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(71) Applicant: **Ormazabal Distribucion Primaria, S.A.**
48140 Igorre Vizcaya (ES)

(72) Inventors:
- **Hernani Perez, Ricardo**
  48140 Igorre (Vizcaya) (ES)
- **Lorenzo Michelena, Alberto**
  48140 Igorre (Vizcaya) (ES)

(74) Representative: **Carpintero Lopez, Francisco et al**
Herrero & Asociados, S.L.
Alcalá 35
28014 Madrid (ES)

(54) Operating mechanism with device preventing contact vibration for vacuum circuit breaker.

(57) The invention relates to a break and connection module applied in high voltage switchgear, comprising a multi-pole vacuum switch (2), comprising a fixed contact (9) and a mobile contact (10), an operating mechanism (3) common to all the poles of the switch, a base (4) configured to support the vacuum switch (2) and the operating mechanism (3), a coupling device (16) for each pole of the vacuum switch (2) which transmits an actuating force from the operating mechanism (3) to the mobile contact (10), wherein the operating mechanism (3) comprises a locking device (8) configured to prevent a rebound effect of the mobile contact (10) after performing break and/or connection operations of said vacuum switch (2).

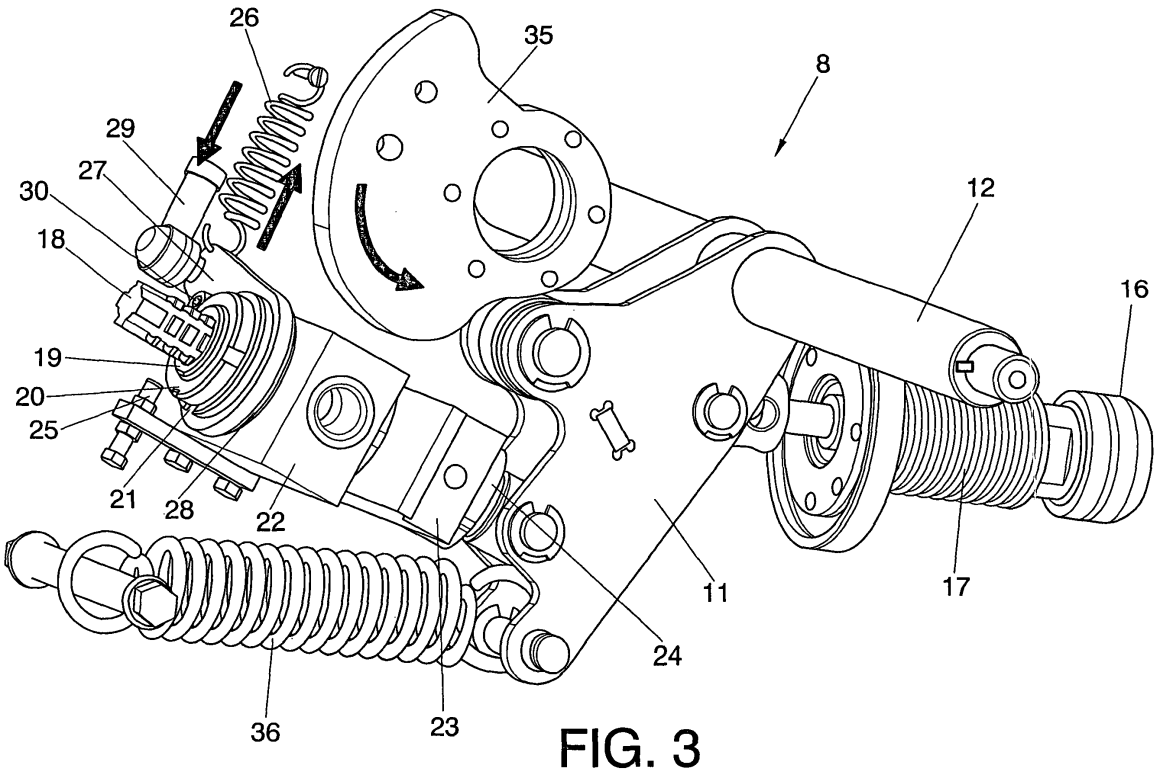

FIG. 3

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Description

Object of the Invention

[0001] The present invention relates to a break and connection module applied in high voltage switchgear having an application in the electric industry, comprising a multi-pole vacuum switch as well as an operating mechanism in turn comprising a locking device configured to prevent the occurrence of a backward or rebound movement of a mobile contact of the vacuum switch after the break and/or connection operations, preventing the creation of an electric arc between the contacts of the switch, with the subsequent increase in the safety of the switch, all with a small number of elements.

Background of the Invention

[0002] The switchgear comprised by the high voltage network is usually installed in prefabricated equipment commonly referred to as cells, which are factory-tested.

[0003] Occasionally, said cells comprise different compartments, such as a bar compartment, a switch compartment, a connections compartment and a low voltage compartment.

[0004] The switch compartment requires the use of an insulating medium, which is usually air or another gaseous medium, such as for example sulfur hexafluoride (SF_6), dry air, nitrogen, etc., for the purpose of reducing the distance between phases and thus obtaining a compact enclosure that is invariable to external or environmental conditions such as pollution or moisture.

[0005] Today there are switch compartments configured to perform sectionalization/sectionalization and grounding functions as well as break and connection functions. To that end, the switch compartment comprises operating elements such as a sectionalizer or a grounding sectionalizer and a switch, respectively, for the aforementioned functions. The switch can consist both of an automatic switch and a load-break switch.

[0006] The switch compartment also comprises a coupling device for each of the aforementioned operating elements provided. Specifically, the coupling device is joined to a mobile contact of the operating element.

[0007] In the event that the switch compartment is tight, since the insulating medium is gaseous, the coupling device transmits in a gas-tight manner the actuating force produced by the individual operating mechanism of each operating element by means of a bellows.

[0008] The operating mechanisms produce the actuating force for carrying out the sectionalization/sectionalization and grounding functions, as well as the break and connection functions. European patents EP 1251614 and EP 564057 describe operating mechanisms forming part of the assembly of elements comprised by the switch compartment, this assembly of elements being more compact, allowing its installation in the switch compartment as a unit.

[0009] The previously discussed modules can comprise a single operating element, such as for example an automatic or load-break switch and its coupling device and its corresponding operating mechanism. This solution is described, for example, in European patent application EP 1156565, in patent application US 2002067230, in patent US 5864108, in patent US 5055640 or in European patent EP 1496585.

[0010] In these cases, the sectionalization/sectionalization and grounding functions are carried out by an operating element which is external or remote to the module, such as for example a sectionalizer or a grounding sectionalizer, said operating element being connected to the switch module by means of a flexible or rigid connection linking the mobile contact of the automatic or load-break switch with said sectionalizer or grounding sectionalizer.

[0011] In addition, European patent application EP 1453164 and European patent EP 543352 describe extractable modules which only comprise a single operating element, with its corresponding operating mechanism and coupling device, wherein said operating element performs the break and connection functions, whereas the sectionalization/sectionalization and grounding functions are performed by means of extracting said module from the switch compartment. The compartments in which these modules are located are obviously not tight, and the only insulation medium that can be used is air, which implies several drawbacks with regard to another type of insulating medium.

[0012] As explained above, the operating mechanism produces the actuating force, which is transmitted to the mobile contact of the operating element by means of the coupling device, such that the movement of the mobile contact causes its connection, or its disconnection, with the fixed contact of the operating element.

[0013] By means of the intervention of the operating mechanism, in the case of a switch, the current in an electric circuit is cut-off or restored, said intervention or operation being able to be deliberate or voluntary, such as in the event that it is restored by an operator, or it can occur as a result of the action of a device sensitive to certain current values, which causes a direct or indirect order to open the circuit.

[0014] In the break or open position, the switch must maintain or support the insulation between two parts of the circuit, whereas in the connection or closed position, the switch must permanently conduct nominal currents as well as support during a certain time accidental or abnormal situations, such as overloads or short-circuits.

[0015] During the break operation, the formation of an electric arc between the separate contacts is possible, this formation being an unwanted phenomenon which must be prevented given that the formation of the arc can destroy the insulations and contacts, as well as cause a sudden temperature and pressure increase which can produce explosions causing property damage, the formation of toxic gases, even personal injury. Therefore,

the break time is fundamental, given that during the passage from the contact to the final separation situation, the contacts pass through a range of distances in which the electric arc may occur, and for this reason said passage must be as quick as possible, i.e., the break time is minimum, for the purpose of minimizing said risk.

[0016] To minimize the break time, the operating mechanisms existing today, such as for example those described in the aforementioned patent documents, perform said break at high break speeds.

[0017] The main drawback of these mechanisms, especially from the safety point of view, is that the mobile contact of the switch undergoes a rebound effect during the break operation at the end of the opening travel as a result of the high break speed required so that the opening is performed in as little time as possible. The negative consequence of the rebound effect is that the contacts approach one another, which considerably increases the risk that an electric arc will occur given the reduced distance between them, with the disastrous consequences it entails, as described above.

[0018] In order to attenuate the serious drawback involved with the rebound effect described in the preceding paragraph, more recent operating mechanisms comprise a plurality of springs, damping means and counterweights, and even inertial masses. The problem in these cases is that these operating mechanisms comprise a much larger number of elements and components, which means that much more complex mechanisms, therefore having much lower reliability in terms of the operation, will have to be used, generating more maintenance problems and therefore a higher cost.

[0019] There are also solutions, such as those described in patent application US 2002067230 or patent US 5055640, in which the switch and the operating mechanism are not mounted on the same shaft of the module, with the drawback that the coupling device has to make several movement conversions before transmitting said movement to the mobile contact of the switch, whereby the use of the coupling device is much more complex, requiring a larger number of components, resulting in the larger dimensions of the module in general.

[0020] To reduce the dimensions of the module formed by the switch, the operating mechanism and the coupling device, a vacuum is normally used as a dielectric means for performing the break and connection operations of the contacts of the switch. Occasionally, the poles of the vacuum switch are arranged in a casing or enclosure, or in independent enclosures, for the purpose of reducing the distances between phases and preventing the risk that an electric arc occurs between live parts. In these modules, the vacuum switch is integrated inside the switch compartment, which contains an insulating gas favoring the reduction of distances between the live parts and aids in dissipating heat.

Description of the Invention

[0021] The present invention relates to a break and connection module applied in high voltage switchgear, and particularly incorporated in a compartment of a cell, for example in the switch compartment, this compartment being able to be tight, and therefore insulated in a gas, in this case a being break and connection module that cannot be extracted from said compartment.

[0022] Said break and connection module comprises an operating mechanism in turn comprising a locking device preventing a backward or rebound movement of a mobile contact of a vacuum switch from occurring after performing break and/or connection operations, preventing the creation of an electric arc between the contacts of the switch.

[0023] According to the invention, the break and connection module comprises a multi-pole vacuum switch, preferably with its longitudinal shafts arranged horizontally, comprising a fixed contact and a mobile contact.

[0024] The module also comprises an operating mechanism common to all the poles of the vacuum switch, said operating mechanism being able to be manually or automatically operated or motor-driven.

[0025] The module comprises a base which is configured to support and fix the vacuum switch and the operating mechanism, which are separated by a wall comprised by said base and which separates the poles of the vacuum switch and the operating mechanism.

[0026] In addition, the module comprises a coupling device for each pole of the vacuum switch, which transmits in a gas-tight manner by means of a transmitting means, which can consist of a bellows, an actuating force from the operating mechanism to the mobile contact of the vacuum switch.

[0027] According to the invention, the operating mechanism, which applies both for load-break switches and for automatic switches, comprises a locking device which is configured to prevent a rebound effect of the mobile contact after performing break and/or connection operations of said vacuum switch.

[0028] It is contemplated that the locking device comprises at least one plate, configured to rotate in relation to a rotation shaft, said plate being joined to the coupling device. Said locking device also comprises a locking shaft comprising a plurality of teeth arranged according to longitudinal rows, i.e., parallel to the actual locking shaft, said locking shaft being joined to the plate.

[0029] The locking device also comprises a locking sleeve comprising a plurality of complementary teeth located in an inner part of said locking sleeve and arranged according to longitudinal rows, said locking sleeve being traversed by the locking shaft.

[0030] Arranged between the rows of teeth there are defined longitudinal grooves which, depending on the position of the locking shaft in relation to the locking sleeve, allow the complementary teeth to mesh, be housed in or match up with the teeth of the locking shaft, locking axial

movement. In the event that the complementary teeth are housed in the longitudinal grooves of the locking shaft, said axial sliding of the locking shaft in relation to the locking sleeve is allowed.

[0031] It is contemplated as a possibility that the locking device comprises an adjustable nut which is threaded in the locking shaft, an opening stop which is traversed by the locking shaft and is fixed to a casing, preferably made of aluminum, which encloses and protects the operating mechanism, a support which is fixed to the casing and traversed by the locking sleeve, two axial bushings, located on each side of the support, which are traversed by the locking sleeve, a connecting rod which is fixed and traversed by the locking sleeve, with which it is integral, for example, by means of a key which is fitted in a groove that said locking sleeve may be provided with longitudinally.

[0032] The locking device described in the preceding paragraph also comprises at least two lock washers and at least two lock nuts which are threaded in the locking sleeve and which are configured to adjust the axial bushings, the connecting rod and the lock washers against the support, a release mechanism and a latch spring which are joined to the connecting rod, a release stop which is joined to the support, and a stop screw which is joined to the connecting rod.

[0033] It is contemplated that during a connection operation of the vacuum switch the release mechanism is configured to rotate the connecting rod, said rotation being limited by the release stop and the stop screw, said rotation of the connecting rod being configured to cause a rotation of the locking sleeve such that its complementary teeth do not match up, i.e., do not contact, the teeth of the locking shaft, allowing an axial movement of the locking shaft caused by the action of a cam on the plate, transmitting a movement to the coupling device and to the mobile contact.

[0034] Preferably during the connection operation of the vacuum switch, when the mobile contact is located at the end of travel, the cam is configured to act on or to continue pushing the plate, allowing the axial movement of the locking shaft to continue until the complementary teeth of the locking sleeve mesh with, are housed in or match up with the teeth of said locking shaft, the mobile contact being locked in a connection position, the latch spring being configured to cause a rotational movement of the locking sleeve.

[0035] During the connection or closing operation of the switch, the operating mechanism acts on the cam, which acts on the plate, which in turn moves a rod causing the movement of the coupling device, which in turn acts on the mobile contact until it contacts the fixed contact, whereby closing the circuit.

[0036] The coupling device does not act directly on the mobile contact, but rather on the opening springs which are joined to the mobile contact, such that once the mobile contact closes the circuit by means of its contact with the fixed contact, the coupling device continues its movement or actuation against the opening spring, causing its compression. Without said additional travel, a small backward movement of the mobile contact in relation to the fixed contact will occur.

[0037] At the same time the connection operation begins, the operating mechanism acts on the release mechanism, which causes the rotation of the connecting rod, which in turn causes the rotation of the locking sleeve, causing the complementary teeth to come out of mesh with or dislodge from the teeth of the locking shaft.

[0038] The locking shaft is joined to the plate, such that said plate is only allowed rotational movement as a result of the actuation of the cam when the locking shaft is released, i.e., when the complementary teeth of the locking sleeve are not in contact, meshed, with the teeth of the locking shaft. Therefore, the locking shaft can be released and the mobile contact of the switch moved simultaneously by means of the actuation of the operating mechanism.

[0039] Once the connection or closed position between the mobile contact and the fixed contact has been reached, it is necessary to lock the device again for the purpose of maintaining said closed position of the switch. To that end, the connecting rod receives at all times the action of a latch spring which tends to cause a rotational movement of the locking sleeve in relation to the locking shaft.

[0040] The operating mechanism acts on the release mechanism in the moment in which the connection operation begins, but it does not immediately release it, such that the latch spring makes the locking sleeve rotate so that its complementary teeth are in a meshing or matching position with the teeth of the locking shaft.

[0041] It is contemplated that during a break operation of the vacuum switch the release mechanism is configured to rotate the connecting rod, said rotation being limited by the release stop and the stop screw, said rotation of the connecting rod being configured to cause a rotation of the locking sleeve such that its complementary teeth do not match up with the teeth of the locking shaft.

[0042] The foregoing allows an axial movement of the locking shaft which is limited by the opening stop and the adjustable nut and said axial movement is caused by the decompressive force or action of an opening spring that each pole of the vacuum switch has and by the tractive force or action of a spring which links or which is performed on the coupling device and the plate, causing a movement of the mobile contact and, accordingly, separating it from the fixed contact.

[0043] Preferably during the break operation of the vacuum switch, when the mobile contact is located in at the end of travel, due to the action of the latch spring causing the rotation of the locking sleeve, the complementary teeth match up with the teeth of the locking shaft, the mobile contact being locked in a break position.

[0044] At the same time the break or opening operation of the switch begins, the operating mechanism acts on the release mechanism, causing the rotation of the con-

necting rod and therefore the freeing, release or coming out of mesh between the teeth of the locking shaft and the complementary teeth of the locking sleeve.

[0045] A loss of force or decompression in the opening spring of the mobile contact, which acts on the coupling device and the latter in turn on the plate, causes a movement of the locking shaft because it is not in a locking position. When the mobile contact reaches an end of opening travel position, i.e., when the operating mechanism no longer acts on the release mechanism, the effect of the latch spring causes a rotational movement of the locking sleeve in relation to the locking shaft, whereby said locking shaft is again in a locking position in relation to the locking sleeve.

[0046] The possibility that the base comprises an enclosure incorporating, supporting or containing the poles of the vacuum switch is contemplated.

[0047] It is also contemplated that each pole of the vacuum switch is incorporated in an independent enclosure comprised by the base.

[0048] According to a preferred embodiment, said at least one enclosure is made of polymer material, and preferably epoxy resin.

[0049] It is contemplated that the base comprises a joining element between the wall and at least one enclosure.

[0050] The possibility that the fixed contact of the vacuum switch is joined to a service element and the mobile contact is joined to an output element is additionally contemplated.

[0051] The service element preferably consists of a rigid connection and the output element consists of a flexible connection.

Description of the Drawings

[0052] To complement the description being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description showing the following with a non-limiting and descriptive character:

Figure 1 shows a perspective view of the break and connection module applied in high voltage switchgear proposed by the invention, in which the base for the support of the multi-pole vacuum switch can be seen, showing a partially sectioned enclosure, as well as the wall separating the switch from the operating mechanism.

Figure 2 shows another perspective view of the break and connection module of the invention, in which the coupling device and the mobile contact of a pole of the switch can be seen, the latter being depicted in a partially sectioned manner, as well as a spring comprised by said mobile contact for performing the switch opening operation.

Figure 3 shows a perspective view of the locking device comprised by the operating mechanism, in which the elements of the coupling device corresponding to one of the poles of the switch have also been depicted.

Figure 4 shows a longitudinal section of the locking shaft housed in the locking sleeve, in a locked situation in which their teeth are in contact, as well as some elements for the support, fixing and operation of said shaft and locking sleeve.

Figure 5 shows a perspective view of the locking shaft coupled, according to the locked situation, in the sleeve, which is shown in a partially sectioned manner.

Preferred Embodiment of the Invention

[0053] In view of the discussed figures, it can be observed how one of the possible embodiments of the invention relates to a break and connection module (1) applied in high voltage switchgear, configured to be incorporated in a switch compartment, said compartment being tight, and therefore insulated in a gas, whereby according to a preferred embodiment the break and connection module (1) is not extractable from said switch compartment.

[0054] As can be seen in Figures 1 and 2, the break and connection module (1) comprises a three-pole vacuum switch (2), with its longitudinal shafts arranged horizontally, comprising a fixed contact (9) and a mobile contact (10), in which the fixed contact (9) is joined to a service element (14), consisting of a rigid connection, and the mobile contact (10) is joined to an output element (15), consisting of a flexible connection.

[0055] The break and connection module (1) also comprises an operating mechanism (3) common to the three poles of the vacuum switch (2), said operating mechanism (3) being motor-driven and/or manually actuated.

[0056] The break and connection module (1) comprises a base (4) which is configured to support and fix the vacuum switch (2) and the operating mechanism (3), which are separated by a wall (5) comprised by said base (4) and which separates the poles of the vacuum switch (2) and the operating mechanism (3). Each pole of the vacuum switch (2) is incorporated in an independent enclosure (6) made of epoxy resin comprised by the base (4).

[0057] As can be seen in Figures 1 and 2, the base (4) comprises a joining element (7) between the wall (5) and at least one enclosure (6).

[0058] In addition, the module (1) of the invention comprises a coupling device (16) for each pole of the vacuum switch (2), which transmits in a gas-tight manner by means of a transmitting means (17), which consists of a bellows, an actuating force from the operating mechanism (3) to the mobile contact (10) of the vacuum switch (2).

[0059] The operating mechanism (3), which is applied for both load-break switches and automatic switches,

comprises a locking device (8), depicted in Figures 3 and 4, which is configured to prevent a rebound effect of the mobile contact (10) after performing break and/or connection operations of said vacuum switch (2).

[0060] As can be seen in Figure 3, the locking device (8) comprises a plate (11), configured to rotate in relation to a rotation shaft (12), said plate (11) being joined to the coupling device (16).

[0061] The locking device (8) also comprises a locking shaft (18) comprising a plurality of teeth (34) arranged according to longitudinal rows, parallel to the locking shaft (18) itself, said locking shaft (18) being joined to the plate (11).

[0062] The locking device (8) also comprises a locking sleeve (19), comprising a plurality of complementary teeth (33) located in an inner part of said locking sleeve (19) arranged according to longitudinal rows, said locking sleeve (19) being traversed by the locking shaft (18), as depicted in Figure 5.

[0063] In addition, the locking device (8) comprises an adjustable nut (24) which is threaded in the locking shaft (18), an opening stop (23) which is traversed by the locking shaft (18) and is fixed to a casing (13) made of aluminum, enclosing and protecting the operating mechanism (3), a support (22) which is fixed to the casing (13) and traversed by the locking sleeve (19), two axial bushings (28, 28'), located on each side of the support (22), which are traversed by the locking sleeve (19), a connecting rod (27) which is fixed and traversed by the locking sleeve (19), with which it is integral by means of a key (31) which is fitted in a groove (32) that said locking sleeve (19) longitudinally has.

[0064] The locking device (8) also comprises two lock washers (21, 21') and two lock nuts (20, 20') which are threaded in the locking sleeve (19) and which are configured to adjust the axial bushings (28, 28'), the connecting rod (27) and the lock washers (21, 21') against the support (22), a release mechanism (29) and a latch spring (26) which are joined to the connecting rod (27), a release stop (25) which is joined to the support (22), and a stop screw (30) which is joined to the connecting rod (27).

[0065] During a connection operation of the vacuum switch (2), the release mechanism (29) is configured to rotate the connecting rod (27), said rotation being limited by the release stop (25) and the stop screw (30), said rotation of the connecting rod (27) being configured to cause a rotation of the locking sleeve (19), such that its complementary teeth (33) do not match up with the teeth (34) of the locking shaft (18), allowing an axial movement of the locking shaft (18) caused by the action of a cam (35) on the plate (11), transmitting a movement to the coupling device (16) and to the mobile contact (10).

[0066] Therefore, during the connection operation of the vacuum switch (2), when the mobile contact (10) is located at the end of travel, the cam (35) is configured to continue acting on the plate (11), allowing the axial movement of the locking shaft (18) to continue until the complementary teeth (33) of the locking sleeve (19) mesh with the teeth (34) of said locking shaft (18), the mobile contact (10) being locked in a connection position, the latch spring (26) being configured to cause a rotational movement of the locking sleeve (19).

[0067] During the connection operation of the switch (2), the operating mechanism (3) acts on the cam (35), which acts on the plate (11), which in turn moves a rod causing the movement of the coupling device (16), which in turn acts on the mobile contact (10) until it contacts the fixed contact (9), whereby closing the circuit.

[0068] In addition, during a break operation of the vacuum switch (2), the release mechanism (29) is configured to rotate the connecting rod (27), said rotation being limited by the release stop (25) and the stop screw (30), said rotation of the connecting rod (27) being configured to cause a rotation of the locking sleeve (19), such that its complementary teeth (33) do not match up with the teeth (34) of the locking shaft (18).

[0069] An axial movement of the locking shaft (18), which is limited by the opening stop (23) and the adjustable nut (24), and is caused by the decompressive force of an opening spring (37) that each pole of the vacuum switch (2) has and by the tractive force of a spring (36) linking the coupling device (16) and the plate (11) is thus allowed, causing a movement of the mobile contact (10) and its separation from the fixed contact (9).

[0070] During the break operation of the vacuum switch (2), when the mobile contact (10) is located at the end of travel, due to the action of the latch spring (26) causing the rotation of the locking sleeve (19), the complementary teeth (33) match up with the teeth (34) of the locking shaft (18), the mobile contact (10) being locked in a break position.

[0071] In view of this description and set of drawings, a person skilled in the art will understand that the embodiments of the invention that have been described can be combined in many ways within the object of the invention. The invention has been described according to some preferred embodiments thereof, but it will be evident for a person skilled in the art that many variations can be introduced in said preferred embodiments without exceeding the object of the claimed invention.

Claims

1. Break and connection module, applied in high voltage switchgear, comprising:

   - a multi-pole vacuum switch (2) comprising a fixed contact (9) and a mobile contact (10),
   - an operating mechanism (3) common to all the poles of the vacuum switch (2),
   - a base (4) configured to support the vacuum switch (2) and the operating mechanism (3), which are separated by a wall (5),
   - a coupling device (16) for each pole of the vac-

uum switch (2) which transmits by means of transmitting means (17) an actuating force from the operating mechanism (3) to the mobile contact (10) of the vacuum switch (2),

characterized in that the operating mechanism (3) comprises a locking device (8) configured to prevent a rebound effect of the mobile contact (10) after performing break and/or connection operations of said vacuum switch (2).

2. Break and connection module according to claim 1, **characterized in that** it is not extractable.

3. Break and connection module according to any of claims 1 and 2, **characterized in that** the locking device (8) comprises:

- at least one plate (11), configured to rotate in relation to a rotation shaft (12), which is joined to the coupling device (16),
- a locking shaft (18) comprising a plurality of teeth (34) arranged according to longitudinal rows, said locking shaft (18) being joined to the plate (11), and
- a locking sleeve (19) comprising a plurality of complementary teeth (33) located in an inner part of said locking sleeve (19) arranged according to longitudinal rows, said locking sleeve (19) being traversed by the locking shaft (18).

4. Break and connection module according to claim 3, **characterized in that** the locking device (8) comprises:

- an adjustable nut (24) which is threaded in the locking shaft (18),
- an opening stop (23) which is traversed by the locking shaft (18) and is fixed to a casing (13) enclosing and protecting the operating mechanism (3),
- a support (22) which is fixed to the casing (13) and is traversed by the locking sleeve (19),
- two axial bushings (28, 28'), located on each side of the support (22), which are traversed by the locking sleeve (19),
- a connecting rod (27) integral with locking sleeve (19) through a key (31) which is fitted in a groove (32) that the locking sleeve (19) has,
- at least two lock washers (21, 21') and at least two lock nuts (20, 20') which are threaded in the locking sleeve (19) and which are configured to adjust the axial bushings (28, 28'), the connecting rod (27) and the lock washers (21, 21') against the support (22),
- a release mechanism (29) and a latch spring (26) which are joined to the connecting rod (27),
- a release stop (25) which is joined to the support (22), and
- a stop screw (30) which is joined to the connecting rod (27).

5. Break and connection module according to claim 4, **characterized in that** during a connection operation of the vacuum switch (2) the release mechanism (29) is configured to rotate the connecting rod (27), said rotation being limited by the release stop (25) and the stop screw (30), said rotation of the connecting rod (27) being configured to cause a rotation of the locking sleeve (19) such that its complementary teeth (33) do not match up with the teeth (34) of the locking shaft (18), allowing an axial movement of the locking shaft (18) caused by the action of a cam (35) on the plate (11), transmitting a movement to the coupling device (16) and to the mobile contact (10).

6. Break and connection module according to claim 5, **characterized in that** during the connection operation of the vacuum switch (2), when the mobile contact (10) is located at the end of travel, the cam (35) is configured to continue acting on the plate (11), allowing the axial movement of the locking shaft (18) until the complementary teeth (33) of the locking sleeve (19) mesh with the teeth (34) of said locking shaft (18), the mobile contact (10) being locked in a connection position, the latch spring (26) being configured to cause a rotational movement of the locking sleeve (19).

7. Break and connection module according to any of claims 4 to 6, **characterized in that** during a break operation of the vacuum switch (2) the release mechanism (29) is configured to rotate the connecting rod (27), said rotation being limited by the release stop (25) and the stop screw (30), said rotation of the connecting rod (27) being configured to cause a rotation of the locking sleeve (19) such that its complementary teeth (33) do not match up with the teeth (34) of the locking shaft (18), allowing an axial movement of the locking shaft (18) which is limited by the opening stop (23) and the adjustable nut (24) and is caused by the action of an opening spring (37) that each pole of the vacuum switch (2) has and by the action of a spring (36) linking the coupling device (16) and the plate (11), causing a movement of the mobile contact (10) and its separation from the fixed contact (9).

8. Break and connection module according to claim 7, **characterized in that** during the break operation of the vacuum switch (2), when the mobile contact (10) is located at the end of travel, due to the action of the latch spring (26) causing the rotation of the locking sleeve (19), the complementary teeth (33) match up with the teeth (34) of the locking shaft (18), the mobile contact (10) being locked in a break position.

9. Break and connection module according to any of the previous claims, **characterized in that** the base (4) comprises an enclosure (6) which supports the poles of the vacuum switch (2).

10. Break and connection module according to any of claims 1 to 8, **characterized in that** each pole of the vacuum switch (2) is in an independent enclosure (6) comprised by the base (4).

11. Break and connection module according to any of claims 9 and 10, **characterized in that** at least one enclosure (6) is made of polymer material.

12. Break and connection module according to any of claims 9 to 11, **characterized in that** the base (4) comprises a joining element (7) between the wall (5) and at least one enclosure (6).

13. Break and connection module according to any of claims 4 to 12, **characterized in that** the casing (13) is made of aluminum.

14. Break and connection module according to any of the previous claims, **characterized in that** the fixed contact (9) of the vacuum switch (2) is joined to a service element (14) and the mobile contact (10) is joined to an output element (15).

15. Break and connection module according to claim 14, **characterized in that** the service element (14) consists of a rigid connection and the output element (15) consists of a flexible connection.

16. Break and connection module according to any of the previous claims, **characterized in that** the multipole vacuum switch (2) comprises a fixed contact (9) and a mobile contact (10), with its longitudinal shaft arranged horizontally.

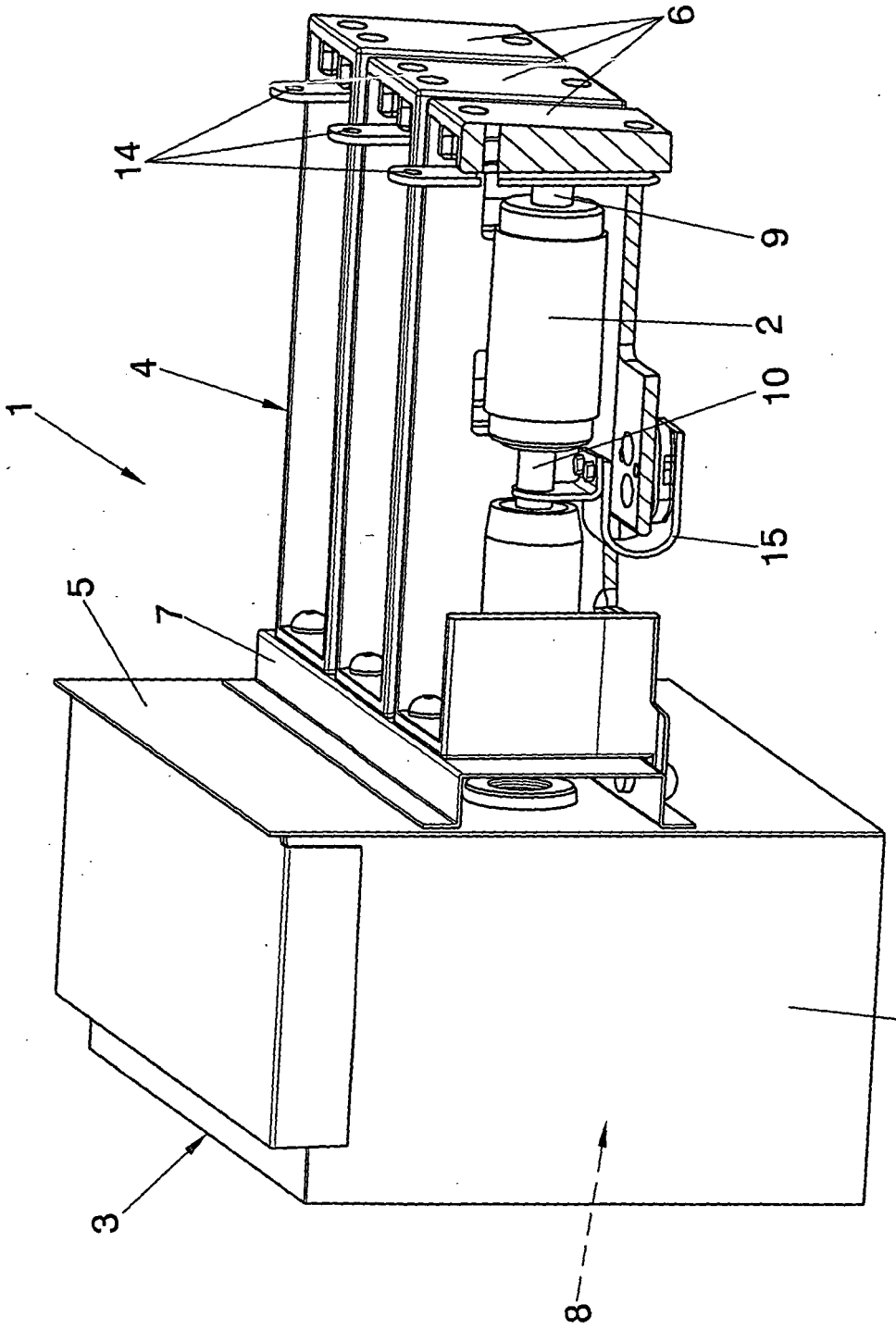

FIG. 1

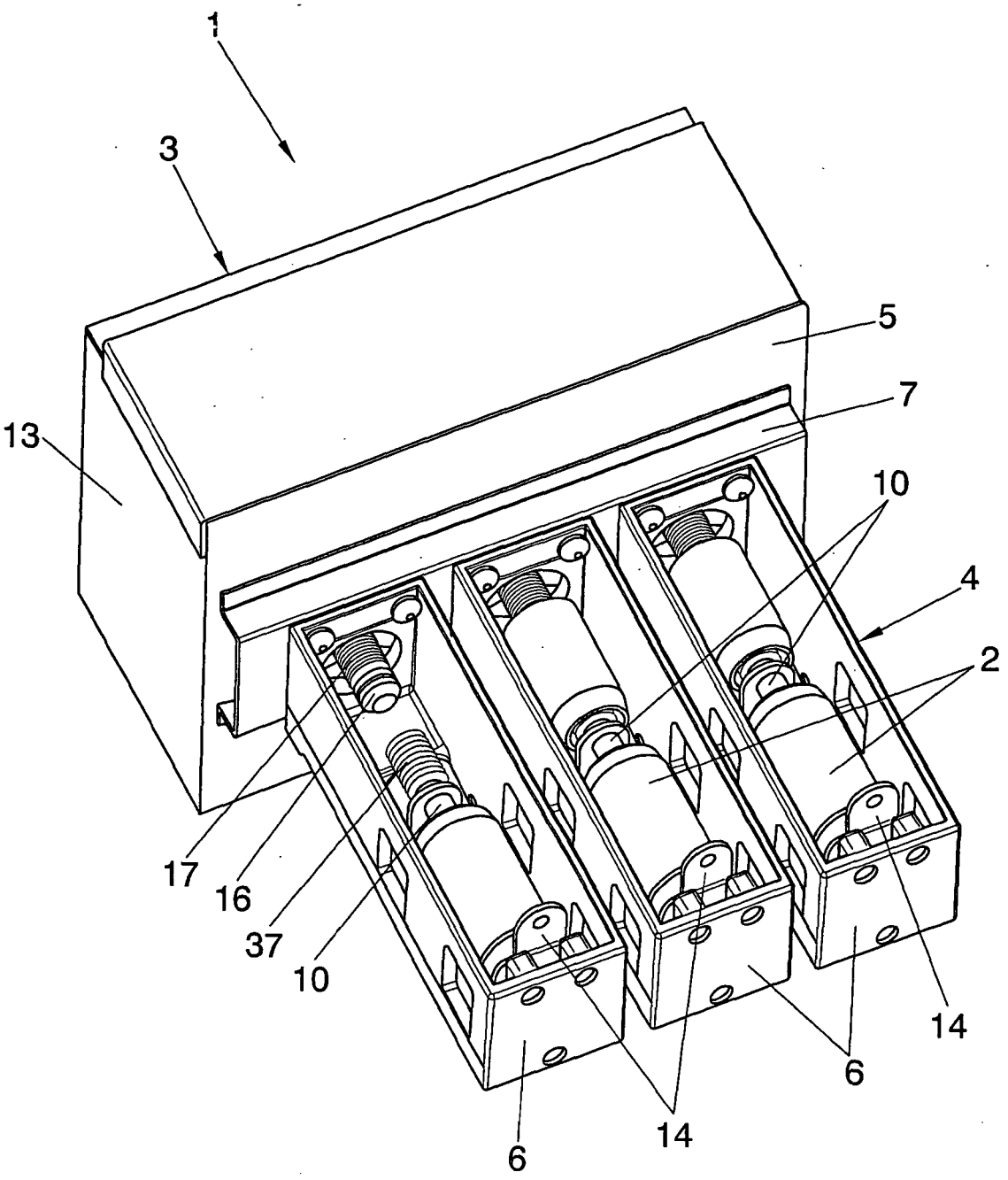

FIG. 2

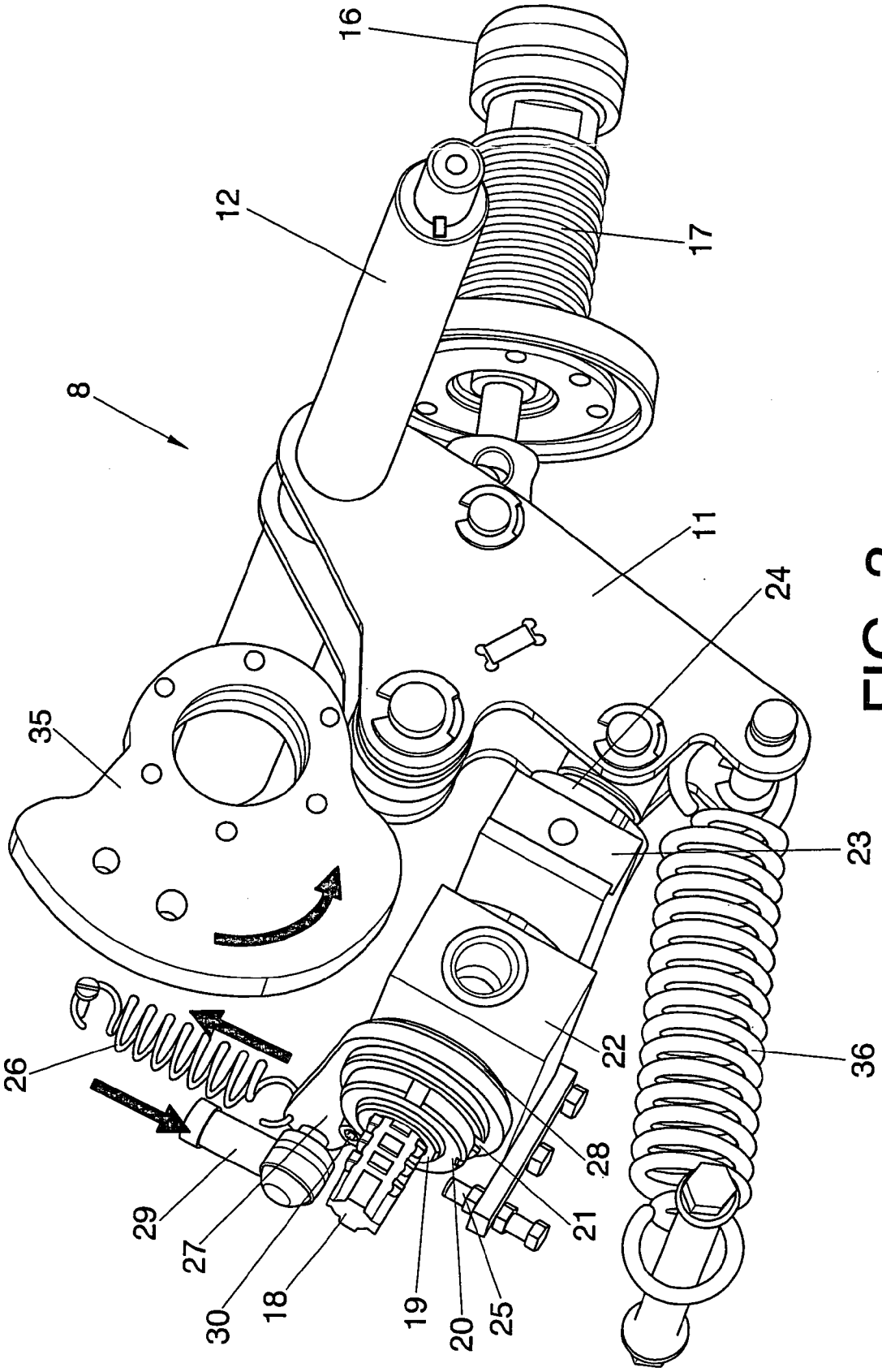

FIG. 3

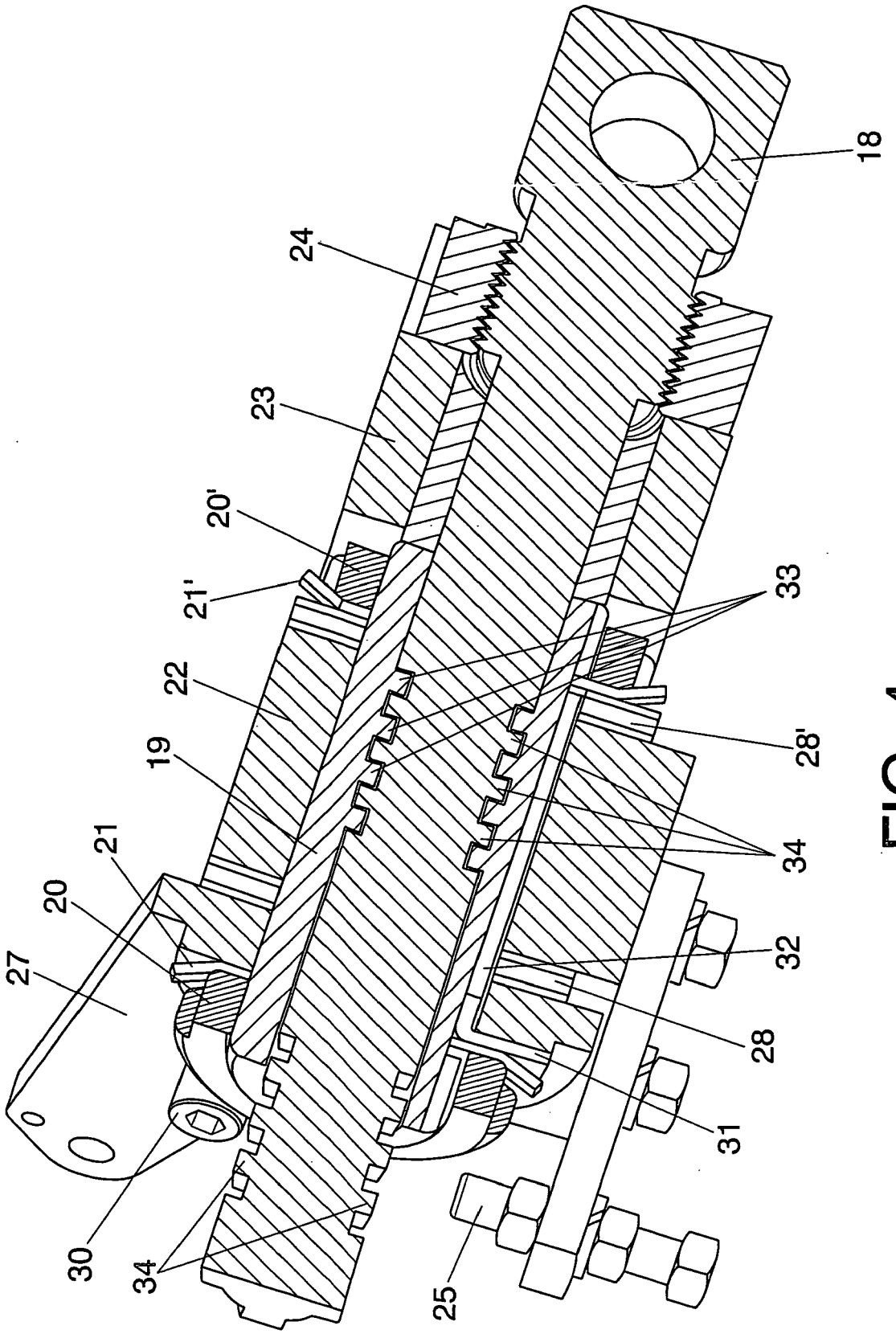

FIG. 4

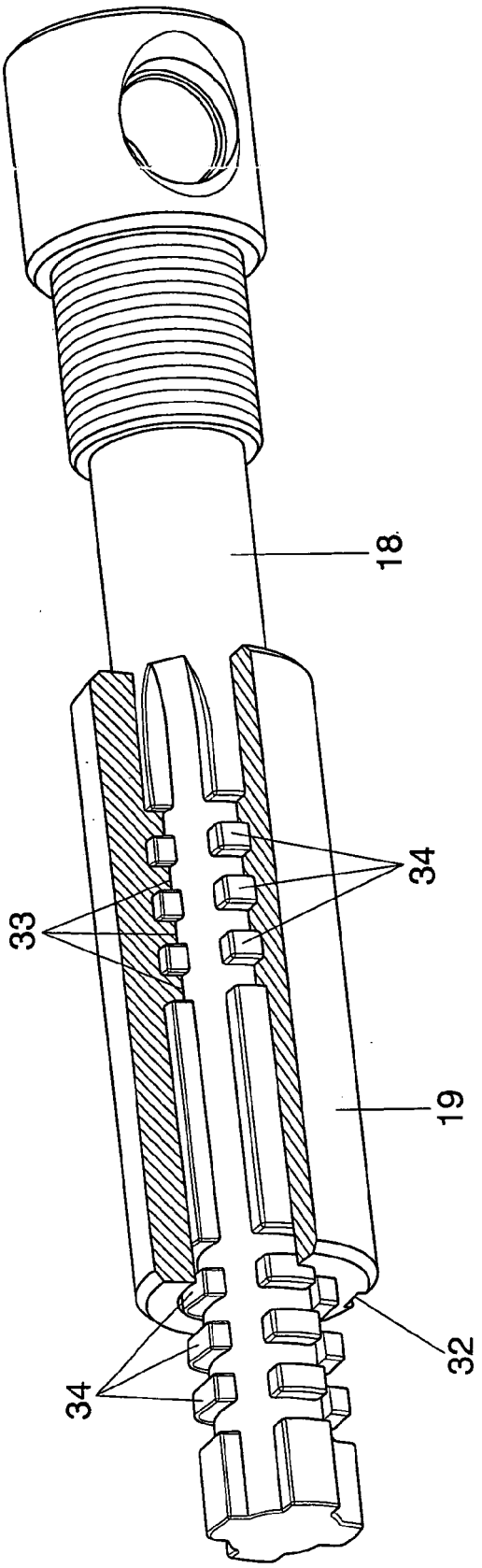

FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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