

(19)



(11)

EP 1 857 617 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

21.11.2007 Bulletin 2007/47

(51) Int Cl.:

E05B 9/08 (2006.01)

E05C 9/04 (2006.01)

E05B 17/20 (2006.01)

E05B 17/20 (2006.01)

(21) Application number: **07251509.1**

(22) Date of filing: **05.04.2007**

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE
SI SK TR**

Designated Extension States:

AL BA HR MK YU

(30) Priority: **07.04.2006 ES 200600911**

(71) Applicant: **Talleres De Escoriaza, S.A.
20305 Irun (Guipuzcoa) (ES)**

(72) Inventors:

- **Otegui, Eduardo**
20305 Irun-Guipuzcoa (ES)
- **Goni, Fenando**
20305 Irun-Guipuzcoa (ES)

(74) Representative: **Howick, Nicholas Keith et al**

CARPMAELS & RANSFORD
43-45 Bloomsbury Square
London WC1A 2RA (GB)

(54) **Cogwheel lock with retention for metal frame structures**

(57) Cogwheel assembly lock with retention mechanism for metal frames, characterised by the fact that output wheel (4) engages with the cogged rack of the descending closure plate (1), the output wheel (4) operating in a hollow (6) formed in the edge of the descending closure plate (1) and because it includes handle (17) retrac-

tion functions through the descending closure plate (1), jointly with the input wheel (3), and because it has the means to automatically hold in place the cogwheel assembly in the absence of the lock's cylinder (5).

EP 1 857 617 A2

Description

FIELD OF THE INVENTION

[0001] This invention consists of a lock for embedding in metal frames manufactured with commercial profiles. Specifically it is a lock with latch and handle, comprising a cogwheel assembly mounted in such a way that its last stage is an input wheel and its first stage is an output wheel that is activated by the eccentricity of a key lock cylinder, positioned coaxially to this input wheel and is mounted "in situ" using a screw placed transversal to the cylinder, from the front of the lock. This lock also includes a solid descending closure plate that has terminals to engage the latches that activate the upper and lower locking bolts. The vertical plane of this descending plate forms a cogged rack and the plate operates between the upper and lower latch opening and closing positions, respectively.

PRIOR ART

[0002] The locks used with commercial metal profile frames are conditioned in terms of the small space available in the width of the frame in which the lock is embedded.

[0003] It is important, therefore, that the inevitably numerous components of a mechanism of this type occupy the least possible space in lock width, which is generally particularly difficult when using a cogwheel assembly that requires various transmission stages to provide the operating power necessary to raise the solid descending closing plate smoothly and with the reduced rotation force that can be applied by the corresponding lock key.

[0004] Furthermore, there is the requirement of obtaining a mechanism that offers security against break-in using the well-known method of inserting a credit card, or similar, in the gap between the door and the frame to force the lever (latch) back and the handle to turn. For this, a solid closing plate that closes in its descended position is used, so that any break-in attempt requires great pressure to be applied in order to raise this plate.

[0005] Logically, the mechanism of a lock of this type should combine the greatest possible security with the use of the least possible number of parts, which should be simple and economical, offering smooth and reliable operation and favouring an overall design that is compact and occupies the least possible space.

[0006] On the other hand, there has to be a device that enables mounting the cogwheel assembly in its operating position before the lock cylinder is mounted, in such a way that when the lock is supplied, the lock case and cylinder can be packaged separately, thus facilitating storage, packaging and transport.

[0007] As regards the system for moving the descending closure plate, the most common device used in this field is one in which the cogwheel assembly operates directly on the latch and it is the latch that, as it moves,

operates the descending closure plate. This solution tends to make it difficult to achieve mechanisms that fit in a lock case suitable for the narrowness of the frame in which it has to be embedded, which leads to using thinner and smaller parts, which in turn results in a weaker mechanism.

DESCRIPTION OF THE INVENTION AND ADVANTAGES

[0008] Taking into account this situation, this invention is for a lock for embedding in metal frames manufactured with commercial profiles, with a closing system, as previously indicated, of the latch and handle type, and comprising a cogwheel assembly mounted in such a way that its last stage is an output wheel and its first stage is an input wheel that is activated by the eccentricity of a key lock cylinder, positioned coaxially to the input wheel and mounted "in situ" using a screw placed transversal to the cylinder, from the front of the lock. This lock also includes a solid descending closure plate that has terminals to engage the latches that activate the upper and lower locking bolts. The vertical plane of this descending plate forms a cogged rack that and the plate operates between the upper and lower latch opening and closing positions, respectively.

[0009] Within the general makeup of the invention, it has the particularity that the output cogwheel engages with the cogged rack of the descending closure plate, this output wheel operating in a hollow in the edge of the descending closure plate. Furthermore, it includes a handle retraction function via the descending closure plate and it also has the means to automatically hold the cogwheel assembly in place in the absence of the lock's cylinder. In contrast with other mechanisms that exist in this field, in the proposed solution the cogwheel assembly acts directly on the descending closure plate, through the cogged rack, at it is the descending closure plate, as it moves, that subsequently activates the operating movements of the closing latch or lever.

[0010] Another particularity of the invention is that the mechanisms that retract the handle, through the descending closure plate and together with the input wheel. These mechanisms consist of a flat, vertical rod that, capable of sliding whilst attached to one side of the lock case, is guided between an upper, or pre-active position, to a lower, or inhibited position. This rod has a top face, a lug projecting from the front bottom, transversal to the rod's plane, and a tooth projecting from the rear vertical edge of the rod, noticeably in the same plane. The top face, in pre-active position, faces and is adjacent to the radial projection of a rotating cam, or follower rod, which, with its radial shaft, retracts the handle. The lug travels in an opening in the front edge of the descending closure plate in such a way that, when the latter is in its lower and upper positions, the lug touches the top and bottom of the opening, respectively. The bottom edge of the tooth is horizontal and the top edge is sloped. With respect to

the aforementioned lower or inhibited, and upper or pre-active positions of the rod, this tooth is positioned, respectively, away from or in the path of the rotational operating route of the rear projection of the input wheel, when this is activated during opening by the eccentricity of the lock cylinder. As the attached graphic documentation clearly shows, the workings of this solution consists basically in that when the descending closure plate has risen to the point in which the latch has been completely retracted, the lower end of its front opening has pushed the rod lug along the front opening of the descending closure plate, pulling the rod itself up until the top face lies under the radial projection of the follower rod and the lower horizontal face of the tooth on the rod is inserted in the engaging rotational path, activated by the eccentricity of the lock cylinder. This means that with the possible additional turn of this eccentric element, the rod would be pulled upwards (by way of the rear projection of the input wheel, its top face pushing against the radial shaft of the follower rod and making this turn so that it retracts the handle with its radial shaft. When this additional turn is reversed and the eccentricity returns, the rod lug can descend in the front opening, which it does due to the pressure of the retrieval spring, and now it is the radial projection that pushes on the top face of the rod, which descends, aided by gravity.

[0011] As regards the invention's system for automatically holding the cogwheel assembly in place in the absence the lock cylinder, this consists in a vertically sliding tab that moves between an upper, or active position, propelled by a spring, and an lower, or inhibited position, contrary to the spring propulsion. In the lower part of the tab there is a lateral projection, the top of which forms a peak and in its upper active position the tab is positioned in a housing on the outside edge of the input wheel of the cogwheel assembly, whilst the peak of the lateral projection enters the longitudinal hole in the lock case that houses the transversal screw that screws into the lock cylinder, when this is mounted. In its lower, inhibited position, the tab and lateral projection remain, respectively, outside the input wheel housing and the longitudinal hole in the lock case.

[0012] The mechanisms functioning is simple, efficient and reliable: when the cylinder is not operationally mounted in the lock case, the tab, pushed by the spring, is inside the corresponding peripheral housing in the input wheel and its lateral projection, with the peaked top, interposed in the path of the mountings screw that screws through the cylinder; when the cylinder is mounted in the lock case, as the screw is fixed it exerts pressure as an inclined plane against one of the sloped sides of the tab, pushing it down so that it comes out of the peripheral housing in the input wheel and compresses the spring. The spring, elastically charged, is then ready to push the tab out of its previous position as soon as the screw is removed again. This ensures that the cogwheel assembly in the lock case will remain intact at all times during storage and transport to the customer.

[0013] Another particularity of the invention consists in that the descending closure plate has a downward, front to back, stepped sliding mechanism formed by a central oblique section that forms vertically, at its front, or superior, and rear or inferior ends an upper ascending projection and a lower descending projection, ending in hollows that take the corresponding spigot with the latch that slides along this stepped slide. The upper projection has a rear vertical border and in the lower projection the hollow is linked to the upper edge of the oblique section of the stepped slide by way of a rear vertical border with a longitude that, together with effect resulting from the cogwheel assembly, provides an empty run which is noticeably less than the vertical operative run of the rod during handle retraction. This configuration, on one hand, allows the rear vertical border (of the upper projection of the stepped slide) to act as a stop that prevents retraction of the descending closure plate when this is attempted with the plate is in its lower position (lock closed); on the other hand, the empty run linked to the rear vertical border (of the lower projection of the stepped slide) enables the relative play necessary for the rod to achieve handle retraction.

DRAWINGS AND REFERENCES

[0014] For better understanding of the characteristics of the invention, attached are drawings that are included as a mere guide, but are not limited to an industrial manufacturing proposal.

[0015] Fig. 1 shows a perspective of the invented lock, seen from the front with the lateral cover removed, in open position and with the handle extended. The transversal screw (21) and the cylinder (5) are shown enlarged, the latter only partially, in orthogonal transformation and seen from the side. This figure also shows an enlargement, in orthogonal transformation, of the upper part of the mechanism, seen from the front of the uncovered side.

[0016] Fig. 2 is a side view, in orthogonal transformation, of the lock in Fig. 1, but with the lock closed.

[0017] Fig. 3 is a perspective view of the flat vertical rod (7), which includes an enlargement of the tooth (12).

[0018] Fig. 4 shows the input wheel (3) seen in Fig. 2, showing the cogged side.

[0019] Fig. 5 is a rear view of the input wheel seen in Fig. 4.

[0020] Fig. 6 is a perspective view from the rear of the input wheel (3) shown in Figs. 4 and 5.

[0021] Fig. 7 is an enlarged view of detail VII marked in Fig. 5.

[0022] Figs. 8 to 11 illustrate the operational sequence for retracting the handle (17), showing the lock in Fig. 1, seen from the opposite side and with the latch (16) retracted. Fig. 8 shows the initial position, in which the cylinder (5) has not yet begun to turn for the retraction operation. In Fig. 9 the cylinder has begun to turn, but the input wheel (3) has not. Fig. 10 it can be seen that the

handle (17) has begun to retract, and Fig. 11 shows the complete retraction of the handle (17).

[0023] Figures 12 and 13 also show the handle (17) retraction operational sequence, but from the other side of the lock, in order to better illustrate the relative action of the lug (11) and the rod (7) in the opening (18) of the descending closure plate (1). Fig. 12 is an enlargement of the area marked XII in Fig. 2, showing a section that contains the axis of the longitudinal screw hole (26) and the spring (23), with the cylinder (5), cross-sectioned to demonstrate the eccentricity (5a) and the threaded bore hole (5b). It also shows a small part of the descending closure plate (1) in order to locate its forward opening (18) in relation to the lug (11) of the rod (7), when the descending closure plate (1) has still not completed its ascending opening run, in this figure the rod is in its lower or inhibited position. Fig. 13 is the same as fig. 12, but shows the rod (7) in position to be moved upwards to retract the handle.

[0024] Fig. 14 is a representation similar to fig. 12, but referring to the means of automatic retention of the mounted cogwheel assembly. It shows the transversal screw (21) commencing its entry into the screw hole (26) of the cylinder (5), which has already been positioned in place. The presence of part of the descending closure plate (1) is not shown in this figure.

[0025] Fig. 15 is similar to Fig. 14, but it shows the transversal screw (21) now inside the screw hole (5b) of the cylinder (5).

[0026] Fig. 16 shows the descending closure plate (1) seen from the same side as in Figs. 1 and 2.

[0027] Fig. 17 is an enlargement of section XVII marked in Fig. 16.

[0028] The following is a list of the references that appear in the aforementioned figures:

1. Descending closure plate

2. Cogged rack of the plate (1)

3. Input wheel

3a. Input wheel (3) rear projection

4. Output wheel

5. Lock cylinder

5a. Eccentricity of the lock cylinder (5)

5b. Threaded bore hole of the lock cylinder (5)

6. Plate (1) hollow

7. Flat vertical rod

8. Lock case

9. Side of the lock case (8)

10. Top front of the rod (7)

11. Rod (7) lug

12. Rod (7) tooth

13. Rotating cam or follower rod

14. Radial shaft of the follower rod (13)

15. Radial projection of the follower rod (13)

16. Latch

16a. Latch (16) spigot

17. Handle

18. Front opening of the plate (1)

19. Lower horizontal plane of the tooth (12)

20. Sloped upper plane of the tooth (12)

21. Transversal screw

22. Tab

23. Spring

24. Peaked lateral projection of tab (22)

25. Peripheral housing in the input wheel (3)

26. Longitudinal screw hole in the lock case (8)

27. Stepped slide mechanism in the descending plate (1)

27a. Upper ascending slide projection (27)

27b. Lower descending slide projection (27)

27c. Rear edge of upper projection (27a)

27d. Rear edge of lower projection (27b)

27e. Empty run

EXPLANATION OF A PREFERRED REALISATION

[0029] With reference to the drawings and references listed above, the attached plans illustrate a preferential realisation of the invention for a lock to be embedded in metal frames manufactured with commercial profiles, of the latch (16) and handle (17) type, and which, as shown

in Fig. 1, comprises a cogwheel assembly mounted in such a way that its last stage is an output wheel (4) and its first stage is an input wheel (3) that is activated by the eccentricity (5a) of a key lock cylinder (5), positioned coaxially to this input wheel (3) and mounted "in situ" using a screw (21) placed transversally to and from the front of the lock. This lock also includes a solid descending closure plate (1) that has terminals to engage the latches that activate the upper and lower locking bolts. The vertical plane of this descending closure plate (1) forms a cogged rack (2) and the descending closure plate (1) operates between the upper and lower latch (16) opening and closing positions, respectively.

[0030] Fig. 1 illustrates one of the purposes of the invention, which is to have the output cogwheel (4) engage with the cogged rack (2) of the descending closure plate (1), the output wheel (4) operating in a hollow (6) formed in the edge of the descending closure plate (1). Furthermore, it includes handle (17) retraction functions via the descending closure plate (1) and it also has the means to automatically hold the cogwheel assembly in the absence of the lock's cylinder (5). In contrast with other aforementioned solutions that exist in this field, in this solution when the input wheel (3) is activated by the cylinder (5), the descending closure plate (1) is moved directly by the cogwheel assembly through the engagement of the output cylinder (4) in the cogged rack (2), as a result of the opposition of the respective positions of these elements, shown in Figs. 1 and 2., and it is this descending closure plate (1) that subsequently pushes out/retracts the latch (16) by the already known means of a sloped sliding mechanism and button. In this solution the output wheel (4) is located in said hollow (6) and acts on the thickness of the descending closure plate (1), which makes it possible to build a narrower lock case (8) which is, therefore, more suitable to be embedded in the narrow frontal width of a metal frame.

[0031] Another particularity of the invention is illustrated in Figs. 3 to 13 and it refers to the mechanisms that retract the handle (17) due to the eccentricity (5a) of the cylinder (5) and through the descending closure plate (1), together with the input wheel (3). These mechanisms consist of a flat, vertical rod (7) (Fig. 3) that, being capable of sliding whilst attached to one side (9) of the lock case (8), is guided between an upper, or pre-active position (Figs. 1, 8, 9 and 13), to a lower, or inhibited position (Figs. 2 and 12). This rod (7) has a top face (10), a lug (11) projecting from the front bottom, transversal to the rod's plane, and a tooth (12) projecting from the rear vertical edge of the rod, noticeably in the same plane. The top face (10), in pre-active position, faces and is adjacent to a radial projection (15) of a rotating cam, or follower rod (13), which, with its radial shaft (14), retracts the handle (17). The lug (11) travels in an opening (18) in the front edge of the descending closure plate (1) in such a way that, when the latter is in its lower and upper positions, the lug (11) touches the top and bottom of the opening (18), respectively. The bottom edge of the tooth (12)

is horizontal (19) and the top edge is sloped (20) and with respect to the aforementioned lower or inhibited, and upper or pre-active positions of the rod (7), the tooth (12) is positioned, respectively, away from (figs. 2 and 12) or in the path of (Figs. 10, 11 and 13) the rotational operating run of the rear projection (3a) of the input wheel (3) when it is activated, during the opening turn, by the eccentricity (5a) of the lock cylinder (5). That is, after two clockwise turns of the key in the cylinder (5) (Figs. 8 and 13) (remember that in Fig. 12, this situation has not yet been reached), the plate (1) has completed its opening run, the bottom end of its front opening (18) has pulled the rod (7) until the tooth (12) is situated in the position indicated in Fig. 13, where it has its horizontal edge (19) ready (Fig. 7) to be pushed by the rear projection (3a) of the input wheel (3), raising the rod (7) which pushes against the radial projection (15) of the follower rod (13) and makes the input wheel turn and with its radial shaft (14), retract the handle (17), as indicated in Figs. 10 and 11. In this last movement the lug (11) rises in relation to the lower end of the front opening (18), so that when the eccentric action (5a) ceases, the rod (7) can descend to its previous position when the handle (17) does so, and once again be propelled by the spring.

[0032] Another of the purposes of this invention concerns the system for automatically holding the cogwheel assembly in place in the absence the lock cylinder (5). This consists in a vertically sliding tab (22) that moves between an upper, or active position, propelled by a spring (23), and a lower, or inhibited position, opposing the spring (23) propulsion. In the lower part of the tab (22) there is a lateral projection (24), the top of which forms a peak and in its upper active position the tab (22) is positioned in a housing (25) on the outside edge of the input wheel (3) of the cogwheel assembly, whilst the lateral projection (24) is inserted inside the longitudinal screw hole (26) in the lock case (8), which takes the transversal screw (21) that screws into the lock cylinder (5), when this is mounted. In its lower, inhibited position, the tab (22) and lateral projection (24) are positioned, respectively, outside the input wheel (3) housing (25) and the longitudinal hole (26) in the lock case (8).

[0033] Its configuration and functioning are illustrated in Figs 14 and 15. Beginning with Fig. 14 and imagining that the cylinder (5) is not yet positioned against the input wheel (3), as the transversal screw (21) is has not yet been inserted, the tab (22), pushed by the spring (23), is inside the housing (25) in the input wheel (3). When the transversal screw (21) is inserted, its point (Fig. 14) presses against one of the sloped sides of the lateral projection (24) of the tab (22) and, due to inclined plane, the tab (22) descends (Fig. 15), coming out of the housing (25) of the input wheel (3) and compressing the spring (23), which will push the tab (22) out again when the screw (21) is removed. That is, when the screw (21) is not in place, the tab (22) ensures that the cogwheel assembly stays in place in the lock case (8), and when the screw (21) is inserted, upon mounting the cylinder (5)

and completing assembly of the whole lock, the tab (22) is retracted, allowing the input wheel to turn to open and close the lock.

[0034] Another particularity of the invention consists in that the descending closure plate (1) has a downward, front to back, stepped sliding mechanism (27) formed by a central oblique section that forms vertically, at its front, or superior, and rear or inferior ends an upper ascending projection (27a) and a lower descending projection (27b), ending in hollows that take the corresponding spigot (16a) with the latch (16) that slides along this stepped slide (27). The upper projection (27a) has a rear vertical border (27c) and in the lower projection (27b) the hollow is linked to the upper edge of the oblique section of the stepped slide (27) by way of a rear vertical border (27d) with a longitude that, together with effect resulting from the cogwheel assembly, gives an empty run (27e) that is noticeably less than the vertical operative run of the rod (7) during handle (17) retraction. This configuration is clearly illustrated in Figs. 16 and 17, in which the advantages assigned in the preceding text can be immediately appreciated: the rear vertical border (27c) prevents forced retraction of the latch (16) spigot (16a) when the lock is closed (Figs. 1 and 2), in contrast to the slope effect that appears if this spigot (16a) is retracted against the oblique central section edge of the stepped slide (27). It is the rear vertical border (27d) that provides the possibility of the empty run (27e) between the spigot (16a) and the descending closure plate (1) to enable handle (17) retraction through the rod (7) movement.

Claims

1. Cogwheel assembly lock with retention mechanism for metal frames, specifically a lock with latch (16) and handle (17), comprising a cogwheel assembly mounted in such a way that its last stage is an output wheel (4) and its first stage is an input wheel (3) that is activated by the eccentricity (5a) of a key lock cylinder (5), positioned coaxially to this input wheel (3) and mounted "in situ" using a screw (21) placed transversally to and from the front of the lock including also the said lock a solid descending closure plate (1) that has terminals to engage the latches that activate the upper and lower locking bolts, the vertical edge of the descending closure plate (1) forming a cogged rack (2) and this descending closure plate (1) operates between the upper and lower opening and closing positions, respectively, of the latch (16), the output wheel (4) engaging with the cogged rack (2) of the descending closure plate (1), the output wheel (4) operating in a hollow (6) formed in the edge of the descending closure plate (1) and because it includes handle (17) retraction functions through the descending closure plate (1), jointly with the input wheel (3), having also the means to hold automatically in place the cogwheel assembly in the absence

of the lock's cylinder (5).

2. Cogwheel assembly lock with retention mechanism for metal frames, as stated in Claim 1, **characterised by** mechanisms to retract the handle (17) through the action of the descending closure plate (1), together with the input wheel (3) consisting of a flat, vertical rod (7) that, being capable of sliding whilst attached to one side (9) of the lock case (8), is guided between an upper or pre-active position, to a lower or inhibited position which rod (7) has a top face (10), a lug (11) projecting from the front bottom, transversal to the rod's plane, and a tooth (12) projecting from the rear vertical edge of the rod, noticeably in the same plane; the top face (10), in pre-active position, faces and is adjacent to a radial projection (15) of a rotating cam, or follower rod (13), which, with its radial shaft (14), retracts the handle (17); the lug (11) travels in an opening (18) in the front edge of the descending closure plate (1) in such a way that, when the latter is in its lower and upper positions, the lug (11) touches the top and bottom of the opening (18), respectively, being the bottom edge of the tooth (12) horizontal (19) and the top edge is sloped (20), and with respect to the aforementioned lower or inhibited and upper or pre-active positions of the rod (7), the tooth (12) is positioned, respectively, away from or in the path of the rotational operating run of the rear projection (3a) on the input wheel (3) when it is activated, during the opening turn, by the eccentricity (5a) of the lock cylinder (5).
3. Cogwheel assembly lock with retention mechanism for metal frames, as stated in any one of the previous Claims, **characterised by** a system for automatically holding the cogwheel assembly in place in the absence the lock cylinder (5) consisting of a vertically sliding tab (22) that moves between an upper, or active position, propelled by a spring (23), and a lower, or inhibited position, opposing the spring (23) propulsion, being in the lower part of the tab (22) a lateral projection (24), the top of which forms a vertical peak and in its upper active position the tab (22) is positioned in a housing (25) on the outside edge of the input wheel (3) of the cogwheel assembly, whilst the peak of the lateral projection (24) is inserted inside the longitudinal screw hole (26) in the lock case (8), which takes the transversal screw (21) that screws into the lock cylinder (5), when this is mounted and in its lower, inhibited position, the tab (22) and lateral projection (24) are positioned, respectively, outside the input wheel (3) housing (25) and the longitudinal hole (26) in the lock case (8).
4. Cogwheel assembly lock with retention mechanism for metal frames, as stated in any one of the previous Claims, **characterised by** the fact that the descending closure plate (1) has a downward, front to back,

stepped sliding mechanism (27) formed by a central oblique section that forms vertically, at its front, or superior, and rear or inferior ends an upper ascending projection (27a) and a lower descending projection (27b), ending in hollows that take the corresponding spigot (16a) with the latch (16) that slides along this stepped slide (27), having the upper projection (27a) a rear vertical border (27c) and in the lower projection (27b) the hollow is linked to the upper edge of the oblique section of the stepped slide (27) by way of a rear vertical border (27d) with a length that, together with effect resulting from the engagement of the cogwheel assembly, gives an empty run (27e) that is noticeably shorter than the vertical operative run of the rod (7) during handle (17) retraction.

20

25

30

35

40

45

50

55

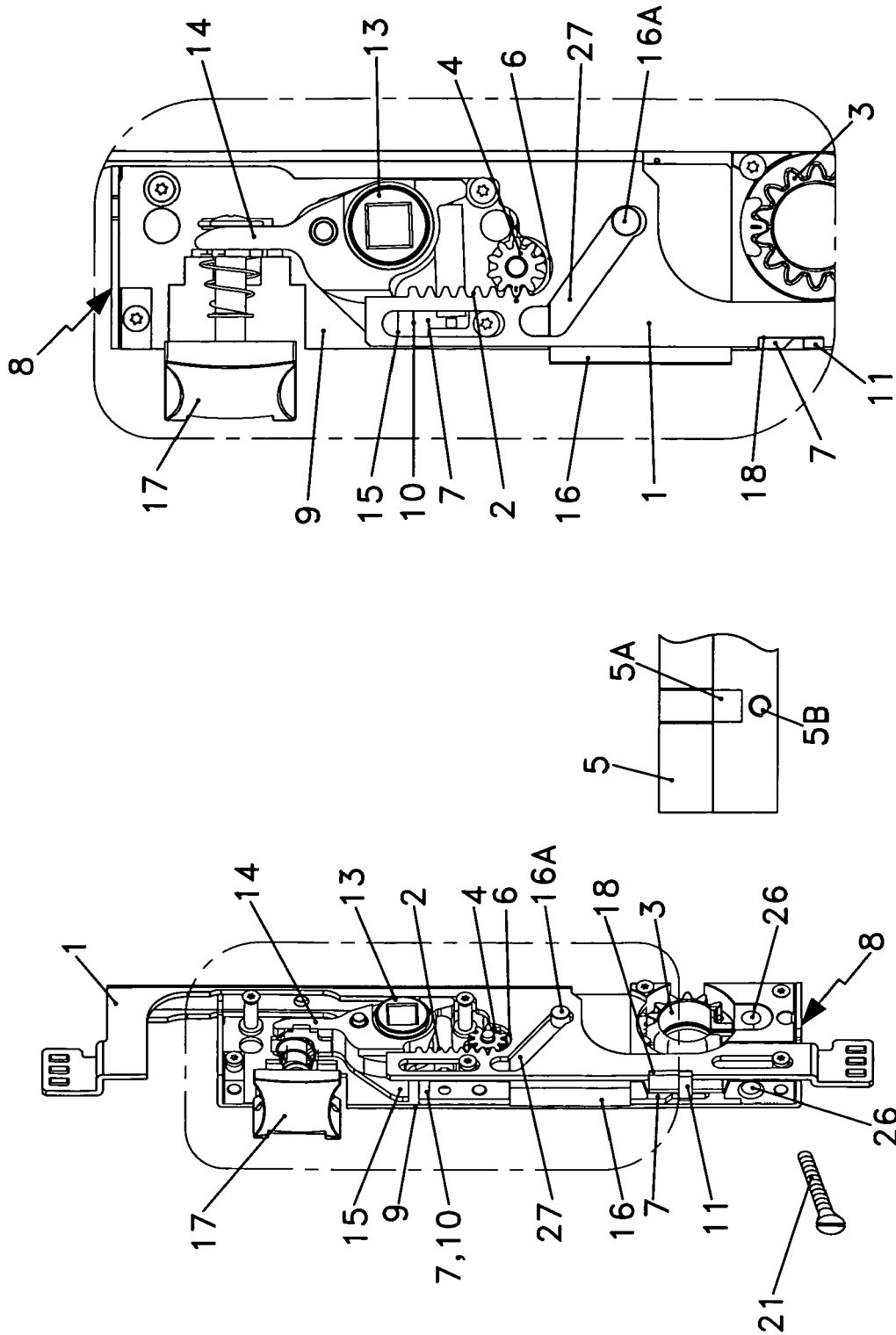


Fig.1

Fig.4

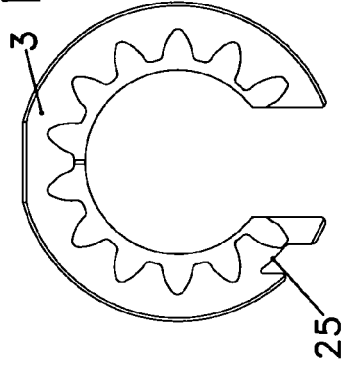


Fig.3

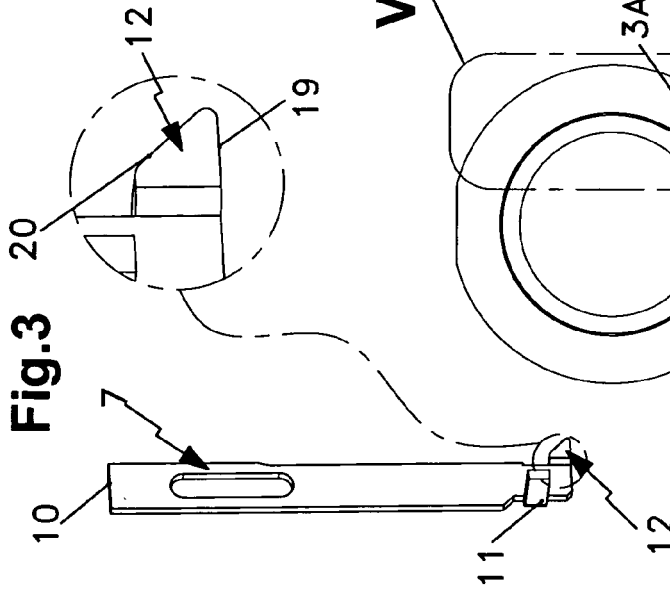
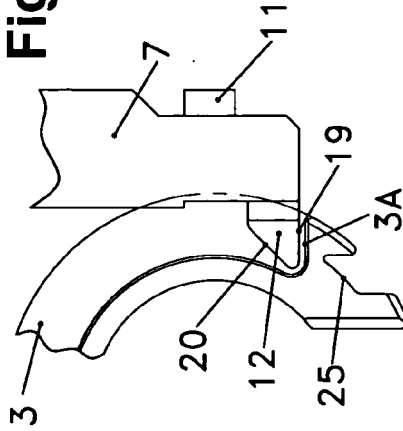


Fig.7



VII

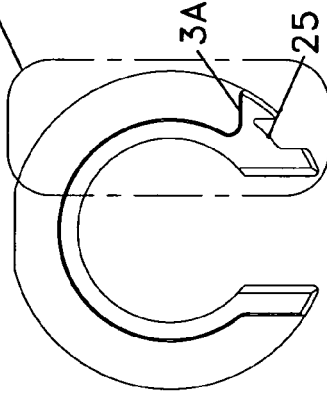


Fig.5

Fig.6

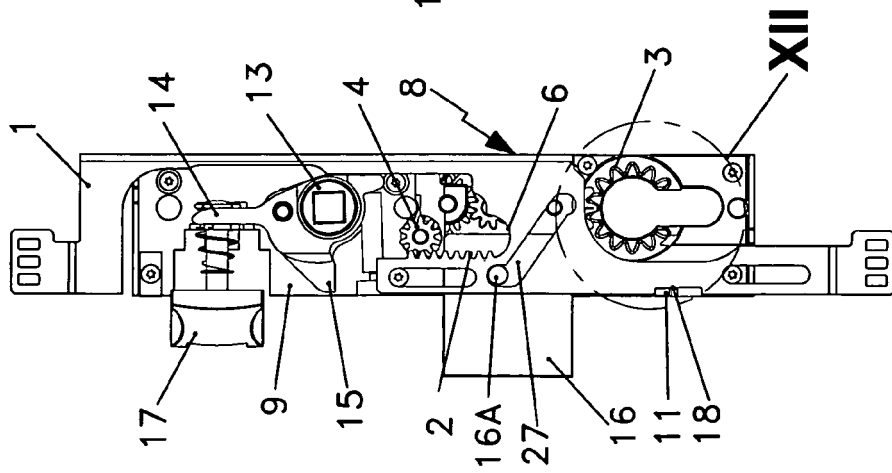
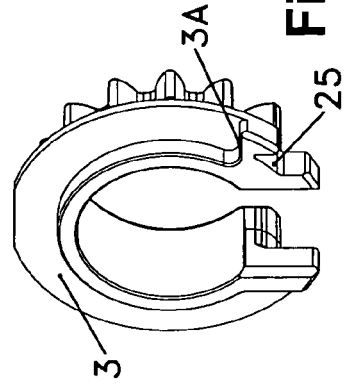


Fig.2

XII

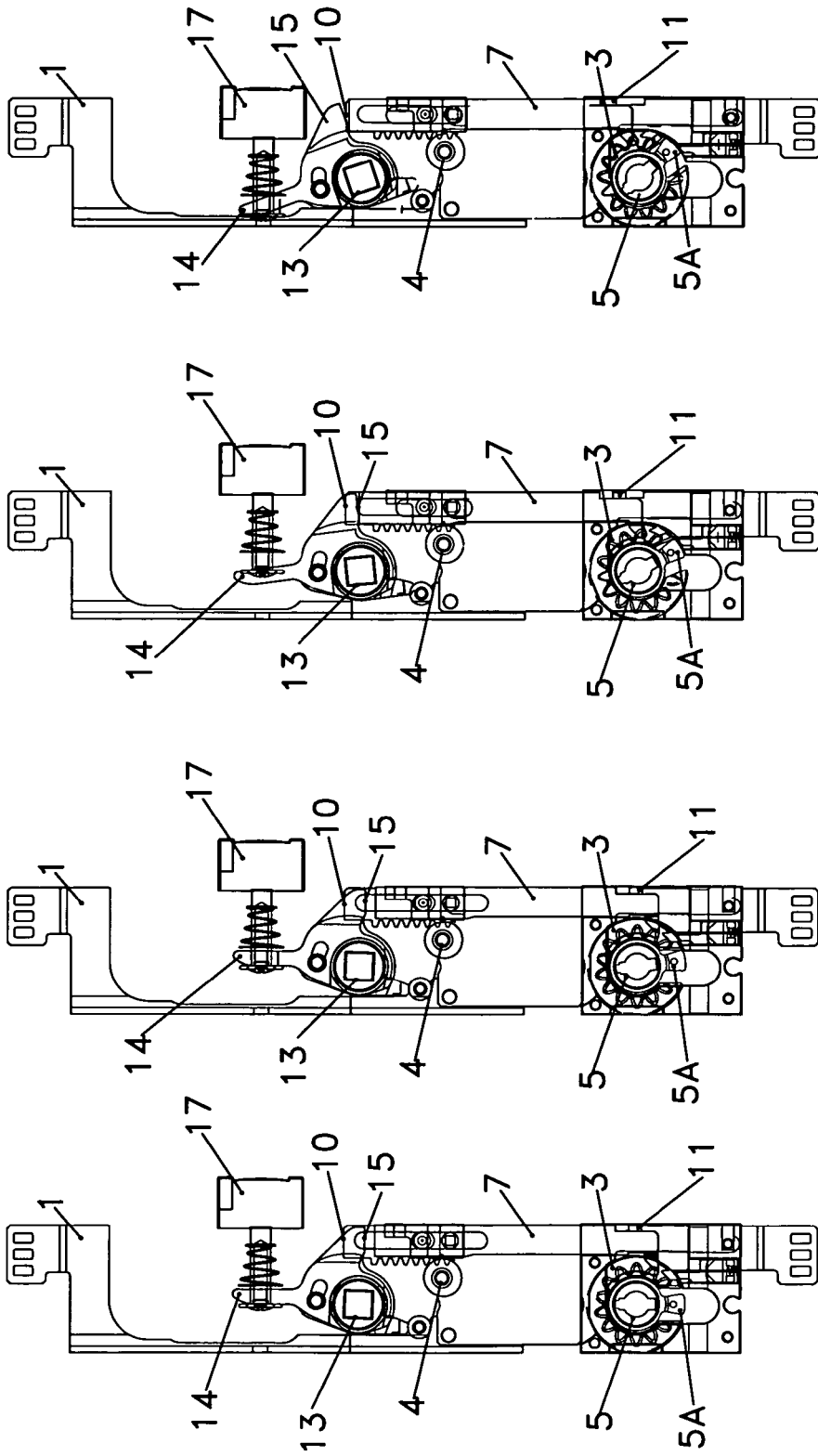


Fig.8

Fig.9

Fig.10

Fig.11

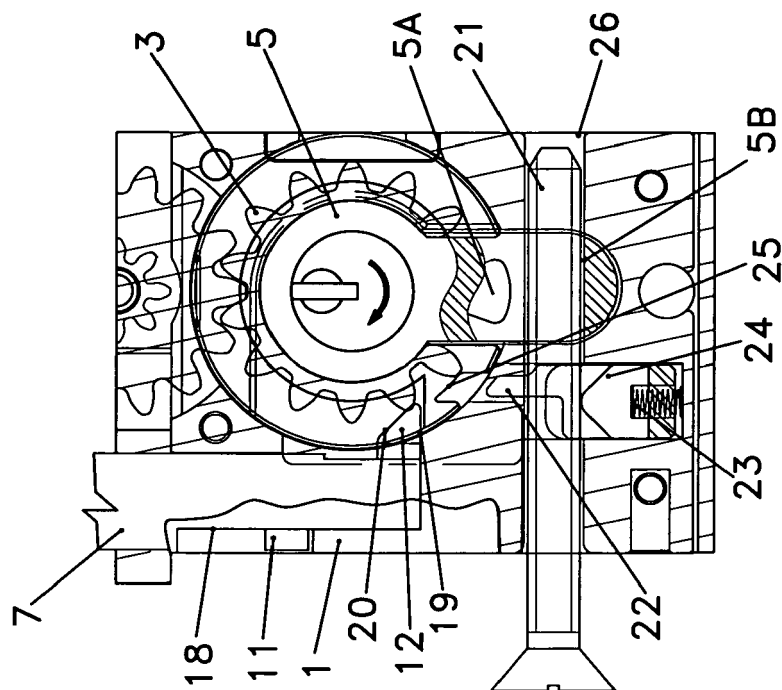


Fig.13

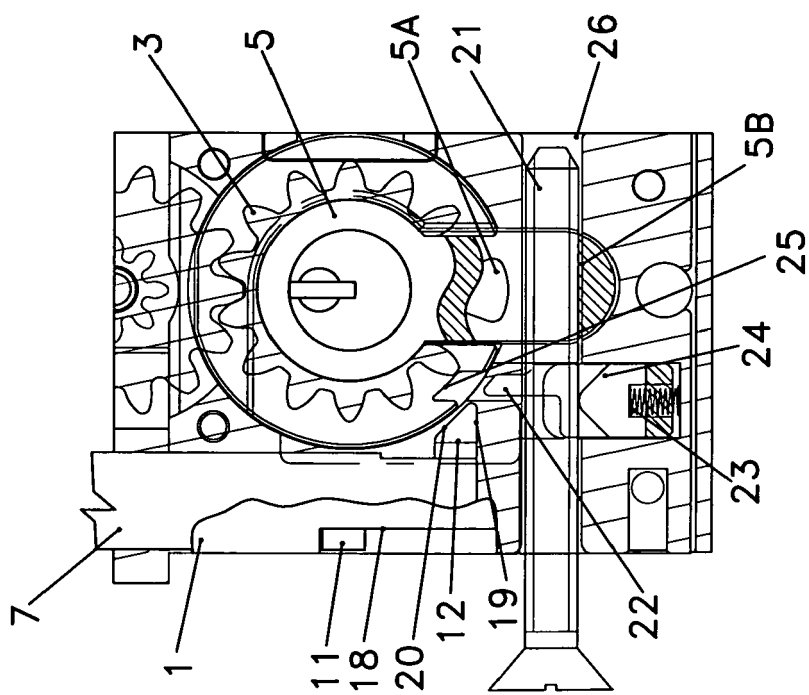


Fig.12

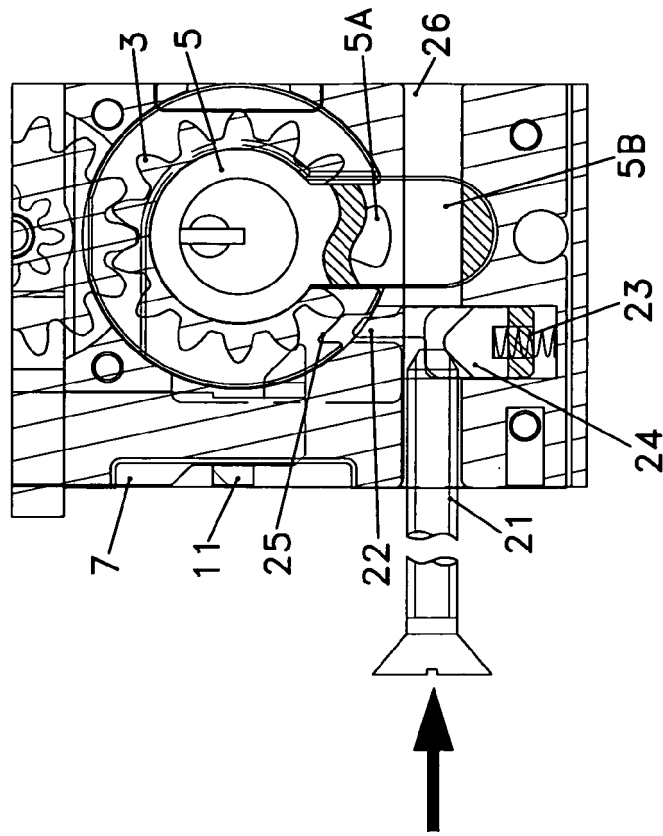


Fig. 14

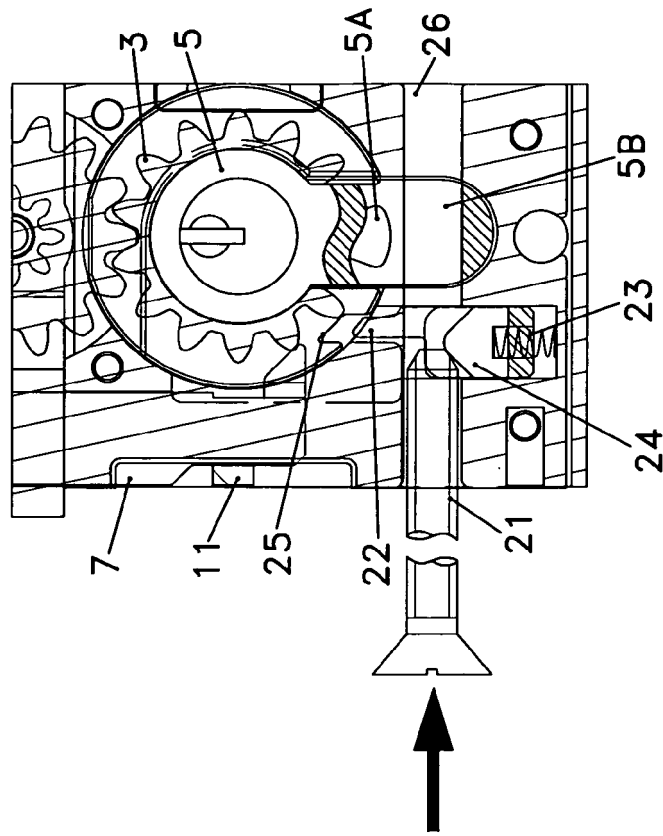


Fig. 15

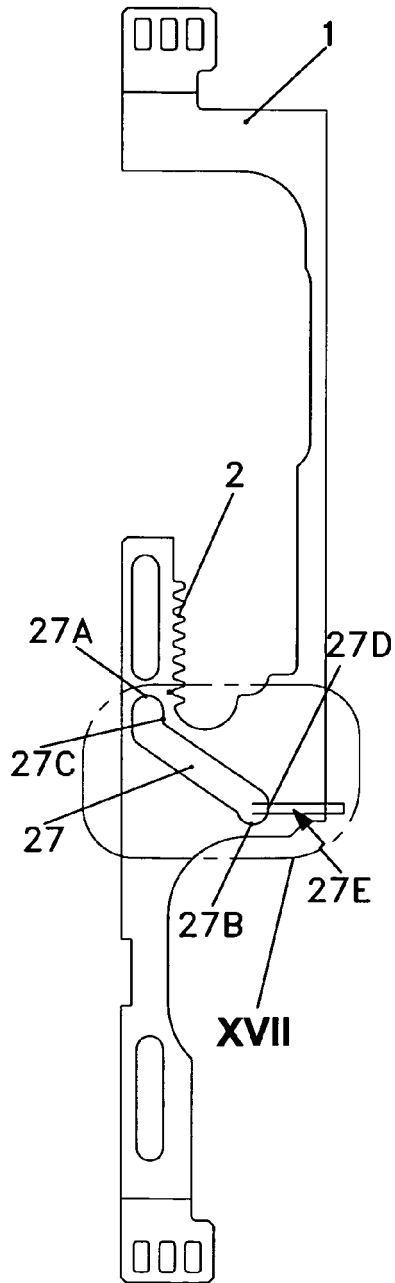


Fig.16

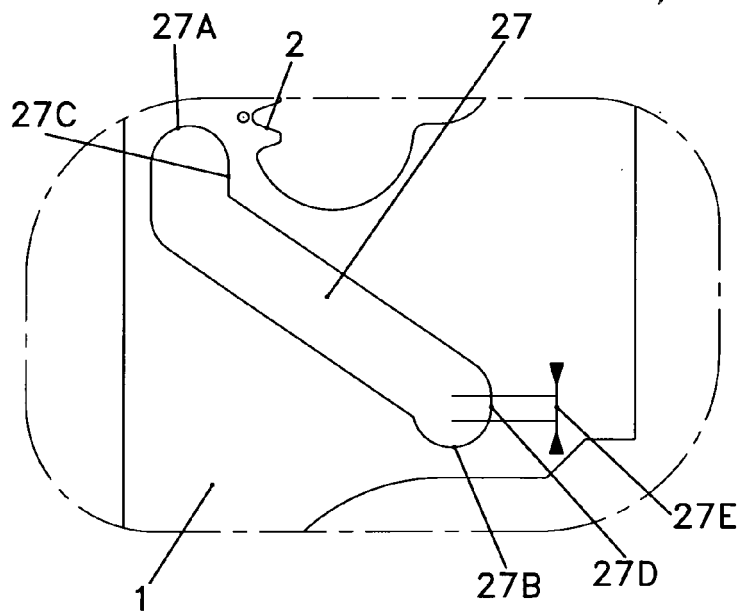


Fig.17