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

(11) EP 0 994 057 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.04.2000 Bulletin 2000/16

(51) Int. Cl.[7]: **B65H 19/12**

(21) Application number: **99120328.2**

(22) Date of filing: **12.10.1999**

(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: **14.10.1998 IT SV980058**

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(54) Supply unit of bobbins of wrapping material in a cigarette packing machine and process for pick-up and transfer of the same bobbins

(57) The invention relates to a supply unit of bobbins (2) of materials, in particular of bobbins of wrapping material in form of a band and in the cigarette packing machines, comprising a bobbin carrier reservoir (11) equipped with means of supplying the bobbins to a pick-up station and a pick-up device (15) that transfers the bobbins from said reservoir onto the mandrel (107) unwinding the same, as the path of the bobbin to the pick-up station and the one of the pick-up device are paths intersecting each other and sensors being provided on the pick-up device to detect at least two sections or points diametrically opposed of the external perimeter and/or internal perimeter of the bobbin in the pick-up station, whereas the signals of the sensors are fed to a box that controls the drive of the motion of the bobbin itself and/or of the pick-up device. The invention also relates to a process of pick-up and transfer of the same bobbins.

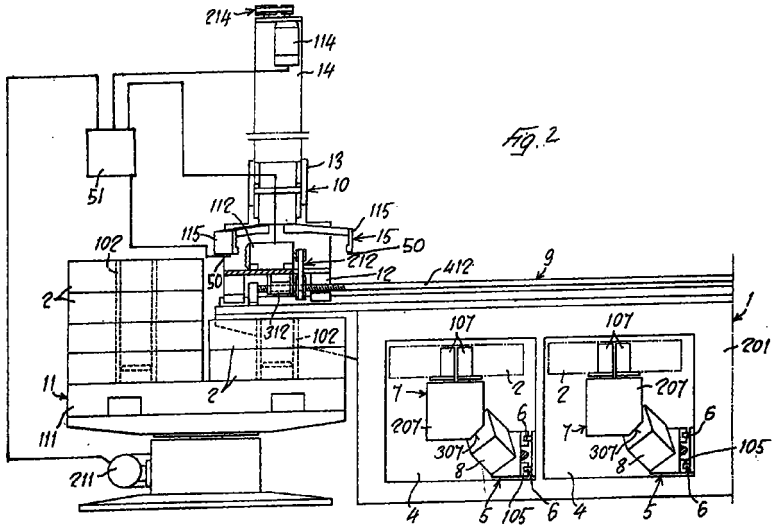

Fig. 2

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Description

[0001] The invention relates to a supply unit of material in bobbins, in particular of bobbins of wrapping material in form of a band and in the cigarette packing machines, comprising a bobbin carrier storage and on which at least one bobbin is loaded and a pick-up/transfer device to the bobbin-carrier device of a machine using it, the pick-up device and/or the bobbin carrier storage with at least one single bobbin of material arranged in a preset position relative to the pick-up of the bobbin from said bobbin carrier storage by the pick-up device, and said pick-up device and/or the said bobbin carrier storage being movable relative to each other for carrying the bobbin into a position of readiness to be grasped by the clamping device.

[0002] A unit of this type is known for example from a preceding Italian patent application of the same titular having number of application GE94A000105.

[0003] The problem on which the application is based is the one of perfecting a unit of the type described at the beginning, in such a manner whereby by simple and inexpensive means it becomes possible to obtain a precise reciprocal positioning of the pick-up device with the bobbin respectively in the pick-up position provided for that purpose. Such positioning should be possible in a fast manner and without requiring the interventions of external operators.

[0004] The invention attains the above aims with a unit of the type described at the beginning, in which are provided means for moving the bobbin to a pick-up station according to one first direction transversal to the axis of the same and means for moving the bobbin into the pick-up station towards the pick-up device and/or for moving the pick-up device towards the bobbin in the pick-up station according to a path perpendicular to the first direction of motion of the bobbin in the pick-up station in particular parallel to the axis of the same bobbin, whereas further means are provided for adjusting the centering of the bobbin in the pick-up station relative to the pick-up device, in particular to the clamping units fitted on the same, the said centering means control the start and stop of the motion of the bobbin on the bobbin carrier storage.

[0005] According to a further feature, the said centering means are formed at least by a pair of sensors for reading at least two points diametrically opposite of the external and/or internal perimeter of the bobbin.

[0006] The sensors can be of any type and are formed by photocells in particular.

[0007] The photocells are arranged in such a manner to be able to read the presence in their field of operation of a corresponding peripheral section of the bobbin. In particular the reciprocal reading position between the photocell and the bobbin and the range of operation or of sensitivity of the photocell or of other sensors are calibrated in such a manner, whereby the face or the part closest to the same of the bobbin is being read, whereas the opposite part or face of the bobbin is outside the field of detection or operative ray of the photocell or of the sensor.

[0008] In this way the correct pick-up position of the bobbin is given when the at least two opposed photocells or the two opposed sensors designed to read diametrically opposed peripheral sections of the bobbin both read the presence of said sections. Should that not be the case one has a positioning staggered in the opposite direction to the photocell or to the sensor that does not read the presence of the peripheral edge of the bobbin and the position must be corrected.

[0009] Advantageously, the unit has a control box of the means of motion of the bobbin in the pick-up station that processes the signals of the sensors and drives the motion of the bobbin according to the signals received from the sensors.

[0010] Therefore when one of the at least two sensors does not read the presence of the bobbin, the box starts the motion of the bobbin in direction of said sensor.

[0011] According to a preferred form of execution the sensors are at least three and are formed by photocells with a maximum operational radius such that the maximum level of the reading is intermediate with regards to the thickness of the bobbin, therefore thus generating a signal from the sensors only when the bobbin, that is the external or internal peripheral edge of the same enters into the operational field of the photocell.

[0012] Advantageously the pick-up device has at least two preferably more radial jaws designed to overlap each other on at least two diametrically opposite points or sections angularly distributed along the external perimeter of the bobbin, at the peripheral side of the shell of the same, the said jaws are radially movable with regards to a common axis and parallel to the axis of the same bobbin from a radially inward clamping position to a non-clamping position radially moved outwards., whereas on at least two jaws, preferably on all jaws is fitted a respective sensor.

[0013] Advantageously, the control box drives the axial motion of approachment and of moving away of the pick-up device from the bobbin itself and the opening or closing of the jaws, as a closing cycle of jaws themselves is provided in the moving away position of the pick-up device or in an intermediate position of approach towards the bobbin during the descend and the contextual activation and reading of the signals emitted by the sensors when the jaws are in the position of closure, whereas contextual and dependent on the signals emitted by the sensors, the box itself drives means of motion of the bobbin in the pick-up station for the perfect centering with regards to the pick-up device. In this way it is possible to avoid errors due to excessive dimensional tolerances of the maximum diameter of the bobbins of materials.

[0014] Furthermore the invention provides that the

pick-up head be movable along an axis secant an anular path preferably circular supplying the bobbins in the pick-up station as the correct centering position is provided for in the tangent point of said axis with the said circular path. In particular, when the bobbins are arranged flat with their axis in the vertical position, the tangent point between the two said paths coincides with a position in which the axis of the bobbin is coaxial to the axis of a clamping jaw of the same in the pick-up device.

[0015] This arrangement allows for carrying out the centering both thanks to an angular displacement of the bobbin along the circular path as well as thanks to a translation of the pick-up device along the above-mentioned axis.

[0016] The succession of steps or the choice of which of the two parts to move, that is the bobbin to be picked-up or the pick-up device can be optimized on hand of the calculation carried out by the control box of the true conditions of position relative to the ideal ones and on hand of the readings supplied by the sensors.

[0017] In this manner it is possible to rapidly obtain with a minimum number of steps and in a safe manner the correct alignment or the correct centering between the bobbin in the pick-up station and the pick-up device.

[0018] The bobbin is moved in small steps in direction of the sensor That has not detected The presence in its own field of operation of the corresponding peripheral part of the bobbin. The reading is repeated and the signals of the sensors are again analyzed. According to the answer from the sensors the opportunity is verified to carry out as subsequent step also or in alternative a step of displacement of the pick-up head.

[0019] Therefore in the method according to the invention it is possible to provide for a repetition of operative step comprising intercalated between them, the readings of the signals emitted by the sensors, one or more steps of displacement of the bobbin and/or of the pick-up head , the analysis of the results obtained with the displacement by means of a new reading of the signals from the sensors, the processing of the data of an eventual further successive displacement of the bobbin and/or the pick-up head, as well as the direction and the amplitude of the step.

[0020] The steps of displacement can be preset or calculated on hand of the signals supplied by the sensors. In this case it is possible to provide in appropriate and diverse positions additional sensors that supply eventual additional data of measurement of the position of the bobbin and/or of the pick-up head relative to the correct position of alignment of the two parts.

[0021] The invention relates also to the process of supply of bobbins that used the device previously described and that comprises the following steps:

the feeding of one bobbin along a preset path in a station of pick-up by a pick-up device, and the said path intersects with a path of advancement of the pick-up device relatively to a position of axial alignment of the pick-up device and of the bobbin in the pick-up station;

the detection of the correct position of alignment of the pick-up device with the bobbin by means of sensors arranged in such a manner to detect in their field of operation the presence of the external peripheral edge and/or the internal peripheral edge of the bobbin in the pick-up station;

the relative staggering of the bobbin and/or of the pick-up along the two paths intersecant to each other as long as each sensor does not detect in its own field of operation the presence of the corresponding section of the external and/or internal peripheral edge of the bobbin in the pick-up station.

[0022] Thanks to the above expediencies it is possible to obtain in a relatively economical and safe manner a fast automatic centering of the pick-up device and the bobbins to be picked-up.

[0023] The perfectings of the invention are subject of the claims below.

[0024] The features of the invention and the advantages derived therefrom are better evidenced by the following description of an executive example illustrated as non limiting in the attached drawings, in which:

The Fig. 1 is a schematic plan view of a making machine with a unit according to the invention.

The Fig. 2 is a partial view from the rear side of a making machine according to Fig. 1 with the unit according to the invention.

The Fig. 3 is a view in direction of transfer of the pick-up device according to the invention.

The Fig. 4 is a view in direction of the axis of the clamping jaw of the pick-up device.

The Fig. 5 is an enlarged, partial, axial cross-section of the clamping jaw according to the Fig. 4.

[0025] In the Figures from 1 to 3 the unit according to the invention is illustrated in combination with a making machine 1 that uses bands of material wound in bobbins 2, as for example a cigarette making or cigarette packing or a cellophane wrapping machine, or similar. Of the making machine 1 only the part of the body relevant to invention is illustrated. In working position of unwinding, the bobbins 2 are arranged on the front side of the making machine 1, with their axes oriented substantially perpendicular to said side. In the bottom section of at least one front side of the making machine 1, are provided at least one through tunnel, preferably two tunnels 4 side by side and parallel that are oriented parallel to the axis of the bobbins 2 in working unwinding position of the band. The through tunnels 4 have a port larger than the diameter of the bobbins 2 and are open in correspondence to the front side 101 and of the rear side 201 of the making machine itself. In each through tunnel 4 are provided transfer means 5, for one bobbin

respectively. The transfer means are provided with a slide 105 that is mounted movable on guides 6 oriented parallel to the through tunnel 4 and are movable from the front side of the machine, in a position of end of stroke in which the bobbin 2 is in working unwinding position, at the rear side of the same (Fig. 1), or beyond the said rear side 201, in a position, in which they protrude beyond the rear mouth of the through tunnels 4 in a dimension larger than the diameter of the full bobbins 2 themselves, and vice versa. The movement of the slide 105 is driven by a motor thanks to a feeding screw/nut. The transfer means 5 have each directly an unwinding mandrel 7 for the bobbins 2. The mandrels 7 are of the expanding jaws 107 type, substantially known, and clamp the core 102 of the bobbins 2 from the inside. Both the drive motor of the mandrel 7 as well as of the drive actuators of the jaws 107 are themselves carried on the transfer means 5, whereas the activation of the same is controlled by the making machine, in a manner synchronized with the working units of the same, through the flexible lines and/or conduits of controls of the type commonly known. The mandrels 7 are mounted on the slides 105 of the means of transfer 5 in a manner oscillating alternatively in a position with the axis of the same oriented parallel to the direction of transfer, and that is coaxial to the axis of the bobbins 2 in the working position of unwinding, and in a position, in which the axis of the same is oriental vertically upwards. This motion is obtained by connecting the box 207 of the mandrels to the output shaft of the reducer 8 that has a preset angulation. The specific construction is described in detail in a preceding patent, issued, of the same titular with application number GE94A000105.

[0026] Along the rear side 201 of the making machine 1 a guide 9 is provided for sliding horizontally and perpendicularly to the vertical axis and to the axis of the through tunnel 4 that is for a pick-up device 10 of the full bobbins 2 from a bobbin carrier 11 storage on which are placed two stacks of full bobbins to the transfer means 5 in the end of stroke position on the rear side of the making machine 1. The bobbin carrier storage 11 houses at least one vertical stack of full bobbins that are oriented coaxial to each other and the vertical axis of which is contained in the same vertical plane, in particular parallel to the horizontal slide guide 9, from the axis of the mandrels 7 in the rear end of stroke position of the transfer means 5. Advantageously said vertical plane is provided behind the horizontal slide guide 9, whereas on the guide 9 is carried by means of a saddle 12 a further vertical guide 13, in which is mounted vertically movable a support riser 14. At its bottom end, the support riser 14 has cantilevered from its rear side a pick-up head 15 of the full bobbins 2, the central axis of which V is itself also contained in the vertical plane containing the axes of the stack of full bobbins 2 on the bobbin carrier storage 11, in the pick-up position, and the axes of the mandrels 7 oriented vertically upwards, in the position of the rear end of stroke. Therefore, the clamping head, or the vertical axis of the same parallel to the axis of the bobbins on the storage 11 can slide along an axes horizontal or parallel to the guide 9, and can be shifted between a position of pick-up of the full bobbins 2 from the stack in the storage 11, in which the axis V of the pick-up head 15 is coaxial, in a position of unloading of the bobbin picked-up on the corresponding mandrel 7 in the rear end of stroke position, in which it is coaxial to the same with a simple horizontal, rectilinear transfer.

[0027] The horizontal transfer saddle 12 has a drive motor 112 from which by means of a transmission 212 the driving motion of a transmission in shape of a threaded bolt and female thread 312, 412 is taken. The vertical movement of the pick-up head 15 is also driven by a motor 114 carried at the top end of the sliding riser 14 and that drives the rotation by means of a belt transmission 214 of a nut 314 that is supported in a revolving manner in the riser 14 made in titular form and that is oriented parallel to said riser 14. The nut 314 engages in a threaded bushing 414 that is integral with the guide 13 and does not rotate.

[0028] Advantageously, when the bobbins 2 are equipped with cores 102, before the full bobbin 2 can be unloaded onto one of the mandrels 7 it becomes necessary to eject the empty core 102. Therefore a gripping clap for the cores 102 is provided in the executive form illustrated and advantageously integrated in the pick-up head 15 for the full bobbins.

[0029] With reference to the Figs. 4 and 5, the pick-up head 15, has a plurality of jaws 115 for clamping the full bobbins 2 from their external peripheral side, in order to avoid an interference with the mandrels 7 on the transfer means 5 that grip the core 102 of the bobbins 2 from the inside of the same. In the executive form illustrated, are provided three bobbin-clamping jaws 115 appropriately curved correspondingly to the external peripheral side of the full bobbins 2 and that are radially movable in a direction away from and of approach to the axes of the pick-up head 15. The bobbin-clamping jaws115 are carried cantilevered downwards at the extremity of the radial jaw-carrying arms 215 that are fixed at their radially internal extremity to radial sliders 116 of an activating unit 16. The activating unit 16 is of a type known in itself and substantially identical to the radial activating means of the jaws 107 of the mandrels 7, as for example of the type marketed by the company Rhom with the trade name TYP 538. The sliders 116 have inclined surfaces 216 that co-operate with a conjugate conical axial pusher 316, the motion of which is driven in one direction by an hydraulic or pneumatic plunger 416 and by a contrasting spring 516 in the other direction.

[0030] To the activating unit 16, or to the stationary part of the body of the same are fitted, in an intermediate position between the jaw-carrying arms 215, the arms 315 that carry cantilevered towards the bottom side and under the jaw-carrying arms 215, a coaxial end of stroke sensor ring 17. The sensor ring 17 is sup-

ported in an axial manner, elastically yielding, by means of guide bolts 117 with widened heads that are engaged in a sliding manner in coinciding holes 415 of the sensor-carrying arms 315 springs 217 being interposed between the facing sides of the sensor ring 17 and the stationary sensor carrying arms 315. The diameter of the sensor ring 17 is correspondent to an intermediate diameter of a full bobbin 2. On the side turned towards the sensor-carrying arms 315, the sensor ring 17 cooperates with sensors, for example proximity sensors, or similar 18 that are carried by the small sensor-carrying arms 315 themselves and that control the activation and the deactivation of the motor 114. The small jaw-carrying arms have in their intermediate section, determined in a manner corresponding to the radial stroke of the same and to the diameter of the cores 102 of the bobbins 2, gripping jaws 515 for the cores 102 themselves. The small jaw-carrying arms 215 are made inclined downwards in direction of their radially external extremity, whereby the core-gripping jaws 515 are provided at a level above the bobbin-clamping jaws 115 and above the full bobbin presence sensor ring 17.

[0031] The small sensor-carrying arms 315 support an additional sensor ring 19 to detect the presence of the core 102. The sensor ring 19 extends itself radially inside the core-gripping jaws 515 and has an internal and external diameter substantially corresponding to the same. The cores 102 presence sensor 19 is fitted on the small sensor-carrying arms 315 by means of external radial extensions 119. The cores presence sensor 19 is provided at the level of the top end section of the core-gripping sensor 515 and is supported in a manner analogous to the full bobbins 2 presence sensor ring 17. This arrangement is due to the particular geometric and dimensional features of the bobbins 2 and of the cores 102 and in clamping condition of the full bobbins 2, the cores 102 presence sensor ring 19 results interfering with the cores-gripping jaws 515, as it is not pushed axially upwards by the core 102, as is the case in the gripping phase of a core 102. Therefore, the cores-gripping jaws 515 a supported on springs radially yielding outward by a dimension corresponding to the gripping stroke of the bobbin-clamping jaws 115. The cores 102 gripping jaws 515 are fitted on a pair of radial guide bolts 615 with an enlarged head that are guided in radial slide holes of a small guide block 715 fixed on the small jaws-carrying arms 215 on the radially external side of the jaws themselves and as springs 815 are interposed between the small guide block 715 and the respective cores-gripping jaw 515, preferably two elicoidal springs slipped on the bolts 615. Furthermore, the cores-gripping jaws 515 are arranged inside a recess 317 made on the radially internal side of the full bobbin 2 presence sensor ring 17.

[0032] Thanks to this construction, it is possible to control both the bobbin-clamping jaws 155 as well as the cores-gripping jaws that are carried on the small arms 215 themselves with one single activator unit. The characteristic operation of the sensors 17, 19 itself is also described in greater detail in the preceding Italian patent application, published GE94A000105.

[0033] With reference to the Figures, each jaw 115 of the pick-up head 15 has a sensor 50 to detect the corresponding section of the external peripheral edge of the bobbin in the position ready for being picked-up from the bobbins-carrying storage 11. The sensors 50 can be of any type and are formed preferably by photocells with a preset field of reading in the axial direction of the bobbin 2 that is superior to a preset axial distance from the face of said bobbin 2 in position of pick-up turned towards the pick-up head 15 from jaws 115 and inferior to the corresponding distance from the opposite face, with reference to a associated preset reading position of the pick-up head 15 itself. The reading position of the pick-up head can be any position comprised between the one of maximum distance away from the bobbin 11 in the pick-up position and the one of readiness for pick-up, that is of maximum nearness.

[0034] Apart from the clamping jaws of the bobbins, the sensors 50 can be provided also on the gripping jaws of the cores gripping clamp.

[0035] A control box 51 controls the motors or the actuators of the storage 11 of the horizontal saddle 12 and of the vertical one 14 of the pick-up head with the jaws to clamp the bobbins 2 and the jaws to grip the cores 102. Furthermore the control box drive actuators of the said jaws and in the case the sensors 50 should be provided for on the jaws of the cores-gripping clamp also the motors and the actuators of the conveyors 5.

[0036] As input, the box receives the signal of the sensors 50. The processing of the signals of the sensors 50 takes place in such a manner, whereby the motors and the motion actuators, that is of horizontal and vertical transfer of the pick-up head 15 and of movement of the bobbin 2 or of the stack of bobbins 2 in the horizontal plane of the storage 11, as well as the transfer and motion of the conveyors 5, are activated, in order to obtain a signal of presence from all the sensors 50 that read the bobbin 2 or the core 102. In this condition the bobbin 2 and/or the core 102 and the pick-up head 15 result to be axially perfectly aligned, within the range of the accepted tolerances. The direction is obviously indicated by the sensor or sensors 50 that do not read the presence of the associated part of the bobbin or of the core.

[0037] The criteria of movement can be of any type and can be managed in a manner as to optimize the handling.

[0038] Thanks to the fact that the vertical plane defined by the path of the vertical axis V of the pick-up head 15 and indicated in Fig. 1 by the axis 0 intersects with the path R in the horizontal plane of the bobbin 2 or the core on the plane of the storage 11 or on the conveyor 5 it is possible to compensate for any wrong position of the bobbin 2 and/or cores 102 when they are in the pick-up station.

[0039] Advantageously the path R of supply A of the bobbin 2 or of the stack of bobbins 2 is anular, preferably circular, in the horizontal plane.

[0040] In this way by suitably programming the control box 51, it is possible to generate geometric criteria of movement of the bobbin 2 and/or the core 102 and of the pick-up head 15 that minimize the centering procedure.

[0041] The use of a circular path allows also to provide for a bobbin-carrier storage 11 of a rotating type that carries at least two stacks of bobbins. The stacks of bobbins are distributed angularly with their axes on a same ideal circular path with reference to the axis of rotation of the storage 11. In the case of only two bobbins 2, these are obviously diametrically opposite each other.

[0042] When all the sensors 50 detect the presence of the corresponding peripheral section of the bobbin 2 or of the core 102, then yes it is in perfect centering condition and the box 51 initiates the pick-up procedure.

[0043] According to one perfectioning, the reading takes place in conditions of closure of the jaws 115 and/or 515 of the pick-up head 15. In this way it is possible to prevent errors due to tolerances of the diameter of the bobbins 2 and/or cores 102.

[0044] In this case the control box is programmed in such a way to stop the pick-up head 15 in the position of detection of the centering and to control the clamping jaws 115 of the bobbin 2 or those that grip the cores 102 in position of closure. Then the reading process of the centering is carried out and when the centering is completed, the jaws are opened and the pick-up head 15 is brought in clamping position of the bobbin 2 or the core 102.

[0045] When the bobbin storage 11 carries stacks of bobbins, it is possible that the control box 51 keeps count of the number of bobbins 2 of each stack. In this case, programming the parameters relative to the axial dimensions of the bobbins in the control box, it is possible to adapt from time to time the vertical position of detection of the pick-up head 15, always taking the same to such a distance from the bobbin 2 on top of the stack, where the radius of operation of the sensors ends at an intermediate level between the two faces of said bobbin 2 on the top of the stack. This can be obtained both by raising the support plane of the bobbin-carrier storage 11, as veil as more convenient for said construction by adapting the vertical position of detection of the pick-up head. The control box 51 will be equipped for example with a counter and with a suitable data processing program in which the axial dimension of the bobbins can be programmed and that keeps score of the number of bobbins picked-up from each stack, as well as of the code of the stack itself. The pick-up head 15 will therefore be approached from time to time in a dimension corresponding to the number of bobbins 2 picked-up from the corresponding stack as far as the vertical reading position of the centering is concerned., each time that the corresponding stack presents itself to the position of pick-up of a bobbin, that is in the pick-up station.

[0046] Alternatively, using the full bobbin 2 presence sensor 17, the reading position of the pick-up head 15 can be determined from the direct measurement by the pick-up head 15 of the level of the face turned towards the same of the bobbin 2 on the top of the stack in the pick-up station. This option can be used in the case that stacks of bobbins should be used that are not homogeneous with regards to the axial dimensions within the range of a stack itself.

[0047] When the bobbins are homogeneous with regards to the dimension in height it is possible to use the sensors 50 to replace also the sensor rings 17 and 19.

[0048] Obviously, instead of the sensors 50 of the photocell type it is possible to provide for other types of sensors this also depending on the topology of the material handled.

[0049] The sensors can also be arranged in different positions and this also dependent from their topology or it is possible to provide different types of sensors in different positions.

[0050] The movements of reciprocal alignment or centering of the bobbin and/or the core with the pick-up head can take place in both directions as indicated by the arrows F1 and F2 in Fig. 1 and can also be formed by steps of advancement of a preset amplitude. It is also possible that the steps are instead calculated for example thanks to additional information on the position of the bobbin and/or core and/or
pick-up head.

[0051] With regards to the rotary type bobbin-carrier storage or stores 11, in the example illustrated, these are constituted by tables in form of a plane rotating around a vertical axis. These carry more stacks of full bobbins 2, each of the stacks being taken to the pick-up position, coinciding coaxially with the pick-up head 15, with a preset rotation 111 of the plane of the table. This one is driven by a motor 211 by means of a suitable transmission (not illustrated) and in a synchronized manner with the means of supply, or with the pick -up head 15.

[0052] Advantageously, the rotary plane 111 of the storage in form of a rotating table is suitable to house or is formed by a so-called pallet, facilitating considerably the operations of loading the storage 11. In particular the pallet has dimensions different from the ones of the CEE standards and substantially reduced, that is the 1200 mm of length and 800 mm of width. Each pallet can in this way house substantially diagonally offset two bobbins of diameter of 600 mm, like those customary used in the cigarette packing machines, or similar.

[0053] Naturally, the invention is not limited to the executive forms described and illustrated but can be amply varied and modified, above all constructively, without abandoning the informative principle explained

above and claimed below.

Claims

1. Supply unit of bobbins of material, particular of bobbins of wrapping materials in shape of a band and in the cigarette packing machines, comprising a bobbin carrier storage (11) on which at least one bobbin (2) is loaded and a pick-up device (15) of the bobbins to a bobbin holder device (5) of a machine using it, the pick-up device (15) and/or the bobbin-carrier storage (11) with at least one single bobbin (2) of material being arranged in a preset position with regards to the pick-up of the bobbin (2) from the bobbin carrier storage (11) by the said pick-up device (15), the said pick-up device (15) and/or the said bobbin carrier storage (11) being movable relative to each other (r, o) to bring the bobbin (2) in a position of readiness to be clamped by the clamping device (15), characterized by the fact that means (211) are provided for moving the bobbin (2) into a pick-up station according to a first transversal direction of the axis of the same and means (13, 14) for moving the bobbin in the pick-up station towards the pick-up device and/or for moving the pick-up device towards the bobbin in the pick-up station according to a path perpendicular to the first direction of movement of the bobbin (2) in the pick-up station in particular parallel to the axis of the bobbin itself. whereas additional means (50, 51) are provided for adjusting the centering of the bobbin (2) in the pick-up station relative to the pick-up device (15), in particular to gripper units (115, 515) provided on the same, the said centering means (50, 51) control the activation and stop of the means (211) of motion of the bobbin (2) on the bobbin-carrier storage (11).

2. Unit according to the claim 1, characterized by the fact that said means of centering are constituted by at least two pairs of sensors (50) to read at least two points or two sections diametrically opposed of the external and/or internal perimeter of the bobbin (2).

3. Unit according to the claim 2, characterized by the fact that said centering means are constituted by three sensors (50) distribute angularly equidistant and in such a manner to read the internal diameter and/or the external diameter of the bobbin (2).

4. Unit according to one or more of the preceding claims, characterized by the fact that a control box (51) is provided for controlling the means (211) of movement of the bobbin in the pick-up station that processes the signals of the sensors (50) and drives the means (211) of motion of the bobbin (2) according to the signals received from the sensors (50).

5. Unit according to one or more of the preceding claims, characterized by the fact that the sensors (50) are constituted by photocells with a maximum radius of operation such that the maximum level of reading is intermediate with regards to the thickness of the bobbin (2), in the position of readiness for pick-up respectively, a signal being therefore generated by the sensors (50) only when the bobbin, that is the external or internal peripheral edge of the same enters into the operative field of the photocell (50).

6. Unit according to one or more of the preceding claims, characterized by the fact that the pick-up device (15) has at least two, preferably more radial jaws (115) designed to overlap at least two points or sections diametrically opposite or more points or sections angularly distributed along the external perimeter of the bobbin (2), on the peripheral side of the shell of the same, the said jaws (115) are radially movable relative to a common axis parallel to the axis of the bobbin (2) itself from a radially inward receding clamping position to a non clamping position moved radially outwards, preferably a respective sensor (50) fitted on all the jaws (115).

7. Unit according to one or more of the preceding claims, characterized by the fact that the control box (51) drives the axial movement of approach and of moving away of the pick-up device (15) of the bobbin (2) itself and the opening and closure of the jaws (115), a closing phase of the jaws (115) themselves being provided in the position of moving away of the pick-up device (15) or in an intermediate station of moving towards the bobbin (2) during the descent and the contextual activation and reading of the signals emitted by the sensors (50) when the jaws are in the position of closure, whereas contextual and dependent on signals emitted by the sensors (50), the control box (51) itself drives the means (211) of motion of the bobbin (2) in the pick-up station for the perfect centering relative to the pick-up device (15).

8. Unit according to one or more of the preceding claims, characterized by the fact that the pick-up device (15) is movable (9) according to a further direction (o) transversal to the one of moving towards or moving away (V) from the bobbin (2), the said direction (o) intersects with the path (R) of motion of the bobbin (2) itself in the pick-up station, means (9) being provided for guidance and movement of the pick-up device in the said direction (o) and the means (9) of motion being themselves driven by the control box (51) on hand of the signals emitted by the sensors (5).

9. Unit according to one or more of the preceding claims, characterized by the fact that the path (R) of motion of the bobbin (2) in the pick-up station is a circular one.

10. Unit according to one or more of the preceding claims, characterized by the fact that

- the bobbin-carrier storage (11) has a horizontal support plane (111) of at least one bobbin (2) and that can be rotated around a vertical axis external to the bobbin (2) itself and parallel to the axis of the bobbin (2);
- whereas the pick-up device (15) is movable according to two directions perpendicular to each other and rectilinear (V, o) of which one (V) of axially moving towards and away from the bobbin (2) to be picked up and parallel to the axis of the bobbin (2) itself, whereas the other (o) is a horizontal rectilinear path that is oriented in such a way whereby the axis parallel to said path and intersecant with the common vertical axis of the radial clamping jaws and one secant to the circular path (R) that the bobbin (2) carries out during the rotation of the bobbin (2) on the rotary bobbin-carrier storage (11);
- the correct position relative to the alignment and pick-up of the pick-up device (15) with the bobbin (2) being provided at the point of intersection of the ideal circular path (R) of the axis of the bobbin (2) and the horizontal rectilinear path (o) of the common vertical axis (V) of the clamping jaws (115, 215);
- and the staggering of positioning of the bobbin (2) in the said correct position of pick-up being detected by means of sensors (50) on the clamping jaws (115) of the pick-up device (15) the signals of which are processed by the control box (51) that drives the means of motion (9, 13, 14) of the pick-up device (15) and of the bobbin-carrier storage (11), in the sense of defining the correct position of pick-up with the relative position of the bobbin (2) on the bobbin-carrier storage (11) and of the pick-up device(15) the one in which each sensor (50) reads the presence of the bobbin (2) in its field of operation.

11. Unit according to one or more of the preceding claims, characterized by the fact that the bobbin-carrier storage (11) carries at least one stack of bobbins (2) substantially coaxial.

12. Unit according to one or more of the preceding claims, characterized by the fact that the bobbin-carrier storage (11) carries more bobbins (2) side by side or more stacks of bobbins (2) side by side that are arranged with their central axes substantially equidistant from the axis of the circular path (R) of movement of the same in the pick-up station.

13. Process for the supply of bobbins characterized by the fact that it has the following steps:

the feeding of one bobbin along a preset path in a pick-up station by a pick-up device, the said path intersects with a path of movement of the pick-up device relative to a position of axial alignment of the pick-up device and of the bobbin in the pick-up station;
the detection of the correct position of alignment of the pick-up device with the bobbin by means of sensors arranged in a manner to detect the presence of the external peripheral edge and/or internal peripheral edge of the bobbin in the pick-up station in their field of operation;
the relative staggering of the bobbin and/or the pick-up along the two path intersecant each other as long as each sensor does not detect in its field of operation the presence of the corresponding section of the external peripheral edge and/or internal peripheral edge of the bobbin in the pick-up station.

14. Procedure according to the claim 13, characterized by the fact that at least two diametrically opposite point of the external perimeter of the bobbin are read in the pick-up station, the reading section being radially moved inwards in a position of the smallest possible external diameter of the bobbin.

15. Procedure according to the claim 13 or 14, characterized by the fact that the direction of movement of the bobbin and/or of the movement of the pick-up head and the priority of the movement of the bobbin with regards to the one of movement of the pick-up head is being defined on hand of the differences between the real relative position between the bobbin and the pick-up head and the ideal geometrically defined one that are processed from the data supplied by the sensors.

16. Unit according to one or more of the preceding claims, characterized by the fact that it is used for the correct alignment between the means of pick-up and/or clamping of the empty cores.

17. Unit according to one or more of the preceding claims, characterized by the fact that it is used for the correct positioning and the correct centering between the pick-up means of the bobbin and the unwinding mandrel.

18. Process according to one or more of the preceding

claims 13 to 16, characterized by the fact that it is used for the correct alignment between the pick-up means and/or gripping means of the empty cores.

19. Process according to one or more of the claims 13 to 18, characterized by the fact that

- the bobbin is moved in small steps in direction of the sensor that has not detected the presence in its field of operation of the corresponding peripheral part of the bobbin;
- The reading is repeated and the signals are analyzed anew;
- According to the reply of the sensors the opportunity of carrying out as the next step also or in alternative a step of movement of the pick-up head is verified.

20. Process according to one or more of the preceding claims, characterized by the fact that it provides for a repetition of intercalated steps between each other consisting in the reading of the signals emitted by the sensors, in one or more steps of motion of the bobbin and or of the pick-up head, in the analysis of the results obtained by the movement by means of a new reading of the signals received from the sensors, in the processing of the eventual further successive movements of the bobbin and/or of the pick-up head, as well as the direction and amplitude of the step.

21. Process according to one or more of the preceding claims, characterized by the fact that the steps of motion can be preset or calculated on hand of the signals supplied by the sensors.

22. Process according to the claim 21, characterized by the fact that it provides for the reading of additional dimensions of the position of the bobbin and/or of the pick-up head relative to the correct position of alignment of the said two parts.

23. Process according to one or more of the claims 13 to 22, characterized by the fact that the correct positioning or the correct centering between the means of pick-up of the bobbin and the unwinding mandrel is used

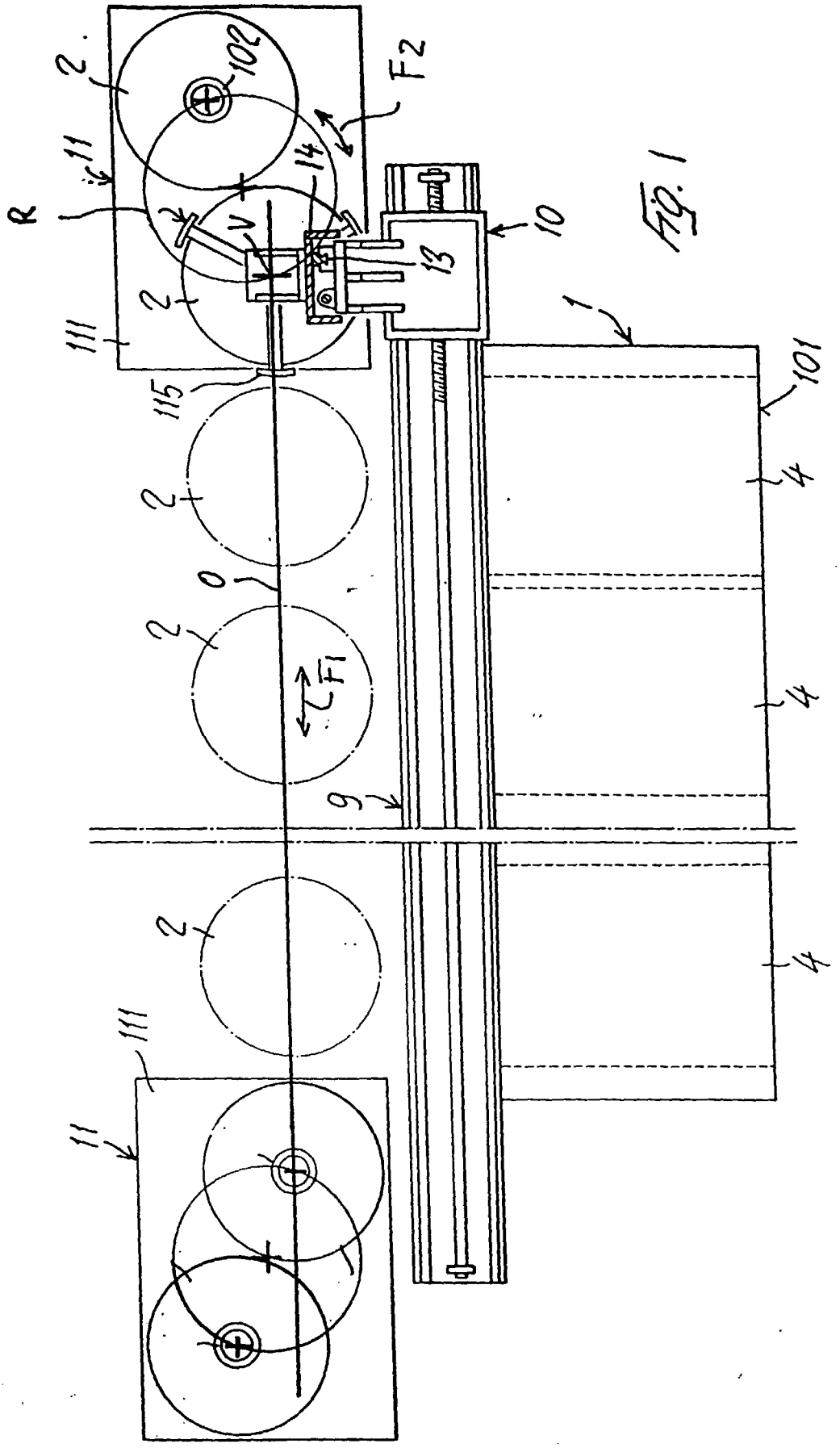

Fig. 1

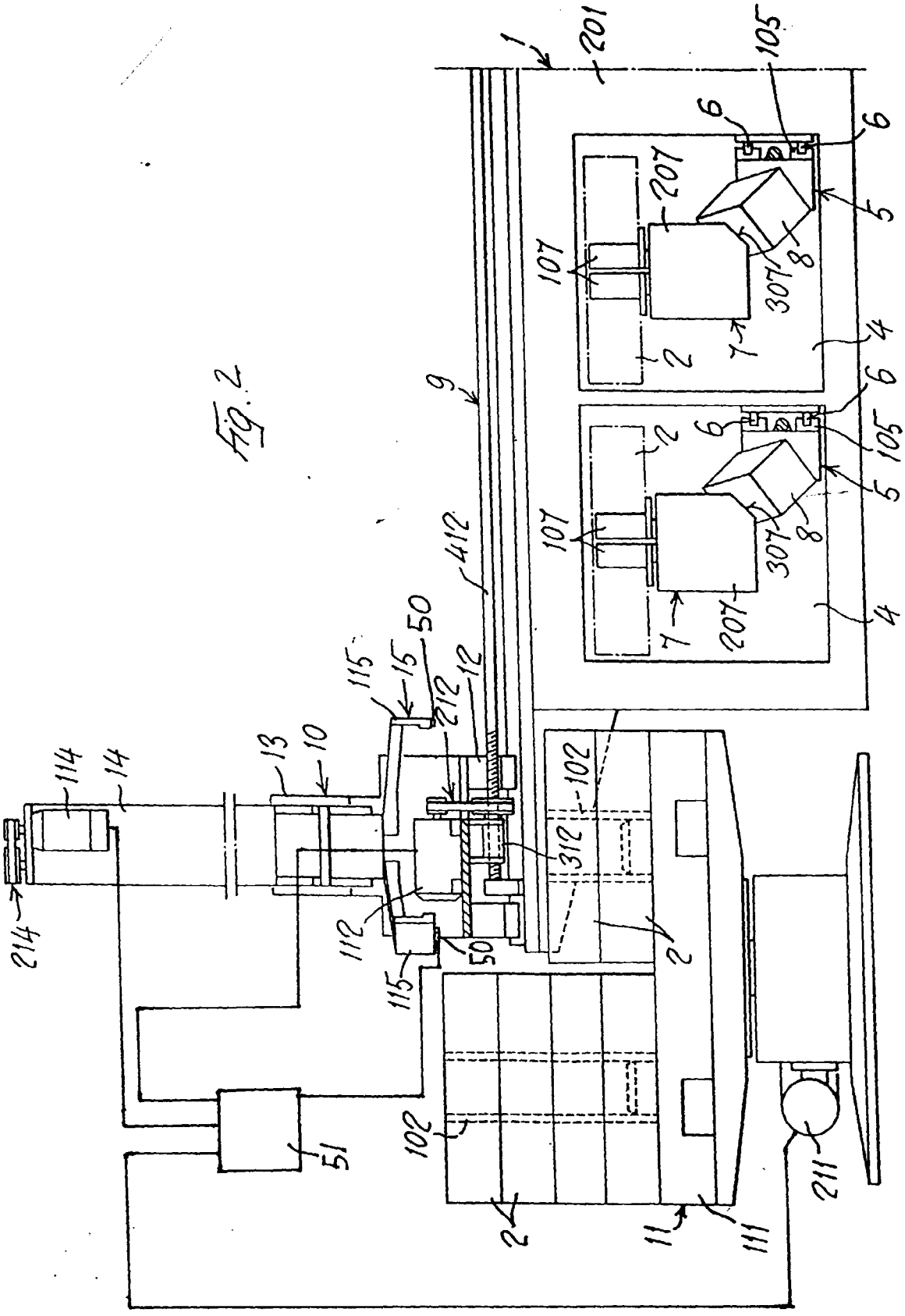
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Fig. 2

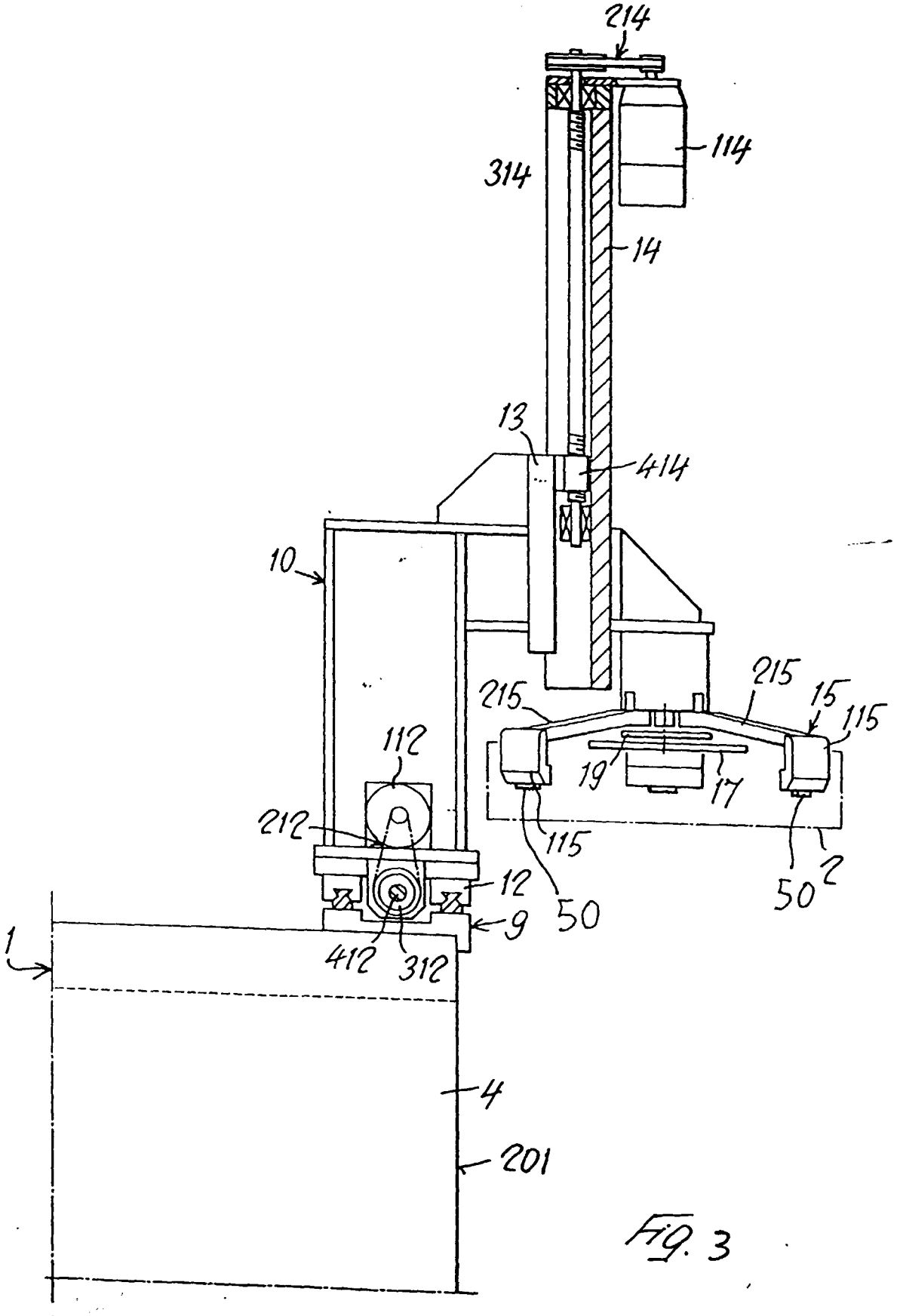
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FIG. 3

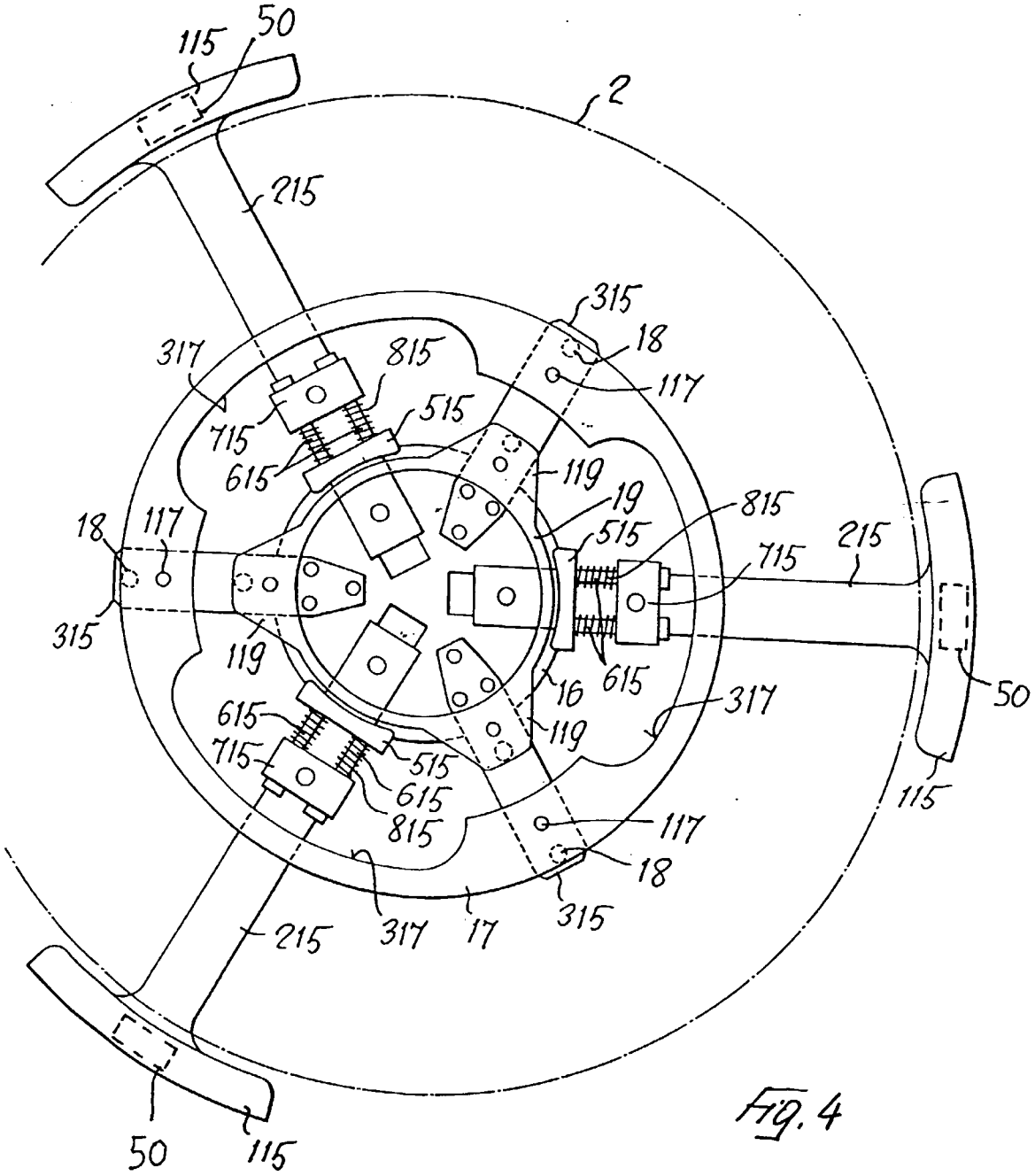
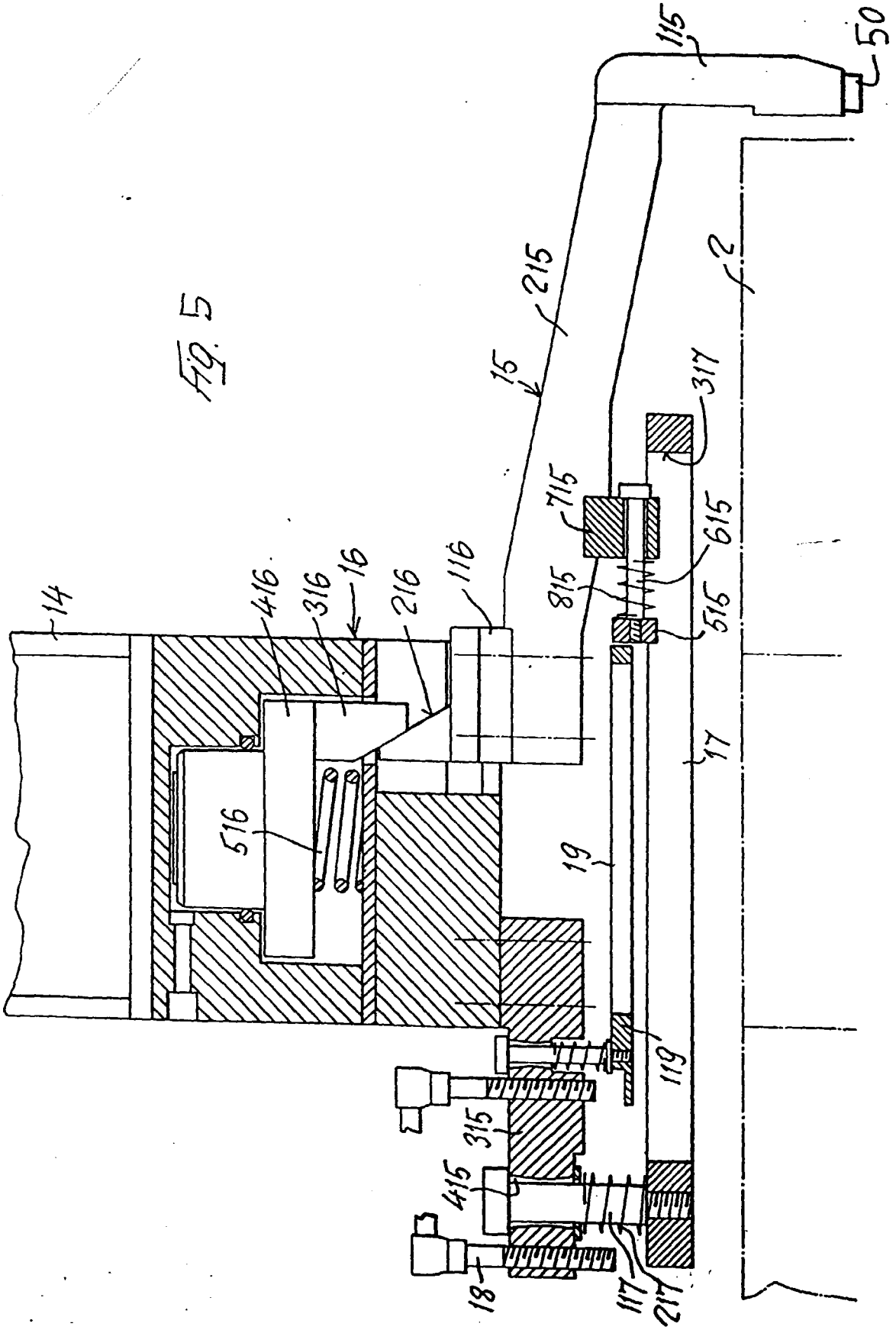


Fig. 4

Fig. 5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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 12 0328

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 January 2000	Haaken, W

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