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(54) Packaging machine for delicate rod-shaped objects, especially cigarettes.

(57) A packaging machine for delicate rod-shaped objects, especially cigarettes, comprises a feeder (1) that takes a succession of ordered groups of cigarettes (S) to a station (A) that feeds them to a unit (30) that transfers said ordered groups one after the other into a transfer station (T), in which each of them is transferred, by pusher means (13, 16) and together with a wrapping sheet (F), into an empty cigarette carrying socket (118) in a folding drum (18). According to the invention, the transfer unit (30) is constructed in such a way that the individual groups of cigarettes (S) are carried from the feeding station (A) to the transfer station (T) following a straight path (X) of predetermined length along a stationary conveying surface (4) which is in a predetermined position and which has an inlet end at the feeding station (A) and an outlet end at the transfer station (T).

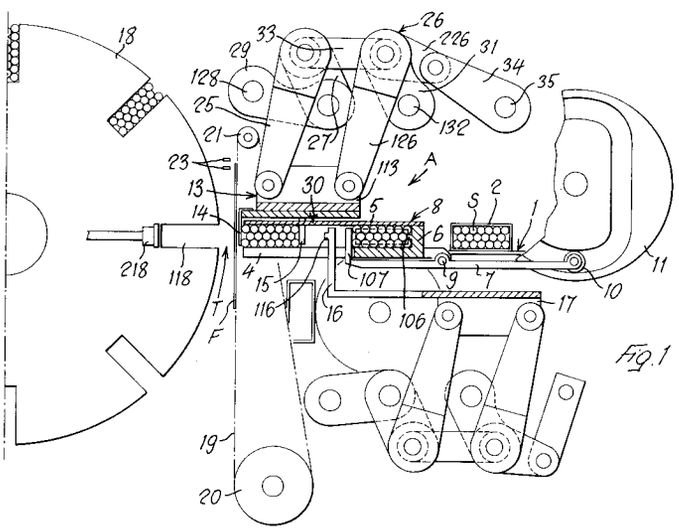

FIG. 1

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The invention relates to a packaging machine for delicate rod-shaped objects, especially cigarettes, of the type comprising a feeder which takes a succession of ordered groups of cigarettes to a station that feeds said groups of cigarettes to a transfer unit, which in turn takes the ordered groups of cigarettes one after the other to a transfer station, in which each ordered group of cigarettes is transferred, by pusher means and together with a wrapping sheet fed to said transfer station by a feeding/positioning unit, into a coinciding empty socket in a drum that folds said wrapping sheet around its ordered group of cigarettes.

At present, the unit for transferring the ordered groups of cigarettes from the feeding station to the transfer station consists of a transfer drum that rotates about an axis parallel with the axis of the folding drum, is aligned side-on with it in the vertical plane and is provided in much the same way with a plurality of cigarette carrying sockets, for example with at least two diametrically opposite each other. The driving of the folding and transfer drums is synchronized and they execute rotational steps of predetermined angular amplitude, by means of which they bring an empty socket and a full socket respectively into a mutually coinciding position in the transfer station.

Constructing the transfer unit in the form of a drum with sockets limits the machine's operating speed, that is to say the production of packets of cigarettes per unit of time and exposes the cigarettes to possible damage owing to the less delicate treatment of easily damaged objects such as cigarettes.

This is due to the fact that the transfer path on a circular route is comparatively long. Accordingly, in order to ensure a high production rate, the transfer drum must be driven at high speeds of rotation. The higher speed of operation results in less delicacy in the handling of the delicate product, owing for example to the setting up of powerful centrifugal forces or other similar effects. Besides this, especially in machines with a reciprocating action such as cigarette packaging machines, high operating speeds necessitate larger operating members, with associated problems of control of synchronization. This also has repercussions on the structural aspect of the drum which becomes complex and expensive, owing both to the need to reduce inertial masses and, for example to the need to provide parts to hold the cigarettes inside the sockets during rotation against their centrifugal expulsion, or for other similar reasons. The reduction in the length of the path along which the groups of cigarettes are transferred, as for example by means of a possible increase in the number of sockets and hence a reduction in the angular amplitude of the steps, is related moreover to an increase in inertial masses and considerable technical efforts must be directed at limiting this increase. In addition, known transfer drums are inconvenient and ill adapted both as far as maintenance is concerned and as regards access, even purely visual access, to the product during its transfer and to the operating parts.

As far as the synchronization of the transfer drum with the folding drum is concerned, this requires not only synchronization in terms of chronological coincidence, so that an empty socket and a full socket respectively are present in the transfer station, but also a coinciding in the correct position, lined up and face to face, of the full socket of the transfer drum relative to the empty socket of the folding drum, and monitoring is therefore necessary in order to ensure that at least these two conditions occur.

The invention is therefore based on the problem of providing a packaging machine of the type described at the outset, in which the transfer unit is constructed in such a way as to overcome the disadvantages described above, and to provide a treatment that is more appropriate for the delicate objects being handled, greater accuracy of synchronization and greater efficiency of the machine itself, as well as easier and direct accessibility for manual intervention and visual monitoring of the products being processed and of the operating parts.

The invention solves this problem with a packaging machine of the type described at the outset, in which the transfer unit is constructed in such a way that the individual groups of cigarettes are transferred from the feeding station to the transfer station following a straight path of predetermined length along a stationary conveying surface which is in a predetermined position and which has an inlet end at the feeding station and an outlet end at the transfer station.

Each group of cigarettes in the transfer station is transferred into the empty cigarette carrying socket of the folding drum by an additional transferring movement in the direction of a continuation of the carrying path.

The length of the straight transfer path from the feeding station to the transfer station is comparatively short and is between two and three times the length of the group of cigarettes in the transfer direction.

The cigarettes, or rather the group of cigarettes, is transferred along the conveying surface perpendicularly to their axis.

In a preferred embodiment, the transfer unit consists of a straight, horizontal, stationary movement guide oriented radially with respect to the folding drum and aligned vertically with the cigarette carrying sockets of said folding drum, which

guide is provided with means for the linear collecting/carrying of a group of cigarettes from the inlet end to the outlet end of said guide.

The collecting/carrying means may be of any kind.

They are preferably constructed in such a way as to keep the cigarettes of each group in the preordered condition adopted in the feeder of the ordered groups of cigarettes and can be moved back and forth in both directions over the horizontal movement guide in an active transfer stroke from the inlet end to the outlet end and an empty return stroke along a path a certain distance away from said guide, away from the area of interference of said collecting/carrying means with the groups of cigarettes on the movement guide.

The collecting/carrying means may consist of a vertical transverse wall that acts on the rear side of the group of cigarettes on the movement guide, with reference to the carrying direction.

In an improvement, said means may have two transverse walls, one at the front and the other at the back, separated from each other in a fixed manner in the carrying direction by a distance corresponding to the size of the group of cigarettes which are moved together.

Advantageously, the movement guide consists of an open-sided and open-ended movement channel, the distance between whose horizontal sides corresponds to the horizontal size of the group of cigarettes.

Because the transfer stroke is reduced, it is possible to obtain higher machine operating speeds. In particular, keeping the operating speed constant gives the advantage of a lower running speed for the carrying means. This opens the way to a more delicate treatment of the cigarettes, reducing the risks of damage and thus conserving the product better. The lower running speed of the collecting/carrying means together with a smaller inertial mass of these means makes it possible to reduce the inertial load on the drive motor, the dimensions of which can be smaller. Furthermore, the smaller inertial mass ensures that synchronization is more accurate.

As regards the coincidence of positioning, it is necessary to control only the correct positioning of the folding drum relative to the stationary horizontal guide.

From the ergonomic point of view the design according to the invention is more easily accessible, visually and manually, both for monitoring purposes and to allow maintenance and work to be done in the event of malfunction.

Other features which further improve the packaging machine described above are also the subject of the invention and are covered by the subclaims.

The particular features of the invention and the advantages procured thereby will be seen in greater detail in the description of a preferred embodiment illustrated as a non-restricting example in the accompanying drawings in which:

Fig. 1 shows a front view of a packaging machine according to the invention, with only the area of the transfer device visible.

Fig. 2 shows an enlarged schematic top view of the area of the transfer device shown in Fig. 1.

Fig. 3 is a partly sectional view of the lever mechanisms which operate the collector/transferrer of the transfer device shown in the previous figures.

Figs. 4 and 5 show two respective phases in the transfer movement with the device shown in the previous figures.

Figs. 6 and 7 show the path of the collector/transferrer and of the pusher shown in the previous figures.

A packaging machine, especially for cigarettes, comprises an endless feeder belt 1 provided with a plurality of cassettes 2 for holding successive ordered groups of cigarettes S. The cigarettes S are fed from a hopper (not shown) in which they are held loose and are arranged in an ordered manner in the cassettes 2 in a predetermined manner in a previous station. The ordered groups of cigarettes S are conveyed to a feeding station A in which they are fed to a transfer unit 30 which is to the side of and forwards of the conveyor belt 1. On the conveyor belt 1 cigarettes S are conveyed perpendicularly to their axis, while each group of cigarettes is fed to the inlet end of a horizontal movement channel in the transfer unit 30 by means of an axial pusher 3.

The transfer unit 30 is composed of a horizontal movement channel oriented parallel with the conveyor belt 1 and positioned to the side of, in front of and at the same level as the belt 1. The horizontal movement channel is open at the sides and at its forward end, with reference to the carrying direction, at the outlet end. The movement channel is formed by two lower parallel horizontal rods 4 which are spaced apart and on which the opposite end portions of the cigarettes S rest, and by a roof 5 consisting of a plate parallel with the rods 4. The roof 5 is centred with respect to the two lower rods 4 and its width in the axial direction is less than the axial length of the cigarettes S, thus leaving their end portions supported on the rods 4 free. The roof 5 is raised vertically above the upper surface of the rods 4 by a distance corresponding approximately to the vertical opening of the cassettes 2 on the conveyor belt 1, in other words to the vertical dimension of the ordered groups of cigarettes S. At its inlet end the movement channel has a loading chamber 8 whose

internal volume is identical to the internal volume holding the ordered groups of cigarettes S of the cassettes 2 on the conveyor belt 1. With reference to the direction of transfer, the loading chamber 8 has a stationary vertical transverse rear wall 6 which closes off its rear end. The rear wall 6 may possess, as in the case depicted, a central horizontal rib 106 on its inside face, which rib 106 helps to maintain the staggered arrangement of the superimposed rows of cigarettes S in each ordered group, as is customary in the packaging of cigarettes. The opposite wall 107 of the loading chamber 8, which is in front with reference to the direction of transfer, is supported removably so that this side of the loading chamber 8 can be opened as the transfer takes place (Figs. 1, 4, 5). To this end the transverse forward wall 107 is formed by the forward vertical foot of an angled lever 7 which extends underneath the rods 4 and pivots near its centre at 9, while the opposite end from the vertical foot 107 is engaged by a roller 10 in a cam 11. In this way the transverse forward wall 107 can oscillate between a position in which it closes the loading chamber 8 and a position in which it opens it (Figs. 1, 4 and 5) on its side facing towards the transfer station, that is towards the outlet end of the movement channel. As is clearly shown in Fig. 2, the length of the rear 6 and forward 107 transverse walls, tranversely to the movement channel, is approximately equal to or preferably slightly less than the free distance between the two lower guide rods 4, said walls being interposed between said guide rods 4, so that the end portions of the cigarettes resting on the rods 4 also project beyond said transverse walls 6 and 107.

In the feeding station A between the corresponding cassette 2 on the conveyor belt 1 and the loading chamber 8 at the inlet end of the movement channel of the transfer unit 30 is a stationary guideway 12 which is coaxial and coincident with the loading chamber 8 and whose lateral walls and upper and lower walls (not shown) flare out 112 towards the cassette 2 to guide it in.

The group of cigarettes fed into the loading chamber 8 is conveyed to the outlet end of the movement channel by means of a collector/carrier 13. The collector/carrier 13 possesses, on its forward and rear sides with reference to the direction in which the group of cigarettes is carried, means for engaging the corresponding transverse sides of the group of cigarettes which are complementary to the movement channel and to the loading chamber 8 and also so designed that these engaging means can be freely engaged with the movement channel in their active position or disengaged from the movement channel.

In the example illustrated, at the forward end and rear end of the collector/carrier 13 are pairs of vertical end fingers 14 and 15. The forward and rear vertical fingers 14 and 15 are vertically in line with the guide rods 4 and therefore engage the ends of the cigarettes S projecting out of the roof 5 of the movement channel and out of the vertical transverse walls 6 and 107 of the loading chamber 8. Said transverse walls 6 and 107 of the loading chamber 8, and the roof 5 of the movement channel which also forms the roof of the loading chamber 8, lie therefore, within the intermediate free space between the pairs of forward 14 and rear 15 fingers. The two pairs of fingers 14 and 15 are spaced apart in the direction in which the group of cigarettes is carried by a distance equal to the extension thereof, that is to the distance between the transverse walls of the cassettes 2 and of the loading chamber 8, thus forming a carrying chamber which enables the predetermined ordered arrangement of the cigarettes in one group to be maintained while that group is being moved along the channel.

The fingers 14 and 15 of the collector/carrier 13 project from a supporting part 113 located above the roof 5 of the movement channel, to which part the means that drive the collector/carrier 13 are connected.

A pusher 16 moving back and forth in the transfer direction projects into the movement channel from below, between the two movement rods 4. The pusher 16 consists of a vertical transverse wall carried cantilever-fashion by a lower supporting part 17. In much the same way as the transverse rear wall 6 of the loading chamber 8, this has, in a complementary position, a horizontal transverse rib 116 which projects towards the facing transverse rear side of the group of cigarettes. As shown in particular in Fig. 4, in the active position, the pusher 16 is in contact with the rear side of the group of cigarettes and the rib 116 fits into the recess formed by the staggered arrangement of the rows of cigarettes in the row to be transferred.

The outlet end of the movement channel is located at a transfer station T in which the group of cigarettes is transferred into an empty cigarette carrying socket 118 in a folding drum 18. The folding drum 18 is so positioned that the movement channel is oriented radially with respect to the drum and is vertically in line with the cigarette carrying sockets 118 of the folding drum 18. Said sockets 118 are also arranged radially and are open on their radially outward peripheral side. The lower movement surface of the movement channel, i.e. the lower guide rods 4, is positioned, in relation to the axis of rotation of the folding drum 18, in such a way that in the transfer station T the corresponding empty cigarette carrying socket 118 is horizontally in line and in a coaxial position with the movement channel. Between the folding drum 18

and the outlet end of the movement channel, in the transfer station T there are means for feeding/positioning a wrapping sheet F. These means may be of any kind. Advantageously, the means illustrated consist of a pair of parallel, mutually coplanar suction belts 19 running around two rollers 20, 21, at least one of which is powered. One side of each suction belt 19 is interposed between the outlet end of the transfer unit 30 and the folding drum 18 and is oriented vertically.

The belts 19 are set laterally back from the corresponding ends of the cigarettes S of the group in the movement channel, so that said group can pass freely between them. They grip the corresponding lateral edges of the sheet F. Correct positioning of the sheet F is monitored and controlled by presence sensors 23, for example a light barrier or the like.

With reference to Figs. 6 and 7, the collector/transferrer 13 is made to move along an approximately rectangular path in the vertical plane. This path comprises: a first carrying stroke X parallel with the movement channel from the inlet end to the outlet end thereof, that is from the feeding station A to the transfer station T, during which said collector/carrier 13 is in the lowered position with the fingers 14 and 15 inside the movement channel, and the group of cigarettes is engaged with the front and rear fingers 14 and 15; next an approximately vertical rising stroke Y in which at the outlet end of the movement channel the collector/carrier 13 is raised above it to a position of disengagement of the fingers 14 and 15 from it and of noninterference with the group of cigarettes; a return stroke Z approximately parallel with the carrying stroke X and in which the collector/carrier 13 is moved back to the feeding station A at the inlet end of the movement channel and a lowering stroke W in which the carrier/collector 13 is lowered on to the loading chamber 8 so that the front 14 and rear 15 fingers are lined up with its corresponding forward 107 and rear 6 transverse walls and engaging with the projecting ends of the cigarettes of the group.

The pusher 16 executes a stroke which is basically similar but symmetrically opposite with respect to the horizontal plane of the movement channel. A substantial difference is that, since as shown in Fig. 5 the pusher accompanies the cigarettes all the way into the empty socket 118 of the folding drum 18, it must be withdrawn from said socket 118 before it can execute the vertical lowering stroke W'. Accordingly the return stroke Z' includes an initial section Z'' that is approximately coplanar with the end section of the transfer stroke X'.

With reference to Figs. 1 and 3, in order to operate the collector/carrier 13 and the pusher 16, the example illustrated uses basically similar means consisting of an articulated parallelogram provided with means for correcting the rounding of the circuit during the individual strokes.

At points that are spaced out at longitudinal intervals in the movement channel, hinged to the part 113 supporting the collector/carrier 13 in such a way as to pivot about a horizontal axis at right angles to the movement guide, are a front driving link 25 and a rear driving link 126. The front link 25 pivots on the free end of an intermediate lever 27 whose opposite end pivots in turn on the free end of another control lever 29 which is keyed at its opposite end to the output shaft 128 of a periodic or rotary actuator 28 (for example of the kind sold by the company Tecnocamme s.r.l.) and which comprises an input shaft providing continuous drive to a positive-drive cam controlling a pair of rollers at the ends of mutually opposing levers keyed to the output shaft 128, the cam being constructed in such a way as to produce an angular movement in the output shaft in one direction or the other at predetermined intervals of its angular actuation. The rear driving link 126 is formed by one section of an angled lever 26. The length of said section is equal to the length of the front driving link 25. The angled lever 26 pivots in the region of the angle, relative to it, on the free end of a control lever 31, whose opposite end is keyed to the output shaft 132 of a separate rotary actuator 32. The region of the angle of the angled lever 26, that is the upper end of the driving link 126 and the equivalent end of the front driving link 25 are connected rigidly together by a crosslink 33 which is mounted so as to pivot relative to these. The section 226 of the angled lever 26 pivots on the end of a correcting lever 34 whose opposite end pivots freely on a stationary spindle 35.

The control lever 29 essentially controls the lifting of the collector/carrier 13, while the control lever 31 controls its movement in the horizontal plane. The appropriately synchronized driving of the two controlling rotary actuators 28, 32 enables the collector/carrier 13 to be moved around the approximately rectangular circuit shown in Fig. 6, while the correcting lever 34 for correcting the rounding of the carrying stroke X and return stroke Z permits suppression or substantial limitation in unimportant regions of said curved circuit.

The articulated parallelogram for driving the pusher 16 is constructed in much the same way as that for driving the collector/carrier 13. The difference between the two circuits shown in Figs. 6 and 7 is achieved by altering the synchronization of the two rotary actuators with each other.

The operation of the invention can be seen clearly in Figs. 1, 4 and 5. At the end of a return stroke Z, the collector/carrier 13 collects, by fitting

over it, the group of cigarettes in the loading chamber 8 of the movement guide. The forward transverse wall 107 of said loading chamber 8 (Fig. 5) is then lowered and the collector/carrier 13 executes its carrying stroke up to the outlet end of the movement channel (Fig. 1). Simultaneously the forward transverse wall 107 of the loading chamber 8 is raised and at the same time the next group of cigarettes is fed in. The pusher 16 is moved up against the rear side of the group of cigarettes (Fig. 4), while an opposing pusher 218 connected to the folding drum 18 is moved up against the forward side of the group of cigarettes, pushing the wrapping sheet F against it. Following the raising Y of the collector/carrier 13 from the outlet end of the movement guide, and during the return stroke Z and lowering stroke W, the pusher 16 and opposing pusher 218 are re-activated. The group of cigarettes is transferred with the wrapping sheet F into the socket 118 of the folding drum 18, and the initial portion Z'' of the return stroke Z' of the pusher 16, and the lowering stroke W', are carried out. The completion of the return stroke Z' by the pusher 16 occurs during the carrying stroke X by the collector/carrier 13 of the new group of cigarettes, while the rising stroke Y' of the pusher 16 takes place after the collector/carrier 13 has completed its carrying stroke X.

Claims

1. Packaging machine for delicate rod-shaped objects, especially cigarettes, of the type comprising a feeder (1) which takes a succession of ordered groups of cigarettes (S) to a station (A) that feeds said groups of cigarettes to a transfer unit (30), which in turn takes the ordered groups of cigarettes (S) one after the other to a transfer station (T), in which each ordered group of cigarettes (S) is transferred, by pusher means (13, 16) and together with a wrapping sheet (F) fed to said transfer station by a feeding/positioning unit (19, 20, 21), into a coinciding empty cigarette carrying socket (118) in a drum (18) that folds said wrapping sheet (F) around its ordered group of cigarettes (S), characterized in that the transfer unit (30) is constructed in such a way that the individual groups of cigarettes (S) are carried from the feeding station (A) to the transfer station (T) following a straight path (X) of predetermined length along a stationary conveying surface (4) which is in a predetermined position and which has an inlet end at the feeding station (A) and an outlet end at the transfer station (T).

2. Packaging machine according to Claim 1, characterized in that each group of cigarettes (S) in the transfer station (T) is transferred into the empty cigarette carrying socket (118) of the folding drum (18) by an additional transferring movement in the direction of a continuation of the carrying path (X).

3. Packaging machine according to Claim 1 or 2, characterized in that the length of the straight carrying path (X) from the feeding station (A) to the transfer station (T) is comparatively short and is between two and three times the length of the group of cigarettes (S) in the carrying direction (X).

4. Packaging machine according to one or more of the previous claims, characterized in that the cigarettes (S), or rather the group of cigarettes, is carried and transferred along the conveying surface (4) perpendicularly to their axis.

5. Packaging machine according to one or more of the previous claims, characterized in that the transfer unit (30) consists of a straight, horizontal, stationary movement guide (4, 5) oriented radially with respect to the folding drum (18) and aligned vertically with the cigarette carrying sockets (118) of said folding drum (18), which guide (4, 5) is provided with means (13, 113, 14, 15) for the linear collecting/carrying of a group of cigarettes (S) from the inlet end to the outlet end of said guide (4, 5).

6. Packaging machine according to one or more of the previous claims, characterized in that the collecting/carrying means (13, 113, 14, 15) are constructed in such a way as to keep the cigarettes (S) of each group in the pre-ordered condition adopted in the feeder (1, 2) of the ordered groups of cigarettes and can be moved back and forth in both directions over the horizontal movement guide (4, 5) in an active carrying stroke (X) from the inlet end to the outlet end and an empty return stroke (Z) along a path a certain distance away from said guide (4, 5), away from the area of interference of said collecting/carrying means (13, 113, 14, 15) with the groups of cigarettes on said movement guide (4, 5).

7. Packaging machine according to Claim 6, characterized in that the collecting/carrying means may consist of at least one vertical transverse wall (15) that acts on the rear side of the group of cigarettes (S) on the movement guide (4, 5), with reference to the carrying

direction.

8. Packaging machine according to Claim 6 or 7, characterized in that the collecting/carrying means may have two transverse walls (14, 15), one at the front and the other at the back, separated from each other in a fixed manner in the carrying direction (X) by a distance corresponding to the size of the group of cigarettes (S) which are moved together.

9. Packaging machine according to one or more of the previous claims, characterized in that the movement guide (4, 5) consists of an open-sided and open-ended movement channel, the distance between whose horizontal sides corresponds to the horizontal size of the group of cigarettes (Z).

10. Packaging machine according to Claim 9, characterized in that the width of the roof (5) of the movement channel is less than the axial length of the cigarettes (S), while the collecting/carrying means possess instead of the forward and rear walls a pair of peripheral pins (14, 15) which are spaced apart from each other in the transverse direction by a distance equal to the transverse width of the roof (5) and are mounted in such a way as to project vertically down, which pairs of fingers (14, 15) engage from the outside the ends of the forward and rear sides of the group of cigarettes (S) projecting beyond the roof (5) of the movement channel and are positioned a short distance off the lower surface (4) of the movement channel during the carrying stroke (X).

11. Packaging machine according to Claim 9 or 10, characterized in that at the inlet end of the movement channel in the feeding station (A) is a loading chamber (8) into which is loaded a group of cigarettes (S) with which the collector/carrier (13, 113, 14, 15) engages.

12. Packaging machine according to Claim 11, characterized in that the loading chamber (8) is constructed in such a way as to accommodate a group of cigarettes (S) in the transverse direction of carrying in the movement channel (4, 5) and is tubular with its longitudinal ends open and with a volume of complementary shape to the group of cigarettes (S), having a lower wall (4) and roof (5) both approximately coplanar with the lower wall (4) and roof (5) of the carrying channel and a stationary rear wall (6) positioned transversely to the movement channel and a forward transverse wall (107) that is spaced apart from the rear wall by a distance equal to the dimensions of the group of cigarettes, while the roof (5) and forward (107) and rear (6) transverse walls are of a length transversely to the movement channel which is less than the axial length of the cigarettes (S), the axial ends of which cigarettes project beyond said walls (107, 6) and said roof (5), and which is equal to the distance between the pairs of fingers (14, 15) of the collector/carrier (13), the forward transverse wall (107) being movable into the closed and open positions of the corresponding side of the loading chamber (8), in synchronism with the carrying stroke (X) of the collector/carrier (13).

13. Packaging machine according to one or more of the previous claims, characterized in that the transferring movement from the transfer station (T) to the outlet end of the movement guide into the empty socket (118) of the folding drum (18) is performed by means of a pusher (16) which is driven in synchronism with the collector/carrier (13), said pusher (16) consisting of a vertical transverse wall supported cantilever-fashion inside the movement channel through a complementary longitudinal slot in the lower wall (4) of said channel, the length of which vertical wall transversely to the movement channel is approximately equal to the distance between the fingers (14, 15) of the collector/carrier (13), said wall being movable between positions of engagement and disengagement with the cigarettes inside the movement channel.

14. Packaging machine according to one or more of the previous claims, characterized in that the means for feeding/positioning the wrapping sheet (F) consist of a pair of endless parallel suction belts (19) running around rollers (21, 22), at least one of which rollers is powered, said belts having at least one vertical side in an intermediate plane between the outlet end of the movement guide and the empty socket (118) of the folding drum (18) and being set laterally back from the lateral edges of said movement guide.

15. Packaging machine according to one or more of the previous claims, characterized in that the collector/carrier (13) is made to describe an approximately rectangular circuit, around which it moves approximately parallel with itself, said circuit being composed of a carrying stroke (X) from the inlet end, in which it is in a position of coincidence with the loading chamber (8) and engages the group of cigarettes (S) therein, to the outlet end and parallel with the

movement guide; next a vertical rising stroke (Y) of sufficient length to disengage from the group of cigarettes (S), that is approximately equal to or slightly greater than the vertical dimension of the group of cigarettes (S); an empty return stroke (Z) approximately parallel with the carrying stroke (X), from the outlet end to the inlet end of the movement guide until vertically in line with the loading chamber (8); and a lowering stroke (W) until it coincides with said loading chamber (8), the length of this stroke being approximately equal to the rising stroke (Y).

16. Packaging machine according to Claim 15, characterized in that the pusher (16) is driven around a circuit comprising a vertical rising stroke (Y') into a position of engagement in the movement channel behind the collector/carrier (13) after the latter has executed its carrying stroke (X); a horizontal stroke (X') bringing it up against the rear side of the group of cigarettes (S) and transferring this group into the socket (118) of the folding drum (18), after the collector/carrier (13) has been raised (Y), this stroke being simultaneous with the approach stroke of an opposing pusher (218) from said folding drum (18); a horizontal stroke (Z'') away from the folding drum (18), approximately coinciding with the final section of the transfer stroke (X') and then a vertical lowering stroke (W') into a position of disengagement from the movement channel, these being simultaneous with the return and lowering stroke (Z, W) of the collector/carrier (13) and a remaining horizontal return stroke (Z') to a position behind the collector/carrier (13) during the latter's carrying stroke (X).

17. Packaging machine according to Claims 15 and 16, characterized in that the collector/carrier (13) and the pusher (16) are operated independently by means of a system of levers in the form of an articulated parallelogram (25, 126, 27, 29 31 113, 33).

18. Packaging machine according to Claim 17, characterized in that the articulated parallelogram system of levers comprises means (226, 34, 35) for correcting the rounding of the path.

19. Packaging machine according to Claim 17 or 18, characterized in that the system of driving levers consists of two parallel vertical links (25, 126) pivoting at their ends about respective points separated from each other in the carrying direction on the part (113, 17) that supports the collector/carrier (13) and the pusher (16) and at the ends of driving levers (27, 29; 31) that are keyed to the output shafts (128, 132) of separate reciprocating rotary actuators (28, 32) which are synchronized with each other in accordance with the desired circuit, the rotary actuator (28) being basically in control of the rising and lowering (Y, W; Y', W') and the rotary actuator (32) being in control of the horizontal strokes (X, X'; Z, Z', Z'').

20. Packaging machine according to Claims 17 to 19, characterized in that the means for correcting the rounding of the strokes (X, X', Y, Y', Z, Z', Z'', W, W') consist of a lever (226) fixed integrally in the region of the pivot to a link (126), with a predetermined angle relative to the latter and connected in a pivoting manner with the end of another lever (34) supported so as to pivot freely about a stationary spindle (35) at its opposite end.

21. Packaging machine according to one or more of the previous claims, characterized in that the movement guide is coplanar and set laterally back from the feeder (1, 2) of ordered groups of cigarettes, said feeder being provided with a plurality of cassettes (2) containing the ordered groups of cigarettes (S) which in the feeding station are brought into a position of coincidence with the complementary loading chamber (8) at the inlet end of said guide.

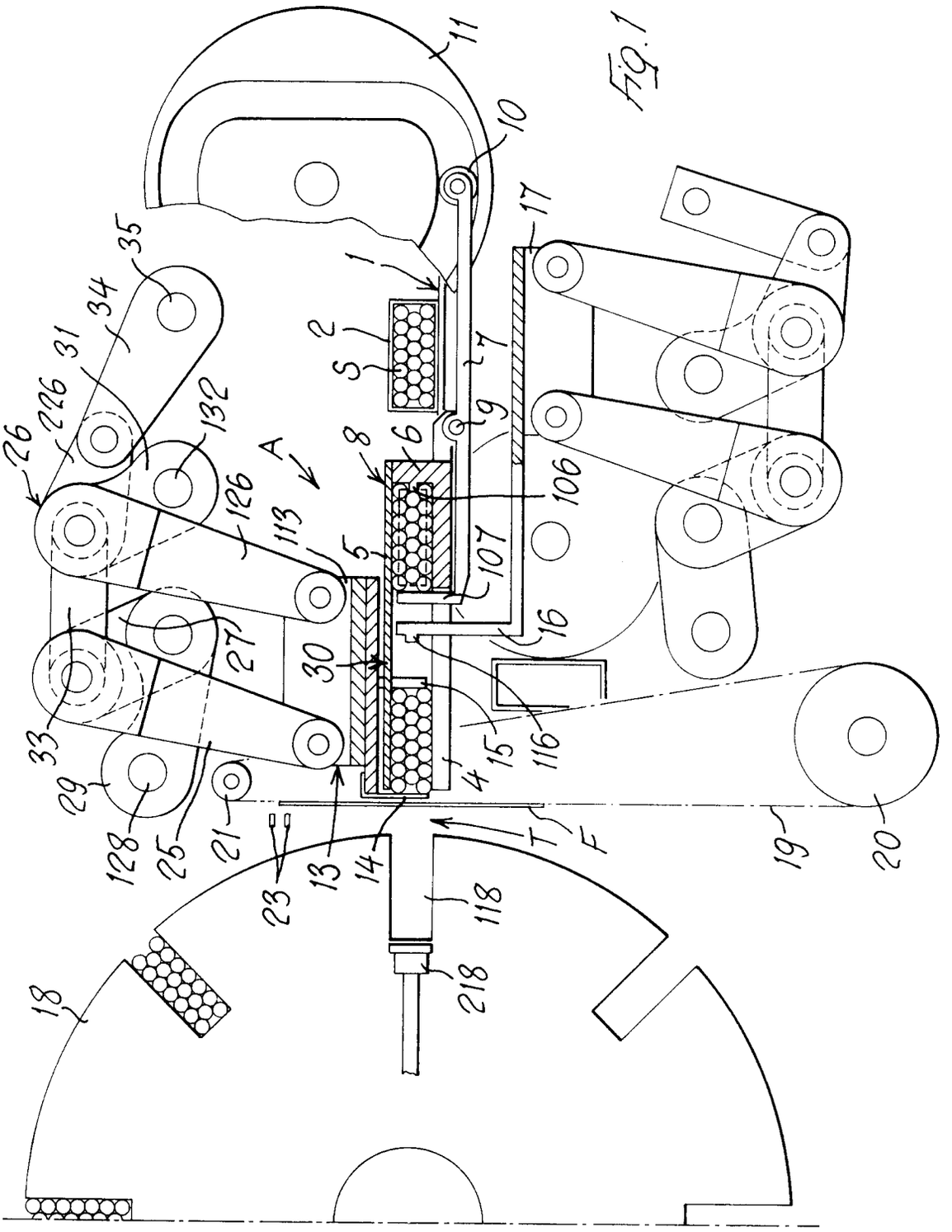
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Fig. 1

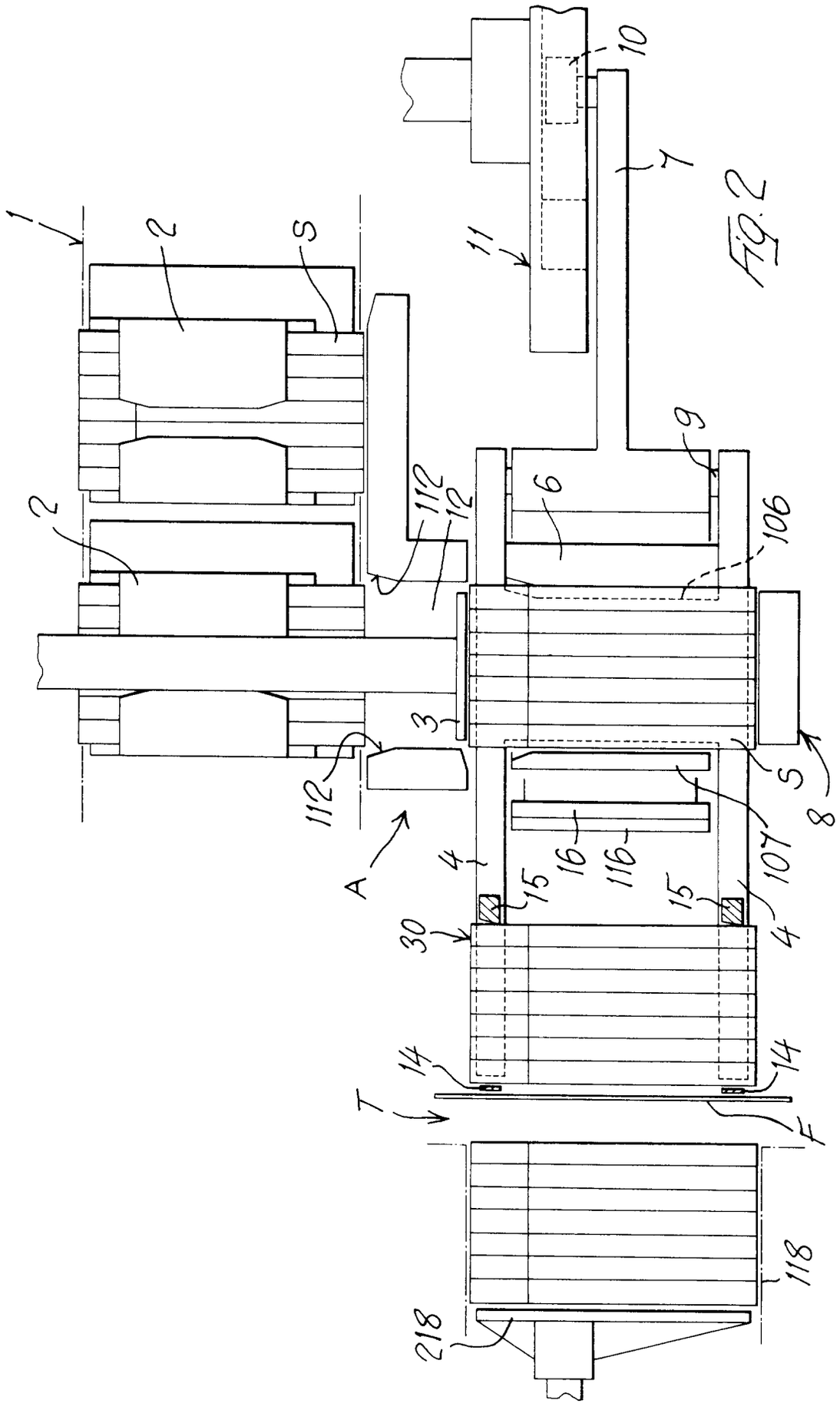

Fig. 2

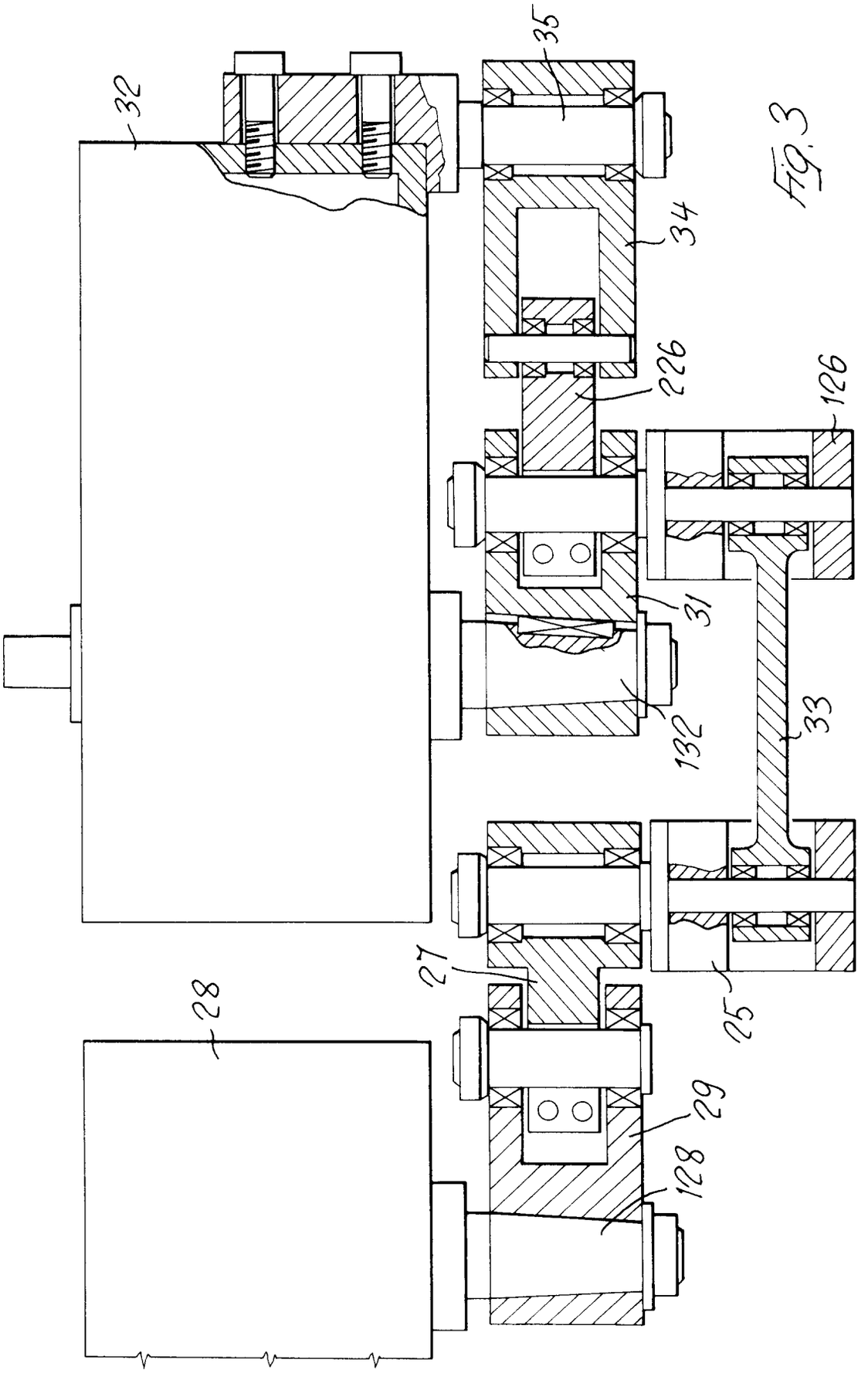

Fig. 3

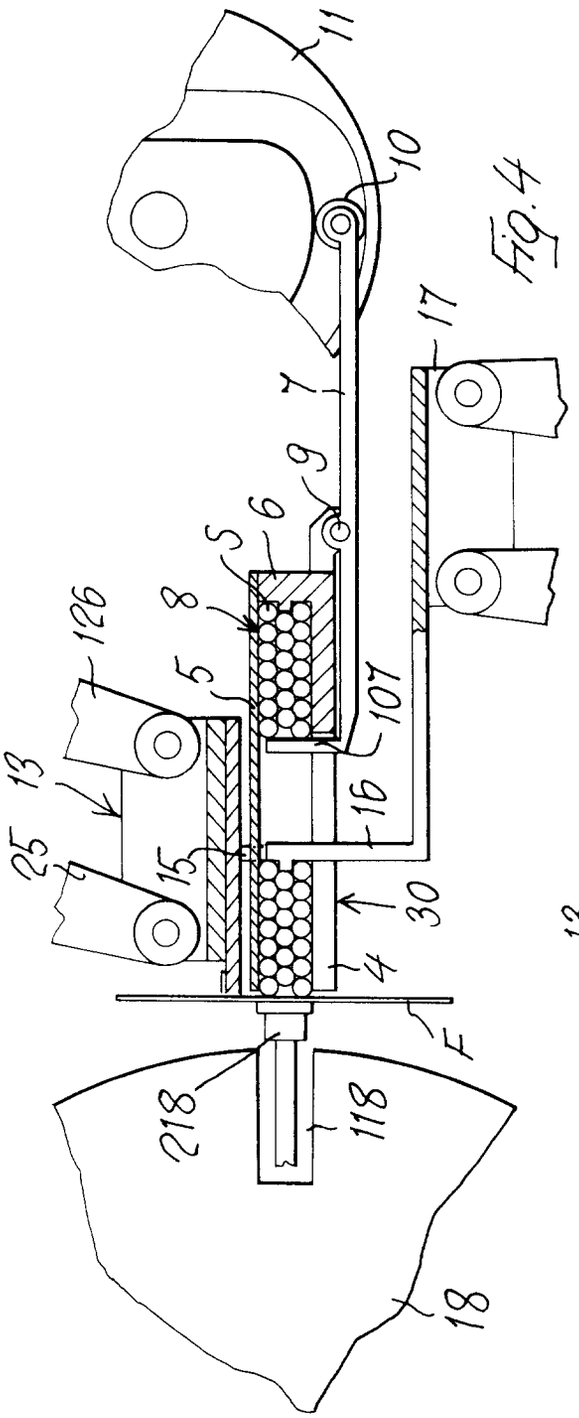
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Fig. 4

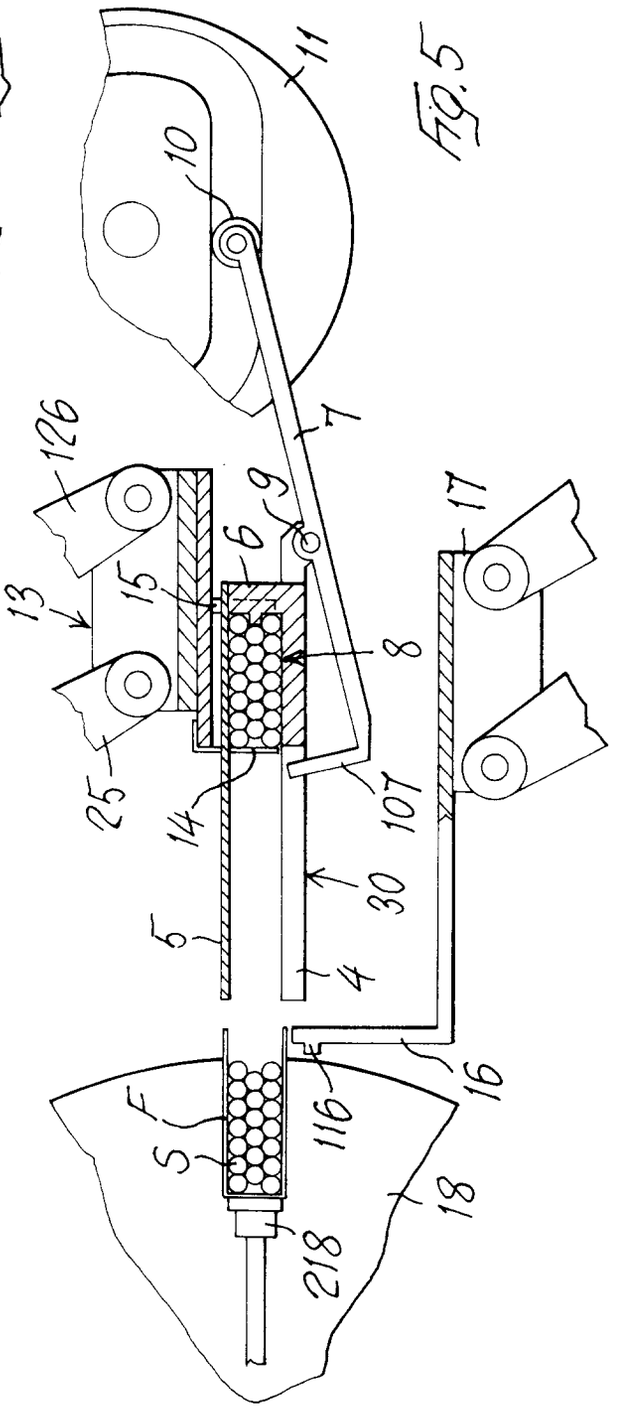
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Fig. 5

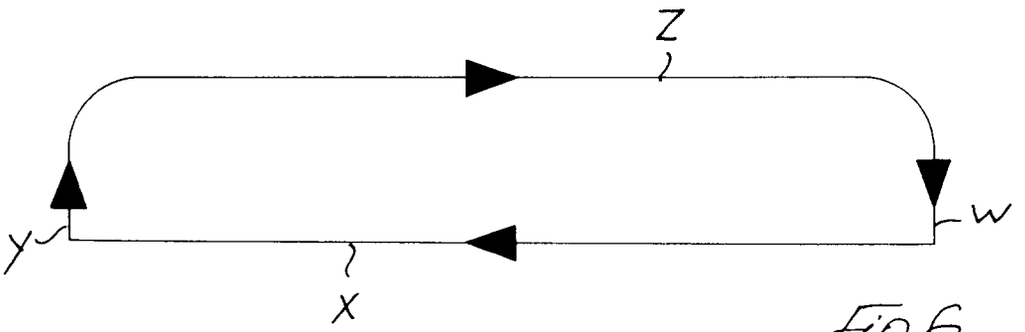

Fig. 6

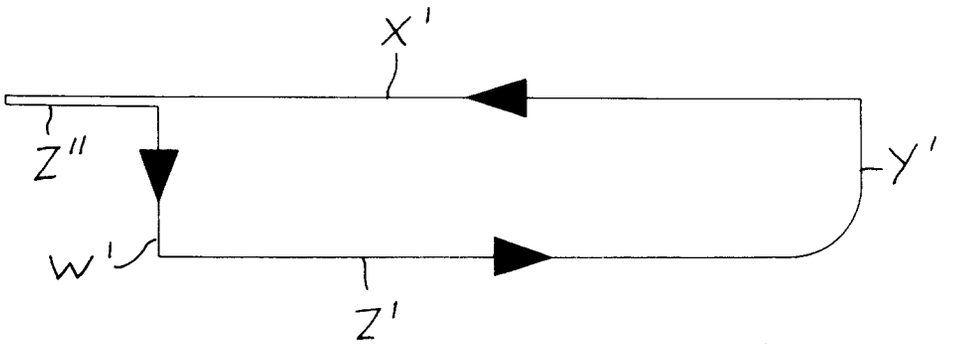

Fig. 7

European Patent Office

EUROPEAN SEARCH REPORT

Application Number EP 94115553.3

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. 6)
A	FR - A - 2 344 449 (G.D. SOCIETA PER AZIONI) * Fig. 4,5,6 *	1,2,4, 5,9, 10,12, 13	B 65 B 19/04 B 65 B 19/02
A	FR - A - 2 274 506 (FOCKE & PFUHL) * Fig. 1,3,4 *	1,2,4, 5,12, 13	
A	DE - A - 2 361 545 (G.D. SOCIETA SERAGNOLI) * Fig. 1 *	1,2,4, 5,12	
A	DE - A - 2 439 192 (FOCKE & PFUHL) * Fig. 5-11 *	1,2,4, 5,12, 13	

TECHNICAL FIELDS SEARCHED (Int. Cl. 6)

B 65 B 19/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	19-12-1994	RIEMANN

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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