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- (73) Patenthaver: **EVVA Sicherheitstechnologie GmbH, Wienerbergstrasse 59-65, 1120 Wien, Østrig**
- (72) Opfinder: **BAUMHAUER, Walter, Gablenzgasse 24-26a, A-1160 Wien, Østrig**
- (74) Fuldmægtig i Danmark: **GUARDIAN IP CONSULTING I/S, Diplomvej 381, 2800 Kongens Lyngby, Danmark**
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CYLINDER LOCK WITH CYLINDER HOUSING AND FLAT KEY FOR A
CYLINDER LOCK

The invention relates to a cylinder lock having a cylinder core and a housing, in which spring-loaded tumbler pins comprising housing pins and cylinder core pins are provided for sensing milled incisions located on the key, wherein the cylinder core pins are formed on the end protruding into the key way as sensing extensions which are narrower than the diameter of the cylinder core pin and which are oriented in the longitudinal direction of the key way, wherein at least two cylinder core pins have sensing extensions which are different from one another and which are arranged either centrally along the central longitudinal plane of the key way or offset at a distance in parallel thereto on the left or right, said sensing extensions being provided for sensing milled incisions on the key narrow side(s).

A cylinder lock having a flat key which has the aforementioned features is disclosed in AT 503 166 A1. In this lock, whilst an increase in the number of variations is provided due to the different sensing possibilities on the key narrow sides, only one position is able to be sensed for each sensed position. A further increase in the number of possible variations of the milled incisions or profiled grooves on the key would, however, normally result in making the construction of the lock increasingly complex, which is both disadvantageous for the functional reliability of the lock and also leads to higher production costs.

Further generic cylinder locks and flat keys are disclosed in the publications AT 503 166 B, US 2005/061043 A, DE 299 22 815 U1, CN 2 627 151 Y and CN 2 089 042 U.

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Increasing the number of variations on the flat key is usually possible only by the use of a wide variety of milling machines and/or processing the blank in multiple steps on different machines, whereby the costs for the individual key are substantially higher in this case.

It is the object of the invention, therefore, to provide a lock which substantially increases the possible variations of the aforementioned lock, and to provide a key which also has a substantially higher number of possible variations in the encoding of the key, with the same constructional cost. Naturally, increased functional reliability is also intended to be provided and the total production costs kept low.

This is achieved by a cylinder lock according to the invention according to claim 1.

For the sensing of the core pins, these core pins comprise at least one release groove on the flanks thereof remote from the key way for the engagement of a sensing spigot of a locking element, wherein the locking element is further assigned to a latching recess of the cylinder housing. Thus only when the correct key is inserted can the sensing spigot of the locking element penetrate into the release groove of the core pin, whereby the locking element is able to be moved out of the latching recess of the cylinder housing when the cylinder core is rotated.

Moreover, a feature of the invention is that one respective row of core pins having sensing cams is provided on at least one side of the key way, wherein at least two, preferably five, core pins having sensing cams are arranged in a row on one side of the key way.

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The milled incisions located on the edge of the key narrow side are sensed by the sensing cams, wherein in a conventional cylinder lock, with for example five cylinder core pins and five lateral core pins, a total of ten sensing positions may be sensed at the same time, which substantially increases the possible variations of the lock.

A further feature of the invention is that at least one cylinder core pin and two core pins having sensing cams are arranged in the region of a sensing position, whereby the lock is designed such that in the region of this position at least three milled incisions are able to be sensed on the key narrow side(s). By means of a locking cylinder construction according to the aforementioned prior art, whilst the number of variations of the key is increased by the milled incisions not only being able to have a different depth but also a different position transversely to the central longitudinal plane on the narrow side of the key, with such a lock only one position is able to be sensed in the region of a sensing position. By means of the locking cylinder according to the invention, up to three milled incisions may be sensed on the key narrow side in the region of a sensing position.

According to a further feature of the invention, the sensing extensions of the cylinder core pins are configured as projections which are able to be arranged at a normal distance, parallel to the central longitudinal plane or centrally along the central longitudinal plane. The sensing extensions of the cylinder core pins may also have the same or different widths. The cylinder core pins may have lateral extensions which are arranged in corresponding grooves in the cylinder core, whereby the twisting of the cylinder core pins is prevented.

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A further feature of the invention is that the key way at its insertion opening comprises a control chamfer which is arranged at an angle which is greater than 0° and less than 90° to the vertical and which is designed to cooperate with control radii located on the control tip.

The aforementioned object is also achieved by a flat key according to claim 8.

According to the above-described cylinder lock, a flat key according to the invention has three milled incisions on a key narrow side, at least in the region of a sensing position, which substantially increases the possible variations of the flat key. In the longitudinal direction of the key, the actual sensing positions of the milled incisions are offset to one another to a minimum extent, which increases the locking security of the lock and makes it difficult to copy the key. The milled incisions located on the edge side are preferably narrower in their width than those located further inwardly.

A further feature of a flat key according to the invention is that at least three, preferably five, milled incisions are provided, said milled incisions being different from one another at their normal distance from the central longitudinal plane and optionally overlapping one another. The milled incisions may have a control surface in the form of a circular arc portion. According to a further feature, at least one milled incision is covered to the side by two ribs of the remaining key material. This feature additionally makes it difficult to copy the key.

Moreover, a feature of a flat key according to the invention is that a plurality of milled incisions, preferably five milled incisions, are arranged on an edge of the key narrow side in the form of a control cam. Such a control cam may also have an individual shape and thus have a customer-specific profile.

According to a further feature of the invention, the control cam of the milled incisions located on the edge of the flat key has a lead-in chamfer on the key tip which has a greater angle relative to the longitudinal axis than the lead-in chamfer of the control surfaces located closer to the central longitudinal plane, wherein the end thereof on the key tip side is located in the vicinity of the longitudinal axis of the key.

Moreover, the key flat sides may have longitudinal profiled grooves. At least two of the longitudinal profiled grooves may be arranged overlapping one another on the opposing key flat sides.

As a further feature of the invention, control radii are provided on the key tip, said control radii being designed to cooperate with a control chamfer at the insertion opening of the cylinder lock and thus improve the correct centring of the flat key during insertion.

Further features may be derived from the accompanying drawings, the claims and the description, wherein Fig. 1 shows a cross section through a cylinder lock according to the invention.

Fig. 2 shows a plan view of the cylinder core pins and the core pins of a cylinder lock according to the invention, wherein the surrounding lock is not shown.

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Fig. 3 shows a perspective view of five cylinder core pins and five core pins and a locking element.

Fig. 4 shows a front view of a cylinder core pin and two core pins, wherein the surrounding cylinder lock is not shown.

Fig. 5 shows a detailed side view of a flat key according to the invention.

Fig. 6 shows a detailed plan view of the flat key of Fig. 5.

Fig. 7 shows a schematic longitudinal section through a cylinder core and a flat key arranged on the insertion opening.

Fig. 8 shows a perspective detailed view of a flat key according to the invention.

The cylinder lock shown in Fig. 1 has a housing 1 with a cylinder core 2 rotatably arranged therein. For sensing the flat key located in the key way 7, split tumbler pins in the form of housing pins 3 and cylinder core pins 4 are provided, said pins being pretensioned by means of a spring 5 in the direction of the cylinder core 2. The cylinder core pins 4 have sensing projections 8 on their end on the key way side, said sensing projections being configured to be narrower than the key narrow sides and being arranged in the longitudinal direction of the key way 7.

As additional sensing elements, core pins 6 are arranged on both sides of the key way 7 and are pretensioned by means of springs. By means of sensing cams 9 protruding into the key way 7, these core pins 6

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sense the milled incisions located on the edge of the key narrow sides.

Release grooves 10 are located on the flanks of the core pins 6 remote from the key way, sensing spigots 11 of a locking element 12 being able to engage therein when the correct key is inserted. When the incorrect key is inserted, the sensing spigot 11 is not able to be received in the release groove of the core pins 6 and thus remains in a latching recess 13 in the housing 1, whereby the lock is not able to be turned.

The locking situation, when the incorrect key is inserted, is shown in the left-hand half of Fig. 1. The locking situation, when the correct key is inserted, is shown in the right-hand half of Fig. 1.

Fig. 2 shows a plan view of five cylinder core pins 4 and two sets of five core pins 6 in the form that they are able to be arranged in a cylinder lock according to the invention. For greater clarity, the surrounding cylinder lock has not been shown.

As visible from Fig. 2, the sensing extensions 8 of the cylinder core pins 4 may be arranged at different spacings from the central longitudinal plane of the key. In the example shown, two sensing extensions 8 are arranged centrally and three sensing extensions are arranged to the left and/or right of the central longitudinal plane. For further increasing the number of possible variations, the lateral core pins 6 sense additional milled incisions located on the edge of the key narrow side. As in the example shown, therefore, in the region of a sensing position three milled incisions may be sensed at the same time on the key narrow side, wherein in the example shown here, when all positions

are occupied, fifteen sensing positions are possible on a key narrow side.

Fig. 3 shows a perspective view of the cylinder core pins 4 shown in Fig. 2, and a series of core pins 6 with sensing cams 9 protruding into the key way 7. Also shown is the locking element 12 which may be received with its sensing spigot 11 in the release groove 10 of the core pins 6.

Fig. 4 is a further view of a cylinder core pin 4 and two core pins 6, wherein for greater clarity the surrounding cylinder lock is not shown. As is visible in this view, the sensing cams 9 are arranged such that they may be moved unimpeded past the cylinder core pin 4, whereby all possible sensing positions of the milled incisions are able to be sensed without it leading to an obstruction of the core pins by the cylinder core pins.

Figs. 5 and 6 show the key bit of a flat key according to the invention with key flat sides 14 and key narrow sides 15. Shown in each case are milled incisions 16 located on the edge side, central milled incisions 18 and milled incisions 17 spaced apart from the central longitudinal plane. In the example shown, therefore, this results in five possible sensing positions in the transverse direction of the key narrow side 15.

Also shown is the respective sensing position 19 of the milled incisions 16, 17. For increasing the locking security, these sensing positions 19 are arranged offset in a region adjacent to one another in the longitudinal direction of the key.

In order to increase the protection against copying, the step depths, i.e. the different possible depths of

the milled incisions, of the milled incisions located on the edge side relative to the central milled incisions, are offset relative to one another in terms of their depth. When the milled incisions are located closer to the central longitudinal plane, three to five different depths may be provided, wherein in each case a step of 0.5 mm is provided between the individual sensing positions in the exemplary embodiment shown. The milled incisions located on the edge side may also have five different depths, wherein the step between two sensing position depths is 0.75 mm. Also included in the number of possible depths specified is the back of the key with a depth of 0 as a sensing position.

As a further feature on the flat key according to the invention, at least one milled incision 18 is covered in each case by two ribs 20 of remaining key material.

A further feature of the key is that, relative to the longitudinal axis of the key, the lead-in chamfer 21 for the core pins 6 has a steeper angle than the lead-in chamfer 22 for the cylinder core pins 4. The lead-in chamfer 21 in this case starts closer to the centre of the key tip 23, in order to facilitate the upward travel of the sensing cams 9 of the core pins 6.

Figure 7 shows a schematic longitudinal section through a cylinder core 2 with a key way 7. A control chamfer 24 is located at the insertion opening, said control chamfer cooperating with the control radii 25 and 26 and ensuring simple and correct centring of the key when the key is inserted.

Figure 8 shows a perspective detailed view of the key tip 23 of a flat key according to the invention. For improved centring behaviour of the flat key, control radii 25 and 26 are provided on the key tip 23, said

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control radii ensuring that the control surface 24 slides along the radii when the key is inserted and thus that the key is correctly centred.

CLAIMS

1. A cylinder lock having a cylinder core (2) and a housing (1) in which spring-loaded tumbler pins comprising housing pins (3) and cylinder core pins (4) are provided for sensing milled incisions (17, 18) located on the key, wherein the cylinder core pins (4) are formed on the end protruding into the key way (7) as sensing extensions (8) which are narrower than the diameter of the cylinder core pin (4) and which are oriented in the longitudinal direction of the key way (7), wherein at least two cylinder core pins (4) have sensing extensions (8) which are different from one another and which are arranged either centrally along the central longitudinal plane of the key way (7) or offset at a distance in parallel thereto on the left or right, said sensing extensions being provided for sensing milled incisions (17, 18) on the key narrow side(s) (15), characterised in that core pin bores which are arranged approximately parallel on at least one side of the key way (7) are provided, said core pin bores having resiliently pretensioned core pins (6) which are displaceable therein, wherein the core pins (6) have sensing cams (9) protruding into the key way (7) and terminating at a distance from the central longitudinal plane, said sensing cams being provided for sensing milled incisions (16) on the edge(s) of the key narrow side(s) (15), wherein the distance of the sensing cams (9) from the central longitudinal plane is greater than the distance of the sensing extensions (8) of the cylinder core pins (4) arranged offset to the left or right of the central longitudinal plane, wherein in the longitudinal direction of the key way the sensing cams (9) are offset to a minimum

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relative to the respective adjacent sensing extension (8).

2. The cylinder lock according to claim 1, characterised in that the core pins (6) comprise at least one release groove (10) on the flanks thereof remote from the key way (7) for the engagement of a sensing spigot (11) of a locking element (12) and wherein the locking element (12) is assigned to a latching recess (13) of the cylinder housing (1).
3. The cylinder lock according to claim 1, characterised in that one respective row of core pins (6) having sensing cams (9) is provided on at least one side of the key way (7), wherein at least two, preferably five, core pins (6) having sensing cams (9) are arranged in a row on one side of the key way (7).
4. The cylinder lock according to claim 1 or 2, characterised in that at least one cylinder core pin (4) and a core pin (6) having sensing cams (9), preferably two core pins (6) having sensing cams (9), are arranged in the region of a sensing position (19), whereby the lock is designed such that in the region of this position at least two, preferably three, milled incisions (16, 17, 18) are able to be sensed on the key narrow side(s) (15).
5. The cylinder lock according to one of claims 1 to 3, characterized in that the sensing extensions (8) of the cylinder core pins (4) are configured as projections which are able to be arranged at a normal distance, parallel to the central

longitudinal plane or centrally along the central longitudinal plane.

6. The cylinder lock according to one of claims 1 to 5, characterized in that the cylinder core pins (4) have lateral extensions which are arranged in corresponding grooves in the cylinder core (2), whereby the twisting of the cylinder core pins (4) is prevented.
7. The cylinder lock according to one of claims 1 to 6, characterised in that the key way (7) at its insertion opening comprises a control chamfer (24) which is arranged at an angle which is greater than 0° and less than 90° to the vertical and which is designed to cooperate with control radii (25, 26) located on the key tip (23).
8. A flat key for a cylinder lock according to one of claims 1 to 7, wherein the flat key is preferably configured as a reversible key with two key flat sides (14) and two key narrow sides (15), and wherein the flat key has milled incisions (16, 17, 18) of variable depth on at least one key narrow side (15), preferably on two key narrow sides (15), and optionally further control surfaces, indentations or control tracks on the key flat sides (14), wherein in the transverse direction of the key narrow side at least three different milled incision regions are provided, wherein the milled incisions (16, 17, 18) are narrower than the key narrow side (15) and are arranged either centrally or at a normal distance parallel to the central longitudinal axis of the key, wherein in the region of a sensing position (19) at least three milled incisions (16, 17, 18) in the transverse direction of the key are arranged

adjacent to one another, characterised in that in the longitudinal direction of the key the sensing positions (19) of the milled incisions (16) located on the edge side are offset to one another to a minimum extent relative to the milled incisions (17, 18) located closer to the central longitudinal plane.

9. The flat key according to claim 8, characterised in that at least three, preferably five, milled incisions (16, 17, 18) are provided, said milled incisions being different from one another at their normal distance from the central longitudinal plane and optionally overlapping one another.
10. The flat key according to claim 9, characterised in that the milled incisions (16) located on the edge side are narrower in their width than the milled incisions (17, 18) located closer to the central longitudinal plane.
11. The flat key according to one of claims 8 to 10, characterised in that the milled incisions (16, 17, 18) have a control surface in the form of a circular arc portion.
12. The flat key according to one of claims 8 to 10, characterised in that at least one milled incision (17, 18) is covered to the side by two ribs (20) of the remaining key material.
13. The flat key according to one of claims 8 to 11, characterised in that a plurality of milled incisions (16), preferably five milled incisions, are arranged on an edge of the key narrow side in the form of a control cam.

14. The flat key according to claim 12, characterised in that the control cam of the milled incisions (16) located on the edge side has a lead-in chamfer (21) on the key tip which has a greater angle relative to the longitudinal axis than the lead-in chamfer (22) of the control surfaces located closer to the central longitudinal plane, and in that the end thereof on the key tip side is located in the vicinity of the longitudinal axis of the key.

15. The flat key according to one of claims 8 to 14, characterised in that control radii (25, 26) are provided on the key tip (23), said control radii being designed to cooperate with a control chamfer (24) at the insertion opening of the cylinder lock and thus improve the correct centring of the flat key during insertion.

Patentkrav

1. Cylinderlås med en cylinderkerne (2) og et hus (1), i hvilket der er tilvejebragt fjederbelastede tilholderstifter, der omfatter husstifter (3) og cylinderkernestifter (4), til registrering af indsnitsudfræsninger (17, 18), som er lokaliseret på nøglen, hvor cylinderkernestifterne (4) er
5 dannet på den ende, der rager ind i nøglekanalen (7), som registreringstappe (8), der er smallere end cylinderkernestiftens (4) diameter, og som er orienteret i nøglekanalens (7) længderetning, hvor mindst to cylinderkernestifter (4) har registreringstappe (8), der er forskellige fra hinanden, og som er anbragt enten centralt langs med nøglekanalens (7) længdemidterplan eller forskudt med en afstand parallelt dermed til venstre eller højre, idet
10 tapfremspringene er anbragt med henblik på registrering af indsnitsudfræsninger (17, 18) på nøglens smalle side(r) (15), hvilken cylinderlås er **kendetegnet ved, at** der tilvejebringes kernestiftudboringer, som er anbragt omtrent parallelt på mindst én side af nøglekanalen (7), idet kernestiftudboringerne har fjedrende forspændte kernestifter (6), der er forskydelige deri, hvor kernestifterne (6) har registreringskamme (9), der rager ind i nøglekanalen (7) og slutter i
15 en afstand fra længdemidterplanet, idet registreringskammene er tilvejebragt med henblik på at registrere indsnitsudfræsninger (16) på kanten(-erne) af nøglens smalle side(r) (15), hvor registreringskammenes (9) afstand fra længdemidterplanet er større end afstanden for registreringstappene (8) i cylinderkernestifterne (4), som er anbragt forskudt til venstre eller højre for længdemidterplanet, hvor registreringskammene (9) i nøglekanalens længderetning er
20 forskudt minimalt i forhold til den tilhørende nabostillede registreringstap (8).

2. Cylinderlås ifølge krav 1, der er **kendetegnet ved, at** kernestifterne (6) omfatter mindst én frigivelsesnot (10) på flankerne deraf fjernt fra nøglekanalen (7) til indgreb af en registreringsstyretap (11) i et spærreelement (12), og hvor spærreelementet (12) er placeret i
25 en indgrebsfordybning (13) i cylinderhuset (1).

3. Cylinderlås ifølge krav 1, der er **kendetegnet ved, at** der er anbragt én tilhørende række af kernestifter (6) med registreringskamme (9) på mindst én side af nøglekanalen (7), hvor der er anbragt mindst to, fortrinsvis fem, kernestifter (6) med registreringskamme (9) i en række på én

side af nøglekanalen (7).

4. Cylinderlås ifølge krav 1 eller 2, der er **kendetegnet ved, at** der i området for en registreringsposition (19) er anbragt mindst én cylinderkernestift (4) og en kernestift (6) med en registreringskam (9), fortrinsvis to kernestifter (6) med registreringskamme (9), hvorved låsen er udformet således, at der i området for denne position kan registreres mindst to, fortrinsvis tre, indsnitsudfræsninger (16, 17, 18) på nøglens smalle side(r) (15).
5. Cylinderlås ifølge et af kravene 1 til 3, der er **kendetegnet ved, at** registreringstappene (8) på cylinderkernestifterne (4) er konfigureret som fremspring, der kan anbringes i en normal afstand, parallelt med længdemidterplanet eller centralt langs med længdemidterplanet.
6. Cylinderlås ifølge et af kravene 1 til 5, der er **kendetegnet ved, at** cylinderkernestifterne (4) har laterale tappe, som er anbragt i tilsvarende noter i cylinderkernen (2), hvorved fordrejning af cylinderkernestifterne (4) forhindres.
7. Cylinderlås ifølge et af kravene 1 til 6, der er **kendetegnet ved, at** nøglekanalen (7) ved sin indskydningsåbning omfatter en styreskråkant (24), som er anbragt i en vinkel, der er større end 0° og mindre end 90° i forhold til vertikalen, og som er udformet til at samvirke med styreradier (25, 26), som er lokaliseret på nøglespidsen (23).
8. Fladnøgle til en cylinderlås ifølge et af kravene 1 til 7, hvor fladnøglen fortrinsvis er konfigureret som en vendnøgle med to flade nøglesider (14) og to smalle nøglesider (15), og hvor fladnøglen har indsnitsudfræsninger (16, 17, 18) med variabel dybde på mindst én smal nøgleside (15), fortrinsvis på to smalle nøglesider (15), og valgfrit endvidere styreflader, indskæringer eller styrebaner på nøglens flade sider (14), hvor der i tværetningen af nøglens smalle side er anbragt mindst tre forskellige indsnitsudfræsningssområder, hvor indsnitsudfræsningerne (16, 17, 18) er smallere end nøglens smalle side (15) og er anbragt enten centralt eller i en normal afstand parallelt med nøglens længdemidterakse, hvor der i

området for en registreringsposition (19) er anbragt mindst tre indsnitsudfræsninger (16, 17, 18) i nøglens tværretning nabostillet med hinanden, hvilken fladnøgle er **kendetegnet ved, at** registreringspositionerne (19) for indsnitsudfræsningerne (16), som er lokaliseret på kantsiden, i nøglens længderetning er forskudt minimalt for hinanden i forhold til de
5 indsnitsudfræsninger (17, 18), som er lokaliseret tættere på længdemidterplanet.

9. Fladnøgle ifølge krav 8, der er **kendetegnet ved, at** der er tilvejebragt mindst tre, fortrinsvis fem, indsnitsudfræsninger (16, 17, 18), idet indsnitsudfræsningerne er forskellige fra hinanden i deres normale afstand fra længdemidterplanet og valgfrit overlapper hinanden.

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10. Fladnøgle ifølge krav 9, der er **kendetegnet ved, at** de indsnitsudfræsninger (16), som er lokaliseret på kantsiden, er smallere i deres bredde end de indsnitsudfræsninger (17, 18), som er lokaliseret tættere på længdemidterplanet.

15 11. Fladnøgle ifølge et af kravene 8 til 10, der er **kendetegnet ved, at** indsnitsudfræsningerne (16, 17, 18) har en styreflade i form af en cirkelbuedel.

12. Fladnøgle ifølge et af kravene 8 til 10, der er **kendetegnet ved, at** mindst én indsnitsudfræsning (17, 18) er tildækket på siden af to ribber (20) af det tilbageværende
20 nøglemateriale.

13. Fladnøgle ifølge et af kravene 8 til 11, der er **kendetegnet ved, at** der er anbragt en flerhed af indsnitsudfræsninger (16), fortrinsvis fem indsnitsudfræsninger, på en kant af nøglens smalle side i form af en styrekam.

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14. Fladnøgle ifølge krav 12, der er **kendetegnet ved, at** styrekammen i indsnitsudfræsningerne (16), som er lokaliseret på kantsiden, har en indføringsskråkant (21) på nøglespidsen, der har en større vinkel i forhold til længdeaksen end indføringsskråkanten (22) på de styreflader, som er lokaliseret tættere på længdemidterplanet, og **ved at** enden deraf på nøglespidsens side er

lokaliseret i nærheden af nøglens længdeakse.

- 5 **15.** Fladnøgle ifølge et af kravene 8 til 14, der er **kendetegnet ved, at** der er anbragt styreradier (25, 26) på nøglespidsen (23), hvilke styreradier er udformet til at samvirke med en styreskråkant (24) ved indskubningsåbningen i cylinderlåsen og således forbedre den korrekte centrering af fladnøglen under indskubningen.

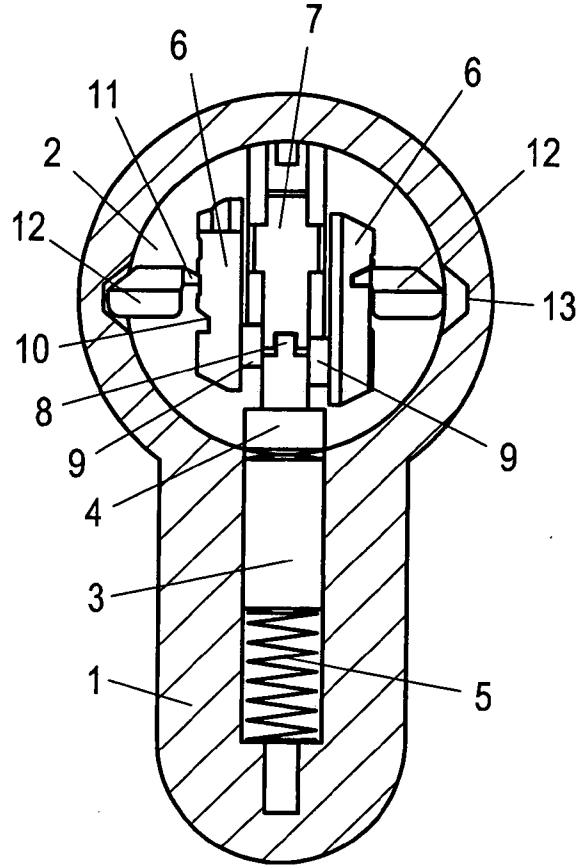


Fig. 1

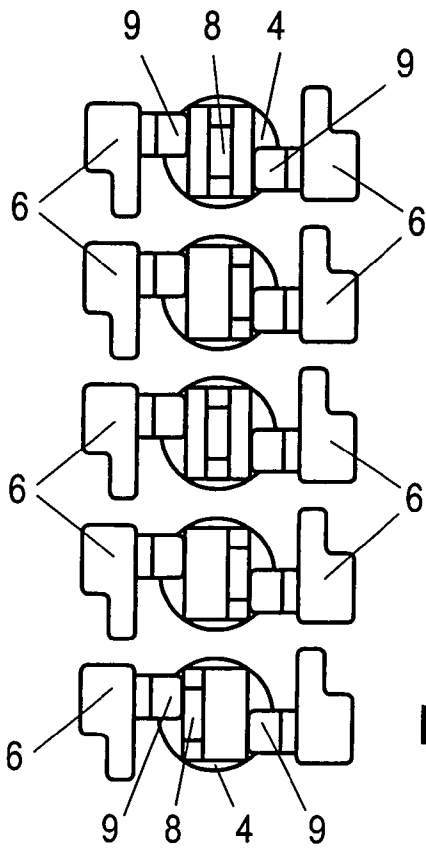


Fig. 2

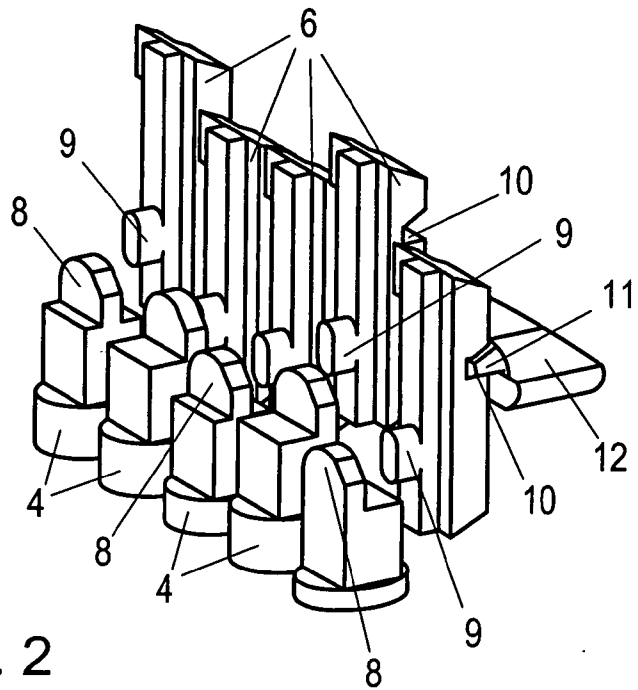


Fig. 3

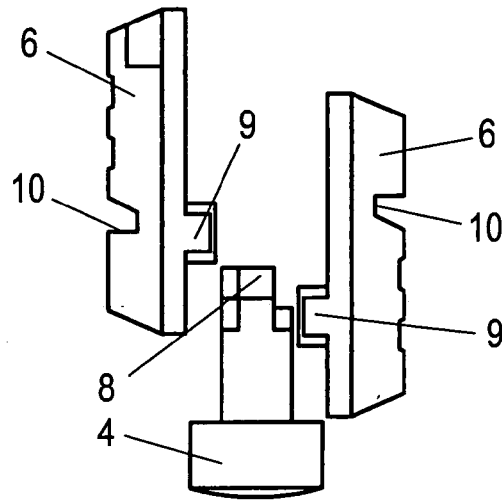


Fig. 4

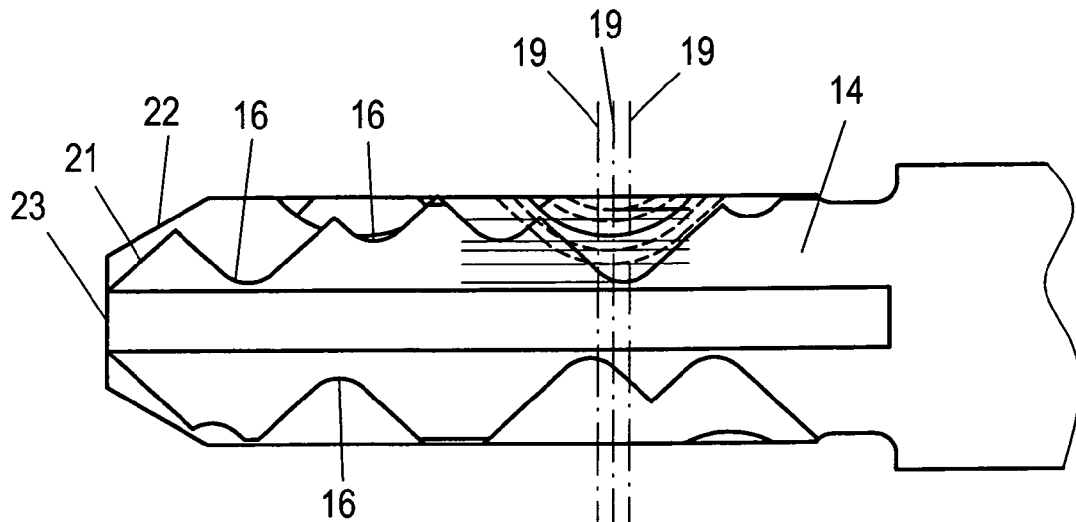


Fig. 5

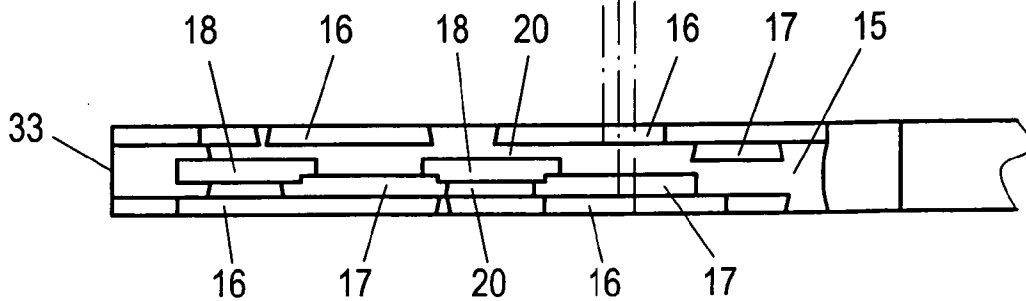


Fig. 6

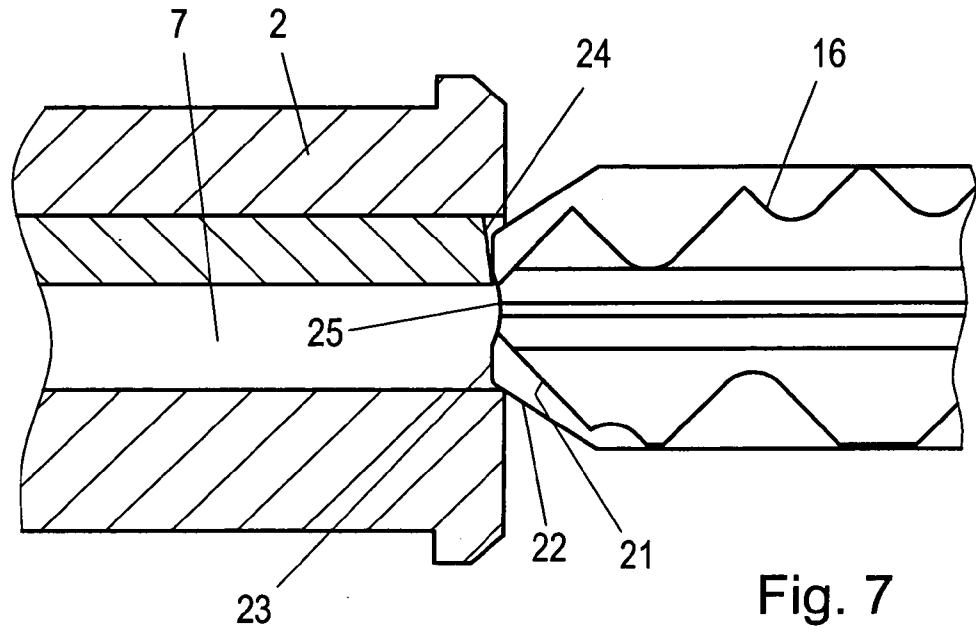


Fig. 7

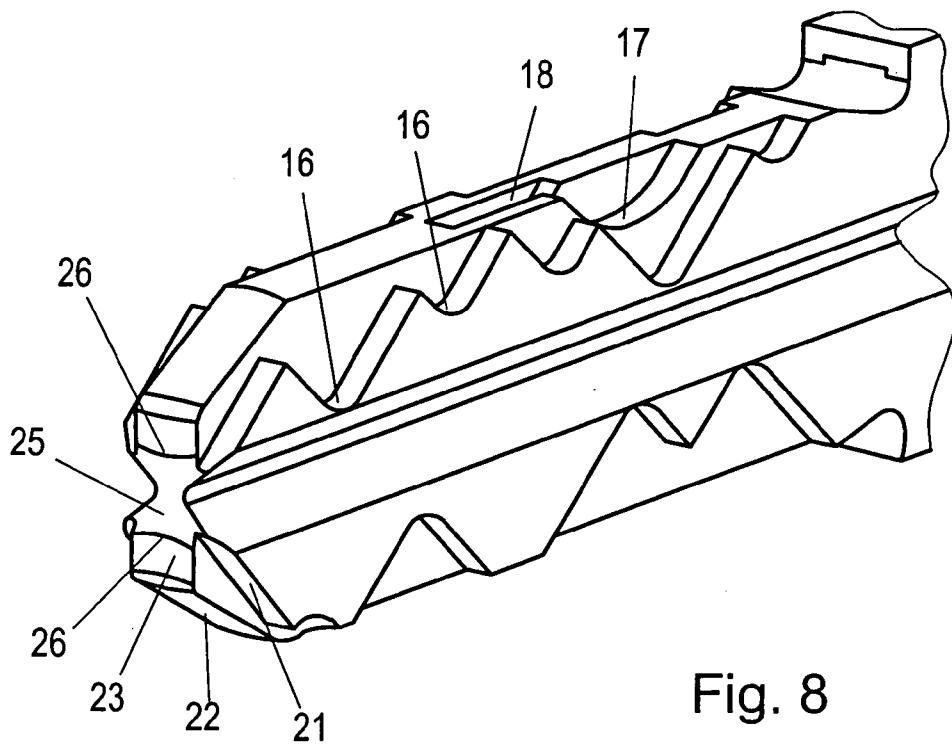


Fig. 8