(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 911 262 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
28.04.1999 Bulletin 1999/17

(51) Int. Cl.[6]: **B65B 57/20**, B65B 57/14, B65G 47/51

(21) Application number: **98119571.2**

(22) Date of filing: **16.10.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **21.10.1997 IT BO970629**

(71) Applicant: **S.T.S. S.r.l.**
40011 Anzola Emilia (Bologna) (IT)

(72) Inventors:
- **Montali, Gianluigi**
  41056 Savignano sul Panaro (Modena) (IT)
- **Grilli, Gianluca**
  40050 Monteveglio (Bologna) (IT)

(74) Representative:
Dall'Olio, Giancarlo
c/o INVENTION s.a.s.,
Via delle Armi, 1
40137 Bologna (IT)

(54) Station for determining a preset number of articles, partially inserted in one another, forming a group of these articles

(57) A grouping station (100) receives rows (11) of plastic beakers (1) inserted one into another, coming from a rim making machine (2). The rows (11) of beakers (1) are subdivided into groups (10), that are moved to a packing station situated downstream thereof and including a main packing machine (30) and an additional packing machine (31). The grouping station (100) includes a rotary displacement device (5), that sends the rows (11) to a first counting-separating device (60) during regular operation. The first counting-separating device (60) is connected with the main packing machine (30). When a jam occurs, the rotary displacement device (5) sends the rows (11) to a second counting-separating device (80) that is connected with the additional packing machine (31). Each one of the counting-separating device (60,80) includes a disc (13) formed by adjacent sectors twisted along their radial axes like fan paddles. The disc separates from a row (11) a number of beakers necessary to form a predetermined group (10).

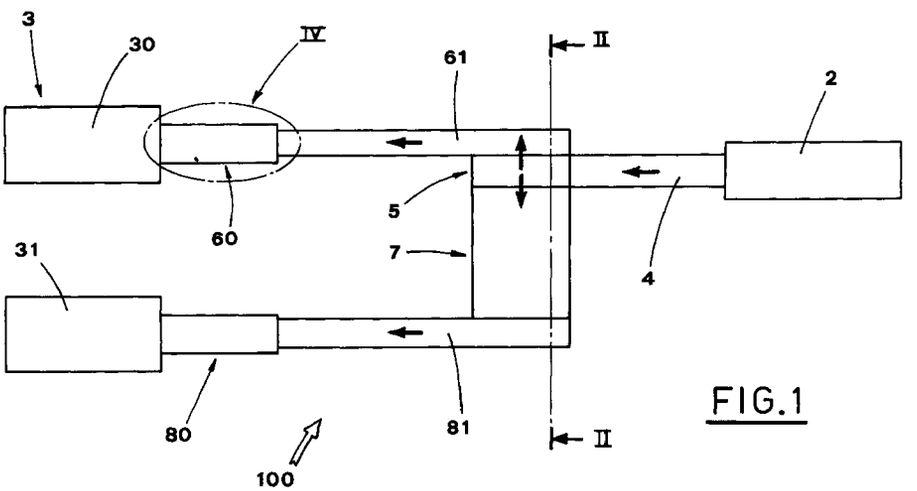


FIG.1

EP 0 911 262 A1

Description

[0001] The present invention concerns packaging articles which can be partially inserted in one another, e.g. plastic beakers used for food.

[0002] These beakers are usually sold in series, each series containing a predetermined number thereof.

[0003] The beakers going out of the rim making machine are arranged in a series of stepwise spaced out horizontal rows.

[0004] The beakers in each row are partially inserted in one another.

[0005] Downstream of the rim making machine there is a packaging machine, that takes groups of beakers and wraps them into packages.

[0006] A device for dividing the rows of beakers into groups of predetermined number thereof, is disposed between the rim making machine and the packaging machine,

[0007] Known devices for forming the groups of beakers usually include a toothed wheel which meshes with a row of beakers, so as to count them.

[0008] The toothed wheel co-operates with separating means, of various shapes, which separate each group from the row of beakers.

[0009] The major disadvantage of these known devices is a low working speed which reduces the global production rate and does not guarantee an acceptable reliability.

[0010] It is possible that the beakers, due to their shape and material from which they are made, are not spaced out regularly. Counting errors can occur quite often and/or the toothed wheel can damage the beakers increasing the number of rejected products.

[0011] More generally, it is important to avoid halting of the rim making machine because of jamming occurred downstream thereof up to the outlet of the packaging machine, where the number of rejected products would become very high.

[0012] The object of the present invention is to propose a station, situated between a rim making machine and a packaging machine, and equipped with suitable means and devices, that cooperate with one another and feature the following technical - functional characteristics:

- high working speed
- capability of forming article groups with high counting precision
- no damages to the articles
- easy size change over
- high working flexibility, with capability of storing the rim making machine production for a period of time sufficient to remove a possible jam in this station or in the packaging machine situated downstream thereof.

[0013] Another object of the present invention is to propose a station, whose requested performance is achieved by simple technical solutions, which guarantee a high general reliability.

[0014] The characteristics of the invention will be evident from the following description, in accordance with the contents of the claims and with reference to the enclosed drawings, in which:

- Figure 1 shows a lay-out of a processing line including the subject station, according to a possible embodiment;
- Figure 2 shows a section view taken along II-II of the Figure 1;
- Figure 3 shows a perspective view of a constructive detail of the station;
- Figure 4 shows an enlarged view of the part indicated in Figure 1;
- Figure 5 shows a lateral view of the means of Figure 4;
- Figure 6 shows a perspective view of the means for counting beakers and forming predetermined groups;
- Figures 7a, 7b, 7c show lateral views of the means of Figure 4, in different working steps.

[0015] With reference to the above mentioned figures, reference numeral 100 indicates the whole subject station for forming groups 10 containing a predetermined number of articles 1 partially inserted in one another.

[0016] In the example illustrated in the figures, these articles 1 are plastic beakers for food or beverages.

[0017] The group-forming station 100 is situated downstream of a rim making machine 2, which makes a rim around the upper edge 1a of each beaker 1, so as to allow its safe use, without the risk of injuring.

[0018] The groups of articles 10, leaving the station 100, are directed to a packaging station 3, situated downstream, where each group 10 is suitably packed by known, not shown, means.

[0019] The beakers 1 going out of the rim making machine 2, arranged in a series of horizontal rows 11 with the beakers of each row inserted in one another, are conveyed, by a conveying line 4, to a rotary displacement device 5 of the station 100.

[0020] In the illustrated example, the rotary displacement device 5 includes a shaft 50 equipped with a series of radial frames 51, angularly spaced apart.

[0021] The rotary displacement device 5 is supported, with possibility to turn, by a not shown structure, over the final part of the conveying line 4 and with the shaft 50 extending parallel to the line 4 (Figures 2 and 3).

[0022] Motor means, not shown, are joined to the rotary displacement device 5 and drive it into stepwise rotation, in one or the other direction. The width of each step corresponds to angular width between the two adjacent frames 51.

[0023] An inlet conveyor 61, joined to a first counting-separating device 60 of the station 100, is situated

along the conveying line 4 near the rotary displacement device 5.

[0024] According to a preferred embodiment, a connection conveyor 7 extends on the other side of the line 4, between the rotary displacement device 5 and a second inlet conveyor 81 joined to a relative counting-separating device 80, identical with the first one.

[0025] The connection conveyor 7 has made therein a plurality of seats 70, each of which contains one row 11 of beakers 1; in this way the connection conveyor 7 acts as a storage unit, whose function will be better explained later on.

[0026] The first counting-separating device 60 is disposed upstream of a main packaging machine 30 of the packaging station 3, while the second counting-separating device 80 is disposed upstream of an additional packaging machine 31, also situated in the station 3.

[0027] The packaging machines 30, 31 are identical and have not been shown in detail, as they are of known type.

[0028] During normal operation, the rows 11 of beakers 1 conveyed by the conveying line 4 are gradually intercepted by the frames 51 of the rotary displacement device 5, which is operated in suitable time relation and according to a first direction R1 (Figure 2).

[0029] Thus the rows 11 are moved sidewise and put onto the inlet conveyor 61 of the first counting-separating device 60, which subsequently feeds the main packaging machine 30. These groups 10 comprise a predetermined number of beakers 1 and are obtained from these rows 11 as described in the following.

[0030] In case of failure of the main packaging machine 30 or the first counting-separating device 60, which is noticed by the operator or detected by suitable sensors, the rotary displacement device 5 is driven in the direction R2, opposite to the first one.

[0031] Operation of the rotary displacement device 5 displaces the rows 11 coming out from the rim making machine 2 to the connection conveyor 7, and subsequently to the second counting-separating device 80 and to the additional packaging machine 31 (Figure 2).

[0032] The storage unit, constituted by the connecting conveyor 7, is particularly advantageous

[0033] In fact, it allows activation of the second counting-separating device 80 and the additional packaging machine 31 without stopping the rim making machine 2.

[0034] During the shifting operation, an interval of time results which can be used for controlling the correct arrangement of the operating means,.

[0035] Now, a preferred embodiment of devices 60, 80 will be described.

[0036] Besides the respective inlet conveyors 61, 81, each of the devices 60, 80 includes also centring means 9, made by e.g. a pair of longitudinal bars 9a opposite to each other.

[0037] The task of the longitudinal bars 9a is that of guiding the rows 11 of beakers 1 towards a disc 13, situated over the respective inlet conveyor, vertical and crosswise to the advancement direction of the beakers 1.

[0038] The disc 13 has an outer circular edge, that is divided in sectors 14, each of which is rotated by a predetermined angle about the respective radial symmetry line, like fan paddles.

[0039] The above mentioned rotation angle is sufficient for the distance between the adjacent edges of two successive sectors 14 to permit the rim 1a of a container 1 to be inserted therebetween in the region of the outer edge of the disc 13.

[0040] The disc 13 is driven by a motor 15, in a predetermined direction T.

[0041] The disc 13 is fitted with a plurality of holes 16 regularly spaced apart along a circumference, which is coaxial with the disc 13, each in correspondence to a relative sector 14 (Figure 6).

[0042] The disc 13 is provided also with suitable sensor means 17, which detect each hole 16 while passing thereby, and consequently, also a respective beaker 1 being moved downstream of the disc 13.

[0043] The row 11 of beakers 1, with their openings facing the disc 13, is pushed against the disc, being kept motionless, which halts the whole row (Figures 6, 7a).

[0044] Then, the disc 13 is made to rotate in direction T until the number of sectors 14 which pass the point of contact with the row 11 is the same as the number of beakers 1 required to form each group 10.

[0045] During rotation of the disc 13, the edge of every sector 14 is inserted between the rims of the first two beakers 1, thus separating them and pushing forward the first, while keeping the second one.

[0046] The separation of the so obtained group 10 from the row 11 is facilitated by two ducts 18, 19, fed with compressed air in suitable time relation with the disc 13 being stopped (Figures 7a, 7b, 7c).

[0047] An aspiration hood 20 is provided over the disc 13 for evacuating possible dust produced by the disc 13 rubbing against the beakers, by keeping the area under negative pressure.

[0048] Expeller means 40 and sensor means 39 are provided downstream of the disc 13.

[0049] The expeller means 40 include a stop pin 41 operated by a relative jack 42, and a pusher 43 operated by relative jacks 44.

[0050] The stop pin 41 is situated on the groups 10 outlet line and, when in its working position O (indicated with broken line in Figure 5), it stops the group 10 just formed by the disc 13.

[0051] The pusher 43 is situated beside the groups 10 outlet line and, when in its working position K (indicated with broken line in Figure 4), it displaces crosswise the group 10 blocked by the pin 41.

[0052] The sensor means 39, situated over the groups 10 outlet line, verify the regular flow of the groups toward the packaging machine, situated downstream.

[0053] If the packaging machine jams, the sensor means 39 detect the groups 10 accumulated at the

machine inlet and issue a signal corresponding to the necessity to activate the expellers 40.

[0054] Then the group 10 just formed by the disc 13 is stopped by the pin 41 and transferred, by the pusher 43, toward a lateral discharge chute 45, so as to be subsequently collected.

[0055] When the main packaging machine 30 jams, the expeller means 40 of the first counting-separating device 60 allow to empty the line, while the rows 11 going out of the rim making machine 2 are sent, by the rotary displacement device 5, to the other counting-separating device 80 joined to the additional packaging machine 31.

[0056] If the additional packaging machine 31 jams before the main packaging machine resumes regular operation, it is not necessary to stop the rim making machine 2, because the expeller means 40 of the second counting-separating device 80 allow discharge of the groups 10 located beside the line, from where they will be collected later on.

[0057] It is clear that the station 100 as described, achieves all the objects specified in the introductory statement.

[0058] In fact, the additional line including also a storage unit allows to temporarily store the rim making machine production without stopping it, while the particular shape of the counting-separating devices 60, 80 allows to reach a high working speed together with the high precision of articles counting without risk of their damage.

[0059] It also appears that the operating means of the station 100 are very simple to adjust when the size of the articles 1 is changed, also because there are few standard sizes of beakers.

Claims

1. Station for grouping a predetermined number of articles partially inserted in one another, to form a group of these articles, said groups being obtained by separating single articles from rows (11) of articles (1) coming from the outlet of an article processing machine (2) situated upstream of said forming station (100), and successively packed in a relative packaging station (3) located downstream of said forming station (100), said forming station characterised in that it includes:

   a first counting-separating device (60), connected to a main packaging machine (30) of said packaging station (3);
   a second counting-separating device (80), connected to an additional packaging machine (31) of said packaging station (3);
   a rotary displacement device (5), which displaces at least one of said rows (11) of articles (1), lying on a conveying line (4) situated at the outlet of said processing machine (2), towards said a first counting-separating device (60) in case of regular operation, and towards said second counting-separating device (80), in case of jamming or non-regular operation.

2. Station according to claim 1, characterised in that it includes a connecting conveyor (7), situated between said rotary displacement device (5) and second countingseparating device (80) and acting as a storage unit of a predetermined number of said rows (11) of articles (1), released in sequence by said rotary displacement device (5) and transferred, by said connecting conveyor (7), to said second counting-separating device (80).

3. Station according to claim 1, characterised in that said rotary displacement device (5) includes a shaft (50) with a series of radial frames (51) angularly spaced apart, said rotary displacement device (5) being rotatably supported over the final part of said conveying line (4) and with said shaft (50) extending parallel to said conveying line (4), driving means being provided for driving said rotary displacement device (5) in stepwise rotation, the width of each step corresponding to angular width between two adjacent frames (51), respectively in a first direction (R1), if said groups forming station (100) works regularly, and a second direction (R2) opposite to the first one, in case of failure of the first counting-separating device (60) or said main packaging machine (30).

4. Station, according to claim 1, characterised in that each of said first and second counting-separating devices (60,80) includes:

   an inlet conveyor (61,81), which conveys said rows (11) of articles (1) to a disc (13), arranged vertical and crosswise to the rows (11) advancement direction at a height that allows its outer edge to touch said rows (11), said disc (13) having said outer edge divided in sectors (14), each of which is rotated by a predetermined angle with respect to its radial axis, so that the distance between the edges of two adjacent sectors (14) allows insertion of the rim (1a) of an article (1) therebetween;
   a motor (15) for driving said disc (13) into rotation in a predetermined direction (T) until the number of sectors (14) which pass the point of contact with the row (11) is the same as the number of articles (1) required to form one group (10).

5. Station, according to claim 4, characterised in that said disc (13) has a plurality of holes (16) regularly spaced apart along a circumference, which is coaxial with the disc (13), each hole being located in the

region of a related sector (14), said disc (13) being also equipped with sensor means (17) for detecting and counting said holes (16) passing thereby due to the disc rotation.

6. Station, according to claim 4, characterised in that it includes also centring means (9), situated at the sides of the respective inlet conveyor (61,81) and aimed at guiding the rows (11) of articles (1) with respect to said disc (13).

7. Station, according to claim 4, characterised in that each of said counting-separating devices (60,80) has an aspiration hood (20), provided over the disc (13) for keeping the working area surrounding said disc (13) in depression.

8. Station, according to claim 1 or 4, characterised in that each of said counting-separating devices (60,80) has sensor means (39), connected to the expeller means (40), said expeller means (40) acting crosswise to said groups (10) formed downstream of said disc (13), so as to transfer these groups (10) from the relative outlet line to a lateral discharge chute (45) in case of a jam of a relative packaging machine (30,31) situated downstream of said counting-separating devices (60,80).

9. Station, according to claim 8, characterised in that said expeller means (40) include a stop pin (41), situated on the path run by the outlet line of each group (10) of articles, and a pusher (43) situated beside said groups (10) outlet line, said stop pin (41) and pusher (43) acting in time relation for stopping the group (10) formed downstream of said disc (13) and for transferring said group (10) toward said lateral discharge chute (45).

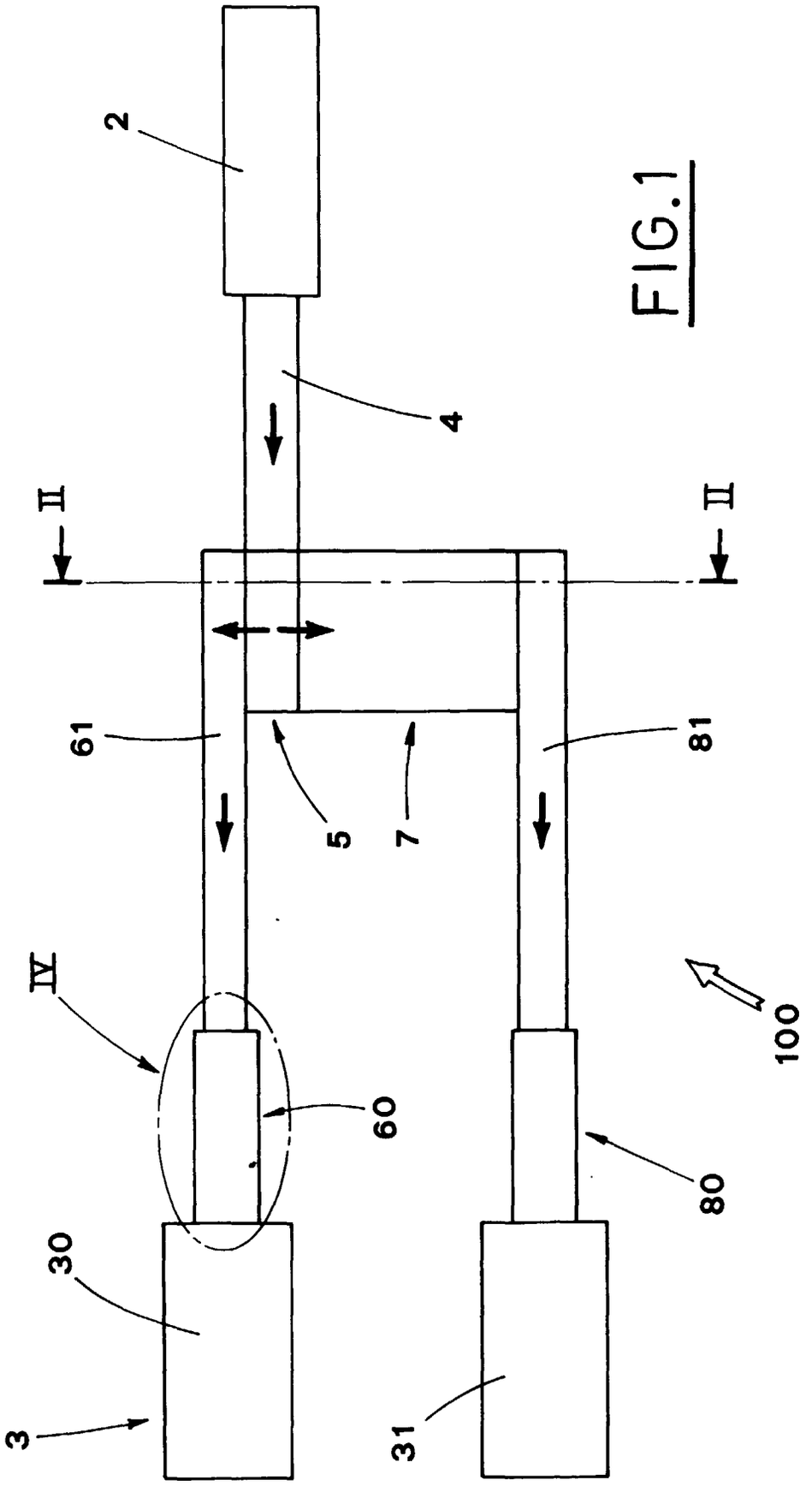


FIG.1

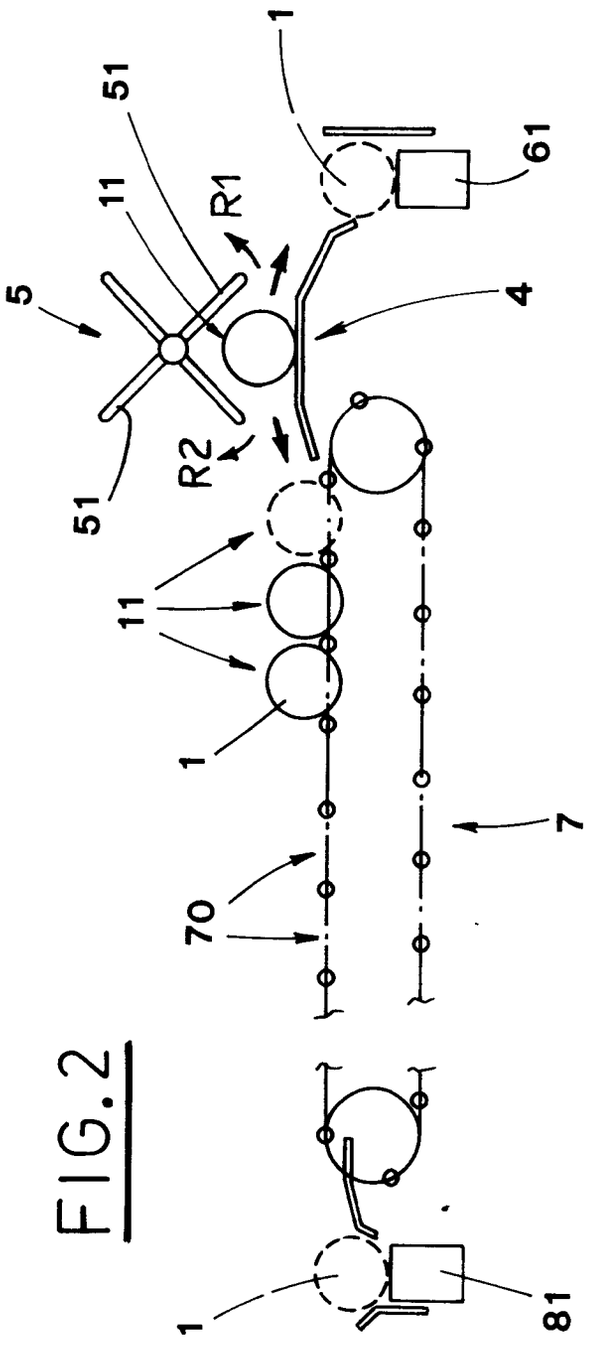


FIG.2

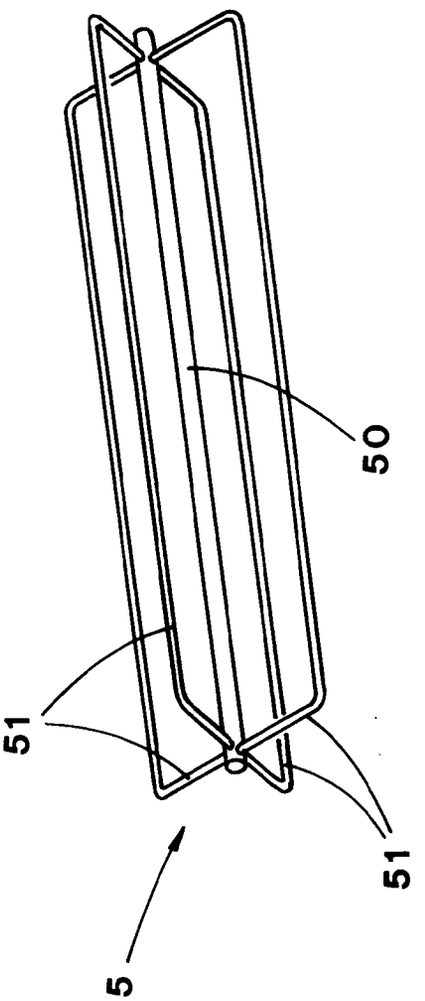
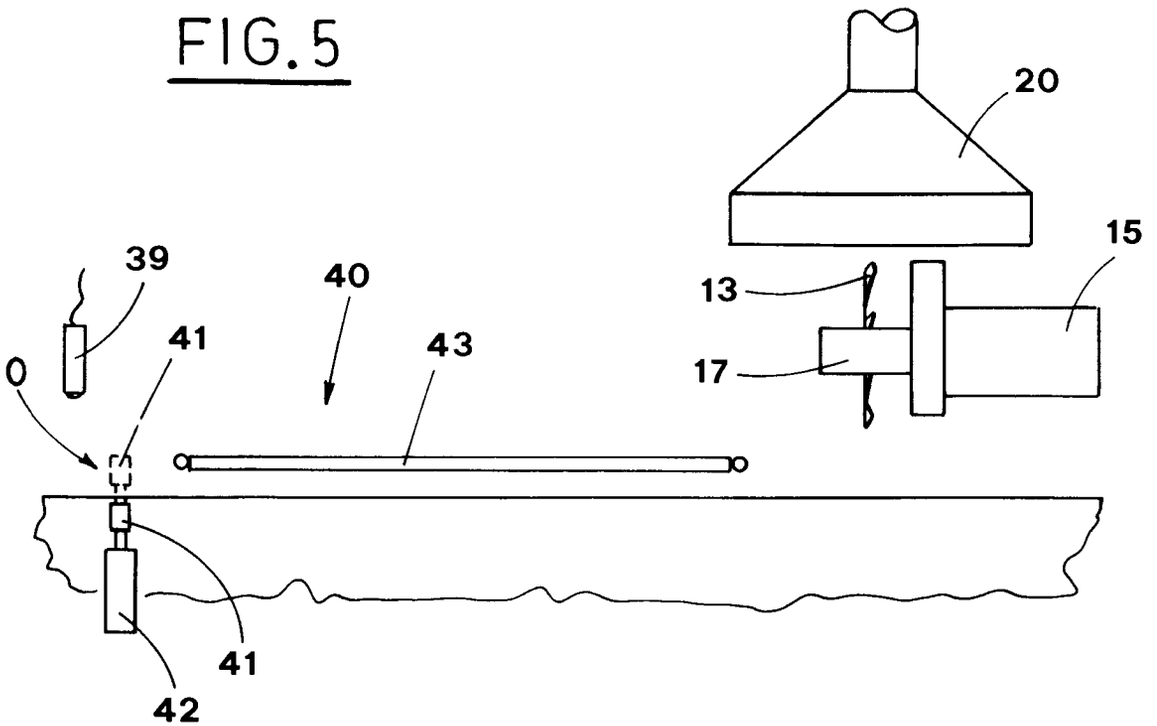


FIG.3

FIG.5



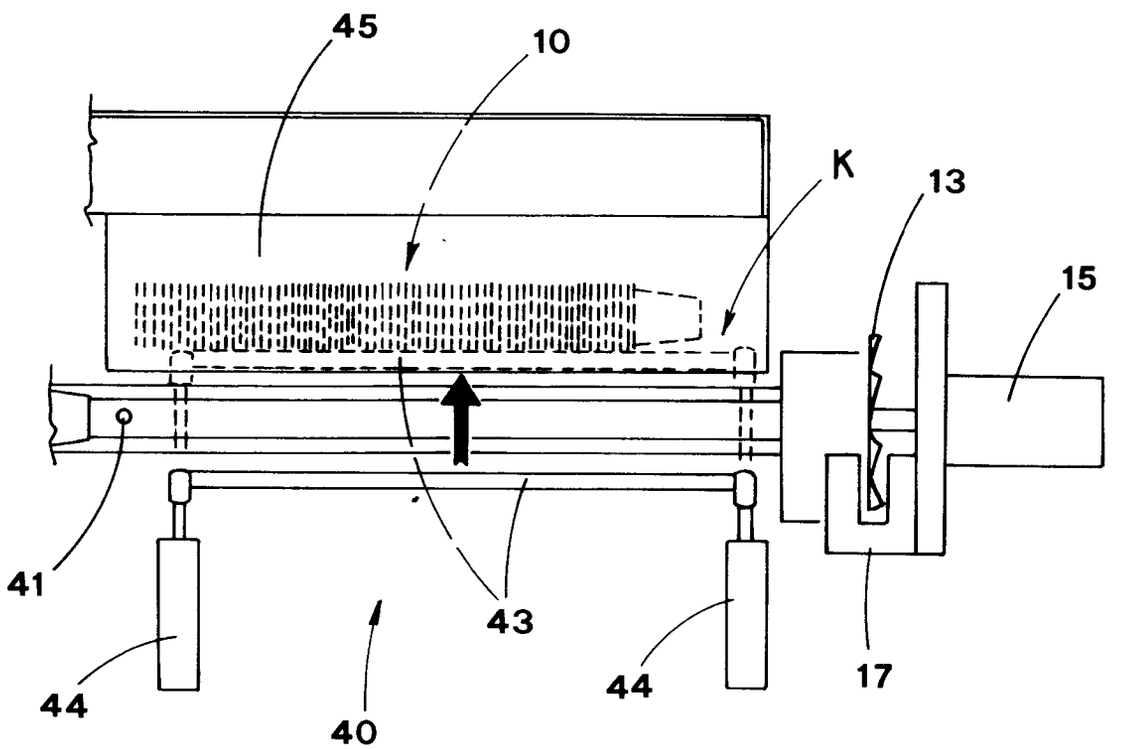
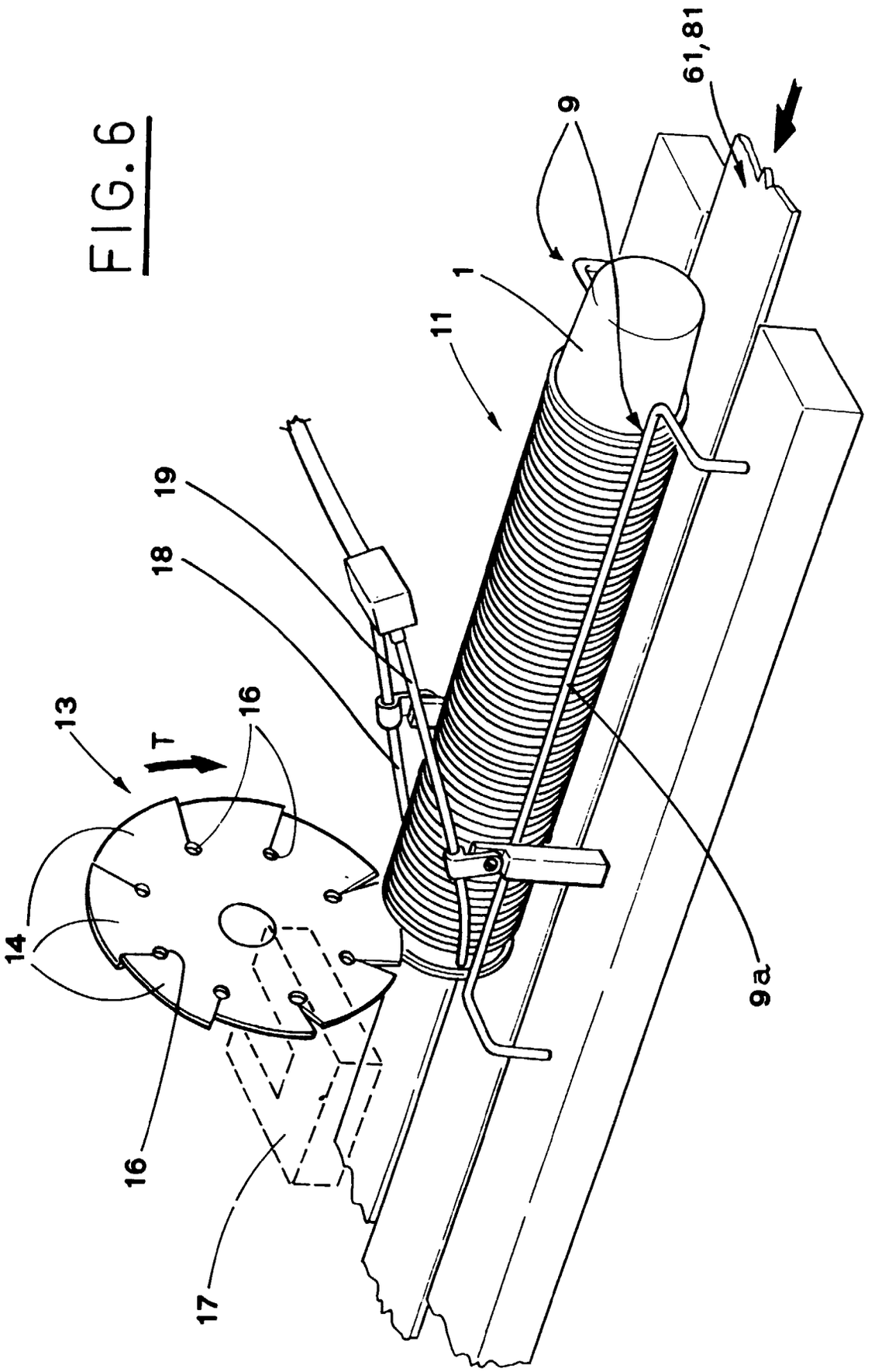


FIG.4

FIG. 6



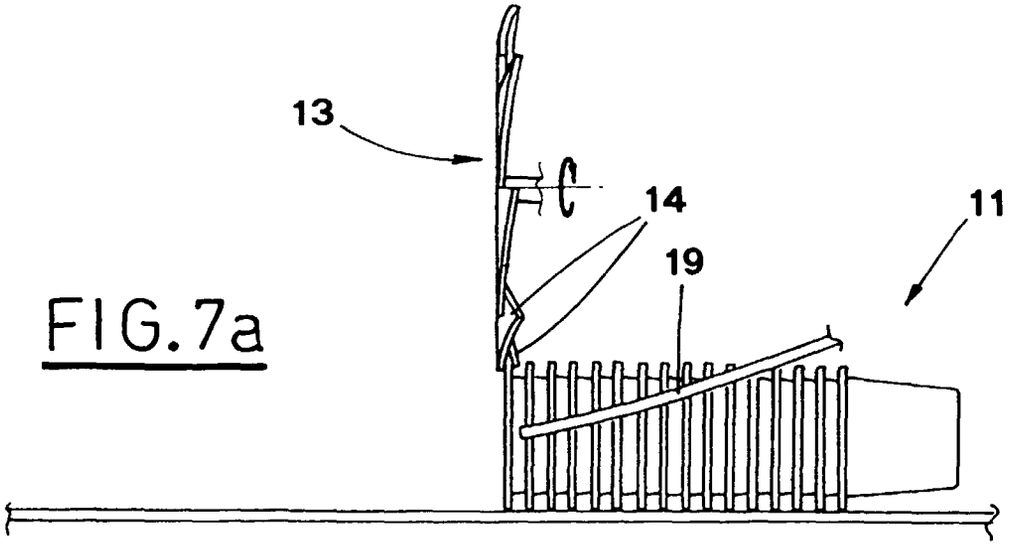


FIG.7a

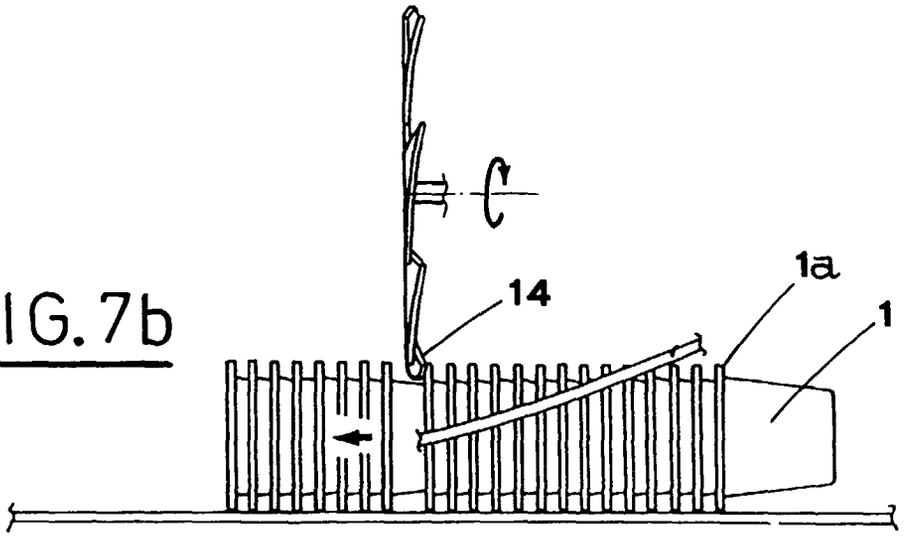


FIG.7b

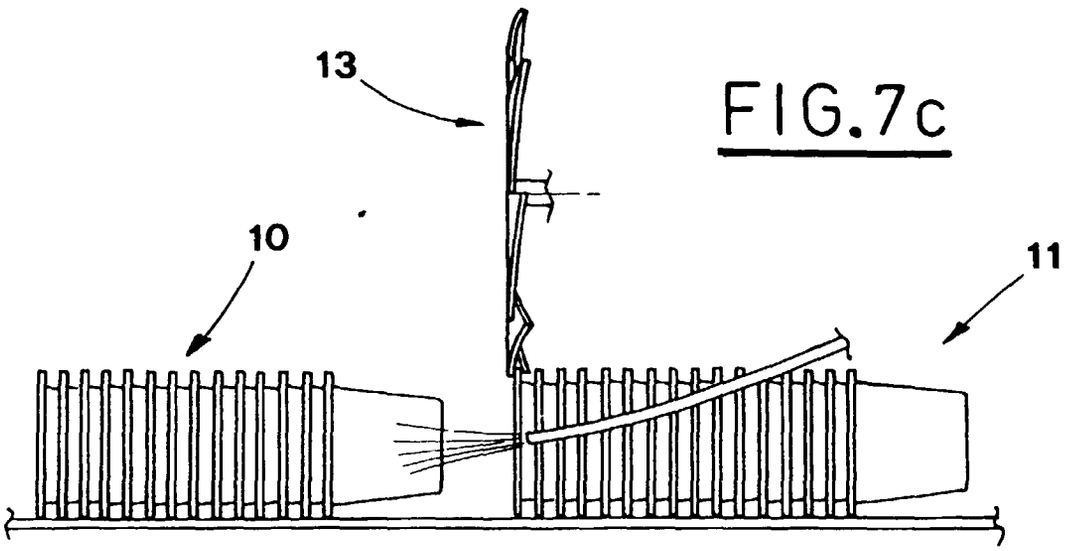


FIG.7c

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 9571

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	FR 88 882 E (SAPAL) 16 June 1967 * page 1; figure *	1,2	B65B57/20 B65B57/14 B65G47/51
A	EP 0 654 408 A (CASSOLI MACCHINE AUTOMATICHE C) 24 May 1995 * column 1, line 1 - line 10; claim 1; figure 1 *	1	
A	EP 0 302 837 A (STS SRL) 8 February 1989 * claim 1; figure 1 *	1,4,6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 January 1999	Bridault, A

CATEGORY OF CITED DOCUMENTS

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

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

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 11 9571

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.

21-01-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 88882 E	16-06-1967	NONE	
EP 0654408 A	24-05-1995	IT 1264739 B	04-10-1996
EP 0302837 A	08-02-1989	IT 212184 Z	04-07-1989
		DE 3876532 D	21-01-1993
		US 4927319 A	22-05-1990

EPO FORM P0459

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