



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.09.1997 Bulletin 1997/36

(51) Int. Cl.⁶: **B65B 19/22**, B65B 11/30

(21) Application number: **97102647.1**

(22) Date of filing: **19.02.1997**

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **01.03.1996 IT SV960009**

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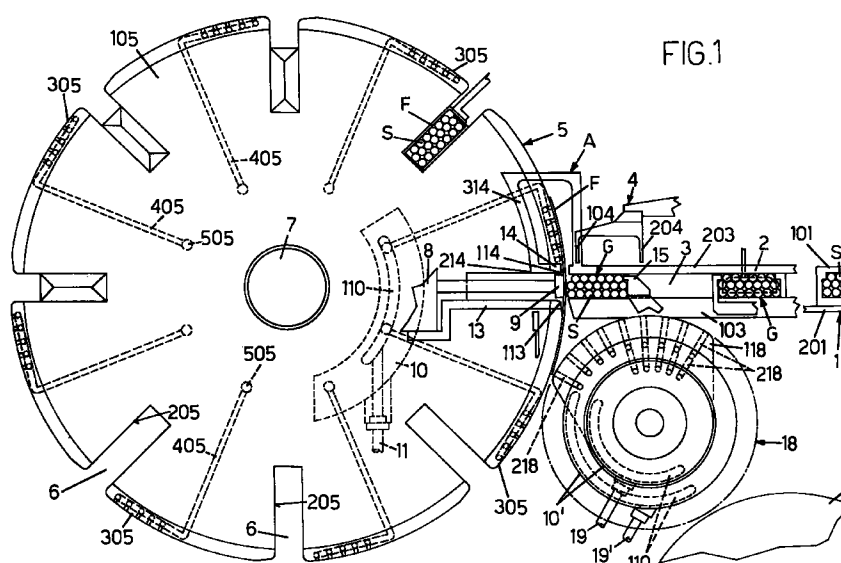
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(54) **Packing machine particularly for cigarettes, or similar**

(57) Packing machine, particularly for cigarettes, or similar, comprising: a station (A) for combination of a wrapping slip (F) with an orderly group (G) of cigarettes (S); a forming unit (5) by means of which the wrapping slip (F) is picked up from the combining station (A) together with the group (G) of cigarettes (S) and wrapped around the latter and with at least one movable forming compartment (6) with the entry aperture coinciding with the combining station (A); means (1, 2, 3, 4) for feeding a sequence of orderly groups (G) of ciga-

rettes (S) to the combining station (A); means (T, 5, 18) for feeding a sequence of slips (F) to the combining station (A) and means (5) for positioning them between the orderly group (G) of cigarettes (S) and the corresponding compartment (6) of the forming unit (5). According to the invention, the means for positioning the slip (F) into the station (A) for its combination with the group (G) of cigarettes (S) are made of or integrated to the forming unit (5) itself.



Description

The invention relates to a packing machine for cigarettes, or similar, comprising

- a station for combination of a wrapping slip with an orderly group of cigarettes;
- a forming unit by means of which the wrapping slip is picked up from the combining station together with the group of cigarettes and wrapped around the orderly group of cigarettes, with at least one or preferably a plurality of movable forming compartments, whose entry aperture coincides with the combining station;
- means for feeding a sequence of orderly groups of cigarettes to the combining station;
- means for feeding a sequence of slips to the combining station and means for positioning them between the orderly group of cigarettes and the corresponding compartment of the forming unit.

Presently, in prior art machines of this type, the means for feeding the slips and positioning the slips into the station for combination with the group of cigarettes are made of wheels, pairs of adjacent discs or pairs of adjacent suction belts, which are part of a separate operating assembly. In some cases, the means for feeding and positioning the wrapping slips may be integrated into a single operating unit with the means for feeding the orderly groups of cigarettes to the combining station.

Cigarette packing machines are made of a great number of actuators, feeders, and controllers, which all are to operate together in perfect synchronism with each other and at very high speeds. Since, for ensuring this high synchronization accuracy at high speeds, the operating units have to draw the driving motion, through mechanical transmissions, from a common main motor, the eventually large number of the said operating units is a burden to the torque demanded of the motor itself and a limit to the attainable operating speeds. A further load to this situation is the fact that the said packing machines have a stepping operation, so that all members are alternately accelerated and decelerated. Moreover, the large quantity of operating units, particularly in the area over which the groups of cigarettes are transferred from the means for forming the said groups to the combining station, results in an overload of the said area, blocking the view for a visual control of the machine operation and consistently slackening the eventual intervention of the operator in case of malfunction.

The invention is intended to provide a packing machine of the type described hereinbefore, in such a way that, by means of relatively simple and cheap expedients, the number of operating units may be reduced, ensuring, at the same time, a more rational construction, and generating the possibility to reach higher operating speeds, within the range of the required

synchronization accuracy, and with no further efforts for the drive motor and the widest view of and accessibility to the area for transfer and combination of the cigarettes with the slips.

The invention reaches the above stated purposes providing a packing machine of the type described hereinbefore, in which the means for positioning the slip into the station for its combination with the group of cigarettes are made of and integrated to the forming unit itself.

In a preferred embodiment, the forming unit is provided with a plurality of compartments, which are sequentially movable, on an annular path, along which there are provided one or more stations for folding the wrapping slip, between the station for combination of the wrapping slip itself with the cigarettes and a discharge station, there being associated to each compartment some specific means for grasping/positioning a wrapping slip.

Particularly, a forming unit of the said type may advantageously consist of a grooved wheel, in which the grooves are pockets with a predetermined shape for housing their respective groups of cigarettes and the associated slip folded around them in a U shape, the grooves being spaced at equal angular distances on the periphery of the wheel, and at least the circumferential, radially outer side, and the two sides parallel to the wheel faces being made to be completely open, while, at each axial end of the grooves, and at least in an angularly advanced position, with respect to the corresponding grooves - referring to the direction of rotation - for each groove there is provided a pair of circular suction sectors, for grasping the wrapping slip and picking it up from the feeding means.

The suction sectors are placed radially outermost with respect to the open circumferential side of the grooves, so that the wrapping slip gets to be arranged in front of the said open circumferential side of its corresponding groove and in an intermediate position between the latter and the corresponding group of cigarettes.

According to a further improvement, the grooves are not substantially U-shaped pockets, with their radial sides and their circumferential radially inner side being continuously closed, and with the edges for delimitation of the circumferential side, open on the two sides parallel to the axis of the wheel, being stationary folders for a U-folding of the slip around the group of cigarettes on joint introduction of the slip and the group of cigarettes into the associated groove, but a pair of U-shaped cradles, being radially orientated and axially aligned with each other, the said cradles being provided in two adjacent and coaxial discs respectively, the said discs being at such an axial distance from each other that the distance between the two outer faces of the two discs corresponds to the length of the cigarettes.

Particularly, the cigarettes are housed in the grooves, with their axes parallel to the axes of the forming wheel, that is those of the coaxial discs.

In this case, for the U-folding of the slip to be carried

out on insertion of the latter, together with the group of cigarettes, into the corresponding groove, there are provided two stationary folders, which form edges or planes parallel to the axis of the wheel and which, in the forming station, extend flush with the two planes subtended by the facing radial sides of the two cradles, the said folders being supported projectingly by stationary parts of the framework, in an intermediate position between the two discs, not interfering with the rotation of the latter.

Particularly, when the two discs have no axial linkage and are operated separately but in synchronism with each other, a stationary folder, the rear one, is made of a plate, supported by the common stationary axis about which the two discs rotate, and may extend for the whole radial depth of the corresponding side of the cradles, up to the peripheral edge of the discs, whereas the front stationary folder, referring to the direction of rotation, is integrated with a stationary folder, whose assigned task is to fold the front flap of the slip - still referring to the direction of rotation - radially projecting outwards from the open circumferential side of the U-shaped cradles, against the corresponding side of the group of cigarettes during the first step of rotation. In this case, the said stationary folder accomplishes two functions, both of U-folding the slip on its introduction with the cigarettes into the groove, and of folding the projecting front flap during the first step of rotation of the discs, and may be formed, for example, by a blade, disposed flush with the front radial sides of the U-shaped cradles - referring to the direction of rotation - and extending from the peripheral edge of the discs until it reaches a radius corresponding to the radial space taken by the cigarettes inside the grooves.

As the forming wheel undergoes its steps of advance with a predetermined rate and with a well-defined acceleration and deceleration phase, the means for feeding the slip thereto include a suction transfer drum, which is driven in such a way as to execute an angular differential motion, complying with that of the forming wheel, that is of the discs.

Particularly, when the feeding means are provided with at least one feeding drum, whose rotation is synchronized but constant, the transfer drum has only one suction circular sector for grasping the slip, which extends over at least part of the angular width with respect to the total length of the slip in the direction of advance, and which can only interact either with the drum of the feeding means or with the forming wheel, while the rotary drive means are made in such a way that, when the said suction sector of the transfer drum interacts with the suction sectors of the forming wheel, it executes a differential angular motion which is perfectly synchronized with and at the same speed as the forming wheel whereas, when it interacts with the slip feeding drum, the said suction sector moves with an angular motion, which is constant and complying with that of the feeding drum. Advantageously, the said suction sector is interposed between the forming wheel and the slip feed-

ing drum, the said two parts being substantially arranged in diametrically opposite positions with respect to the axis of the transfer drum.

The invention also relates to other objects which form the subject of the dependent claims.

The characteristics of the invention and the advantages derived therefrom will appear more clearly from the following description of an embodiment, illustrated as a non-limiting example in the annexed drawings, in which:

Fig. 1 is a schematic axial view of a combining station and of the associated forming wheel in a packing machine according to the invention.

Fig. 2 shows a section with respect to a vertical axial plane through a forming wheel according to the invention.

Fig. 3 shows a section with respect to a vertical plane, parallel to the axis of the forming wheel, through the transfer drum with a suction sector with a limited angular width.

With reference to the figures, a packing machine according to the invention comprises a station A for combination of an orderly group G of cigarettes S with a wrapping slip F.

The orderly groups G of cigarettes S are sequentially fed by means of a so-called box conveyor 1, that is a continuous conveyor belt 201 bearing a plurality of substantially tubular compartments 101, in which the groups of cigarettes G are formed. The groups of cigarettes G, which, in the example, are carried transversely to the axis of the cigarettes S, are moved in the axial direction of the cigarettes S from the corresponding tubular compartment 101, by means of an axial pusher 2, into a duct 3 for transfer of the groups G of cigarettes S to the station for combination with the slip F.

In the illustrated example, the groups G of cigarettes S are moved into the transfer duct 3 along a straightaway path by means of pulling means 4, which are movable alternately to and fro along the transfer duct 3 and, additionally, into a position of penetration in the said transfer duct 3, engaging the group G of cigarettes between a front fork 104 and a rear fork 204. The forks 104, 204 are downwardly protruding, and the pulling means 4 are movable from the said position of penetration and a position of extraction from the said transfer duct 3, in which they do not interfere with the group G of cigarettes S, on execution of the return travel.

Obviously, the path 3 along which the cigarettes are transferred into the station A for combination with the slip F, as well as the means 4 for moving the cigarettes S along this path may also be different from those illustrated.

In front of the exit side of the duct 3 for transfer of the groups G of cigarettes S, which is provided in coincidence with the combining station A, there is provided a forming wheel 5, having a plurality of radial peripheral

grooves 6. The grooves 6 are open at their peripheral, circumferential side, and at their axial ends, that is on the opposite faces of the wheel 5. The wheel 5 is supported rotatably about an axis which is transverse to the direction of feed of the groups G of cigarettes, that is parallel to the cigarettes themselves. The axis of rotation of the wheel is provided substantially at the same level as the median plane of the transfer path 3 for the groups G of cigarettes, so that the single grooves 6 may be carried by sequences in front of the exit side of the duct 3 for transfer to the combining station A. In this position, the grooves 6 are perfectly aligned on the ideal coaxial extension of the transfer duct 3, so that the group G of cigarettes S may be inserted into the corresponding groove by a simple translation onwards.

The forming wheel 5 is composed of two discs 105, 105', which are mounted rotatably on two stationary and coaxial shaft bodies 7, one of which bears, between the two discs, the projecting compartment case 8 of a following member 9. The two discs 105, 105' have no mechanical linking elements and are driven by two identical kinematic chains each for one single disc 105, 105'. Both these kinematic chains draw the driving motion from a common main motor-driven shaft (not shown). By this arrangement, the two discs 105, 105' execute a perfectly synchronized rotary motion with no need for intermediate axial means for mechanical linkage to each other.

Therefore, the grooves 6 are only formed by U-shaped cradles in axially coinciding positions on each disc 105, 105'. The U-shaped cradles are formed by properly shaped radial notches 205, made in the discs 105, 105' themselves and open on the peripheral edges of the latter.

The depth of the notches 205, which form the grooves 6, is larger than the corresponding radial dimension of the group G of cigarettes S. In an angularly advanced position with respect to each groove 6, that is to each notch 205, each disc 105, 105' has, on its peripheral edge, a suction sector 305. The suction sectors have a limited angular width and are made of hollow blades, provided with suction holes communicating outwards with their peripheral side, the said blades being axially widened inwards towards the adjacent disc 105, 105'. The hollow of the suction blades of each disc 105, 105' is connected, through radial ducts 405, to a rotating distributor for each disc 105, 105'. In the illustrated example, each disc 105, 105' is associated to a distributing sole 10, which has a distributing throat in the form of a circular sector 110, and, coinciding with the said throat, that is at the same radial distance of the said throat 110 on the adjacent face of the corresponding disc 105, 105', there are provided the outlets of ducts or axial holes 505, communicating with radial connecting ducts 405, which lead to the suction sectors 305.

Each distributor 10 is connected separately, through ducts 11 to the vacuum source. Therefore, the suction sectors 305 of each disc 105, 105' are fed separately. This prevents the connecting ducts of the suc-

tion sectors 305 of the two discs 105, 105' from having different lengths, and consequently from asymmetries in the suction effect exerted by the two adjacent suction sectors 305. Since the suction sectors 305 are alternately connected to the vacuum source and to atmospheric pressure or to a pressure source, the length difference between the connecting ducts of the two suction sectors 305 implies slightly spaced times of exertion of the necessary vacuum for picking up and holding back the slip. These times, however, become considerable when, like in packing machines, the operating speed is very high. The slip F picked up by the suction sectors 305 might then take a slightly staggered position with respect to the optimal one, with the consequent production of reject packs.

The suction sectors 305 terminate at the open side of the grooves 6, that is of the notches 205. The radial dimension of the discs 105, 105' is such that the peripheral edges of the two discs 105, 105', in perfect axial alignment, are disposed only at a short distance from the outlet end of the duct 3 for transfer of the groups G of cigarettes S.

The distance between the two discs 105, 105' is such, that the ends of the cigarettes S extend flush with the outer face of the corresponding disc, or at least with the portion thereof coinciding with the edge of the notches 205. The slip F generally has an axial size, which is larger than the distance between the two discs 105, 105' and than the length of the cigarettes S, and it is held back by the peripheral suction sectors 305 in a median area of its extension in the axial direction of the cigarettes and in the front part with reference to the direction of advance. Instead, the following part of the slip F, that is the portion coinciding with the aperture of the groove 6 and the tail extending beyond the groove 6 are free.

In the combining station A, the grooves 6, that is the pairs of adjacent U-shaped cradles 205 of the discs 105, 105', disposed on the coaxial extension of the duct 3 for transfer of the groups of cigarettes have their radial sides, the front and the rear ones - referring to the direction of rotation - aligned with a stationary folder 13, 14 respectively.

These stationary folders 13, 14 may be of any type and must substantially form two edges 113, 114, which are aligned each with one of the two radial sides, the front and the rear ones, of the grooves 6, and against which, on simultaneous transfer of the group G of cigarettes S, and of the slip F, which is interposed between the former and the groove 6, that is also the stationary folders 13, 14, this slip F is U-folded around the circumferential inner sides and the two radial sides of the group G of cigarettes S with reference to the associated groove 6.

In the illustrated example, the stationary folder associated to the rear radial side of the notches 205 is made of a stationary plate 13, which is carried projectingly, radially out of the case 8 of the follower 9, the said case being mounted on the stationary axis of rotation

between the two discs 105, 105'. The said plate 13 is on the same plane as the sliding surface 103 of the duct 3 for transfer of the groups G of cigarettes S to the combining station A, or at least as the terminal segment of the said duct 3 in coincidence with the combining station A. The other folder associated to the front radial sides of the grooves 6 is made of a blade 14, which is carried projectingly in an intermediate position between the two discs 105, 105' and which extends parallel to the plate 13. The blade 14 is on the same plane as the top 203 of the duct 3 for transfer of the groups G of cigarettes S to the combining station A. The front stationary folding blade 14 extends radially inwards from the peripheral edge of the discs 105, 105' to an extent corresponding to the difference between the radial space taken by the group G of cigarettes S inside the groove 6 and the external radius of the discs 105, 105'. Then, it terminates flush with the circumferential, radially outer side of the groups G of cigarettes S inside the grooves 6, connecting to a wall in the form of a circular sector 314, which is only supported on the front side, at such a distance from the horizontal axis of the wheel 7 as to contain the front portion of the slip F, and forming a stationary folding edge 214 at its radial inner end. This edge 214 is intended to fold against the said circumferential radially outer side of the groups G of cigarettes S, the flap of the slip F which projects radially outwards beyond the radial space taken by the group G of cigarettes S. The two edges 113, 114 which U-fold the slip F around the group G of cigarettes S may also be slightly rounded or chamfered. The group G of cigarettes S and the slip F are transferred from the combining station A into the corresponding groove 6 thanks to the combined action of a pusher 15 and a counter-pusher, that is a follower 9, and are pressed between the said two elements.

As fig. 1 shows, the slip F is released while being transferred into the groove 6 together with the cigarettes, through connection of the suction sectors 305 either to atmospheric pressure or to a pressure source. To achieve this purpose, the slots shaped as circular sectors 110 of the rotating distributors 10 must be properly positioned, angularly with respect to the angular position of the feed ducts 505, 405, connected to the suction sectors themselves. There may be provided both that suction does not stop before the slip being held pressed, together with the group G of cigarettes S, between the pusher 15 and the follower 9, or, as fig. 1 shows, in which the throat 110 of the distributors 10 is illustrated by means of broken lines, when the pressing action between the said two elements is sufficiently fast, the suction may be interrupted at the moment in which the groove 6 and thus the slip F reach the correct combining position of the latter with the group G of cigarettes S. This is possible for the fact that a certain period is needed before compensation of vacuum, so that the effect of release of the slip F by the suction sectors 305 is not simultaneous but is produced after a certain delay with respect to the moment of stopping the vacuum

source or of closing the connections thereto.

In an intermediate position between a drum T of an assembly for feeding and cutting the slips F from a continuous tape reel, the said drum T rotating at a constant speed, there is provided a transfer drum 18, which has a suction sector 118, of such an angular width that its peripheral, circumferential extension substantially corresponds to the length of the slip in the direction of feed. Preferably, as shown in fig. 3, the suction sector 118 is made of two radial ribs projecting from a common hub, whose axial distance from each other corresponds to the distance between the suction sectors 305 of the forming wheel 5. The suction sectors 118 of the transfer drum 18 are made so as to be substantially analogous to those 305 of the discs 105, 105' of the forming wheel 5, and their alternate connection to the vacuum source (not shown) and to atmospheric pressure, or to a pressure source is carried out through means that are analogous to those used for the suction sectors 305 of the discs 105, 105' of the forming wheel 5. Consequently, as shown in figs. 1 and 3, here too there are provided rotating distributors or valves, for example rotating soles 10', supplied with distributing throats in the form of circular sectors 110, which coincide with the inlets of the connection ducts 218. In this case too, the suction sectors 118 on the two sides of the slip F are connected separately 19, 19' to the vacuum source and to atmospheric pressure or to the pressure source through separate distributing soles 10'.

As the feeding drum T rotates at a constant speed, whereas the forming wheel 5 executes steps of rotation spaced by dwell times and thus it is subject to continuous acceleration and deceleration phases during the steps of rotation, thanks to the limited angular width of the suction sectors, the transfer drum 18 interacts alternately either with the forming wheel 5 or with the feeding drum T and is driven rotatably in a differential manner and in synchronism with, and at the same speed as, the forming wheel 5, and the feeding drum T alternately.

Referring to fig. 3, the differential rotary motion of the transfer drum 18 is obtained by means of a drive kinematic chain, in which there are provided at least one crank transmission and at least one intermitter with parallel axes, in a cascade arrangement, while the driving motion of the kinematic chain 20 is drawn from the shaft 21 of the feeding drum T. With reference to fig. 3, a first transmission shaft 120 is driven rotatably from the driving shaft 21 of the feeding drum T, by means of a crank coupling 220, in which the crankpin is excentrically and rotatably engaged with the said driving shaft 21 of the feeding drum T. The first transmission shaft 120 drives a second crank 320 which is linked, by means of an arm 420, to a third crank 620, fixed to the input camshaft 520 of an intermitter with parallel axes, whose output shaft 720 directly drives the transfer drum 18. There is also provided a device for preventing the crank 620 from reversing the direction of rotation while passing through dead points. The combination of the three cranks 220, 320, 620 and of the intermitter with parallel axes 520,

720, allows for a rotary behaviour of the transfer drum 18, such that when it interacts with the forming wheel 5, and when it interacts with the feeding drum T, the said transfer drum 18 always rotates at the same speeds of the forming wheel 5 and of the feeding drum T respectively, thus ensuring the best conditions for transferring the slip F.

Thanks to the construction according to the invention, that is to the picking up of the slip F and to its positioning into the combining station A, directly by the forming wheel 5, there is no need for separate slip positioning means and for the associated means for the slip position control and for synchronization. In this case, once the slip is properly picked up by the forming wheel 5, its placement into the combining station is made automatically when the forming wheel 5 properly stops, by making use of the synchronized drive means of the forming wheel 5. A further advantage is the fact that, with the lack of separate means for positioning the slip F, which are generally placed over the duct 3 for transfer of the groups G of cigarettes S, the latter is easily accessible both visually and directly with hands or with the necessary tools, by the personnel on duty, consistently simplifying the eventual simple control operations and the elimination of eventual improperly disposed groups of cigarettes. As evidently shown in figs. 1, 2 and 3, the duct 3 for transfer of the groups G of cigarettes S and the pulling means 4 are completely free and easily reachable from the upper side.

Naturally, the invention is not limited to the embodiments described and illustrated herein, but may be greatly varied, especially as regards construction, without departure from the guiding principle disclosed above and claimed below.

Claims

1. Packing machine, particularly for cigarettes, or similar, comprising:

- a station for combination (A) of a wrapping slip (F) with an orderly group (G) of cigarettes (S);
- a forming unit (5) by means of which the wrapping slip (F) is picked up from the combining station (A) together with the group (G) of cigarettes (S) and wrapped around the orderly group (G) of cigarettes (S), with at least one or preferably a plurality of movable forming compartments (6), whose entry aperture coincides with the combining station;
- means (1, 2, 3, 4) for feeding a sequence of orderly groups (G) of cigarettes (S) to the combining station (A);
- means (T, 5, 18) for feeding a sequence of slips (F) to the combining station (A) and means (5) for positioning them between the orderly group (G) of cigarettes (S) and the corresponding compartment (6) of the forming unit (5); characterized in that

- the means for positioning the slip (F) into the station for its combination (A) with the group (G) of cigarettes (S) are formed of or integrated to the forming unit (5) itself.

2. Machine as claimed in claim 1, characterized in that the forming unit (5) is provided with one or more compartments (6), which are sequentially movable, on an annular path, along which there are provided one or more stations for folding the wrapping slip (F), between the station for combination (A) of the wrapping slip itself with the cigarettes (S) and a discharge station, there being associated to each compartment (6) some specific means (305) for grasping/positioning a wrapping slip (F).

3. Machine as claimed in claim 2, characterized in that the means for grasping/positioning the wrapping slips (F) associated to the compartment or compartments (6) of the forming unit (5) are made of suction sectors (305) orientated in the direction of advance of the compartments (6) and disposed at least in front of the latter, referring to the direction of advance, the said suction sectors (305) extending so as to interact with at least two parts, which are at a distance from each other in the direction transverse to the direction of advance of the compartments (6) at least in the portion of the slip (F) which is made to be projecting onwards with respect to the corresponding compartment (6), in the direction of advance of the latter.

4. Machine as claimed in one or more of the preceding claims, characterized in that each compartment (6) of the forming unit is associated to two suction sectors (305) aligned in the direction of advance of the compartments (6) themselves and interacting with side bands of the slip (F), provided in the area of the sides of the groups (G) of cigarettes, which are orientated in the direction of advance of the compartment or compartments (6).

5. Machine as claimed in one or more of the preceding claims, characterized in that the two adjacent suction sectors (305), associated to each compartment (6) of the forming unit (5) may be separately connected (10, 110) by means of rotating distributors or valves alternately to a vacuum source and to atmospheric pressure or to a pressure source.

6. Machine as claimed in one or more of the preceding claims, characterized in that the forming unit (5) comprises a grooved wheel, in which the grooves are pockets (6) with a predetermined shape for housing their respective groups (G) of cigarettes (S) and the associated slip (F) folded around them in a U-shape, the grooves being spaced at equal angular distances on the periphery of the wheel and at least the circumferential, radially external

side, and the two sides parallel to the wheel faces being made to be completely open, while, at each axial end of the grooves, and at least in an angularly advanced position, with respect to the corresponding grooves - referring to the direction of rotation - for each groove there is provided a pair of circular suction sectors (305), for grasping the wrapping slip (F) and picking it up from the feeding means (T).

7. Machine as claimed in one or more of the preceding claims, characterized in that the suction sectors (305) are placed radially outermost with respect to the open circumferential side of the grooves (6), so that the wrapping slip (F) gets to be arranged in front of the said open circumferential side of the corresponding groove (6) and in an intermediate position between the latter and the corresponding group (G) of cigarettes (S) in the combining station (A).
8. Machine as claimed in one or more of the preceding claims, characterized in that the grooves (6) are made of a pair of U-shaped cradles radially orientated and axially aligned with each other, the said cradles being made of radial properly and identically shaped notches (205) in two adjacent and coaxial discs (105, 105') respectively, the said discs (105, 105') being at such an axial distance from each other that the distance between the two outer faces of the two discs (105, 105') corresponds to the length of the cigarettes (S).
9. Machine as claimed in claim 8, characterized in that the cigarettes (S) are housed in the grooves (6), with their axes parallel to the axes of the forming wheel (5), that is of the coaxial discs (105, 105').
10. Machine as claimed in claims 8 or 9, characterized in that the discs (105, 105') of the forming wheel have no axial linkage to each other and are supported by common stationary axes coaxially to each other, while they are driven in synchronism by two separate transmission assemblies, driven by the same motor shaft.
11. Machine as claimed in one or more of claims 8 to 10, characterized in that, in order to perform the U-folding of the slip (F) around the group (G) of cigarettes (S) on their simultaneous introduction into the associated groove (6), there are provided two stationary folders (13, 14), which form at least some folding edges (113, 114) or planes parallel to the axis of the wheel (5) and which, in the combining station (A), extend flush with the two planes subtended by the facing radial sides of the two cradles, that is of the two notches (205) which form the said cradles, that is the grooves (6), and the said folders (13, 14) being supported projectingly by stationary parts of the framework, in an intermediate position

between the two discs (105, 105') and between the grooves (6), that is the portion of the latter which is intended to house the groups (G) of cigarettes (S) and the peripheral edge of the discs (105, 105') that is the peripheral suction sectors (305).

12. Machine as claimed in claim 11, characterized in that on the peripheral edge of the discs (105, 105'), there is provided a ring of equally spaced suction sectors (305), the radius of the discs being considerably longer than the radial space taken by the groups (G) of cigarettes (S) in the grooves (6), and the front stationary folder (14), referring to the direction of rotation of the discs (105, 105'), being made of a blade extending flush with the radial front side of the grooves (6), that is of the notches (205), and terminating, on one side flush with or slightly receded with respect to the outer peripheral edge of the discs (105, 105'), and on the radially inner side, flush with the radially outer side of the groups (G) of cigarettes (S) when being inserted in the said grooves (6).
13. Machine as claimed in claim 12, characterized in that the front stationary folder (14) is integrated to the stationary folder whose assigned task is to fold the front flap of the slip (F) - still referring to the direction of rotation - radially projecting beyond the radially outmost side of the group (G) of cigarettes (S), against the said radially outmost side.
14. Machine as claimed in claims 11, 12 or 13, characterized in that the rear stationary folder (13) is made of a plate, supported by the common stationary axis (7), about which the two discs (105, 105') rotate, and may extend for the whole radial depth of the corresponding radial side of the grooves (6), that is of the notches (205) of the discs (105, 105'), terminating substantially flush with or slightly receded with respect to the peripheral edge of the discs (105, 105') themselves.
15. Machine as claimed in one or more of the preceding claims, characterized in that, as the forming wheel (5) undergoes its steps of advance with a predetermined rate and with a well-defined acceleration and deceleration phase, the means for transfer (18) of the slip to the said wheel comprise a suction transfer drum, which is driven in such a way as to execute an angular differential motion, complying with that of the forming wheel (5) itself, at least during the phase in which the slip is released to the latter.
16. Machine as claimed in claim 15, characterized in that it has means (T) for feeding the slip (F), for example a feeding drum, which rotates differently from the forming wheel (5), for example at a constant angular speed, the transfer drum (18) has only one suction circular sector (118) for grasping

the slip (F) which extends circumferentially over at least part of the angular width with respect to the total length of the slip (F) and at the most for the whole of the said length, in the direction of advance and which can only interact either with the feeding drum (T) or with the forming wheel (5), while the rotary drive means (20) are made in such a way that, when the said suction sector (118) of the transfer drum (18) interacts with the suction sectors (305) of the forming wheel (5), it executes a differential angular motion which is perfectly synchronized with and at the same speed as the forming wheel (5) whereas, when it interacts with drum (T) for feeding the slip (F), the said suction sector (118) moves with an angular motion, which is constant and complying with that of the feeding drum.

17. Machine as claimed in claim 16, characterized in that the said suction sector (118) is interposed between the forming wheel (5) and the drum (T) for feeding the slip (F), the said two parts (5, T) being substantially arranged in diametrically opposite positions with respect to the axis of the transfer drum (18).

18. Machine as claimed in one or more of the preceding claims, characterized in that the transfer drum (18) is driven differentially by means of a kinematic chain, comprising several means, in a cascade arrangement, for transmission of the constant angular motion (120, 320, 420, 520, 620, 720).

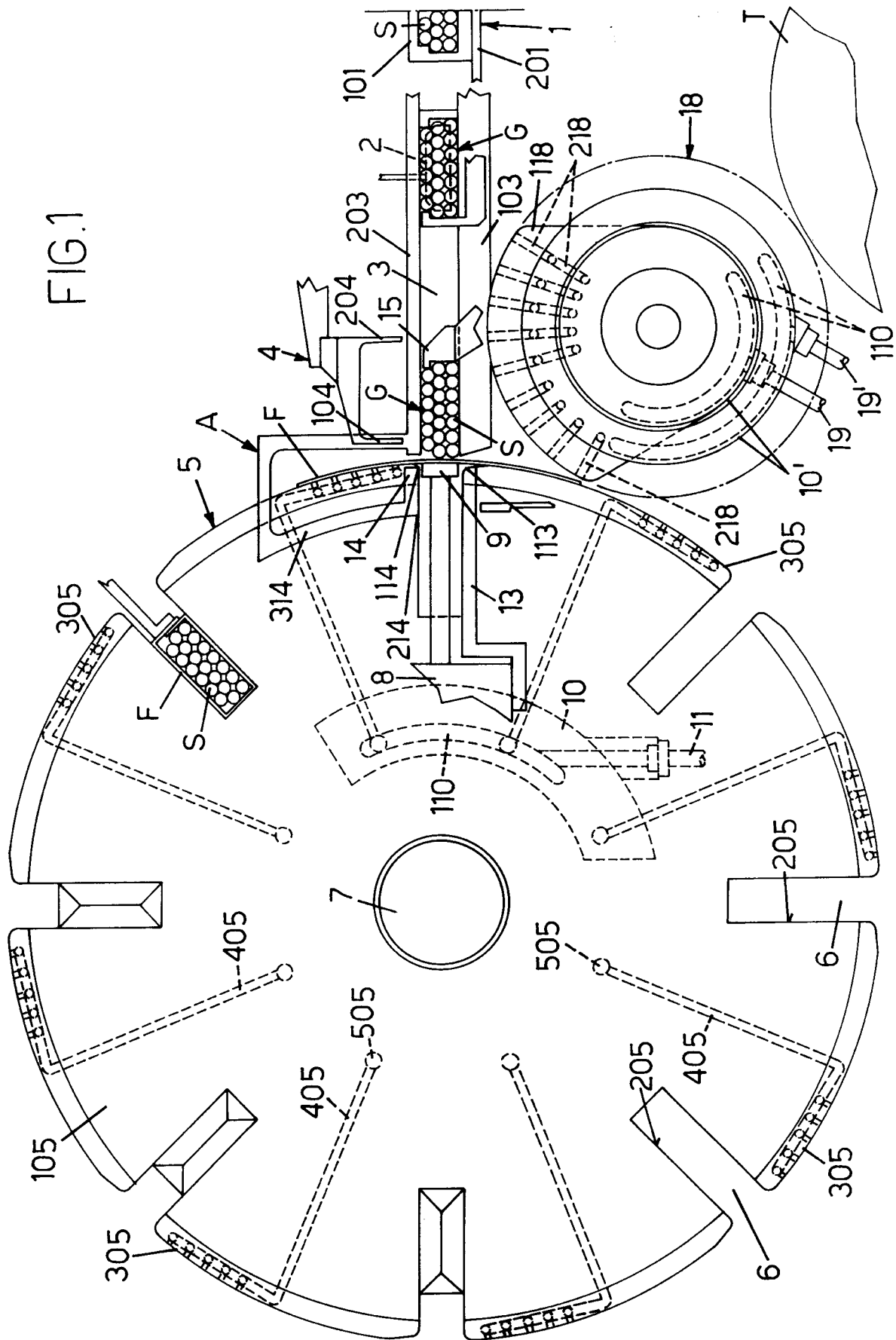
19. Machine as claimed in claim 18, characterized in that the transmission (20) comprises a first transmission shaft (120) which is rotatably driven by the shaft (21) for driving the feeding drum (T), through a crank coupling (220), whose crankpin is engaged excentrically and rotatably with the said shaft (21) for driving the feeding drum (T), the said first transmission shaft (120) drives a second crank (320), which is linked, by means of an arm (420), to a third crank (620), fixed to the input camshaft (520) of an intermitter with parallel axes, whose output shaft (720) directly drives the transfer drum (18).

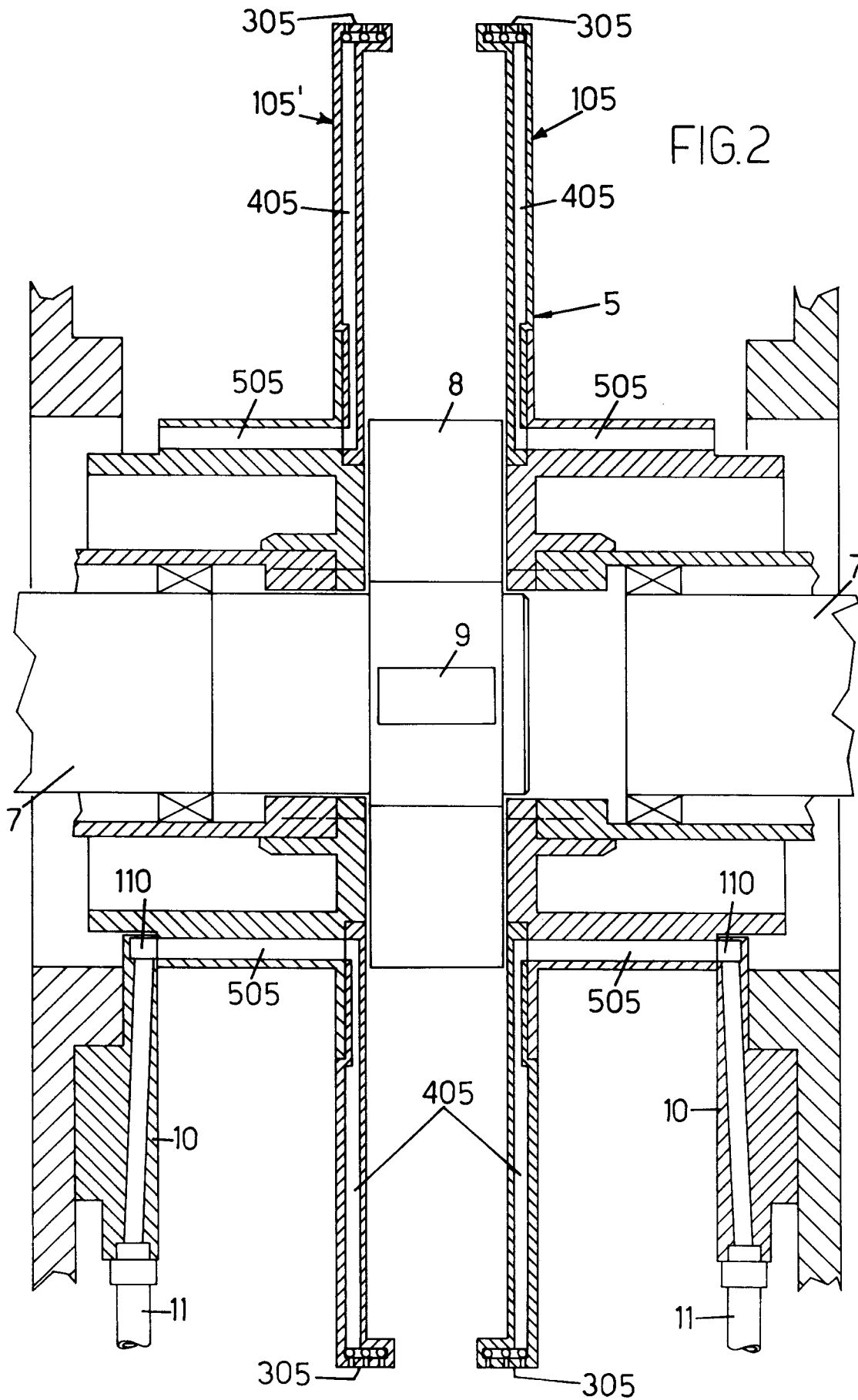
20. Machine as claimed in one or more of the preceding claims, characterized in that the suction circular sector (118) of the transfer drum (18) is made of two radial ribs, whose radial distance substantially corresponds to that of the suction sectors (305) of the discs (105, 105') of the forming wheel (5) and axially coinciding with each other, the said suction sectors (118) of the transfer drum (18) being provided, like the suction sectors (305) of the discs (105, 105'), of the forming wheel (5), with suction holes terminating on their outer peripheral edge, and which, for each rib, are separately connected (218, 19) to the vacuum generators and/or to atmospheric pressure or to a pressure source,

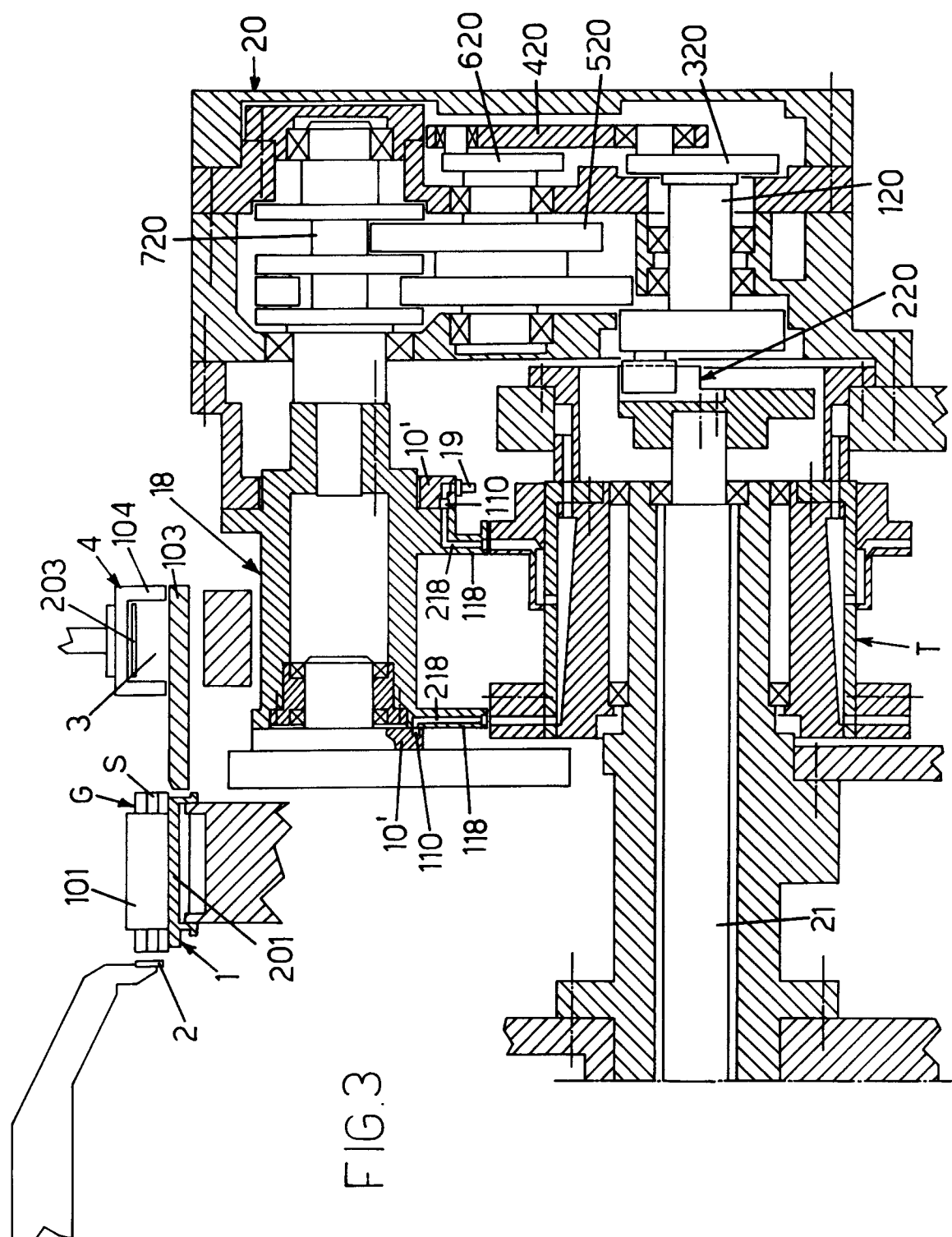
through rotating distributors or valves (10', 110).

21. Packing machine, particularly for cigarettes, or similar, wholly or partially as described, illustrated and for the purposes stated above.

FIG.1









European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 2647

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)
X Y	DE 15 11 585 A (FÖCKE & PFUHL) * page 3, line 24 - page 6, line 2; figures *	1-7 2,5, 8-10,12	B65B19/22 B65B11/30
X A	EP 0 519 402 A (G.D.) * column 4, line 35 - column 6, line 23; figures *	1,3,4,6, 7,11 13	
Y A	EP 0 614 811 A (SASIB) * column 3, line 18 - column 6, line 5; figures *	5,8-10, 12 1-3,7,15	
Y A	EP 0 553 636 A (TOKYO AUTOMATIC MACHINERY WORKS) * column 9, line 48 - column 13, line 7; figures 1,8,10 *	2 1,11	
A	GB 2 244 970 A (G.D.) * page 4, line 26 - page 10, line 9; figures *	1-3,15	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	GB 2 195 314 A (G.D.) * page 2, line 43 - page 3, line 46; figures *	4-6	B65B
A	US 4 358 920 A (LOTTE CO.)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 June 1997	Examiner Jagusiak, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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