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(54) APPARATUS FOR THE FORMATION AND TRANSPORTATION TO A PACKAGING STATION OF GROUPS OF SALTED MEAT SLICES

(71) We VICTOR SLICING SYSTEMS S.A.S. DI RE TARCISIO AND C. an Italian Limited Partnership (formerly trading as MECC. VICCTORIO RE) of Via Verdi 15, R H O Italy, 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 an apparatus for the formation and transportation to a packaging station of groups of salted meat slices, each group consisting of at least two rows of partially overlapping slices.

More particularly, the present invention relates to an apparatus which operates to receive on a conveyor belt the salted meat slices leaving a slicing machine, to arrange such slices in groups of at least two partially overlapping rows, and finally to convey continuously said groups in succession to a packaging station, discharging directly each group of slices into the zone where its packaging is carried out.

It is known that at present the manufacturer of groups of salted meat slices, each group consisting of at least two rows of partially overlapping slices, must be manually carried out by an operator who provides for overlapping the rows on each other as soon as they have been formed on a conveyor belt underneath the slicing machine. Thereafter, the operator must still manually take care that the groups of slices thus arranged are brought into the packaging machine. The operator must, therefore, place each group in the zone where the packaging is carried out.

Apparatus of the above-mentioned type involve the considerable drawback that they need the continuous presence of trained personnel at each apparatus, both as far as the formation of the groups of slices is concerned and the subsequent actuation of the packaging machine as soon as said groups have been arranged in the packaging zone. Such drawback results in an increase in the working times as well as in the production costs of the single packaging thus obtained.

Besides, the goods obtained by this machine are not homogenous, because the number of slices, the mutual arrangement of the rows of slices as well as their position in the packaging machine vary from operator to operator.

In accordance with the present invention, there is provided apparatus for the formation of the trausportation to a packaging station of groups of salted meat slices, the apparatus comprising a first conveyor belt disposed below a slicing machine; first control means for cyclically imparting to said first conveyor belt a first longitudinal advancement and a second longitudinal advancement, in opposite direction to said first advancement, for the formation of a group of slices, which group comprises a first and a second row of slices; second control means for imparting to said first conveyor belt, between said first and second longitudinal advancements, a transverse movement for causing the partial overlapping of the second row onto the first row of slices; a second conveyor belt for receiving each group of slices from the first conveyor belt; means for detecting the passage of each said group, along said second conveyor belt and arranged to cause, at the detected passage of each said group, a longitudinal advancement toward the packaging station of a movable apparatus section; a third conveyor belt arranged on said movable section and arranged to receive a said group from said second conveyor belt at each said advancement of the movable section; means for controlling the advancement of the third conveyor belt

which means is activatable at the end of the advancement of the movable section; means for then stopping the third conveyor belt whenever a said group enters a zone of discharge of the group from the movable section into the packaging station; and means for then controlling the reverse motion of the movable section to its initial position with simultaneous advancement of the third conveyor belt, so as to discharge into the packaging station the group at said zone.

In a preferred embodiment to be described herein, both the formation of groups of slices and their transportation to the packaging station are carried out in a completely automatic way thus avoiding the necessity of an operator at each apparatus, because a single operator can take care of several apparatus, which operator is in charge of the proper operation of those apparatus and the feeding of the salted meats into the slicing machines.

Particularly, it should be noted that as the slicing machine, there could be advantageously used the slicing machine which is the subject matter of Italian Patent specification No. 970981.

A first advantage presented by the embodiment of apparatus to be described herein derives from the fact that the operation thereof is totally automatic both as far as is concerns the overlapping of the slice rows for the formation of the slice groups to be packaged, and as far as it concerns the transportation of the slice groups toward the packaging station and their arrangement in the packaging zone.

A further advantage of this embodiment of apparatus derives from the fact that the operator is exclusively in charge of apparatus control and supervision duties. The only manual operation which is required is that of periodically feeding the salted meats into the slicing machine.

A further advantage presented by this embodiment derives from the uniformity of the obtained packages which present themselves alike both as for the mutual arrangement of the slices and as for the number of the slices.

Still a further advantage of this embodiment derives from the high output capacity of the apparatus which permits a large number of packages per time unit to be obtained and, consequently, a reduction of the packages costs.

Further advantages and characteristics of said embodiment of apparatus, for the formation of groups of salted meat slices and for the transportation thereof to a packaging station, will become more evident from the following detailed description of said preferred embodiment, given by way of non-limiting example, with reference to the accompanying drawings, wherein:

FIGURE 1 is a plan view of the embodiment apparatus;

FIGURE 2 is a side view of the apparatus shown in Fig. 1;

FIGURE 3 is a view showing in detail the zone where the slice groups are formed;

FIGURE 4 is a view showing the control means of the first conveyor belt; and

FIGURE 5 is a view of the discharge zone of the apparatus.

With reference to the figures, the apparatus shown comprises a first conveyor belt, generally indicated with the reference numeral 1, advancing beneath a slicing machine known *per se*, generally indicated with A. The first conveyor belt 1 consists of a plurality of cords 2 made of an elastic material, e.g. rubber, arranged parallel to each other between a drawing roller 3, actuated in the way which will be herebelow described, and a driven roller 4.The drawing roller 3 is supported by a shaft 5 the ends of which are rotatably fitted in the fixed frame 8 of the apparatus.

The driven roller 4 is supported on a shaft 7 the ends of which are also rotatably fitted in the fixed frame of the apparatus. The drawing roller 3 and the driven roller 4 are contoured in such a way as to present circumferential grooves 9 suitable for receiving the ends of the cords 2 in order to prevent them from being transversally displaced. The number of the circumferential grooves 9 provided on the drawing roller 3 is larger than the number of the cords 2, whilst the number of the circumferential grooves 9 provided on the driven roller 4 is the same as the number of the cords 2.

The fixed frame 8 of the apparatus is provided, at a middle zone between the drawing roller 3 and the driven roller 4, with a recess 10 in which a plate 11 is movable, transversally to the advancement direction of the conveyor belt 1. The surface of plate 11 facing the slicing machine A is flush with the plane of the fixed frame 8 so as not to interfere with the passage of slice groups toward the packaging station. On the opposite face, the plate 11 is provided with a pair of substantially parallelepiped-shaped projections 12 housed within the corresponding grooves 13 of the fixed frame 8. The control means for causing the plate 11 to move transversally to the advancement direction of the first conveyor belt 1 comprises a piston 14, the cylinder 15 of which is fixed on the frame 8, whilst its shank 16 has its end connected to a pin 17 fixed on the same face of the plate 11 on which the projections 12 are provided.

With specific reference to Figs. 1 and

3, the plate 11 is provided on its face facing the slicing machine A with a plurality of longitudinally extending grooves 18 suitable for receiving the middle zone of cords 2, and yet allowing the cords 2 to move. The periodic transverse movements of the plate 11 between two positions illustrated in figure 1 with continuous line, are such as to make the cords 2 take on two distinct shapes. A first shape, corresponding to the position other than that illustrated, of the plate 11, is that one in which the cords 2 are rectilinear and parallel to each other, as shown in dotted lines. The second shape, shown in continuous lines and corresponding to the position of the plate 11 illustrated with the continuous line, is that one in which only the middle portion of the cords 2 is parallel to the advancement direction of the slice groups, because the middle zone of the cords 2 is held in the grooves 18 of the plate 11. The remaining portion of the cords 2 consists of sections at an angle to the advancement direction in symmetrical way to the movement direction of the plate 11.

The apparatus is provided with means for controlling the advancement of the first conveyor belt 1, which means is generally indicated with the reference numeral 19. Such control means comprises three brake-clutch units 20, 21 and 22 known *per se*. This means is suitable for imparting to the first conveyor belt 1 a first advancement along the direction of the arrow F_1, a second advancement along the direction of the arrow F and a third and last advancement still along the direction of the arrow F. Between the first and second advancement, the transverse movement of the plate 11 takes place.

In particular, the first and the second movements take place at low speed so as to permit the formation of two rows of slices as these latter fall from the slicing machine A. The third movement takes place at a higher speed than that of the previous movements, because during this third movement, the formation of slice groups does not occur but only the conveyance of a formed group of slices.

With specific reference to Fig. 4, the first and second brake-clutch units 20, 21 are actuated by a single driving motor M. On the shaft 53 of the motor M a drawing disc 54 is keyed which is suitable to cause the rotation of a driven disk 55 rotatably mounted on the same shaft 53. The driven disk 55 is integral with a pulley 56 connected via a belt 57 to a pulley 58 keyed on a countershaft 59. The second brake-clutch unit 21 is provided with a drawing disk 60 keyed on a shaft 61 on which a driven disk 62 is rotatably mounted. This latter is integral with a pulley 63 connected via a belt 64 to a pulley 65 keyed on the countershaft 59. On the shafts 53 and 61 there are keyed two gear wheels 66, 67 permanently in mesh with each other so as to transmit the movement caused by motor M from the shaft 53 to the shaft 61.

Still with reference to Fig. 4, the third brake-clutch unit 22 comprises a drawing disk 68 keyed on the shaft 69 of a motor M_1. On the shaft 69 there is rotatably mounted a driven disk 70 which is integral with a pulley 71 connected, via a belt 72, to a pulley 73 keyed on the countershaft 59. This latter is connected via a pulley 74 and a belt 75 to a pulley 76 keyed on the shaft of the drawing roller 3.

As shown in Fig. 4, the brake-clutch unit 20 is energized and, therefore, the movement is transmitted to the shaft of roller 3 via the belt 57, the shaft 59 and the belt 75. The shaft 61 is rotating, however, since the brake-clutch unit 21 is not activated, the driven disk 62 is stationary and, therefore, no movement is transmitted to the shaft 59 from the brake-clutch unit 21. In order to obtain movement from this latter shaft one has to disengage the first brake-clutch unit 20 and engage the second brake-clutch unit 21. Analogously, the third brake-clutch unit 22 is engaged when both the brake-clutch units 20, 21 are disengaged. The control of the various engagements and disengagements is obtained through an electronic control apparatus the construction of which is not part of the present invention and therefore is not described in detail.

The operation of that portion of the hereinabove described apparatus which is specifically suitable for the production of a pair of rows of partly overlapping slices, is as follows.

After a salted meat has been fed into the slicing machine A, the apparatus is started. The conveyor belt 1, actuated by the first brake-clutch unit 20, advances along the direction of the arrow F_1, for a predetermined time while the first slices fall from the slicing machine 2. In such a way, the first row of slices is accomplished. At the end of the advancement along the direction of the arrow F_1, the first brake-clutch unit 20 is reactivated and, before the second brake-clutch unit 21 is connected, the piston 14 is activated. This latter causes transverse movement of the plate 11 to the position illustrated with the continuous line. Correspondingly, the cords 2 move from the position illustrated with the dotted lines to that position illustrated with the continuous lines, i.e. to the deformed position. At the end of the traverse movement of the plate 11, the second brake-clutch unit 21 is activated and the

conveyor belt 1 is caused to advance a predetermined length along the direction of the arrow F. In such a way, the formation of the second row of slices is carried out. This latter row partially overlaps the first row because the slices continue to fall in the same position, however, through the displacement of the plate 11, a displacement of the collection zone has been achieved. At the end of the stroke along the direction of arrow F, the second brake-clutch unit 21 is reactivated and the third brake-clutch unit is inserted, which unit controls the advancement of the conveyor belt 1 still along the direction of the arrow F, however, at a higher speed than the previous advancement. This is carried out with a view to decreasing the transportation times of the slice groups.

With specific reference to Figs. 1 and 2, the apparatus further comprises a second conveyor belt, generally indicated with reference numeral 23, which also consists of a plurality of elastic cords 24, identical to the cords 2 of the first conveyor belt 1, placed parallel to each other between the drawing roller 3 of the first conveyor belt 1 and a driven roller 25 rotatably mounted on a shaft 26 arranged on the fixed frame 8 of the apparatus. Between the drawing roller 3 and the driven roller 25 there is arranged a further roller 27 mounted on a shaft 28 which passes through a slot G in fixed frame 8 and is supported at its end by two longitudinal members 29 of a movable section 30 of the apparatus by which, as it will become more apparent herebelow, the slice groups are conveyed to the packaging zone. The section 30 of the apparatus moves first along the direction F towards the packaging machine C and thereafter advances along the direction of arrow F_1 discharging the slice groups into the packaging machine C.

During the first of said advancements, the roller 27 does not rotate because it is not connected to any driving means. The slice groups pass above roller 27, supported by the cords 24 of the second conveyor belt 23 which is caused to advance under the action of the drawing roller 3 of the first conveyor belt 1. The slice groups pass, therefore, continuously from the first conveyor belt 1 to the second conveyor belt 23. During the reverse movement, the roller 27 acts as a drawing roller for a third conveyor belt 31 which also consists of a plurality of elastic cords 32, substantially identical to the elastic cords 2 and 23 and having an end wound around the roller 27, whilst the opposite end is wound around a roller 33 rotatably mounted on the longitudinal members 29 of the section 30 and arranged in the forward zone of this latter along the advancement movement of the slice groups. As viewed particularly in Fig. 5, the cords 24 of the second conveyor belt 23 are alternate and placed above the cords 32. These latter are housed in grooves 32*a* provided in the roller 25 so as to be connected to roller 33.

Above the driven roller 25 there is arranged a photoelectric cell 34 supported by a bracket 35 fixedly secured to the fixed frame 8 of the apparatus. The photoelectric cell 34 is capable of detecting the passage of the slice group and controlling the subsequent movement of the section 30 in such a way that their number is equal to the number of the slice groups to be discharged. In the illustrated case, the slice groups to be discharged at any cycle are two and, consequently, the photoelectric cell 34 controls two subsequent movements of the section 30 until its forward end arrives in the position shown with dotted line above the packaging zone 36. To this end, the photoelectric cell 34 is connected to a piston with double cylinder 38 comprising a first cylinder 39 secured to the frame 8 of the apparatus, in which a second cylinder 40 is slidable, which cylinder is provided with a shank 41 the end of which is fixed to a pin 42 blocked to one member of the longitudinal members 29 of section 30. The connection of the photoelectric cell 34 to the piston 38 is known *per se* and is, therefore, not illustrated. At the end of the advancement of the section 30, a stop controls the actuation of a motor 37 which causes the rotation of the roller 27 trailing the conveyor belt 31. When the first group of slices reaches the forward end of section 30 of the apparatus, a second photoelectric cell 43, supported by a rack 44 fixedly secured on one of the longitudinal members 29 of section 30, controls the stop of the motor 37 and, consequently, of the advancement of the third conveyor belt 31. At this moment, the apparatus is set to carry out the discharge of the slice groups into the packaging machine C. For safety's sake, the packaging machine C is provided with a contact (not shown) enabling the reverse motion of section 30 to its initial position. Such a contact is automatically energized whenever the packaging machine C is ready for receiving the two slice groups arranged on section 30 of the apparatus.

Before the beginning of the reverse movement of section 30, the first slice group is placed below the photoelectric cell 43, whilst the second group is placed at a distance between the packaging zone 36 and the packaging zone 36*a*. In order to obtain such a distance, one has to adjust preliminarily the actuation time of the first conveyor belt 1, i.e. the time elapsing between two subsequent to-and-fro movements for the formation of two slice rows. During the reverse

movement of section 30 of the apparatus, the third conveyor belt 31 must provide for the discharge of the slice groups and, therefore, the roller 27 must be brought into rotation, independently from motor 37 which is in this case deactivated. In order that the actuation of the third conveyor belt 31 is synchronous with the advancement of the section 30 along the direction of the arrow F_1, a pinion-rack unit transforms the rectilinear motion of section 30 into a rotation movement of the roller 27. As particularly viewed in Fig. 1, between one member of the longitudinal members 29 of section 30 and the fixed frame 8 of the apparatus, there is provided a rack 45 on which a first toothed wheel 46 moves, which toothed wheel is keyed along with a second toothed wheel 47, on a shaft (not shown) which has an end rotatably mounted on the longitudinal member 29, the opposite end being slidable on the fixed frame 8. The second toothed wheel 47 meshes with a third toothed wheel 48 cooperating with the shafts 28 of the roller 27 *via* a freewheel device. This latter, during the advancement of the section 30 along the direction of arrow F, permits the shaft 28 not to rotate, whilst the third toothed wheel 48 rotates clockwise under the action of the rotation of the second pulley 47. During the reverse motion, the free-wheel device controls a counterclockwise rotation of shaft 28 as a consequence of the clockwise rotation of the third pulley 47. Ultimately, the roller 27, in the final step of transportation and discharge of the slice groups, is constantly rotating, the first time under the action of the motor 37 and the second time under the action of the free-wheel device of the third toothed wheel 48.

Such a movement is made possible because the cords 32 are placed below the cords 24 and do not interfere therewith.

The section 30 is supported, on its side opposite to that where the rack 45 is provided, by a cross member 49 arranged parallel between the longitudinal member 29 and the fixed frame 8 and supported at its ends by pivots 50 placed on the fixed frame 8. On the cross member 49 two sleeves 51 secured to the longitudinal member 29 are slidably mounted.

It should be finally noted, with specific reference to Fig. 2, that section 30 of the apparatus is provided at its forward zone with a chute 52 to facilitate the discharge of the slice groups.

The operation of the apparatus, from the moment at which the slice groups leave the first conveyor belt 1 to the moment at which they are discharged into the packaging machine C, is as follows.

The groups of slices which one after another come from the first conveyor belt 1, pass continuously onto the second conveyor belt 23 as a consequence of the alternate arrangement of the cords 2 and the cords 24 of said two conveyor belts. When the first group of slices reaches the zone below the photoelectric cell 34, this latter controls the actuation of the piston 38 and, therefore the first advancement of section 30. The first group of slices falls onto the third conveyor belt 31 and moves away from the photoelectric cell 34 on account of the movement of section 30.

When the second group of slices reaches the zone below the photoelectric cell 34, this latter again actuates the piston 38 and, therefore, the second advancement of section 30, at the end of which the motor 37 is actuated. The first group of slices reaches the zone below the photoelectric cell 43, while section 30 is in the position illustrated by the dotted line. The photoelectric cell 43 controls the stopping of the motor 37 and, therefore, the first group of slices awaits to be discharged after the packaging machine C has emitted a suitable enabling signal.

After this enabling signal has been emitted in any way known *per se*, the blocking action of the photoelectric cell 43 is removed and the piston 38 is continuously actuated in a reverse direction with respect to the previous one, whilst the roller 27 is caused to rotate still in the same direction via the above described pinion-rack unit. At the end of the reverse stroke of section 30 of the apparatus, all of the mechanisms and control devices are reset to perform the next cycle, i.e. the discharge of a further pair of slice groups. It is apparent that the above-described embodiment is not limited either to the use of a single slicing machine or to the realization of a single pair of rows of partly overlapping slices. For instance, it should be understood that the use in combination of a pair of slicing machines requires slight modifications not departing from the inventive concept of the apparatus of this invention. Analogously, the obtainment of more than two rows of slices would not require major modifications.

It should be finally noted that the second conveyor belt 23 can be realized by using the cords 2 of the first conveyor belt 1. In such a case, some of the cords 2 are wound around the roller 3, whilst the remaining cords wind up around the roller 25.

WHAT WE CLAIM IS:

1. Apparatus for the formation and the transportation to a packaging station of groups of salted meat slices, the apparatus comprising a first conveyor belt disposed below a slicing machine; first control means for cyclically imparting to said first conveyor belt a first longitudinal advancement and a second longitudinal advancement, in opposite direction to said first advancement,

for the formation of a group of slices, which group comprises a first and a second row of slices; second control means for imparting to said first conveyor belt, between said first and second longitudinal advancements, a transverse movement for causing the partial overlapping of the second row onto the first row of slices; a second conveyor belt for receiving each group of slices from the first conveyor belt; means for detecting the passage of each said group along said second conveyor belt and arranged to cause, at the detected passage of each said group, a longitudinal advancement toward the packaging station of a movable apparatus section; a third conveyor belt arranged on said movable section and arranged to receive a said group from said second conveyor belt at each said advancement of the movable section; means for controlling the advancement of the third conveyor belt which means is activatable at the end of the advancement of the movable section; means for then stopping the third conveyor belt whenever a said group enters a zone of discharge of the group from the movable section into the packaging station; and means for then controlling the reverse motion of the movable section to its initial position with simultaneous advancement of the third conveyor belt, so as to discharge into the packaging station the group at said zone.

2. Apparatus according to claim 1, wherein the means for controlling the advancement of the first conveyor belt comprises a pair of counter-rotating, alternately activatable brake-clutch units, respectively for imparting to said first conveyor belt said first and second longitudinal advancements.

3. The apparatus according to claim 2, wherein there is provided a third brake-clutch unit, activatable when the other two brake-clutch units are disengaged, and arranged to advance said first conveyor belt, at a greater speed than either of said other two brake-clutch units, in a direction to pass each said group to the second conveyor belt.

4. The apparatus according to any preceding claim, wherein the first conveyor belt consists of a plurality of elastic cords which are entrained in circumferential grooves provided in a pair of rollers.

5. The apparatus according to claim 4, wherein the means for imparting a transverse movement to the first conveyor belt comprises, in a zone underlying the slicing machine, a plate transversally slidable to the advancement direction of the cords and provided with a plurality of longitudinal grooves housing the middle portions of respective said cords.

6. The apparatus according to claim 5, wherein the surface of the plate facing the slicing machine is flush with the transportation plane of the slices groups along the first conveyor belt.

7. The apparatus according to claim 5 or 6, wherein the second conveyor belt consists of a plurality of elastic cords which are entrained, at one end of said second conveyor belt, in circumferential grooves provided in one of the rollers of the first conveyor belt, at the adjacent end of the first conveyor belt, and which are also entrained, at the other end of the second conveyor belt, in circumferential grooves of a further roller arranged downstream of said one roller, in the advancement direction of the slice groups.

8. The apparatus according to claim 7, wherein some of the cords of the first conveyor belt are wound round the further roller, thus also forming the second conveyor belt.

9. The apparatus according to any preceding claim, wherein the means for detecting the passage of a group of slices comprises a photoelectric cell arranged above the downstream-end of the second conveyor belt, which photoelectric cell is arranged for controlling the actuation of a piston the shaft of which is connected to the movable section of the apparatus.

10. The apparatus according to any preceding claim, wherein the means for controlling the advancement of the third conveyor belt, at the end of the advancement of the movable section, comprises a motor responsive to said means for stopping the third conveyor or belt.

11. The apparatus according to any preceding claim, wherein the means for stopping the third conveyor belt comprises a photoelectric cell disposed at the end of the third conveyor belt and arranged to detect the presence of a slice group.

12. The apparatus according to any preceding claim, wherein the means for advancing the third conveyor belt during the reverse movement of the movable section comprises a pinion gear-rack unit for converting the rectiliner movement of the movable section into rotational movement of a roller around which one of the ends of the third conveyor belt is wound.

13. The apparatus according to any preceding claim, wherein the upper run of the third conveyor belt is arranged beneath the upper run of the second conveyor belt.

14. The apparatus substantially as hereinbefore described and disclosed with reference to the annexed drawings.

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1574465 COMPLETE SPECIFICATION

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Sheet 1

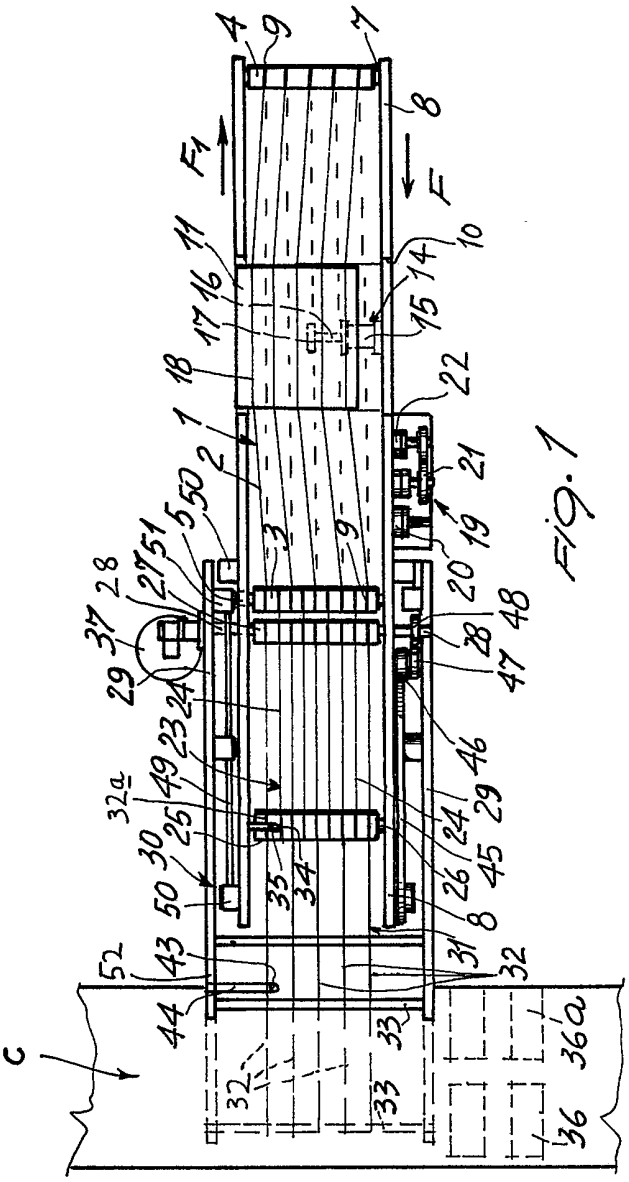

Fig. 1

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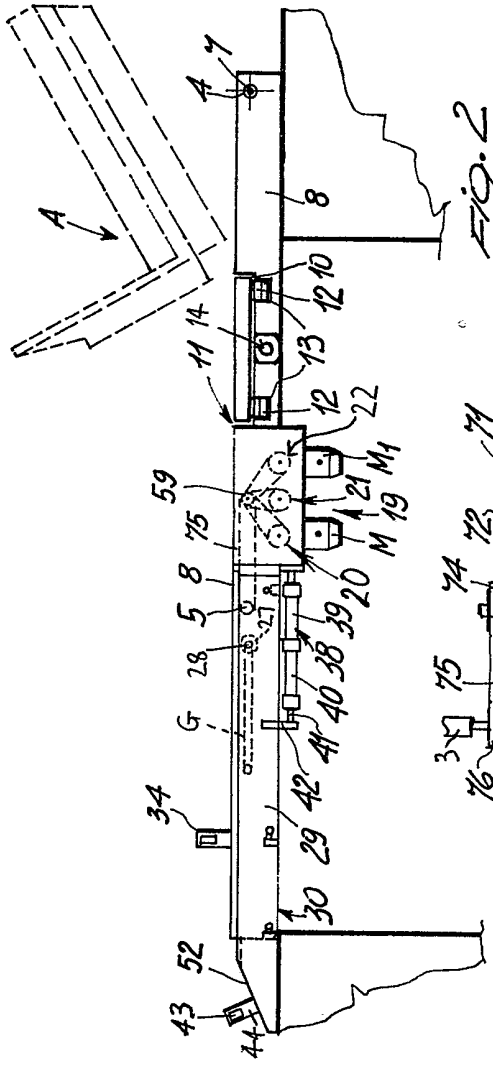

Fig. 2

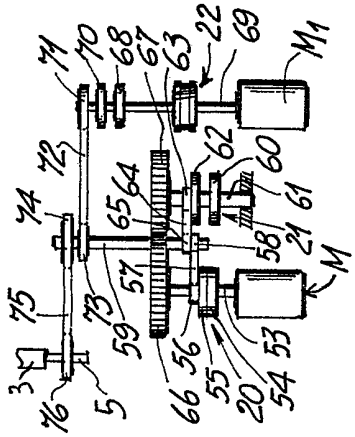

Fig. 4

1574465 COMPLETE SPECIFICATION
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Sheet 3

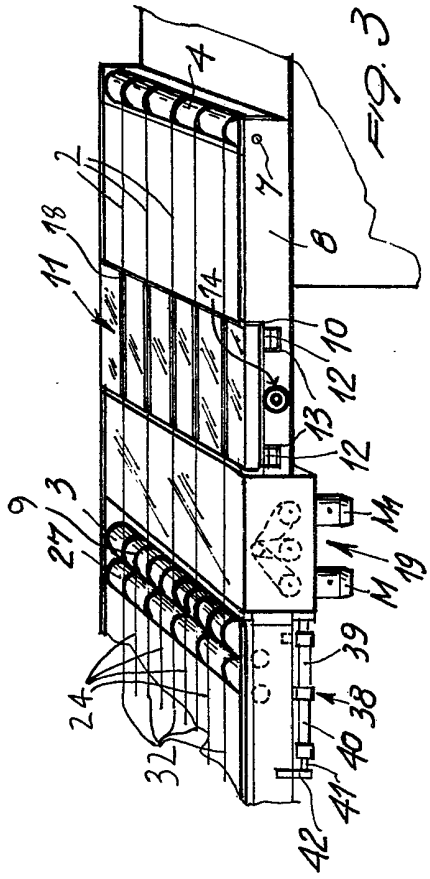

Fig. 3

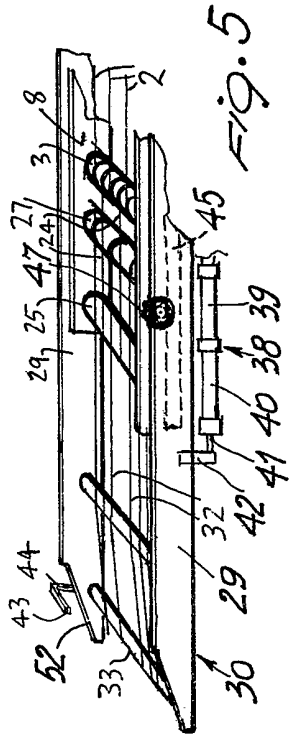

Fig. 5