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(54) **Boxing machine**

(57) A boxing machine comprises a supporting structure (2) on which a head (3) is mounted, the head rotating according to a main axis of rotation (X). The head (3) is equipped with means (4) for picking up and releasing products (5) and can rotate between a pick up position (7) in which the pick up and release means (4) can pick up products (5) to be boxed, and a release position (8) in which the pick up and release means (4) can release

the products (5) in boxes (8). Head (3) rotation about the main axis of rotation (X) is guaranteed by a motor (22) having a stator (23) and a rotor (24) rotatably connected to the stator (23) according to a secondary axis of rotation. The motor (22) is positioned with the secondary axis of rotation coinciding with the main axis of rotation (X) and the rotary head (3) is supported by the motor (22) rotor (24).

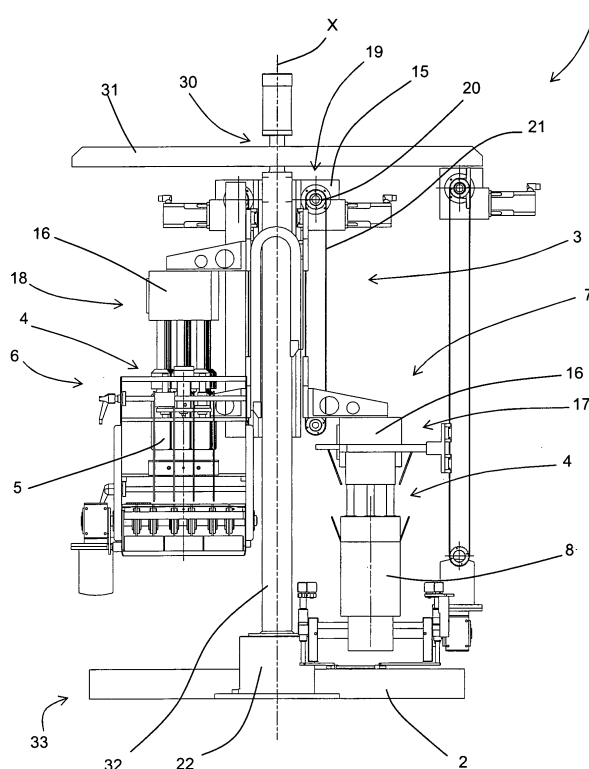


FIG. 5

Description

[0001] The present invention relates to a boxing machine, that is to say a machine able to pick up loose products and insert them in suitable boxes.

[0002] In general, boxing machines comprise a supporting structure on which a head supporting product pick up and release means is rotatably mounted. The head can rotate at least between a first position in which the pick up and release means can pick up products from a product feed device, and a second position in which the pick up and release means can place the products in boxes positioned on a second feed device.

[0003] At present there are many known types of boxing machines. In particular, there are known boxing machines in which the rotary head is supported by the lower part of the frame (described for example in patents US 4 977 727 and US 6 722 101) and machines in which, in contrast, the head is suspended below the upper part of the frame (see for example patent EP 1 318 074).

[0004] In all of the currently known boxing machines, head rotation is driven by a suitable motor (normally with horizontal axis) mounted close to one end of the head vertical axis of rotation and connected to the head by a specific transmission.

[0005] However, this known technology has several disadvantages, since the known type of motor - transmission assembly normally has relatively large dimensions and its construction is quite complex.

[0006] In this situation, the technical purpose which forms the basis of the present invention is to provide a boxing machine which overcomes the above-mentioned disadvantages.

[0007] In particular, the present invention has for a technical purpose to provide a boxing machine which is compact and has limited construction complexity. The technical purpose specified and the aims indicated are substantially achieved by a boxing machine as described in the claims herein.

[0008] Further features and advantages of the present invention are more apparent in the detailed description below, with reference to several preferred, non-limiting embodiments of a boxing machine, illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic axonometric three-quarter front view of a boxing machine made in accordance with a first embodiment of the present invention;
- Figure 2 is a top view of the machine of Figure 1;
- Figure 3 is a side view of the machine of Figure 1;
- Figure 4 is a rear view of the machine of Figure 1, with some parts cut away to better illustrate others;
- Figure 5 is a rear view, corresponding to that of Figure 4, of a second embodiment of a boxing machine made in accordance with the present invention; and
- Figure 6 is a schematic cross-section of part of the machines in the previous figures.

[0009] With reference to the accompanying drawings, the numeral 1 denotes as a whole a boxing machine in accordance with the present invention.

[0010] In general, the boxing machine 1 comprises a supporting structure 2 on which there is rotatably mounted, according to a main axis of rotation X, a rotary head 3 equipped with means 4 for picking up and releasing products 5 (products 5 only visible in Figures 4 and 5), and able to move by rotating between a pick up position 6 in which the pick up and release means 4 can pick up products 5 to be boxed, and a release position 7 in which the pick up and release means 4 can release the products 5 in suitable boxes 8.

[0011] In particular, in the embodiments illustrated in the accompanying drawings, the machine also comprises at least a first feed device 9 for feeding products 5 to a first station 10 located at the head 3 pick up position 7, where the products can be picked up by the pick up and release means 4, at least a second feed device 11 for feeding boxes 8 to a second station 12 located at the head 3 release position 8, where the products 5 can be released into boxes 8 by the pick up and release means 4, and at least one distancing device 13 for moving away the boxes 8 filled with products 5.

[0012] As shown in Figures 1 and 2, the first feed device 9 consists of a first conveyor to the top of which there are associated vertical panels 14 positioned parallel with the direction in which the conveyor extends so as to form lanes for guiding the products 5 to be boxed. Advantageously, the width of each lane allows it to receive only one row of products 5, and each lane is designed to arrange the products 5 in such a way that they can easily be picked up by the pick up and release means 4.

[0013] In the accompanying drawings the second feed device 11 and the distancing device 13 consist of a single second conveyor, with the second station 12 at an intermediate position.

[0014] In addition, the first and second conveyors are positioned parallel with one another and in such a way that the first station 10 and the second station 12 are positioned, relative to the head 3, on diametrically opposed sides of the axis of rotation X (therefore separated by a rotation of 180°).

[0015] Therefore, advantageously, in the embodiments illustrated, the rotary head 3 has a substantially symmetrical shape in such a way that it doubles its productivity, operating simultaneously in both the first station 10 and in the second station 12. For this purpose, the head 3 comprises a frame 15 on which two load-bearing elements 16, each part of the pick up and release means 4, are slidably mounted in diametrically opposed positions. As shown in Figure 5, the elements 16 may be moved on the frame 15 between a lower position 17 and an upper position 18, according to a direction of movement parallel with the head 3 axis of rotation (vertical), by the action of suitable movement means 19. The movement means 19 may preferably consist of at least one actuator (fluid or electric) which can be operatively con-

nected to each element 16 either directly or by means of at least one transmission. In particular, in the embodiments illustrated the movement of each element 16 is guaranteed by an electric actuator 20 connected to the relative element 16 by a belt drive 21.

[0016] However, it must be emphasised that in other embodiments only one sliding element 16 is mounted on the head 3, or more than two may be mounted.

[0017] Head 3 rotation relative to the supporting structure 2 is guaranteed by a motor 22 operatively connected to it, and which has, in the known way, a stator 23 and a rotor 24 rotatably connected to the stator 23 according to a secondary axis of rotation.

[0018] In accordance with the present invention, the motor 22 is positioned in such a way that the secondary axis of rotation coincides with the main axis of rotation X and in such a way that the rotary head 3 (and in particular its frame 15) is supported by the motor 22 rotor 24. In other words, in accordance with the present invention, practically the entire weight of the head 3 rests on the rotor 24 of the motor 22 designed to move it.

[0019] In the preferred embodiment, the head 3 rests on top of the motor 22 rotor 24, but in other embodiments it may also be hooked below it.

[0020] Figure 6 is a cross-section of a possible motor 22 which can be used with the present invention to support the rotary head 3 from below. Said motor 22 comprises a central supporting body 25 consisting of a cylinder (hollow in the accompanying drawings but which may also be solid) on which an annular bearing 26 is mounted, in turn supporting the rotor 24 which also consists of a hollow cylinder (on the outer surface of which permanent magnets 27 are fixed). The motor 22 stator 23 consists of another hollow cylinder mounted outside the rotor 24 and mechanically connected to the central body 25 by a lower part 28 also connected to the machine supporting structure 2. The motor 22 also comprises an upper part 29 (disc - shaped) integral with the rotor 24 and connected to the head 3.

[0021] Moreover, in the embodiment illustrated in Figure 5, the boxing machine 1 comprises means 30 for guiding head 3 rotation, the means connected to an upper portion 31 of the supporting structure 2, above the head 3. Advantageously, the guide means 30 apply a reaction force on the head 3 practically solely in the radial direction to always maintain the correct positioning of the axis of rotation, counterbalancing any radial stresses to which it may be subjected.

[0022] Depending on design requirements, in accordance with the present invention the motor 22 may be positioned at any height from the ground.

[0023] For example, whilst in Figures 1 to 4 an embodiment is illustrated in which the motor 22 is, in practice, higher than both the products 5 and the boxes 8, in the embodiment in Figure 5 it is connected directly to the lower base of the supporting structure 2.

[0024] Consequently, in the embodiment in Figures 1 to 4, the supporting structure 2 comprises a supporting

column 32 extending upwards from the lower portion 33 of the supporting structure 2, and the motor 22 is connected to an upper end of the column 32. In contrast, in the embodiment in Figure 5, where the motor 22 is positioned at a lower portion 33 of the supporting structure 2, a supporting column 32 extending mainly vertically is present between the motor 22 and the rotary head 3. The top of the column 32 is connected to the head 3 and the bottom of the column is connected to the motor 22.

[0025] Therefore, whilst in the former case the head 3 is integral with the motor 22 rotor 24, in the latter case the head 3 is integral with the column 32 whilst the column 32, in turn, is integral with the rotor 24.

[0026] Operation of the boxing machine 1 disclosed is immediately relative to the structural description above and is similar to that of conventional machines.

[0027] The present invention brings important advantages.

[0028] Thanks to the present invention it was possible to prepare compact boxing machines with limited construction complexity.

[0029] Moreover, thanks to the positioning of the motor directly aligned with the rotary head, rotation of the head is more easily controlled.

[0030] It should also be noticed that the present invention is relatively easy to produce and even the cost linked to implementation of the invention is not very high.

[0031] The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

[0032] All details of the invention may be substituted by other technically equivalent elements and, in practice, all of the materials used, as well as the shapes and dimensions of the various components, may be any according to requirements.

Claims

1. A boxing machine comprising:

- a supporting structure (2);
- a rotary head (3) rotatably mounted on the supporting structure (2) according to a main axis of rotation (X);
- a motor (22) having a stator (23) and a rotor (24) rotatably connected to the stator (23) according to a secondary axis of rotation, the motor (22) being operatively connected to the head (3) so as to cause it to rotate about the main axis of rotation (X);
- means (4) for picking up and releasing products (5), mounted on the head (3);
- the head (3) being able to rotate between a pick up position (7) in which the pick up and release means (4) can pick up products (5) to be boxed, and a release position (8) in which the pick up and

- release means (4) can release the products (5) in boxes (8);
the boxing machine being **characterised in that** the motor (22) is positioned with the secondary axis of rotation coinciding with the main axis of rotation (X) and **in that** the rotary head (3) is supported by the motor (22) rotor (24).
2. The boxing machine according to claim 1, **characterised in that** the motor (22) in turn comprises a lower part (28) integral with the stator (23) and connected to the supporting structure (2), and an upper part (29) integral with the rotor (24) and connected to the head (3).
 3. The boxing machine according to claim 1 or 2, **characterised in that** it also comprises means (30) for guiding head (3) rotation, the means being connected to an upper portion (31) of the supporting structure (2) above the head (3).
 4. The boxing machine according to any of the foregoing claims, **characterised in that** the supporting structure (2) comprises a supporting column (32) extending upwards from a lower portion (33) of the supporting structure (2), the motor (22) being connected to an upper end of the column (32).
 5. The boxing machine according to any of the claims from 1 to 3, **characterised in that** the motor (22) is positioned at a lower portion (33) of the supporting structure (2), and **in that** it also comprises a supporting column (32) extending mainly vertically, the top of the column being connected to the head (3) and the bottom of the column connected to the motor (22).
 6. The boxing machine according to any of the foregoing claims, **characterised in that** the head (3) is integral with the motor (22) rotor (24).
 7. The boxing machine according to claims 5 and 6, **characterised in that** the head (3) is integral with the column (32) and **in that** the column (32) in turn is integral with the motor (22) rotor (24).
 8. The boxing machine according to any of the foregoing claims, **characterised in that** it also comprises at least a first feed device (9) for feeding the products (5) to a first station (10) located at the head (3) pick up position (7), where the products can be picked up by the pick up and release means (4).
 9. The boxing machine according to any of the foregoing claims, **characterised in that** it also comprises at least a second feed device (11) for feeding the boxes (8) to a second station (12) located at the head (3) release position (8), where the products (5) can be released by the pick up and release means (4).
 10. The boxing machine according to any of the foregoing claims, **characterised in that** it also comprises at least one distancing device (13) for moving away the boxes (8) filled with products (5).
 11. The boxing machine according to any of the foregoing claims, **characterised in that** the head (3) comprises a frame (15) supported by the motor (22) and at least one element (16) slidably mounted on the frame (15) according to a direction of movement parallel with the axis of rotation, the pick up and release means (4) being mounted on said element (16).
 12. The boxing machine according to claim 11, **characterised in that** it also comprises means (19) for moving the element (16) between a lower position (17) and an upper position (18).
 13. The boxing machine according to claim 12, **characterised in that** the pick up means comprise at least one actuator.
 14. The boxing machine according to claim 13, **characterised in that** said actuator is a fluid actuator.
 15. The boxing machine according to claim 13, **characterised in that** said actuator is an electric actuator.
 16. The boxing machine according to any of the claims from 12 to 15, **characterised in that** the movement means (19) also comprise at least one transmission inserted between the element (16) and the actuator.

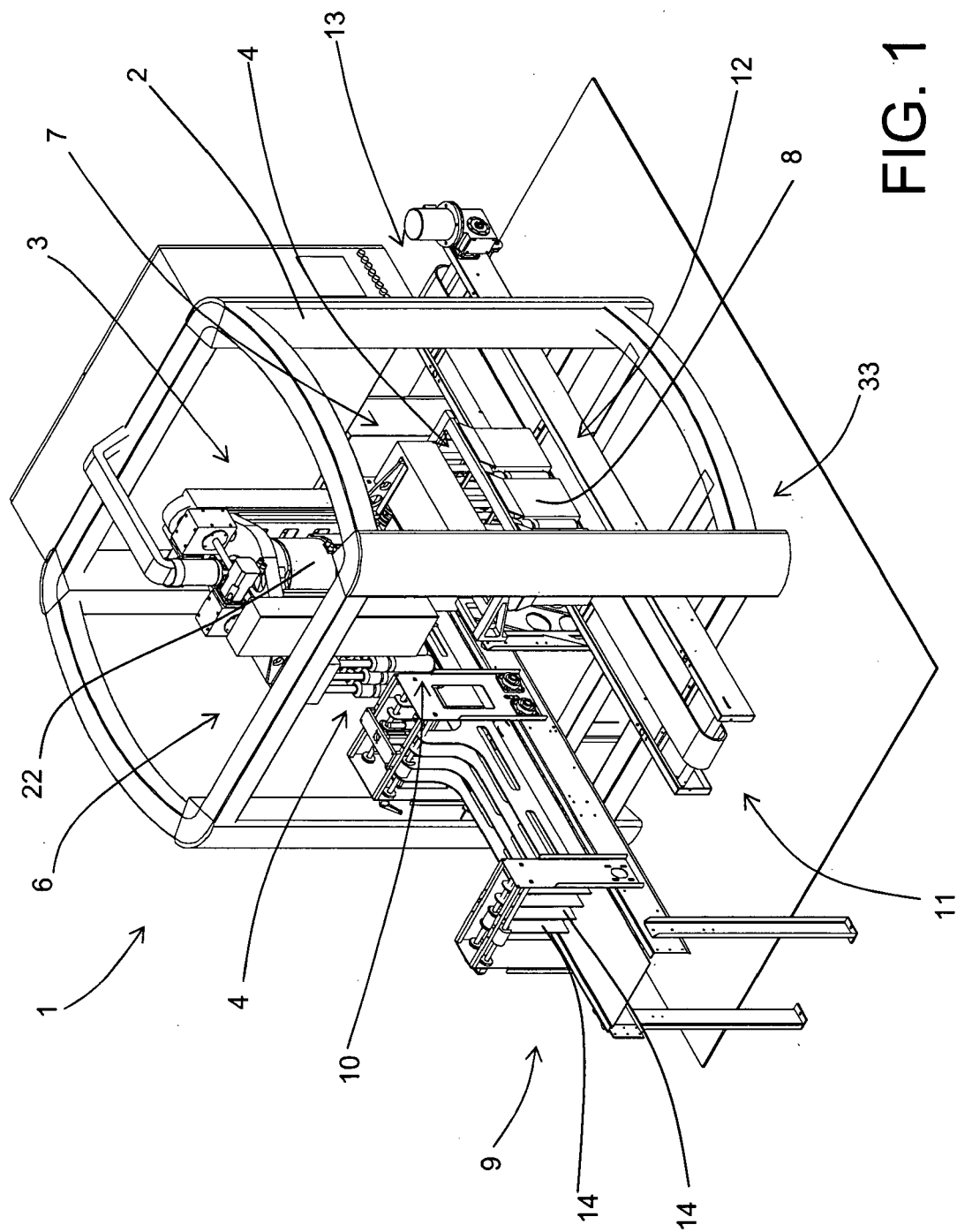
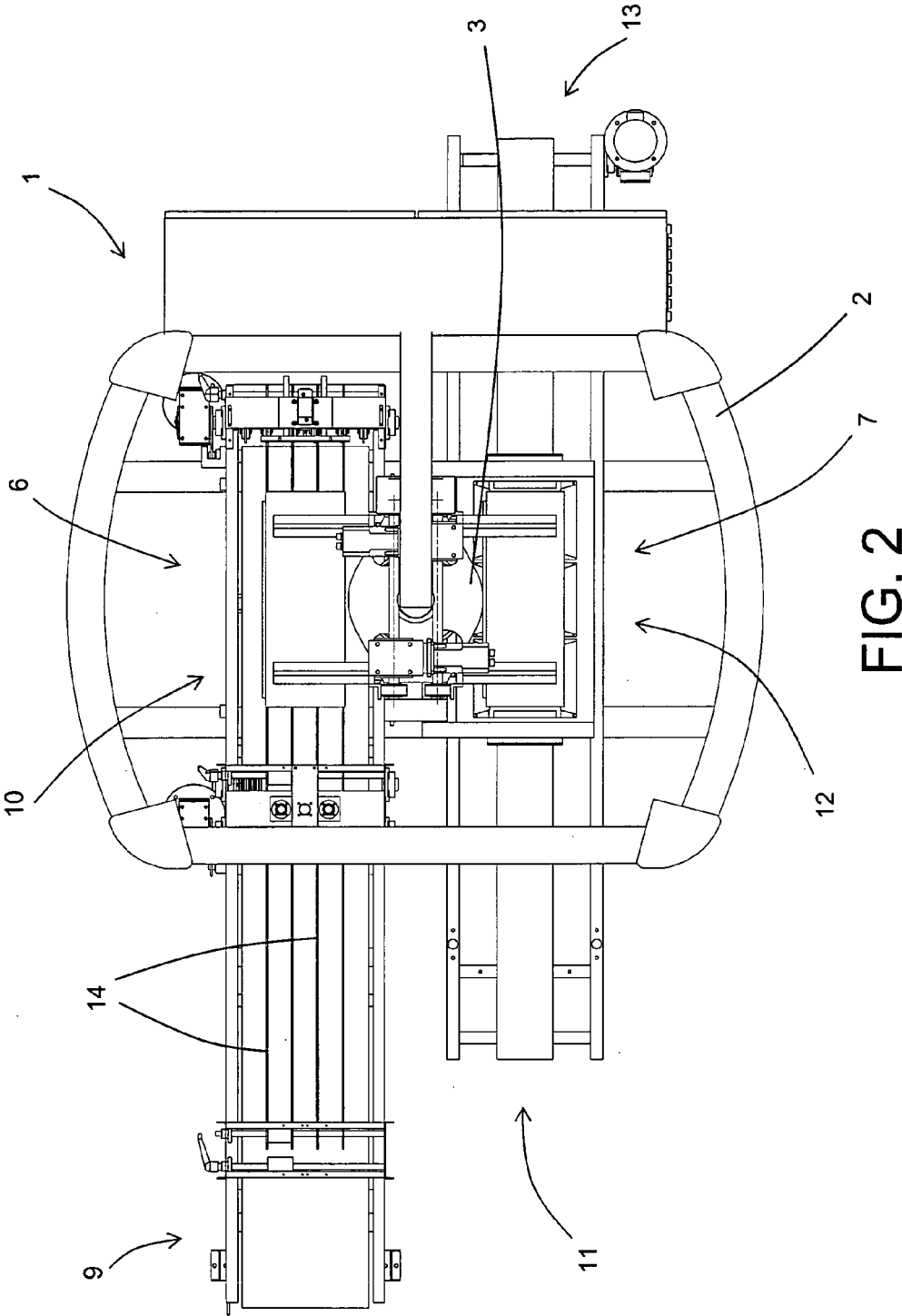
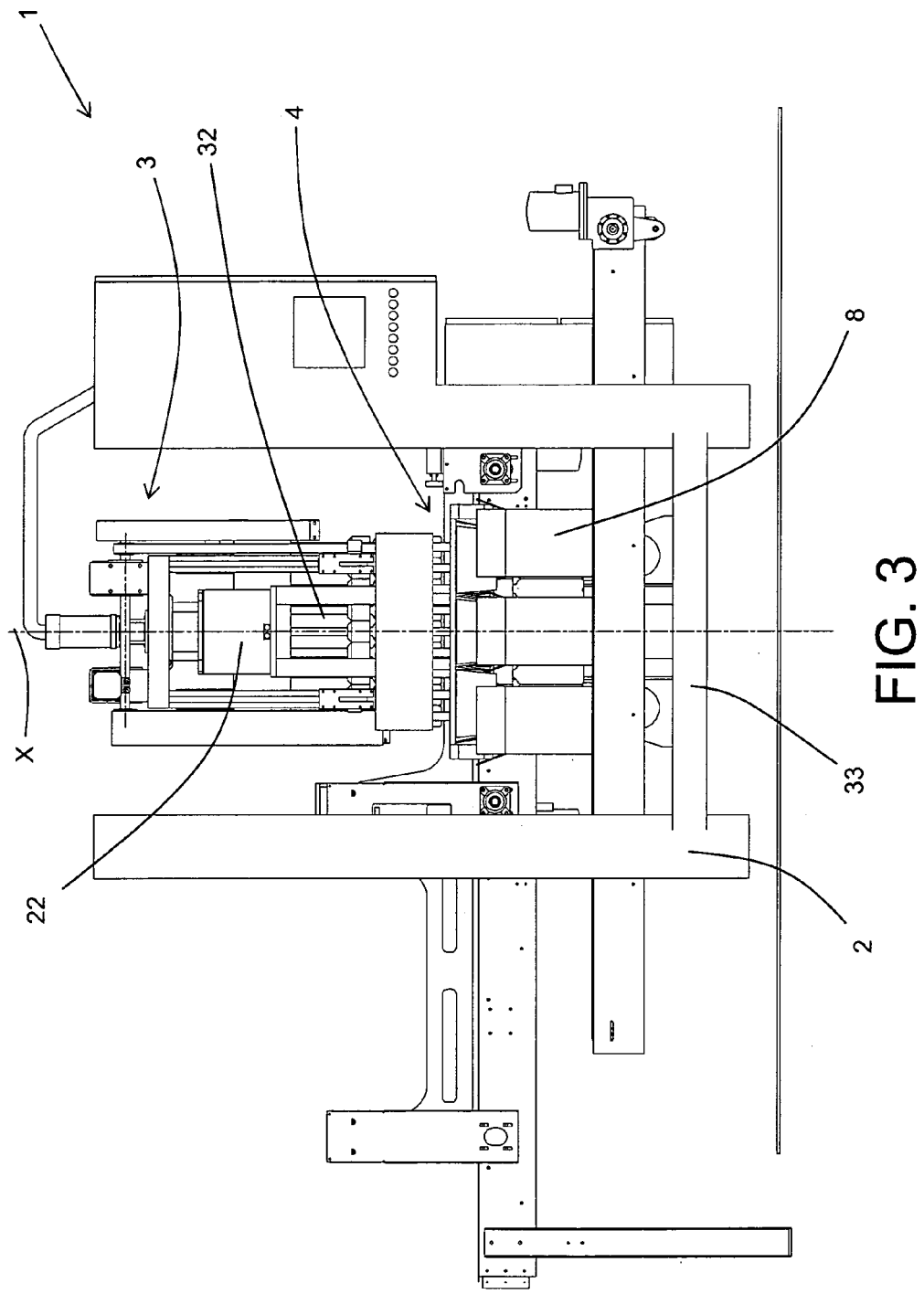
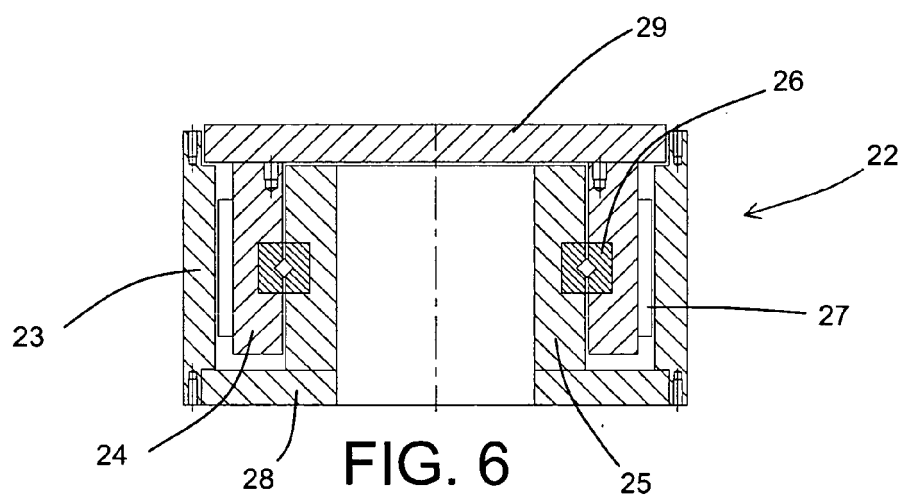
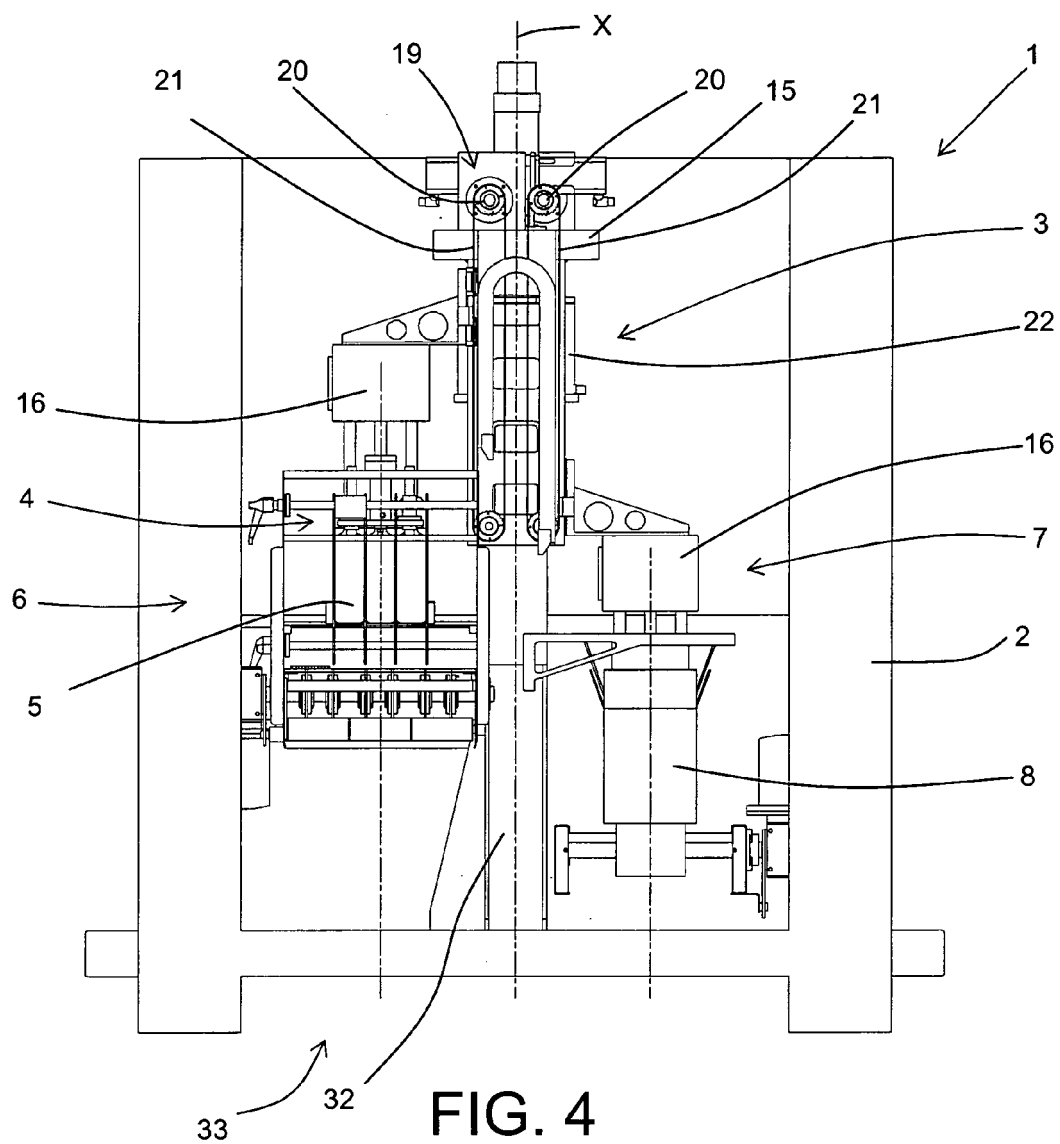


FIG. 1







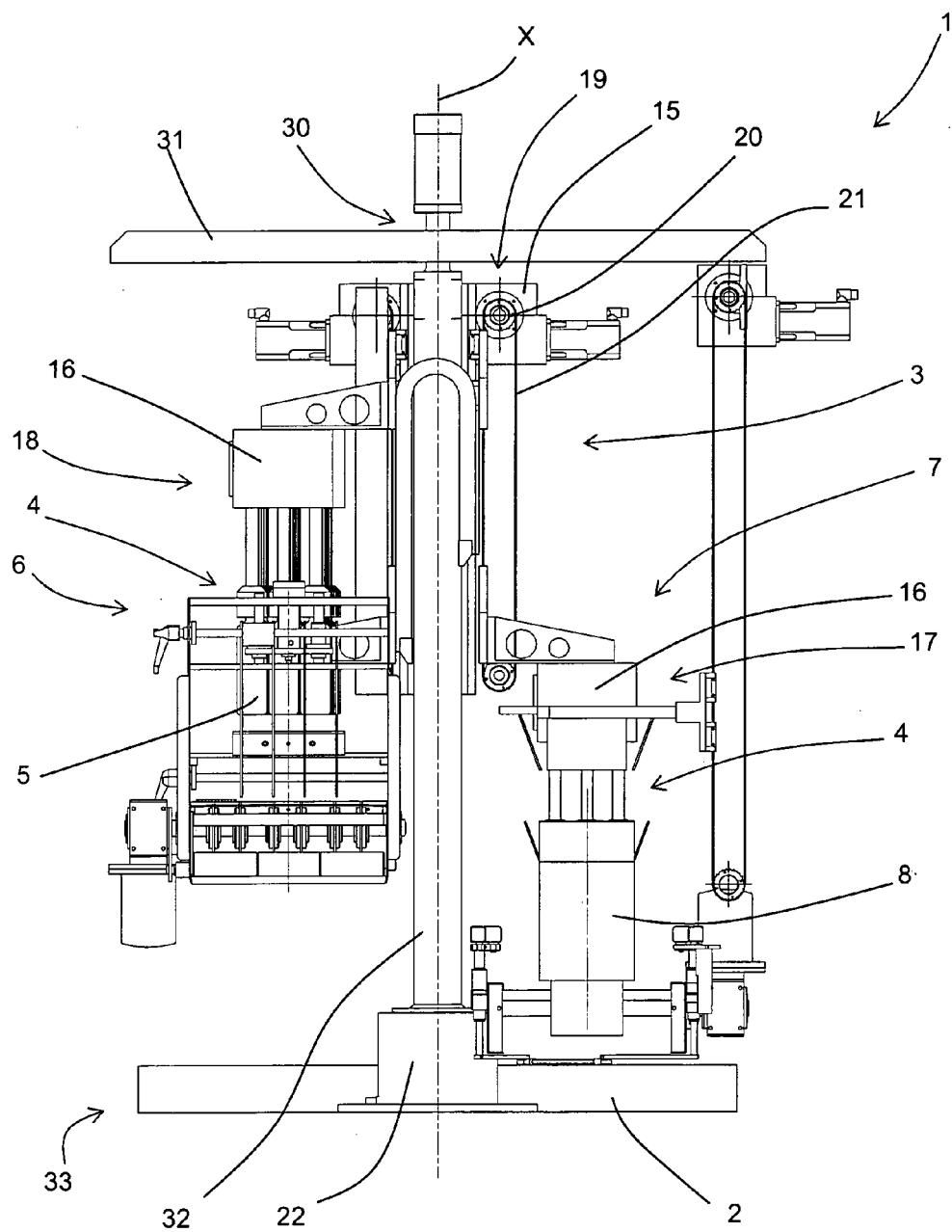


FIG. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5113

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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 28 August 2008	Examiner Schelle, Joseph
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EPO FORM 1503 03.82 (P04C01)

**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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