

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 January 2006 (26.01.2006)

PCT

(10) International Publication Number
WO 2006/008624 A1

- (51) International Patent Classification : **B65B 29/02**,
1/12, 1/24
- (21) International Application Number:
PCT/IB2005/002005
- (22) International Filing Date: 30 June 2005 (30.06.2005)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
BO2004A000442 16 July 2004 (16.07.2004) IT
- (71) Applicant (for all designated States except US): **I.M.A. INDUSTRIA MACCHINE AUTOMATICHE S.P.A.**
[IT/IT]; Via Emilia Levante, 428-442, I-40064 Ozzano Emilia (IT).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **CONTI, Roberto**
[IT/IT]; Via Condotto, 13A, I-40026 Imola (IT).
- (74) Agent: **LANZONI, Luciano**; Bugnion S.p.A., Via Goito, 18, I-40126 Bologna (IT).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

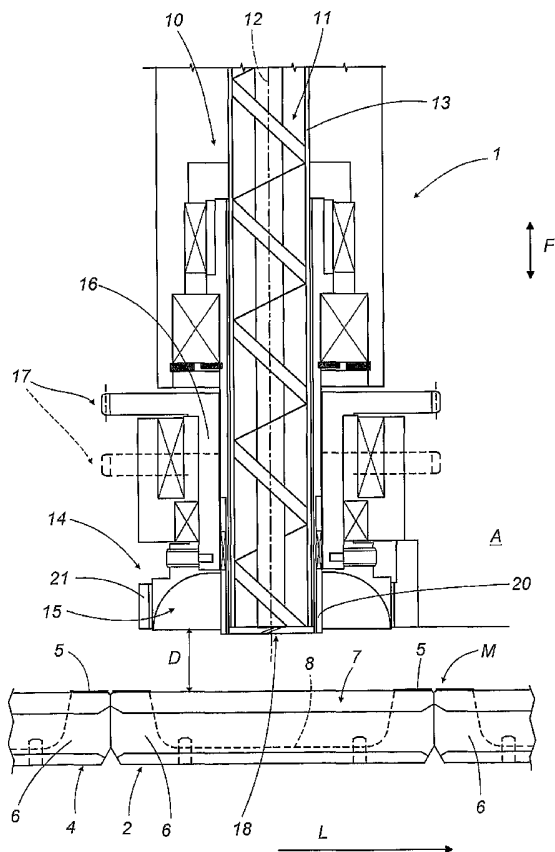
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: UNIT FOR FEEDING INFUSION MATERIAL TO A MACHINE PRODUCING FILTER PACKS



(57) Abstract: Described is a unit (1) for feeding powdered infusion material to a machine (M) producing packs (3) made from filter material (5). The machine (M) comprises a production line (2) for making such packs (3) and consists of a conveyor (4) with mobile recesses (7) moving in a feed direction (L) designed to be covered with filter material (5) and to form impressions (8) in the filter material (5); rotary feeders (10) fitted to the unit (1) designed to feed an amount or dose (C) of the powdered infusion material into the impressions (8), and rotary pre-compactors (14) mounted on the rotary feeders (10) acting together with rotary feeders (10) to distribute the doses (C) uniformly inside the impressions (8).

WO 2006/008624 A1

DescriptionUnit for feeding infusion material to a machine producing filter
packsTechnical Field

This invention relates to a unit for feeding infusion material to a machine producing packs made from filter material.

In particular, the present invention can be advantageously employed to feed powdered, ground coffee to an automatic packing machine designed to produce coffee "pods" made from filter paper. The description below makes explicit reference to this embodiment without restricting the scope of the invention.

10 Background Art

At the present time, feeding powdered coffee to machines which make and fill filter-paper coffee pods is performed by a unit fitted to the machine itself where the unit consists of feeder devices designed to drop an amount of coffee into a dosing chamber.

The dosing chamber is horizontal and inside has a sliding, reciprocating piston designed to push the dose of coffee dropped down by the feeders into a vertical feed tube from where the coffee drops down into a series of circular filter paper impressions; the impressions are formed by embossing a strip of filter paper on a corresponding series of circular recesses on an intermittent conveyor which forms the pod shaping and conveying line of the packing machine.

Vertical, reciprocating pressers are mounted at the feed tube and compress the coffee in the circular impressions before the impressions are covered on the top with a strip of filter paper in order to close and complete the pod.

A serious drawback to the feeding-dosing unit described above is that the powdered coffee is not distributed uniformly

inside the circular pod impressions.

The principal cause of this drawback is the fact that the coffee, pushed by the piston element in the feed tube, drops down into the impressions in an uncontrolled and uneven manner and not even the action of the pressers is able to distribute the coffee uniformly in the impressions.

The result using the type of feeder-doser described above is a coffee pod which does not meet quality specifications.

This considerable drawback worsens as the operating speed of the pod maker-filler machine increases.

The aim of the present invention is to produce a feeder unit which overcomes the drawbacks cited above.

In particular, the aim of the present invention is to produce a coffee feeder unit for a packing machine that produces filter paper coffee pods of the specified quality and which operates at high production speeds.

Disclosure of the invention

The present invention describes a unit for feeding infusion material to a machine producing packs made from filter material. The machine comprises a production line for making such packs and consists of a conveyor with mobile recesses moving in the feed direction and designed to be covered with filter material in order to form impressions in the filter material. The unit is characterised in that it comprises rotary feeders designed to feed an amount or dose of infusion material into the impressions, and rotary precompactors mounted on the rotary feeders acting together with the rotary feeders to distribute the doses uniformly inside the impressions.

Brief description of the drawings

The technical characteristics of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are apparent from the detailed description which follows, and from the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without limiting the scope of the

inventive step, and in which:

- Figure 1 is a front view, with some parts cut away and others in cross section to better illustrate certain details, of an embodiment of the feeder unit in a first operating position;

5 - Figures 2a and 2b are enlarged views of the unit in Figure 1 as seen from the front and from above respectively;

- Figure 3 is a front view, with some parts cut away and others in cross section to better illustrate certain details, of the feeder unit in Figure 1 in a second operating position;

10 - Figure 4 is front view of an infusion material pack filled by the feeder unit described in this invention.

Detailed description of the preferred embodiments of the invention

15 With reference to Figure 1, the numeral 1 indicates a feeder unit for feeding powdered, ground coffee to the production line 2 of a packing machine M producing coffee pods 3 (Figure 4) made from filter paper, the feeder unit 1 being an integral part of this machine.

20 The production line 2 comprises a intermittent-motion conveyor 4 moving in a horizontal feed direction L carrying a filter-paper strip 5, and having a series of modular elements 6.

25 Each modular element 6 has at least one, mobile circular recess 7 moving in the direction L and designed to make a corresponding circular impression 8 in the filter paper (dashed line in Figure 1). The impression is formed, using a known embossing method not illustrated here, by pressing the strip 5 into the recess 7 in order to form the lower portion or half-shell 9 (Figure 4) of the pod 3 being formed by the machine.

30 Figures 1, 2a and 3 show a feeder unit 1 consisting of rotary feeders 10 in the form of a feed screw 11 rotating about a vertical axis 12 inside a hollow, tubular, cylindrical container 13 and designed to feed a specified amount or dose C of powdered coffee into the impressions 8 of the conveyor 4 of the line 2.

35 The cylindrical container 13 is mounted at a distance D from the conveyor 4 (Figure 1) and supports, on its outer surface, a sliding precompactor 14.

Figures 1 and 3 show the precompactor 14 which consists of a

hollow, ring-shaped cap 15 fixed to a hollow, cylindrical, tubular element 16.

One end 17 of the tubular element 16 is designed to engage with the gear wheel (not shown here) of a motor unit (also not shown here) which rotates the tubular element around the cylinder 13 on special bearings and around the axis 12; the tubular element also slides vertically (arrow F in Figures 1 and 3) on the cylinder 13 between a rest position A, where the cap 15 is positioned at a distance from the conveyor 4 substantially the same as the distance D (Figure 1), and an operating position B where the cap 15 is designed to act on the upper portion of the powdered coffee dose C fed into the pod impression 8 by the feed screw 11 in order to aid the uniform distribution of the dose C (Figure 3) by levelling it out uniformly inside the impression 8.

Figures 2a and 2b show the end of the feed screw 11 where there is a separator 18 consisting of blades 19 extending radially at one end of a rotary cylinder 20 which rotates around the cylinder 13 which in turn rotates, independent of the feed screw 11 action, together with the tubular element 16 to which it is connected. The rotary blades 19 are designed to act on the coffee dose C in the impression 8 already distributed uniformly by the action of the rotary cap 15 and thereby produce a dynamic separation between the dose C and the lower end of the screw feed 11.

The blades 19 are rotated together with the precompactor 14 by the tubular element 16 to which they are both connected and rotate together with the feed screw 11 to aid the flow of coffee downwards towards the impressions 8 when the feed screw 11 itself is rotating; when the feed screw 11 stops rotating, the blades 19 continue to rotate thus producing a dynamic separation.

In practice, when the filter paper impression 8 on the module 6 of the conveyor 4 is under the feed screw 11 during an operating cycle, the tubular element 16 slides downwards from position A to position B and, at the same time, rotates around the cylinder 13. This has the effect of rotating the feed screw 11 of the unit 1 so that a coffee dose C drops down into the impression 8.

In position B, the rotary cap 15 presses down and rotates on the upper part of the dose C currently being formed thus effectively and uniformly precompacting the dose C being formed so that it is uniformly distributed inside the impression 8; a paper presser 21 mounted on the element 14 holds and stabilises the filter paper strip 5 while the dose C is being compacted.

When the screw feed 11 stops rotating this stops the flow of coffee powder, the blades 19 of the separator-leveller 18 continue to rotate thus separating the dose C from the feed screw 11.

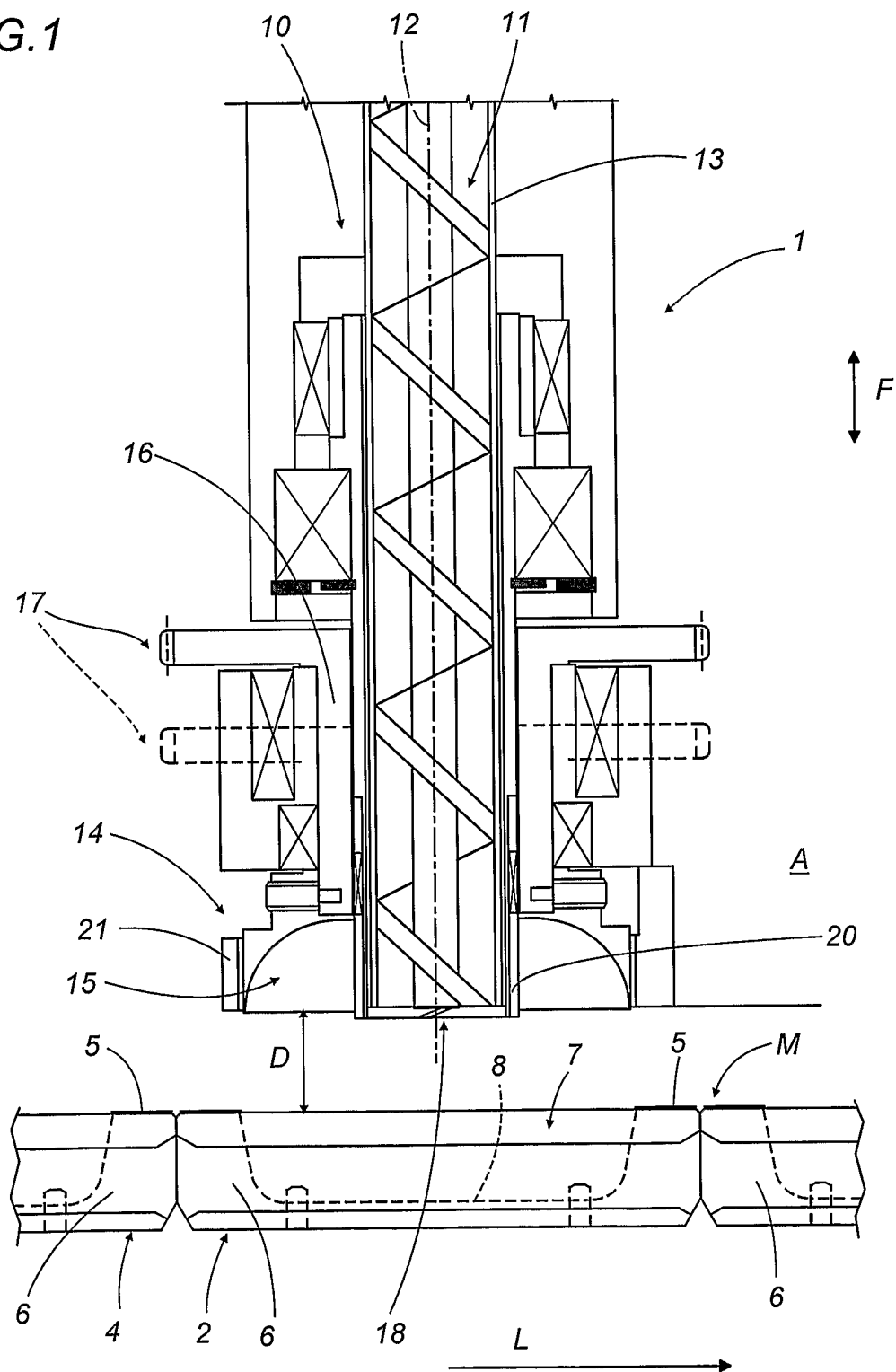
At the end of the cycle, the tubular element 16 travels upwards carrying the cap 15 of the precompactor 14 back to the home position A. The impression 8, now filled with the precompact dose C, moves forward towards another presser element (of a known type and not shown here) which completes compaction of the dose C after the conveyor 4 feeds forward by one step in the direction L. The next impression 8 is now in position under the feed screw 11 ready to be filled with a new dose from the feeder unit 1.

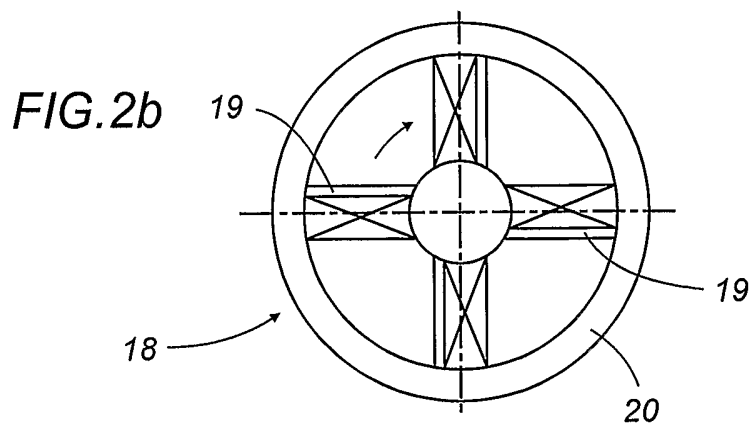
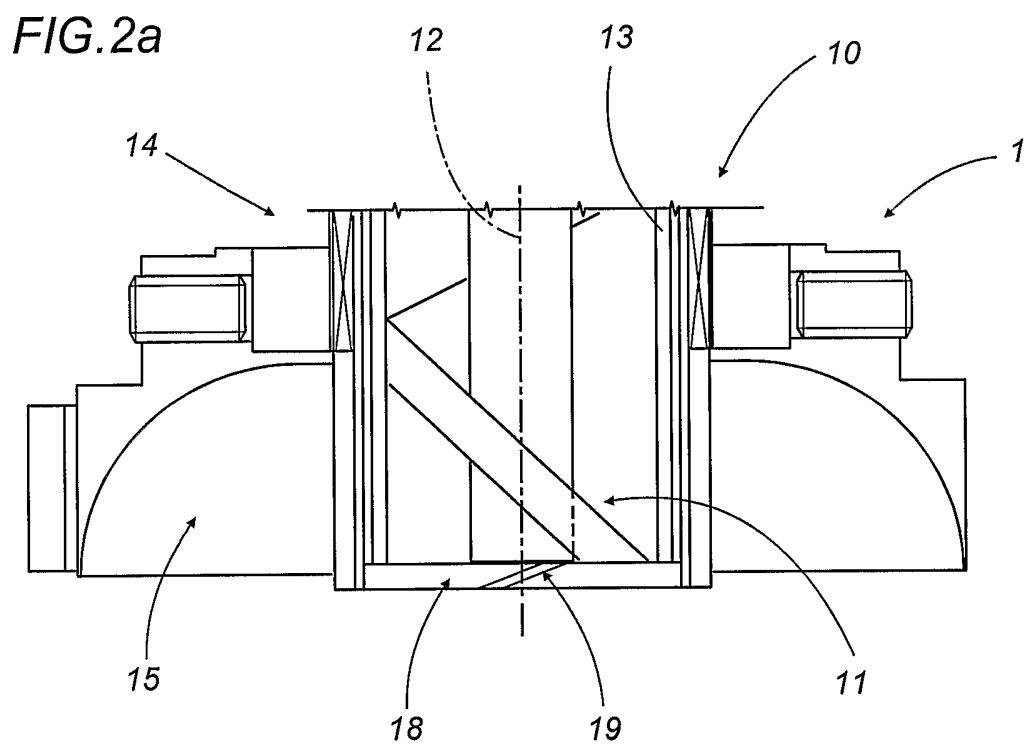
The invention described here may be subject to modifications and variations without thereby departing from the scope of the inventive concept; all the details of the invention may be substituted by technically equivalent elements.

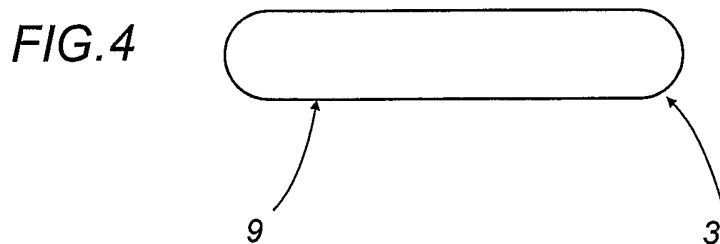
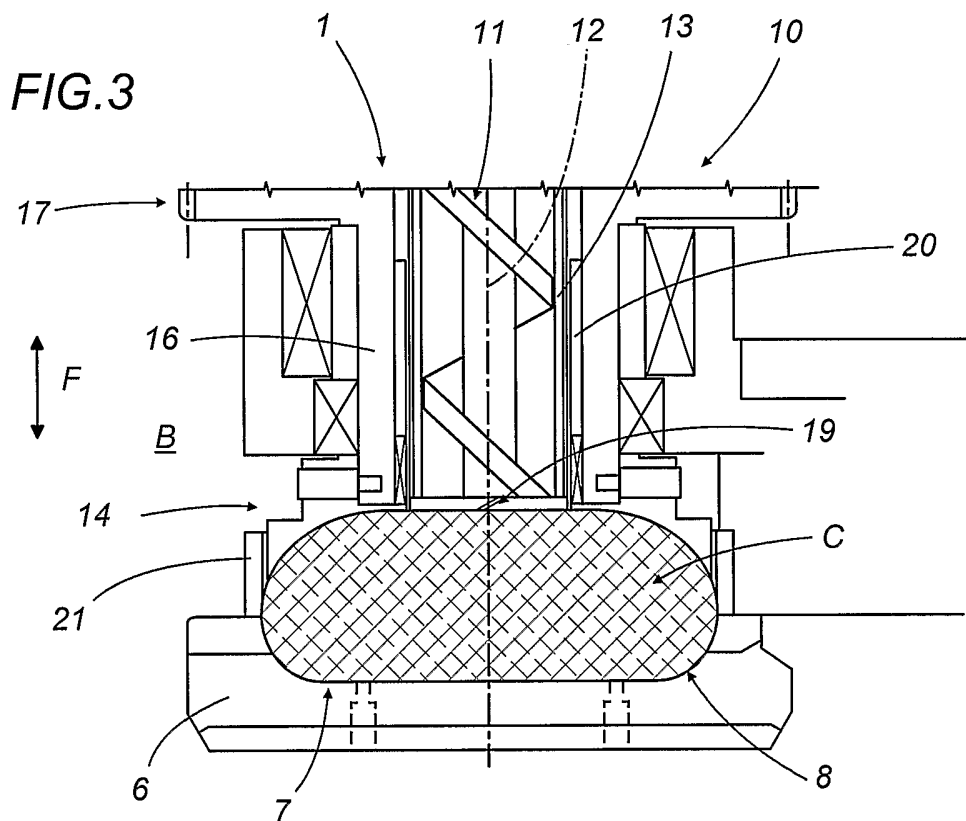
Claims

1. A unit (1) for feeding infusion material to a machine (M) producing packs (3) made from filter material (5) where the machine (M) comprises a production line (2) for such packs (3) consisting of a conveyor (4) with mobile recesses (7) moving in a specified feed direction (L) and designed to be covered with filter material (5) to form impressions (8) in the filter material (5); the unit (1) being characterised in that it comprises rotary feeders (10) designed to feed an amount or dose (C) of infusion material into the impressions (8) and rotary precompactors (14) mounted on the rotary feeders (10) and acting together with the rotary feeders (10) to distribute the doses (C) uniformly inside the impressions (8).
2. A unit according to claim 1, characterised in that the rotary feeders (10) consist of a feed screw (11) rotating inside a hollow, tubular container (13) positioned transversely across the feed direction (L) at a fixed distance (D) from the conveyor of the production line (2); the precompactors (14) being mounted so as to rotate around the tubular container (13) and to slide on the container (13) towards and away from the operating position (B) where the precompactors (14) are in contact with at least one of the doses (C) already inside one of the impressions (8).
3. A unit according to claim 2, characterised in that the precompactors (14) consist of a hollow, ring-shaped cap (15) fixed to a hollow, cylindrical, tubular element (16) which is designed to rotate around and slide up the cylindrical container (13) of the feed screw (11).
4. A unit according to any of the foregoing claims from 1 to 3, characterised in that the rotary feeders (10) support other separator-leveller devices (18) fitted with rotary blades (19) designed to act on the doses (C).
5. A unit according to claim 4, characterised in that the rotary blades (19) are designed to produce a dynamic separation between the doses (C) and the feeders (10).

FIG. 1







INTERNATIONAL SEARCH REPORT

International Application No
PC., B2005/002005

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65B29/02 B65B1/12 B65B1/24

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)
IPC 7 B65B

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 943 544 A (DIMA S.R.L) 22 September 1999 (1999-09-22) abstract; figure 4	1
A	EP 0 144 623 A (ILLYCAFFE S.P.A) 19 June 1985 (1985-06-19) page 9, line 26 - page 10, line 9; figures 2-7	1
A	US 2 603 927 A (GREY GEORGE) 22 July 1952 (1952-07-22) column 8, line 5 - line 43; figures 2,6,7,9,12	1
A	WO 99/47423 A (MOLINS PLC; BAILEY, THOMAS, WILLIAM; SEAWARD, DAVID, ROBERT) 23 September 1999 (1999-09-23)	
	-/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in 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

27 September 2005

Date of mailing of the international search report

05/10/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Wartenhorst, F

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP02/002005

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 470 921 B1 (MCGREGOR HAROLD) 29 October 2002 (2002-10-29) -----	

INTERNATIONAL SEARCH REPORT

Annex to the International Search Report
relating to the international patent family members

International Application No
PCT/JP2005/002005

Patent document cited in search report	Classification	Publication date	Country	Patent family member(s)	Publication date
EP 0943544	A	22-09-1999	IT	B0980184 A1	20-09-1999
EP 0144623	A	19-06-1985	CA	1220409 A1	14-04-1987
			DE	3475767 D1	02-02-1989
			IT	1169585 B	03-06-1987
			JP	1764193 C	28-05-1993
			JP	4055927 B	04-09-1992
			JP	60099808 A	03-06-1985
			US	4555894 A	03-12-1985
US 2603927	A	22-07-1952	NONE		
WO 9947423	A	23-09-1999	AU	2942899 A	11-10-1999
US 6470921	B1	29-10-2002	NONE		