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(54) Packaging machine and tray packaging method

(57) The packaging machine (1) comprises a first conveyor (2) arranged to discontinuously feed trays (3) for closure to two or more sealing units (4) disposed in-line. It comprises, upstream of the first conveyor (2), a second conveyor (5) connectable to a machine for filling the trays (3), and means (7) for transferring the trays (3) from the second to the first conveyor (5, 2), in such a manner that the trays (3) are fed continuously to the packaging machine (1) and are fed discontinuously to the sealing units (4). The tray packaging method consisting of conveying the trays (3) by a first conveyor (2) moving with discontinuous movement into sealing units (4) where they are closed. A predetermined number of trays (3) are fed in line to a second conveyor (5) which moves with unidirectional movement, these trays (3) being transferred onto the first conveyor (2).

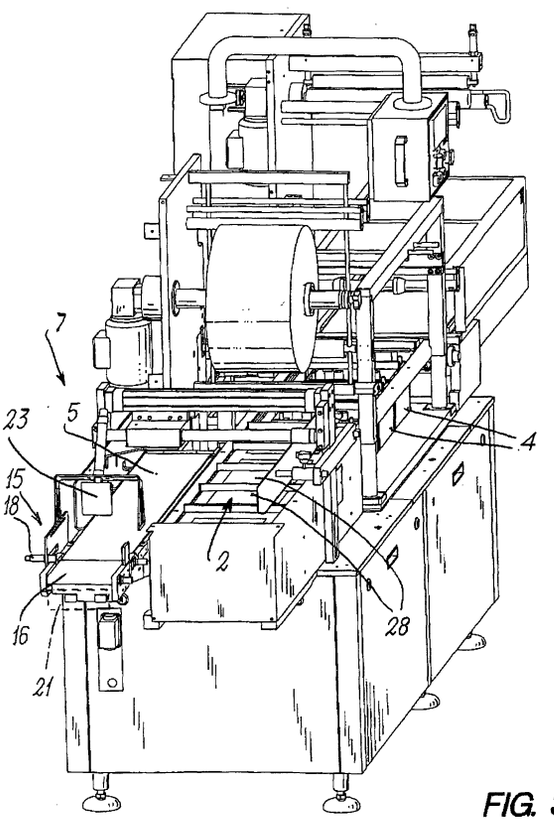

FIG. 3

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Description

[0001] The present invention relates to packaging machine and a tray packaging method.

[0002] In particular, reference will be made hereinafter to packaging machines for trays containing food products; there trays are often sealed by a protective plastic film after being previously filled with an inert gas different from air, such as nitrogen or carbon dioxide.

[0003] Packaging machines currently exist consisting of a conveyor which feeds the already filled trays for sealing to a sealing unit, where the trays are closed by the film after the air has been replaced by an insert gas.

[0004] The conveyor is usually of the slat type, presenting slats disposed transversely to the tray advancement direction, the slats being connected both together and to a drive system.

[0005] Advancement is hence achieved by translationally moving the slats, which by their movement drag the tray.

[0006] This conveying system has proved very effective because it enables high precision to be achieved in positioning the tray within the sealing unit.

[0007] However the productivity which can be achieved using traditional packaging machines with a slat conveyor is very limited, because after the slat conveyor has conveyed the trays into the sealing unit, it has to move back (so freeing the sealing unit) to enable the sealing unit to close.

[0008] Hence in practice the machine operation is discontinuous, its productivity being limited by the fact that the conveyor can only feed one tray at a time to the sealing unit, after which the slat conveyor has to withdraw, and while the sealing unit is working, the conveyor has to remain at rest waiting for the sealing unit to terminate its work and reopen.

[0009] To overcome this drawback machines have been developed provided with several sealing units working in parallel; hence the trays all pass through the filling machine in a line, after which their overall path is divided into several paths, each feeding one sealing unit.

[0010] These machines are evidently very complicated and costly because of the multiplication of the sealing units and the presence of a tray distributor to deviate the trays along different paths.

[0011] To further improve machines of the described type, packaging machines have been developed presenting several in-line sealing units and provided with slat conveyors (in which the trays are inserted manually) arranged to feed one tray to each of the sealing units; hence in practice the machine is able to simultaneously seal several trays while being free of the complex deviator device of the previously described solution.

[0012] Not with standing the high productivity obtainable with such a packaging machine, it presents certain drawbacks deriving mainly from the considerable idle time between one sealing stage (simultaneous for several trays) and the next.

[0013] In this respect, when the sealing units are working to seal the trays, the conveyor must necessarily remain at rest as the conveyor (and in particular its constituent transverse slats) would not have space to move and would interfere with the sealing unit structure.

[0014] These idle times are hence again a cause of limited productivity and possible high costs due to the need to multiply the number of sealing machines in order to be able, within a reasonable time, to wrap all those trays continuously supplied by the filling machines.

[0015] The technical aim of the present invention is therefore to provide a packaging machine and a tray packaging method by which the stated technical drawbacks of the known art are eliminated.

[0016] Within the scope of this technical aim, an object of the invention is to provide a packaging machine and method achieving very high overall productivity.

[0017] Another object of the invention is to provide a machine and method which are very economical and do not require the use of a large number of machines to clear (package) all the trays supplied by the filling machine (for closure).

[0018] A further object of the invention is to provide a packaging machine and a tray packaging method which are simple and reliable and enable conveyors of traditional type to be used to insert the trays into the sealing units for closure.

[0019] The technical aim, together with these and other objects, are attained according to the present invention by a packaging machine comprising a first conveyor arranged to discontinuously feed trays for closure to two or more sealing units disposed in-line, characterised by comprising, upstream of said first conveyor, a second conveyor connectable to a machine for filling said trays, and means for transferring said trays from said second to said first conveyor, in such a manner that said trays are fed continuously to said packaging machine by said second conveyor, and are fed discontinuously to said sealing units by said first conveyor.

[0020] The present invention also relates to a tray packaging method consisting of conveying the trays by a first conveyor moving with discontinuous movement into sealing units where they are closed, characterised by feeding a predetermined number of trays in line to a second conveyor which moves with unidirectional movement, and to transfer these trays onto the first conveyor, in such a manner that, by the time the first conveyor feeds one tray into each sealing unit and returns to its initial configuration remaining at rest while awaiting termination of sealing, the predetermined number of trays are fed onto the second conveyor.

[0021] Other characteristics of the present invention are defined in the other claims.

[0022] Advantageously, the machine and method of the present invention allow the second conveyor to move while the first remains at rest during the operation of the sealing units.

[0023] Further characteristics and advantages of the invention will be more apparent from the ensuing description of a preferred but non-exclusive embodiment of the packaging machine and tray packaging method of the invention, the machine being illustrated by way of non-limiting example in the accompanying drawings, in which:

Figure 1 is a schematic view of a machine according to the present invention;
Figure 2 is a side perspective view of the machine of the invention;
Figure 3 is a front perspective view of the machine of the invention; and
Figure 4 is an enlarged detail of Figure 3.

[0024] Said figures show a packaging machine indicated overall by the reference numeral 1.

[0025] The packaging machine 1 comprises a first conveyor 2 for discontinuously feeding trays 3 for closure to two or more in-line sealing units 4.

[0026] The first conveyor 2 is a traditional slat conveyor, but in other embodiments it may be a belt conveyor, plate conveyor, etc.

[0027] The machine also comprises, upstream of the first conveyor 2, a second conveyor 5 connectable to a tray filling machine (of which only the exit conveyor 6 for the filled trays is shown).

[0028] The machine also comprises means 7 for transferring the trays 3 from the second conveyor 5 to the first conveyor 2.

[0029] The trays 3 are fed continuously to the packaging machine 1 by the second conveyor 5, and are fed discontinuously to the sealing units 4 by the first conveyor 2; this enables the second conveyor 5 to be operated (to receive the trays) even while the sealing units are operating and the first conveyor 2 is at rest.

[0030] The transfer means 7 are arranged to move the trays 3 in a direction substantially transverse to the axis 10 of the first conveyor 2.

[0031] For this reason the first and second conveyor 2, 5 present a portion 11a, 11b side-by-side each other to enable the trays to slide from the second to the first conveyor 2, 5.

[0032] Advantageously, the transfer means 7 comprise a pusher 12 movable above the second and first conveyor 5, 2 in correspondence with their side-by-side portion 11a, 11b.

[0033] The pusher 12 is rigid with an actuator 13 slidable on a shaft 14; the actuator is of the hydraulic, pneumatic or electrical type according to requirements.

[0034] The machine 1 also comprises means 15 for controlling the number of trays 3 fed to the second conveyor 5.

[0035] These control means 15 comprise a third conveyor 16 positioned upstream of the second conveyor 5, and a sensor 18 for sensing the presence and/or passage of a tray 3 on the third conveyor 16.

[0036] The sensor 18 is connected to an electronic processor 19 for controlling the movement of the first, second and third conveyor 2, 5, 16 and of the transfer means 7.

[0037] In a preferred embodiment the machine 1 comprises a first stop 21 positioned upstream of the third conveyor 16; this first stop 21 is movable between a non-operative position 21b (shown by dashed lines in Figure 4) in which it allows the trays 3 originating from the filling machine to pass, and an operative position 21a in which it prevents this passage.

[0038] Advantageously, the machine 1 also comprises a second stop 23 located downstream of the sensor 18; the second stop is movable between a non-operative position 23b in which it allows the trays 3 to pass (this position is shown by full lines in Figure 4), and an operative position 23a in which it prevents passage of the trays 3.

[0039] The operation of the packaging machine of the invention is apparent from that described and illustrated, and is substantially the following.

[0040] In an initial stage the first conveyor 2 and second conveyor 5 are at rest while the third conveyor 16 moves and receives the trays which are continuously fed to it by the conveyor 6 of the filling machine.

[0041] The trays 3 are advantageously guided on the conveyor 6 by fixed tracks 25 along which the trays 3 slide.

[0042] When a tray 3 is dragged onto the third conveyor 16 (which moves at a speed equal to or slightly greater than the conveyor 6 of the filling machine), the sensor 18 senses its presence and causes the first stop 21 to pass from the position 21b (in which it does not hinder tray passage) to the position 21a (in which it prevents passage of further trays originating from the conveyor 6 towards the conveyor 16); this constitutes mainly a safety factor; in other examples the first stop 21 could also be absent.

[0043] The second stop 23 (if present) lies initially in the position 23a (i.e. ready to prevent passage of the trays 3 from the third conveyor 16 to the second conveyor 5).

[0044] When the sensor senses the presence of a tray 3 on the third conveyor 16 the second stop 23 is made to pass from the position 23a to the position 23b (in which it allows the trays to pass from the third conveyor 16 to the second conveyor 5); in practice the second stop 23 is operated simultaneously with or immediately after the first stop 21.

[0045] The second conveyor 5 is then driven (at the same speed as the third conveyor 16) so that the tray 3 abandons the third conveyor 16 and passes onto the second conveyor 5; the second conveyor 5 then halts while awaiting a further tray from the third conveyor 16.

[0046] When the sensor 18 no longer senses the presence of the tray 3 on the third conveyor 16 (because the tray 3 has passed onto the second conveyor 5), the second stop 23 is lowered from the position 23b to the

position 23a; simultaneously (or after a certain time from when the sensor 18 no longer senses the presence of the tray 3 on the third conveyor 16) the first stop 21 passes from the position 21a to the position 21b, allowing a further tray 3 to pass from the conveyor 6 of the filling machine to the third conveyor 16 of the packaging machine 1.

[0047] The trays 3 which have passed from the third conveyor 16 to the second conveyor 5 remain aligned on the conveyor 5, as shown for example in Figure 1 which shows two trays aligned on the conveyor 5.

[0048] The data obtained by the sensor 18 are transmitted to the electronic processor 19 which counts the trays 3 passing in succession from the third conveyor 16 to the second conveyor 5.

[0049] When the electronic processor 19 has counted a predetermined number of trays (preferably corresponding to the number of sealing units 4, which in the present example are four in number), the second conveyor 5 does not merely allow a tray 3 to be conveyed onto it and then stop (allowing the third conveyor 16 to completely abandon it), but continues in its travel until the trays 3 are brought into a position aligned with seats 28 of the first slat conveyor 2 as indicated by the axes 27 of Figure 1; meanwhile the third conveyor 16 continues to operate as described.

[0050] The pusher 12 then transfers the trays 3 transversely from the second conveyor 5 to the first conveyor 2 by making them slide onto a plate 29 positioned between the side-by-side portions 11a and 11b of the conveyors 2 and 5.

[0051] The trays 3 housed on the first slat conveyor 2 are brought into the sealing units 4 in traditional manner and closed.

[0052] Advantageously, while the conveyor 2 conveys the trays into the sealing units 4, then withdraws and remains at rest awaiting completion of tray sealing, the third conveyor 16 continues to receive trays 3 and to convey them onto the second conveyor 5 where they become mutually aligned until, when the predetermined number is attained, they are firstly conveyed into alignment with the axes 27 and then transferred onto the first conveyor 2; this enables very high productivity to be achieved for the packaging machine 1 as the idle times due to sealing (during which the first conveyor 2 has to remain at rest) do not negatively influence the conveyor 5.

[0053] The particular constructional form described takes account of space optimisation, however in other embodiments the second conveyor 5 is proportioned such that when the trays 3 pass from the third conveyor 16 to the second conveyor 5, they are already aligned along the axes 27 and do not require the conveyor 5 to be further moved to bring them into that configuration.

[0054] The present invention also relates to a tray packaging method.

[0055] With this method, by means of a first conveyor 2 moving with discontinuous movement, the trays 3 are conveyed into sealing units 4 where they are closed.

[0056] A predetermined number of trays 3 are also fed in a line to a second conveyor 5 which moves with unidirectional movement to transfer the trays 3 onto the first conveyor 2.

[0057] In this manner, while the first conveyor 2 feeds a tray into each sealing chamber 4 and returns to its initial configuration (then remaining at rest while awaiting termination of sealing), the predetermined number of trays 3 are fed onto the second conveyor 5.

[0058] Preferably the second conveyor 5 moves with discontinuous movement and the first conveyor 32 moves with reciprocating movement.

[0059] With the method of the invention, the trays 3 are moved substantially transversely to their advancement direction onto the first conveyor 2.

[0060] In a preferred embodiment of the method, the number of trays 3 fed onto the second conveyor 5 is counted, and when the number of trays 3 equals the number of sealing units 4, the trays are transferred onto the first conveyor 2.

[0061] Modifications and variants are possible, in addition to those already stated; for example in a different embodiment the machine is without the second conveyor 5; in that embodiment the second conveyor 5 is replaced by the exit conveyor of the filling machine when said packaging machine is in operation.

[0062] The operation of the machine in this embodiment is the same as that already described.

[0063] It has been found in practice that the packaging machine and tray packaging method of the invention are particularly advantageous as they enable very high productivity to be achieved, while using traditional conveyors for example of slat type which ensure high reliability in addition to precision in positioning the trays inside the sealing units.

[0064] The packaging machine and tray packaging method conceived in this manner are susceptible to numerous modifications and variants, all falling within the scope of the inventive concept; moreover all details can be replaced by technically equivalent elements.

[0065] In practice the materials used, and the dimensions, can be chosen at will according to requirements and to the state of the art.

Claims

1. A packaging machine (1) comprising a first conveyor (2) arranged to discontinuously feed trays (3) for closure to two or more sealing units (4) disposed inline, **characterised by** comprising, upstream of said first conveyor (2), a second conveyor (5) connectable to a machine for filling said trays (3), and means (7) for transferring said trays (3) from said second to said first conveyor (5, 2), in such a manner that said trays (3) are fed continuously to said packaging machine (1) by said second conveyor

(5), and are fed discontinuously to said sealing units (4) by said first conveyor (2).

2. A machine (1) as claimed in claim 1, **characterised by** being without said second conveyor (5), said second conveyor (5) being replaced by an exit conveyor (6) of a filling machine when said packaging machine (1) is in operation.

3. A machine (1) as claimed in claim 1 or 2, **characterised in that** said transfer means (7) are arranged to move said trays (3) in a direction substantially transverse to the axis (10) of said first conveyor (2).

4. A machine (1) as claimed in claim 1 or 2 or 3, **characterised in that** said first and second conveyor (2, 5) present at least one portion (11a, 11b) mutually side-by-side to enable the trays (3) to slide from the second conveyor (5) to the first conveyor (2).

5. A machine (1) as claimed in claim 4, **characterised in that** said transfer means (7) comprise a pusher (12) movable above said second conveyor (5) and first conveyor (2) in correspondence with their side-by-side portions (11a, 11b).

6. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising means (15) for controlling the number of trays (3) fed to said second conveyor (5).

7. A machine (1) as claimed in claim 6, **characterised in that** said control means (15) comprise a third conveyor (16) positioned upstream of said second conveyor (5), and a sensor (18) for sensing the presence and/or passage of a tray (3) on said third conveyor (16), said sensor (18) being connected to an electronic processor (19) for controlling the movement of the first, second and third conveyor (2, 5, 16) and of said transfer means (7).

8. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising a first stop (21) positioned upstream of said third conveyor (16), said first stop (21) being movable between a non-operative position (21b) in which it allows the trays (3) originating from the filling machine to pass, and an operative position (21a) in which it prevents this passage.

9. A machine (1) as claimed in claim 1 or 2, **characterised by** comprising a second stop (23) located downstream of said sensor (18), said second stop (23) being movable between a non-operative position (23b) in which it allows said trays (3) to pass, and an operative position (23a) in which it prevents passage of said trays (3).

10. A machine (1) as claimed in claim 1 or 2, **characterised in that** said first conveyor (2) is a slat conveyor.

11. A tray packaging method consisting of conveying the trays (3) by a first conveyor (2) moving with discontinuous movement into sealing units (4) where they are closed, **characterised by** feeding a predetermined number of trays (3) in line to a second conveyor (5) which moves with unidirectional movement, these trays (3) being transferred onto the first conveyor (2) in such a manner that, by the time the first conveyor (2) feeds one tray (3) into each sealing unit (4) and returns to its initial configuration remaining at rest while awaiting termination of sealing, the predetermined number of trays (3) are fed onto the second conveyor (5).

12. A method as claimed in claim 11, **characterised in that** said second conveyor (5) moves with discontinuous movement, and said first conveyor (2) moves with reciprocating movement.

13. A method as claimed in claim 11, **characterised by** transferring said trays (3) substantially transversely to their advancement direction onto said first conveyor (2).

14. A method as claimed in claim 11, **characterised by** counting the number of trays (3) fed onto the second conveyor (5) and, when the number of trays (3) equals the number of sealing units (4), transferring the trays (3) onto the first conveyor (2).

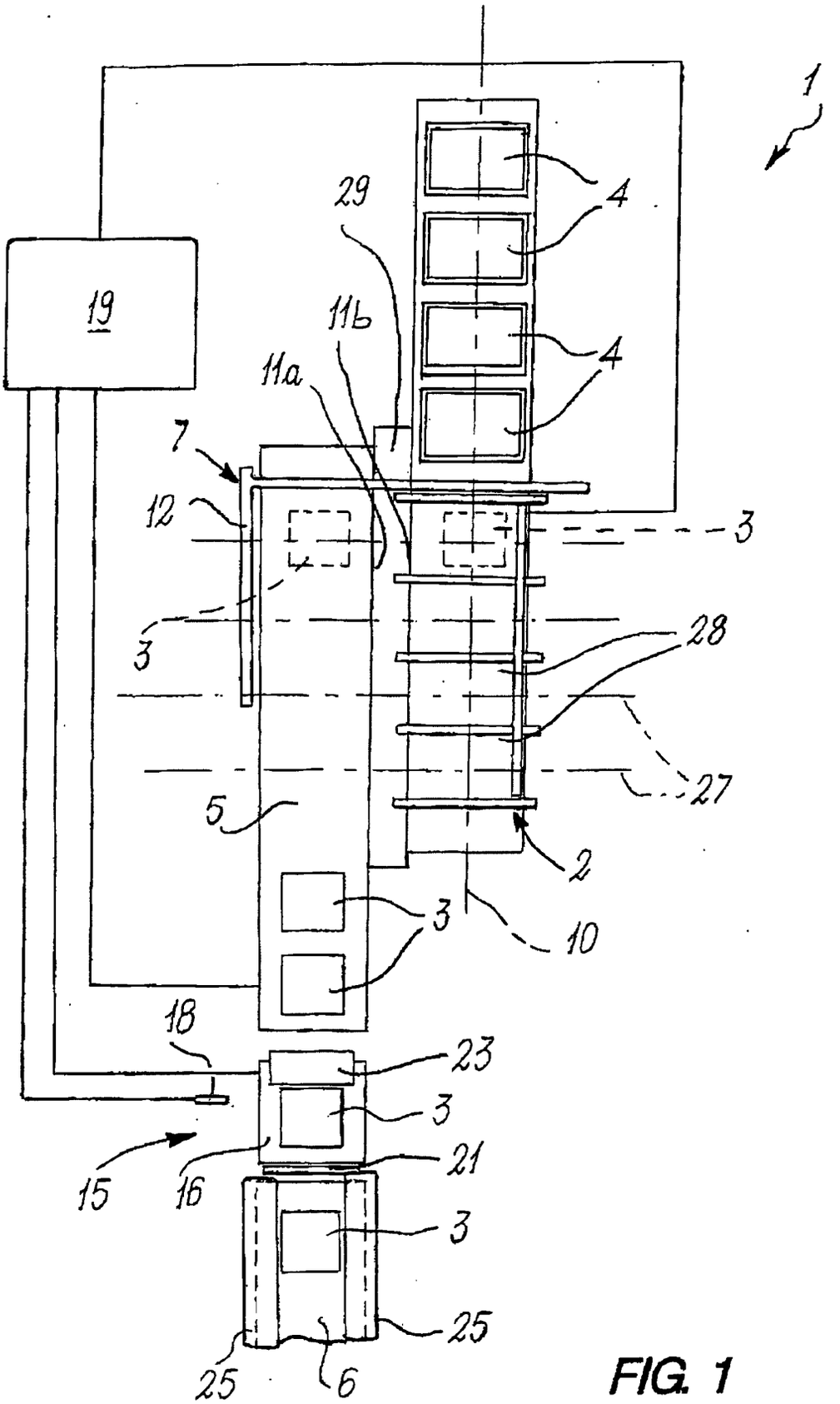

FIG. 1

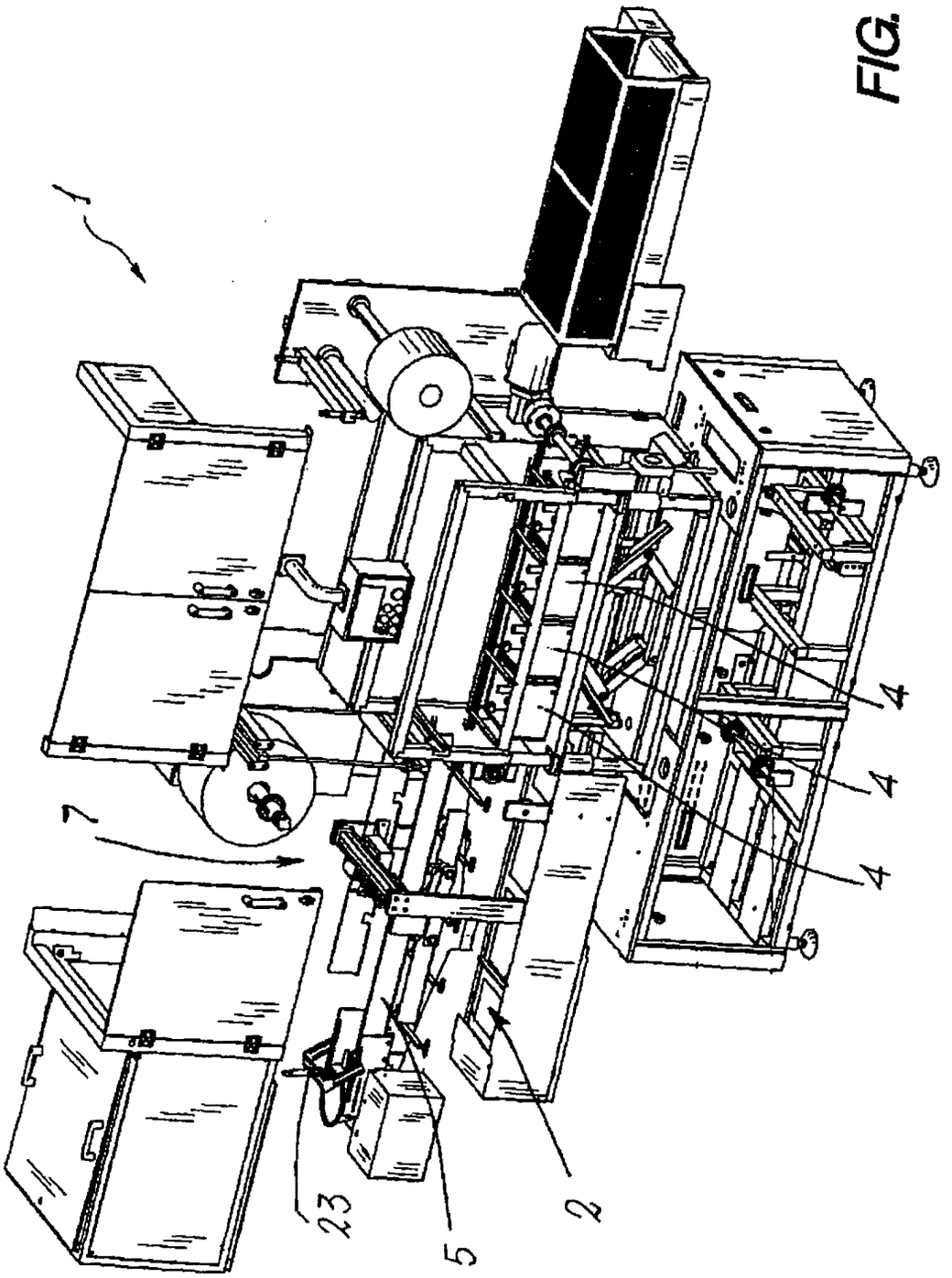

FIG. 2

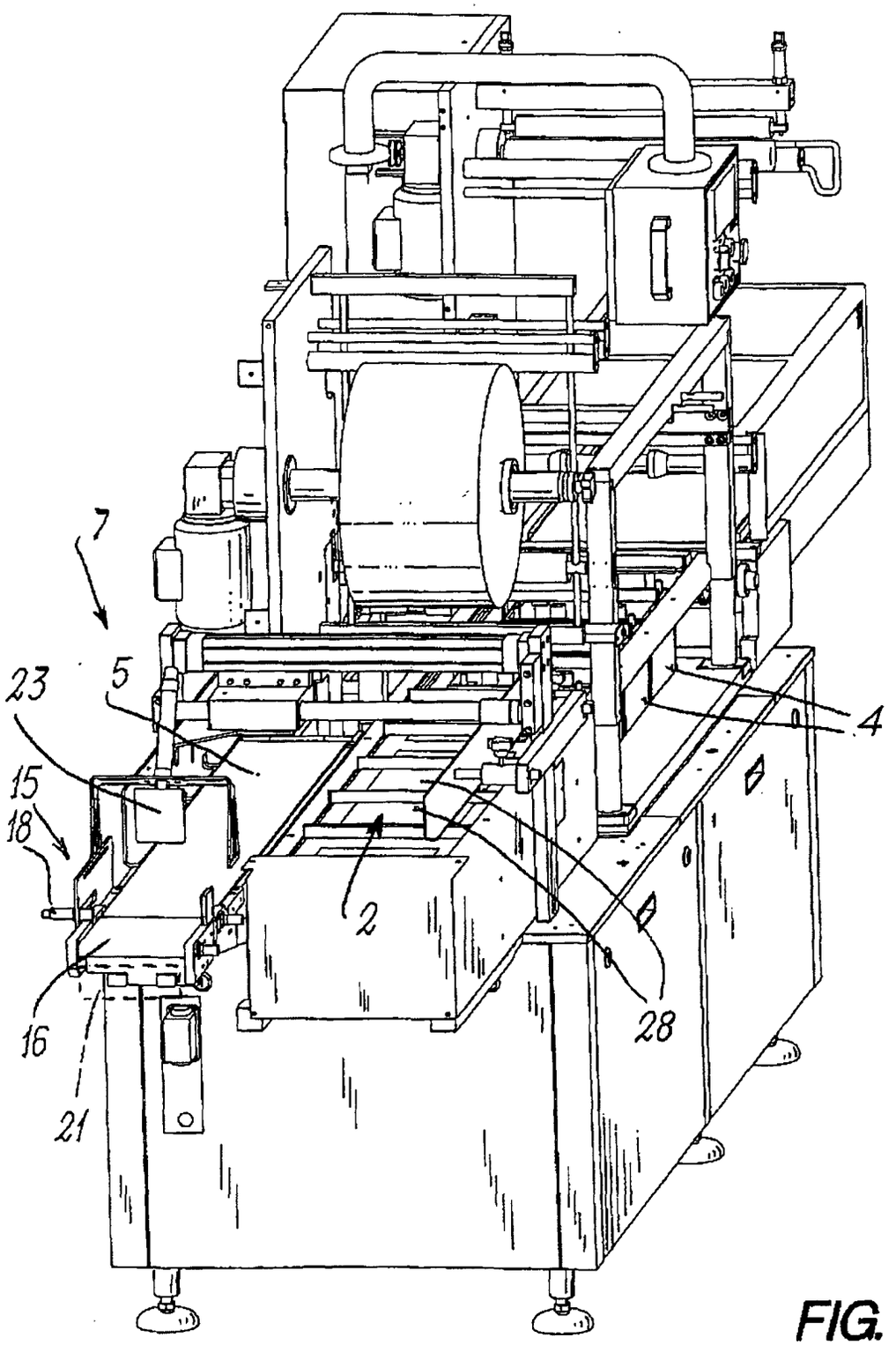

FIG. 3

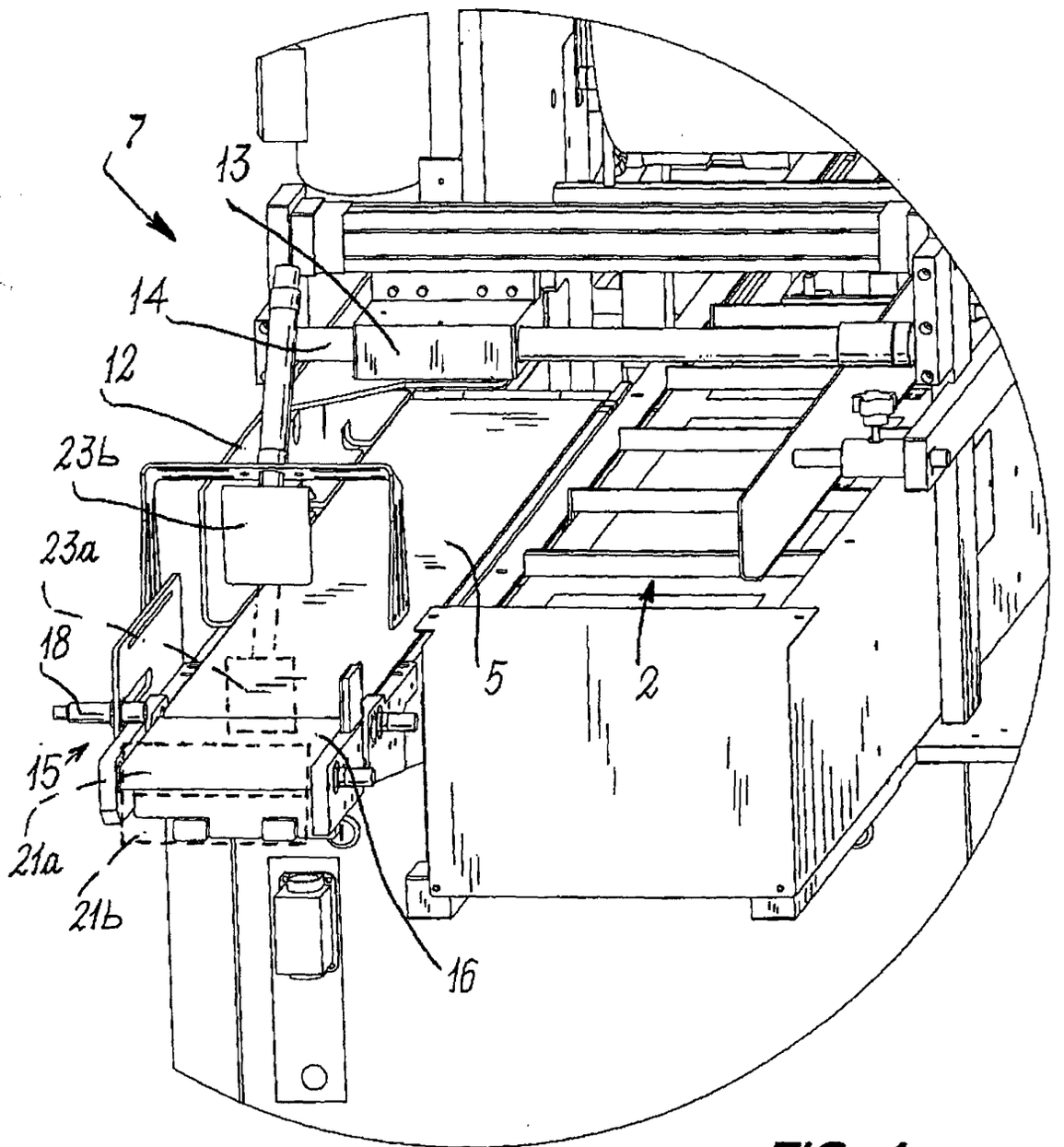

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 05 10 1902

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	EP 0 680 880 A (G. MONDINI S.P.A) 8 November 1995 (1995-11-08) * column 3, line 12 - column 6, line 56; figure 1 *	1,2,6,7, 11,12,14 3-5, 8-10,13	B65B7/16 B65B25/00 B65G47/31
Y	EP 1 359 099 A (SIG PACK SYSTEMS AG) 5 November 2003 (2003-11-05) * the whole document *	3-5,13	
Y	US 6 305 149 B1 (GORLICH MICHAEL P ET AL) 23 October 2001 (2001-10-23) * figures 2,4 *	8-10	
P,A	EP 1 468 913 A (CFS PALAZZOLO S.P.A) 20 October 2004 (2004-10-20) * the whole document *	1,11	
A	WO 97/21594 A (UNILEVER N.V; UNILEVER PLC; OLTHOFF, MARC, MICHIEL; NIEUWENHUYS, AUGUS) 19 June 1997 (1997-06-19) * the whole document *	1,11	
A	US 3 908 342 A (RAQUE ET AL) 30 September 1975 (1975-09-30) * the whole document *	1,11	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B65B B65G
A	US 6 282 866 B1 (NATTERER HANS ET AL) 4 September 2001 (2001-09-04) * the whole document *	1,11	
A	DE 197 50 075 A1 (BENHIL GASTI VERPACKUNGSMASCHINEN GMBH, 41468 NEUSS, DE; GASTI-VERPACK) 27 May 1999 (1999-05-27) * the whole document *	1,11	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 June 2005	Vigilante, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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22-06-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0680880 A	08-11-1995	IT 1269721 B	15-04-1997
		DE 69505877 D1	17-12-1998
		DE 69505877 T2	27-05-1999
		EP 0680880 A1	08-11-1995
		ES 2125511 T3	01-03-1999
		US 5475965 A	19-12-1995
EP 1359099 A	05-11-2003	EP 1359099 A2	05-11-2003
US 6305149 B1	23-10-2001	US 5689937 A	25-11-1997
		US 5419097 A	30-05-1995
		AU 738246 B2	13-09-2001
		AU 6548098 A	29-09-1998
		EP 1040045 A2	04-10-2000
		JP 2001514604 T	11-09-2001
		WO 9840274 A2	17-09-1998
		AU 705773 B2	03-06-1999
		AU 4969796 A	27-08-1996
		CA 2212778 A1	15-08-1996
		EP 0808234 A1	26-11-1997
		JP 11502157 T	23-02-1999
		WO 9624470 A1	15-08-1996
		AT 188660 T	15-01-2000
		AT 247028 T	15-08-2003
		AU 688329 B2	12-03-1998
		AU 6952094 A	20-12-1994
		CA 2163230 A1	08-12-1994
		CA 2261199 A1	08-12-1994
		DE 69422620 D1	17-02-2000
		DE 69422620 T2	31-05-2000
		DE 69433041 D1	18-09-2003
		DE 69433041 T2	27-05-2004
		EP 0699157 A1	06-03-1996
		EP 0899209 A2	03-03-1999
		EP 0949147 A1	13-10-1999
		JP 8510708 T	12-11-1996
		JP 2001294278 A	23-10-2001
		NZ 267278 A	24-11-1997
		WO 9427868 A2	08-12-1994
		US 5479759 A	02-01-1996
EP 1468913 A	20-10-2004	EP 1468913 A1	20-10-2004
		US 2004226262 A1	18-11-2004
WO 9721594 A	19-06-1997	AU 1174897 A	03-07-1997
		WO 9721594 A2	19-06-1997

EPO FORM P0459

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 10 1902

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22-06-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9721594 A		ZA 9610240 A	05-06-1998
US 3908342 A	30-09-1975	NONE	
US 6282866 B1	04-09-2001	DE 19912491 A1	28-09-2000
		CA 2300755 A1	19-09-2000
		DE 50000251 D1	08-08-2002
		EP 1038773 A1	27-09-2000
		ES 2178983 T3	16-01-2003
		JP 2000289701 A	17-10-2000
DE 19750075 A1	27-05-1999	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82