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

(11) Publication number: **0 163 191**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 85105847.9

(22) Date of filing: 13.05.85

(51) Int. Cl.⁴: B 65 B 43/42

(30) Priority: 17.05.84 GB 8412586

(43) Date of publication of application:
04.12.85 Bulletin 85/49

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

(71) Applicant: Lingner and Fischer GmbH
Postfach 1440
D-7580 Buhl (Baden)(DE)

(72) Inventor: Dresel, Richard
Liehenbachstrasse 17
D-7582 Buehlertal(DE)

(74) Representative: Russell, Brian John et al,
Beecham Products Patents Department St George's Avenue
Weybridge Surrey KT13 0DE(GB)

(54) **Feed mechanism.**

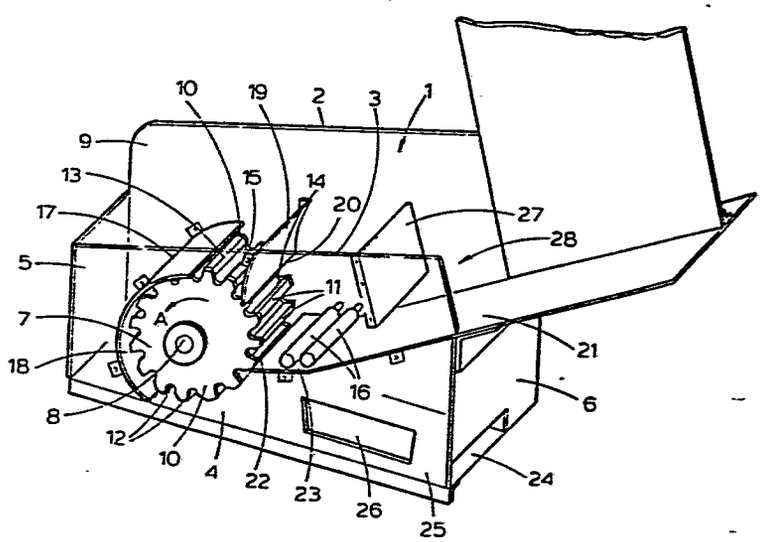
(57) A feed mechanism for a container-filling machine, has a rotatable cylinder ~~(7)~~ mounted in a body (1), the cylinder ~~having~~ axial recesses (12) for receiving tubular containers (16) and transferring them from a feeding station (21, 22) to an outlet station (24).

A curved plate (17) extends partially around the cylinder (7) and is spaced therefrom, so that containers (16) can be temporarily trapped between the plate (17) and the cylinder (7) while being transported to a disengagement position.

A curved skimmer plate (19) is positioned near the feeding station (21, 22) in order to push containers (16) fully into the recesses (12) or to disengage them if not correctly aligned with the recesses (12).

EP 0 163 191 A1

./...


10
19
2
3
1
9
13
15
14
20
27
17
28
5
11
7
A
21
18
16
6
8
12
10
4
22
23
26
24
25

0163191

C223

FEED MECHANISM

This invention relates to a feed mechanism for a container-filling and/or -closing machine.

Conventional machines for filling and/or closing containers such as tubes and bottles on a continuous production-line basis are generally provided with a feed mechanism which ensures an uninterrupted feed of the containers to the machine at a desired constant rate. The rate of throughput of the machine is often limited by the rate of output of the feed mechanism. However, it is often difficult to increase this without the risk of damaging existing conventional containers, or without having to strengthen the existing containers to avoid such risk.

The present invention provides a novel feed mechanism for a continuous-production container-filling and/or -closing machine, which mechanism has a high output rate, and can safely handle conventional containers. It is particularly suitable for feeding cylindrical glue tubes, for example glue tubes to a filling and/or capping machine.

Accordingly the present invention provides a feed mechanism for a continuous-production container-filling and/or -closing machine, which mechanism comprises a body, a rotatable member mounted in the body and having a plurality of recesses disposed in a regular array about the axis of the member, each recess being capable of engaging a container, means for rotating the

rotatable member, means, mounted in the body for feeding the containers to the recesses in the rotatable member, and an outlet from the body, the rotatable member, recesses therein, feeding means and outlet being arranged so that in use rotation of the rotatable member causes each recess to engage a container from the feeding means and to impel the container until it disengages from the recess to pass through the outlet.

Preferably, the body of the feed mechanism of the invention comprises a framework or a partial or complete housing for the rotatable member and/or feeding means. For safety reasons it may be desirable that the body is a partial or complete housing.

The rotatable member is generally mounted by a rotatable shaft on the body, which shaft connects the member to the means for rotating it.

The rotatable member generally has a regular peripheral profile (excluding the recesses) about the axis of the shaft, such as a circular or regular polygonal profile.

In other respects the shape of the member is not material provided that it is compatible with its having a regular array of recesses about its axis and with its function of engaging and impelling the containers.

However, it is generally preferred that the member has an essentially constant peripheral profile along its axis, for example it has the appearance of a right cylinder or a right regular polygonal prism. The member need not however be a solid prism, such as a solid cylinder, provided with recesses. A preferred member consists of two essentially circular discs of the same diameter, each provided with identical

recesses about its periphery, the two discs being connected by axial slats between the recesses to present the appearance of a right cylinder with peripheral recesses.

The recesses in the periphery of the rotatable member are regularly disposed about the periphery to provide a regular continuous output from the outlet. However from the foregoing it will be seen that the recesses are not necessarily regularly disposed in a single regular peripheral row. The rotatable member may be provided with two or more regular peripheral rows of recesses. Each recess in each peripheral row will then generally be axially in register with a recess in the other peripheral row or in each of the other peripheral rows, to form an axially-disposed pair or row of recesses. Each recess of the axially-disposed pair or row of recesses will engage part of a given container. Thus, for example, in the preferred rotatable member described hereinbefore, consisting of two discs connected by axial slats, each recess in the periphery of one disc is axially in register with an identical recess in the other disc. Such axially-disposed pairs of recesses are suitable for example for engaging an elongate, regular prismatic container, such as a tubular container, each recess of the pair engaging the container near each of its ends.

In order that the rotatable member can best perform its function of impelling the containers between the feeding means and the outlet, it may be desirable that each recess is not only capable of engaging a container, but also that each recess is capable of receiving the container, or the part of the container, which it engages. Thus for example in the case of a

tubular container, the bottom of each recess may suitably be circular of the same or greater radius than that of the tubular container, so that the pair of recesses cradles the container.

Other aspects of the appropriate shape for each recess will be determined by the peripheral speed of the rotatable member when rotating in use, and by the nature of the means for feeding containers onto the member. Thus for example it will be clear to the skilled man that a container on the rotating member will tend to ride up the trailing wall of any recess engaging it, under centrifugal force. It is clearly desirable that the recess is deep enough to ensure that the container and recess remain in engagement throughout the peripheral traverse of the container. It may also be desirable for the trailing wall of the recess to slope from the periphery of the rotatable member against the direction of rotation, so that the rotating member itself provides a reactive centripetal force which tends to retain the container in the recess. Suitable depths of recess and/or degree of slope of the trailing face of the recess may be readily ascertained by the skilled man by routine calculation and/or trial and error.

Similarly the mouth of each recess must be sufficiently wide and so shaped as to allow a container to be transferred from the feeding means into a recess or axial pair or row of recesses on the rotatable member as they rotate past the feeding means. This will be determined by a number of factors such as the peripheral speed of the rotatable member, the time of transfer of the container onto the rotating member and the direction of feed relative to the rotating member. (Suitable feeding means are discussed hereinafter).

The appropriate shape for transfer from the feeding means onto the rotating member to be achieved may be readily ascertained by the skilled man by routine calculation and/or trial and error. However, for example, it may be desirable for the leading wall of each recess to slope from the periphery of the rotatable member against the direction of rotation.

The suitable number of recesses in each peripheral row of recesses will be determined, by the desired rate of output of containers from the outlet, the size of the containers, and that peripheral speed of the member which is compatible with the recesses engaging the containers throughout their traverse between feeding means and outlet.

A suitable number of recesses and overall transverse dimension of the rotatable member for any given container and desired output rate will be readily ascertainable by the skilled man by routine calculation and/or trial and error. However by way of example we have found that in the prefered rotatable member described hereinbefore, when used for supplying approximately 200 tubular plastics or aluminium containers (of diameter 10 to 35 mm) per minute to the outlet, a member diameter of 250 to 300 mm and 10 to 20 recesses in each peripheral row, in particular about 16 recesses per such row are appropriate. It will be seen that a rotation rate of 10 to 15 r.p.m. will be appropriate in such a case.

The axis of rotation of the rotatable member may be in any orientation compatible with the function of the member in impelling a container from the feeding means until it disengages from the member to pass through the outlet. Conveniently and preferably, the axis of

rotation may be substantially horizontal so that its recesses can be such as to engage the containers under gravity and the containers can disengage from the recesses again under gravity.

The relative disposition of the feeding means, and outlets about the rotatable member will determine the proportion of the periphery of the member about which each container is carried. We have found that, if the rotatable member is rotated at a fairly constant rate, the regularity, and constancy of the rate, of feed from the outlet may be optimised by maximising the proportion of the periphery of the member traversed by each container. Thus, for example for a rotatable member the axis of which is substantially horizontal, the containers may be fed onto the rotatable member at a level below that of the axis of the member such that each container is carried over the axis and disengages from the rotatable member at or near the lowest point of the periphery of the member. In such an embodiment, where engagement and disengagement of the recesses and containers occurs under gravity, the traverse of a container in engagement with the rotating member may be extended to or beyond the lowest point of the periphery of the member by means of a curved plate running around that part of the periphery of the member where disengagement under gravity may occur. In such a case the plate prevents the container sliding or rolling out of the recess or recesses which engage it until the desired point for disengagement is reached.
The rotatable member may be driven by any conventional rotating means, but preferably the means is speed regulated to ensure a constant output rate from the mechanism. We have found that a speed-regulated direct current electric motor is a convenient means. A convenient method of speed regulation includes a

feedback control regulated by the container output of the mechanism. This may for example be a light beam and photoelectric cell combination mounted across the path of the containers between the rotatable member and the intake of the filling and/or closing machine for which the mechanism is a feed mechanism.

Such a feedback control may also function as a cut-out in case of output blockage, for example caused by failure of the filling and/or closing machine.

The means for feeding the containers onto the rotatable member may be any means which serves to urge the containers onto the rotatable member. A simple and preferred means comprises a slope so that containers fed onto the slope are urged by gravity to slide or roll into engagement with the recesses on the rotatable member. The required slope for given containers, the desired output rate, and any given feed mechanism according to the invention may be readily assertained by the skilled man by routine calculation and/or trial and error. However, by way of example we have found that, for the preferred feed mechanism of the invention, tubular plastics or aluminium containers and output rates described hereinbefore, a slope of 5 to 30°, in particular 10 to 25° is suitable.

The slope serves primarily to urge the containers onto the rotating member, and thus need not be uniform. It may in fact be desirable in order to achieve a good feed of the containers onto the rotating member, to have a feed direction relative to the rotating member which deviates from the direction of the slope. The slope may thus, for example, for this reason decrease near the rotating member below the foregoing exemplary values, even to 0°.

The feeding means may be positioned to feed containers onto the rotatable member in any direction compatible with the role of the rotatable member. However, for the tubular plastics or aluminium containers and the preferred embodiment of the invention described hereinbefore, in particular where the axis of the rotatable member is substantially horizontal, and the containers are impelled over the axis of the member, we have found that a horizontal feed below the level of the axis is convenient.

When the feeding means comprises a slope, the containers may conveniently be fed to the slope via a hopper. It is convenient that the containers are fed to the hopper in an ordered manner. This may be achieved by stacking them in the hopper in the correct orientation for ready transfer onto the rotatable member. In such a case the bottom of the hopper may conveniently be an extension of the slope, and one wall of the hopper may lie at right angles across the slope and extend upwards at right angles to it, and be spaced above the slope such that a single container may pass down the slope under that wall. The containers may then be stacked in multiple layers in the hopper. This is particularly convenient for tubular containers. Alternatively tubular containers in particular may be fed to the slope in an ordered manner from a single-track carton or cassette. The abovementioned type of hopper may also conveniently be used in this case to receive the carton or cassette to discharge down the slope.

The form of the outlet for the containers is immaterial. It may for example be a gap or channel between frame members, where the body is a framework, or an aperture, where the body is a housing. It is

generally convenient for the mechanism of the present invention to be provided with a slope between the point at which the containers disengage from the rotating member and the outlet; this slope may also be the input slope of the associated filling and/or closing machine. Output containers are impelled to slide or roll under gravity down the slope through the outlet. A suitable slope for given containers and operational parameters may be readily ascertained by the skilled man by routine calculation and/or trial and error. However, by way of example we have found that, for the preferred feed mechanism of the invention, tubular plastics containers and output rates described hereinbefore, a slope of 10 to 20°C in particular about 15° is suitable.

Although the parameters of the feeding means and the recesses on the rotatable member should be chosen to ensure good engagement of the containers, it may be desirable to provide a skimmer, an edge of which is close to the periphery of the rotatable member at some point on the peripheral path of the containers between the feeding means and the point of disengagement of the containers. This skimmer serves to either push home any container on the rotating member or to disengage any container which projects further than desired from the rotating member. The skimmer is particularly useful, when there is a curved plate around the rotatable member, to prevent containers fouling the plate. In such a case the skimmer is of course positioned on the peripheral path of the container between the feeding means and the curved plate.

One embodiment of the invention is now described by way of example only with reference to the accompanying drawing, where:

the Figure is a perspective view of a feed mechanism in accordance with the present invention.

Referring to the Figure, a feed mechanism includes a body 1 in the general form of an open-topped plastics box. The upper edges of side walls 2 and 3 of the body 1 are arranged horizontallly while the floor 4 of the body 1 slopes downwardly at about 15° from the front wall 5 towards the rear wall 6.

The feed mechanism also includes a rotatable right cylinder 7 about 250 to 300 mm in diameter, mounted on a shaft 8 between the side walls 2 and 3 of the body 1, the shaft 8 being rotatable in the direction A by a speed- regulated direct current electric motor (not shown). The cylinder 7 consists of two identical circular discs 10, which are coaxial and axially spaced apart, and are connected at regular intervals about their peripheries by axially extending slats 11. Each disc 10 has a series of identical round-bottomed recesses 12 regularly disposed about its periphery, each recess 12 lying between a slat 11 on the periphery of the disc 10. Each recess 12 in one disc 10 is identical and in register axially with a recess 12 in the other disc 10. The cylinder 7 thus has a plurality of recesses 12 which are regularly disposed about its periphery in two regular peripheral rows, there being about 16 recesses in each row. The leading wall 13 and trailing wall 14 of each recess 12 each slope from the periphery of the cylinder 7 against the direction of rotation A of the cylinder 7. The angle between the radial line and the direction of the slope of the leading wall 14 is about 45°, while that between the radial line and the direction of slope of the trailing wall 14 is less than 10°. The radius of the circular bottom 15 of each recess 12 is the same as or greater

than that of a tubular plastics or aluminium glue container 16 which the mechanism is adapted to handle.

An axial pair of recesses 12 can cradle a container 16 and impel it in the direction of rotation A.

The cylinder 7 is spaced above the floor 4 so that rotation of the cylinder can force a container along the floor 4 towards the rear wall 6.

A curved plate 17 of resilient hard PVC is mounted on the body 1 and curves around the periphery of the cylinder 7 from the highest point of the cylinder to meet the floor 4, so that the cylinder 7, rotating in direction A, sweeps the concave face 18 of plate 17 from top to bottom. The plate 17 is sufficiently spaced from the cylinder 7 to allow a container 16 cradled by a pair of recesses 12 to pass within the concave face 18 but sufficiently close to the periphery of the cylinder 7 not to allow the container 16 to pass between the periphery and the face 18.

A skimmer 19 of thin stainless steel sheet is mounted on the body 1 so that an edge 20 is parallel to the axis of the cylinder 7 at a point such that the periphery of the cylinder 7 rotating in direction A passes the skimmer 19 before the plate 17. The skimmer 19 is in the form of a curved plate curving away from the periphery of the cylinder 2. Its edge 20 is sufficiently spaced from the cylinder 7 to allow a container 16 cradled by a pair of recesses 12 to pass under the edge 20, but sufficiently close either to push such a container 16 which is not completely home into the pair of recesses 12 or to skim it out of the recesses 12 if it projects too far from the cylinder.

A means for feeding the containers 16 onto the cylinder 7, in the form of a sloping plate 21, is mounted on the body 1 so that its lower end 22 lies close to the periphery of the cylinder 7 at a level lower than the axis of the cylinder 7 such that the periphery of the cylinder 7 rotating in direction A rises past the lower end 22 of the slope 21. The lower end 22 of the slope 21 is sufficiently close to the periphery of the cylinder 7 to ensure transfer of containers 16 into the recesses 12. The slope 21 is generally inclined at about 10 to 25°, levelling off near its lower end 22 to a horizontal portion 23.

A transverse bulkhead 27 is mounted on the body 1 at right angles to the slope 21 and is spaced above the slope 21 such that a single container 16 may roll under it down the slope 21. The bulkhead 27 and the slope 21 upwardly of the bulkhead 27 thus form a hopper 28 in which the containers 16 may be stacked in multiple layers in a suitable orientation to roll singly down the slope 21 under the bulkhead 27. Alternatively, the hopper 28 may be used to receive a single-track cassette or carton of containers 16 so that the cassette or carton discharges down the slope 21 under the bulkhead 27.

The feed mechanism of the invention is provided with an outlet for the containers 16 in the form of a rectangular aperture 24 in the rear wall 6 of the body 1. The sloping floor 4 (with a slope of about 15°) of the body 1 provides an incline running from the lowest point of the cyclinder 7 to the aperture 24.

The side wall 3 of the body 1 has a trapezoidal opening 26 near its lowest point through which the floor 4 and the output containers 16 may be inspected.

The input of the associated filling and/or closing machine has an incline (not shown) which is an extension of the floor 4 of the mechanism. A light-beam-photoelectric cell combination is mounted with the beam at right angles to and across the input incline.

In use, the cyclinder 7 is rotated in direction A at a fairly constant rate of about 10 to 15 revolutions per minute by the speed-regulated direct current motor. Tubular containers 16 from a single track cassette each in turn roll down the slope 21 into successive axially-disposed pairs of recesses 12, and rise past the lower end 22 of the slope 21. Each container 16 passes under the skimmer 19, if correctly cradled by the pair of recesses, or is pushed home or skimmed off by the skimmer 19 if not correctly cradled. Each remaining container 16 passes under the plate 17. A pair of recesses 12 cradles each container 16 until about the horizontal level of the axis of the cyclinder 7, when the container rolls from the bottoms 15 of recesses 12 but is still held in engagement with the recess trailing walls 14, first by the plate 17 and then the sloping floor 4 of the body 1. At about the lowest point of the cylinder 7 each container disengages under gravity from the cylinder 7 in turn and is impelled down the incline of the sloping floor 4 through the outlet aperture 24 to the associated filling and/or closing machine. Each container in turn breaks the light beam of the light-beam photoelectric cell combination on the machine input. The cell output is fed back into a conventional feedback speed regulation and cut-out circuit to regulate the speed of the electric motor which serves to rotate the cylinder 7, and to provide a cut-out in case of blockage of the input machine.

Claims

1. A feed mechanism for a continuous-production container-filling and/or -closing machine, which mechanism comprises a body (1) and a rotatable member (7) mounted in the body, characterised in that the member (7) has a plurality of recesses (12) disposed in a regular array about the axis of the member (7), each recess (12) being capable of engaging a container (16), means (8) are provided for rotating the member (7), means (21, 22) are mounted in the body (1) for feeding the containers (16) to the recesses (12) in the rotatable member (7), and an outlet (24) from the body is provided, the rotatable member (7), recesses (12) therein, feeding means (21,22) and outlet (24) being arranged so that in use rotation of the member (7) causes each recess (12) to engage a container (16) from the feeding means (21, 22) and to impel the container (16) until it disengages from the recess (12) to pass through the outlet (24).

2. A feed mechanism according to claim 1, characterised in that the body (1) of the mechanism comprises a framework or a partial or complete

housing (2,3,4,5,6) for the rotatable member (7) and/or feeding means (21,22).

3. A feed mechanism according to claim 1 or claim 2, characterised in that the rotatable member (7) comprises a right cylinder mounted by a rotatable shaft (8) on the body (1).

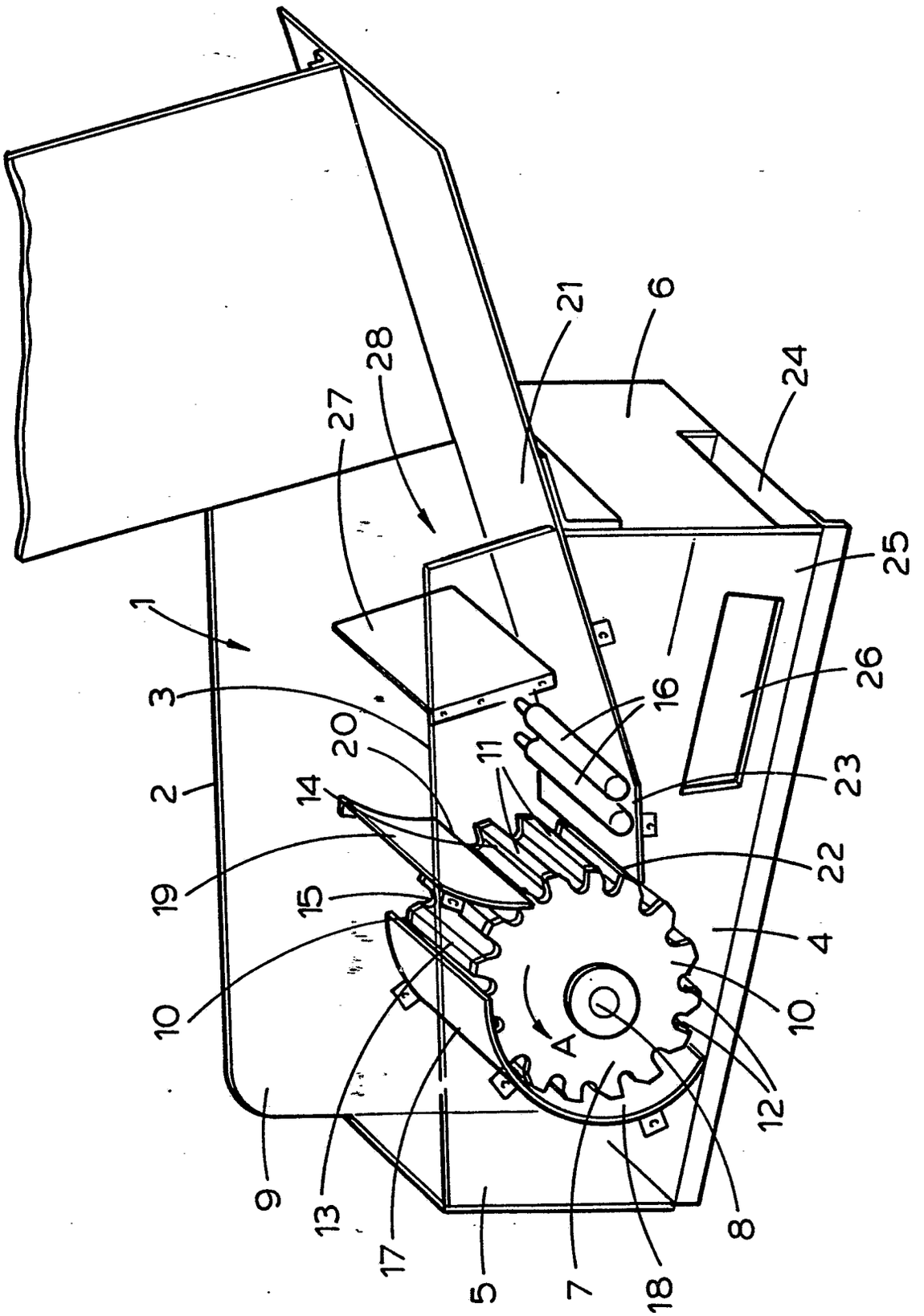
4. A feed mechanism according to claim 3, characterised in that the right cylinder (7) consists of two circular discs (10) of the same diameter, each provided ith identical recesses (12) about its periphery, the two discs (10) being connected by axial slats, (11) between the recesses (12).

5. A feed mechanism according to claim 4, characterised in that the side walls (13,14) of each recess (12) are inclined to a radial line from the centre of each circular disc (10), through the bottom wall of each recess (12).

6. A feed mechanism according to any one of claims 1 to 5, characterised in that a curved plate (17)

extends at least partially around the rotatable member (7) and is spaced therefrom so that containers (16) can be trapped between the plate (17) and the rotatable member (7) while being transported by the member (7) to a disengagement position for the containers (16).

7. A feed mechanism according to any one of claims 1 to 6, in which a skimmer (19) is provided, with an edge (20) adjacent the periphery of the rotatable member (7) in order to push a container (16) onto the member (7) or to disengage a container (16) which projects further than desired from the member (7).


1
2
3
4
5
6
7
8
9
10
10
11
12
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
A

European Patent Office

EUROPEAN SEARCH REPORT

Application number
0168191

EP 85 10 5847

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.4)
X	FR-A-2 277 750 (FREVILLE) * Page 3, line 11 - page 4, line 22; figure 1 *	1-3,6	B 65 B 43/42
Y		4,5,7	

Y	FR-A-2 311 716 (LE QUINTREC) * Page 1, lines 16-18; figures *	4	

Y	FR-A-2 388 721 (ROCHAT) * Page 4, line 23 - page 5, line 2; figure 1 *	5	

Y	US-A-4 183 192 (SMAW) * Column 5, line 22 - column 6, line 6; figure 4 *	7	
	-----		TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-08-1985	CLAEYS H.C.M.

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