

- (21) Application No. 7744/78 (22) Filed 27 Feb. 1978 (19)
 (31) Convention Application No. 7 705 935 (32) Filed 1 March 1977 in
 (33) France (FR)
 (44) Complete Specification published 7 May 1981
 (51) INT. CL.³ B65H 31/38 1/14
 (52) Index at acceptance
 B8R 484 511 AD5



(54) METHOD AND INSTALLATION FOR ORDERING GROUPS OF ARTICLES IN STACKS OR ROWS

(71) We, HOTCHKISS-BRANDT SOGEME H.B.S., a French Body Corporate, of 186, rue du Faubourg St Honore, 75008 Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method and apparatus for placing the leading edges of a group of articles into line so that the articles can then be fed to a device for dispensing them individually. The articles are for example letters (postal or other envelopes), cheques, invoices and similar documents, etc.

The dispensing devices which are used to take the articles one by one from a stack in the order in which they present themselves so that they can be fed to a processing installation for example, generally operate satisfactorily provided that the position of the articles at the time when they are removed from the stack is very accurately defined. In particular it is essential that the leading edges of the articles should all be exactly in line. It is therefore necessary to tamp or "jog" the articles at least against a vertical plane or even, simultaneously against vertical and horizontal planes.

An object of the present invention is to enable these results to be achieved automatically with groups of articles initially arranged with no special care.

Accordingly from a first aspect the present invention consists in a method of placing into line the leading edges of a group of articles which are to be dispensed one by one by a dispensing device, comprising the steps of inserting groups of articles between pressure members which advance in the direction of said dispensing device along a path, causing the pressure members to move apart from one another whilst travelling along a portion of said path corresponding to a jogging zone whilst their overall speed of advance remains the same, propelling the articles making up a group during the travel of said pressure members along said portion, towards a wall

forming a vertical abutment so as to cause said articles to align themselves by one of their edges, and closing up said pressure members again along a further portion of said path before the articles arrive at a dispensing device.

Accordingly from a second aspect the present invention consists in apparatus for placing into line the leading edges of a group of articles by the method comprising a plurality of pressure members between adjacent pairs of which a group of articles may be gripped, said members being mounted on an endless chain along which they are distributed and whereby they can be moved along a closed path, means for acting on a group of articles located between a pair of pressure members to thrust them towards a vertical abutment as the pressure members pass through a portion of said path, means for moving pairs of pressure members apart when they are in said portion and for causing said members to move closer together after they have passed through said portion.

In order that the present invention may be more readily understood, an embodiment thereof will now be described by way of example and which reference to the accompanying drawings, in which:—

Fig. 1 is a schematic general view of an installation according to the invention,

Fig. 2 is a schematic view showing an endless chain associated with pressure fingers,

Fig. 3 is a detail view of the links of the chain,

Fig. 4 is an enlarged-scale view in cross-sectional elevation on line III—III of Fig. 1,

Fig. 5 is a detail view of a pressure member,

Fig. 6 is a schematic view of the system for guiding the pressure members,

Fig. 7 is a schematic view of a modified embodiment of certain component parts of the installation of Fig. 1,

Fig. 8 is a cross-sectional view in elevation on line III—III of Fig. 7,

Fig. 9 is a cross-sectional view in elevation on line II—II of Fig. 7,

Fig. 10 is a view of the exterior of a helical roller,

Fig. 11 is a diagram showing the change, as a function of time, in the distance between the lower edge of an article and the horizontal surface on which it rests.

With a view to simplicity, the same items bear the same reference numerals in all the Figures.

Referring now to the drawings Fig. 1 shows a device 1 for dispensing articles 3 (for example: letters) individually, which takes hold of the letters one by one and feeds them to a belt conveyor 2. The dispensing device 1 co-operates with a letter supply installation 4 according to the invention. All the operations take place on a horizontal surface 5 which is supported by a fixed structure which will be described subsequently.

The letter dispensing device 1 may, for example, be of the pneumatic type and comprises a rotary extractor drum 6 whose axis is perpendicular to the surface 5 and through whose perforated wall suction is applied from a fixed chamber 7 connected to a source of fluid at reduced pressure (not shown). Upstream of the drum 6 is arranged a wall 8 which forms an abutment for the letters and which has a perforated zone to which suction is applied from an enclosure 9 to ensure that the letter following that currently being extracted is held back.

Associated with this dispensing device 1 is an embodiment of a supply installation 4 according to the invention. The latter includes a plurality of pressure members or fingers 11 which advance in the direction of the drum 6 and the wall 8. Bundles of letters may be put down between each pair of fingers in what is termed a loading zone C by a human (or automatic) handler without any special precautions, the letters resting on edge against surface 5. Facing the leading edges of the letters is arranged a wall 12 which is substantially perpendicular to the surface 5 and parallel to the direction of movement of the fingers 11 and which forms a vertical abutment for lining up the leading edges. This wall 12 preferably has a substantially smooth surface.

In addition, underneath the surface 5, in what is termed a jogging zone T which is situated downstream of the loading zone C and upstream of the extracting zone D, are arranged a set of first rotary rollers 13 whose axes are substantially parallel to the direction of movement of the fingers 11. These rollers, which come substantially flush with the surface 5 through openings 14 formed in said surface, are rotated (by means which are not shown) in such a way as to thrust the letters towards the wall 12. In this way, no matter what the initial position of the letters, their leading edges are caused to but against the vertical abutment 12 also termed a "jogging barrier" and are thus lined up correctly.

The position of the wall 12 relative to the extractor drum 6 is of course chosen in such a way as to enable the said drum to extract the letters properly. So that the "jogging" operation shall take place as satisfactorily as possible it is advisable for the letters to be relatively loosely spaced in the jogging zone T, whereas at the time of the loading (zone C) and extraction (zone D) operations, it is preferable for them to be relatively tightly packed. As will now be described, and in accordance with the invention, the letters are moved along in such a way as to become less tightly packed at the time of the jogging operation (lining up) and then to become more tightly packed again just before extraction. The fingers 11 are driven along a cyclic path by a traction member which is for example an endless chain 19 travelling round within a casing.

Fig. 2 is a schematic view which shows more clearly the endless chain 19. The chain is driven by sprockets 21 whose axes are substantially vertical. On the outward path, it moves between two guides 32 and 33 which co-operate with the rollers 38 of the chain.

Fig. 3 is an enlarged-scale view of a detail of such a chain 19. The chain is formed from links comprising rollers 38 and springs 31 which tend to fold the links towards one another. In the loading zone (C), the guides 32 and 33 are far enough apart to allow the chain to be substantially collapsed concertina fashion. The fingers 11 are thus relatively close together and the letters are therefore packed tight. In the jogging zone (T), where the lining-up operation is to take place, the guides 32 and 33 are close together, which causes the chain to be displaced, the fingers to move apart and thus the letters to become less tightly packed. In the dealing out or extracting zone (D), the guides 32, 33 return to substantially their original spacing, which causes the fingers to close up again.

As Figs. 4 and 5 show, each finger 11, which is bent into the shape of an inverted V, is secured to an arm 16 provided with a roller 17. This arm 16 is pivoted in a clevis 18 which is able to move between the surface 5 and a casing 20 under the guidance of rollers 23. The clevis is fitted with a pivot pin 22 which fits through the casing 20 into one of the rivets around which the chain 19 hinges between two links. The fingers 11, which are regularly spaced along the chain 19 and which are separated by even numbers of links (two in the embodiment shown), are thus secured in displacement to the chain. On the outward path, that is to say the path towards the dealing out device 1, the fingers are in a raised, vertical position, passing through surface 5 via a slot 24. They are held in position at this time by a through-shaped guide 25 secured to the casing 20 which co-operates with the rollers 17 on the arms 16.

On the return path, they are in a withdrawn position underneath the surface 5 and are guided by the edge 26 of the casing 20.

As is shown in Fig. 6, guide systems 28 and 29 which co-operate with the rollers 17 respectively enable the fingers to be raised at the beginning of the loading zone and to be retracted near the dealing out device (extracting zone).

An installation as described above causes the articles to be jogged against a vertical plane, namely the vertical abutment-forming wall 12. A modified embodiment of an installation according to the invention will now be described. This enables the articles to be jogged against both the horizontal surface 5 and the vertical wall 12.

Fig. 7 shows the parts of an installation such as that which is shown in Fig. 1, but which are modified. This modification is confined substantially to the jogging zone T.

Underneath the surface 5, opposite openings 14 formed in this surface, are arranged two sets of rotary rollers whose axes are substantially parallel to the direction of movement of the fingers 11. These rollers, which lie substantially flush with the surface 5, are all rotated together from pulleys 15, so that they thrust the letters towards the jogging wall 12. The principal function of a first set of first rotary rollers 13 of circular cross-section is to tamp the letters by lining them up against the wall 12 which forms a lining-up abutment (or jogging barrier).

The principal function of a second set of second rotary rollers 130 is to tamp the letters by lining them up against the horizontal surface 5.

The first rotary rollers 13 are preferably divided into two groups. First group 132(a) situated close to the wall 12 have surfaces exhibiting a high coefficient of friction, whereas second group 132(b) remote from the said wall 12 have a low coefficient of friction, their principal function being to support the letters while having only a small propulsive effect on them. It is in fact preferable to drive the letters from the front (rollers 132(a)) in order to reduce the danger of crumpling them during this operation. In the embodiment described, the first group of rollers 132(a) are made of rough-surfaced rubber whilst the second group of rollers 132(b) are made of smooth metal.

As is shown in Fig. 8, co-operating with the series of first rollers 13 is at least one auxiliary roller 16 whose axis lies substantially parallel to the direction of movement of the letters and which is arranged in an opening 17 formed in the wall 12.

This roller 16 has an eccentric shaft 18 and its cross-sectional outline is similar to that of the rollers 130 which will be described below. As it rotates, this roller 16 gradually thrusts the letters back from the wall 12 to a

position where they are a maximum distance away and then releases them suddenly to allow them to return under the prompting of the rollers 132(a) and strike against the vertical abutment 12.

Such a combination of rollers 132(a) and 132(b), possibly co-operating with a roller 16, may be provided in the jogging zone T of an installation as shown in Fig. 1. When this is the case the rollers 13, instead of being identical, have the characteristics which have just been described, i.e. a difference in coefficient of friction between them depending on whether they are close to or distant from the vertical wall 12.

In the embodiment shown, the configuration of roller 16 is the same from one end to the other. In certain cases however it may possibly be given a helical configuration similar to that of the rollers 130 described below.

As is shown in Figs. 9 and 10, the rollers 130 have eccentric shafts 131, which enables them to push up the letters periodically and then to let them drop back against the horizontal surface 5.

As an example, their outline shape may have a straight section 130(c) associated with a spiral section consisting of an arc 130(a) of a circle whose centre is the axis of the roller and of an arc 130(b) of an eccentric circle.

It is preferable for all the letters carried by a roller not to rise or drop back at the same time, in order to reduce the noise made by the installation. To this end, the rollers 130 are of helical configuration. In cross-section, a roller 130 has an outline shape which moves round progressively from one end of the roller to the other. On the other hand it is preferable for the rollers 130 themselves to be in phase (Fig. 9), that is to say for their outlines at a given distance from one of their ends to be in identical angular positions.

It may be noted from Fig. 10 that each roller has at its upstream end an oblique portion which leads exactly into the surface 5 whatever the angular position of the roller.

Fig. 11 shows the cycle followed by the articles at the point where the rollers 130 are situated. It is a diagrammatic representation of the change in the distance between the lower edge of a letter and the surface 5 as a function of time, during phases A, B and C of the rotation of a roller 130. When the roller 130 which is taken as an example is in position A (phase A) only gravity is acting on the article. Then, when the roller turns in the direction indicated by the arrow (f), it raises the article (phase B) to a maximum height and then suddenly lets it drop back (zone C), thus giving rise to an impact when the article reaches the horizontal surface 5 at point C.

Thus, as they rotate, the rollers cause the letters to rise and fall successively from one

end of the rollers to the other, thus causing a sort of undulation in the letters. Such a provision gives rise to shear forces between the letters which are able to assist in the sliding between them and thus to assist in the jogging of all the letters against the surface 5 at the time of impact following their dropping back.

Article supply installations according to the invention as described enable the method according to the invention to be put into practice. On the one hand they move together and apart the fingers between which the articles are held by using means which are responsible for folding and straightening the links of the transfer chain. This automatically gives the desired change in the spacing of the fingers 11 which assists in the jogging operation, without causing any change in the overall speed at which the fingers advance, which is essential. It may also be mentioned that this result is achieved with only one drive member, namely the chain 19, which is very simple and highly reliable.

On the one hand the rollers 13, which may possibly co-operate with auxiliary rollers 16, provide for jogging against the vertical wall 12, and on the other hand the combination of rollers 13 and 130, and possibly 16, enable jogging to take place both in a horizontal plane and in a vertical plane.

Applications involving a method and an installation according to the invention for feeding thin articles are numerous. Particular mention may be made of arrangements for handling thin articles and in particular those having to do with postal sorting.

WHAT WE CLAIM IS:—

1. A method of placing into line the leading edges of a group of articles which are to be dispensed one by one by a dispensing device, comprising the steps of inserting the groups of articles between pressure members which advance in the direction of said dispensing device along a path, causing the pressure members to move apart from one another whilst travelling along a portion of said path corresponding to a jogging zone whilst their overall speed of advance remains the same, propelling the articles making up a group during the travel of said pressure members along said portion, towards a wall forming a vertical abutment so as to cause said articles to align themselves by one of their edges, and closing up said pressure members again along a further portion of said path before the articles arrive at a dispensing device.

2. A method according to claim 1, wherein during the step of causing said pressure members to move apart, the articles are tamped against said vertical abutment.

3. A method according to claim 1, wherein during the step of causing said

pressure members to move apart, the articles are lined up and tamped against said vertical abutment and against an horizontal surface which supports them.

4. Apparatus for placing into line the leading edges of a group of articles by the method according to claim 1 comprising a plurality of pressure members between adjacent pairs of which a group of articles may be gripped, said members being mounted on an endless chain along which they are distributed and whereby they can be moved along a closed path, means for acting on a group of articles located between a pair of pressure members to thrust them towards a vertical abutment as the pressure members pass through a portion of said path, means for moving pairs of pressure members apart when they are in said portion and for causing said members to move closer together after they have passed through said portion.

5. Apparatus according to claim 4, wherein said endless chain comprises links and springs which tend to fold the links towards one another, said links co-operating with a set of guides which force the links to straighten out in said portion of the path and to fold up outside said portion, thus bringing about said movements apart and together of said pressure members.

6. Apparatus according to claim 5, wherein each of said pressure member is formed by a finger pivotally secured to the chain, said finger being provided with a roller which co-operates with guides capable of raising the finger at the beginning of a loading zone and retracting it near an extracting zone.

7. Apparatus according to any one of claims 4 to 6, wherein means for thrusting the articles towards the vertical abutment are formed by a first set of rotary rollers onto which the articles pass.

8. Apparatus according to claim 7, wherein said first set of rotary rollers have their axes substantially parallel to the direction of movement of the said pressure members as they pass through said portion of the path and are of circular cross-section.

9. Apparatus according to claim 7, wherein said first set of rotary rollers are divided into a first and a second group, said first group being closer to said vertical abutment and comprising rollers having a surface exhibiting a relatively high coefficient of friction, said second group being more distant from said vertical abutment and comprising rollers having a surface which exhibits a relatively low coefficient of friction.

10. Apparatus according to claim 9, wherein said rollers of said first and second groups have their axes substantially parallel to the direction of movement of said pressure members and are of circular cross-section.

11. Apparatus according to any one of claims 7 to 9 and further comprising an

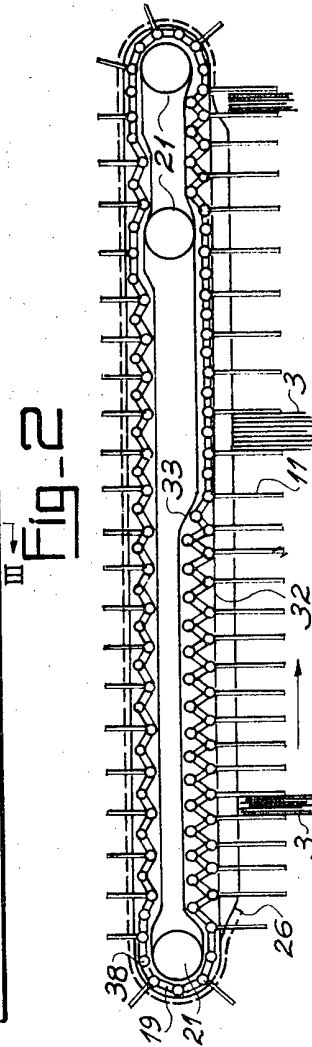
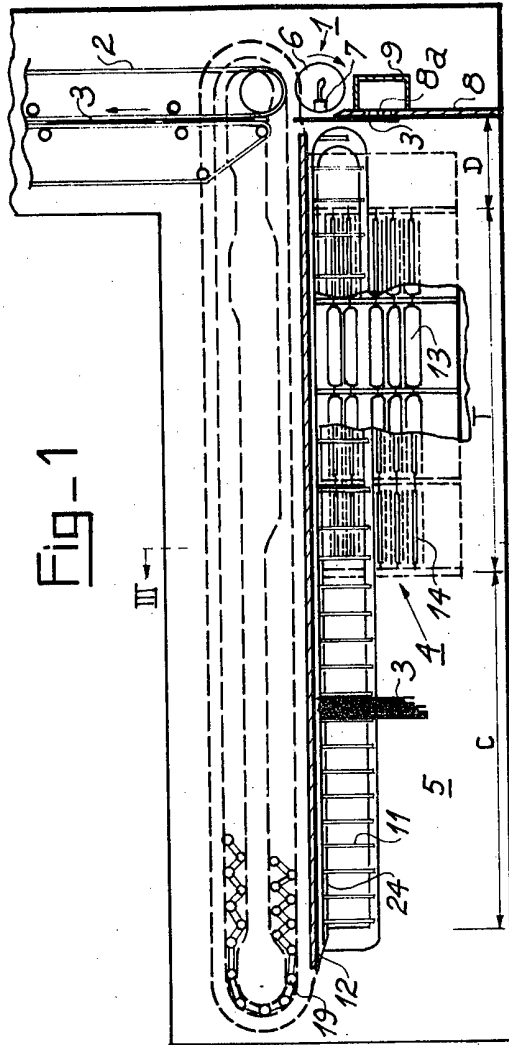
- auxiliary rotary roller having an axis substantially parallel to the direction of movement of the articles, which is arranged in an opening formed in said vertical abutment and has an eccentric shaft, and which thrusts the articles gradually back from said vertical abutment to a farthest distant position and then releases them suddenly. 30
12. Apparatus according to claim 7, wherein the means for thrusting the articles towards said vertical abutment comprise said first set of first rotary rollers and a second set of second rotary rollers. 35
13. Apparatus according to claim 12, wherein said first set of first rotary rollers co-operates with said second set of second rotary rollers, said first rotary rollers having eccentric shafts and being capable of pushing the articles up periodically and then letting them drop back against an horizontal surface which supports them. 40
14. Apparatus according to claim 13, wherein said second set of second rotary rollers are of helical configuration. 45
15. Apparatus according to any one of claims 12 to 14, further comprising an auxiliary rotary roller having an axis substantially parallel to the direction of movement of the articles, said auxiliary roller being arranged in an opening formed in said vertical abutment and having an eccentric shaft, and being operative to thrust said articles gradually back from said vertical abutment and then release them.
16. Apparatus according to claim 15, wherein said auxiliary rotary roller is of helical configuration.
17. A method of placing into line the leading edges of a group of articles substantially as hereinbefore described with reference to the accompanying drawings.
18. Apparatus for placing into line the leading edges of a group of articles substantially as hereinbefore described with reference to the accompanying drawings.
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COMPLETE SPECIFICATION

5 SHEETS

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Sheet 1



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Sheet 2

Fig - 3

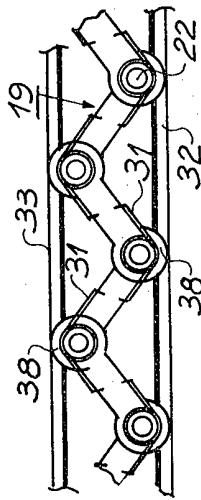


Fig - 5

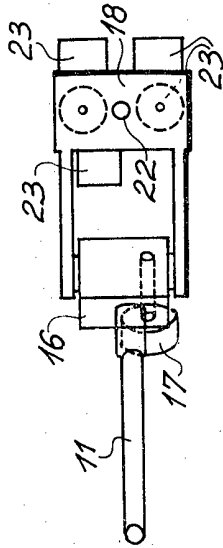
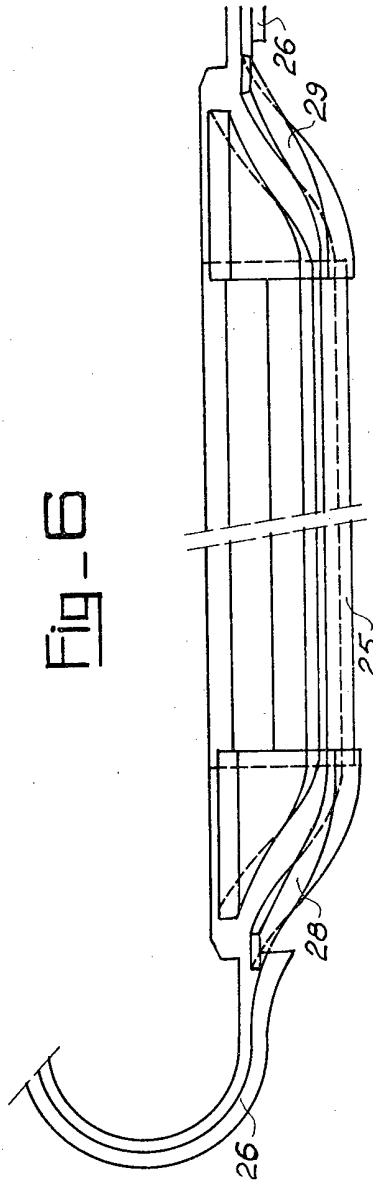


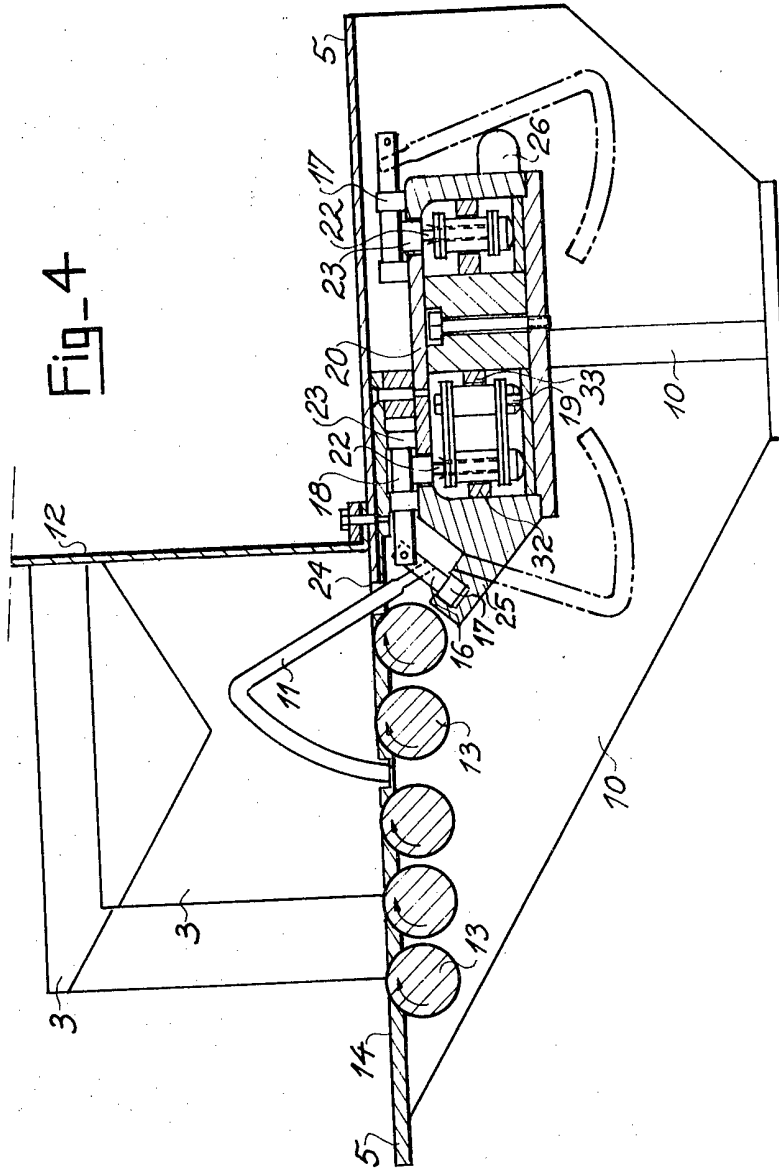
Fig - 6



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Fig-4



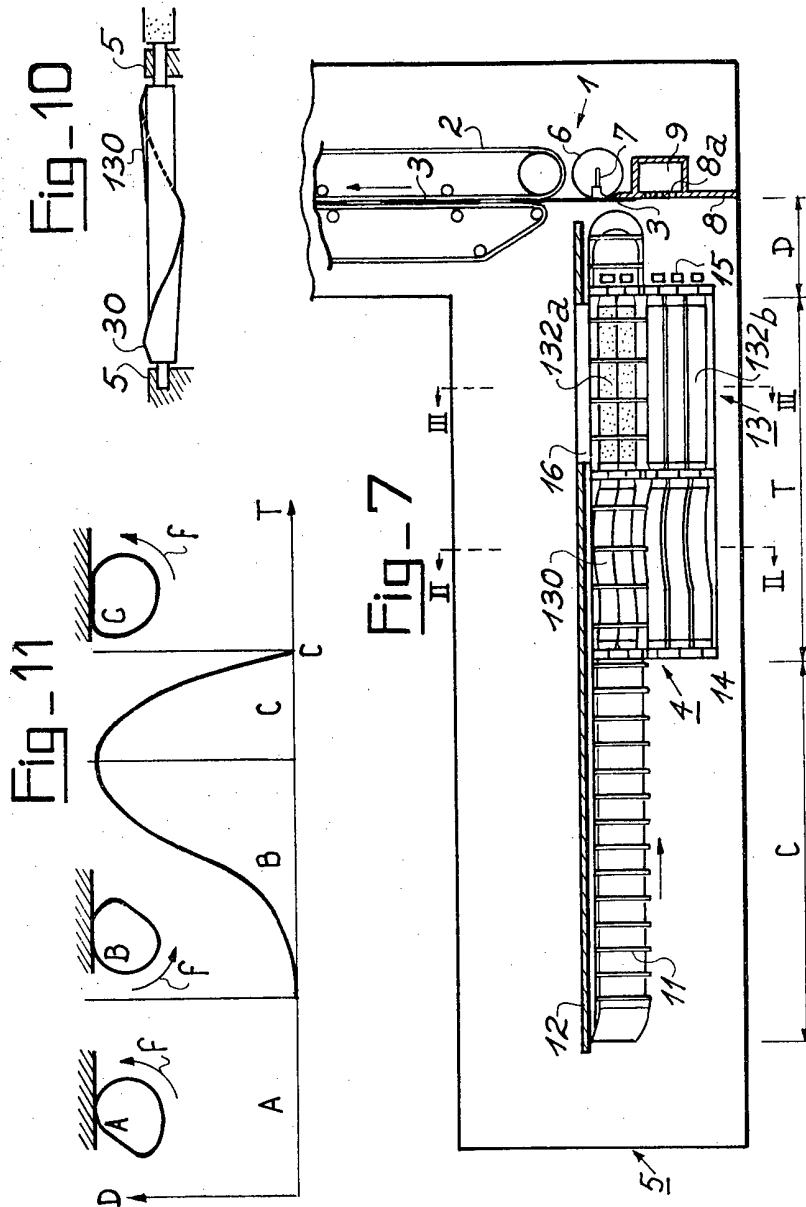


Fig 8

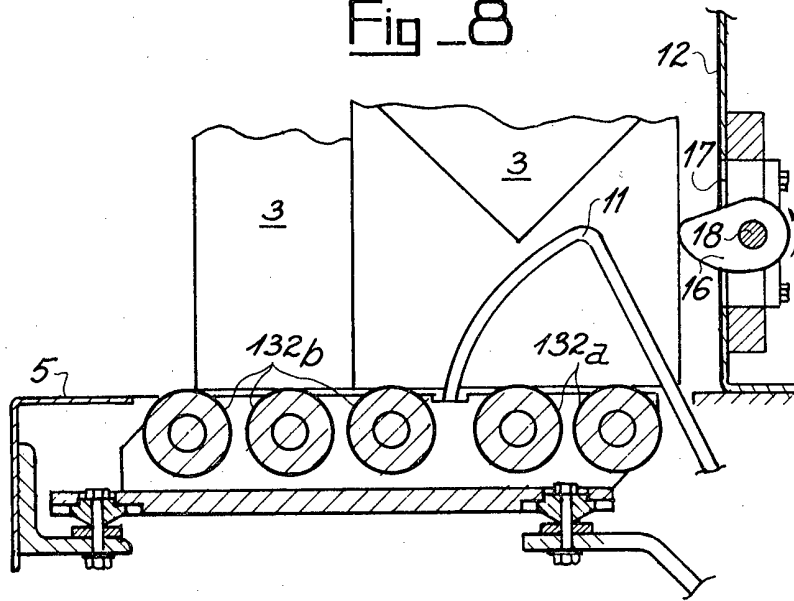


Fig 9

