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(54) **OPEN END SPINNING MACHINE WITH IMPROVED BRAKING SYSTEM OF THE ROTOR SHAFT**

(57) Open end spinning machine (4) comprising
- at least one spinning unit (8) provided with rotor housing (12),
- wherein the rotor housing (12) houses a spinning rotor (16) having a rotor shaft (20) with direct rotor bearing (24), the rotor shaft (20) rotating around a rotation axis (X-X),
- the spinning unit (8) comprising at least one braking pad (28) influenced by a braking actuator (32) for selectively braking the rotor shaft (20),
characterized by the fact that
- direct rotor bearing (24) is inside the rotor housing (12) and the braking actuator (32) is separated and independent from the rotor shaft (20) and the rotor housing (12).

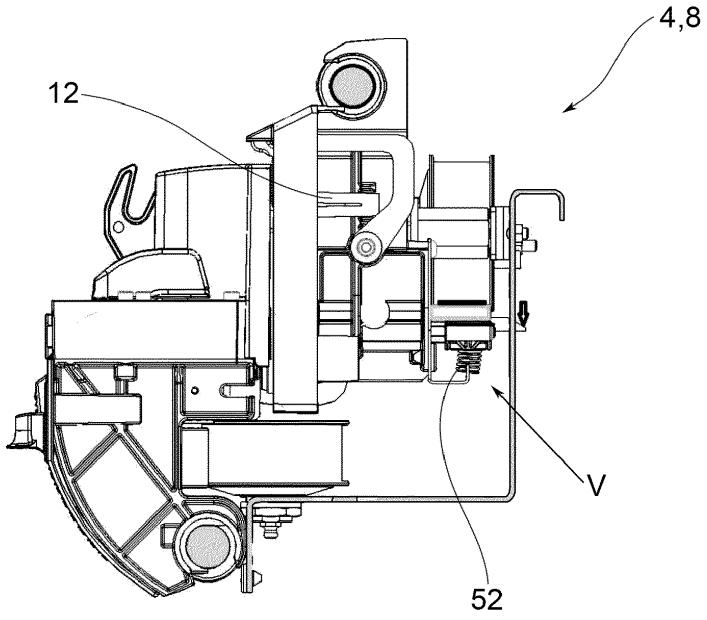

FIG.3

EP 3 489 397 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to an open end spinning machine with improved braking system of the rotor shaft.

STATE OF THE ART

[0002] Today' s open end (OE) spinning machines with direct bearing, like the so-call semi-automated machine as well as automated machines, need a brake to stop the rotor (comprising a rotor cup and a shaft with related bearing) when the spin-box is opened (e.g. for cleaning, making a new piecing) and the shaft of the rotor bearing is no longer driven by the belt or touching the belt.

[0003] Known solutions have a brake system which is combined with the rotor housing, wherein the rotor housing is linked with the spinning body.

[0004] In particular, in the spinning mode (figure 1), the rotor housing is pressed by the spinning body against a girder and the rotor shaft touches the belt. The brake is in the position released; between the brake system and the shaft is normally just a small gap; brake system is turn down (by gravity or by a spring).

[0005] When the box is opened (figure 2), the rotor body is moving out of its running position due to the link with the spinning body. When the spin body is opened, it is limited by the "hook" at the brake system, which is stopped by the girder. After stopping the brake system, its brake pad touches the rotor shaft and reduces the rotational speed of the shaft until the latter comes to a complete stop.

[0006] The brakes result (time for stopping) is given by the force on the brake pad, which is a result of the weight of the related system rotor housing and the spinning body.

[0007] The brake force is not only linked to the weight of the spin box, but it also depends on how tighten/rough-running is the system. Furthermore, the operator can reduce the stop-time, by putting additional pressure on the spinning body to increase the force urging the brake pad against the shaft.

[0008] In this case, the brake situation can be totally different form the planed/designed set-up/specification and the higher force can also (temporary) overload the bearings, which leads, over the time, to a short life time. Moreover, additional force / impact stress on bearing can occur at each opening of spinning unit, not only during running.

[0009] Next problem can be wrong parallelism of braking segment with bearing shaft which can cause the wear of bearing shaft.

SUMMARY OF THE INVENTION

[0010] The purpose of the present invention is that of providing

[0011] An open end spinning machine which overcomes the drawbacks mentioned with reference to the prior art.

[0012] Such aim is reached by an open end spinning machine according to claim 1.

[0013] Other embodiments of the open end spinning machine according to the invention are described in the subsequent claims.

[0014] Further characteristics and advantages of the present invention will be more clearly comprehensible from the description given below of its preferred and non-limiting embodiments, wherein:

- figure 1 shows a lateral view of an open end spinning machine according to prior art, in spinning mode;
- figure 2 shows a view of the known open end spinning machine of figure 1, in braking mode;
- figures 3-4 show opposite lateral views of an open end spinning machine according to a possible embodiment of the present invention, in a spinning mode;
- figure 5 shows a front view of particular V of figure 3;
- figure 6 show a perspective view of particular V of figure 3;
- figure 7 shows perspective views of components of an open end spinning machine according to possible embodiments of present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The elements or parts of elements common to the embodiments described below will be indicated using the same reference numerals.

[0016] With reference to the aforementioned figures, reference numeral 4 globally denotes an open end spinning machine, in particular a semi-automatic or automatic open-end spinning machine.

[0017] The open end spinning machine 4 comprises at least one spinning unit 8 provided with rotor housing 12.

[0018] The rotor housing 12 houses a spinning rotor 16 having a rotor shaft 20 with direct rotor bearing 24.

[0019] The rotor shaft 20 rotates around a rotation axis X-X so as to produce a thread, in a known manner.

[0020] The spinning unit 8 comprises at least one braking pad 28 pressed by a braking actuator 32 against a portion of the rotor shaft 20 for selectively braking the rotor shaft 20.

[0021] The braking pad 28 comprises a plate 36, directly influenced by the braking actuator 32, and a friction segment 40 directly scraping against the rotor shaft 20, wherein the plate 36 and the friction segment 40 are preferably made of different materials.

[0022] Advantageously, the direct rotor bearing 24 is inside the rotor housing 12 and the braking actuator 32 is separated and independent from the rotor shaft 20 and the rotor housing 12.

[0023] In this way, the braking force is independent from e.g. the weight of housings and from a possible impact of the operator, when opening the spin box manually or automated by a robot. In other words, the brake pad 28 works independently from the weight and or the position of the spinning body, and can't be manipulated by the operator so there is no risk of overloading.

[0024] In a preferred embodiment, the braking actuator 32 is configured to press the braking pad 28 against the rotor shaft 20 in a movement parallel to said rotation axis X-X.

[0025] According to a possible embodiment, the braking actuator 32 comprises an oscillating arm 44 urging the braking pad 28 against the rotor shaft 20; in particular the oscillating arm 44 rotates around a pin 48 parallel to the rotor shaft 20 and positioned offset with respect to the rotor shaft 20.

[0026] According to another possible embodiment, the braking actuator 32 comprises a translating bracket (not shown) urging the braking pad 28 against the rotor shaft 20, wherein the translating bracket moves along a radial axis perpendicular to the rotating shaft X-X.

[0027] Preferably, the braking pad 28 is positioned and extends parallel to the rotation axis X-X.

[0028] Preferably, the braking pad 28, in particular the friction segment 40, is counter-shaped with respect to an end of the rotor shaft 20.

[0029] For example, the braking pad 28, or better the friction segment 40, is concave and axis-symmetrical with respect to said rotation axis X-X.

[0030] In this way the wear of the friction segment 40 is more uniform and there are no vibrations during braking phase of the rotor shaft 20.

[0031] The braking actuator 32 is configured to push the braking pad 28 against the rotor shaft 20 in different ways.

[0032] For example the braking actuator pushes the braking pad 28 against the rotor shaft 20 mechanically by elastic means 52 such as a spring, and/or pneumatically by pressurised air and/or by magnetic force.

[0033] Of course, the pushing force on the braking pad 28 can be adjustable by change of any parts of the mechanism or by setting of distance/position of the elastic means 52 and the position of the braking pad 28 when touches the rotor shaft 20 or by changing of air pressure or magnetic force in other cases.

[0034] The spinning unit 8 comprises at least one lever 56 for blocking/unblocking the braking actuator 32 when the rotor housing 12 is closed or open respectively.

[0035] In other words, the lever 56 has to lock the braking actuator 32 when the rotor housing 12 is closed, during spinning steps; in this way there is no risk of braking the rotor shaft 20 during the spinning of the thread.

[0036] Moreover, the lever 56 has to unlock the braking actuator 32 when the rotor housing 12 is open.

[0037] After unlocking the braking actuator 32, the braking pad 28 is automatically pushed against the rotor shaft 20 until it is stopped. Therefore, the lever 56 when the rotor housing 12 is open, overcomes the pushing force of the braking actuator.

[0038] As it can be seen from the description, the open end spinning machine according to the invention makes it possible to overcome the drawbacks mentioned with reference to the prior art.

[0039] In particular, the open end according to the present invention ensures brake down of the rotor speed by an independently from outside influence working brake system, whereas a brake pad is, when released, pressed against the rotor shaft with a defined force given by a spring or other pressing means.

[0040] Moreover, the brake system can work from one side of the rotor shaft or, as an alternative embodiment, also from both sides of the rotor shaft.

[0041] Moreover, in any case, the braking force is independent form e.g. the weight of housings and from a possible impact of the operator, when opening the spin box manually or automated by a robot. In other words, the brake pad works independently from the weight and or the position of the spinning body, and can't be manipulated by the operator so there is no risk of overloading.

[0042] Especially when using a direct bearing solution for high speed (>120.000 rpm) the impact of "overloading" is huge and leads to a short lifetime and a limitation of speed.

[0043] Therefore, the life time of the rotor, and above all of the bearings of the rotor, with respect to prior art solutions is significantly increased.

[0044] Moreover, the life time of the breaking pad is increased due to bigger surface of contact, with respect to known solutions.

[0045] A person skilled in the art may make numerous modifications and variations to the open end spinning machines described above so as to satisfy contingent and specific requirements, while remaining within the scope of protection of the invention as defined by the following claims.

Claims

1. Open end spinning machine (4) comprising

- at least one spinning unit (8) provided with rotor housing (12),
- wherein the rotor housing (12) houses a spinning rotor (16) having a rotor shaft (20) with direct rotor bearing (24), the rotor shaft (20) rotating around a rotation axis (X-X),
- the spinning unit (8) comprising at least one braking pad (28) influenced by a braking actuator (32) for selectively braking the rotor shaft (20),

characterized by the fact that

- direct rotor bearing (24) is inside the rotor hous-

ing (12) and the braking actuator (32) is separated and independent from the rotor shaft (20) and the rotor housing (12).

2. Open end spinning machine (4) according to claim 1, wherein the braking actuator (32) is configured to press the braking pad (28) against the rotor shaft (20) in a movement parallel to said rotation axis (X-X).

3. Open end spinning machine (4) according to claim 1 or 2, wherein the braking actuator (32) comprises an oscillating arm (44) urging the braking pad (28) against the rotor shaft (20), the oscillating arm (44) rotating around a pin (48) parallel to the rotor shaft (20) and positioned offset with respect to the rotor shaft (20).

4. Open end spinning machine (4) according to claim 1 or 2, wherein the braking actuator (32) comprises a translating bracket urging the braking pad (28) against the rotor shaft (20), the translating bracket moving along a radial axis perpendicular to the rotor shaft (20) .

5. Open end spinning machine (4) according to any one of previous claims, wherein the braking pad (28) is positioned and extends parallel to the rotation axis (X-X) .

6. Open end spinning machine (4) according to any one of claims from 1 to 5, wherein the braking pad (28) is counter-shaped with respect to an end of the rotor shaft (20) .

7. Open end spinning machine (4) according to any one of claims from 1 to 6, wherein the braking pad (28) is concave and axis-symmetrical with respect to said rotation axis (X-X).

8. Open end spinning machine (4) according to any one of claims from 1 to 7, wherein the braking actuator (32) is configured to push the braking pad (28) against the rotor shaft (20) mechanically by an elastic means (52), and/or pneumatically by pressurised air and/or by magnetic force.

9. Open end spinning machine (4) according to any one of previous claims, wherein the spinning unit (8) comprises at least one lever (56) for blocking/unblocking the braking actuator (32) when the rotor housing (12) is closed or open respectively.

10. Open end spinning machine (4) according to any one of claims from 1 to 9, wherein the braking pad (28) comprises a plate (36), directly influenced by the braking actuator (32), and a friction segment (40) directly scraping against the rotor shaft (20), wherein the plate (36) and the friction segment (40) are made of different materials.

11. Open end spinning machine (4) according to any one of claims from 1 to 10, wherein the machine (4) is a semi-automatic or automatic open-end spinning machine.

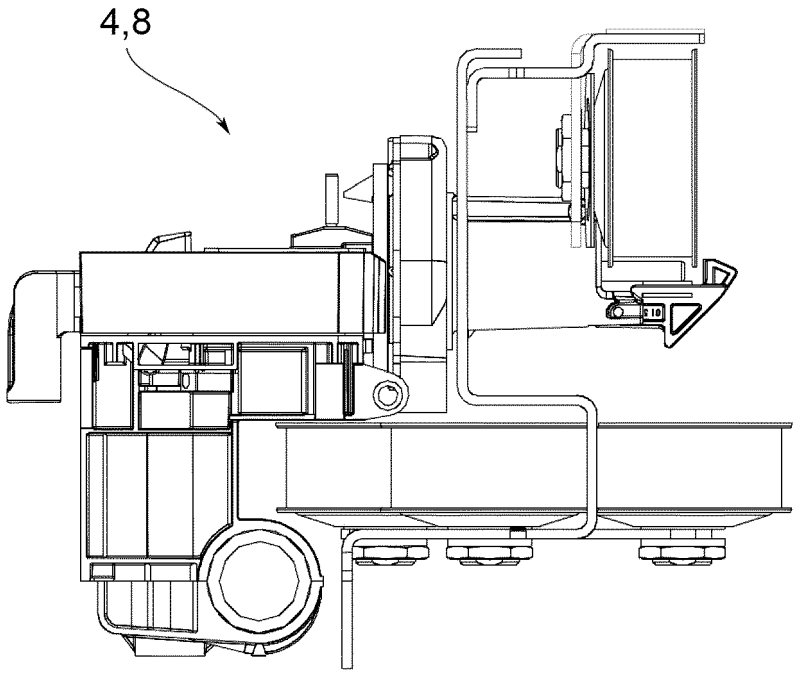

FIG.1 - Prior art

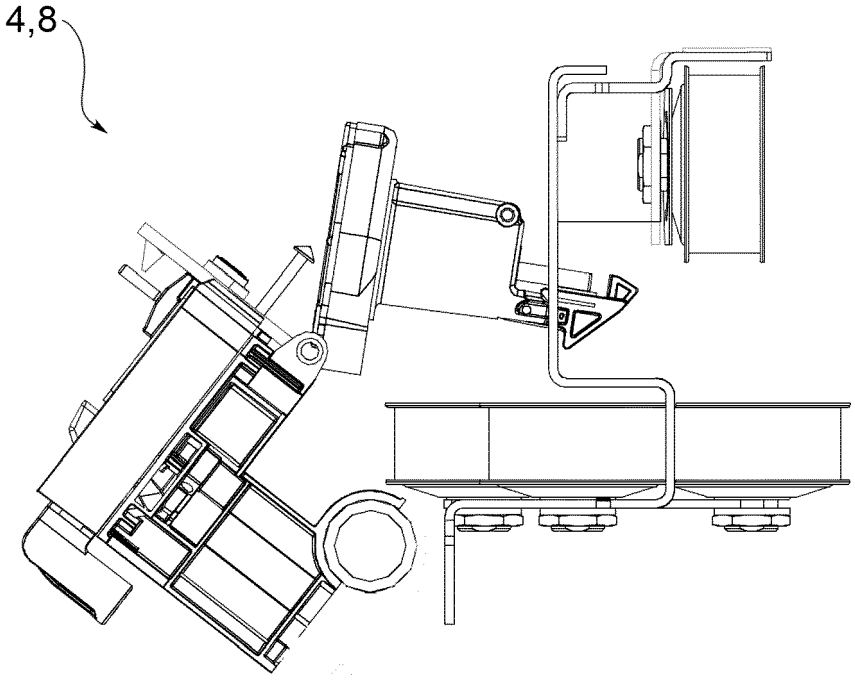

FIG.2 - Prior art

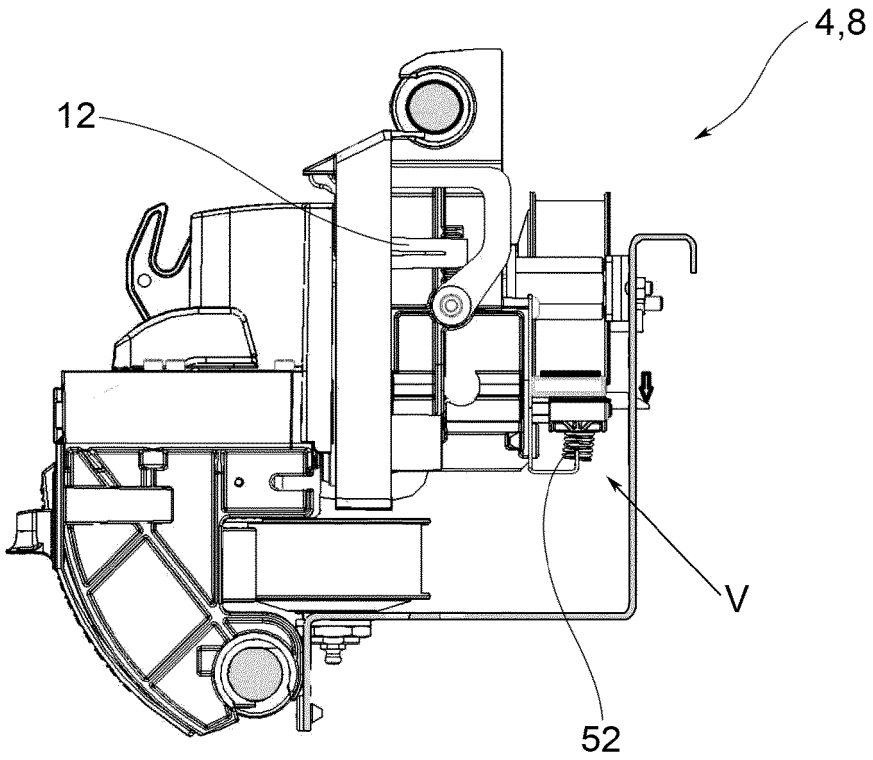

FIG.3

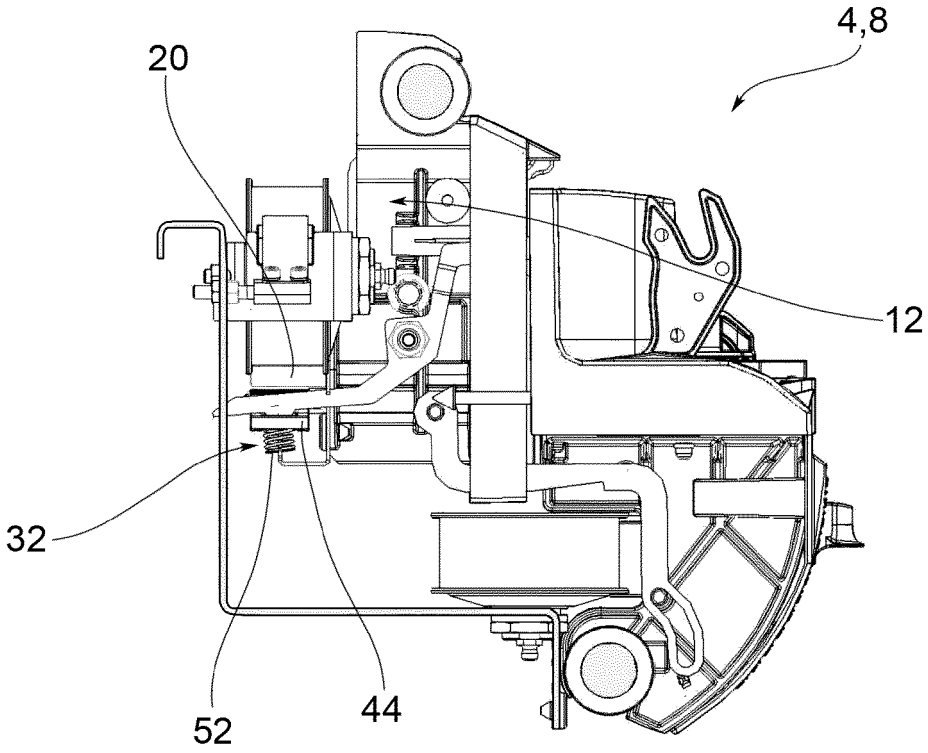

FIG.4

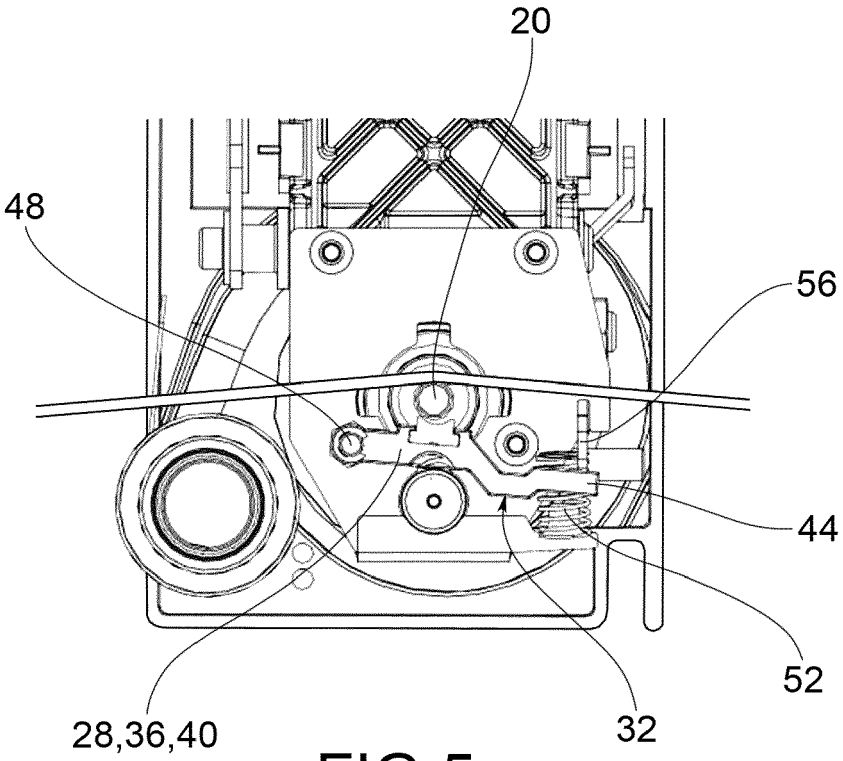

FIG.5

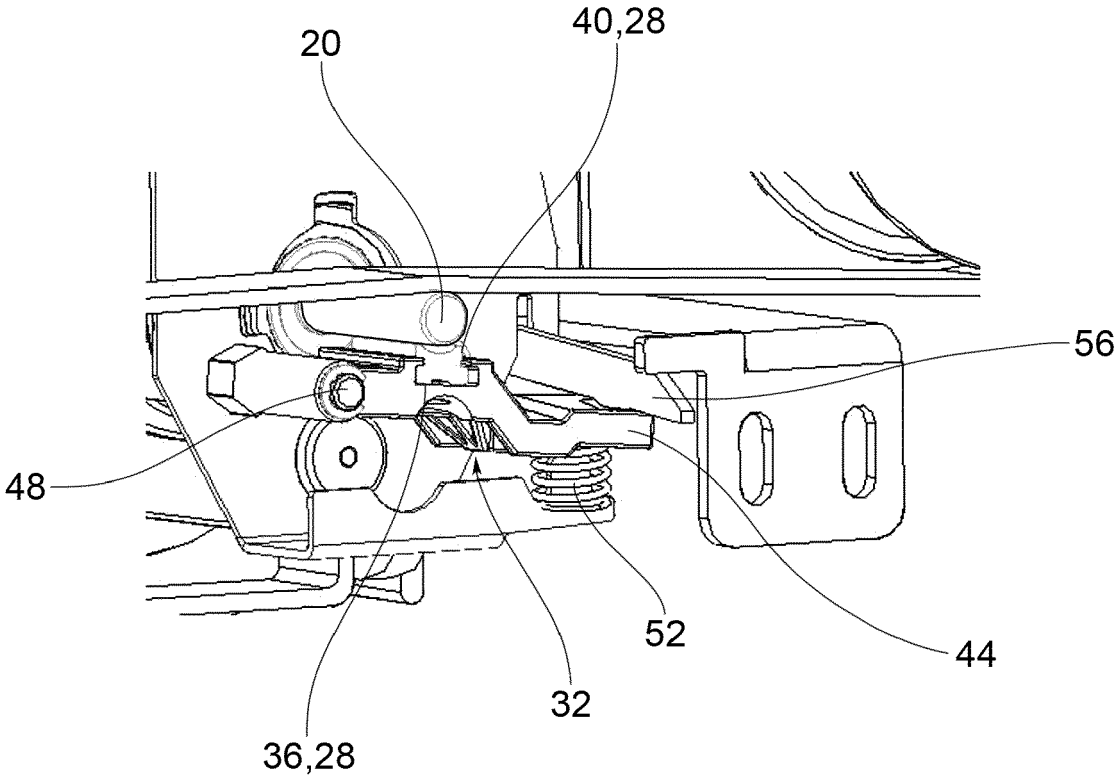

FIG.6

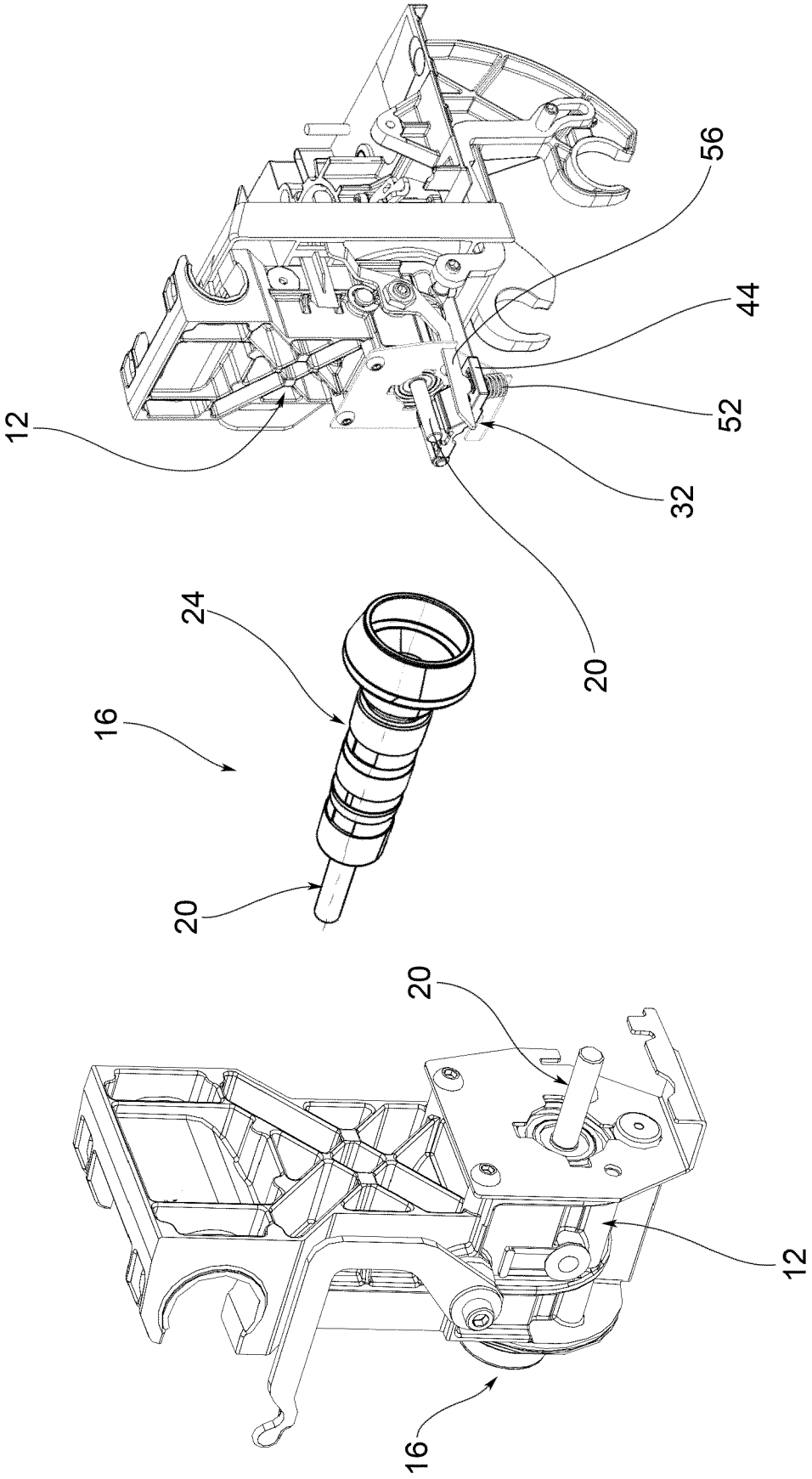

FIG.7

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EUROPEAN SEARCH REPORT

Application Number
EP 18 20 5378

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 April 2019	Humbert, Thomas

CATEGORY OF CITED DOCUMENTS

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