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(54) **Spindle moulder**

(57) A spindle moulder comprises spindle shaft means (4), extending along a rotation axis (Z1), and arranged for rotationally supporting a milling tool (2) and motor shaft means (14, 18, 30, 31) for rotating said spindle shaft means (4), characterised in that said spindle shaft means (4) and said motor shaft means (14, 18, 30, 31) have in common said rotation axis (Z1).

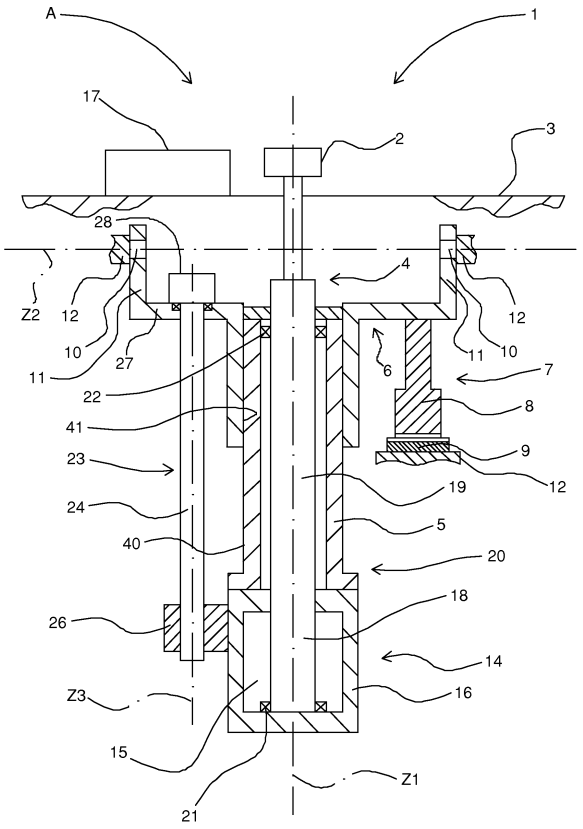


Fig. 1

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## Description

**[0001]** The invention relates to a machine tool, or toupie, or spindle moulder, used in the woodworking industry to make frames, shaped profiled elements, notches, grooves and the like on pieces made of wood or similar materials.

**[0002]** Spindle moulders are known comprising a vertical axis milling tool operationally positioned above a work surface on which the workpieces to be machined are placed.

**[0003]** The milling tool is fixed to a spindle shaft mounted on a cylindrical support operationally positioned below the aforesaid work surface.

**[0004]** The cylindrical support is axially slidable in, and is supported by, an external support which can be orientated or fixed with respect to the work surface.

**[0005]** In this way, it is possible to adjust both a working height of the milling tool and a tilt thereof with respect to the work surface, depending on the dimensions of workpiece to be machined and on the type of machinings that it is desired to carry out.

**[0006]** The external support further support an electric motor arranged for rotating the spindle shaft.

**[0007]** In particular, the electric motor is positioned laterally with respect to the spindle shaft and is provided with a motor shaft, or rotor, which is connected to the spindle shaft by means of a belt drive.

**[0008]** In other words, the spindle shaft and the motor shaft extend along respective substantially parallel axes.

**[0009]** A drawback of the aforesaid spindle moulders relates to the limited angular travels that are achievable in use by the spindle shaft, which limits the machinings that are performable by the milling tool.

**[0010]** This is in particular due to the side overall dimensions of the spindle shaft-electric motor unit.

**[0011]** Further, the aforesaid spindle moulders, in addition to being structurally complex, require periodical maintenance, with consequent prolonged machine downtimes and increased costs connected therewith, to replace the belt drive when worn.

**[0012]** An object of the invention is to improve the spindle moulders.

**[0013]** A further object is to make spindle moulders that enable angular travels to be obtained that are greater than those of known spindle moulders.

**[0014]** A still further object is to provide spindle moulders that are structurally simple and more reliable than known spindle moulders.

**[0015]** In a first aspect of the invention, a spindle moulder is provided comprising spindle shaft means extending along a rotation axis and arranged for rotationally supporting a milling tool, and motor shaft means for rotating said spindle shaft means, characterised in that said spindle shaft means and said motor shaft means have in common said rotation axis.

**[0016]** In a second aspect of the invention, a spindle moulder is provided comprising supporting means for supporting spindle shaft means and a supporting casing for supporting motor shaft means, said motor shaft means being arranged for rotating said spindle shaft means, characterised in that said supporting means is fixed to said supporting casing.

**[0017]** In an embodiment of the invention the spindle shaft means and the motor shaft means form a single shaft and the casing is mounted operationally below the support which supports the spindle shaft means.

**[0018]** This both enables greater angular travels to be obtained than those of known spindle moulders inasmuch as the side overall dimensions of the spindle shaft means-motor shaft means unit are reduced and enables the structure of the spindle moulders to be simplified.

**[0019]** Furthermore, the spindle moulders made according to the invention do not require belt drives, which eliminates the maintenance operations for replacing the belt drives, with consequent money savings and less frequent machine downtimes, and makes the spindle moulders more reliable than known spindle moulders.

**[0020]** The invention can be better understood and implemented with reference to the attached drawings that illustrate some embodiments thereof by way of non-limiting example, in which:

Figure 1 is a longitudinal schematic section of a spindle moulder in a first embodiment;
Figure 2 is a longitudinal schematic section of the spindle moulder in Figure 1 in a second embodiment;
Figure 3 is a longitudinal schematic section of the spindle moulder in Figure 1 in a third embodiment.

**[0021]** With reference to Figure 1 there is shown a first embodiment A of a spindle moulder 1 used in the woodworking industry to make frames, shaped profiled elements, joints, grooves and the like on workpieces 17 made of wood or similar materials. The spindle moulder 1 comprises a cutting tool 2, for example a vertical axis milling cutter, operationally positioned above a work surface 3 on which the workpieces 17 to be machined are placed and moved.

**[0022]** The cutting tool 2 is rotationally supported by a spindle shaft 4 that is rotatable around a first rotation axis Z1 thereof.

**[0023]** The spindle shaft 4 is a motor shaft, or rotor, of an electric motor 14 and comprises a first section 18 positioned in a casing 16 of the electric motor 14, such a casing 16 being arranged for supporting a stator 15.

**[0024]** The spindle moulder 1 further comprises first bearing means 21 interposed between the casing 16 and the first section 18 for rotationally supporting the latter around the first rotation axis Z1.

**[0025]** The spindle shaft 4 further comprises a second section 19 at least partially received in a sleeve 5.

**[0026]** The sleeve 5, having substantially the shape of a hollow cylinder and being operationally positioned below the aforesaid work surface 3, is fixed substantially at a first end 20 thereof by means of a threaded connection,

which is not shown, to the casing 16.

**[0027]** The spindle moulder 1 further comprises second bearing means 22 interposed between the sleeve 5 and the second section 19 for rotationally supporting the latter around the first rotation axis Z1.

**[0028]** Furthermore, the spindle moulder 1 comprises a support 6 internally coupled by means of guide means, which is not shown, to the sleeve 5.

**[0029]** In this way, the sleeve 5 is internally slidable with respect to the support 6 along the first rotation axis Z1.

**[0030]** In an embodiment of the invention, the guide means comprises linear guide means.

**[0031]** In a further embodiment of the invention, the guide means comprises a ball bearing guide.

**[0032]** In a still further embodiment of the invention, the guide means comprises an internal wall 41 of the support 6 and an external wall 40 of the sleeve 5.

**[0033]** The support 6 is further rotatable with respect to a second rotation axis Z2 which is transverse to the first rotation axis Z1.

**[0034]** In other words, the support 6 can be orientated with respect to the work surface 3.

**[0035]** In this way, it is possible to adjust both a work height of the cutting tool 2 and a tilt thereof with respect to the work surface 3, depending on the dimensions of the workpiece 17 to be machined and on the type of machinings that it is desired to perform.

**[0036]** The spindle moulder 1 further comprises first moving means 7 arranged for rotating the support 6 around the second rotation axis Z2.

**[0037]** The first moving means 7 comprises a toothed circular sector 8 fixed to the support 6 and a toothed guide 9 arranged for engaging the toothed circular sector 8 and supported by a frame 12 of the spindle moulder 1.

**[0038]** The first moving means 7 further comprises first driving means, which is not shown, arranged for driving the toothed guide 9.

**[0039]** Furthermore, the first moving means 7 comprises pins 10 extending around the second rotation axis Z2.

**[0040]** The pins 10 engage respective first portions 11 of the support 6 that are substantially perpendicular to the second rotation axis Z2 and are supported by the frame 12.

**[0041]** In an embodiment of the invention, which is not shown, the first moving means 7 comprises a smooth circular sector fixed to the support 6 and engaging a respective guide 9 supported by the frame 12, the smooth circular sector being driven by further first driving means.

**[0042]** In a further embodiment of the invention, which is not shown, the first moving means 7 comprises a linear actuator. In a still further embodiment of the invention, which is not shown, the support 6 is fixed with respect to the work surface 3.

**[0043]** The spindle moulder 1 further comprises second moving means 23 for moving the sleeve 5 and thus the casing 16 fixed on the latter, with respect to the support 6 along the first rotation axis Z1.

**[0044]** The second movement means 23 comprises a worm 24 extending along a third rotation axis Z3 substantially parallel to the first rotation axis Z1.

**[0045]** The worm 24 is rotationally supported by a second portion 27 of the support 6, extending substantially parallel to the second rotation axis Z2, and engages a lead nut 26 fixed to the casing 16.

**[0046]** The second moving means 23 further comprises second driving means 28 for rotating the worm 24.

**[0047]** In an embodiment of the invention, which is not shown, the second moving means 23 comprises a further linear actuator.

**[0048]** It should be noted that the worm 24 also acts as an antirotation element for the sleeve 5.

**[0049]** In an embodiment of the invention, which is not shown, the second moving means 23 is separate from an antirotation element that is provided for the spindle moulder 1.

**[0050]** With reference to Figure 2 there is shown a second embodiment B of the spindle moulder 1.

**[0051]** The constructional details of the second embodiment B which are substantially structurally and functionally similar to the constructional details of the first embodiment A will not be disclosed below and will be indicated by the same numerical references.

**[0052]** The second embodiment B differs from the first embodiment A inasmuch as the spindle shaft 4 is connected by joint means 29 to a motor shaft 30, or rotor, of a further electric motor 31, the spindle shaft 4 and the motor shaft 30 being rotatable around the first rotation axis Z1.

**[0053]** The motor shaft 30 is received in, and supported by, the casing 16 of the further electric motor 31 and is wound by the stator 15, whilst the spindle shaft 4 is received in, and rotationally supported by, the sleeve 5 via third bearing means 33 and fourth bearing means 34.

**[0054]** With reference to Figure 3 there is shown a third embodiment C of the spindle moulder 1.

**[0055]** The constructional details of the third embodiment C that are substantially structurally and functionally similar to the constructional details of the second embodiment B, will not be disclosed below and will be indicated by the same numerical references.

**[0056]** The third embodiment C differs from the second embodiment B, inasmuch as the motor shaft 30 is received in, and rotationally supported by, the casing 16 via fifth bearing means 50 and sixth bearing means 51.

**[0057]** It should be noted that the spindle moulder 1 is structurally simple and enables angular travels to be obtained that are greater than those of known spindle moulders owing to the limited side overall dimensions.

**[0058]** In fact, in the first embodiment A the spindle shaft 4 is the motor shaft, or rotor, of the electric motor 14, whilst in the second embodiment B and in the third embodiment C the spindle shaft 4 and the motor shaft 30 are interconnected via joint means 28 and have in common the first rotation axis Z1.

**[0059]** It should further be noted that the spindle

moulder 1 is devoid of belt drives, which eliminates the maintenance operations required to replace the latter, with a consequent saving of money and less frequent machine downtimes and makes the spindle moulders 1 more reliable than known spindle moulders.

## Claims

1. Spindle moulder comprising spindle shaft means (4) extending along a rotation axis (Z1) and arranged for rotationally supporting a milling tool (2), and motor shaft means (14, 18, 30, 31) for rotating said spindle shaft means (4), **characterised in that** said spindle shaft means (4) and said motor shaft means (14, 18, 30, 31) have in common said rotation axis (Z1).

2. Spindle moulder according to claim 1, wherein said spindle shaft means and said motor shaft means (14, 18, 30, 31) are part of a single shaft (4).

3. Spindle moulder according to claim 1, wherein said spindle shaft means and said motor shaft means (14, 18, 30, 31) are parts of respective shafts (4, 30) connected together by joint means (29).

4. Spindle moulder according to any preceding claim, and comprising internal supporting means (5) for supporting said spindle shaft means (4), said internal supporting means (5) being fixed to a supporting casing (6) for supporting said motor shaft means (14, 18, 30, 31).

5. Spindle moulder according to claim 4, wherein said internal supporting means comprises a sleeve (5).

6. Spindle moulder according to claim 4, or 5, and comprising external supporting means (6) internally couplable with said internal supporting means (5).

7. Spindle moulder according to claim 6, and comprising guide means associated with said external supporting means (6) for enabling said internal supporting means (5) to slide axially with respect to said external supporting means (6) along said rotation axis (Z1).

8. Spindle moulder according to claim 7, wherein said guide means comprises a linear guide.

9. Spindle moulder according to claim 7, wherein said guide means comprises a ball bearing guide.

10. Spindle moulder according to claim 7, wherein said guide means comprises an internal wall (41) of said external supporting means (6) and an external wall (40) of said internal supporting means (5).

11. Spindle moulder according to any one of claims 6 to 10, and comprising moving means (23) for moving said internal supporting means (5) with respect to said external supporting means (6) along said rotation axis (Z1) .

12. Spindle moulder according to any one of claims 6 to 11, and comprising further moving means (7) associated with, and arranged for, orientating said external supporting means (6) with respect to a work surface (3) of said spindle moulder (1).

13. Spindle moulder according to claim 12 as appended to claim 11, wherein said moving means (23) and said further moving means (7) comprise linear actuating means.

14. Spindle moulder according to any one of claims 4 to 13, and comprising antirotation means (24) to prevent said internal supporting means (5) from rotating around said rotation axis (Z1).

15. Spindle moulder according to any preceding claim, wherein said motor shaft means (14, 18, 30, 31) is part of an electric motor (14, 31).

16. Spindle moulder comprising supporting means (5) for supporting spindle shaft means (4) and a supporting casing (16) for supporting motor shaft means (14, 18, 30, 31), said motor shaft means (14, 18, 30, 31) being arranged for rotating said spindle shaft means (4), **characterised in that** said supporting means (5) is fixed to said supporting casing (16).

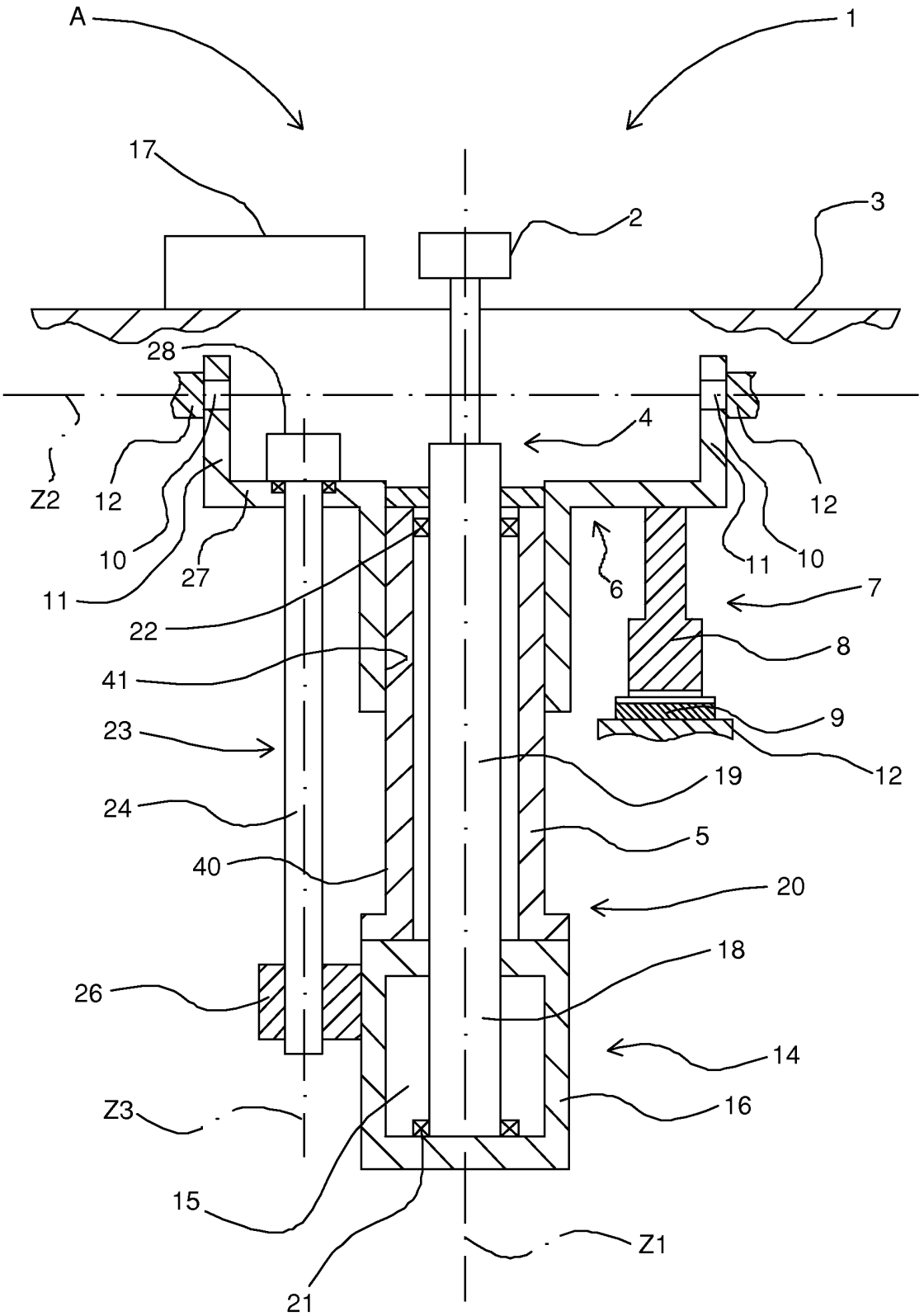
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Fig. 1

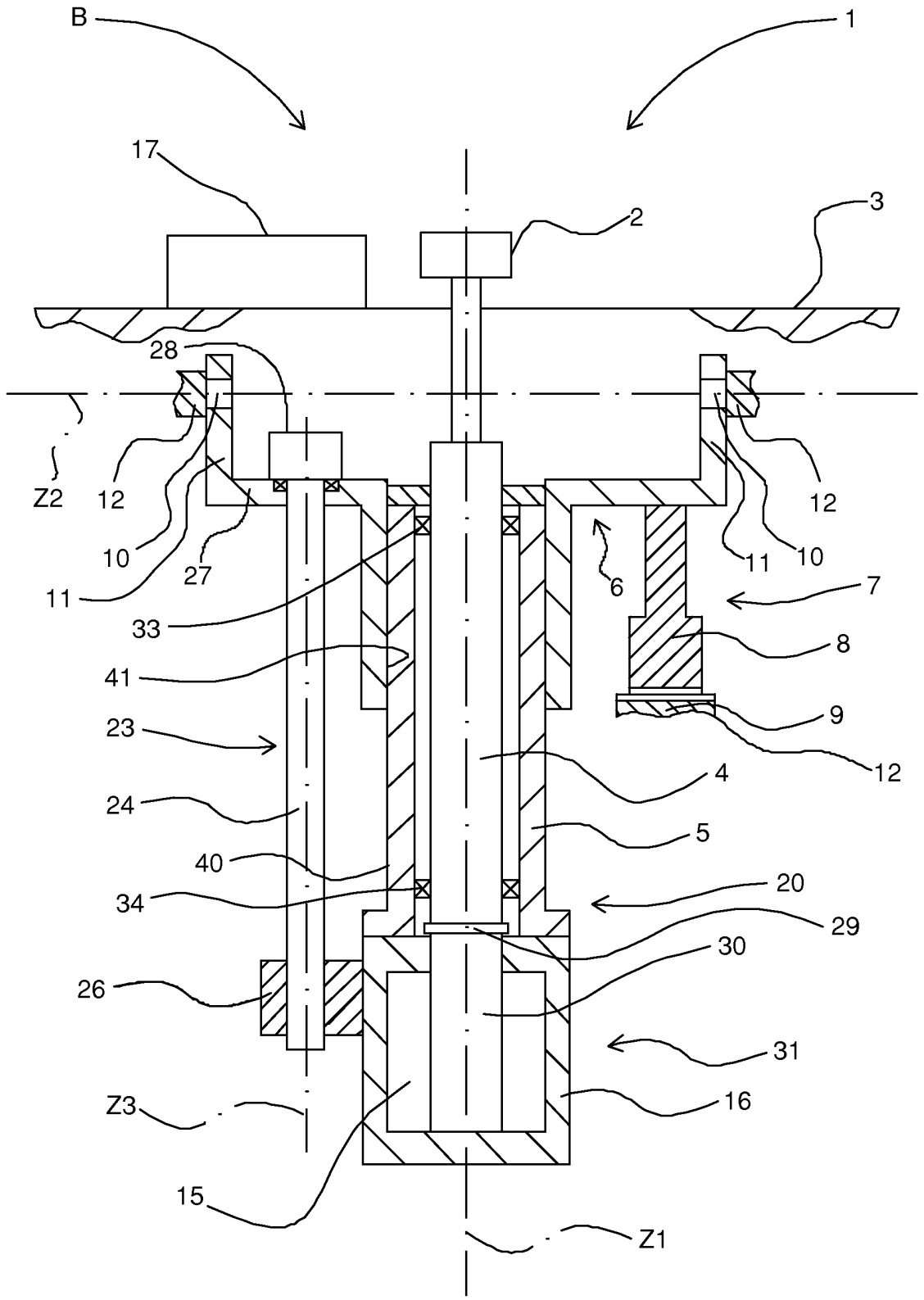
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Fig. 2

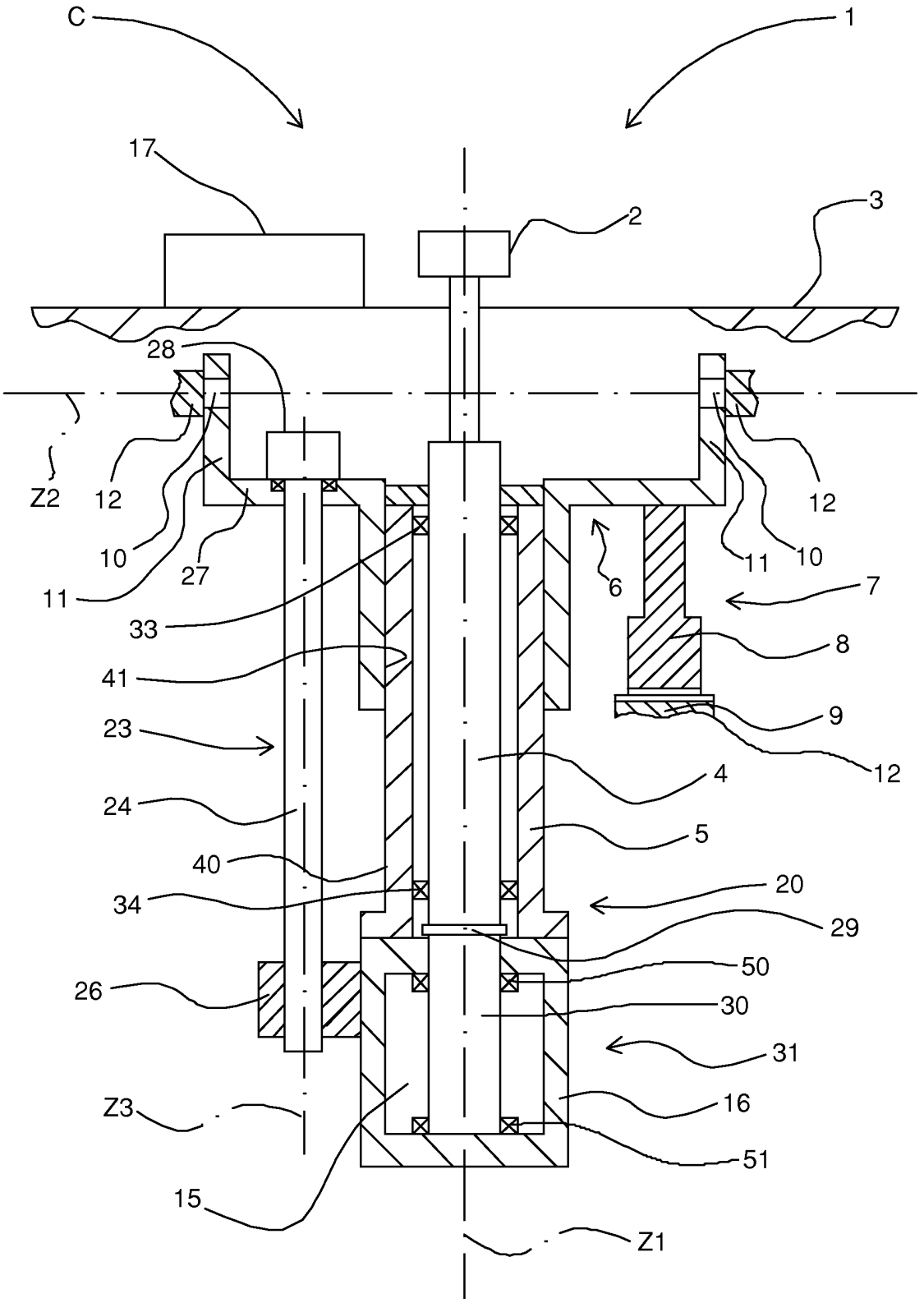
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Fig. 3

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 07 11 9076

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 1 506 154 A (VILHELM BERTHELSEN HANS JENS ET AL) 26 August 1924 (1924-08-26)<br>* page 1, lines 16-23 *<br>* page 1, lines 35-41 *<br>* page 1, lines 76-91 *<br>* page 2, lines 12-14 *<br>* page 2, lines 83-85 *<br>* figures * | 1,2, 4-11,15 | INV. B27C5/02 B23Q7/00 |
| X | EP 1 136 206 A (LEONHARD HOFMANN MASCHINENFABR [DE]) 26 September 2001 (2001-09-26)<br>* abstract *<br>* paragraph [0001] *<br>* paragraph [0002] *<br>* paragraph [0014] *<br>* paragraphs [0016] - [0018] *<br>* figures * | 1,2,4-6, 15,16 | |
| X | DE 33 33 623 A1 (LUTZ EUGEN MASCH [DE]) 11 April 1985 (1985-04-11)<br>* abstract *<br>* page 9, lines 25-29 *<br>* figures * | 1,3 | TECHNICAL FIELDS SEARCHED (IPC)<br>B23Q<br>B27C<br>B27G |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 4 January 2008 | Hamel, Pascal |

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 11 9076

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04-01-2008

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 1506154 A | 26-08-1924 | FR 605213 A | 21-05-1926 |
| EP 1136206 A | 26-09-2001 | AT 267675 T | 15-06-2004 |
| | | DE 10013571 A1 | 27-09-2001 |
| DE 3333623 A1 | 11-04-1985 | NONE | |

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82