



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
31.08.2016 Bulletin 2016/35

(51) Int Cl.:
E05B 81/20 (2014.01) **E05B 17/00** (2006.01)
E05B 81/46 (2014.01) **E05B 81/90** (2014.01)

(21) Application number: **16157650.9**

(22) Date of filing: **26.02.2016**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(30) Priority: **27.02.2015 IT FI20150051**

(54) **AUTOMATIC SAFETY LOCK**

(57) An automatic safety snap lock for doors, comprising automatic closure means adapted to automatically carry out the locking between the two parts of the lock,

without requiring said two parts of the lock to be placed in contact with a sufficient force to overcome the resistant force of the closure mechanism itself.

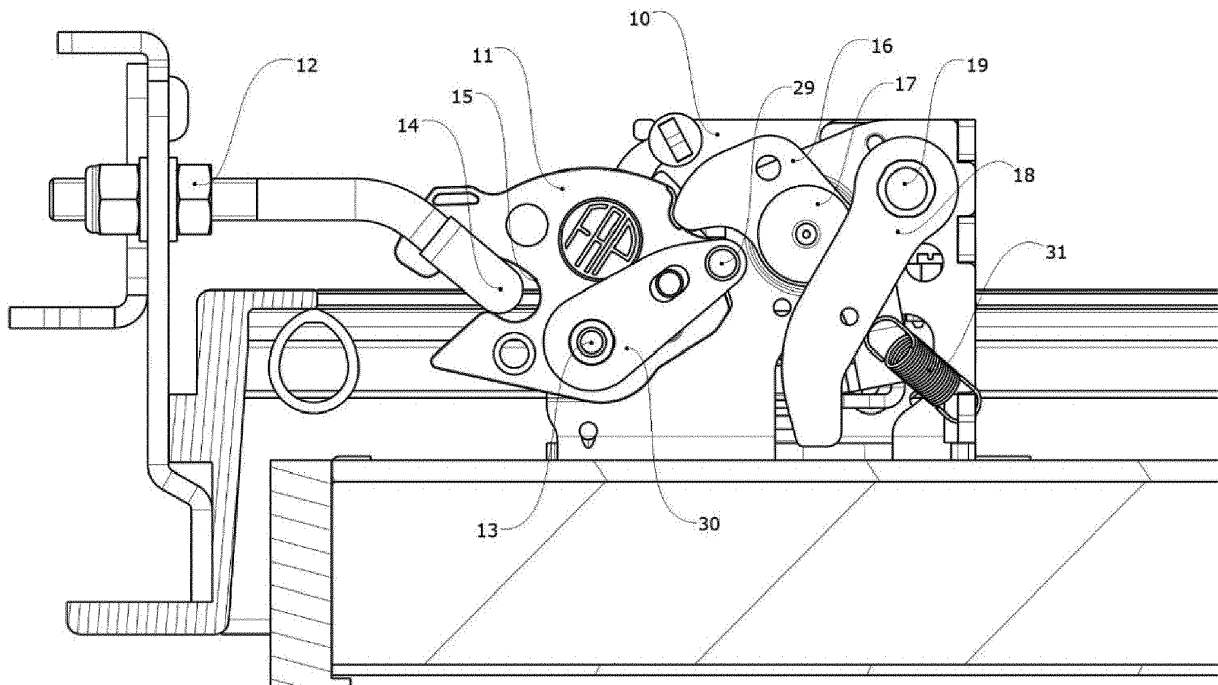


Fig. 1

Description

Field of the invention

[0001] The present invention relates to the field of closing systems and of safety locks for doors and hatches, in particular the present invention relates to the technical field of automatic safety locks for doors and hatches of motor vehicles, especially concerning vans, caravans, motorcaravans and the like.

Background art

[0002] In the field of closing systems and safety locks for doors and hatches, snap closure devices are available in the market which generally comprise a lock body, applied integrally to the door or hatch concerned, and a counterpart, applied to the frame of said door or hatch, which houses means adapted to be engaged with said lock and to promote the closure of the door. Said lock generally comprises a shaft adapted to guide a closure bar or similar closure mechanisms which allow the lock to be reversibly engaged with the counterpart applied to the frame of said door or hatch. A handle, e.g. of the lever type, is always associated with said closure mechanism so as to promote the release thereof, and therefore the opening of the door, when operated. If said lock comprises a shaft adapted to guide a closure bar, which is kept in closed position by suitable elastic means, the handle is adapted to operate said shaft by pushing it in axial direction so as to open the lock which it is part of. Said operating handle is also generally provided with a cylinder lock, or similar key locking means, which makes the locking thereof possible.

[0003] Snap closure mechanisms generally used on doors and hatches, especially concerning vans, caravans, motorcaravans and the like, are adapted to allow the operation thereof if the door is closed with a given force, which is sufficient to cause the two parts of the lock integral to the door and to the frame of the door to be engaged with each other, thus overcoming the resistant force. If the force with which the two lock counterparts mounted on the door and frame come into contact is not sufficient, the door is not properly closed regardless of the user's intentions.

[0004] The safety snap lock according to the present invention is adapted to solve the above-described technical problem because it comprises an automatic closure mechanism adapted to complete the locking movement between the two parts of the lock, without requiring said two parts of the lock to be placed in contact with a sufficient force to overcome the resistant force of the closure mechanism itself.

Brief description of the Figures

[0005] Further objects, features and advantages of the present invention will become more apparent from the

following detailed description, provided by way of non-limiting example and illustrated in the accompanying drawings, in which:

Fig. 1 shows a cross section of a preferred embodiment of the lock according to the present invention, in a first operating position;

Fig. 2 shows a longitudinal section of a preferred embodiment of the lock according to the present invention, in a first operating position;

Fig. 3 shows a detail of a longitudinal section of a preferred embodiment of the present invention;

Fig. 4 shows a cross section of a preferred embodiment of the lock according to the present invention, in a second operating position;

Fig. 5 shows a longitudinal section of a preferred embodiment of the lock according to the present invention, in a third operating position;

Fig. 6 shows a detail of the longitudinal section of a preferred embodiment of the lock according to the present invention, in a second operating position;

Fig. 7 shows a detail of the cross section of a preferred embodiment of the lock according to the present invention, in a third operating position.

Detailed description of the invention

[0006] With reference to the accompanying drawings, the safety snap lock according to the present invention is adapted to be fastened to a door or to the frame of a door and is further adapted to be engaged with a corresponding counterpart, fastened to a frame or door, respectively, so as to promote the closure of the door. By way of example, let's consider that the lock is fastened on the door and that the respective counterpart, e.g. a striking plate 12 provided with a cylindrical end 14, preferably a coated cylindrical end, is fastened to the frame of the door.

[0007] The automatic safety snap lock according to the present invention comprises automatic closure means adapted to automatically carry out the locking between the two parts of the lock, without requiring said two parts of the lock to be placed in contact with a sufficient force to overcome the resistant force of the closure mechanism. In particular, the automatic safety snap lock according to the present invention comprises a striking plate, means for coupling to said striking plate, automatic locking means associated with said coupling means, release means associated with said coupling means and at least one handle associated with said release means.

[0008] A preferred embodiment of the safety snap lock according to the present invention comprises:

A support 10 provided with suitable means for fastening to the door.

A striking plate 12 provided with suitable means for fastening to the frame of said door. Said striking plate preferably comprises a cylindrical end 14, possibly

coated with plastic or metal material.

[0009] A closure lever 11 hinged on said support 10 so as to be free to rotate about a first pin 13 with axis parallel to the surface of said door, said closure lever 11 comprising means for engaging with said selvage 12.

[0010] If said striking plate 12 comprises a cylindrical striking end 14, said engaging means comprise an elongate housing 15 in turn comprising an opening, a curved profile and an end, which are adapted to accommodate said cylindrical end 14 of said striking plate 12.

[0011] A coupling lever 16 hinged on said support 10 so as to be free to rotate about a second pin 17 having axis parallel to the surface of said door, said coupling lever 16 comprising an end adapted to drag on the profile of said closure lever 11.

[0012] A closure control lever 18, which is integral with a third pin 19 having the axis parallel to the surface of said door, so as to be free to rotate on said support 10, said closure control lever 18 comprising an end adapted to be engaged with the pin 29 of a second closure lever 30 which is integral with said closure lever 11, so as to place said closure lever 11 in rotation about said first pin 13 and accordingly allow the sliding of the cylindrical end 14 of said striking plate 12 inside said housing 15 up to the end thereof, and therefore the complete closure of the lock.

[0013] An electric motor 20 fastened to said support 10 and having the shaft substantially parallel to the surface of said door and connected rigidly to a pinion 21, said electric motor 20 being provided with suitable electric supply and drive means.

[0014] A toothed sector 22, which is integral with said closure control lever 18 and is adapted to be engaged with the pinion 21 of said electric motor 20.

[0015] Means for translating said toothed sector 22 in direction parallel to the shaft of said electric motor 20 and adapted to engage and disengage said toothed sector 22 to/from said pinion 21.

[0016] A microcontroller, or similar programmable device, adapted to operate said electric motor 20, in a first time interval, with a rotation direction such as to carry out, by means of coupling between said pinion 21 and said toothed sector 22, the complete closure of the door and, in a second time interval when the door is closed, with a rotation direction opposite to the preceding one so as to drive said closure control lever 18 to the initial position.

[0017] A first electric switch 23 adapted to enable the operation of said electric motor 20 by means of said microcontroller or similar programmable device.

[0018] A second electric switch 24 adapted to disable the operation of said electric motor 20 by means of said microcontroller or similar programmable device and during the rotation step which is inverted with respect to the one for closing the door, when said closure control lever 18 returns to the initial position.

[0019] A middle lever 25 hinged on support 10 so as

to rotate about a fourth pin 27 with axis perpendicular to the surface of said door, having an end adapted to operate said coupling lever 16 and a release lever 28 also hinged on support 10 so as to rotate about said fourth pin 27 with axis perpendicular to the surface of said door, and an end connected with a cable 26 in turn connected to the handle of the lock and operable thereby. Said release lever 28 has an end adapted to translate the toothed sector 22 in order to disengage said toothed sector 22 from pinion 21. Said release lever 28 preferably comprises a length 34 adapted to control the middle lever 25, when cable 26 is operated.

[0020] The middle lever 25 and the release lever 28 are free to move independently during the closure step, however they are integral in the step of operating cable 26 by means of said length 34, which is arranged on the release lever 28.

[0021] A tension spring 31 connected between said closure control lever 18 and said support 10, adapted to bring said closure lever 18 in initial position if the operation of motor 20 is blocked, both in the closure and return step of the closure control lever 18. Said tension spring 31 causes the closure lever 11 to be free to rotate both in the opening step and in the closure step.

[0022] The operation of the safety snap lock according to the present invention is the following: when the door is pushed towards the frame in order to close it, said closure lever 11 engages with said selvage 12. The cylindrical end 14 of said striking plate 12 is introduced into the housing 15 of said closure lever 11. Correspondingly, said closure lever 11 starts to rotate about said first pin 13, thus causing the rotation of said coupling lever 16, the end of which is free to drag on the profile of said closure lever 11 up to reaching a first operating position corresponding to a first click of the lock and to the closure of the contact of said first switch 23 which is controlled by said closure lever 11.

[0023] In a preferred embodiment of the present invention, said first switch 23 is controlled by a track 32 located on the inner part of said closure lever 11, track 32 which is adapted to close switch 23 at the first click of the lock and to open it at the second click of the lock.

[0024] The closure of said first switch 23 operates the electric motor 20 which, by means of the coupling between the gears of pinion 21 and the toothed sector 22, puts the closure control lever 18 into integral rotation with said third pin 19, on support 10. The closure control lever 18, countered by selvage 12, in turn pushes said closure lever 11 in order to continue its rotation about said first pin 13 past said first operating position, up to reaching a second operating position corresponding to a second click of the lock and to the final and secure closure of the lock.

[0025] When said second click of the lock according to the present invention is reached, the contact of said first electric switch 23 is opened by the action of said closure lever 11, and accordingly the electric motor 20, following suitable control of the microcontroller, inverts

the rotation direction, thus bringing said closure control lever 18 into the original position and promoting the closure of said second electric switch 24 and the subsequent disabling of said electric motor 20. The closure of said second switch 24 occurs by means of a tailpiece 33 of said toothed sector 22 adapted to come into contact with said second switch 24 when said lever 18, and accordingly said pin 19 and said toothed sector 22, are in the initial position.

[0026] With regards to opening the lock according to the present invention, acting on the handle accordingly acts on said cable 26, which brings said release lever 28 into rotation, which in turn translates said toothed sector 22, thus releasing it from pinion 21. Said release lever 28 also brings said middle lever 25 into rotation by means of length 34. Said middle lever 25 in turn operates said coupling lever 16, which rotates so as to free the closure lever 11.

[0027] Thereby, the closure lever 11 may in turn allow the cylindrical end 14 of said striking plate 12 to slide outside said housing 15, thus allowing the opening of the door (third operating position).

[0028] If motor 20 suffers a breakdown, both in the closure and in the return step of the closure control lever 18, the lock may in any case be opened by operating said at least one handle. Said at least one handle indeed operates, by means of: said cable 26, said release lever 28 and said middle lever 25, the coupling lever 16 which releases the closure lever 11 and the toothed sector 22 which is disengaged from pinion 21. Accordingly, said closure control lever 18 is disengaged from the second closure lever 30 and therefore placed in idle condition by said tension spring 31. Thereby, the lock will act as a normal non-automated lock.

[0029] The lock according to the present invention also operates in such a manner as not to operate motor 20 and the automatic locking means connected to motor 20 if the door which houses the lock is closed with a force such as to guide said closure lever 11 directly to the second operating position, corresponding to the second click, thus operating a complete manual closure.

[0030] The door may be provided with a plurality of locks according to the present invention. In this case, the locks mounted on the door are preferably made independent so that each lock performs its closure cycle independently from the others. If the force applied by the user on the door being closed is such as to directly close one lock and not the others, the latter will complete its automatic closure cycle independently from the others.

[0031] The lock according to the present invention may be made with metal or plastic material provided with the required features of sturdiness.

[0032] The preferred embodiment of the present invention as described above and illustrated in the accompanying drawings is to be considered a non-limiting embodiment with respect to alternative embodiments using the same inventive concept.

Claims

1. An automatic safety lock for doors, comprising:

- a support (10) provided with suitable means for fastening to the door;
- a striking plate (12) provided with suitable means for fastening to the frame of said door;
- at least one handle;
- a first closure lever (11) comprising means for engaging with said selva (12) and adapted to rotate about a first pin (13) which is integral with said support (10) and having the axis parallel to the surface of said door;
- automatic locking means associated to said first closure lever (11) and adapted to place said first closure lever (11) in rotation and to keep it fixed in position;
- driving means associated to said automatic locking means;
- release means associated to said automatic locking means and to said at least one handle, **characterized in that** said automatic locking means comprise:

- a coupling lever (16) comprising an end adapted to drag on the profile of said first closure lever (11) and adapted to rotate about a second pin (17) which is integral with said support (10) and having the axis parallel to the surface of said door;
- a closure control lever (18) which is integral with a third pin (19) having the axis parallel to the surface of said door, said closure control lever (18) being adapted to rotate on said support (10) and further comprising an end adapted to engage with the pin (29) of a second closure lever (30) which is integral with said first closure lever (11), so as to place said first closure lever (11) in rotation about said first pin (13) and allow the engagement of said first closure lever (11) with said striking plate (12) until the complete closure of the lock.

2. A lock according to the preceding claim, **characterized in that** said striking plate (12) comprises a cylindrical end (14) and said means for engaging said closure lever (11) with said selva (12) comprise an elongate housing (15) in turn comprising an opening, a curved profile and an end adapted to accommodate the cylindrical end (14) of said striking plate (12).

3. A lock according to one or more of the preceding claims, **characterized in that** said cylindrical end (14) is coated with plastic or metal material.

4. A lock according to one or more of the preceding claims, **characterized in that** said driving means associated to said automatic locking means comprise:

- an electric motor (20) fastened to said support (10) and having the shaft substantially parallel to the surface of said door and connected rigidly to a pinion (21), said electric motor (20) being provided with suitable electric supply and drive means;
- a toothed sector (22) which is integral with said closure control lever (18) and is adapted to engage with the pinion (21) of said electric motor (20);
- means for translating said toothed sector (22) in direction parallel to the shaft of said electric motor (20) and adapted to engage and disengage said toothed sector (22) to/from said pinion (21);
- a microcontroller adapted to operate said electric motor (20) - in a first time interval corresponding to the step of closing said door - with a first rotation direction such as to allow the engagement of said first closure lever (11) with said striking plate (12) until the complete closure of the door, and - in a second time interval corresponding to the step of opening said door - with a second rotation direction adapted to bring back said closure control lever (18) to the initial position;
- a first electric switch (23) adapted to control the operation and the rotation direction of said electric motor (20) by means of said microcontroller;
- a second electric switch (24) adapted to disable the operation of said electric motor (20) by means of said microcontroller;
- a middle lever (25) adapted to rotate about a fourth pin (27) which is integral with said support (10) and having the axis perpendicular to the surface of said door, said middle lever (25) having an end adapted to operate said coupling lever (16);
- a release lever (28) adapted to rotate about a fourth pin (27) which is integral with said support (10) and having the axis perpendicular to the surface of said door and to an end connected with a cable (26) in turn connected to and operable by said at least one handle, said release lever (28) further having an end adapted to translate the toothed sector (22) to disengage said toothed sector (22) from the pinion (21) and a length (34) adapted to control the middle lever (25) when said cable (26) is operated;
- a tension spring (31) connected between said closure control lever (18) and said support (10) and adapted to carry said closure lever (18) in

initial position if the operation of said motor (20) is blocked.

5. A lock according to one or more of the preceding claims, **characterized in that** said closure lever (11) comprises a raised track (32) adapted to interfere with said first switch (23) so as to close said first switch (23) at the first click of the lock, and to open said first switch (23) at the second click of the lock.
6. A lock according to one or more of the preceding claims, **characterized in that** said toothed sector (22) comprises a tailpiece (33) adapted to interfere with said second switch (24) when said lever (18), said pin (19) and said toothed sector (22) are in the initial position corresponding to the open lock.
7. A lock according to one or more of the preceding claims, **characterized in that** it is made with metal material or with plastic material.
8. A door comprising at least one automatic safety lock according to one or more of claims 1 to 7.
9. A door according to the preceding claims, **characterized in that** it comprises a plurality of locks according to one or more of claims 1 to 7, said locks being mutually independent and adapted to perform their own closure cycle independently from the others.

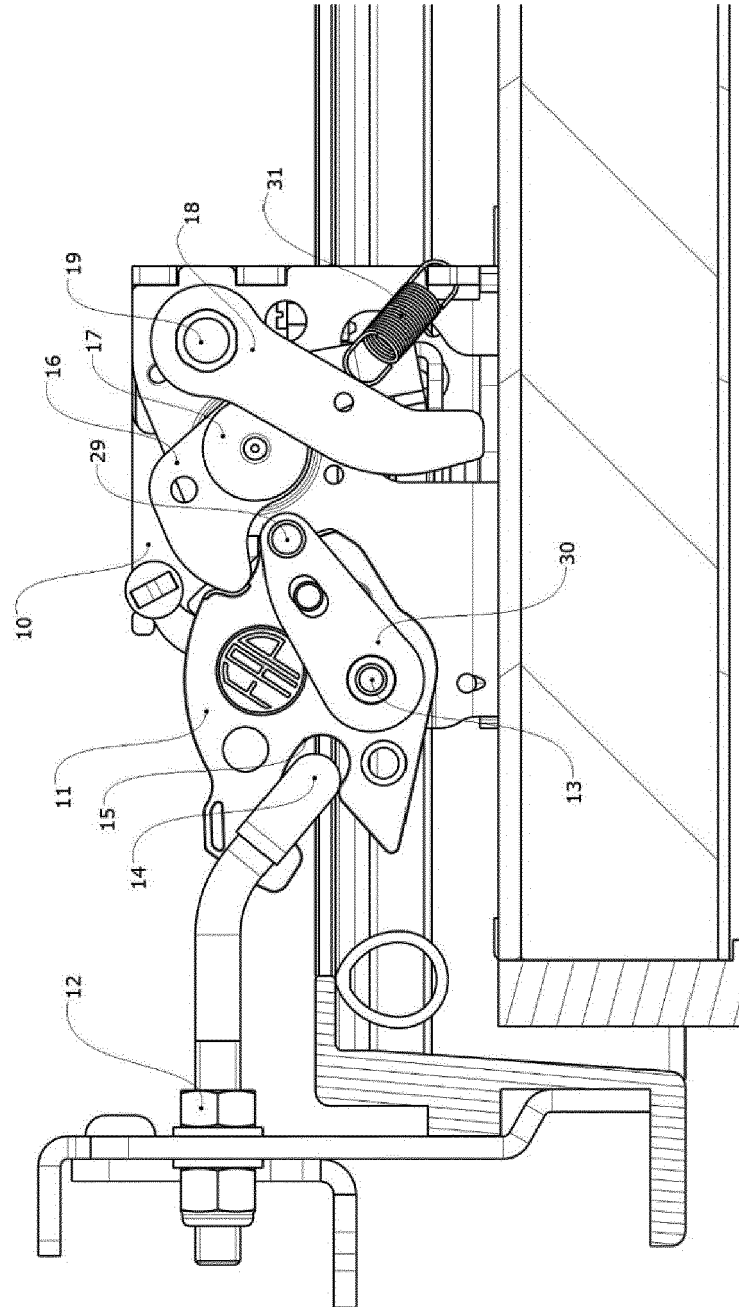


Fig. 1

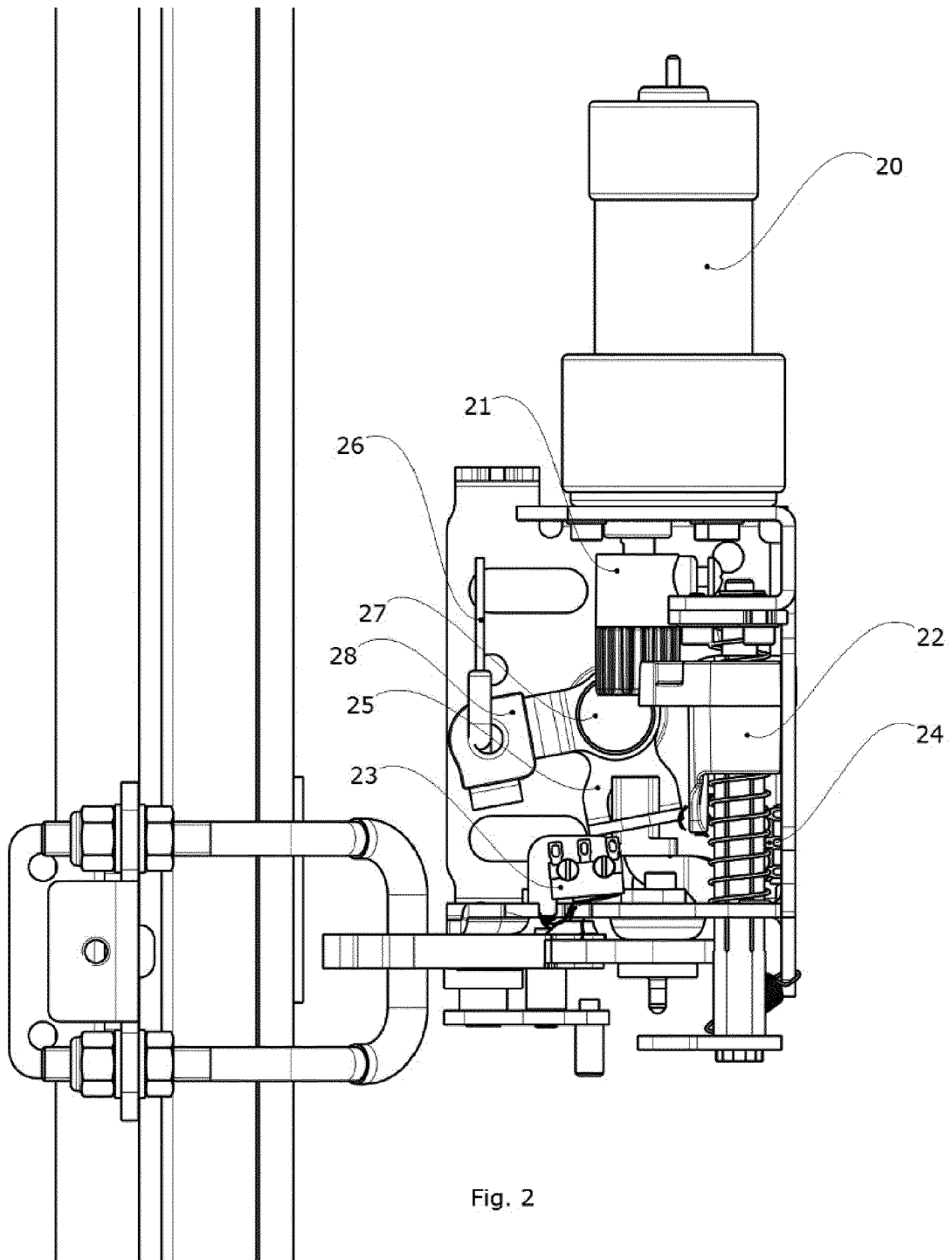


Fig. 2

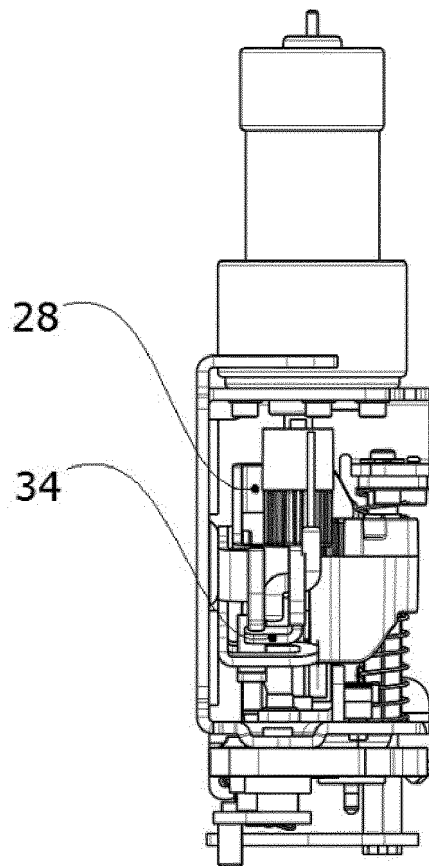


Fig. 3

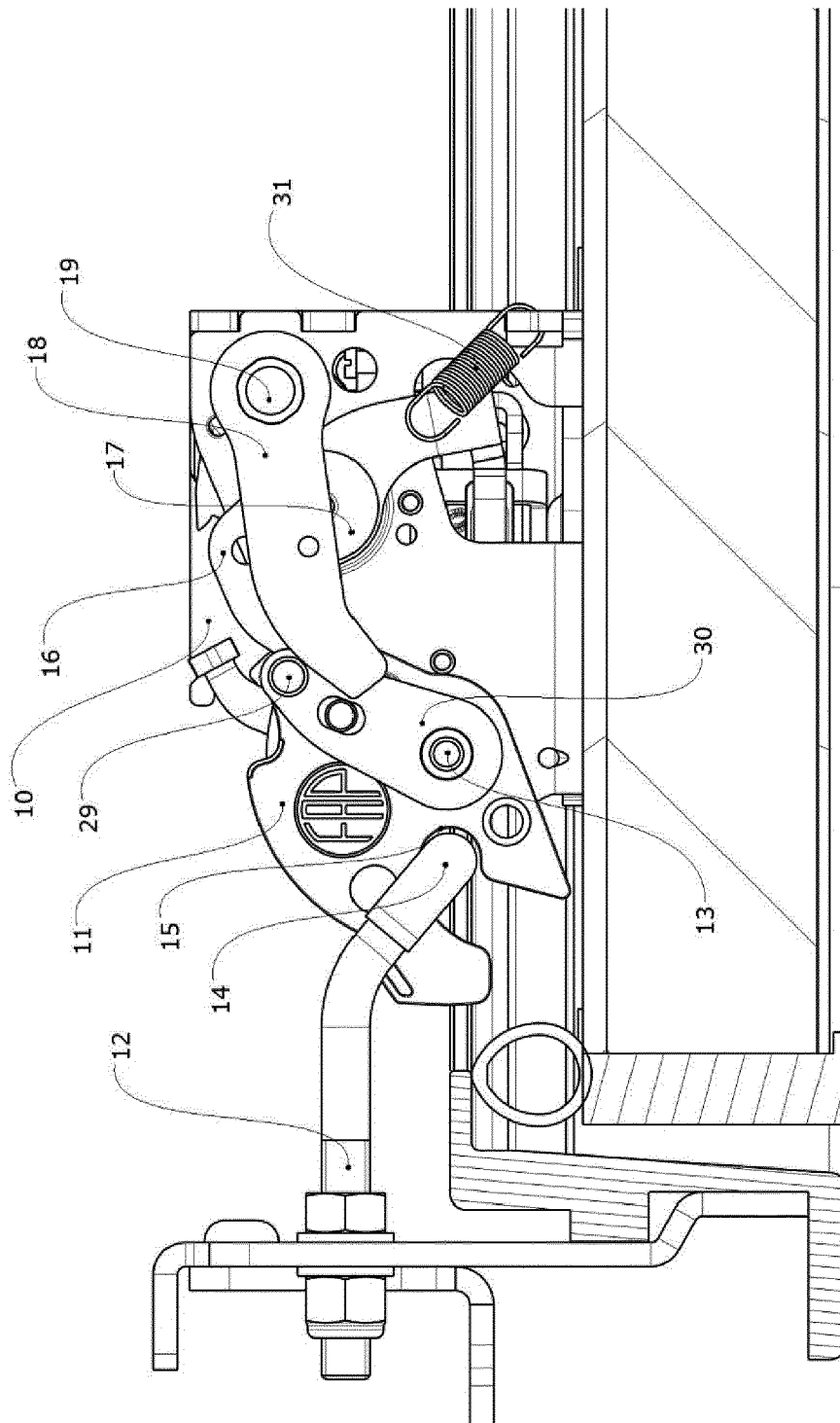
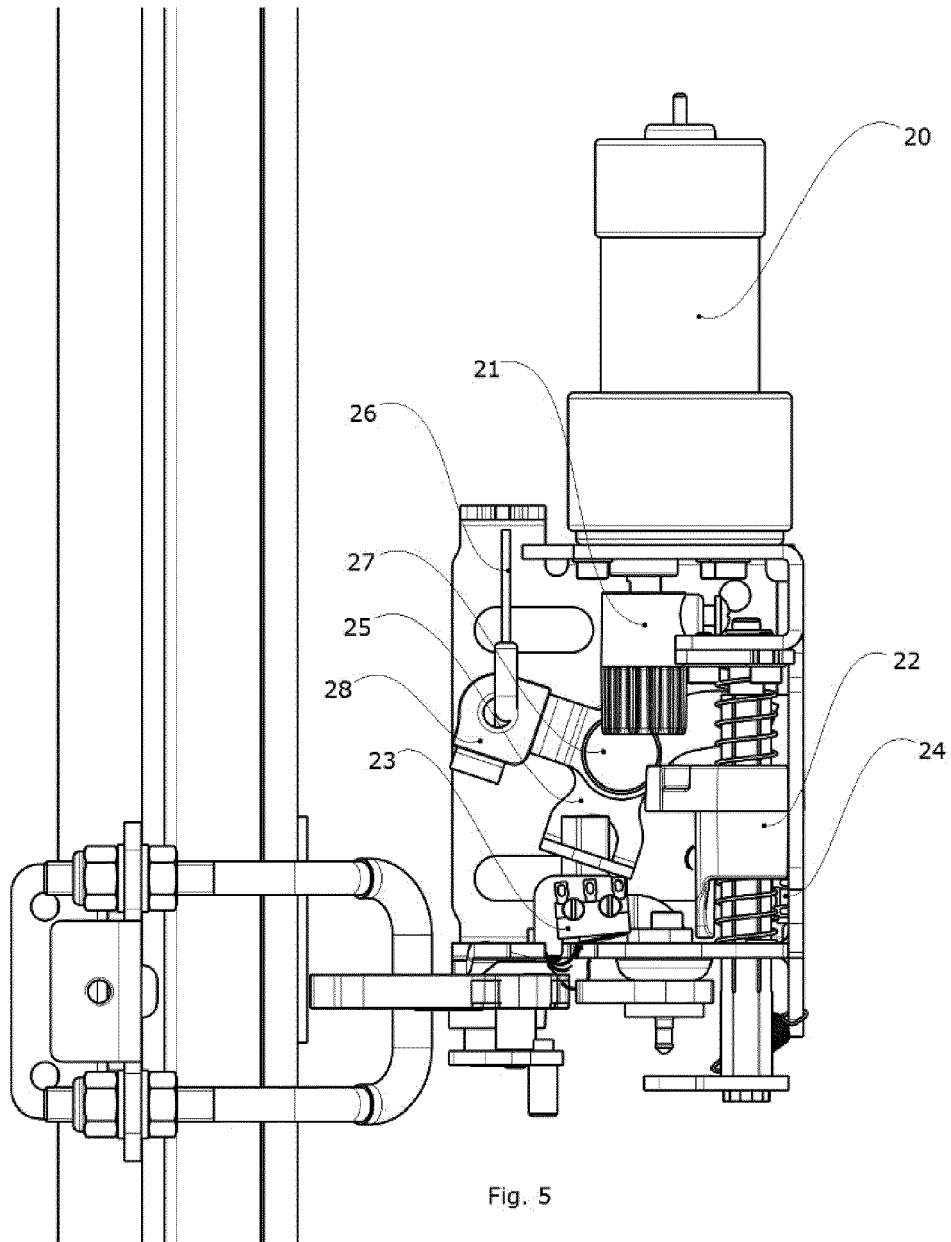


Fig. 4



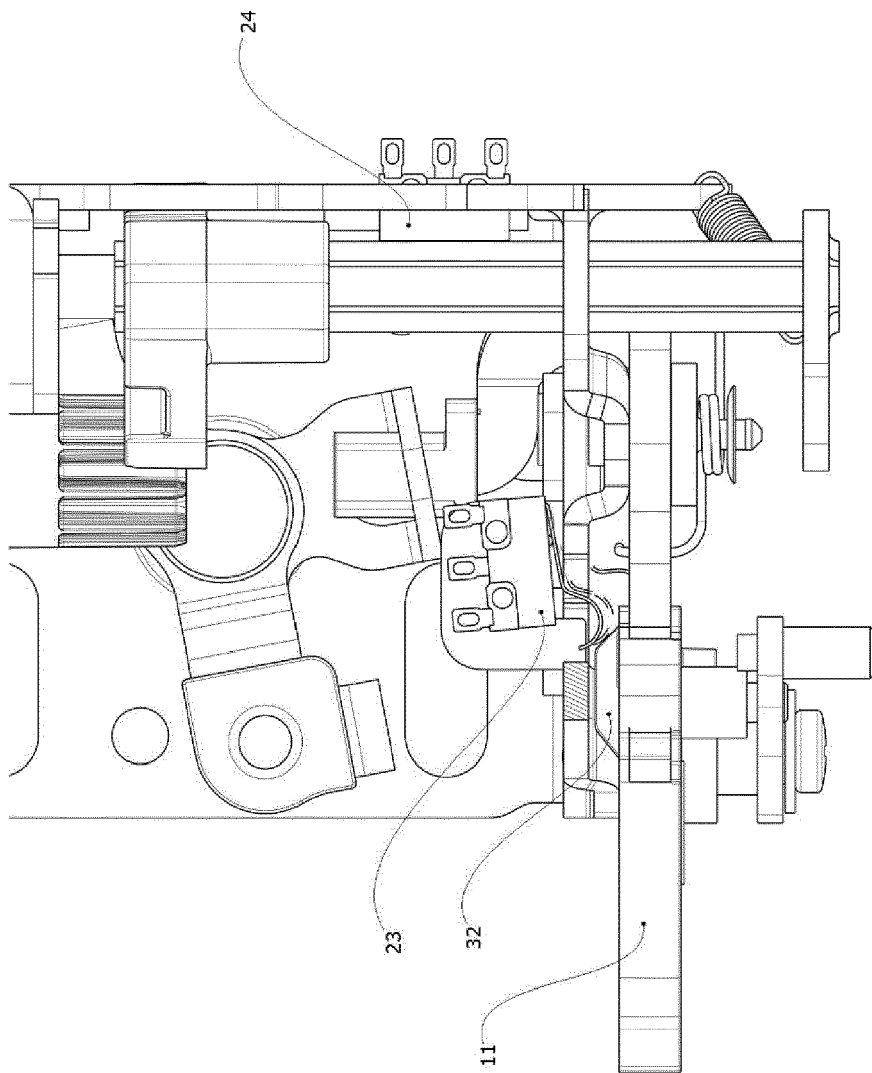


Fig. 6

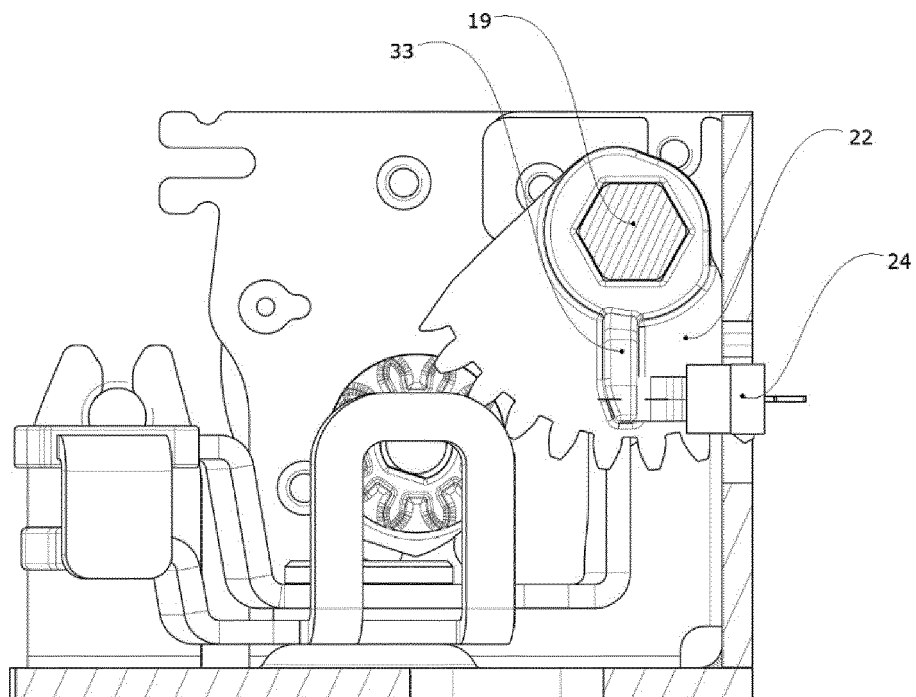


Fig. 7



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Application Number
EP 16 15 7650

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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 10 June 2016	Examiner Robelin, Fabrice
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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