

Description

[0001] The present invention relates to an automatic loading unit for stockings and tights for fixing machines.

[0002] The present invention is in particular applied in the field of final processing of stockings where the stockings made must be subjected to special fixing treatments intended to give the stockings the final shape and appearance.

[0003] Such fixing treatments are carried out by subjecting the stockings placed on suitable processing profiles to special treatments, for example thermal treatments.

[0004] To place the stockings on the processing profiles, automatic loading units were developed which allow the operator to operate in a position that is remote relative to the processing profiles, avoiding direct contact with them (since they are heated to high temperatures).

[0005] In particular, there are prior art loading units comprising a pair of profiles which are coplanar during the loading step and on which an operator places a stocking, at the same time carrying out a visual inspection to find any defects.

[0006] The profiles are then transferred near to two processing profiles, allowing the stocking to be transferred to the latter.

[0007] In some prior art systems, the fixing machine profiles are positioned so that they are coplanar and opposite each other, meaning that during stocking transfer, the two loading profiles on which the operator placed the stocking are also rotated relative to each other book-style so that they are positioned parallel with and opposite each other, allowing the transfer to the fixing machine profiles.

[0008] One of the disadvantages encountered in prior art loading units is difficulty loading manually due to the book-style open position of the loading profiles, which causes significant deformation of the stockings and necessitates repeated application of excessive force by the operator in charge of manual loading.

[0009] In this context, the present invention has for a main aim to propose an automatic loading unit for stockings and tights for fixing machines which is free of the above-mentioned disadvantages.

[0010] In particular, the present invention has for an aim to provide an automatic loading unit for stockings and tights for fixing machines which at the same time allows easy and rapid loading of the stockings on the profiles and easy visual inspection of the stockings during the loading step to check for any defects in the stockings to be fixed and packaged. The technical purpose indicated and the aims specified are substantially achieved by an automatic loading unit for stockings and tights for fixing machines with the technical characteristics described in one or more of the appended claims. Further features and advantages of the present invention are more apparent from the non-limiting description which follows of a preferred, non-limiting embodiment of an automatic

loading unit for stockings and tights for fixing machines according to the invention, illustrated in the accompanying drawings, in which:

- 5 - Figure 1 is a schematic plan view of an automatic loading unit for stockings and tights for fixing machines according to the present invention;
- Figure 2 is a schematic side view of the unit of Figure 1 during an operating step;
- 10 - Figure 3 is a schematic top view of the operating steps of a machine;
- Figures 4 and 5 illustrate details of the loading unit of Figure 1.

15 **[0011]** With reference to the accompanying drawings, the numeral 1 denotes as a whole an automatic loading unit for stockings and tights for fixing machines according to the present invention.

[0012] The unit 1 comprises a carrousel 2 rotating about a vertical axis, the outside of the carrousel supporting at least one pair of profiles 3 designed to receive a stocking 100 (the latter being schematically illustrated in Figure 2) in a first operating station "a" and to transfer it onto the profiles 102 of a fixing machine, positioned in

20 a second operating station "b".
[0013] With reference to the example embodiment illustrated in the accompanying drawings, the profiles 3 each comprise a flat, vertical wall 4, preferably tapered towards the top portion to facilitate application of the stocking 100.

[0014] Each wall 4 also comprises an L-shaped section, supported by a lower plate 5, integral with the wall 4.

[0015] According to the invention, in the loading station "a" the profiles 3 are positioned in a diverging configuration, substantially forming a V.

[0016] Thanks to the diverging configuration of the profiles 3, during application of the stockings 100 on the profiles 3, the stockings 100 are not excessively deformed and the operator (schematically illustrated and labelled 101 in Figure 1) does not have to apply excessive force to deform the stocking 100 during its application on the profiles 3.

[0017] Moreover, thanks to this configuration of the pair of profiles 3 the operator is in any event able to suitably inspect the entire surface area of the stockings 100.

[0018] The profiles 3, being in a diverging configuration, hold the stocking 100 "open" and therefore clearly visible for the operator 101.

[0019] The unit 1 according to the invention also comprises a transfer mechanism 6 for transferring the pair of profiles 3 from the loading station "a" (illustrated in Figure 1), in which the pair of profiles 3 receives the stocking 100, to a second operating position, coinciding with the transfer station "b" (illustrated in Figures 1 and 2), in which the pair of profiles 3 releases the stocking 100 to a pair of fixing profiles 102 (illustrated in Figure 2) belonging to a fixing machine (not illustrated) intended to carry out stocking 100 fixing and finishing operations.

[0020] With reference to the accompanying drawings, the mechanism 6 comprises a mechanism 9 for moving each pair of profiles 3 with a combined movement towards/away from each other and rotation relative to each other during movement of the profiles through the different operating stations and in particular from the loading station "a" to the transfer station "b".

[0021] In particular with reference to Figures 1 and 4, the profile movement mechanism 9 comprises a Y-shaped support 10 for each pair of profiles 3, in which diverging guides 7 are made for each profile 3 of each pair of loading profiles.

[0022] Advantageously, in combination with the support 10, the profile movement mechanism 9 comprises a joint 11 mechanically connecting the profiles 3 to each other.

[0023] In particular, with reference to Figure 4, the joint 11 comprises three rod-shaped elements 22, 23, 24, each having two end portions 22a, 22b, 23a, 23b, 24a, 24b.

[0024] The first end 22a of the first rod-shaped element 22 is hinged to a rod 26 and its second end 22b is hinged to the first end 23a of the second rod-shaped element.

[0025] The two rods 26 are each integral with a respective bushing 28 which slides on a shared transversal shaft 25.

[0026] Similarly, the first end 24a of the third rod-shaped element 24 is hinged to a bushing 28 and its second end 24b is hinged to the second end 23b of the second rod-shaped element 23.

[0027] A central portion 23c of the second rod-shaped element 23 is also hinged to a supporting element 21 fixed to the transversal shaft 25 and able to slide along a shaft 29 positioned radially relative to the carrousel and in a position which is generally symmetrical relative to the Y-shaped support 10.

[0028] In this way, by moving only one of the three rod-shaped elements, the other two rod-shaped elements are also moved, moving the bushings 28 and therefore the rods 26 towards or away from each other.

[0029] The supporting element 21 may also be controlled by an actuator which controls its movement along the shaft 29 in one or more of the operating stations.

[0030] It must also be specified that the movement of one of the three rod-shaped elements may be performed according to known methods, for example using an actuator acting on the first 22 or the third 24 rod-shaped element.

[0031] As shown in Figure 1, in the preferred embodiment the unit 1 comprises four pairs of profiles 3, each having a respective profile movement mechanism 9. In particular, the rotary carrousel 2 comprises a circular plate 15, whose rotation is driven by a gear motor 8, to which a pair of profiles 3 is connected every 90°, so that the four pairs 3 are equidistant and opposite each other in pairs relative to the carrousel.

[0032] Each pair of profiles 3 can also be translated vertically relative to the circular plate 15 of the carrousel

2, allowing the pair of profiles 3 to reach a position in which it is elevated relative to the fixing profile 102 in the transfer station "b" (Figure 2).

[0033] To guarantee the above-mentioned vertical movement, the carrousel 2 comprises four uprights 16 (only two of which are visible in Figure 2) extending from the circular plate 15 and connected to each other at top portions by another circular plate 17. The pairs of profiles 3 and the corresponding four supports 10 are slidably connected to respective uprights 16.

[0034] Translation of the profiles 3 along the uprights 16 is driven by a motor 18 which drives a toothed belt 19 to which the support 10 is connected (Figure 2). It should be noticed that Figure 2 shows two pairs of profiles 3, one in the upper position 3a, and one in the lower position 3b.

[0035] In particular, each of the four pairs of profiles 3 can be translated towards and away from the axis of rotation of the carrousel 2.

[0036] Figure 1 shows four operating stations, but there may be a different number of stations.

[0037] In particular, in the example described, the loading station "a" is the station at the operator 101 position, whilst the transfer station "b" is the station diametrically opposed to the loading station "a".

[0038] Between the loading station "a" and the transfer station "b" there is a lifting station "c" in which the pairs of profiles 3 are lifted vertically. Between the transfer station "b" and the loading station "a" there is an outfeed station "d". During operation, the operator 101 loads a stocking 100 on the two profiles 3 which are in the opened out position, separated by an angle α approximately between 110° and 130° and in front of the operator in the loading station "a" (Figure 1), in the lowered position.

[0039] Advantageously, during this step the stocking or tights 100 already applied on the profiles 3 is lit up so that it can be checked for defects.

[0040] Then the pair of profiles 3 supporting the stocking 100 is rotated through approximately 90° clockwise, bringing it to the lifting station "c" where the profiles 3 are lifted and moved radially during profile rotation, thanks to engagement of a bearing 33 integral with the radial movement of the profiles 3 and able to slide in a cam 30 (detail in Figure 5) positioned eccentrically relative to the carrousel axis.

[0041] During this movement, the cam 30 guides the profiles 3 in an outward radial direction, so that the rods 26 move forwards, also pulling the connecting rods 25 which connect them to the guides 7 of the support 10, until the ends 31 of the connecting rods 25 are at the forward end point 32 of the guide 7.

[0042] During this step the connecting rods 25, fixed to the profiles 3, are constrained to follow the diverging stretches of the guides 7 and to rotate about the end 31, thus causing a first rotation with closing of the profiles 3 relative to each other.

[0043] Also in the lifting station "c" the jointed linkage 11 is driven to rotate the element 23 and move the rods

26 towards each other, at the same time causing a further rotation of the connecting rods 25 about the end 31 engaged with the guides 7 and therefore a further rotation with closing of the profiles 3 relative to each other.

[0044] When the movement is complete, the loading profiles have performed a vertical translation, a relative rotation and a movement towards/away from each other, at the end of which they are in a raised position and parallel with each other.

[0045] At the same time, another pair of profiles 3 is presented to the operator 101, who applies a new stocking 100 on them.

[0046] When the new stocking 100 has been applied on the new pair of profiles 3, the carrousel 2 rotates through a further 90°, bringing the first pair of profiles 3 to the transfer station "b" and the second pair of profiles 3 to the lifting station "c".

[0047] In the station "b" the stocking is transferred from the loading profiles 3 to the fixing profiles 102.

[0048] As already indicated, each profile 3 comprises respective walls 4 to which respective L-shaped sections are connected which can be positioned opposite each other to form a substantially U-shaped seat.

[0049] In contrast, the two fixing profiles 102 comprise a single wall having a vertical dimension that is much greater than the vertical dimension of the profiles 3 and much greater than the length of the stockings 100.

[0050] The transversal dimensions of the fixing profiles 102 are less than the dimensions of the L-shaped sections of the profiles 3, allowing the fixing profiles 102 to be inserted in the U-shaped seat formed.

[0051] Therefore, if the profiles 3 are vertically aligned with the fixing profiles 102, that is to say, the profiles 3 are centred on the fixing profiles 102 and the pair of profiles 3 is lowered onto the pair of fixing profiles 102, each profile 3 is applied on the corresponding fixing profile 102, receiving the fixing profile inside the U-shaped seat obtained by joining the two L-shaped walls.

[0052] When the profiles 3 are completely lowered onto the fixing profiles 102, the stocking 100 supported by the profiles 3 is gradually removed from the latter and is gradually fitted onto the fixing profiles 102, until the whole stocking 100 is completely transferred to the fixing profile 102, as illustrated in Figure 2.

[0053] The pair of profiles in the lower position 3b, represents the pair of profiles 3a in the upper position, and the stocking 100 which they support, when the profiles 3 have been lowered onto the fixing profiles 102.

[0054] Moreover, once the stocking 100 has been released to the fixing profiles 102, the profiles 3 can be disengaged from the fixing profiles 102 to continue the loading cycle.

[0055] In this way, once the profiles 3 have been lowered onto the fixing profiles 102, transferring the stocking 100 to the fixing profiles, the profiles 3 move away from each other along the guide 7 due to the joint 11 operated in the opposite direction to its previous operation, and they are also moved radially by a suitable actuator to-

wards the axis of rotation of the carrousel 2, leaving the dimensions of the fixing profiles 102.

[0056] At this point the profiles 3 which performed the transfer are in the lowered position, opened out relative to each other in a "V" shape and can return towards the loading station "a".

[0057] In the meantime another stocking 100 may be applied on the third pair of profiles 3.

[0058] When the first stocking 100 has been transferred to the fixing profiles 102, the carrousel 2 rotates through a further 90°, bringing the first pair of profiles 3 to the outfeed station "d".

[0059] At this point a fourth stocking 100 is applied on the fourth pair of profiles 3. The second and third pairs of profiles 3 are subjected to what has already been described with reference to the first pair of profiles 3.

[0060] A further 90° rotation by the carrousel 2 returns the unit to the starting conditions.

[0061] It must be emphasised that carrousel 2 rotation timing, that is to say, the time for which each pair of profiles 3 remains in the station occupied, is determined by the time for which a pair of profiles 3 remains in the operating station requiring the most time to carry out its operating steps.

[0062] In the preferred embodiment of the invention, said operating station is the loading station "a", although the reduction of the force needed for loading thanks to the invention allows this operation to be carried out more rapidly and without damaging the stocking being processed.

[0063] The invention provides various advantages.

[0064] One important advantage is the fact that a loading unit according to the present invention allows an operator 101 to perform manual loading more easily and rapidly than the prior art units.

[0065] In particular, this advantage is obtained by the diverging position of the profiles which does not cause excessive deformation of the stockings and at the same time allows an excellent view of the stocking.

[0066] This latter aspect is also very important, since the operator 101 can visually check for any defects on the stocking 100 during the initial loading step. The invention described above is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all details of the invention may be substituted by technically equivalent elements.

Claims

1. An automatic loading unit (1) for stockings and tights for fixing machines, comprising:

at least one pair of profiles (3) having respective surfaces (4) which are substantially flat, the pair of profiles (3) being designed to have a stocking (100) fitted on it;

- a transfer unit (6) for transferring the pair of profiles (3) from a first operating position (a) in which they receive the stocking (100) to a second operating position (b) in which they release the stocking (100) to a fixing profile (102) of a fixing machine, the unit being **characterised in that** in the first operating position (a) the profiles (3) are angled so that they are diverging from each other, substantially forming the sides of a "V" having an angle (α), the unit also being **characterised in that** it comprises means (9) for moving the pair of profiles (3) for positioning them in a configuration in which they are opposite each other in the second operating position (b).
2. The unit according to claim 1, **characterised in that** the movement means (9) comprise a support (10) having at least one guide (7) for translating each profile of the pair of profiles (3) towards and away from the other.
 3. The unit according to claim 2, **characterised in that** the movement means (9) comprise a jointed mechanism linkage (11) hinged on the support (10) and hinged on each profile of the pair for translating the profiles (3) relative to each other.
 4. The unit according to claim 3, **characterised in that** the movement means (9) comprise means for rotating the profiles relative to each other, operating in conjunction with the means for translating the profiles relative to each other.
 5. The unit according to any of the foregoing claims, **characterised in that** the transfer unit (6) comprises a carrousel (2) which can rotate about a vertical axis; each pair of profiles (3) being connected to the carrousel (2) for rotating between the first operating position (a) and the second operating position (b).
 6. The unit according to claim 5, **characterised in that** it comprises actuator means for translating the profiles (3) in a radial direction relative to the carrousel axis.
 7. The unit according to any of the foregoing claims, **characterised in that** it comprises actuator means for translating the profiles (3) in a vertical direction.
 8. The unit according to any of the foregoing claims, **characterised in that** each profile belonging to the pair of profiles (3) comprises a substantially flat, vertical wall (4); the pair of walls (4) comprising respective L-shaped sections which can be positioned opposite each other to form a substantially U-shaped seat for receiving the fixing profile (102).
 9. The unit according to any of the foregoing claims, **characterised in that** it comprises four pairs of profiles (3) which are equidistant, each separated from the others by 90°, and connected to the carrousel (2).
 10. The unit according to any of the foregoing claims, **characterised in that** the carrousel (2) comprises four uprights (16) to which four supports (10) for the four pairs of profiles (3) are slidably connected, the pairs of profiles (3) being translated along the uprights (16) by a motor (18) connected to a transmission element (19).
 11. The unit according to any of the foregoing claims, **characterised in that** each pair of profiles (3) can be translated towards and away from the carrousel (2) axis of rotation.
 12. A method for automatically load stockings on fixing profiles, comprising the steps of:
 - positioning at least one pair of loading profiles (3) so that they are substantially forming the sides of a "V" with an angle (α) for receiving a pair of stockings (100) at a loading station (a);
 - lifting said pair of profiles (3);
 - moving said pair of profiles (3) to a station (b) for transferring the stockings (100) to a pair of fixing profiles (102);
 - lowering the pair of profiles (3) for transferring the stockings (100) received directly onto the fixing profiles (102).
- Amended claims in accordance with Rule 137(2) EPC.**
1. An automatic loading unit (1) for stockings and tights for fixing machines, comprising:
 - at least one pair of profiles (3) having respective surfaces (4) which are substantially flat, the pair of profiles (3) being designed to have a stocking (100) fitted on it;
 - a transfer unit (6) for transferring the pair of profiles (3) from a first operating position (a) in which they receive the stocking (100) to a second operating position (b) in which they release the stocking (100) to a fixing profile (102) of a fixing machine, in the first operating position (a) the profiles (3) being angled so that they are diverging from each other, substantially forming the sides of a "V" having an angle (α), the unit also comprising a profile movement mechanism (9) for moving the profiles (3) with a combined movement towards/away from each other and for rotation relative to each other during movement of the profiles through the different operating stations for positioning them in a configuration

ration in which they are facing each other in the second operating position (b); **characterised in that** said profile movement mechanism (9) comprises a Y-shaped support (10) for said pair of profiles (3), said Y-shaped support (10) comprising one diverging guide (7) for each profile (3) of said pair of profiles (3). 5

2. The unit according to claim 1, **characterised in that** the profile movement mechanism (9) comprise a jointed mechanism linkage (11) hinged on the support (10) and hinged on each profile of the pair for translating the profiles (3) relative to each other. 10

3. The unit according to claim 2, **characterised in that** the profile movement mechanism (9) comprise means for rotating the profiles relative to each other, operating in conjunction with the means for translating the profiles relative to each other. 15

4. The unit according to any of the foregoing claims, **characterised in that** the transfer unit (6) comprises a carousel (2) which can rotate about a vertical axis; each pair of profiles (3) being connected to the carousel (2) for rotating between the first operating position (a) and the second operating position (b). 20 25

5. The unit according to claim 4, **characterised in that** it comprises actuator means for translating the profiles (3) in a radial direction relative to the carousel axis. 30

6. The unit according to any of the foregoing claims, **characterised in that** it comprises actuator means for translating the profiles (3) in a vertical direction. 35

7. The unit according to any of the foregoing claims, **characterised in that** each profile belonging to the pair of profiles (3) comprises a substantially flat, vertical wall (4); the pair of walls (4) comprising respective L-shaped sections which can be positioned opposite each other to form a substantially U-shaped seat for receiving the fixing profile (102). 40

8. The unit according to any of the foregoing claims, **characterised in that** it comprises four pairs of profiles (3) which are equidistant, each separated from the others by 90°, and connected to the carousel (2). 45

9. The unit according to any of the foregoing claims, **characterised in that** the carousel (2) comprises four uprights (16) to which four supports (10) for the four pairs of profiles (3) are slidably connected, the pairs of profiles (3) being translated along the uprights (16) by a motor (18) connected to a transmission element (19). 50 55

FIG. 1

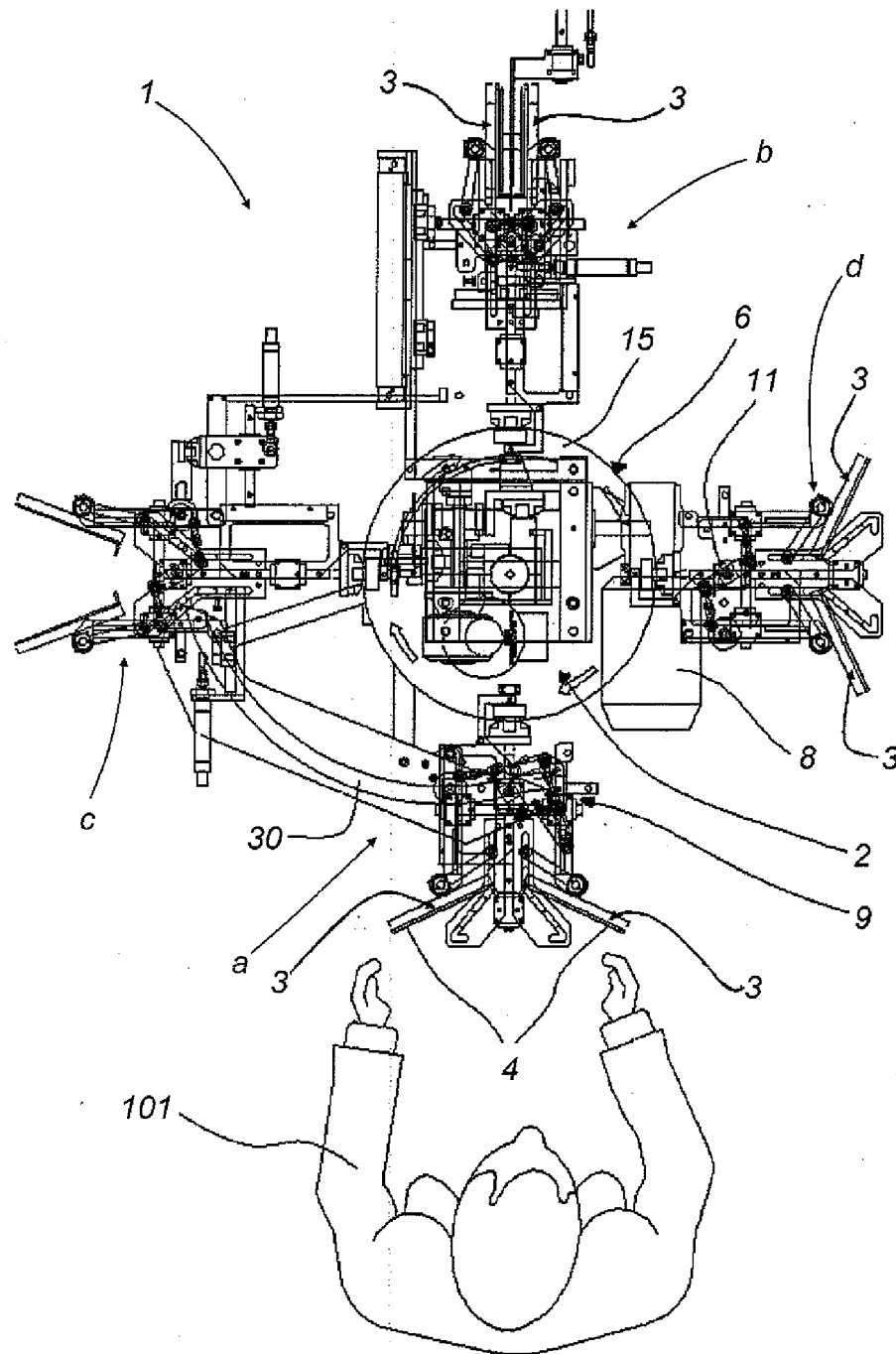


FIG. 2

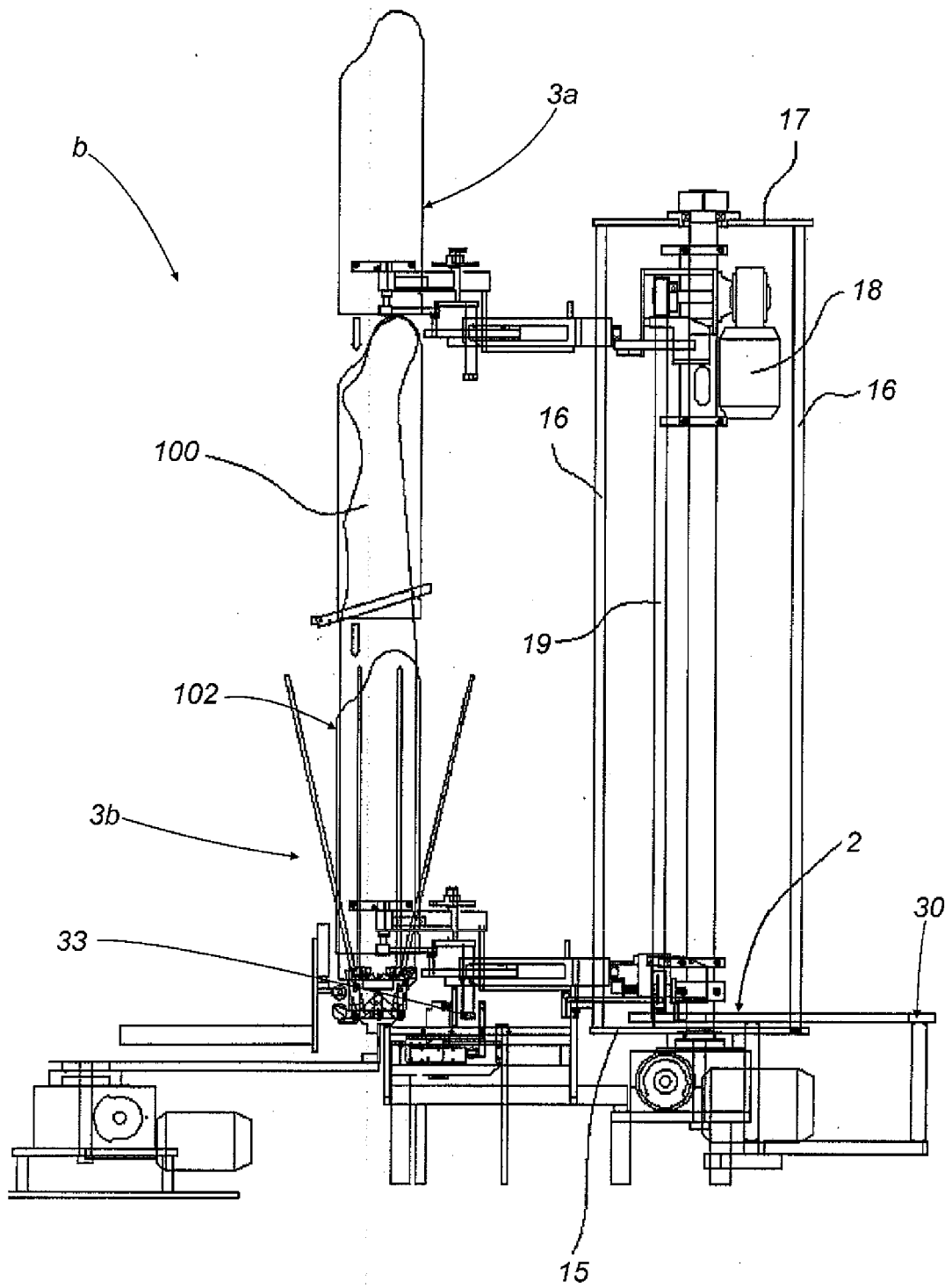


FIG.3

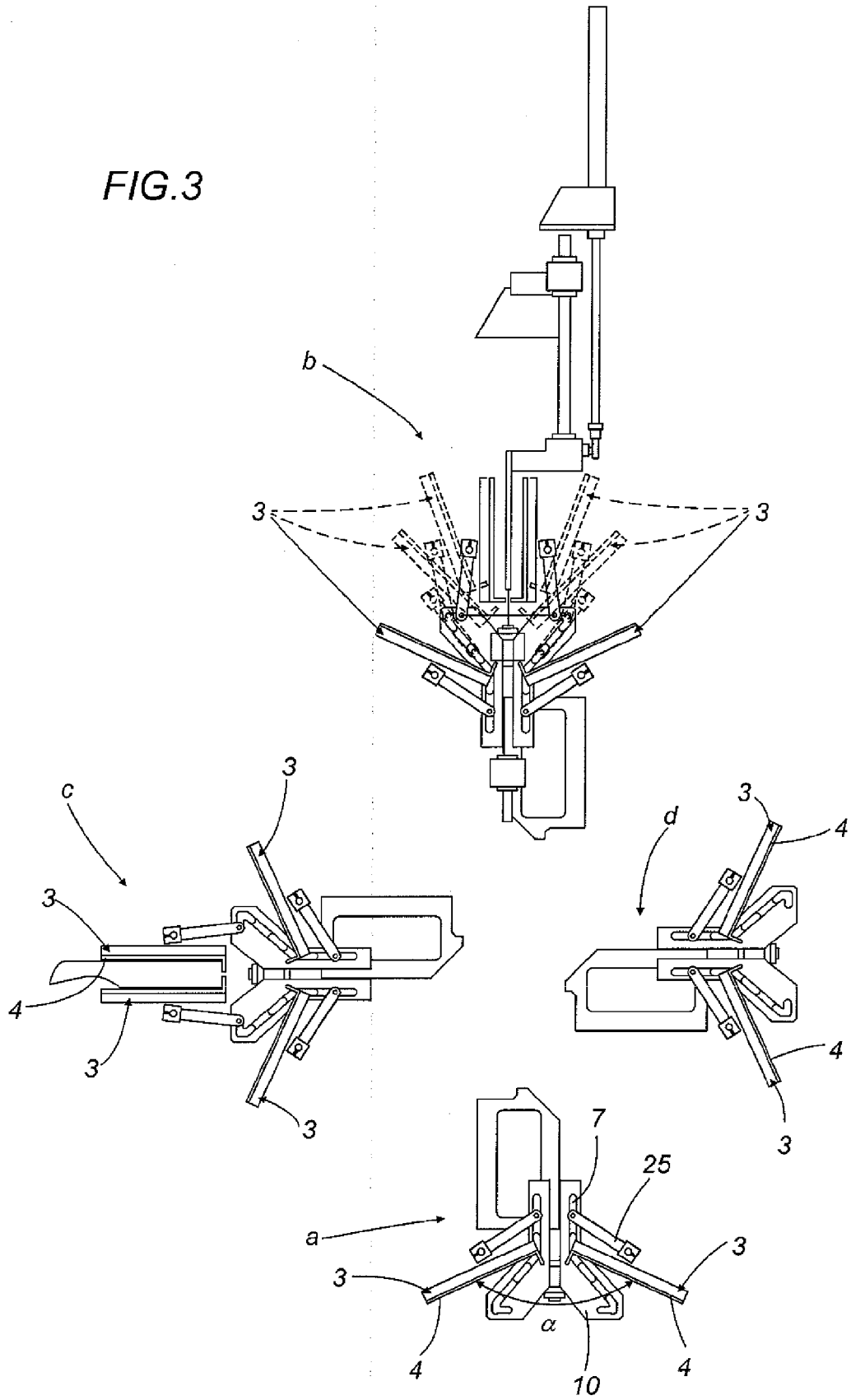


FIG.4

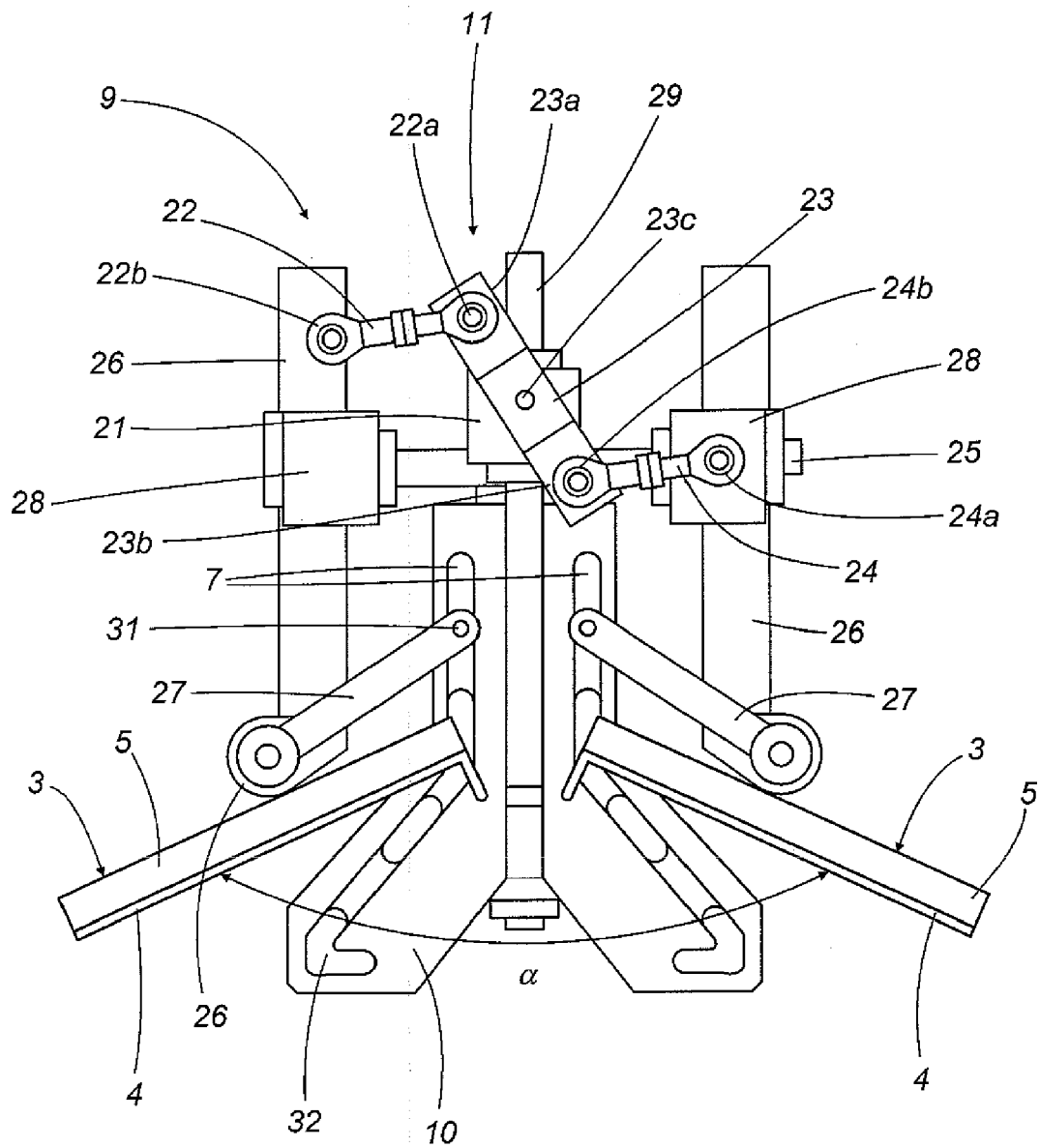
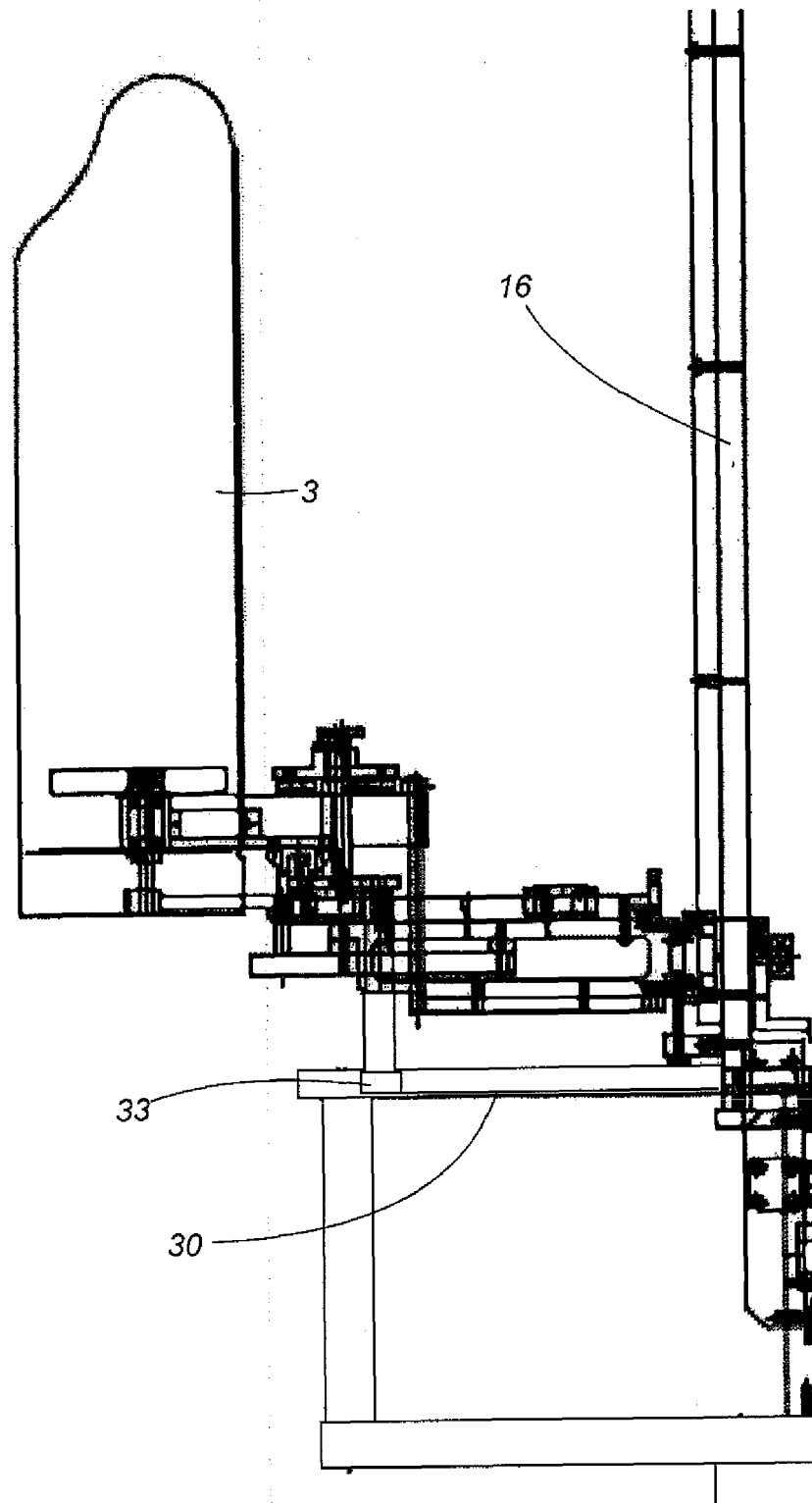


FIG.5





EUROPEAN SEARCH REPORT

Application Number
EP 09 16 2904

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 10 November 2009	Examiner Bichi, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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