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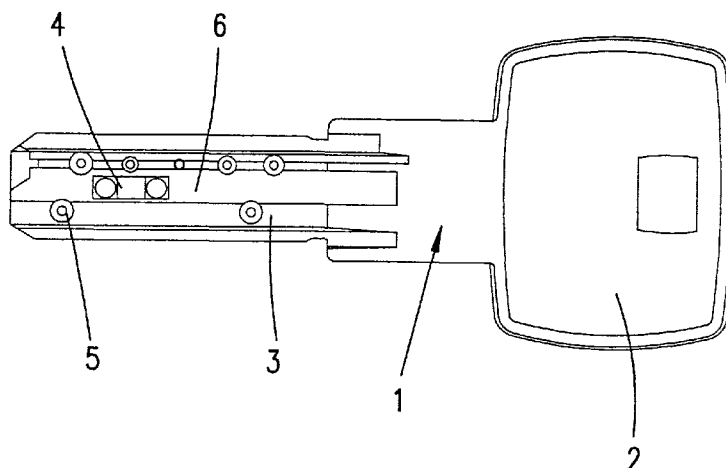
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(54) Cylinder lock and associated turning flat key

(57) A cylinder lock with a flat key (1) for insertion into the key channel (14) of the cylinder lock, into which key channel (14) tumbler pins and at least one supplementary tumbler pin (9) project and the supplementary tumbler pin (9) when the key (1) is fully inserted is displaceable into a release position by a lifting flank (8') of a two-armed pivoted lever (4). The pivoted lever (4) is disposed in an opening (24) of the key bit (3) and is ca-

pable of swivelling about an axis extending at right angles to the insertion direction, the swivelling of the pivoted lever (4) being effected by the action of a control flank (7') of the pivoted lever (4) upon a cam (13, 18'). The lifting flank (8') and the control flank (7') are associated with different arms (7, 8) and tumbler pin (9) and cam (13, 18') are associated with the same key channel wall (14').

Fig. 1

Description

The invention relates to an improved cylinder lock and to an associated flat key.

Such a locking device, comprising a cylinder lock and a key, is known from US Patent No 1 735 868. The flat key, which is disclosed there and does not take the form of a turning key, has in its bit plane a recess in the form of an opening. Seated in said recess is a two-armed pivoted lever, of which the arm directed towards the tip of the key forms a lifting arm with a lifting flank which, when the key is fully inserted into the key channel of the cylinder lock, displaces a supplementary tumbler pin out of a locking position into the release position. Said displacement is effected as a result of a swivelling motion of the lever. The lever has, for said purpose, a control flank, which is associated with the lifting arm and is disposed at the opposite side of the key to the lifting flank. With said control flank the pivoted lever acts upon a peripheral cam, which is provided in the key channel of the cylinder lock and hence brings about the swivelling motion. The pivoted lever has its greatest broadside extension in the region of its bearing axis. When the key is inserted into the key channel, the lifting flank is aligned with the edges of the opening, in which the pivoted lever is supported. The second arm of the pivoted lever is likewise aligned with the edges of the opening and so defines a starting position for the pivoted lever before it acts upon the cam.

EP-A1 0 416 500 discloses a cylinder lock with an associated flat key, which likewise has a pivoted lever pivotally supported in a key bit recess. Said pivoted lever is, however, of a one-armed design.

A key having a movable locking element is moreover disclosed by EP 0 029 498.

It is an object of the present invention to provide a cylinder lock of the type described, and a flat key of the type described, with increased locking security.

The present invention provides a cylinder lock with flat key for insertion into the key channel of the cylinder lock, into which key channel tumbler pins and at least one supplementary tumbler pin project and the supplementary tumbler pin when the key is fully inserted is displaceable into a release position by a lifting flank of a two-armed pivoted lever, which is disposed in an opening of the key bit and is capable of swivelling about an axis extending at right angles to the insertion direction, the swivelling of the pivoted lever being effected by the action of a control flank of the pivoted lever upon a cam, characterised in that the lifting flank and the control flank are associated with different arms and tumbler pin and cam are associated with the same key channel wall.

By virtue of the cylinder lock and the flat key according to the invention a locking device is provided which is incompatible with the known cylinder locks and flat keys, with the result that the total number of possible lock combinations is increased. The invention further provides a locking system of increased operational reliability

since, according to the invention, the control flank and the lifting flank are spatially associated with two different lever arms. Peripheral cam and cylinder pin project from the same key channel wall. The control flank and the lifting flank are disposed on the same broadside plane of the key in such a way that an adequate forward motion of the lifting flank is provided when the control flank is aligned with the edges of the broadside opening of the key bit. The cam is preferably formed by a projection protruding into the key channel. Said projection may be connected uniformly in terms of material to the one half of the cylinder core. The reaming of the cylinder core which forms the key channel may then be effected from both sides of the locking cylinder. The cam engages preferably into a profiled groove of the key. Upon insertion of the key into the key channel, the arm projecting towards the tip of the key may travel over the cam so that, in the fully inserted position of the key, the second arm projecting towards the bow comes to lie upon the cam. The cam may alternatively be formed by the front end of a further pin, e.g. a rigid pin or a tumbler pin. If the further pin were to be movable as a tumbler pin, which is at present not preferred, it would have to be provided with a stronger pressure spring than the pressure spring associated with the supplementary tumbler pin acted upon by the lifting arm. The pivoted lever is preferably dumbbell-shaped. The cross-sectional profiles of the ends of the arms are greater or thicker than the cross-sectional profile in the region of the bearing point of the pivoted lever. In a preferred variant, the pivoted lever is formed by two balls seated on the ends of a steel needle. The balls have radial bores, into which the ends of the steel needle are inserted. The steel needle may be pivotally supported in a central web of the opening. Said pivot bearing may be formed by a groove indented into the edge. The pivot bearing is preferably formed asymmetrically so that the length of the lifting arm is greater than the length of the control arm. In a further variant it is provided that the pivoted lever is capable of swivelling about a transversely positioned spindle in the form of a needle. In a further embodiment, however, the pivoted lever may alternatively have an axial bore, which tapers from both ends towards the middle and situated in which is a needle, which extends in the longitudinal direction of the key and is fastened at both ends to the key bit. When the key is not inserted, the end face of the supplementary tumbler pin preferably projects only as far as into the surface, which is associated with the bottom surface of the profiled groove and lies parallel to the key channel wall. The release position is preferably achieved when the end face of the supplementary tumbler pin is aligned with the key insertion channel wall.

Three embodiments of a cylinder lock with a flat key will now be described with reference to the accompanying drawings, in which:

Figure 1 is a first embodiment of a key;

Figure 2 shows the key according to Figure 1 during insertion into an associated locking cylinder;

Figure 2a is an enlarged view of a sub-region in Figure 2;

Figure 3 is a sequential view of Figure 2;

Figure 4 is a sequential view of Figure 3 with the key fully inserted;

Figure 5 is a section according to the line V-V in Figure 2;

Figure 6 is a section according to the line VI-VI in Figure 2;

Figure 7 is a section according to the line VII-VII in Figure 3;

Figure 8 is a section according to the line VIII-VIII in Figure 3;

Figure 9 is a section according to the line IX-IX in Figure 4;

Figure 10 is a section according to the line X-X in Figure 4;

Figure 11 is a second embodiment of a key;

Figure 12 is a section according to the line XII-XII of Figure 11;

Figure 13 is a detail view of the key according to Figure 11;

Figure 14 is a section according to the line XIV-XIV in Figure 13;

Figure 15 is a view according to Figure 4 of a further embodiment and

Figure 16 is a section according to the line XVI-XVI in Figure 15.

The embodiment illustrated in Figures 1 to 10 comprises a cylinder lock and a key 1. The key 1 has a bow 2 adjoined by a bit 3. The bit 3 has an opening 24, in the present embodiment approximately in the front region. Inserted in said opening 24 is a pivoted lever 4. The opening has a central web 25 for supporting the pivoted lever 4.

In this embodiment, the pivoted lever 4 is dumbbell-shaped. The two ends are formed by balls 17 having radial openings, into which the ends of a steel needle 10 are inserted. The diameters of the balls 17 are greater than the material thickness in the region of the opening 24 of the bit so that in every swivel position at least one ball projects beyond a respective one of the broadside surfaces of said region of the bit 3.

The ball 17, which is directed towards the tip of the key, with the associated portion of the needle forms a lifting arm. The opposite arm forms a control arm. The control arm 7 forms a control flank 7' and the lifting arm 8 forms a lifting flank 8'.

The steel needle 10 connecting the two balls 17 is supported in a groove provided in the central web of the opening 24. A bearing bush 25 which widens towards the two openings is located in the groove, so that the crown of the groove forms a bearing point 16. The groove is closed in the form of indentations 15. The bearing point 16 is disposed asymmetrically so that the

lifting arm 8 is longer than the control arm 7.

Provided in the associated cylinder of a cylinder lock is a key channel 14, into which the key bit 3 is insertable. A projection 13 which is connected uniformly in terms of material to the associated half of the locking cylinder projects from one of the channel walls 14'. The projection 13 engages in this embodiment into a profiled groove 6 of the key. The profiled groove 6 of the key lies adjacent to profiled recesses 5 and in the longitudinal centre plane of the bit 3.

When there is no key inserted into the key channel 14, the supplementary tumbler pin 9 projects only in sections into the key channel 14. Its end face lies approximately in the region of the bottom of the profiled groove 6 of the key, from which the lifting flank 8' projects. Upon insertion of the key into the key channel 14, first the ball directed towards the tip of the key runs with its lifting flank 8' over the projection 13 provided with run-on bevels (cf. Figure 2). When the front ball has surmounted the projection 13, the rear ball 17 encounters the projection 13 (Figure 3). When the key is fully inserted (Figure 4), the rear ball, which is associated with the control arm 7, is seated with its control flank 7' on the projection 13 and holds the pivoted lever 4 in a swivelled position so that the lifting flank 8' of the lifting arm 8 may displace a cylinder pin 9 outwards in relation to the cylinder counter to the pressure of a spring 12 so that the housing pin 11 is shifted into a release position. In the release position, the end face of the supplementary tumbler pin 9 is aligned with the key insertion channel wall 14'.

In the embodiment illustrated in Figures 11 and 12, a steel needle 21 is fastened in the key bit in the longitudinal direction of the key, penetrating the opening 24 in the longitudinal direction approximately in its centre. In so doing, the steel needle 21 penetrates two axial openings 22, 23, which taper towards the middle, of a dumbbell-shaped pivoted lever, the shape of which is similar to that of the first embodiment.

In the embodiment illustrated in Figures 13 to 16, a dumbbell-shaped pivoted lever 4 is capable of swivelling about a steel needle 20, which is supported at right angles to the key insertion direction in the key bit.

In this embodiment also, the geometric dimensions of the pivoted lever cross section are selected so that the lifting flank 8' is in a forward position when the control flank 7' is aligned with the edges 24' of the opening 24.

There is accordingly a swivel position, in which both lifting flank 8' and control flank 7' project beyond the edges of the opening towards the same broadside of the key. In Figures 15 and 16 a variant of the cam is illustrated using the embodiment according to Figure 14 as an example. The cam is now formed by the end face 18' of a further tumbler pin 18. The spring used to press the tumbler pin 18 inwards in relation to the cylinder is stronger than the spring of the cylinder pin 9, with the result that reliable adjustment of the control setting is guaranteed. The cam may alternatively take the form of a rigid pin.

Claims

1. Cylinder lock with flat key (1) for insertion into the key channel (14) of the cylinder lock, into which key channel (14) tumbler pins and at least one supplementary tumbler pin (9) project and the supplementary tumbler pin (9) when the key (1) is fully inserted is displaceable into a release position by a lifting flank (8') of a two-armed pivoted lever (4), which is disposed in an opening (24) of the key bit (3) and is capable of swivelling about an axis extending at right angles to the insertion direction, the swivelling of the pivoted lever (4) being effected by the action of a control flank (7') of the pivoted lever (4) upon a cam (13, 18'), characterised in that the lifting flank (8') and the control flank (7') are associated with different arms (7, 8) and tumbler pin (9) and cam (13, 18') are associated with the same key channel wall (14').
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2. Cylinder lock according to claim 1 characterised in that the cam is formed by a projection (13) protruding into the key channel (14).
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3. Cylinder lock according to claim 1 or claim 2, characterised in that the cam engages into a profiled groove (6) of the key.
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4. Cylinder lock according to any of claims 1 to 3, characterised in that the arm (8) projecting towards the tip of the key upon insertion travels over the cam (13, 18').
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5. Cylinder lock according to any of claims 1 to 4, characterised in that the cam is formed by the front end (18') of a tumbler pin (18).
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6. Flat turning key for a cylinder lock, having a bow (2) adjoined by a key bit (3), in which a two-armed pivoted lever (4) is capable of swivelling in an opening (24) of the key bit (3) about an axis extending at right angles to the insertion direction, characterised in that the first arm (8) forms a lifting flank (8') and the second arm (7) forms a control flank (7'), wherein the lifting flank (8') when the control flank (7') is in a position of alignment with the opening edge (24') or is moved into a position projecting beyond the opening edge (24') projects out beyond the same opening edge (24').
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7. Cylinder lock or flat turning key according to any of claims 1 to 6, characterised in that the pivoted lever (4) is dumbbell-shaped.
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8. Cylinder lock or flat turning key according to any of claims 1 to 7, characterised in that the pivoted lever (4) is formed by two balls (17) seated on the ends of a steel needle (10).
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9. Cylinder lock or flat turning key according to any of claims 1 to 8, characterised in that the steel needle (10) is pivotally supported in a central bearing bush (25) of the opening (24).
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10. Cylinder lock or flat turning key according to any of claims 1 to 9, characterised in that the bearing bush (25) supporting the steel needle (10) is seated in a groove (16) indented into the edge.
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11. Cylinder lock or flat turning key according to any of claims 1 to 10, characterised in that the lifting arm (8) having the lifting flank (8') is longer than the control arm (7) having the control flank (7').
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12. Cylinder lock or flat turning key according to any of claims 1 to 11, characterised in that the pivoted lever (4) is supported about a bearing axis (20) lying in the swivelling axis.
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13. Cylinder lock or flat turning key according to any of claims 1 to 12, characterised in that the pivoted lever (4) has an axial cavity (22, 23), which tapers from both ends towards the middle and situated in which is a needle (21), which extends in longitudinal direction of the key and is fastened to the key bit.
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Fig. 1

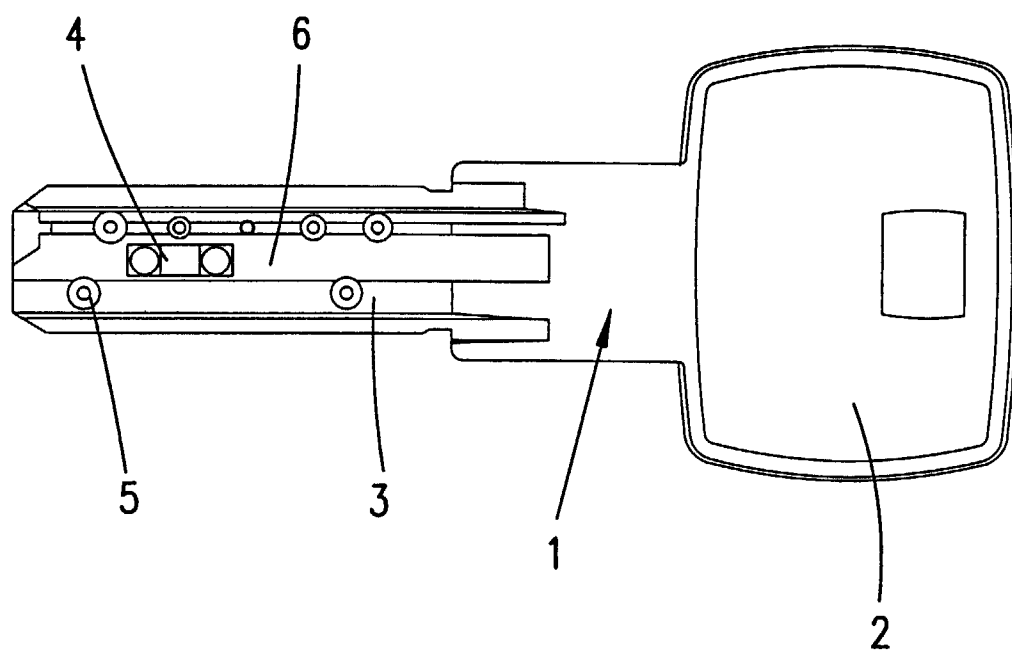


Fig. 2

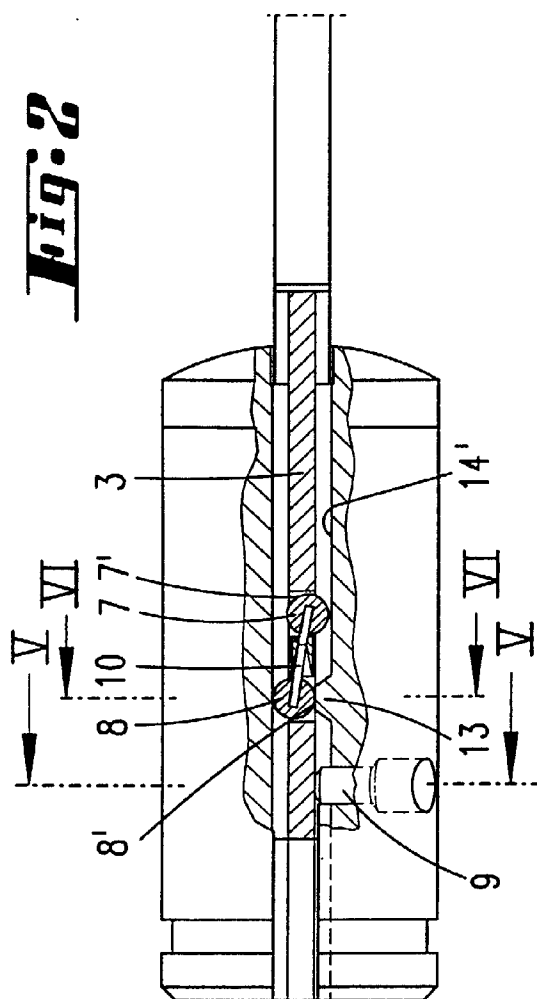


Fig. 3

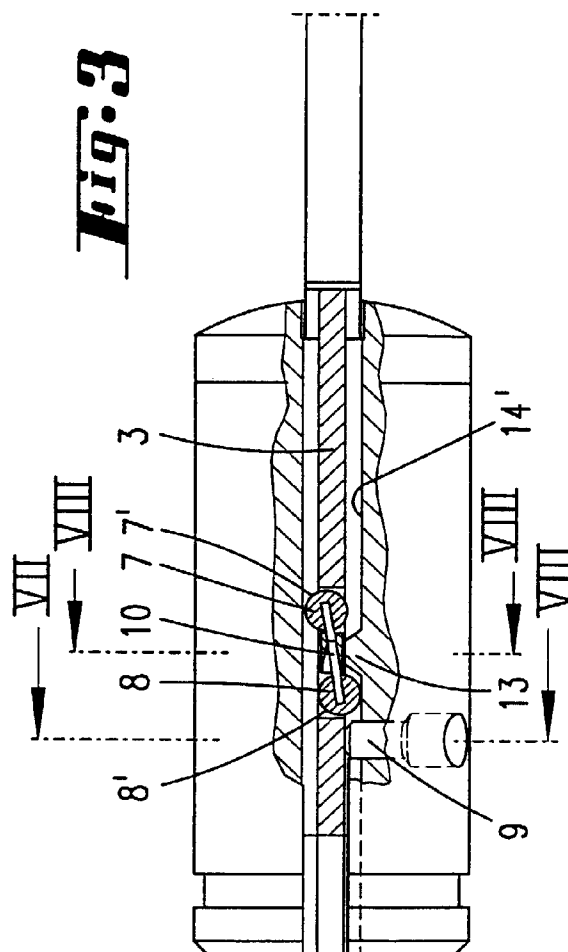


Fig. 6

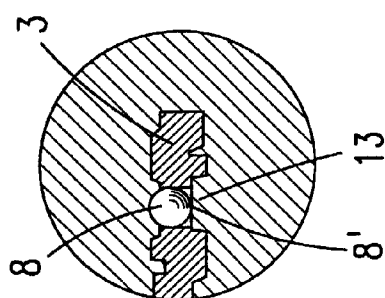


Fig. 8

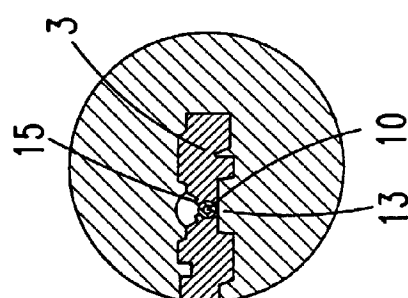


Fig. 5

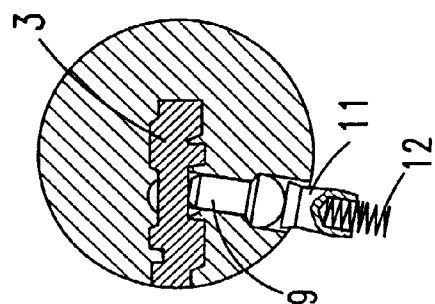


Fig. 7

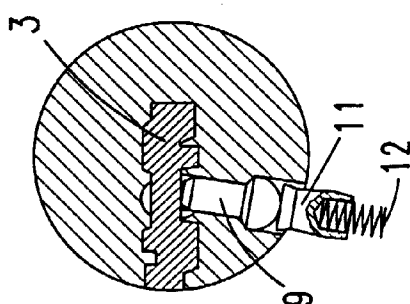


Fig. 2 a

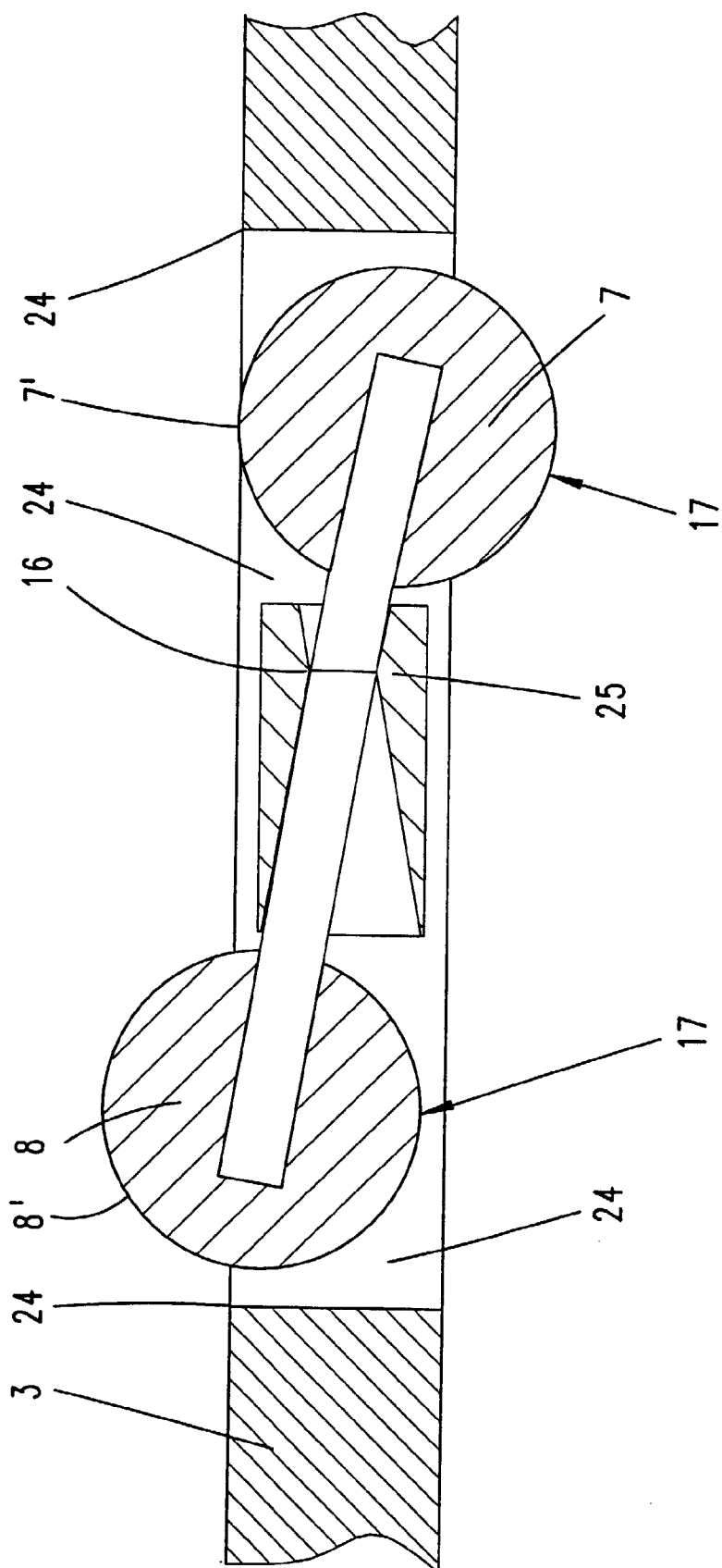


Fig. 4

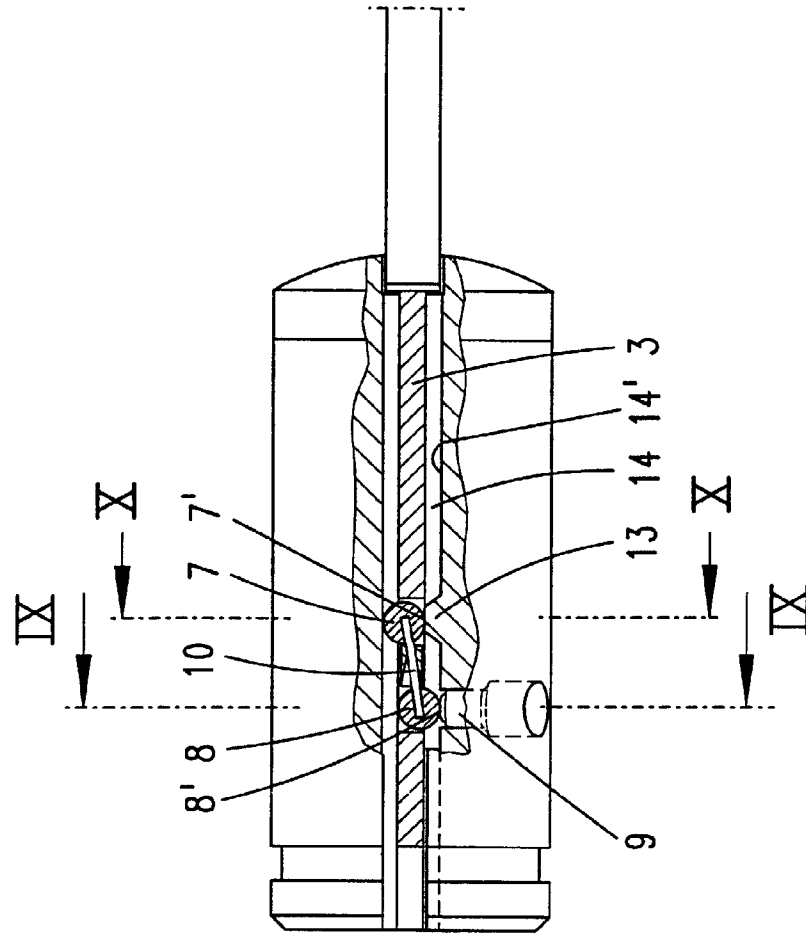


Fig. 9 **Fig. 10**

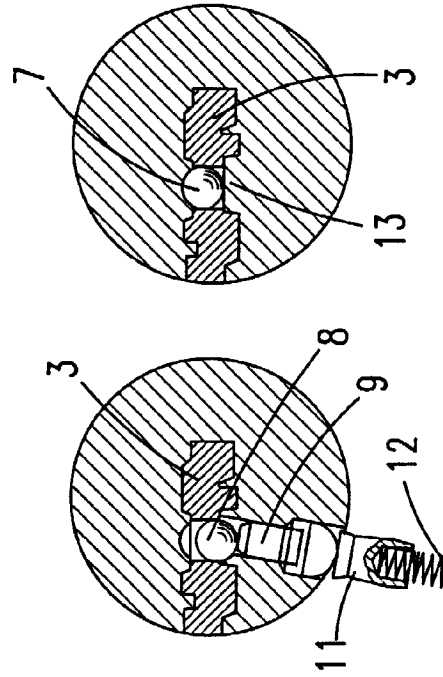


Fig. 11

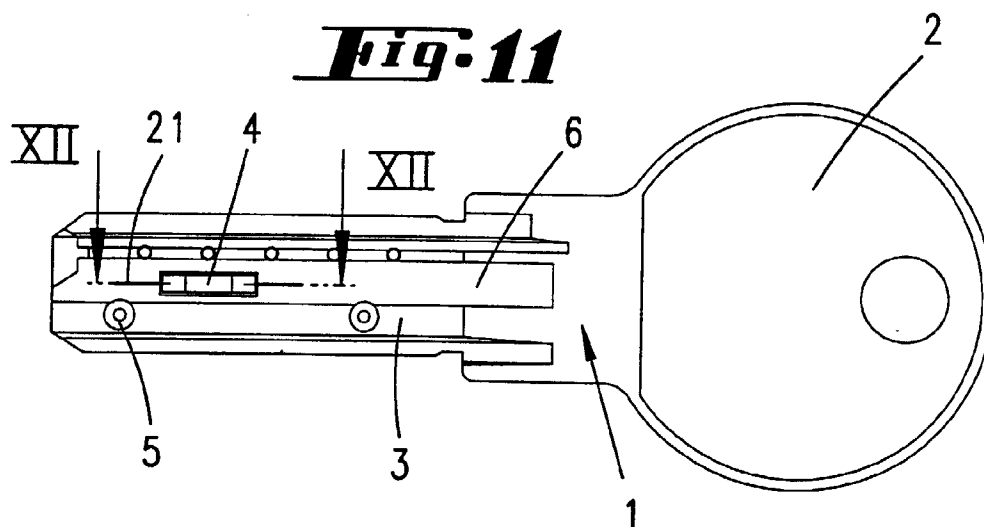


Fig. 12

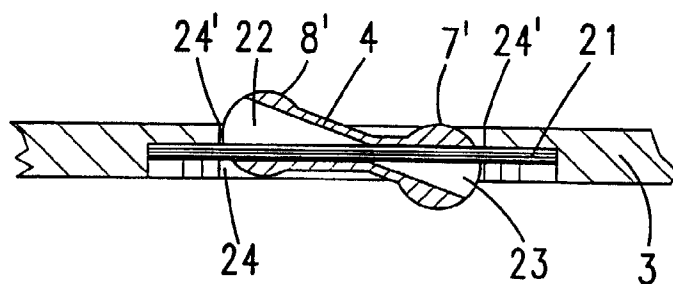


Fig. 13

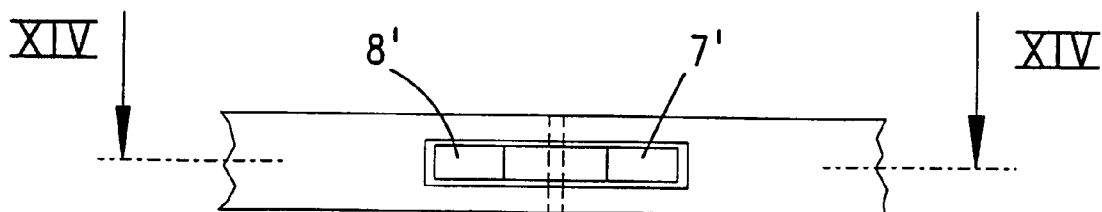


Fig. 14

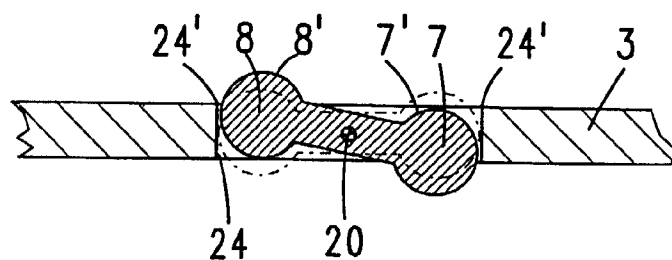


Fig. 15

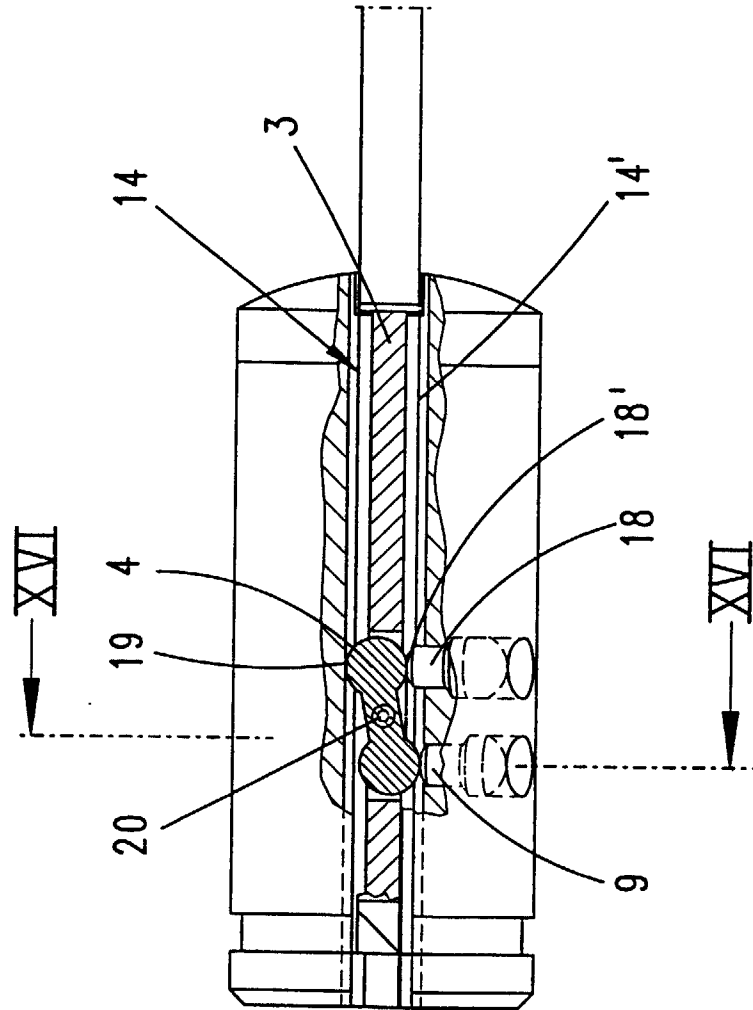
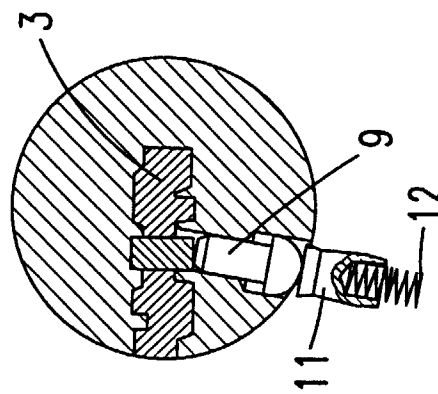


Fig. 16





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 30 5305

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 1 567 979 A (NORTHROP CLARA L) 29 December 1925	1,2,6,12	E05B27/00
A	* the whole document *	11	
A	FR 2 647 841 A (LAPERCHÉ SA) 7 December 1990 * figures 1-3 *	1,2,6	
D,A	US 1 735 868 A (KLINGEL ROBERT H) 19 November 1929 * the whole document *	1,2,4,6,12	
D,A	EP 0 416 500 A (CONSTRUZIONI ITALIANE SERRATURE AFFINI CISA SPA) 13 March 1991 * the whole document *	1,4-7,12	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B
Place of search		Date of completion of the search	Examiner
THE HAGUE		31 August 1998	PEREZ MENDEZ, J
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