

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 447 375 A1

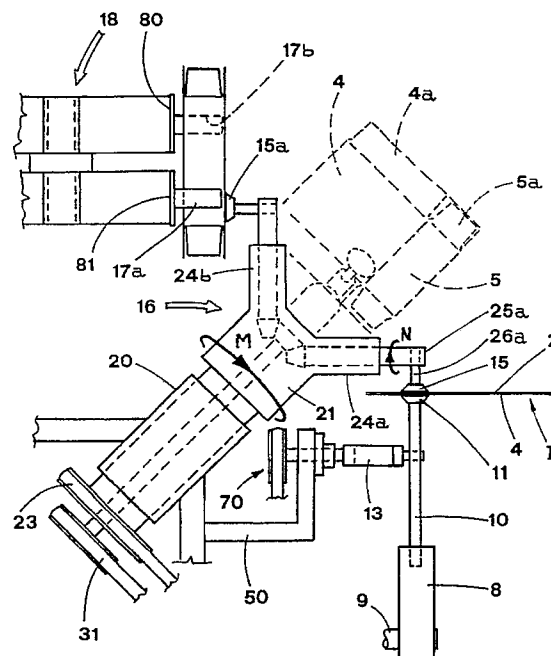
(12)

EUROPEAN PATENT APPLICATION(21) Application number: **91830087.2**(51) Int. Cl.⁵: **B65B 43/28, B65B 43/18**(22) Date of filing: **12.03.91**(30) Priority: **13.03.90 IT 338790**(43) Date of publication of application:
18.09.91 Bulletin 91/38(84) Designated Contracting States:
BE CH DE ES FR GB LI(71) Applicant: **Benedetti, Oliviero**
Via Silvestro Lega, 72**I-48018 Faenza (RA)(IT)**(72) Inventor: **Benedetti, Oliviero**
Via Silvestro Lega, 72
I-48018 Faenza (RA)(IT)(74) Representative: **Dall'Olio, Giancarlo**
INVENTION s.n.c. Via Arienti 26
I-40124 Bologna(IT)

(54) **Device for taking blanks, of flattened tubular form, from a magazine, and for opening said blanks during their transfer to a packaging line for obtaining boxes.**

(57) The device is associated with a line consisting of at least two equal chains (80,81), winding themselves round in a closed ring, according to horizontal planes, motorized with equal speeds, provided with radial prongs (17b,17a), oriented outwards, individuating a series of vertical seatings (45), and of a magazine (6) containing a pile (P) of blanks (1) of flattened tubular form.

First means (7) provide for taking the lower blank (1a) of said pile and for positioning it, horizontally, in an intermediate station (I) where second means (16), acting in relationship of phase with the former, catch said blank, which is imparted a spatial motion of progressive orientation of its axis from horizontal to vertical, and of rotation with respect to the same axis in order to intercept a fixed catch projection (60) first, with partial opening of the same blank, and then the prongs (17a,17b) of a corresponding vertical seating (45) with a speed component (H) contrary to the direction of translation of the prongs themselves, with the completion, through these latter, of the opening of the blank.

**FIG 2****EP 0 447 375 A1**

This invention relates to the technical field concerning the machines designed for packaging containers which, during their handling, (closing of the bottom, filling with products, closing of the upper head) are vertically oriented, with reference to their longer dimension.

In detail, said machines basically comprise:

- a magazine of blanks of flattened tubular form;
- a device to intermittently take the lower blank of the pile of blanks contained by said magazine, and to transfer the same blank with progressive definition of the relative open tubular form, into a corresponding seating of a conveying line;
- said conveying line, made up of a conveyor provided with means defining a plurality of said seatings, with fixed spatial attitude, which in a feeding station located close to the initial part of the inner branch of the conveyor are designed to receive, and to check elastically, corresponding blanks of said open tubular form;
- first means, associated with said inner branch, to close, in cooperation with glue-applying means, the bottom of the blank, so as to form a corresponding container open at the top;
- a feeding station located between the terminal part of the inner branch of the conveyor and the initial part of the outer branch of the latter, designed to insert into said container, from above downwards, a predetermined quantity of products, particularly loose products, such as: pasta, rice, etc., or products in powdery and/or granular form, such as sugar, deteratives, etc.;
- second means, associated with the outer branch of the conveyor, designed, in cooperation with glue-applying means, to close the upper head of said container already filled with products;
- means for transferring the packaged containers from said outer branch to a reception line.

In the machines known hitherto, the seatings to receive the blanks of open tubular form are, as mentioned above, with fixed spatial attitude, consisting of drawers or being defined by as many pairs of consecutive blocks, and the magazine is oriented perpendicularly with respect to the longer dimension of the conveyor, with all the problems of encumbrance involved.

By means of a device of known type, the lower blank of the pile of blanks contained by the magazine is caught and transferred to said feeding station; during said transfer the blank is unfolded, i.e. it is brought from the flattened tubular form to the open tubular form.

The magazines used, associable with said device, do not allow the automated loading of blanks, since said pile is subject to the action of elastic means which keep it pressed against the check means in contrast with which the device intermittently catches the blanks.

In fact, in order to carry out the loading, it is necessary to disengage said elastic means from the pile, and that is precisely why the automatic loading of the magazine is not possible.

On today's date the Applicant filed a Patent Application no. 3388A/90, concerning a machine in which, besides other things, said reception seatings are defined by at least two prongs, borne by relative chains, respectively for catching (the front one) and for pushing (the rear one).

In order to allow the insertion of blanks of open tubular form into relative seatings thus defined, the Applicant invented a device designed to intermittently catch the blanks of flattened tubular form from the bottom of a pile of containers contained by a magazine, and to subsequently transfer the blanks into said seatings, with "unfolding", at least partial, of the same blanks during said transfer.

One of the objects of this invention is precisely the provision of a device performing the functions mentioned above, and designed to exploit also the movement of the prongs defining said reception seatings to complete the "unfolding" of the tubular blank, with consequent advantageous effects in terms of productivity of the device itself.

A further object of this invention is the provision of a device which, besides the features mentioned above, is suited to act on the lower blank of a pile of blanks located in a magazine, disposed parallel to the longer dimension of the conveyor provided with said pairs of corresponding prongs, with said magazine devised in such a way as to allow the automatic loading of blanks.

The objects mentioned above are accomplished by means of a device to take blanks, of flattened tubular form, from a magazine, and to open them blanks during their transfer to a packaging line.

The device, substantially made as described and claimed hereinafter, involves positive effects, on one hand, in terms of productivity and on the other hand of reliability of the latter, since the opening of the blank is always assured.

The technical solution provided by the present invention allows to take the lower blank of a pile of blanks contained by a magazine disposed parallel to the direction of maximum extension of a conveyor (with substantial reduction of the dimensions of the conveyor-magazine unit and device provided by the invention), with said taking carried out according to a direction perpendicular to the lower blank.

Subsequently said blank is transferred, partially unfolded, into a seating where prongs complete the unfolding process.

The particular conformation of the device provided by the invention allows the employment of a magazine suited to allow the automated loading of blanks.

The present invention will be described further, by way of example, with reference to the accompanying drawings, wherein:

- Fig. 1 is a side diagrammatic view of the device conforming to the invention;
- Fig. 2 is a view of said device according to the direction X of fig. 1;
- Fig. 3 is a view of said device according to the direction Y of fig. 1;
- Fig. 4 is a view of a section, obtained through an axial plane, of the means designed to take, from an intermediate station, a tubular blank of flattened form, and to transfer said blank, with the gradual opening of the same, between the prongs, (which carry out the opening), of a container-packaging line.

Referring to said figures, the numeral 1 generally designates a tubular flattened blank, a die-cut blank for instance, of the type defined by four consecutive side walls 2,3,4,5, respectively first, second, third and fourth, mutually articulated, wherein two of them, e.g. the first one 2 and the second one 3, result to be coplanar and fitting together with reference to the remaining walls 4,5; with said walls are articulated relative flaps 2a, 3a, 4a, 5a.

The blanks 1 are stacked in a magazine 6 made up of a horizontal portion 6a and a portion 6b, consecutive to the former, inclined downwards.

In the portion 6a the blanks 1 result to be inclined with respect to the horizontal axis, while in the inclined portion 6b the same blanks are normal to the axis of the latter portion.

The lower blank 1a of the pile P of blanks 1 (with said pile contained by the inclined portion 6b) is supported by known elastic check means, not illustrated; the extension of said portion 6b is such as to avoid overloading said elastic means.

Conventional means, not illustrated, cooperating with suitable sensors, also not illustrated, provide for translating, according to F, the blanks present in the horizontal portion 6a of the magazine 6, so to maintain the inclined portion 6b of the magazine always full of blanks.

Said horizontal portion may also be loaded automatically, e.g. by means of automated units; this is made possible by the fact that on said horizontal portion 6a no means to press the pile are required, thus allowing the automated loading, with all the advantages involved.

The lower blank 1a of the pile P defines a

station S from which the blanks are taken.

First means 7 provide for taking the lower blank 1a, and subsequently for transferring it to an intermediate station I where the same blank results to be in horizontal position (fig. 1).

Said means 7 are made up of a sleeve 8, hinged in 9 to the supporting structure 50 of the device, with which results to be telescopically coupled a stem 10, whose free end bears sucker means 11 fed in a known way, not illustrated; for the sake of simplicity only a single sucker is illustrated, but it is understood that the number of suckers depends on the surface of the blank 1.

With the stem 10 is articulated, in 12, the end of an arm 13 whose other end is hinged, in 14, to said structure.

Through means 70 the arm 13 is made rocking, according to A1-A2, between two limit positions and vice versa, individuating corresponding positions Z1, Z2, for the sucker 11.

The sucker 11 in the position Z1 mates at least a side wall of the blank 1a, e.g. said third wall 4, while in the position Z2 it is horizontal, as well as turned upwards.

The rotation of the arm 13 according to A1 initially causes a translation of the stem 10 parallel to the axis of the inclined portion 6b of the magazine (which is extremely advantageous, since it optimizes the disengagement of the lower blank 1a from the elastic means checking the pile P) and, subsequently, a gradual rotation of the same stem with respect to the fulcrum 9, according to A1, combined first with the re-entering and subsequently with the coming out of this latter into and from the sleeve 8. At the end of the oscillation of the arm 13, in the sense A1, the sucker 11 is in the position Z2 and the blank is positioned, horizontally, in the intermediate station I.

In this latter station, sucker means, e.g. consisting of a sucker 15, associated with second means 16, provide for catching the blank 1, e.g. in correspondence with the first side wall 2, in a suitable relationship of phase with the deactivation of the sucker 11.

The means 16 take the blank 1 from the intermediate station I to transfer it subsequently into a vertical seating 45 formed by a pair of prongs 17a, 17b (respectively for catching and for pushing) provided in a container-packaging line 18, whose inner branch 19a and outer branch 19b result to be parallel to the axis of the horizontal portion 6a of the magazine 6.

The line 18 is made up of at least two chains 80,81 respectively first and second, running parallel to each other and with the first one overlapping the second one (fig. 2).

The first chain 80 bears, equally spaced, the pushing prongs 17b, radially oriented outwards,

and the second chain 81 bears, equally spaced, the catching prongs 17a, in the same number as the former prongs, also radially oriented outwards.

Thus a series of vertical seatings 45 is individuated, each of which is defined by at least one catching prong 17a and by at least a corresponding pushing prong 17b; said seatings pass through a feeding station R defined by the initial part of the inner branch 19a of the conveyor 18.

In detail, as will be pointed out below, said means 16 impart the blank a composite motion, at the end of which the axis of the blank moves from the horizontal position to the vertical one (fig. 1), while the walls of the same blank result to be rotated by 180 degrees (clockwise with reference to the view of fig. 1) with respect to the above-mentioned axis.

During said motion, the blank intercepts a fixed catch projection 60 (fig. 3) which provides for unfolding the blank partially; the unfolding is completed, with the consequent definition of the open tubular form of the blank, by the combined action of the prongs 17a, 17b as will be hereinafter more fully explained.

The means 16 are made up of a cylindrical shell 20, fastened to the structure 50, whose axis 40 results to be inclined by 45 degrees with respect to two perpendicular planes, respectively horizontal and vertical.

Said shell revolvingly supports, inside itself, through known means 22, a tubular turret 21 whose upper portion is provided with two tubular projections 24a, 24b, orthogonal to each other, inclined by 45 degrees with respect to the axis 40.

Said projections revolvingly support, inside themselves, through known means 27, relative shafts 25a, 25b, to whose inner ends result to be splined respective bevel gears 28a, 28b in mutual meshing with one bevel gear 29 splined to the end of a shaft 30 located inside the turret 21 and revolvingly supported by this latter through known means 32.

At the ends of the shafts 25a, 25b, external with respect to the corresponding projections 24a, 24b, are fastened, normal to the same shafts, corresponding arms 26a, 26b, each of them bearing respectively a sucker 15 (mentioned above) and 15a: said suckers identify as many independent operating units.

In the accompanying drawings, the raceways, as well as the means designed to feed the suckers 15, 15a, are not illustrated, since they are not pertaining to the present invention.

The tubular turret 21 is drawn into rotation, according to M through means 23, while the shaft 30 is drawn into rotation through means 31; said means are motorized in relationship of phase with the motorization of the chains 80,81 and of the arm

13.

The unit made up of the means 31 and the bevel gears 29,28a is suited to draw into rotation the shaft 25a in the sense N according to an angular speed double with respect to the angular speed of the turret 21; in other words, to every revolution of the turret correspond two revolutions of the shaft 25a. The same principles also apply to the shaft 25b.

Referring to figs. 1, 2 and 3, the means 16 are illustrated, by a continuous line, in the position wherein the sucker 15 mates the first side wall 2 of the blank, while the sucker 15a has just completed the transfer of a blank, partially open, between a pair of corresponding prongs 17a, 17b.

In the above-mentioned position, the sucker 15a is deactivated, while the sucker 15 is activated.

Reference is made, here below, to the operating unit comprising the sucker 15.

The 180-degree rotation of the turret 21 according to M brings about a gradual rotation of the longitudinal axis of the blank 1 which moves from horizontal to vertical; said rotation, with reference to figs. 1 and 3, is counterclockwise.

If the shaft 25a were fixed, said rotation would involve a synchronous rotation of the side walls of the blank with respect to said axis; during said rotation a portion of the blank (not affected by the sucker 15) would intercept a fixed catch projection, with the consequent partial unfolding of the blank.

With the solution mentioned above, the blank, partially unfolded, would be inserted into the seating 45, defined by the prongs 17a, 17b of a corresponding pair of prongs, with a speed component concordant with the sense T of translation of the inner branch 19a of the line 18; this, when the action of the fixed catch projection ceases, could bring about either the re-closing of the blank, or its coming out of the seating 45.

This drawback is avoided by the rotation, according to N, of the shaft 25a.

Said rotation, contrary to the rotation of the relative tubular projection 24a, is by 360 degrees (as compared to 180 degrees of the turret), thus the blank corresponding to the seating 45 results, with respect to the relative longitudinal axis, to be rotated by 180 degrees in a sense contrary to the sense M according to which the projection 24a is rotated.

The above-mentioned principle makes it possible to insert the blank, partially unfolded by the catch projection 60 (which intercepts, e.g., the second wall 3), in the seating 45 with a speed component H contrary to said sense T.

Thus the edge common to the walls 3,4 intercepts (in a suitable phase relationship with the deactivation of the sucker 15) the pushing prong 17b, while the edge common to the walls 2,5 goes

to strike against the catching prong 17a.

The above-mentioned situation prevents the partially unfolded blank from coming out of the seating 45; the gradual decrease, up to the predetermined value, of the distance between the prongs 17a, 17b (since this latter, while passing through the feeding station R, moves along an arc of circumference first, then it follows a rectilinear trajectory), allows to overcome the elastic reaction of the articulations of the blank, until the unfolding of the same has been completed, with consequent definition of the open form (designated by W in fig. 3) of the same tubular blank.

At this point the sucker 15 carries out its idle run to return to the intermediate station I, and at the same time the other sucker 15a takes from this latter a blank of flattened form: the sucker 15a performs the same operating steps described above with reference to the sucker 15.

The conformation of the means 16 is such as to exploit the prongs 17a, 17b, in order to complete the unfolding of the blank; this involves positive effects, on one hand, in terms of productivity of the device conforming to the invention, and on the other hand of reliability of the latter, since the opening of the blank is assured.

Claims

1. Device to take blanks, of flattened tubular form, from a magazine, and to open said blanks during their transfer to a packaging line, with said line comprising a conveyor (18) defined by at least two equal chains (80,81), respectively first and second, winding themselves round, in a closed ring, according to horizontal planes, with the first chain (80) overlapping the second chain (81), to said chains, motorized with equal speeds, being restrained relative prongs (17b, 17a), equally spaced, respectively for pushing and for catching, radially oriented outwards to jointly define a series of vertical seatings (45), with each seating designed to receive, correspondingly to a feeding station (R) defined by the initial part of the inner branch (19a) of the conveyor (18), a tubular die-cut blank (1) oriented vertically, at least partially open, and to elastically check, subsequently, the same blank; said device being **characterized in that** it comprises: first means (7) designed to take the lower blank (1a) of a pile (P) of blanks (1) contained by said magazine (6), and to transfer it to an intermediate station (I) where the same blank is placed in horizontal position; second means (16) activated in relationship of phase with respect to the moving of said first means (7) and of said chains (80,81) designed to take a blank

located in said intermediate station (I) and suited to impart the die-cut blank a composite spatial motion with progressive orientation from horizontal to vertical and rotation around its axis so to intercept, at first, with the same blank, fixed folding means (60), with partial opening of the latter, and subsequently, with a speed component (H) contrary to the advancing sense (T) of said inner branch (19a) of the conveyor (18), the catching prongs (17a) and the pushing prongs (17b) of a corresponding vertical seating (45), with completion of the opening of the blank carried out by the latter prongs.

2. Device according to Claim 1, **characterized in that** said second means (16) comprise: a tubular turret (21), revolvingly supported by a fixed structure (20,50), inclined with respect to both a horizontal plane and to a vertical plane, provided at one end with at least a tubular projection (24a, 24b), inclined with respect to the axis of the turret so to take two limit positions, respectively horizontal and vertical, as a consequence of the rotation by half a revolution of said turret; a shaft (25a, 25b) located inside said tubular projection (24a, 24b) by which it is revolvingly supported and with respect to which it protrudes, sucker means (15,15a) restrained to the portion of said shaft (25a,25b) external with respect to the relative tubular projection, oriented in such a way as to catch, with this latter disposed horizontally, the upper portion of the blank already positioned in the intermediate station (I); first means to draw said turret (21) into rotation and second means to draw said shaft (25a, 25b) into rotation with angular speed double with respect to the angular speed of said turret and according to a sense (N) contrary to the sense (M) of rotation of the tubular projection (24a, 24b).
3. Device according to Claim 2, **characterized in that** said turret 21 is inclined by 45 degrees with respect to said horizontal and vertical plane, while said tubular projection (24a, 24b) is inclined by 45 degrees with respect to the turret axis, and said first sucker means result to be arranged perpendicularly with respect to the relative supporting shaft (25a, 25b).
4. Device according to Claim 1, **characterized in that** said first means (7) comprise: a sleeve (8), an end of which is hinged to said fixed structure (50); a shaft (10) telescopically coupled with said sleeve; second sucker means (11) restrained to the free end of said shaft; an arm (13) articulated with one of its ends to said

shaft 10 and hinged with the remaining end to said fixed structure; means (70) to rockingly motorize, in relationship of phase with the actuation of said second means (16), said arm (13), defining, for said second sucker means (11), two limit positions (Z1,Z2), respectively for taking said lower blank (1a) from the pile (P) of blanks contained by said magazine (6) and for positioning the same blank into said intermediate station (I).

5. Device according to Claim 1, **characterized in that** said magazine is oriented parallel to the direction of maximum extension of said conveyor (18), and it consists of a longitudinal portion (6a) and a portion (6b) inclined downwards, consecutive to the former, this latter containing said pile (P) of blanks (1) of flattened tubular form.
6. Device according to Claim 3, **characterized in that** said first sucker means comprise at least an arm (26a, 26b), perpendicular with respect to the relative shaft (25a, 25b), with the free end of which at least a sucker (15, 15a) is associated.
7. Device according to Claim 2, **characterized in that** said second motorizing means comprise: a bevel gear (28a, 28b), splined to the inner end of said shaft (25a, 25b), in mutual meshing with a bevel gear (29) splined to the end of a shaft (30) located inside said turret (21) by which it is revolvingly supported, whose remaining end, external to the turret, is associated with motorizing means (31).

40

45

50

55

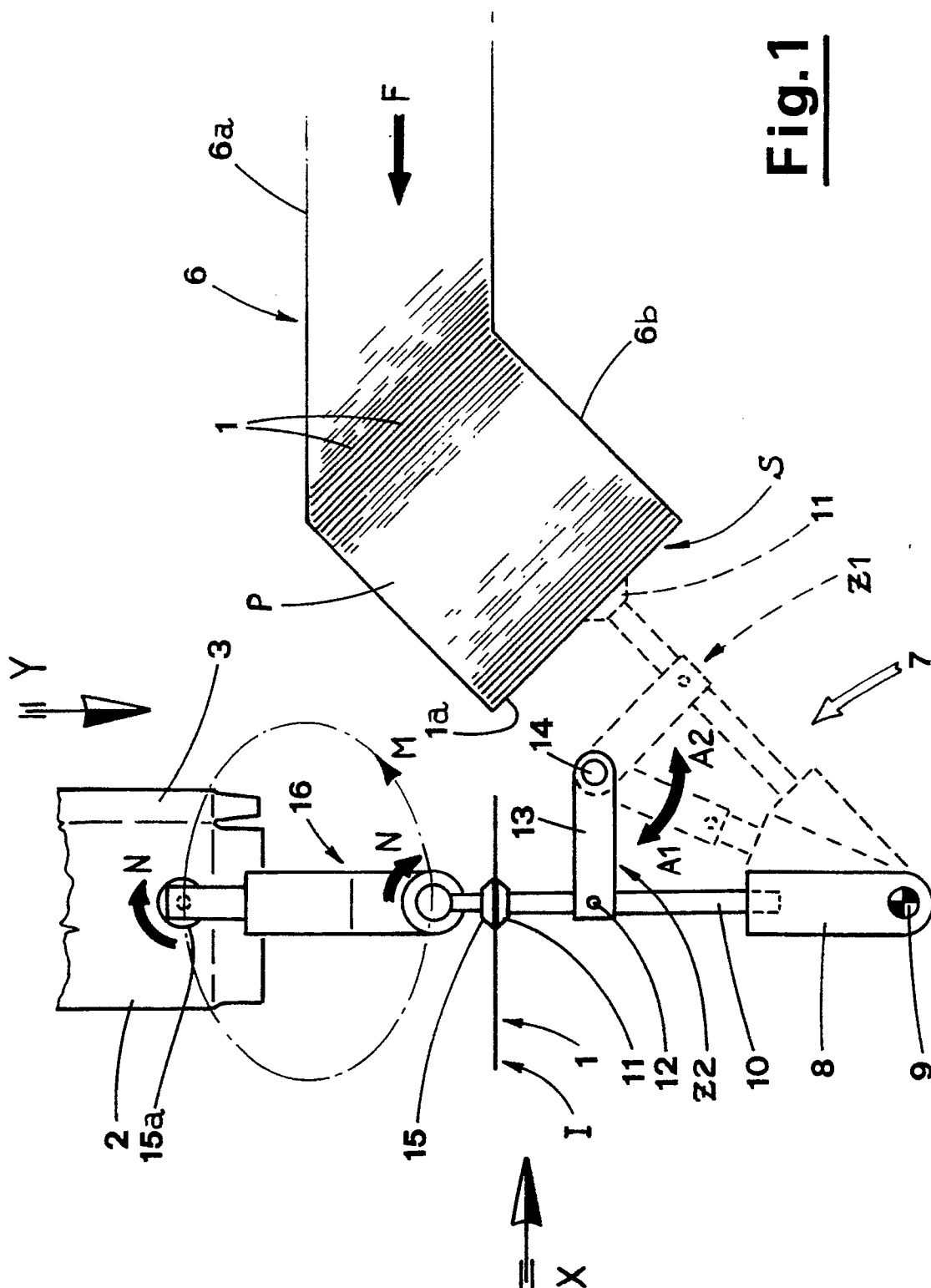


Fig. 1

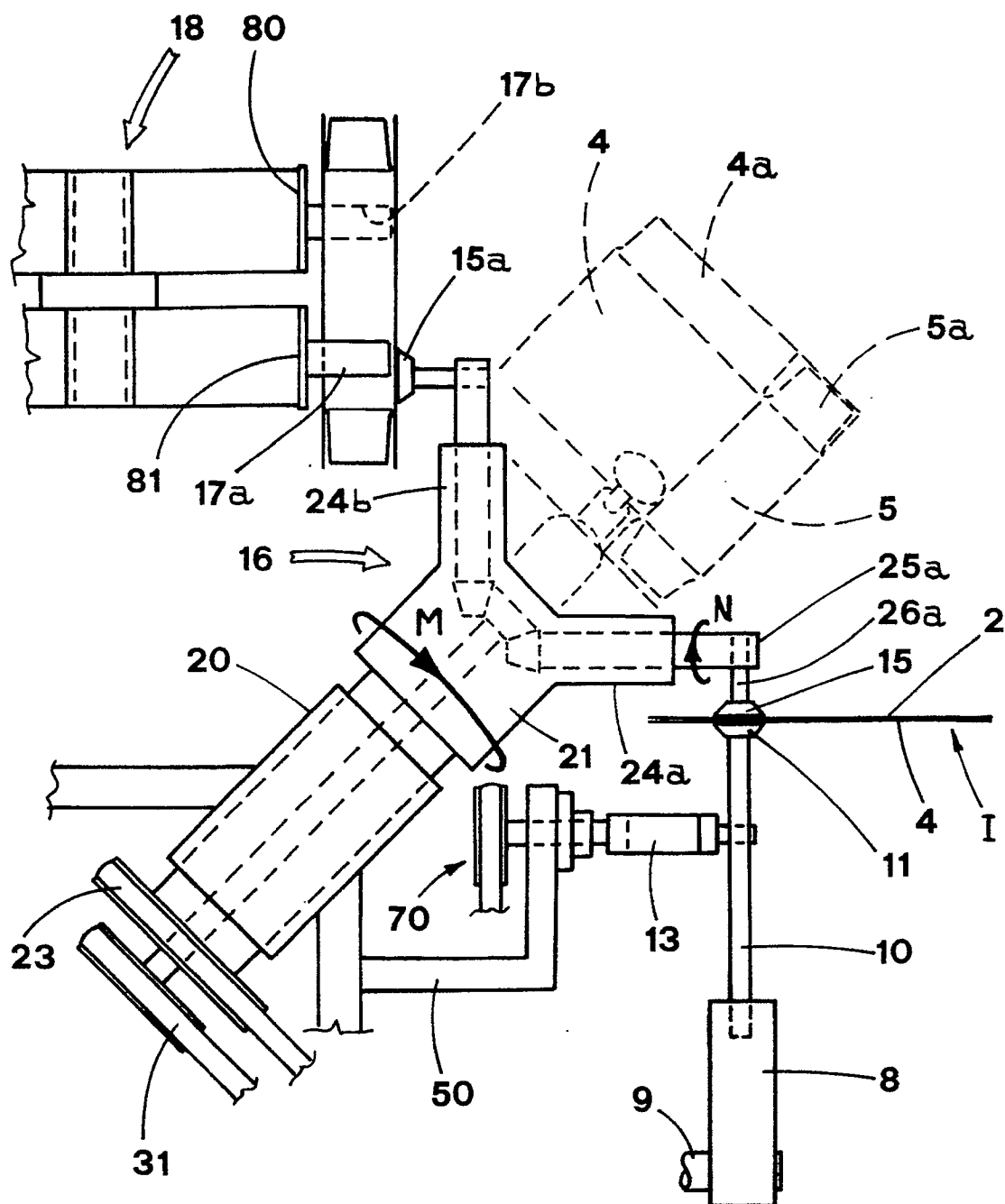


FIG 2

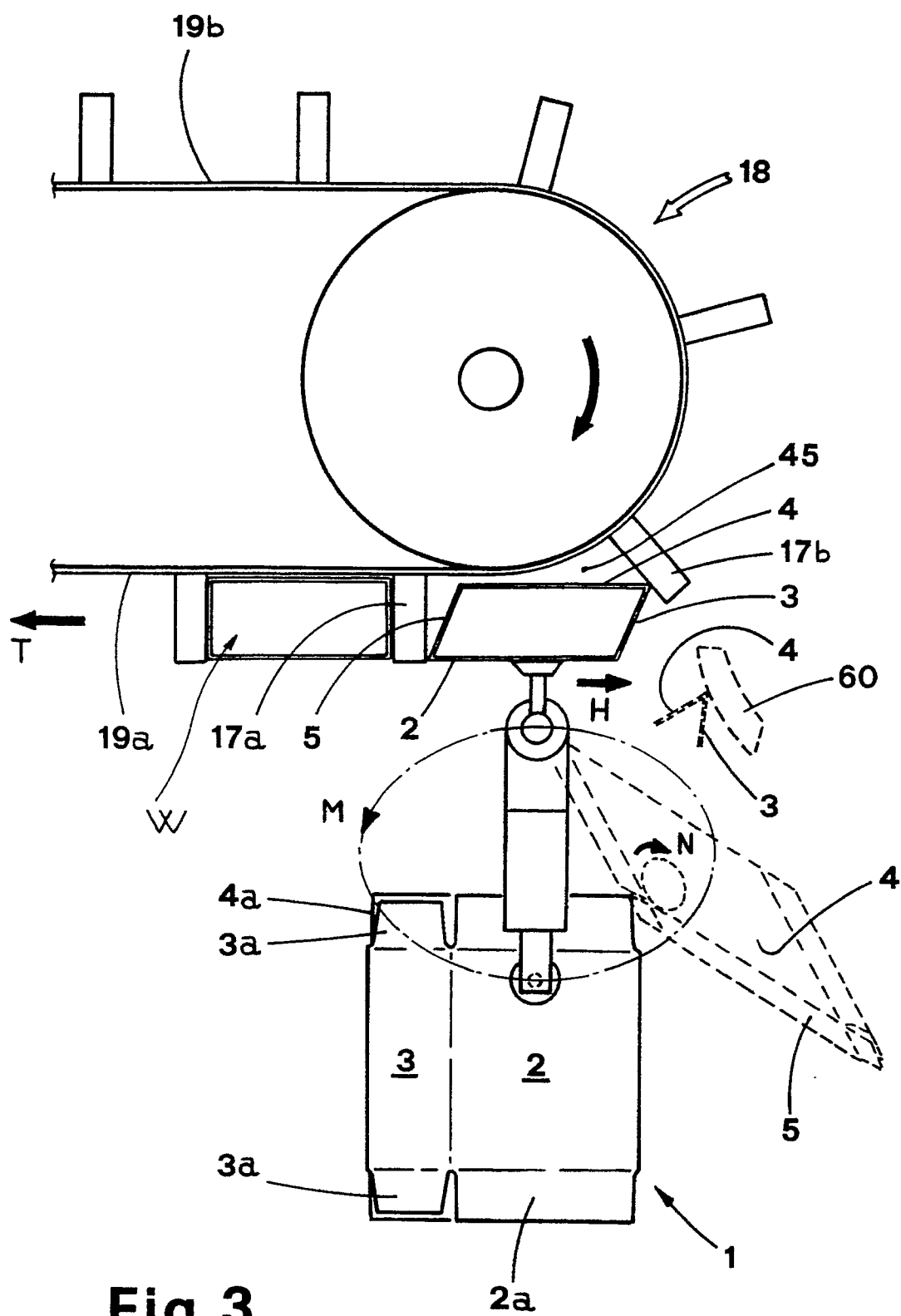
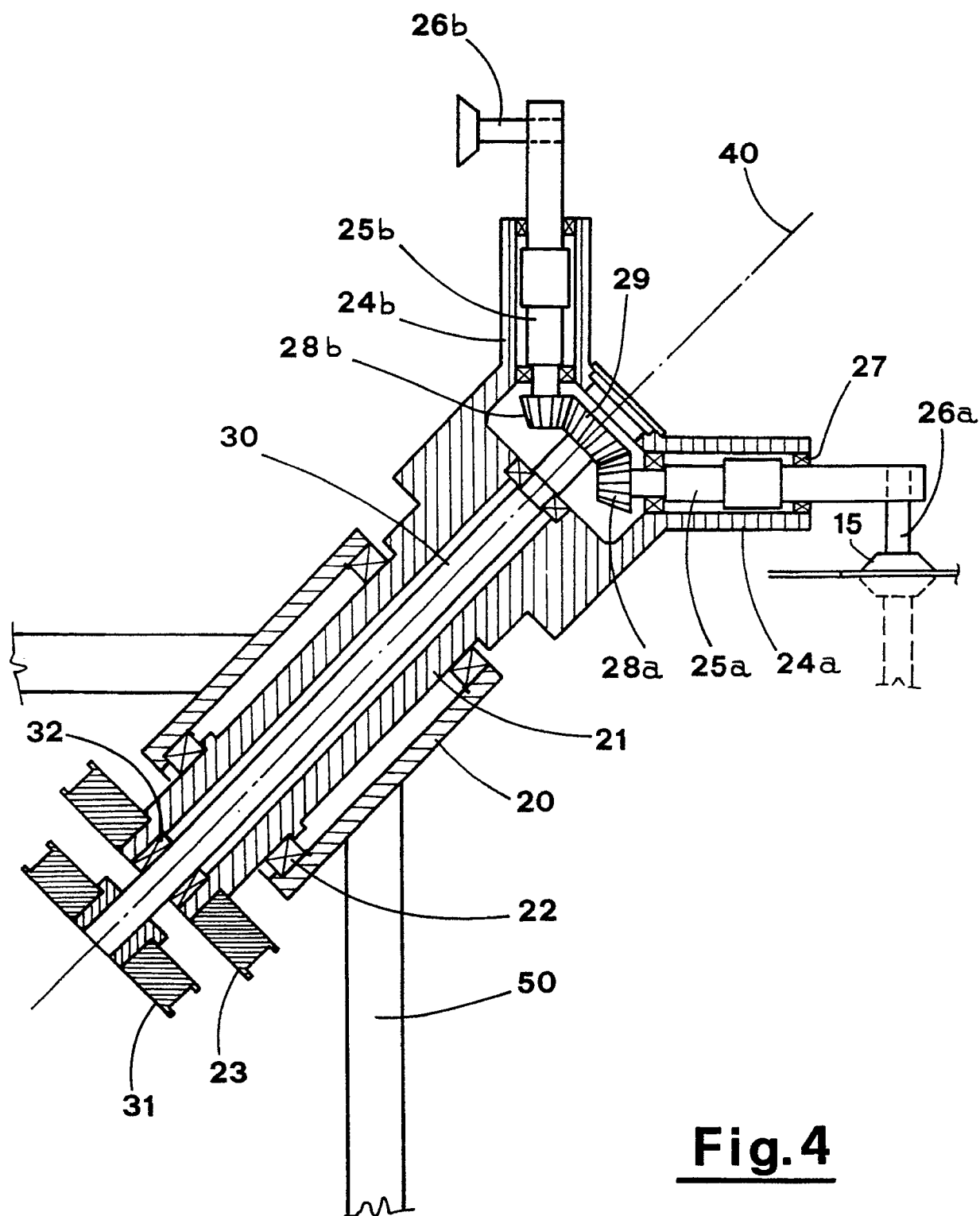


Fig. 3





EUROPEAN SEARCH REPORT

EP 91 83 0087

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.5)
A	EP-A-0 108 947 (BOSCH) * Page 3, paragraph 2 - page 5, paragraph 1; figures 1,2 * - - -	1	B 65 B 43/28 B 65 B 43/18
A	DE-A-1 909 119 (DELDON) * Page 5, last paragraph - page 8, paragraph 2; figures 1,2 * - - -	1	
A	FR-A-2 567 847 (ARGAZZI) * Page 6, line 36 - page 8, line 38; figures 1-3 * - - -	2	
A	AU-B-5 848 04 (JUKNAITUS) * Figure 2 * - - - - -	5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 65 B B 31 B
Place of search The Hague		Date of completion of search 27 May 91	Examiner CLAEYS H.C.M.
<div>CATEGORY OF CITED DOCUMENTS</div> <div><div>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</div><div>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</div></div>			