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(54) **APPARATUS FOR HANDLING PARTS TO BE WORKED**

(57) An apparatus (10) for handling parts to be worked, comprising a worktable (11), means (12) for the rotation of the worktable (11) about an axis that is perpendicular to the plane of arrangement, and means (13) for varying the inclination of the worktable (11). The apparatus (10) comprises means (15) for varying the height of the worktable (11).

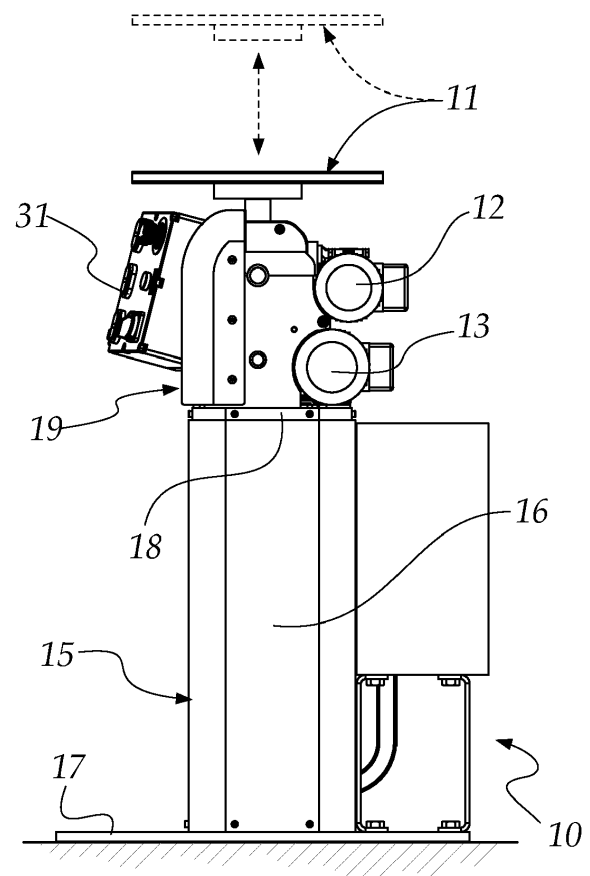


Fig.3

Description

[0001] The present invention relates to an apparatus for handling parts to be worked.

[0002] The invention is applicable in the industrial field, particularly in the metalworking and mechanical engineering industry.

[0003] Currently, in order to perform work on parts, such as for example drilling, threading, deburring, component assembly, welding, polishing, painting, testing, etcetera, the operator must, in many cases, handle the part in order to arrange it in the most favorable configuration for performing the work.

[0004] In the case of a part of significant dimensions and/or mass, the operator is forced to move around it, possibly bending down or assuming awkward positions in order to perform the work effectively.

[0005] To overcome such drawbacks, a positioning device with rotary table is sometimes used for welding operations only.

[0006] Such apparatus has a table on which the part to be welded is placed and, which can rotate on command to move/rotate the part with respect to the operator, preventing the operator from having to move around it in order to perform the work.

[0007] Some positioning devices with rotary table furthermore can vary the inclination of the table in order to increase operator comfort during welding operations.

[0008] Such known techniques have some drawbacks.

[0009] First of all, currently positioning devices with rotary table are used almost exclusively for welding operations.

[0010] Moreover, while some positioning devices with rotary table allow to vary the inclination of the table, they do not allow correct ergonomics or posture to the operators in a sitting or standing position.

[0011] Moreover, operators can be significantly different in height, and currently known apparatuses do not allow to adapt the height of the rotary table to the height of the operator, leading to discomfort for the operator during work steps.

[0012] The aim of the present invention is to provide an apparatus for handling parts to be worked that is capable of improving the background art in one or more of the aspects mentioned above.

[0013] Within this aim, an object of the invention is to provide an apparatus for handling parts to be worked, even of significant dimensions and/or mass, which gives greater comfort to the operator during work steps than similar apparatuses of the known type.

[0014] Another object of the invention is to devise an apparatus for handling parts to be worked that can vary the height and/or inclination of the part being worked as needed.

[0015] Another object of the invention is to provide an apparatus for handling parts to be worked of considerable dimensions and/or mass that is not limited to welding operations only.

[0016] A further object of the present invention is to overcome the drawbacks of the background art in a manner that is alternative to any existing solutions.

[0017] Not least object of the invention is to provide an apparatus for handling parts to be worked that is highly reliable, relatively easy to provide and at competitive costs.

[0018] This aim and these and other objects that will become better apparent hereinafter are achieved by an apparatus for handling parts to be worked, comprising a worktable, means for the rotation of said worktable about an axis that is perpendicular to the plane of arrangement, and means for varying the inclination of said worktable, characterized in that it comprises means for varying the height of said worktable.

[0019] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the apparatus for handling parts to be worked, according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a general perspective view of an apparatus for handling parts to be worked according to the invention;

Figure 2 is a front view of the apparatus of Figure 1 in a first operating configuration;

Figure 3 is a side view of the apparatus of Figure 1 in a second operating configuration;

Figures 4a and 4b are two different views of a portion of the apparatus of Figure 1.

[0020] With reference to the figures, an apparatus for handling parts to be worked, according to the invention, is generally designated by the reference numeral 10.

[0021] The apparatus 10 comprises a worktable 11, means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement, and means 13 for varying the inclination of the worktable 11.

[0022] The expression "axis that is perpendicular to the plane of arrangement" in the present description means an axis that is perpendicular to the plane on which the worktable 11 lies.

[0023] For example, in the case shown in the figures, with the worktable 11 having a circular contour, said axis coincides with the perpendicular axis that passes through the center of the circular surface, while in the case of a worktable 11 with a quadrangular contour said axis can coincide with the axis that passes through the intersection between the diagonals of the quadrangular surface.

[0024] However, in other embodiments, not shown in the figures, such axis that is perpendicular to the plane of arrangement of the worktable 11 might not be a central axis.

[0025] One of the particularities of the invention resides in that the apparatus 10 comprises means 15 for varying the height of the worktable 11.

[0026] Such means 15 for varying the height of the worktable 11 are constituted by a lifting post.

[0027] Such lifting post 15 is provided with a linear actuator, not shown in the figures, inside a telescopic tubular enclosure 16, which is closed:

- at the lower end, by a base 17,
- at the upper end, by a top 18.

[0028] Two fixing plates, not shown in the figures, are integrated at the two ends of the lifting post 15 and the top 18 and the base 17 are fixed to the plates at one end and at the other end.

[0029] A stroke limit is present inside the tubular enclosure 16 and is mounted on a supporting bracket, which in turn is fixed to the base 17, and is actuated by an L-shaped bracket which is fixed on the movable part of the enclosure 16 and connected to the top 18.

[0030] The top 18 of the enclosure 16 is fixed to a movement assembly 19 which comprises the means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement and means 13 for varying the inclination of the worktable 11.

[0031] The lifting post 15 has a stroke, in terms of elevation, on the order of 30 cm.

[0032] The lifting post 15 is, for example, of the type of the one known by the trade name LP2 of the LINAK ITALIA S.r.l. company in Buccinasco (MI).

[0033] In particular, the means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement comprise a first electric motor 20, which is kinematically connected to a first gearmotor 21, from which a first shaft 22 extends for transmitting the rotation to the worktable 11 by means of a rotating joint 30 which is fixed to the worktable 11.

[0034] The means 13 for varying the inclination of the worktable 11 instead comprise a second electric motor 23, which is kinematically connected to a second gearmotor 24, from which a second shaft 25 extends for the transmission of the inclination to the worktable 11.

[0035] Such second electric motor 23 is provided with an electric brake in order to ensure the locking of the worktable 11 with the maximum load and an inclination beyond 45°.

[0036] The first motor 20 and the second electric motor 23 are controlled separately by means of adapted inverters, not shown in the figures.

[0037] Such means 13 for varying the inclination of the worktable 11 have a fixed arrangement with respect to the lifting post 15 and are fixed and at least partially contained in a first substantially box-like support 27, which in turn is anchored in a downward region to the top 18.

[0038] A second substantially box-like support 28 is inserted at least partially within said first support 27, is coupled to the first support 27 but can rotate with respect to it, and the means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement are fixed and at least partially contained in

said second support 28.

[0039] In particular, the second shaft 25 is extended between two opposite walls 29 of the first support 27, is free with respect to them and passes through two opposite walls 26 of the second support 28, which are keyed on said second shaft 25.

[0040] Each one of the walls 26 of the second support 28 is constituted by a sector which faces a corresponding wall 29 of the first support 27.

[0041] When the second shaft 25 rotates, the second support 28 also rotates, since the walls 26 of said second support 28 are keyed thereon.

[0042] The means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement therefore have a variable arrangement, depending on use, with respect to the lifting post 15.

[0043] Such means 12 for the rotation of the worktable 11 about an axis that is perpendicular to the plane of arrangement, the means 13 for varying the inclination of the worktable 11 and the means 15 for varying the height of the worktable 11 are controlled by means of a control panel 31 to which they are connected electrically.

[0044] The worktable 11 can rotate through 360° with respect to its rotation axis, both in a clockwise direction and in a counterclockwise direction, and can tilt by 90° with respect to a horizontal axis.

[0045] The control panel 31 is associated with the movement assembly 19 by means of a first arm 32 and is electrically connected to the lifting post 15 by means of electrical cables contained in a flexible cable track 33.

[0046] It should be noted that the apparatus 10, according to the invention, allows to handle parts even on the order of 250 kg.

[0047] With the apparatus 10 it is possible to move the part on the worktable 11 by making it rotate on the horizontal plane or tilting it or also by adjusting its height in order to allow a correct posture of the operator both standing and sitting.

[0048] Furthermore, by virtue of the possibility to handle the part in three different manners it is possible to work on the part fixed to the worktable on five faces in total safety and ergonomics and without the need to move, with a reduction of movement times on the order of 80%.

[0049] In practice it has been found that the invention has achieved the intended aim and objects, providing an apparatus for handling parts to be worked, even of considerable dimensions and/or mass, which gives the operator greater comfort during work steps than similar apparatuses of the known type.

[0050] The invention provides an apparatus for handling parts to be worked that can vary the height and/or the inclination of the part being worked as needed.

[0051] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the accompanying claims; all the details may furthermore be replaced with other technically equivalent elements.

[0052] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements and the state of the art.

[0053] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An apparatus (10) for handling parts to be worked, comprising a worktable (11), means (12) for the rotation of said worktable (11) about an axis that is perpendicular to the plane of arrangement, and means (13) for varying the inclination of said worktable (11), **characterized in that** it comprises means (15) for varying the height of said worktable (11).
2. The apparatus (10) according to claim 1, **characterized in that** said means (15) for varying the height of said worktable (11) are constituted by a lifting post.
3. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said lifting post (15) is provided with a linear actuator inside a telescopic tubular enclosure (16) which is closed:
 - at the lower end, by a base (17),
 - at the upper end, by a top (18).
4. The apparatus (10) according to claim 3, **characterized in that** said lifting post (15) is of the type of the one known by the trade name LP2 of the LINAK ITALIA S.r.l. company in Buccinasco (MI).
5. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said top (18) of said enclosure (16) is fixed to a movement assembly (19) which comprises said means (12) for the rotation of said worktable (11) about an axis that is perpendicular to the plane of arrangement and said means (13) for varying the inclination of said worktable (11).
6. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said means (12) for the rotation of said worktable (11) about an axis that is perpendicular to the plane of arrangement comprise a first electric motor (20), which is kinematically connected to a first gearmotor (21), from which a first shaft (22) extends for transmitting the rotation to said worktable (11) by means of a rotating joint (30) which is fixed to the worktable (11).
7. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said means (13) for varying the inclination of said worktable (11) comprise a second electric motor (23), which is kinematically connected to a second gearmotor (24), from which a second shaft (25) extends for the transmission of the inclination to said worktable (11).
8. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said means (13) for varying the inclination of said worktable (11) have a fixed arrangement with respect to said lifting post (15) and are fixed and at least partially contained in a first substantially box-like support (27), which in turn is anchored in a downward region to said top (18).
9. The apparatus (10) according to one or more of the preceding claims, **characterized in that** a second substantially box-like support (28) is inserted at least partially within said first support (27), is coupled to said first support (27) and can rotate with respect to said first support, said means (12) for the rotation of said worktable (11) about an axis that is perpendicular to the plane of arrangement being fixed and at least partially contained in said first support.
10. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said second shaft (25) is extended between two opposite walls (29) of said first support (27), is free with respect to them and passes through two opposite walls (26) of said second support (28), which are keyed on said second shaft (25), each one of said walls (26) of said second support (28) being constituted by a sector which faces a corresponding one of said walls (29) of said first support (27).
11. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said means (12) for the rotation of said worktable (11) about an axis that is perpendicular to the plane of arrangement, said means (13) for varying the inclination of said worktable (11) and said means (15) for varying the height of said worktable (11) are controlled by means of a control panel (31) to which they are connected electrically.
12. The apparatus (10) according to one or more of the preceding claims, **characterized in that** said control panel (31) is associated with said movement assembly (19) by means of a first arm (32) and is electrically connected to said height variation means (15) by means of electrical cables contained in a flexible cable track (33).

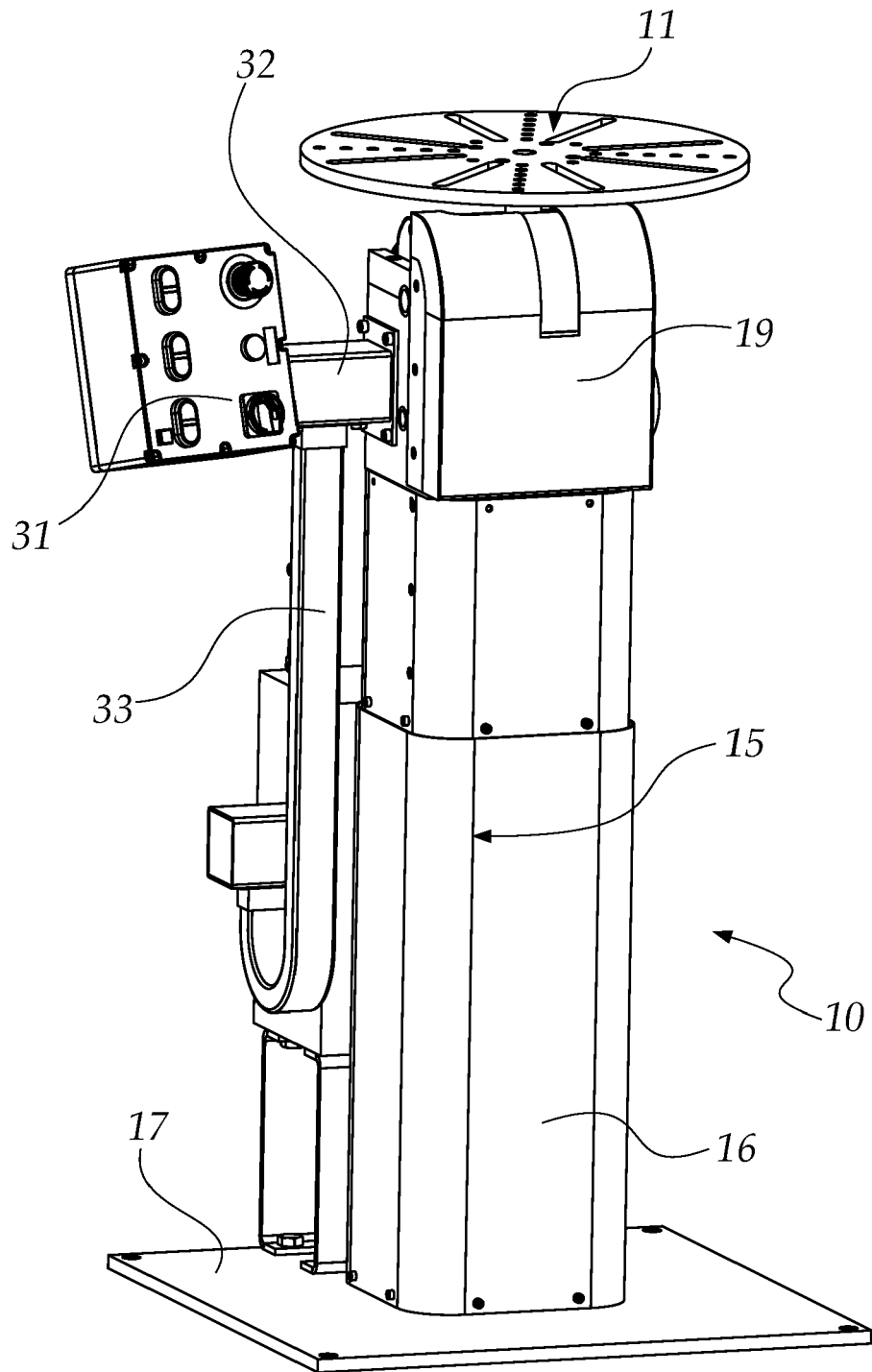


Fig.1

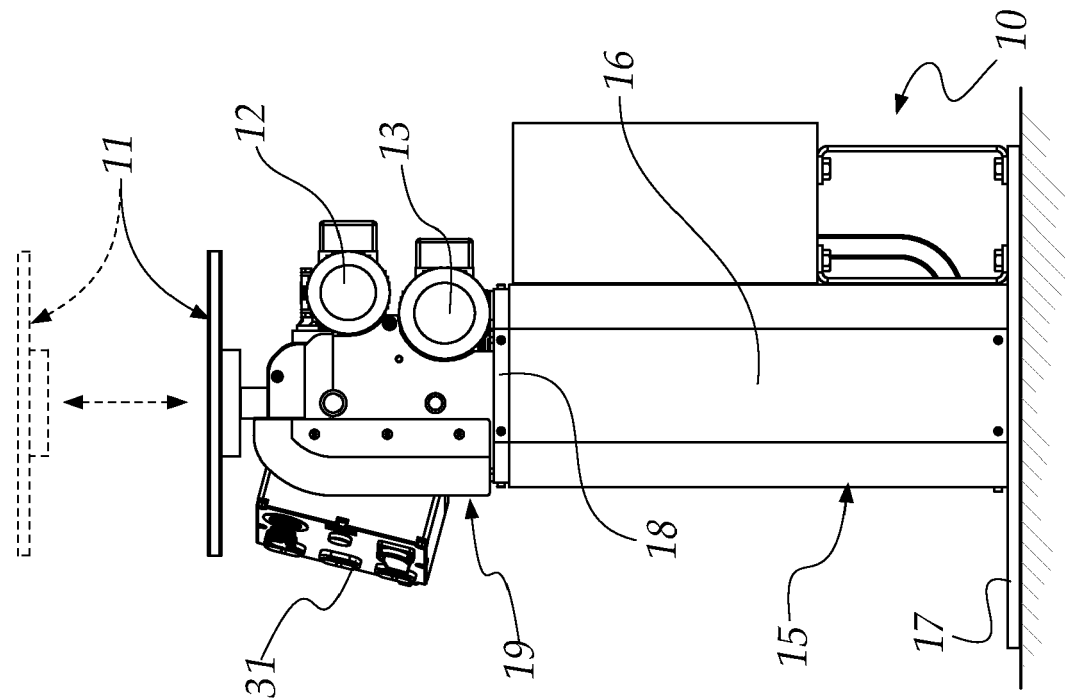


Fig.3

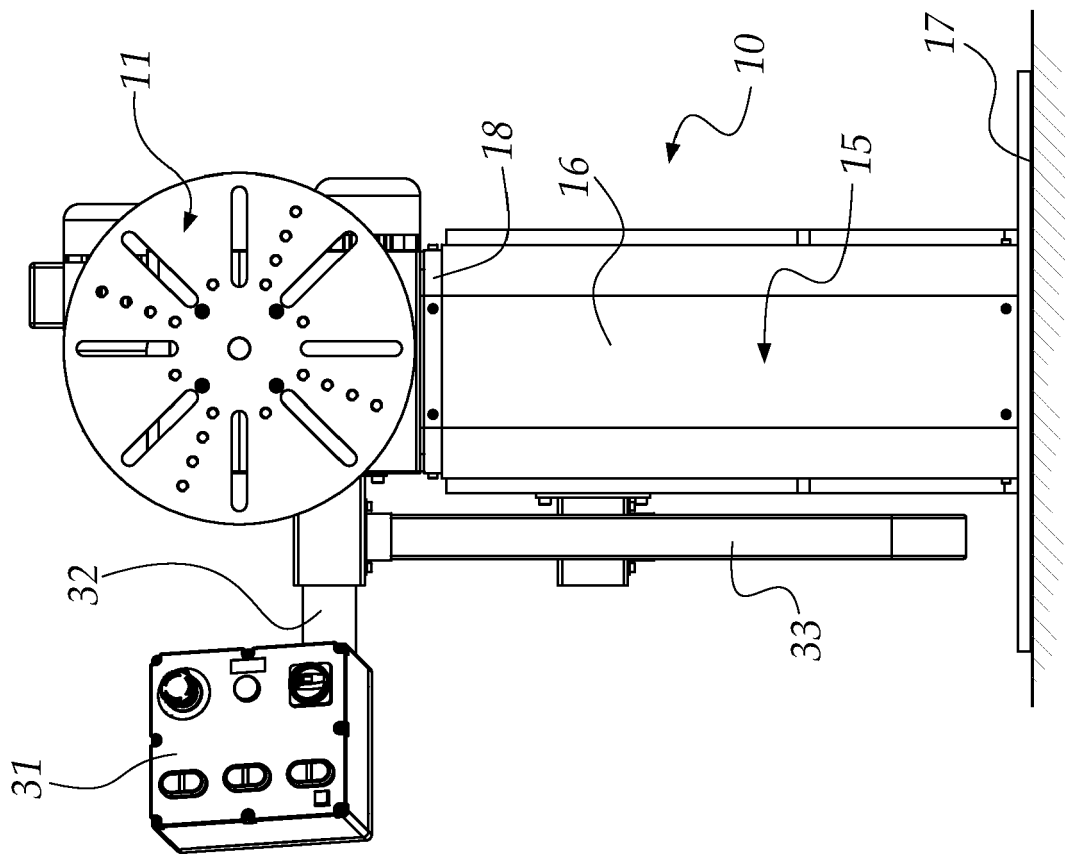


Fig.2

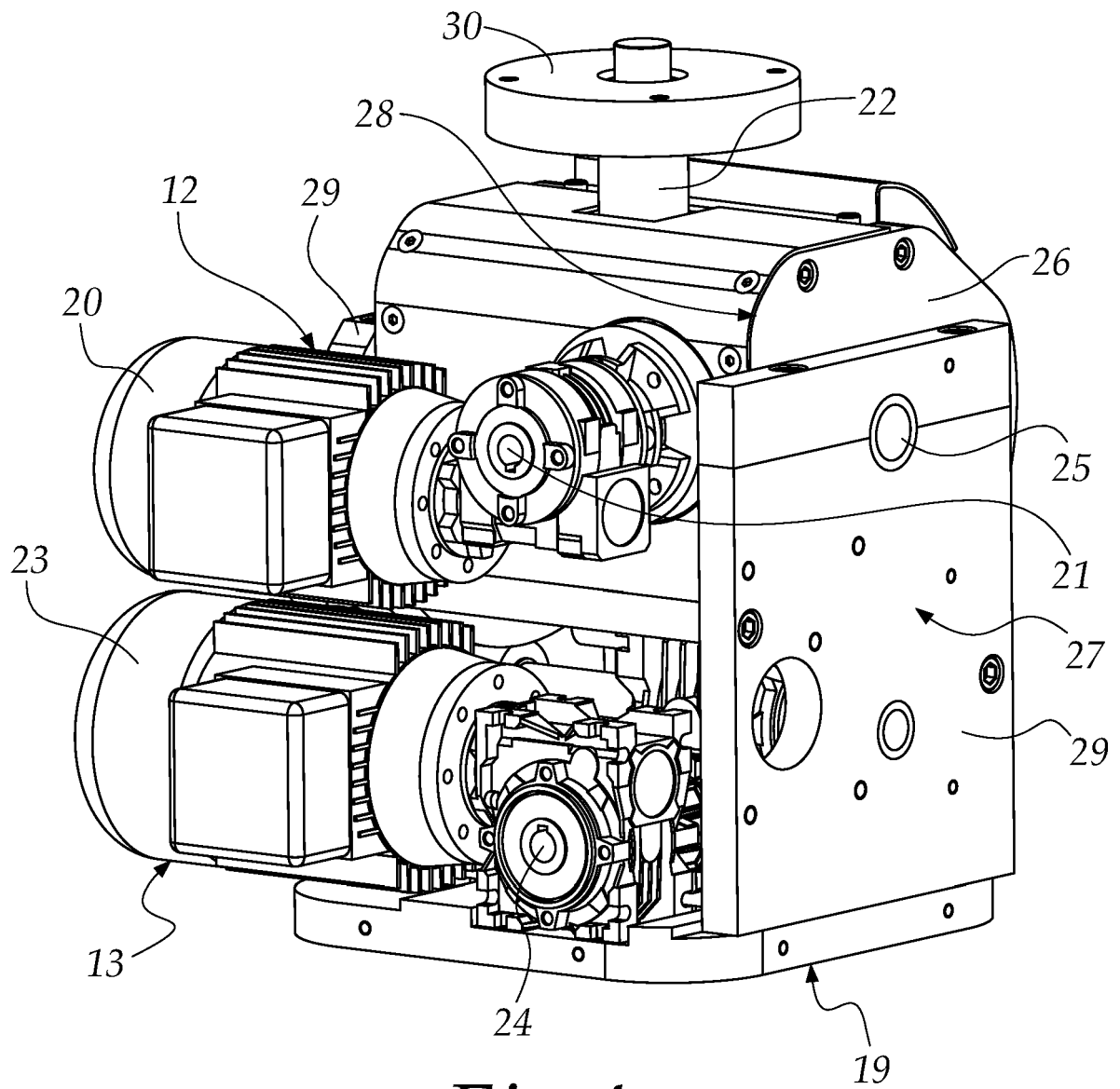


Fig.4a

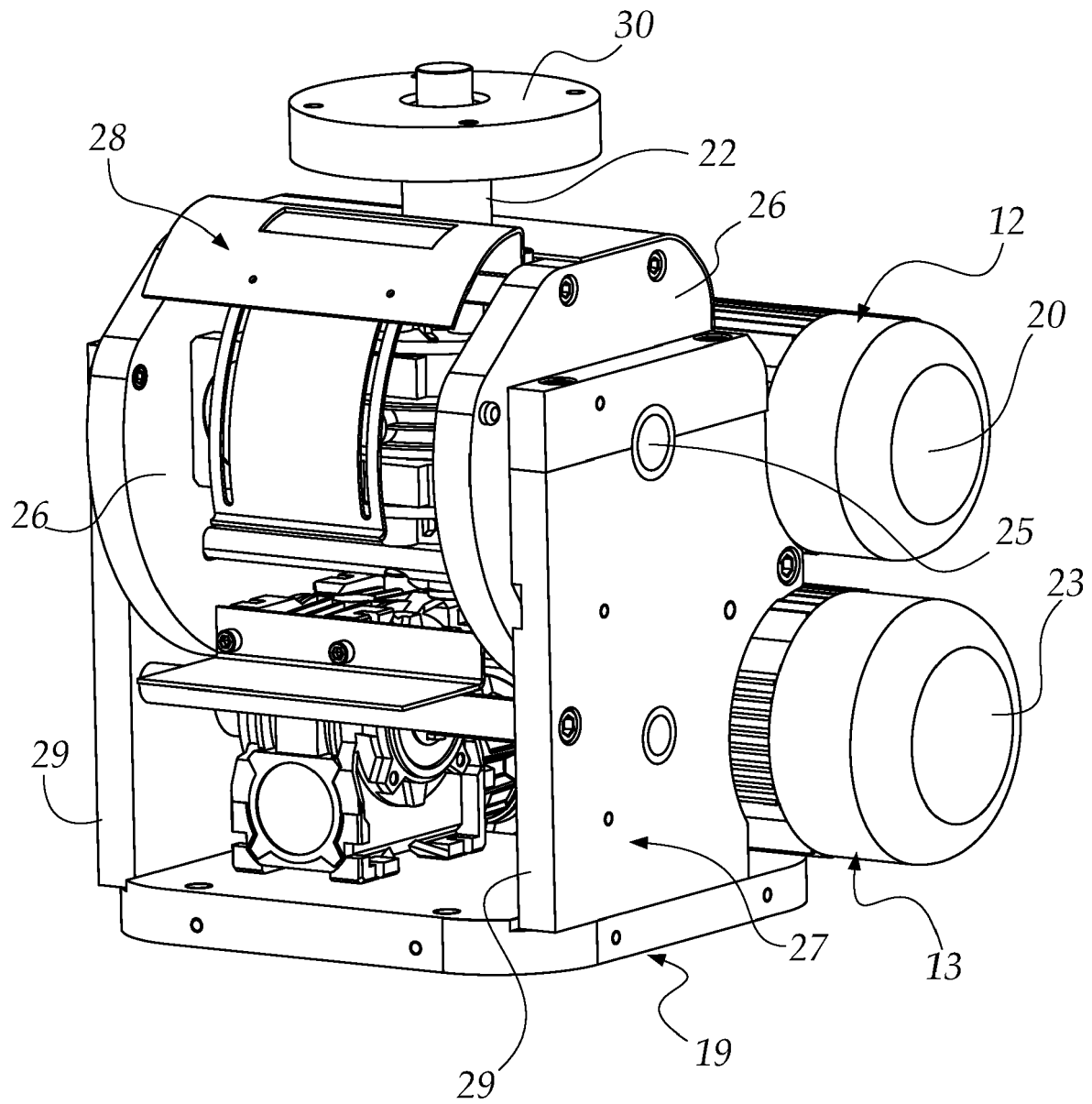


Fig.4b



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 1185

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 December 2022	Examiner D'Andrea, Angela
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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