complete its task and the formation holder to transfer a complete stack (72) and return to its starting position.

30

35

40



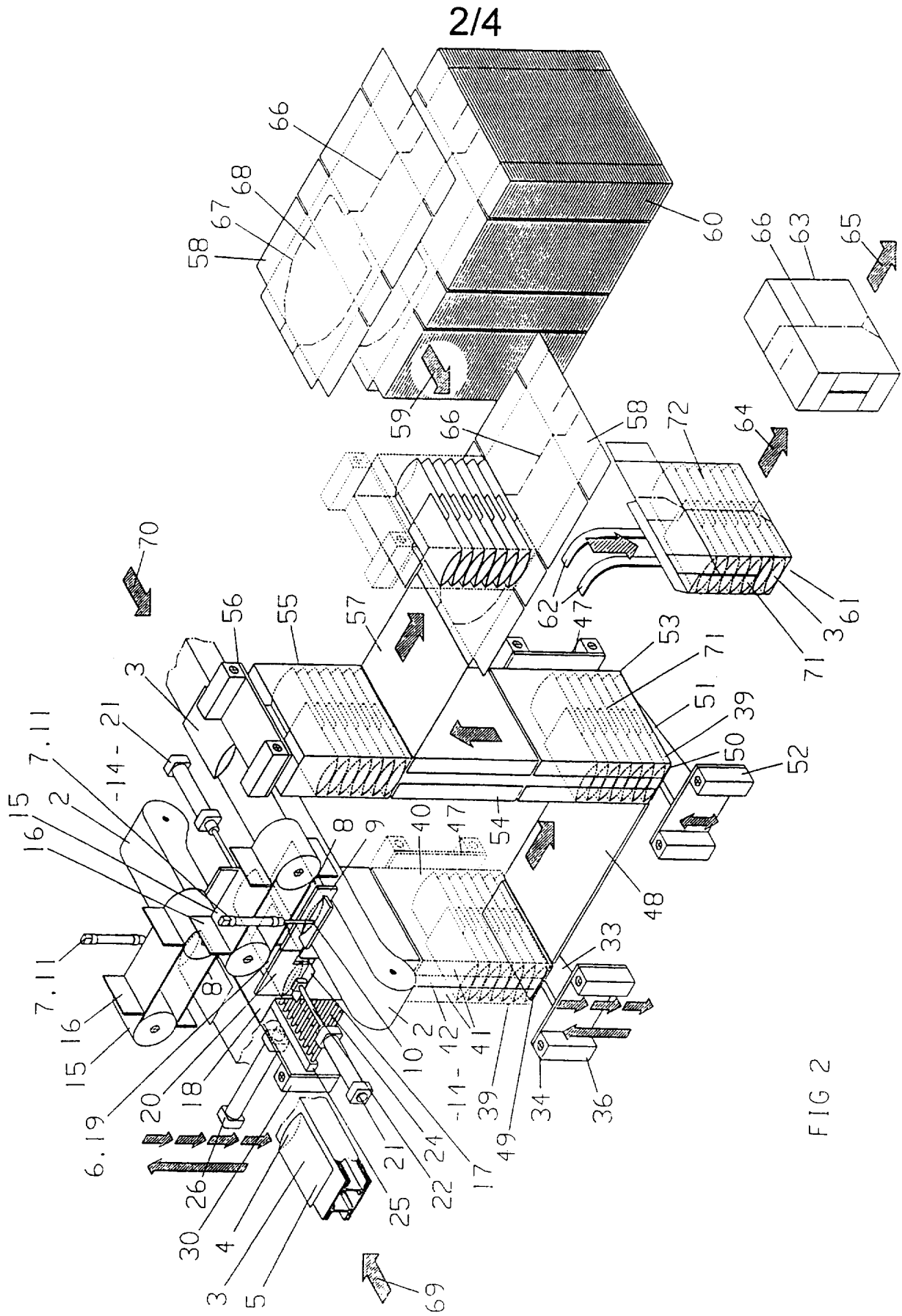


FIG 2

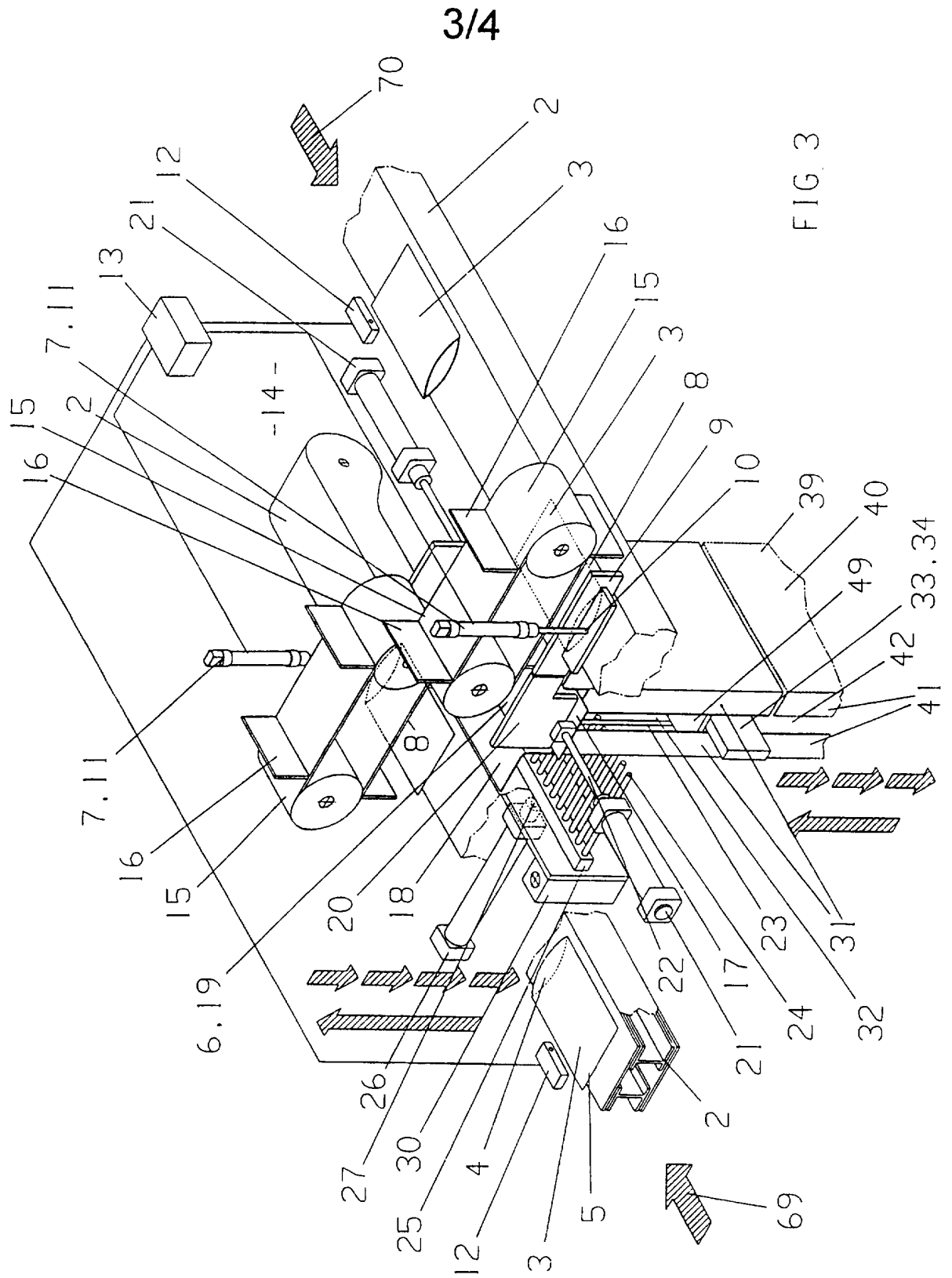


FIG. 3

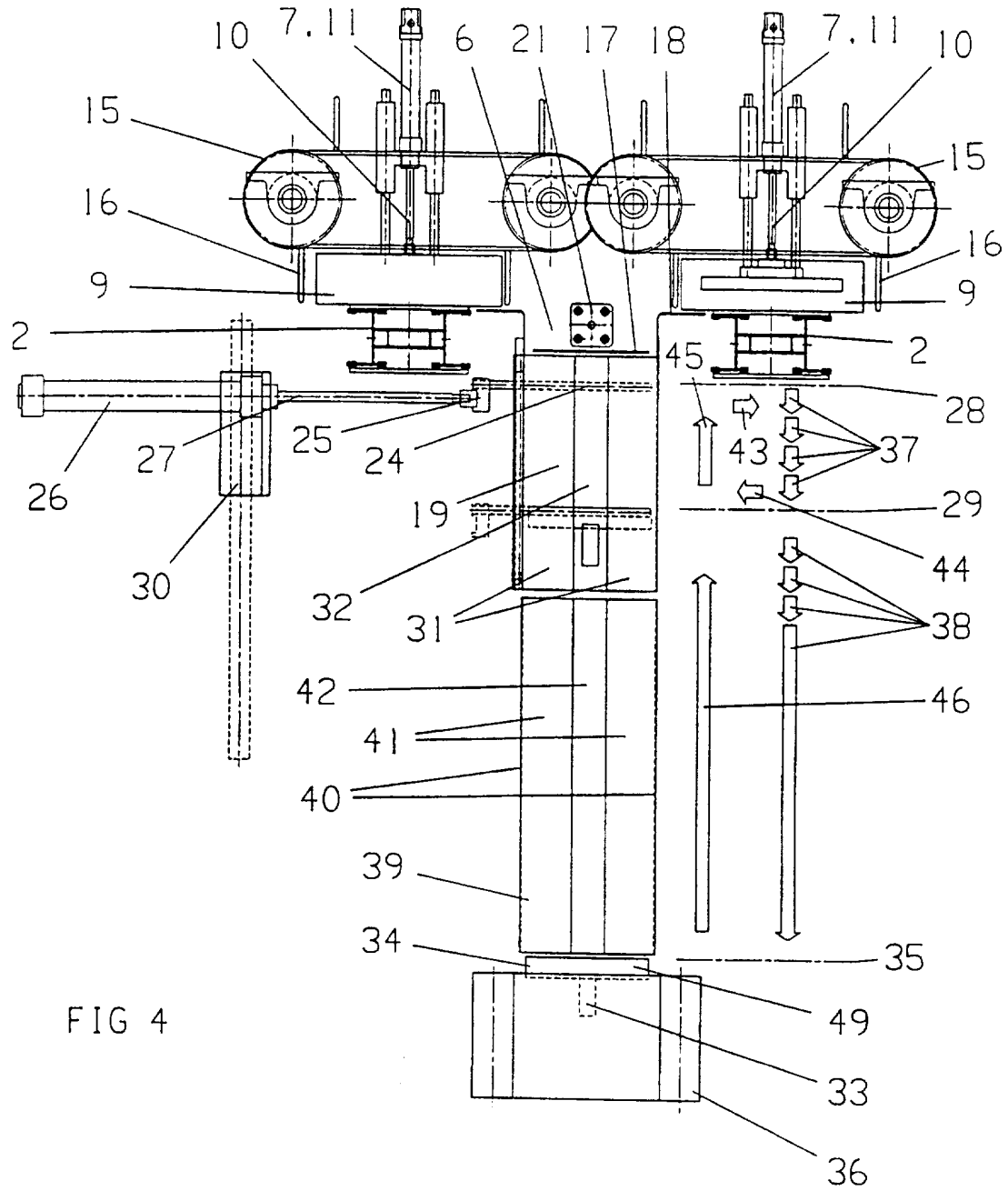


FIG 4

# INTERNATIONAL SEARCH REPORT

Inter. .nal application No.

PCT/SE 97/00767

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65B 5/06, B65B 35/50

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0744345 A1 (GRAB, MARCEL), 27 November 1996 (27.11.96), figure 1, abstract  --	1,4
A	GB 1457624 A (LERNER MACHINE COMPANY LIMITED), 8 December 1976 (08.12.76), page 1, line 12 - line 33  -- -----	

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

21 August 1997

Date of mailing of the international search report

26 -08- 1997

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Kristina Pederson  
Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

Information on patent family members

06/08/97

International application No.

PCT/SE 97/00767

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0744345 A1	27/11/96	NONE	
GB 1457624 A	08/12/76	NONE	