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(54) APPARATUS FOR WORKING METALLIC BODIES

(57) An apparatus (1) for working metallic bodies by plastic deformation, comprising a supporting frame (2) for a carousel (3) that can rotate intermittently about a main rotation axis (100) and defines a plurality of supporting seats (3a) for respective metallic bodies to be worked (4), fed to the carousel (3) by means of a feeder, a front table (5) being provided which can move with an alternating translational motion along a direction that is substantially parallel to the main rotation axis (100) of the carousel (3), the front table (5) supporting a plurality of working stations (5a) intended to engage sequentially the metallic bodies (4) supported by the carousel (3); the front table is supported by a longitudinal element (6) that is extended substantially parallel to the main rotation axis (100) and the supporting frame (2) comprises a first lateral supporting element and at least one second lateral supporting element (8, 9) for the longitudinal element (6), which are arranged on opposite sides with respect to the front table (5), between the first and second supporting elements (8, 9) and the longitudinal element (6) there being at least one respective guiding element (10) that is extended substantially parallel to the rotation axis (100).

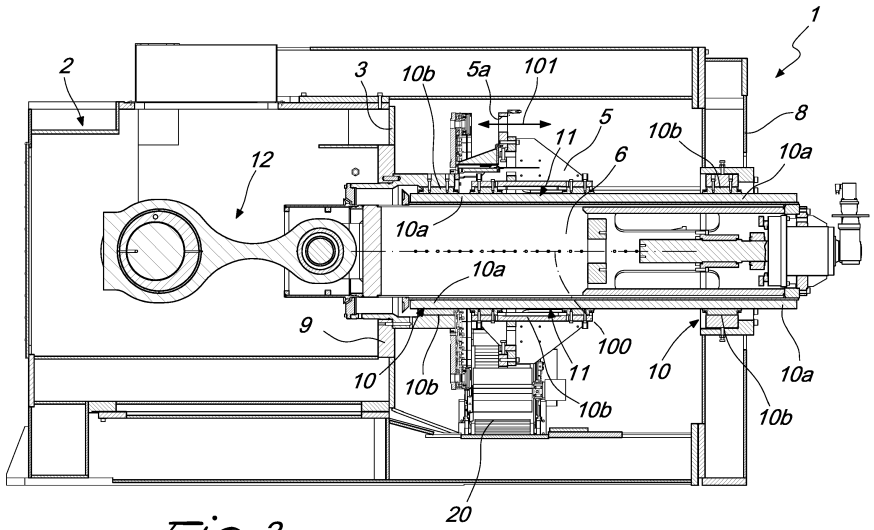

Fig. 2

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Description

[0001] The present invention relates to an apparatus for working metallic bodies, such as for example cylindrical metallic containers for spray cans or aerosol cans.

[0002] Apparatuses are known for working containers, typically made of aluminum or steel and constituted by blanks having a cylindrical cross-section, obtained by extrusion or drawing and provided, at a longitudinal end, with a bottom wall and, at the opposite end, with a free edge on which a tapering operation is to be performed in order to obtain usually a mouth on which for example a thread adapted to be associated with a plug for closing the container or a rim is provided.

[0003] Usually, these apparatuses are constituted by a supporting frame for a carousel that can rotate intermittently about a main rotation axis and forms, at its peripheral region, a plurality of supporting seats for the respective metallic bodies to be worked, which are fed to the carousel by means of a feeder.

[0004] Furthermore, the apparatus comprises a front table which is parallel to the carousel and faces it, and can move with an alternating translational motion along a direction that is substantially parallel to the main axis of rotation of the carousel.

[0005] In particular, the front table supports a plurality of working stations, which are intended to engage sequentially the metallic bodies supported by the carousel.

[0006] The apparatus is provided with a motor, which is connected, by way of kinematic connection means that comprise, among others, a rod-and-crank assembly, both to an elongated element, which supports the front table for the movement of said front table with an alternating motion, and to the carousel in order to allow its intermittent rotation about the main rotation axis.

[0007] Typically, the supporting frame is provided with a footing that supports the elongated element in a cantilever arrangement.

[0008] This embodiment does not always ensure sufficient rigidity to the apparatus and in many cases forces the provision of expensive technical solutions to ensure correct relative motion between the supporting frame and the elongated element.

[0009] In other known solutions the supporting frame comprises two lateral uprights, which are arranged on opposite sides with respect to the front table and are adapted to support slidingly the elongated element.

[0010] In order to ensure the relative movement of the elongated element with respect to the uprights bearings are provided which however are complicated to fit and are expensive.

[0011] The aim of the present invention is to solve the problems and obviate the drawbacks described above, by providing an apparatus for working metallic bodies by plastic deformation that is extremely reliable in use.

[0012] Another object of the present invention is to provide an apparatus for working metallic bodies by plastic deformation that has a competitive production cost, so as to make its use advantageous also from the economic standpoint.

[0013] This aim, as well as these and other objects that will become better apparent hereinafter are achieved by an apparatus for working metallic bodies by plastic deformation according to the provisions of claim 1.

[0014] Further characteristics and advantages of the invention will become better apparent from the description of some preferred but not exclusive embodiments of an apparatus for working metallic bodies by plastic deformation according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a top view of an apparatus for working metallic bodies by plastic deformation according to the invention;

Figure 2 is a longitudinal sectional view of the apparatus shown in Figure 1.

[0015] In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0016] The present invention relates to an apparatus, generally designated by the reference numeral 1, for working metallic bodies by plastic deformation.

[0017] The apparatus 1 comprises a supporting frame 2 for a carousel 3 that can rotate intermittently about a main rotation axis 100.

[0018] The carousel 3 forms a plurality of supporting seats 3a for respective metallic bodies to be worked, which are fed to the carousel 3 by means of a feeder 20.

[0019] Conveniently, the worked parts are unloaded from the carousel 3 by means of an unloading device 21.

[0020] Preferably, the supporting seats 3a are arranged substantially at the peripheral region of the carousel 3 and are mutually angularly spaced evenly about the main rotation axis 100.

[0021] The apparatus 1 comprises further a front table 5, which can move with an alternating translational motion along a direction that is substantially parallel to the main rotation axis 100 of the carousel 3, as indicated by the arrow 101.

[0022] The front table 5 supports a plurality of working stations, which are intended to engage sequentially the metallic bodies supported by the carousel 3.

[0023] The front table 5 is moved with an alternating translational motion and the carousel 3 is moved intermittently about the main rotation axis 100.

[0024] There can be a single motor for moving the front table 5 and the carousel 3 or two motors, one motor for the movement of the front table 5 and one for the movement of the carousel 3.

[0025] With particular reference to the embodiment shown in Figure 2, the front table 5 is supported by a longitudinal element 6 that is extended substantially par-

allel to the main rotation axis 100.

[0026] According to the present invention, the supporting frame 2 comprises a first lateral supporting element and at least one second lateral supporting element 8, 9 for the longitudinal element 6, which are arranged on opposite sides with respect to the front table 5.

[0027] In greater detail, between the first and second supporting elements 8, 9 and the longitudinal element 6 there is at least one respective guiding element 10 that is extended substantially parallel to the rotation axis 100.

[0028] Advantageously, the supporting frame 2 comprises at least two guiding elements 10, which are angularly spaced between each supporting element 8, 9 and the longitudinal element 6.

[0029] In particular, the at least two guiding elements 10 are mutually angularly spaced about the rotation axis 100.

[0030] Preferably, the supporting frame 2 has at least three guiding elements 10, which are angularly mutually spaced between each supporting element 8, 9 and the longitudinal element 6.

[0031] With reference to the embodiment shown in the figures, the supporting frame is provided with four guiding elements 10, which are angularly mutually spaced (by 90° about the longitudinal axis of the longitudinal element 6) and are arranged between each supporting element 8, 9 and the longitudinal element 6.

[0032] The supporting elements 8, 9 conveniently comprise a central element 9 that is arranged proximate to a rod-and-crank assembly 12 that is connected kinematically to the longitudinal element 6 and is intended for its movement, and an end element 8.

[0033] In greater detail, the guiding elements 10 comprise at least one first longitudinal guiding portion 10a, which is integral with the longitudinal element 6, and such first longitudinal guiding portion 10a can be engaged slidingly by a respective first longitudinal seat 10b defined on the respective supporting element 8, 9.

[0034] The longitudinal seat 10b preferably comprises a slider, preferably of the ball or roller type.

[0035] Conveniently, the apparatus 1 comprises means for adjusting the position of the front table 5 along the extension of the longitudinal element 6.

[0036] In particular, the adjustment means comprise at least one adjustment guide 11 that is extended between the longitudinal element 6 and the front table 5 and is extended substantially parallel to the rotation axis 100.

[0037] In this regard, there are means for locking the movement of the front table 5 along the adjustment guide or guides 11.

[0038] Conveniently, the apparatus comprises at least two adjustment guides 11 which are angularly spaced and are extended between the longitudinal elements 6 and the front table 5.

[0039] Preferably, the apparatus is provided with at least three adjustment guides which are angularly mutually spaced and are extended between the longitudinal element 6 and the front table 5.

[0040] With reference to the embodiment shown in the figures, the apparatus is provided with four adjustment guides 11, which are angularly mutually spaced (by 90° about the longitudinal axis of the longitudinal element 6) and are arranged between the longitudinal element 6 and the front table 5.

[0041] According to a preferred embodiment, the adjustment guide 11 comprises at least one second longitudinal guiding portion 12a that is integral with the longitudinal element 6 and can engage slidingly in a respective second longitudinal seat 12b defined on the front table 5.

[0042] Such longitudinal seat 10b also is constituted preferably by a slider, preferably of the ball or roller type.

[0043] Conveniently, the first guiding portion 10a and the second guiding portion 12a are defined on an elongated element that is extended parallel to the rotation axis 100.

[0044] With reference to the embodiment shown in Figure 2, the supporting elements 8, 9 comprise a respective first and second upright elements.

[0045] Advantageously, the first and second upright elements are mutually connected by at least one longitudinal connecting body.

[0046] The longitudinal connecting body comprises a connecting crossmember.

[0047] In practice it has been found that the invention has achieved the intended aim and objects in all of the embodiments.

[0048] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0049] All the characteristics of the invention indicated above as advantageous, convenient or the like may also be omitted or be replaced with equivalents.

[0050] In practice, the dimensions may be any according to requirements and to the state of the art.

[0051] The disclosures in Italian Patent Application no. VR2014A000289 (102014902312193), from which this application claims priority, are incorporated herein by reference.

[0052] 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 (1) for working metallic bodies by plastic deformation, comprising a supporting frame (2) for a carousel (3) that can rotate intermittently about a main rotation axis (100) and defines a plurality of supporting seats (3a) for respective metallic bodies to be worked (4), which are fed to said carousel (3)

by means of a feeder, a front table (5) being provided which can move with an alternating translational motion along a direction that is substantially parallel to said main rotation axis (100) of said carousel (3), said front table (5) supporting a plurality of working stations (5a) intended to engage sequentially the metallic bodies (4) supported by said carousel (3), said front table being supported by a longitudinal element (6) that is extended substantially parallel to said main rotation axis (100), **characterized in that** said supporting frame (2) comprises a first lateral supporting element and at least one second lateral supporting element (8, 9) for said longitudinal element (6) which are arranged on opposite sides with respect to said front table (5), between said first supporting element and said second supporting element (8, 9) and said longitudinal element (6) there being at least one respective guiding element (10) that is extended substantially parallel to said rotation axis (100).

2. The apparatus (1) according to claim 1, **characterized in that** it comprises at least two guiding elements (10) that are angularly spaced between each supporting element (8, 9) and said longitudinal element (6).

3. The apparatus (1) according to claim 1 or 2, **characterized in that** it comprises four guiding elements (10) that are angularly mutually spaced between each supporting element (8, 9) and said longitudinal element (6).

4. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said guiding elements (10) comprise at least one first longitudinal guiding portion (10a) that is integral with said longitudinal element (6) and can engage slidingly in a respective first longitudinal seat (10b) defined on the respective supporting element (8, 9).

5. The apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises means for adjusting the position of said front table (5) along the extension of said longitudinal element (6), said adjustment means comprising at least one adjustment guide (11) that is extended between said longitudinal element (6) and said front table (5) that is extended substantially parallel to said rotation axis (100).

6. The apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises means for the movement of said front table (5) along said adjustment guide (11) and means for locking in position said front table (5) along said adjustment guide (11).

7. The apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises at least two adjustment guides (11) that are angularly spaced and are extended between said longitudinal element (6) and said front table (5).

8. The apparatus (1) according to one or more of the preceding claims, **characterized in that** it comprises four adjustment guides (11) that are mutually angularly spaced and are extended between said longitudinal element (6) and said front table (5).

9. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said at least one adjustment guide (11) comprises at least one second longitudinal guiding portion (12a) that is integral with said longitudinal element (6) that can engage slidingly in a respective second longitudinal seat (12b) defined on the front table (5).

10. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said first guiding portion and said second guiding portion are defined on an elongated body that is extended parallel to said rotation axis (100).

11. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said supporting elements (8, 9) comprise respective first and second upright elements.

12. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said first and second upright elements are mutually connected by at least one longitudinal connecting body.

13. The apparatus (1) according to one or more of the preceding claims, **characterized in that** said at least one longitudinal connecting body comprises a connecting crossmember.

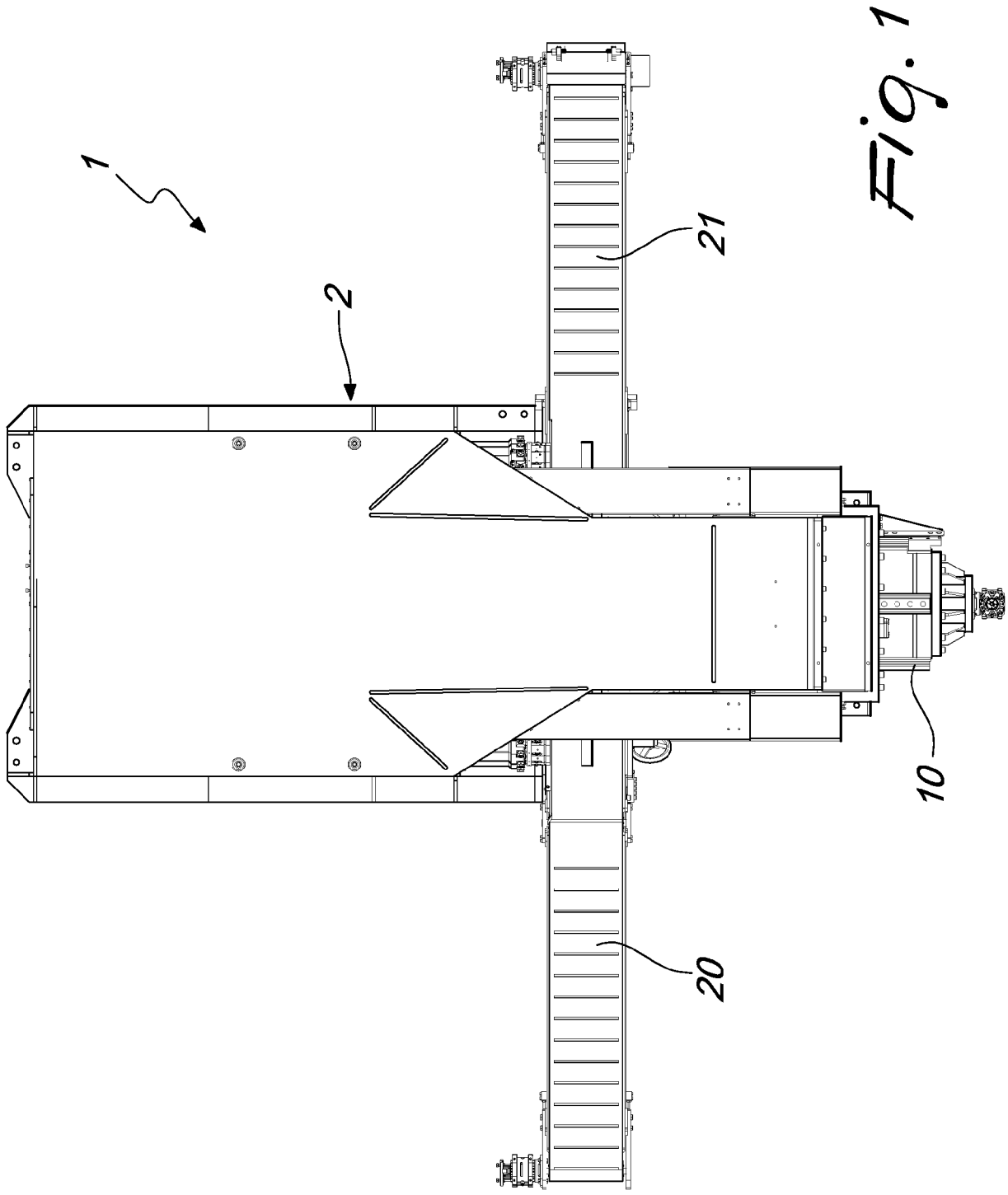

Fig. 1

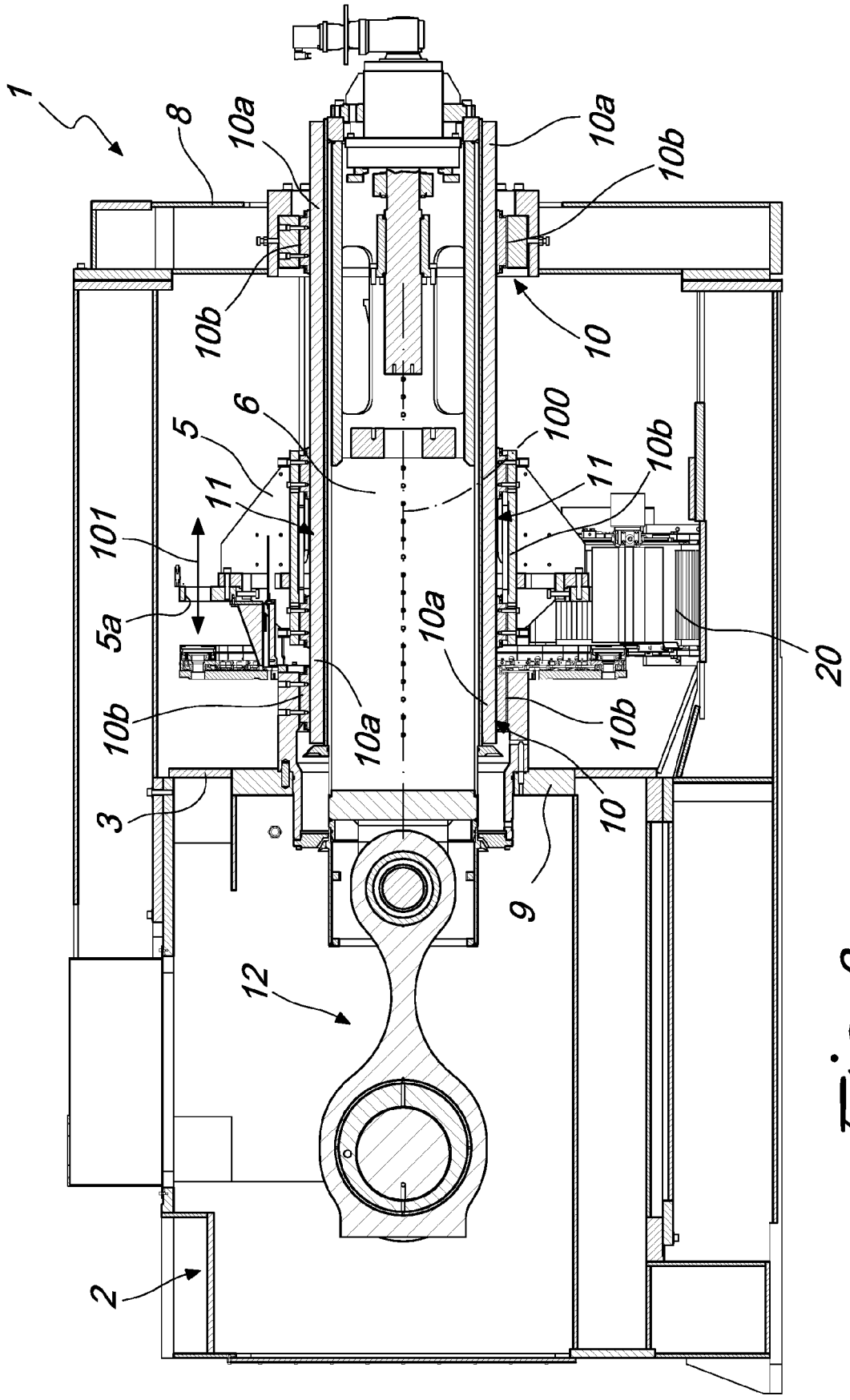
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Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 6115

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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TECHNICAL FIELDS SEARCHED (IPC)

B21D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 March 2016	Cano Palmero, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- IT 102014902312193 **[0051]**