(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 949 148 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.10.1999 Bulletin 1999/41

(51) Int. Cl.[6]: **B65B 43/18**, B65H 3/08, B65H 3/42

(21) Application number: **99106449.4**

(22) Date of filing: **29.03.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **09.04.1998 IT SV980022**

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(54) Device for feeding/singularizing of blanks, labels, or similar

(57) Device for feeding-singularizing of blanks, labels, or similar in particular in the cigarette packing machines, comprising:

- a feeder (1) of blanks (F) with a discharge end;
- a conveyor (2) of blanks with its input end connected to the discharge end of the feeder (1):
- pick up/transfer means (5, 6, 17) of a blank (F) and that pick up one blank at the time from the discharge end of the feeder (1) convey and deliver it to the input end of the conveyor (2).

According to the invention, the pick up/transfer means (5, 6, 17) have at least one pick up /transfer module (6) that is guided on a circular track between the position of pick up of the blank (F) from the discharge end of the feeder (1) of the blanks (F) and the position of delivery of the blank on the conveyor (2).

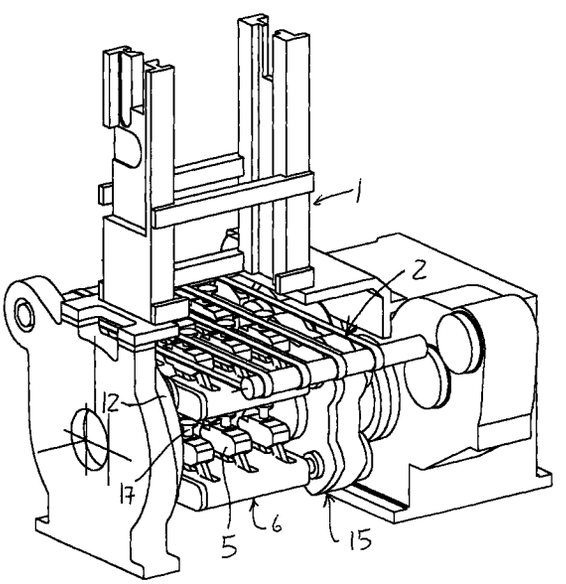

Fig. 18

EP 0 949 148 A1

Description

[0001] The invention relates to a device for feeding-singularizing of blanks, labels, or similar, in particular in the cigarette packing machines, comprising:

- a feeder of the blanks with a discharge end;
- a conveyor of the blanks with its input end connected to the discharge end of the feeder;
- pick up/transfer means of one blank at a time and that pick up one blank at a time from the discharge end of the feeder and transfers it delivering it at the input end of the conveyor.

[0002] At present devices of this type are known that typically comprise an oscillating arm, driven in a manner synchronized with the conveyor. The arm has at its end opposite to the one of the fulcrum pick up means that are constituted generally by surfaces o suction modules. The oscillatory motion is synchronized with the advancement of the conveyor that generally is formed by a band or bands type conveyor. In particular, the known configuration does not comprise a substantially vertical hopper for a stack of blanks and that has a discharge end in correspondence to the bottom side. The discharge end is provided overlapping the input end of the conveyor and the oscillating arm moves alternatively between the discharge end of the hopper and the input end of the conveyor.

[0003] As the output of the packing machines, in particular in the field of the tobacco industry, is constantly being increased, the rate of activation of the arm reaches considerable speeds, with the relative problems of inertia due to the constant accelerations and decelerations required to invert the motion.

[0004] Furthermore, at the moment of delivery of the blank on the conveyor, in order to guarantee an extremely precise position without straining the construction of the arm and of the parts activating the same it would appear advantageous to confer to the blank a motion of acceleration in direction of the conveyor that inserts it in the manufacturing cycle of the machine. This would permit to avoid too long stops of the conveyor and therefore again excessive accelerations and decelerations that weigh upon the construction and the dimensioning of the drive motor and the drive chains.

[0005] The invention has therefore the aim to make a device of the type described at the beginning, that thanks to a relative simple construction can prevent the troublesomeness of the known feeding/singularizing devices., ensuring the maximimum operational reliability and allowing to reachhigh working speeds without excessively weighing down the dimensioning of the drive kinematics and the drive motor.

[0006] The invention attains the above aims with a device of the type described at the beginning, in which:

the pick up/transfer means have at least one pick up/transfer module that is guided between the position of pick-up of the blank at the discharge end of the blank feeder and the position of delivery in a circular path of the blank on the conveyor.

[0007] According to a further feature at least one pick up/transfer module is provided in combination with means which vary at least the component of motion of the same in direction of advancement of the conveyor in such a mnner that upon depositing the blank on said conveyor , the pick up module and the blank it carries have the same speed in the direction of advancement of the conveyor itself.

[0008] Advantageously the variator means of the speed of the motion at least in one component of the motion are made in such a manner to eventually vary also the speed of one or both the motion components of the circular motion in order to ensure a stable relative positioning of the pick up/transfer means and of the feeder at least during the pick up phase of the blank from the said feeder.

[0009] In particular, the pick up/transfer assembly is formed by a support module that is guided on the circular track by conveying means with a constant speed of rotation, while the pick up/transfer head is mounted movable at least in direction of one of the two components of the circular motion, preferably according to both the components of the circular motion relative to the support module by variator means of the speed of advancement of the said head with regards to the associated support module.

[0010] One particularly advantageous configuration provides for the direction of pick up of the blanks from the feeder to be perpendicular or in any case transversal to the direction of advancement of the conveyor.

[0011] One form of execution of this configuration in particular, provides for a hopper for feeding the blanks vertically oriented and with a discharge opening at the bottom end, the said discharge opening overlaps at a certain distance the input or loading end of a band conveyor the direction of conveyance of which is horizontal, while the circular track of at least one pick up/transfer module has a vertical and a horizontal motion cvomponent and the axis of rotation is provided on the side of the track of conveyance of the conveyor opposite to the feed hopper.

[0012] Advantageously the pick up/transfer means have additional pick up/transfer modules that are distributed angularly equidistant along the circular track.

[0013] According to a further advangeous feature, the means that vary the speed components of the pick up/transfer heads of the individual pick up modules are connected to the modules themselves and move together with the same on the circular track.

[0014] A preferred form of execution, provides for the pick up/transfer module each of which is formed by a support module and of at least one pick up/transfer head that is articulated on the support module by

means of a set of levers, in order to form an articulated guadrilateral and the said levers are articulated to small shafts distanced from each other and which are freely supported turning in the support module and are provided along the sides of said support module transversally to the direction of advancement, on the front and the rear with regards to the direction of advancement, at least one of these articulated levers constitutes the drive lever of the articulated quadrilateral and is mounted turning together with its shaft that dynamically engages rotary wise with the rotary drive of the same that turn coaxially to the circular track of the pick up/transfer modules and that can be activated turning with a speed and/or direction of rotation different from the one of the pick up/transfer modules along their circular track.

[0015] In this manner, the differential rotation of the means driving the rotation of the shafts associated with the drive lever of the articulated quadrilaterals allows to give to the pick up/transfer head differental drive components both radially and tangentially with regards to the components of the motion along the circular track of advancement of the support modules. A suitable staggering of the speed of rotation of the activating means of the driven levers allows to substantially cancel the component of horizontal motion in the position of pick up of the blank from the bottom of the hopper. In this case, the tangential component substantially horizontal and in the direction of advancement is being cancelled by the backward motion of the pick up/transfer head due to the activation of the articulated quadrilateral, therefore the said head carries out substantially a movement parallel to the axis of the hopper or to the direction of discharge of the blank from the same. With regards to the position of delivery of the blank on the band conveyor two different options are psossible. In a first option the speed of the pick up/transfer modules along the circular track is regulated in such a manner, that the component of motion of the pick up/transfer heads in direction of advancement of the band is identical to the speed of advancement of the band without the requirement of an additional increase of the drive speed of said heads relative to the motion on the circular track of the support modules. An additional relative motion of the pick up/transfer head may be required in a variation. In this case the differential rotation of the means driving the articulated parallelograms involve apart from the vertical motion of nearing the blank to the band conveyor a positive or negative acceleration in the horizontal direction of advancement relative to the standard horizontal component of the circular motion of advancement of the pick up/transfer modules. The two components of motion add up between themselves making the speed of the pick up/transfer head identical to the one of the bands at the moment of transfer of the blank onto the band conveyor.

[0016] According to a further feature of the executive form, the pick up/transfer modules in form of an articulated parallelogram are supported by driving means along the circular track such, that the support module moves along the circular track keeping always one single orientation, in particular an horizontal orientation with reference to the plane containing the axis of the two shafts.

[0017] In this case providing two levers identical to each other also the pick up/transfer heads have always the same orientation, in particular an orientation parallel to the one of the support module as far as the axes of articulation of the pick up/transfer heads to the corresponding extremities of the two levers of articulation are concerned.

[0018] Such arrangement is advantasgeously obtained by driving means of the pick up/transfer modules formed by two discs with axes parallel to the shafts of articulation and drive associated with the support modules, one of the two shafts being supported turning freely only in one disc, while the other shaft is supported turning freely only in the other disc and as the two discs are parallel to each other, but with axes staggered to each other in a dimension corresponding to the distance between the shafts connected to the support module of the pick up/transfer modules at least one of these discs is rotary driven, while the other is idle.

[0019] When the orientation of the plane containing the two shafts must be horizontal, then the staggering of the axes of the two drive discs is provided only in te horizontal direction.

[0020] According to a further feature, the supporting module has a lengthh in the axial direction of the discs that is substantially corresponding to the dimensions of the blank in said direction, while each support module carries two, three or more pick up/transfer heads identical to each other and placed side by side at a certain distance from each other, the said pick up/transfer heads are each articulated with their own articulating levers to the same shafts of articulation and drive connected to the the support module and that have a corresponding axial extension.

[0021] The band conveyors has advantageously a pair of bands designed to engage with the end areas of the blanks, forming a free zone for the passage of one or more of the pick up /transfer heads, while the two bands have top teeth or ribs that form front and rear stops with the corresponding edges of the blank.

[0022] In combinations with the two toothed conveyor bands, the band conveyor can have in position of noninterference with the free passage of the pick up/transfer heads one or a pair or more aditional retaining bands parallel to each other and to the toothed conveyor bands which are aditionally under suction, in order to hold the blanks effectively in the position of engagement between the front and rear stop teeth of the bands during advancement on the same.

[0023] Each pick up/transfer head is under suction, the connecting conduits to the source of vacuum passing through the free shaft associated with the support

module and that extends itself into a circular distributor, while subsequently it is made to pass through the support module in the drive shaft and through the same into the drive levers rotary integral with this latter, while the conduits made in the drive levers open into a plenum chamber in the corresponding pick up/transfer head from which the vacuum is distributed to the suction nozzle or nozzles or to the suction cup or caps.

[0024] In particular each pick up/transfer head has a body to which the levers are articulated and that carries at least one or more suction cups or suction nozzles.

[0025] To further the separation of the last blank from the stack in the hopper and that is in correspondence to the exit of the same, a narrowing of the hopper is provided in such a manner that the last blank takes up an arched position, separating itself in the middle from the once above.

[0026] Said narrowings are preferably provided on the sides of the hopper mouth which are transversally to the direction of advancement of the band conveyor.

[0027] Furthermore in combination with this feature or separately, the suction pad or pads can have means of motion that determine a sliding in the axial direction of the hopper with a very rapid stroke and that takes place relative to the body of the pick up/transfer head.

[0028] Advantageously, the end conduit of connection to the source of vacuum is made in shape of a cylindrical chamber and houses within in a sealed sliding manner and against the action of a spring part pushing the supporting rod of the suction cup outwards which is itself also cylindrical.

[0029] Therefore, when the suction cup comes into contact with the blank, the suction is no longer free through it and can act against the action of the sprimg part in the sense of recalling the rod of the suction cup to its innermost postion. The suction cup is therefore made to sharply move away for a certain dimension limited by the exit of the hopper, as the stroke is commensurate in a manner sufficient to free the blank from the tightening at the exit of the hopper itself.

[0030] The advantages of the present invention are clearly evidenced by the above description and cleary consist in the fact that it allows for high feeding rates of the blanks without requiring excessive torque loads for the fast acceleration and deceleration of the pick up/transfer means of the blanks. In fact, while the transfer/pick up modules move in their whole with a rotary motion sybstantially uniform and constant, the periods of rest or acceleration are obtained imposing differential motions only on the pick up/transfer heads and therefore to modules with lower inertial mass and above all limiting the differences in speed at which they must be accelerated and decelerated every time the operative heads, thanks to the fact that one operates during the addition up or detraction of the differential components of motion.

[0031] The device according to the invention allows furthermore to work with a plurality of pick up/transfer modules that succeed each other in a continuous manner and which allow to to reduce the speed of movement od siad modules on the circular path. This allows for the reduction of the speed of advancement of the pick up/transfer modules on the circular track to such levels as to minimize the differences in speed to be applied to the pick up/transfer heads to obtain the desired behaviour of motion and to avoid excessive driving speeds of the pick up modules.

[0032] The invention has further perfectionings that are subject of the claims below.

[0033] The features of the invention and the advantages derived therefrom are better evidenced in the following description of a nonlimirting executive example illustrated in the attached drawings, in where:

The Fig. 1 shows a plan view from above partially in cross section of the device according to the invention.

The Fig.s 2 and 3 illustrate two enlarged areas of Fig. 1.

The Fig.s 4 to 9 illustrate schematically the pick up and transfer cycles of the blank with the device according to the preceding Fig.s.

The Fig.s 10 and 11, show two enlarged details similar to the Fig.s 4 to 9 with the pick up/transfer modules in two cycles of pick up of the blank at the discharge end of the hopper.

The Fig.s 12 to 17 illustrate different views in cross section of a pick up/transfer module.

The Fig. 15 is a perspective view of the device according to the preceding figures.

[0034] A device feeding sungularizing of blanks, labels or similar, comprising a hopper 1 substantially vertical and for a stack of blanks. The hopper 1 has a bottom end for discharging the blanks F and is oriented with at least one axis of the blanks transversal to the direction of advancement F of a band conveyor 2. In correspondence to two opposite side and transversal or substantially transversal to the direction of advancement A of the conveyor 2, the hopper 1 has a tightening wall 101. 201. The two walls are inclined and converging. As evidenced in the Fig.s 10 and 11, this causes a blank F or some to form an arch in a convex manner in direction of discharge separating in the middle area from the blanks above. By appropriately adjusting the length of the converging sections and/or their inclination one can also obtain the effect of a progressive arching of the blanks bit by bit as their position in the stack approaches the discharge opening of the hopper 1.

[0035] The band conveyor 2 is arranged directly below the discharge opening of the hopper 1 and and with the conveying branch which apart from the arching for destacking is parallel to the face of the blanks F. The band conveyor 2 is constituted by a first pair of bands 102 which are parallel to each other and are provided in the area of the lateral ends of the hopper 1 in order to

cooperate only with the opposite end sections of the blanks. The two bands 102 are wound around standard drive pulleys and are moved together in a synchronized manner. The two bands 102 have at distances corresponding substantially to the dimensions of the area of the blank intended to rest on the same sets of teeth 202 as front and rear stops for the blanks F respectively, with reference to the direction of advancement A of the band conveyor 2. In this way, the band conveyor 2 has seatings for housing the blanks F that ensure the correct preset positioning relative to each other of the individual blanks F of the sequence on the band conveyor 2 itself. An additional pair of bands 302 themselves also wound around the same rollers of the toothed bands 102 are provided in the middle section. The second pair of bands is under suction and has the function of holding the blanks adhering to the conveyor exerting a force perpendicular to the plane of conveyance. All the conveyor bands 102, 302 are parallel and move together and are laterally distance from each other in such a way to leave, in this case, three free intermediate passageways which allow for the passage like a comb of the pick up/transfer heads 5 of the the pick up/transfer modules 6 that have the function to pick up in sequence a blank in correspondence of the discharge opening of the hopper 1 and deposit it in the seating between the teeth 202 of the bands 102 of the conveyor band 2.

[0036] A pluraility of pick up/transfer modules is provided directly under the band conveyor 2 and the discharge opening of the hopper 1.

[0037] In particular the said pick up/transfer modules 6 are guided along a circular track the axis of which is perpendicular to the direction of advancement A and parallel to the axis of the hopper transversal to said direction of advancement, in such a way as to carry the pick up/transfer heads 5 along a circular track that is tangential or substantially tangential to the face of the blank F at the discharge end of the hopper 1 itself.

[0038] Each pick up/transfer module 6 has a support module 106 which houses the shafts7, 8 parallel to each other and to the axis of the circular track of the pick up/transfer modules 6. The support module or support has in a position centred with the passageways between the bands 102, 302 of the band conveyor 2 openings 206 through which the levers 9, 19 of articulation of a corresponding pick up/transfer head 6 that is hinged at the free end of the levers 9, 10 are connected to the shafts 7, 8. The two levers 9, 10 have axes of articulation at equal distance from each other and so does also the support module 106 and the pick up head 5, in such a manner that each pick up/transfer head 5 forms a branch of an articulated quadrilateral. To each support module 106 of each pick up/transfer module 6 are therefore connected three pick up/transfer heads 5 each being part of an articulated quadrilateral and each of which has a suction pad 11 oriented towards the face of the blank F on the discharge opening of the hopper 1.

[0039] One shaft 7 is supported in a manner to rotate freely around its axis only in correspondence of one of its ends, thanks to an extension beyond the corresponding axial end side of the support module 106 of each pick up/transfer module 6. The shaft 7 protudes beyond the opposite face of the disc 12 and has a gear 13 that engages with a gear wheel 14 coaxial with the disc 12. The other shaft 8 provided at a certain distance from the first is supported only in correspondence of its end opposite to the one of support of the first driven shaft 7 in a freely rotating manner in a second disc 15 that is parallel to the first and is connected to the other axial end side of the support module 106. Also the shaft 8 extends itself beyond the corresponding end side of the support module 106 and beyond the opposite face of the associated disc 15. The two discs 12 and 15 are parallel to each other and their axes are staggered in a direction parallel to the one of advancement A, that is in a horizontal direction in a measure corresponding to the distance between the shafts 7 and 8 that form the articulated parallelogram supporting the pick up/transfer heads 5.

[0040] While the shaft 7 driven by the central gear 14 must extend itself over the entire length of the support module 106 or at least in correspondence to all the pick up/transfer heads 5, it is not necessary that the shaft 8 be made as a piece. In particular at the corresponding end associated with the support module 106 a hub 8 can be connected that protrudes from the end itself, while in the area of each opening 206 of the support module 106 it is possible to provide fulcrum pins coaxial to each other and to the hub 8.

[0041] The extension of the support or the hub 8 have a coaxial central whole that opens on the side of the end protruding beyond the disc 15 and connects thanks to a sliding seal with slots that have a circular cross section 116 of an anular distribution flange that connects to a vacuum source.

[0042] The conduit 108 in the hub 8 connects with a coaxial chamber 107 in the driven shaft 7 thanks to a conduit of distribution in the support module 106 that opens into a chamber in correspondence of the end side of the driven shaft 7 inside the support module , the seal being ensured also in this case thanks to a sliding seal.

[0043] The arms 9 are clamped 109 in manner to rotate with the same in the shaft 7 and have axial conduits that open in correspondence of radial exit wholes 207 of the shaft 7. The opposite end of the driven arms 9 is clamped on revolving pins 105 supported at the corresponding end of the body 205 of the associated pick up/transfer head 5 the revolving pins 105 have an axial conduit 305 that opens into a distribution chamber 405 in the body 205 of the pick up/transfer head 5 from which departs a conduit 505 that opens into a cylindrical chamber 605 whose axis is perpendicular to the stack of blanks, or substantially parallel to the axis of the hopper 1. In the chamber 605 is housed in a sealed and axially sliding manner the hollow rod 117 of the suction

cups 17. A spring part, for instance a coil spring 18 is placed between the bottom of the chamber 605 and an anular shoulder 217 of the rod 117 of the suction cup 17. Preferably the coil spring 18 is of a diameter smaller than the internal diameter of the hollw rod 117 of the suction cup 117 inserts itself inside the same abutting against an internal shoulder 217 preferably at the end section connecting to the suction cup itself.

[0044] The lever 10 is articulated on the shaft or on the pins 8 in a freely turning manner and with the other end in a manner freely turning around pins of articulation 805 provided on the extremity of the body 205 of the pick up/transfer head 5 opposite to the one of articulation of the driven lever 9.

[0045] With particular reference to the Fig.s 1 to 3, the drive motion of the pick up/transfer module 6 drive along the circular track and the drive motion of the shafts 7 is take from the same power takeoff 20. The main shaft 21 drives thanks to the gears 22 and 23 the input shaft 124 of an intermediate drive link 24 the output shaft 224 of which extends itself as a drive shaft of the gear 14 driving the shafts 7. The disc 12 is rotary integral with a hollow shaft 25 inserted in a manner rotating relative to the same, coaxially on the shaft 224 and that is driven by the main shaft 21 thanks to the gears 26, 27, 28. The Fig.s 1 and 2 show a plan lay out of the kinematic chains. In particular as the kinematic drive chain of the disc 12 is provided with the gear 27 in a position under the input shaft 124 of the intermediate drive link 24, the kinematic chain connected to the disc 12 would appear to be interrupted. The plan layout evidences the fact that part of the gear 27 is repeated in the position of engagement with the gear 28 integral with the hollow shaft 25.

[0046] The Fig.s 1 to 3 evidence further the fact that only the disc 12 is driven rotary wise, while the disc 15 idles and is pulled by the support modules 106 of the pick up/transfer modules 6.

[0047] A further feature consists in the fact that the disc 12 is made in shape of a box closed to the outside and inside which the gears of the driven shafts 7 and the central gear 14 are housed. The operation of the device according to the invention becomes evident from the Fig.s 4 to 9.

[0048] Each pick up/transfer module 6 is carried in sequence to the pickup postion of the blank F respectively in correspondence of the discharge opening of the hopper 1, as said modules 6 are being moved with a uniform motion along the circular track and in direction of the arrow of advancement P. Thanks to the intermediate drive link 24 the gear 14 that is coaxial to the rotary driven disc 12 can assume speeds and/or directions of rotation different from those of the disc 12. Such variations in speed and direction of rotation are selected in such a manner, that each pick up/transfer module 6 reaches the position of pick up of the blank with the suction pads in contact with face of the central section of the blank, with the pick up/transfer heads that precede the associated support module 106 (Fig. 4). The differential rotation of the gear 14 allows the component of advancement of the pick up/transfer heads 5 in the tangential direction to be cancelled that is in the direction parallel to the face of the blank, that is in direction of advancement of the band conveyor 2. The pick up/transfer heads 5 consequently carry out relative to the blank in the hopper 1 only one motion substantially perpendicular to this, or in direction of the axis of the hopper.

[0049] During this phase, as is shown in the Fig.s 16 and 17, as the blank comes into contact with the suction cup 17, this one carries out the motion of release back towards the body 205 of the pick up/transfer head 5, easing the separation of the blank from the discharge opening of the hopper 1 together with the motion of the pick up head 5 given by the differential rotation of the gear 14. Upon separation of the blank from the mouth of the hopper 1, the pick up/transfer heads have not yet reached their maximum position of retraction with regards to the support module106 (Fi.g 6). The subsequent motion of advance of the support module 106 along the circular track, while the gear 14 takes up a speed of rotation substantially corresponding to the one of the disc 12, after having reached the maximum position of retraction of the pick up/transfer heads 5, allows the descent of the pick up/transfer heads 5 towards the band conveyor with a direction and a speed such as to converge towards the same (Fig. 8), with the blank substantially aligned with the set of teeth 202 as the component of the motion is parallel to the band conveyor itself at the moment (Fig. 9) the blank F is deposited on the conveyor. Before the subsequent picker/transfer module 6 reaches the pick up position, the gear 14 is rotated in such a manner as to return the pick up/transfer heads 5 again into the advanced position relative to the support modules 106, resetting to the conditions shown in Fig. 4.

[0050] Obviously what described is only one of the forms of operation of the device according to the invention that within the limits permitted by the structure can have also other forms of operation. In this form, in fact, the pick up/transfer modules 6 move on the circular track whith a speed such, that in the position of depositing the label on the conveyor band the component of motion of the same parallel to the direction of advancement of the conveyor 2 is equal to the speed of advancement of the same. Therefore in this condition the modules 6 and in particular the heads 5 do not carry out any differential motion relative to the motion of the disc 12.

[0051] This obviously simplifies the operation. Nethertheless with the device according to the invention it is possible to provide a phase of agreement of the speed analogous to the one at the point of pick up of the blank also at the phase of deposit.

[0052] Naturally, the invention is not limited to the executive forms described above and illustrated but can be amply varied above all constructively without for this

abbandoning the informative principle described above and claimed hereafter.

Claims

1. Feeding-singularizing device of blanks, labels, or similar, in particular in the cigarette packing machines, comprising:

   - a feeder (1) of blanks (F) with a discharge end:
   - a conveyor (2) of the blanks with the input end connected to the discharge end of the feeder (1);
   - pick up/transfer means (5, 6, 17) of a blank (F) and that pick up one blank at the time at the discharge end of the feeder (1) and convey it depositing it at the input end of the conveyor (2);

   characterized by the fact that

   - the picuper/transfer means (5, 6, 17) have at least one pick up/transfer module (5) that is guided on a circular track between the position of pick up of the blank (F) at the discharge end of the feeder (1) of the blanks (F) and the position of depositing the blankon the conveyor (2).

2. Device according to the claim 1, characterized by the fact that at least one pick upt/transfer module (5, 6, 17) is provided in combination with means (7, 8, 9, 10, 12, 13, 14, 24) that vary at least the component of motion of the same in direction of advancement (A) of the conveyor (2) in such a manner that at the moment of depositing the blank (F) on the said conveyor (2), the pick up/transfer module (5, 6, 17) and the blank (F) carried by the same have the same speed in direction of advancement of the conveyor (2) itself.

3. Device according to the claims 1 and 2, characterized by the fact that the variator means (7, 8, 9, 10, 12, 13, 14, 24) of the speed according to at least one component of motion are made in such a way as to eventually vary also the speed of one or both the components of the circular motion in order to ensure a constant relative positioning of the pick up/transfer modules (6) and of the feeder (1) at least during the pick up cycle pf the blank (F) from the said feeder (1).

4. Device according to one or more of the preceding claims, characterized by the fact the the pick up/transfer module (6) is formed by a support module (106) that is guided along the circular track (P) by conveyor means (12, 15) eventually with a constant speed of rotation, while a pick up/transfer head 5 is provided that is fitted movable at least according to one of the two components of the circular motion, preferably according to both components of the circular motion relative to the support module (106) by variator means (7, 8, 9, 10, 12, 13, 14, 24) of the speed of advancement of the said head with regards to the associated support module (106).

5. Device according to one or more of the preceding claims, characterized by the fact that the direction of pick up of the blanks (F) from the feeder (1) is perpendicular or in any case transversal to the direction of advancement (A) of the conveyor (2).

6. Device according to one or more of the preceding claims, characterized by the fact that it has a feed hopper (1) of the blanks (F) oriented vertically and with a discharge opening on the bottom side, the said discharge opening overlaps at a certain distance from the input or loading end of a band conveyor (2) the direction of conveyance (A) of which is horizontal, while the circular track (P) of at least one pick up/transfer module (6) has a vertical motion component and a horizontal one and the axis of rotation is provided on the side of the track of conveyance of the conveyor (2), opposite to the feed hopper (1).

7. Device according to one or more of the preceding claims, characterized by the fact the the pick up/transfer means have more pick up/transfer modules (6) which are distributed angularly equidistant along the circular track (P).

8. Device according to one or more of the preceding claims, characterized by the fact that the means (7, 8, 9, 10, 13) that vary (7, 8, 9, 10, 13) the components of motion of the pick up/transfer head or heads (5) of the individual pick up modules (6) are connected to the modules (6) themselves and move together with the same on the circular track (P).

9. Device according to one or more of the preceding claims, characterized by the fact that pick up/transfer modules (6) are provided each of which is constituted by a support module (106) and at least one pick up/transfer head (5), preferably more pick up heads side by side to each other and the said head or heads (5) are articulated on the support module (106) by means of a pair of levers (9, 10), in order to form an articulated quadrilateral and the said arms a fulcrated on shafts (7, 8) distanced between each other and that are supported turning freely in the support module (106) and are provided along the sides of the said support module (106) transversal to the direction of advancement (A), on the front and back respectively with reference to the direction of advancement (A) istelf, at least one of those levers (7) constituting the drive lever of the articulated quadrilateral and is fitted revolving together

with its own shaft (7) that engages rotary wise dynamically (13) with the rotary drive means (14) of the same that rotate coaxially to the circular track (P) of the pick up/transfer modules (6) and that are rotary driven with speed and/or direction of rotation different from the one of the pick up/transfer modules (6) along the circular track (P).

10. Device according to one or more of the preceding claims, characterized by the fact that the differential rotation of the rotary drive means of the shafts (7) connected to the drive levers (9) of the articulated quadrilaterals are such, that the pick up/transfer heads (5) move according to differential components of motion both radially as well as transversally relative to the circular track of advancement (P) of the support modules, in order to substantially cancel the components of rotary motion in the pick up postion of the blank from the bottom of the hopper.

11. Device according to the claim 10, chracterized by the fact that the tangential components substantially horizontal and in the direction of advancement (A) of the band conveyor (A) is cancelled by the move backwards of the pick up/transfer head (5) due to the activation of the articulated parallelogram, while as a resulting motion the said head (5) carries out substantially a motion parallel to the axis of the hopper or to the direction of unloading the blank from the same.

12. Device according to one or more of the preceding claims, characterized by the fact that the variator means of the motion are inactive or substantially inactive in the position of deposit of the blank (F) on the band conveyor (2), as the motion of the pick up/transfer modules (6) on the circular track is carried out at a speed such, that the pick up/transfer heads (5) have a speed component of motion in direction of advancement (A) of the conveyor band (2) that is equal to the speed of advancement of the said band conveyor (2).

13. Device according to one or more of the preceding claims, characterized by the fact that the differential rotation of the drive means (14) of the articulated parallelogram that forms each pick up/transfer module (6) relative to the motion on the circular track of the modules (6) themselves is such, that in addition to the vertical movement bringing the blank (f) closer to the band conveyor (2) an acceleration is imparted to the blank (F) on the pick up/transfer head (5) relative to the standard horizontal component of the circular motion of advancement of the pick up/transfer modules (6) that adds to the latter becoming the speed of the pick up/transfer head identical to the one of the conveyor bands (2) at least at the moment of depositing the blank (F) on the band conveyor (2).

14. Device according to one or more of the preceding claims, characterized by the fact that the pick up /transfer modules (6) in form of an articulated parallelogram are carried on driving means (12, 15) along the circular track such, that the support module (106) moves along the circular track always keeping a single orientation, in particular a horizontal orientation or in any case substantially parallel to the blank on the discharge opening of the hopper (1) and with reference to the plane containing the axis of the two shafts (7, 8).

15. Device according to one or more of the preceding claims, characterized by the fact that also the pick up/transfer heads (5) have always the same orientation, in particular an orientation parallel to the one of the support module (106) with regards to the axes of articulation (105, 805) of the pick up/transfer heads (5) to the corresponding ends of the two arms of articulation (9, 10).

16. Device according to one or more of the preceding claims, characterized by the fact that the drive means of the pick up/transfer modules (6) are formed by two discs (12, 15) with axes parallel to the shafts of articulation and drive (7, 8) connected to the support modules (106), one of the two shafts (7) being supported rotating freely only in one disc (12), while the other shaft (8) is supported rotating freely only in the other disc (15) and discs (12, 15) being parallel to each other, but with axes staggered between each other in a dimension correspoinding to the distance between the shafts (7, 8) connected to the support module (106) of the pick up/transfer modules (6) at least one of these discs being rotary driven while the other rotates idle.

17. Device according to the claim 16, characterized by the fact that the plane containing the two shafts (7, 8) of articulation of the support module (106) is horizontal and the staggering of the axes of the two drive discs (12, 15) is provided only in the horizontal direction.

18. Device according to one or more of the preceding claims, characterized by the fact that the support module (106) has a length in the axial direction of the discs (12, 15) that is substantially corresponding to the dimension of the blank (F) in the said direction, while each support module (106) has two, three or more pick up/transfer heads (5) identical to each other, the said pick up/transfer heads (5) are articulated each with their own levers of articulation (9, 10) on the same shafts of articulation and drive (7, 8) connected to the support module (106) and

that have a corresponding axial extension.

19. Device according to one or more of the preceding claims characterized by the fact that the band conveyor (2) has at least one pair of bands (102) intended to engage with the end areas of the blanks (F) and that from a free zone or passageway between themselves for the passage of the pick up/transfer heads (5), while the two bands (102) have teeth or ribs (202) that form front and rear stops with the corresponding edges of the blank (F) and between which each blank (F) is placed.

20. Device according to one or more of the preceding claims , characterized by the fact that in combination with the two toothed conveyor bands (102, 202), the conveyor band (2) has in position of non interferance with the free passage of the pick up/transfer heads (5) one or a pair or more additional holding bands (302) parallel to each other and to the toothed conveyor bands (102, 202) and that are under suction.

21. Device according to one or more of the preceding claims, characterized by the fact that each pick up/transfer head (5) is under vacuum , as the conduits connecting it to the vacuum source are made to pass through the end section of the idle shaft (8) of the support module and that extends itself into a distributor in form of circular sections (16, 116), while subsequently it is conducted through the support module (106) through the drive levers (9) rotary integral with the latter, while the conduits made in the drive levers open through the pins of articulation (105) into the body (205) of the pick up/transfer heads (5) that connect to the suction nozzle or nozzles or to the suction cup or cups (17).

22. Device according to one or more of the preceding claims, characterized by the fact that each pick up/transfer head (5) has a body (205) on which the levers are articulated and that carries at least one or more suction cups or nozzles (17), each of these nozzles or suction cups is connected to means releasing the motion in direction of separation of the blank (F) from the hopper (1).

23. Device according to one or more of the preceding claims, characterized by the fact that the end conduit of connection to the vacuum source in the body of the pick up/transfer heads (5) is made in shape of a cylinder (605) and houses inside in a sealed sliding manner against the action of a spring (18) pushing towards the outside, the support rod (117) of a suction cup (17) that is itself also cylindrical and hollow.

24. Device according to one or more of the preceding claims, characterized by the fact that in order to assist the separation of the last blank (F) from the stack in the hopper (1) and that is located at the discharge of the same, it is foreseen for the hopper (1) to have a narrowing (101, 201) such, that the last blank assumes an arched position, separating itself in the center from those above.

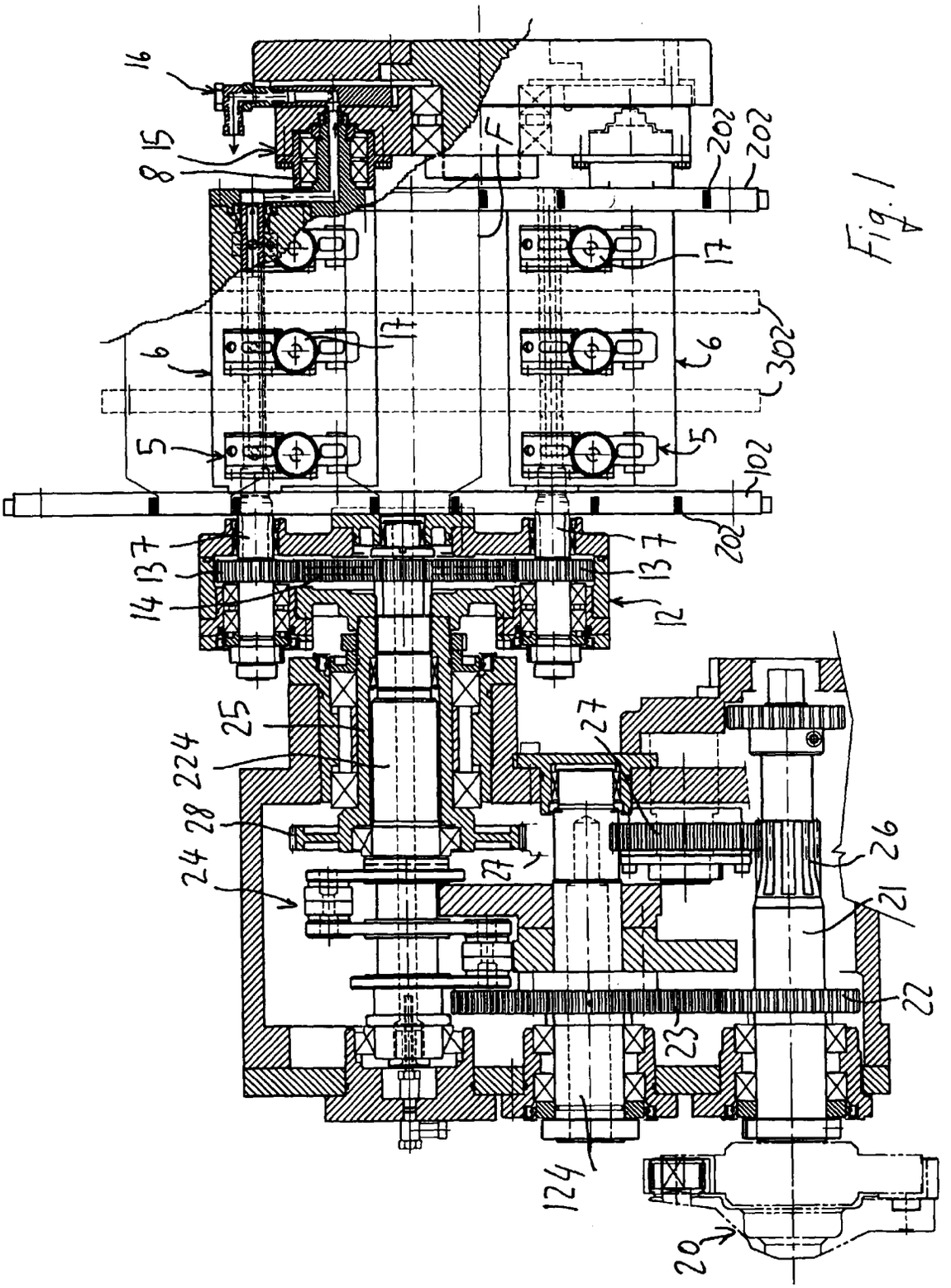
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Fig. 1

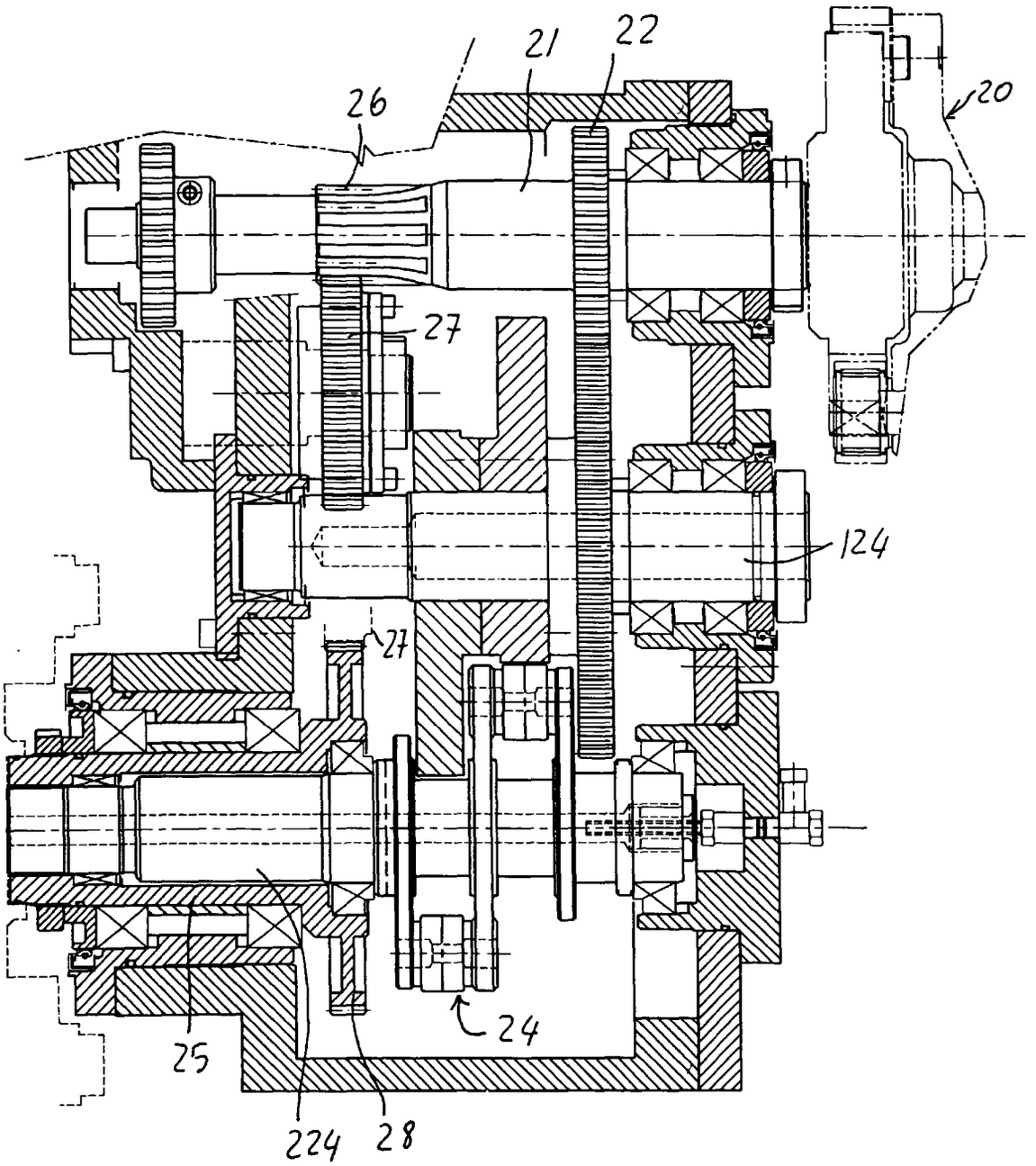
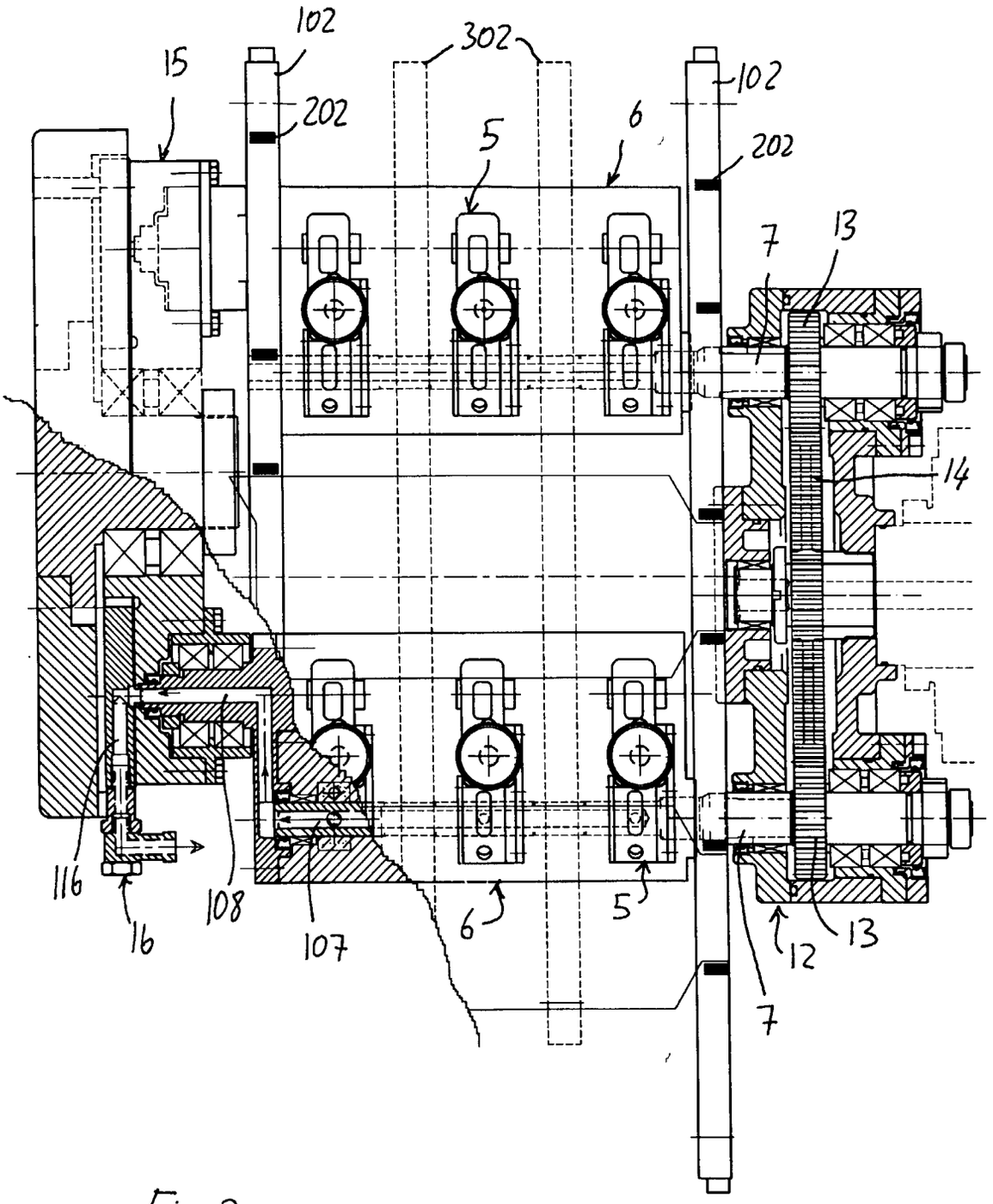


Fig. 2



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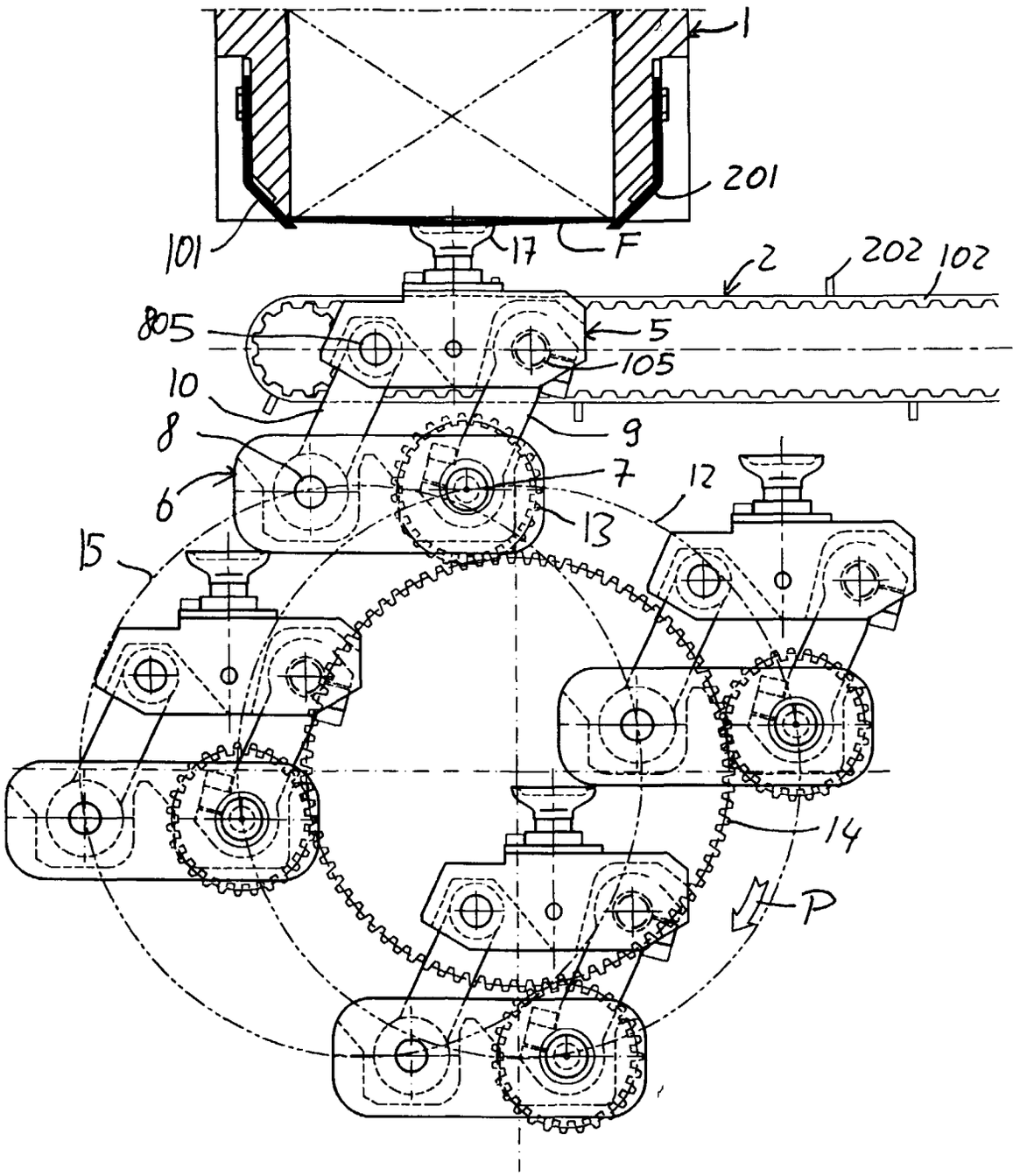
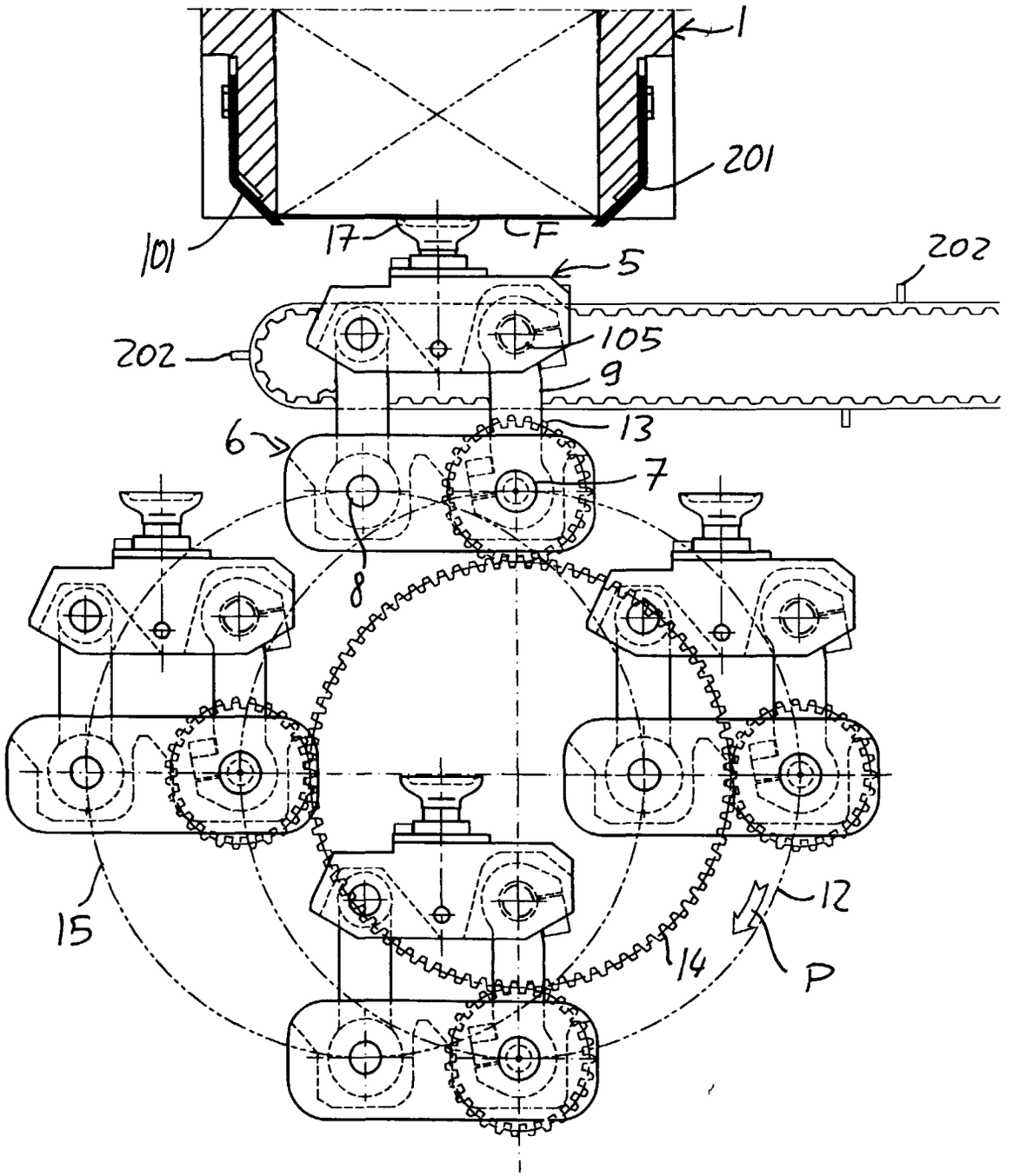


Fig. 4



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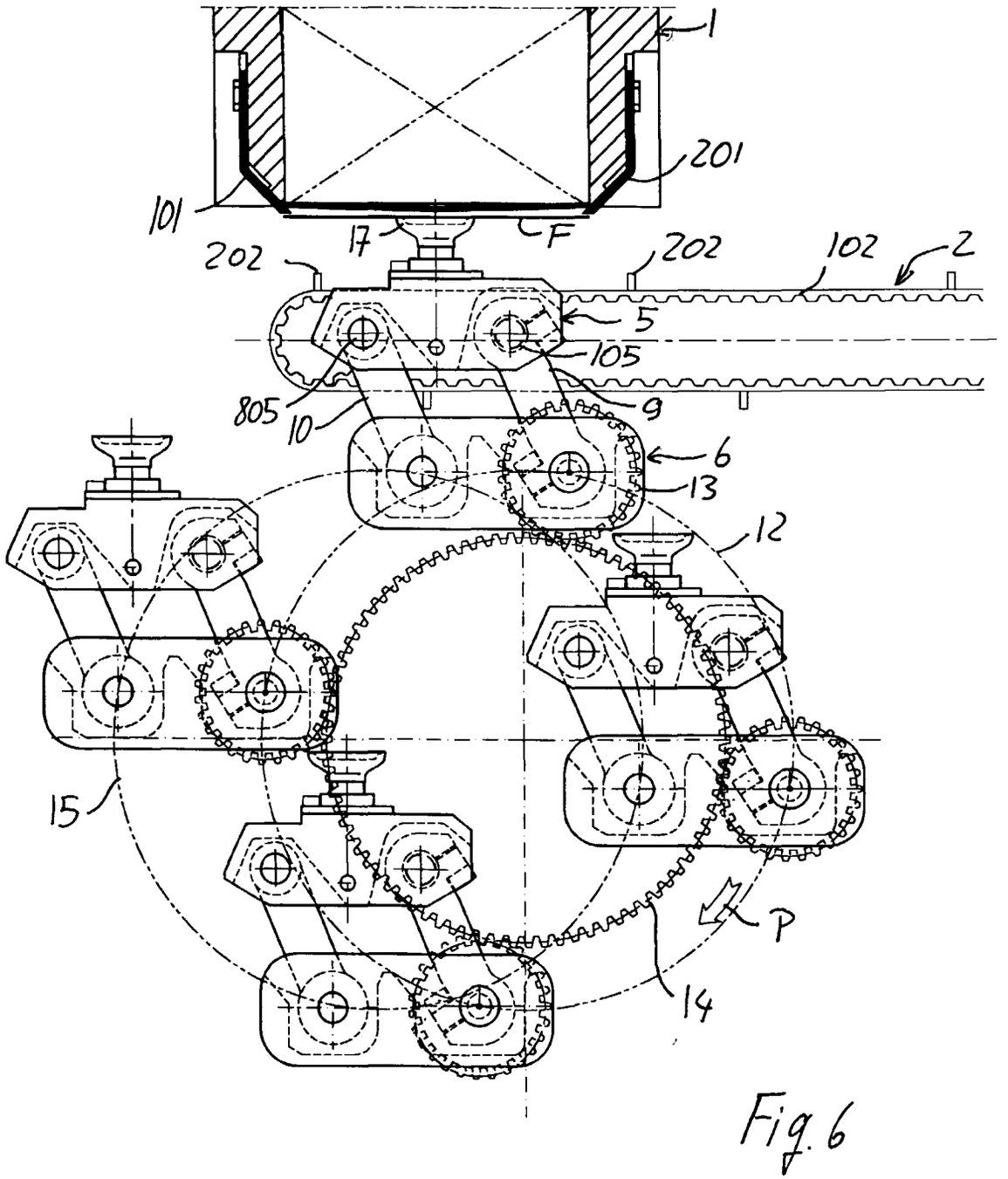

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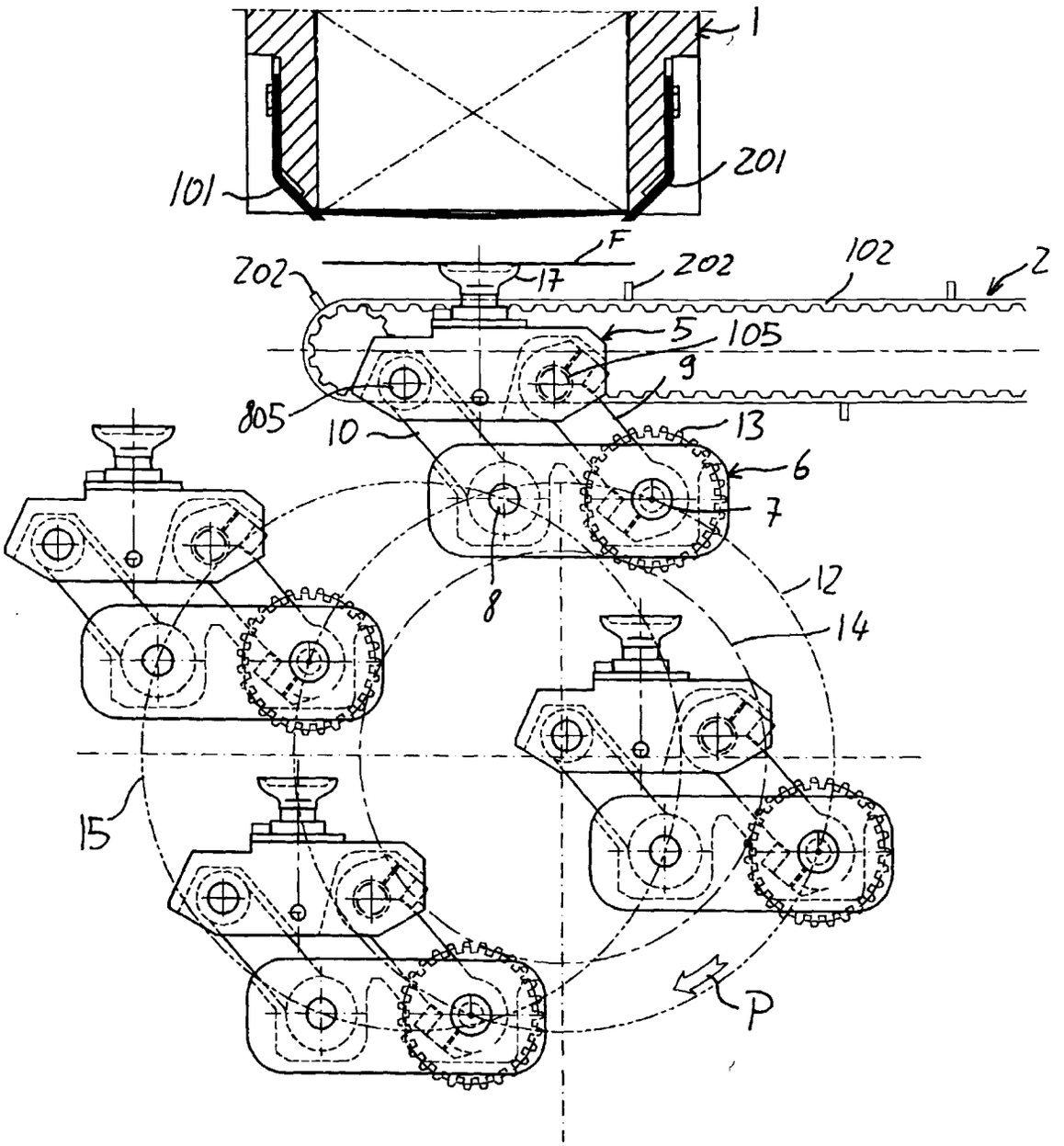

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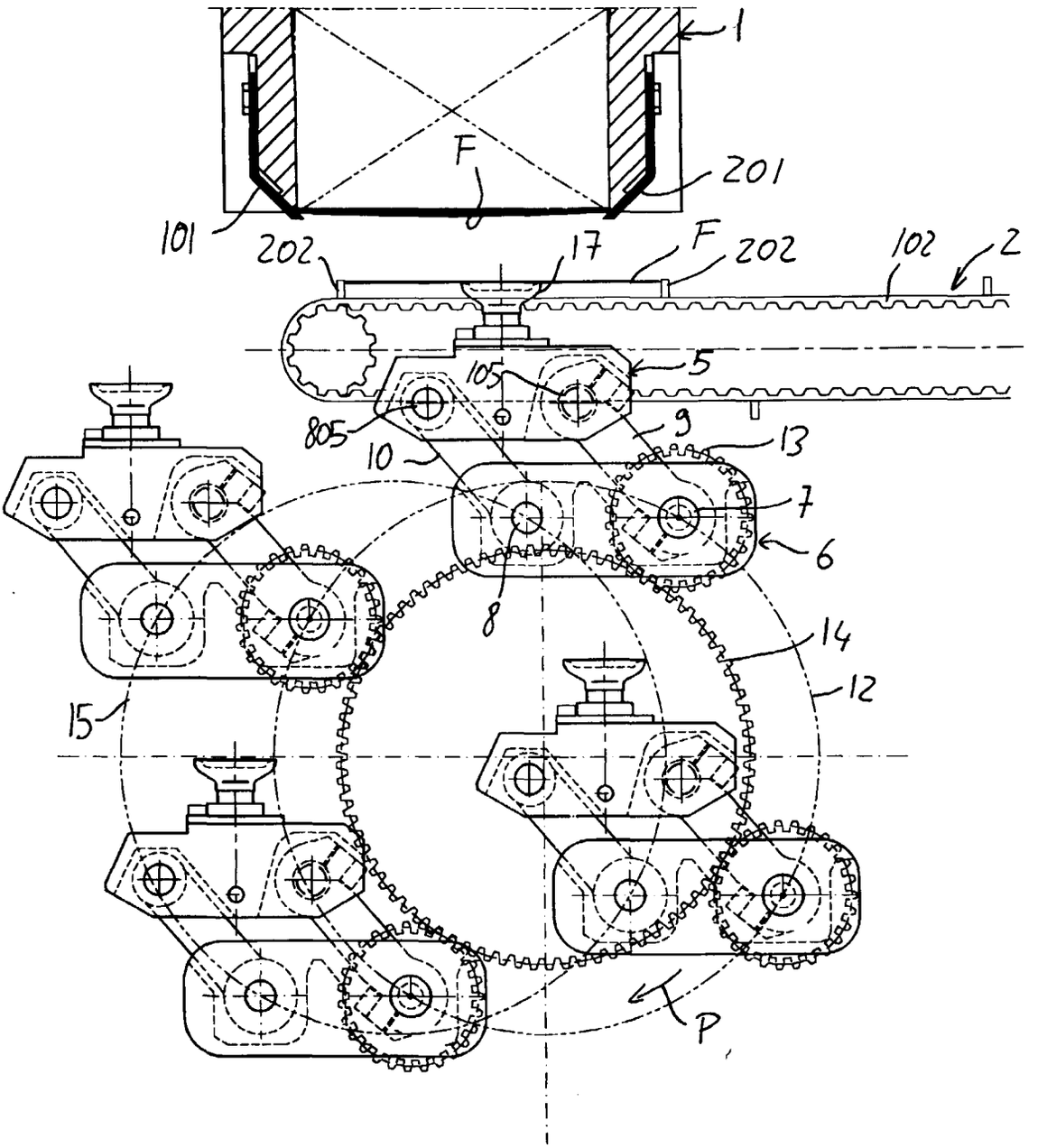

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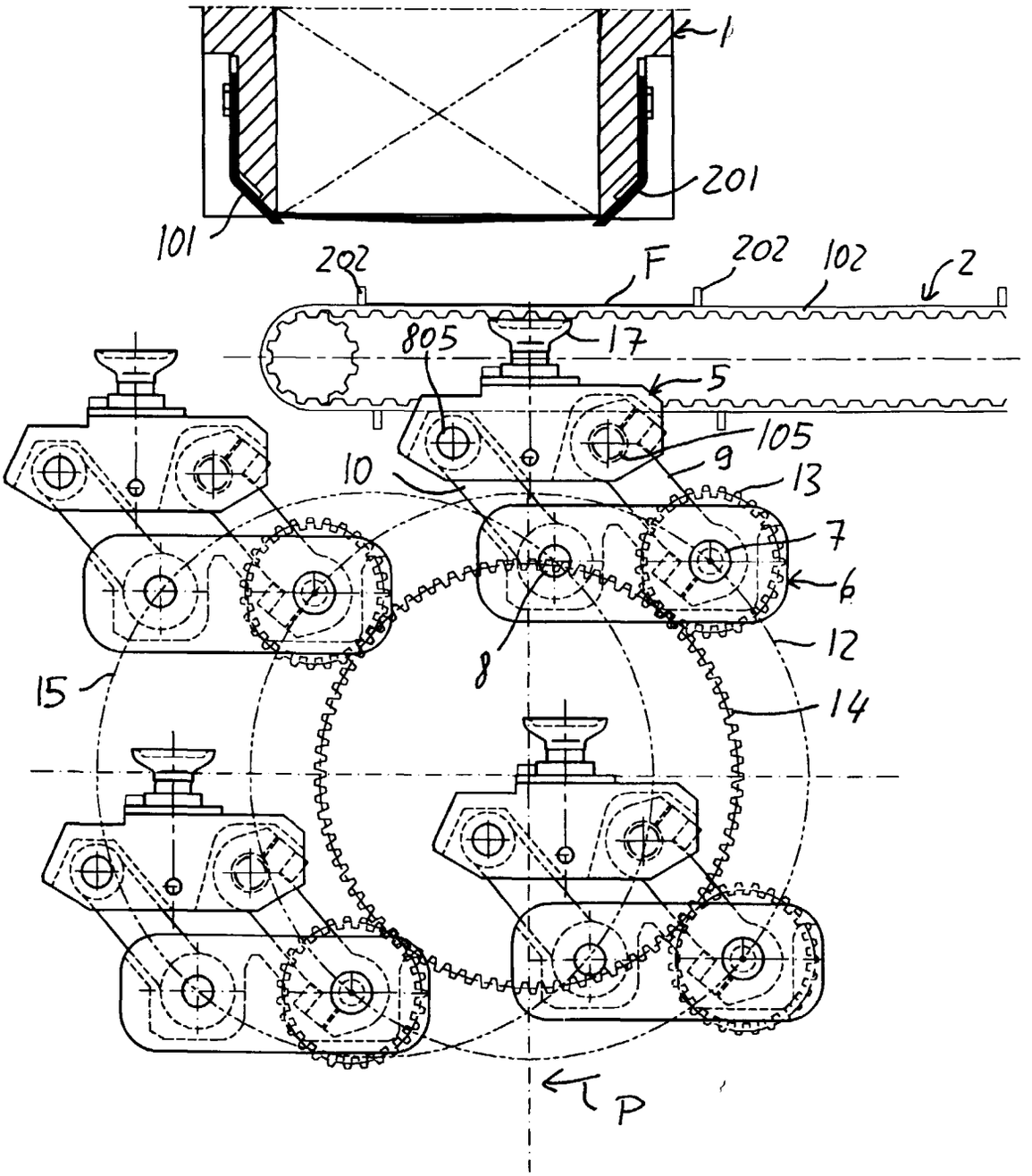

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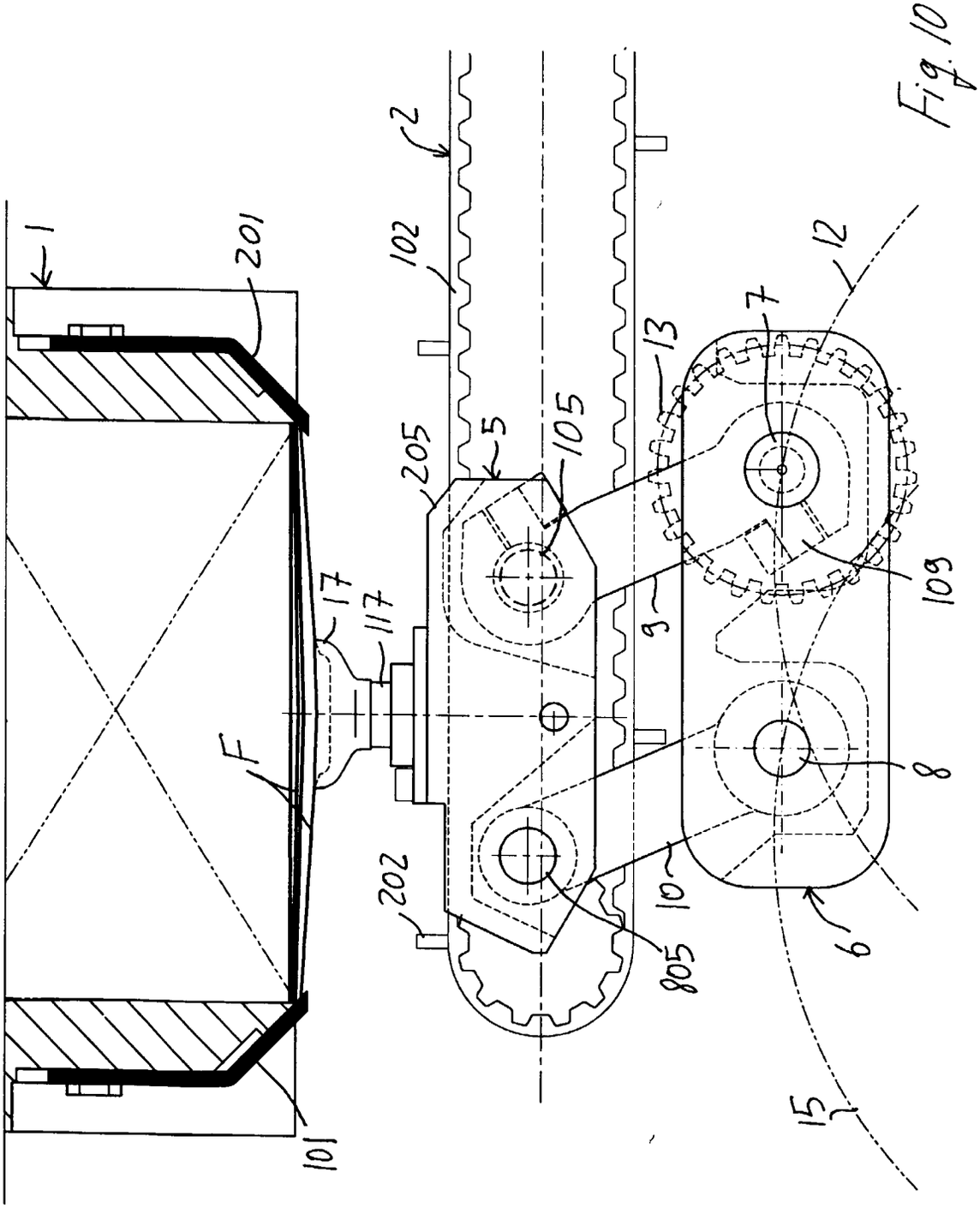
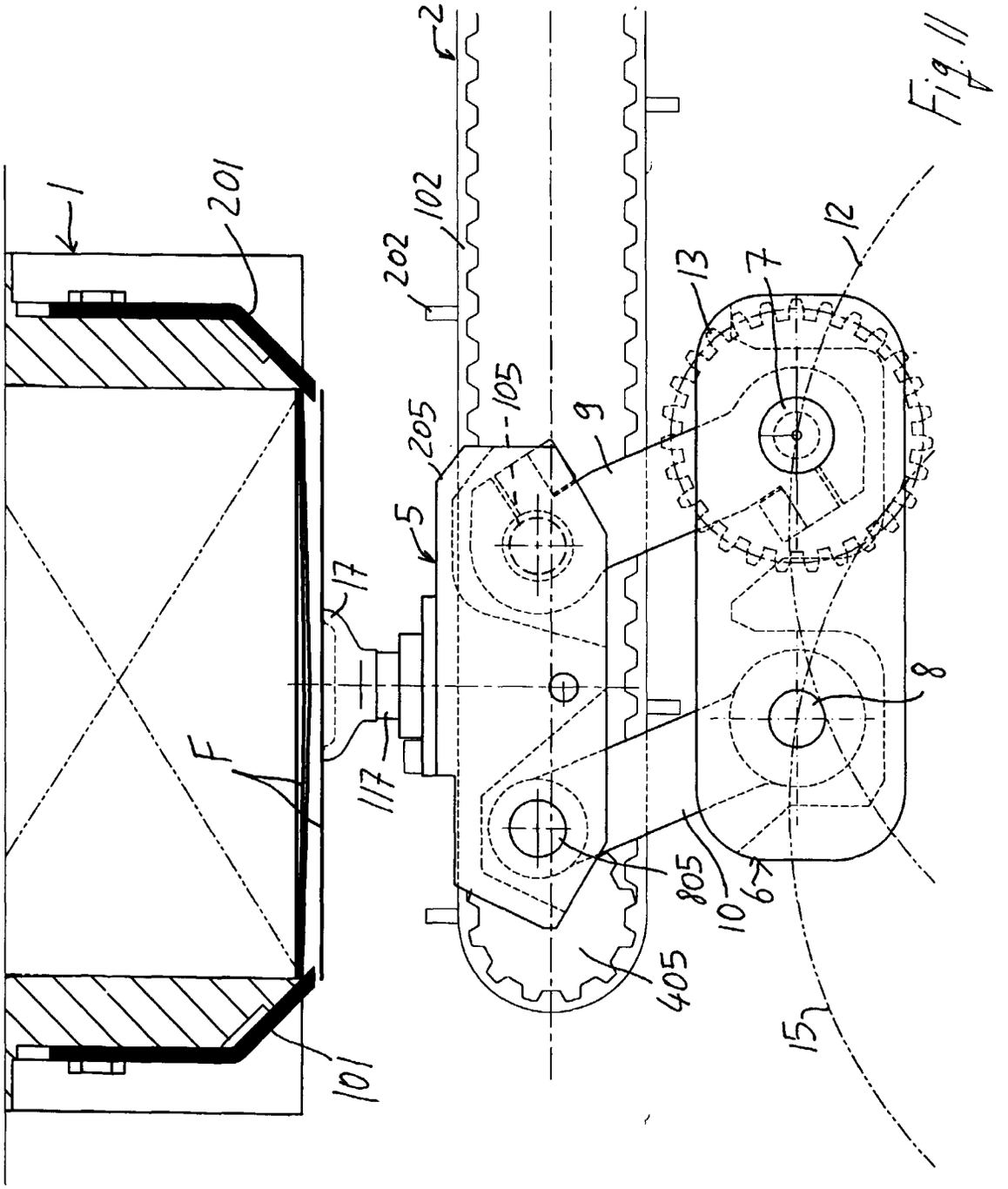


Fig. 10



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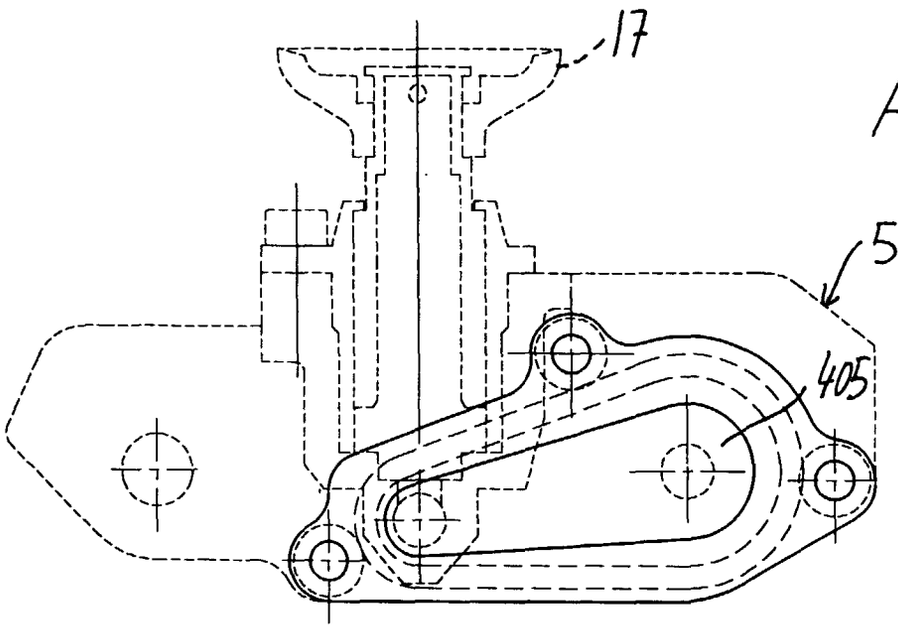

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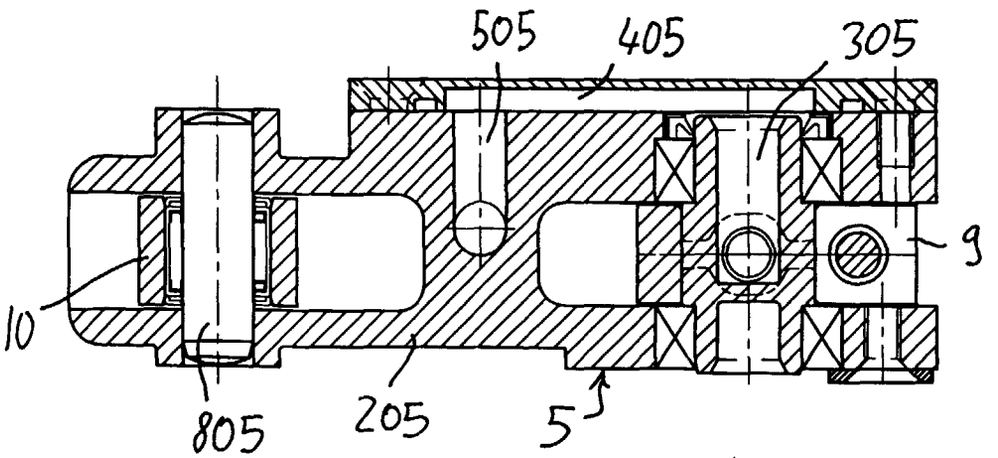

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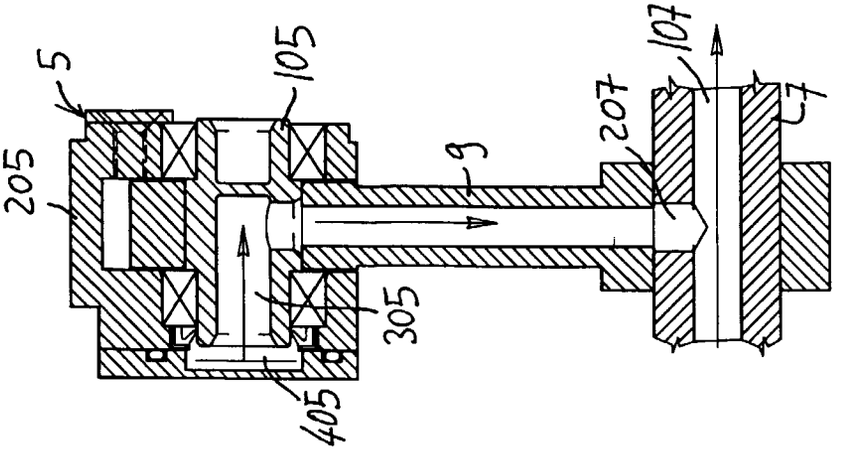
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Fig.15

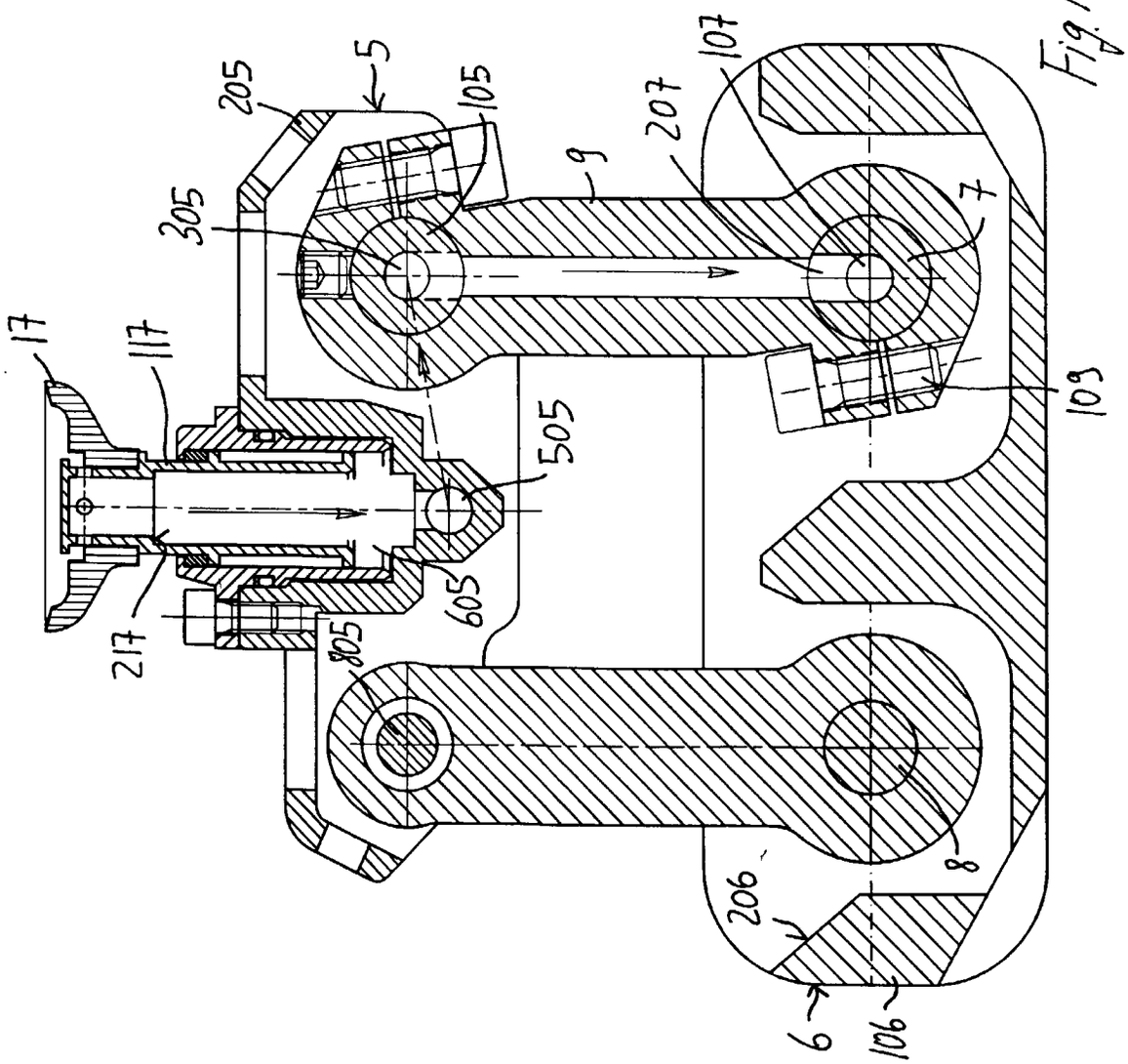
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Fig.14

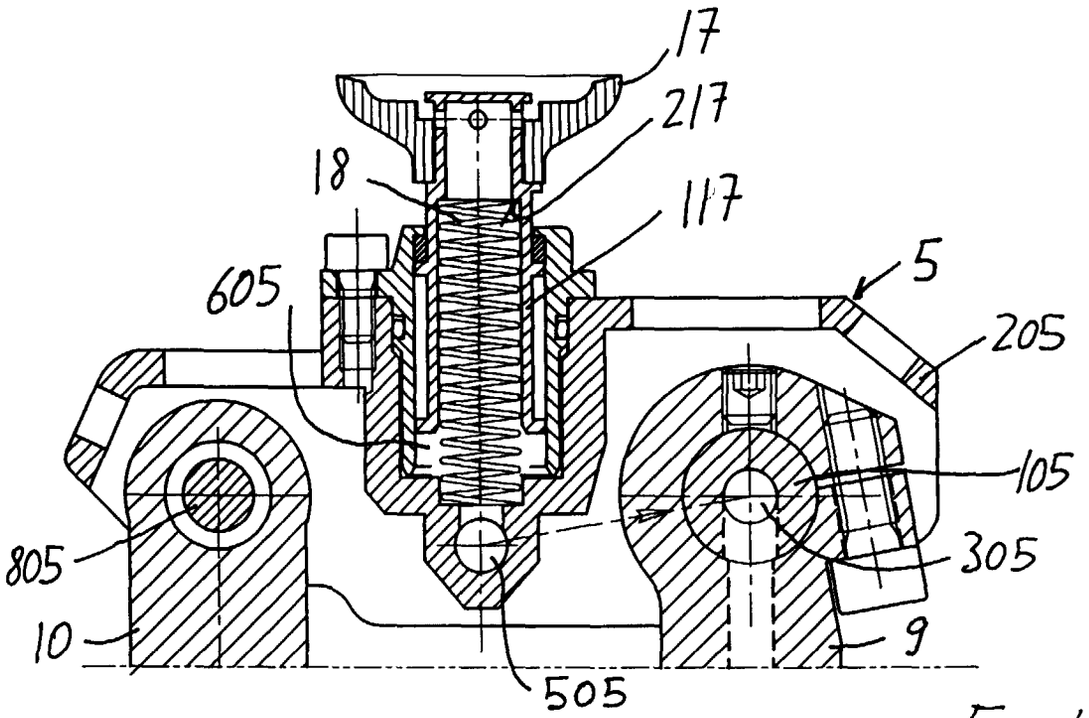
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Fig. 16

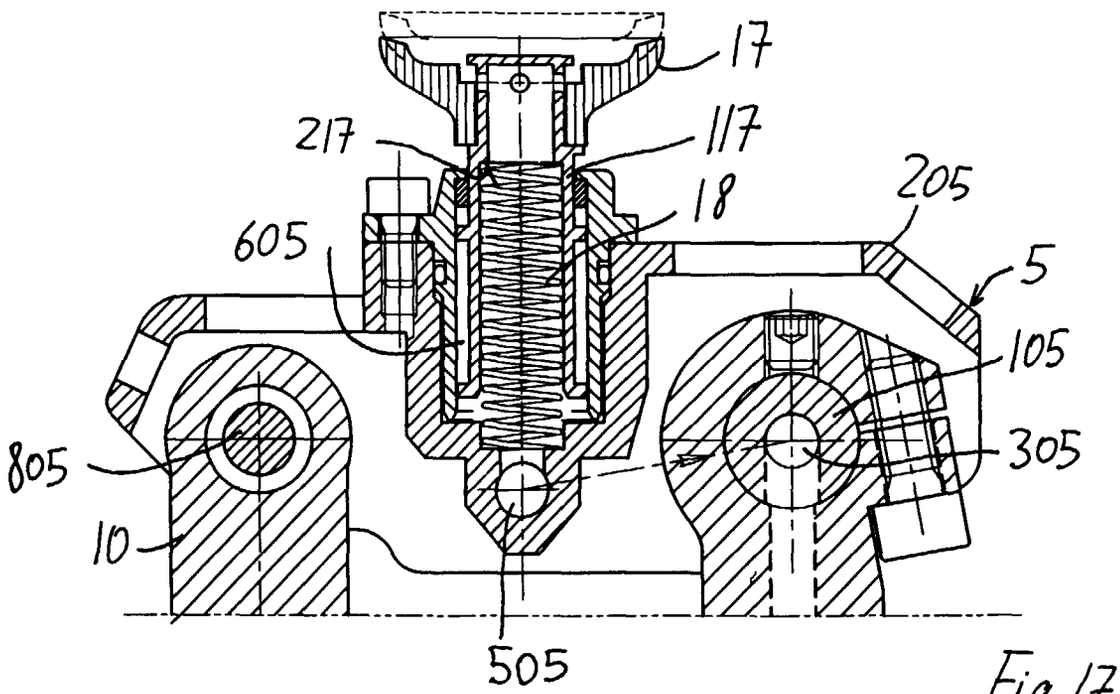
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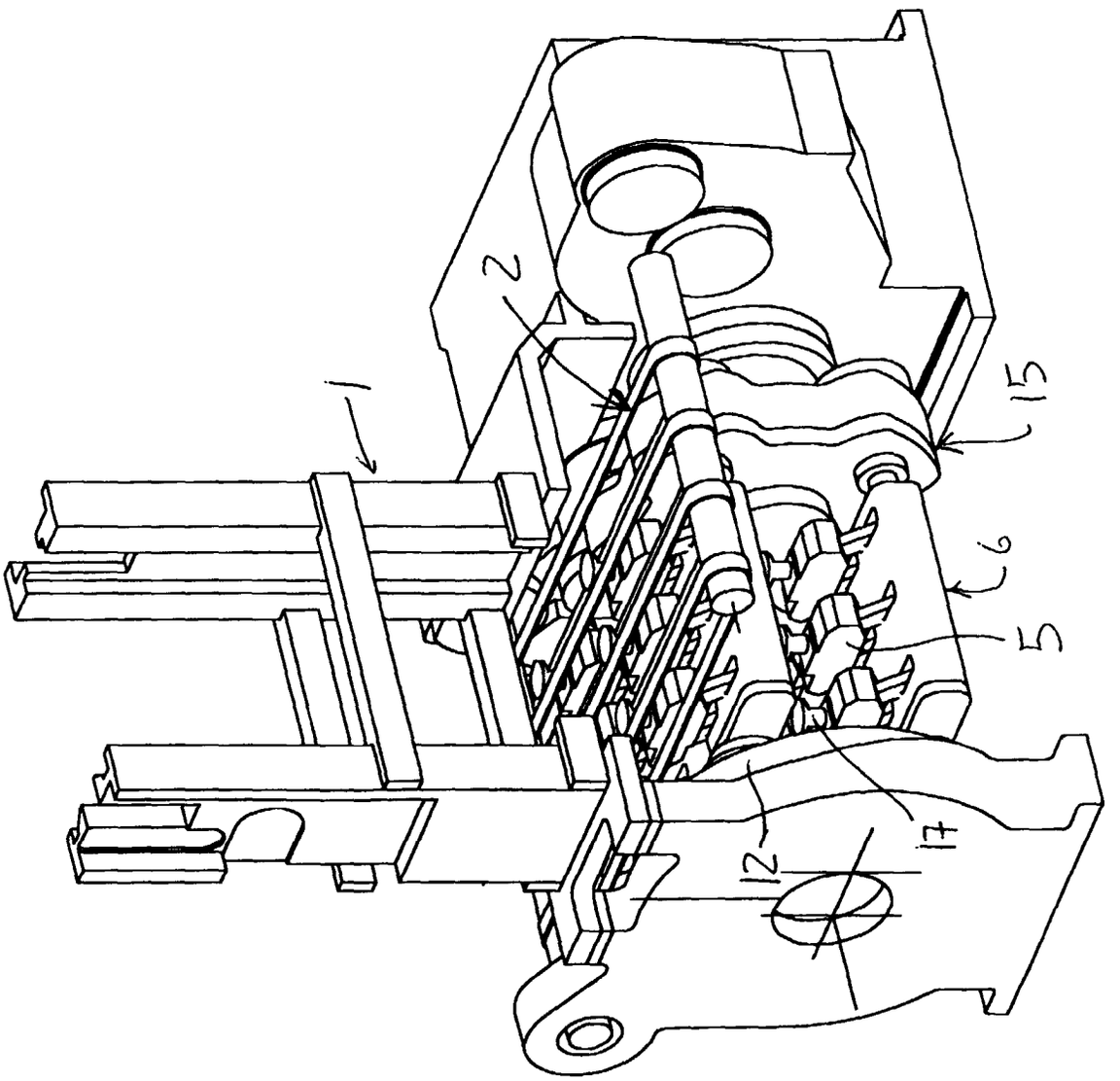
Fig. 17

Fig. 18



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 6449

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	DE 44 39 723 A (ASSIDOMÄN PACKMASTER) 15 May 1996 (1996-05-15) * column 4, line 44 - column 6, line 21; figures 1-5 *	1,4,5,7, 8	B65B43/18 B65H3/08 B65H3/42
A	---	3	
X	US 5 511 772 A (GANZ ET AL.) 30 April 1996 (1996-04-30) * column 1, line 10-30; figures 1,2 *	1,2,5,7	

X	DE 40 29 520 A (ROBERT BOSCH) 19 March 1992 (1992-03-19) * page 1, line 50-63; figure 1 *	1-5,8	
A	---	6	
X	EP 0 331 325 A (KLIKLOK CORPORATION) 6 September 1989 (1989-09-06) * claims 1,2; figures 1,4,7 *	1-5,7,8	

P,X	WO 98 42604 A (MOLINS) 1 October 1998 (1998-10-01) * page 3, line 22 - page 5, line 12; figures 1-4 *	1,4,5,7, 8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B
B65H
B31B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	2 August 1999	Grentzius, W

CATEGORY OF CITED DOCUMENTS

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