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(54) **SYSTEM FOR CLOSING A CYLINDER INSERT, KEY FOR THE SYSTEM AND BLANK KEY INTENDED FOR MAKING SUCH A KEY**

(57) The invention provides a system for closing a cylinder insert, a key for the system and a blank key intended for making an target key or duplicates thereof. The system for closing a cylinder insert comprises a key 1 and a cylinder insert 2. A second end 32 of a locking element 3 and a guiding channel 14 which has the form of an undercut groove, form a matchingly shaped slideable connection. The parallel longitudinal lines that define the profile of the second end 32 of the locking element 3 are inclined at an angle β , different than 0° relative to the

insertion direction of the key 1, and the parallel longitudinal lines that define the guiding channel profile 14 made in the shank 12 of the key 1 are inclined at an angle α , different than 0° relative to the insertion direction of the key 1, and the angles α and β are in the same plane and may have various values, and only in the case when $\alpha = \beta$ it is possible to insert the key 1 into the key channel 23 of the cylinder insert 2 to the full depth and to unlock the locking element 3.

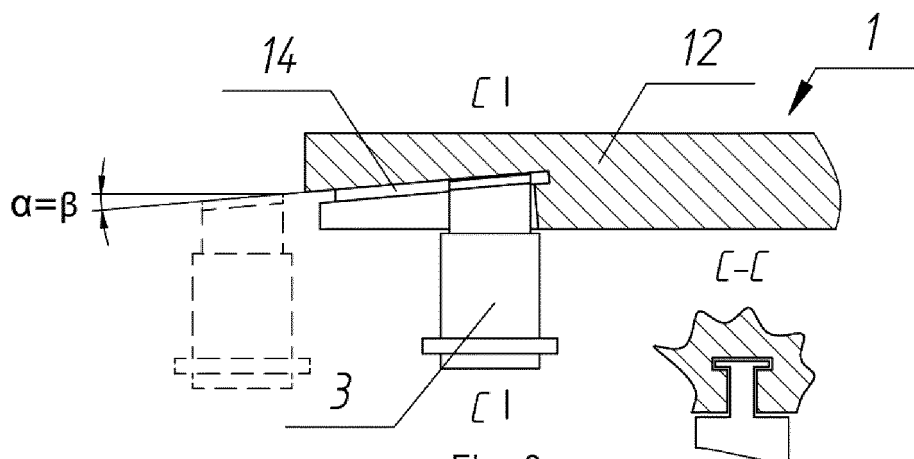


Fig. 8

Description

[0001] The invention provides a system for closing a lock cylinder insert, a key for the system and a blank key to be used for making the actual key or duplicates thereof.

[0002] German patent specification DE 3225952 A1 discloses a key and a lock with a cylinder insert in a locking system for protecting against the use of a duplicated key. In the solution, rotation of the cylinder is possible when a pin of an additional locking element positioned in the rotary core of the cylinder insert is moved by the key. Direction of movement of the locking element of the cylinder core is perpendicular to the plane of the movement of the driver pins. The locking element is supported within the cylinder by a spring that biases it towards the surface of the rotary cylinder. In order to control the movement of the pin of the locking element, a flat key has on its wide side a cavity, open towards its tip. The cavity is designed as a channel with a dove tail shaped cross-section that matches the cross-sectional profile of the head of the locking element for the cylinder core.

[0003] Document US 5819566 A discloses a solution concerning a key and a door lock with a protection system against unauthorized duplication of the key. The side of the shank of the key, facing the head of an auxiliary pin, is provided with a longitudinal slot of a variable depth and having a shape of a dovetail. The slot has a shape that is complementary to the head of the pin. Opening in the shank of the key, extending longitudinally from the tip of the shank, has a slot which acts as a receiving groove into which a plug is clearance-fitted, said plug being defined by the head portion of the auxiliary locking pin. The slot, in particular the surface of the receiving groove, that is to cooperate with the reaction surface of the auxiliary locking pin, has an initial depth which ensures that the head that always protrudes into the receiving groove will be positioned within the slot. The slot also comprises, in the disclosed embodiment, a ramp section where the slot deviates from its initial depth to its maximum functional depth which exceeds the depth of the recess. Therefore, when the blade of the key is inserted into the groove, a section of the slot receives and catches the head of the auxiliary pin and the cooperating surfaces of the plug will adjoin each other.

[0004] Document WO 1116920 A1 discloses a lock system with a key and a lock cylinder which has a lock core mounted within a housing with a channel for the key to be inserted, with multiple pawls it may act onto and which are arranged, in particular, transversely or obliquely to the direction in which the key is inserted. The end of the additional locking element protruding into the key channel, as well as the key shank, are designed so that they define a reciprocal shaped connection for affixing the position of the additional locking element when the key is fully inserted. In order to provide protection against unauthorized duplication, the key shank has a milled undercut groove which begins at the key tip and extends in the longitudinal direction of the key shank. Additionally,

in the cylinder core a spring-loaded locking element is arranged which enters the groove in the key shank when the key is being inserted into the lock. By means of the undercut groove at the side of the key and complementarily shaped pin it is possible to implement easily a shaped connection for fixing the position of the additional locking element. The undercut groove in the key shank may be shaped as a groove with a shape of a dovetail and a T-shaped groove, since grooves of this kind may be relatively easily machined in the key shank in a manufacturing plant environment.

[0005] As it may be seen from the above discussed prior art documents, in known configurations of this kind, the additional locking elements are special pins of the insert core which, when the key is put into the insert, enter side cavities formed as an undercut groove provided in the key, and this causes unlocking of the insert. In turn, opening of the insert without such undercut groove is impossible. Making of such an undercut groove in a key is difficult when commercially available devices for duplicating keys are used. This provides additional protection against unauthorized duplication of keys, as the manufacturer of inserts may decide who is going to be given access to blank keys with the undercut groove.

[0006] The solutions described in the prior art patent documents solely enable providing an additional safety feature to protect the cylinder insert against unauthorized opening with a key without the undercut groove. Nevertheless, these solutions do not enable providing a coding system to allow, along with locking the cylinder insert, for developing an additional coding system for the cylinder insert and a key that broadens the number of combinations available.

[0007] It is the object of the invention to provide a solution for a set of a key and cylinder insert, comprising an additional locking element that makes it impossible to open the cylinder insert with the use of a key without the undercut groove and at the same time offers a new kind of solution providing additional coding of the cylinder insert and key to increase the number of combinations available.

[0008] It is also the object of this invention to provide a solution for a set of a key and insert, in particular for opening and closing a lock, to enable access to protected areas, such as a door lock, padlock and the like, to enable offering a new system for coding locking elements in the set of the cylinder insert and key intended to enhance safety of protected facilities.

[0009] It is the purpose of this invention to provide a key for a cylinder insert of the required kind, with a higher safety value.

[0010] It is the object of this invention to develop a solution for a blank key, in particular for opening and closing a lock to enable access to protected areas, such as a door lock, padlock and the like, and providing a new solution for a key to make unauthorized duplication thereof difficult and thus providing better safety of protected facilities.

[0011] According to the first invention, a system for closing a cylinder insert comprises a key which has a head and a shank, of a cross-section included in a contour similar to a rectangle, and the two short sides of the rectangle form, along the length of the key, two side faces of the key shank. The key is provided with a blade with coding cut-outs for interaction with the lockable striker elements in the cylinder lock. On the key shank, at the opposite side to the head of the key, a guiding channel is formed which is open outwards, onto one of the side faces of the key.

[0012] System for closing a cylinder insert further comprises a cylinder insert which has, positioned in the cylinder insert body, a rotary core with a key channel arranged for inserting a key into it in order to unlock the cylinder insert and enable opening of the lock in which the cylinder insert is positioned. Into the key channel, from the rotary core, strikers protrude which comprise at least core pins protruding into the key channel and body pins positioned within the cylinder insert body and supported by springs. Strikers are controlled by cut-outs in the key blade. In the rotary body of the cylinder insert a locking element is arranged that may slide at an angle, in particular 90° , relative to the direction in which the key is inserted.

[0013] The first end of the locking element, positioned at a side of the cylinder insert body, becomes locked within a cavity in the cylinder insert body due to the action of a spring.

[0014] The second end of the locking element protrudes into the key channel and is shaped so that its cross-section corresponds to the cross-section of a guiding channel made in the key shank. The guiding channel begins at the end of the key that adjoins the head of the key and extends along the longitudinal direction of the key shank.

[0015] The second end of the locking element and the guiding channel define a matching connection which is linearly slidable in parallel, to enable linear movement of the second end of the locking element along the longitudinal axis of the guiding channel, but not to allow movement of the second end of the locking element transversely or angularly relative to the longitudinal axis of the guiding channel.

[0016] Parallel longitudinal lines that define the profile of the second locking element are inclined at an angle β , different than 0° , relative to the key insertion direction, and parallel longitudinal lines that define the profile of the guiding channel made in the key shank are inclined at an angle α , different than 0° , relative to the key insertion direction, where the angles α and β are in the same plane and may have various values. Insertion of the key into the key channel of the cylinder insert to the full depth to enable unlocking of the locking element is possible only when $\alpha = \beta$. When the angles α and β are not equal, then the key becomes locked within the key channel and this makes it impossible to insert it to the full depth and does not allow for unlocking of the locking element, and more-

over this prevents positioning of the coding cut-outs on the key blade so that to enable, through proper positioning of the strikers, unlocking of the rotary core relative to the cylinder insert body.

[0017] The angle α , at which the longitudinal lines that define the guiding channel profile in the key shank are inclined, and the angle β , at which the longitudinal lines that define the second locking element end profile, may have various values and they may change suitably to the way in which the cylinder insert and the key are completed, which may constitute a coding element for the key and insert.

[0018] The key in which the longitudinal lines that define the guiding channel profile are inclined at some other angle than the one of the longitudinal lines that define the second locking element end profile will not allow for unlocking of the cylinder insert.

[0019] Preferably, the angle α , at which the longitudinal lines that define the guiding channel profile in the keys shank are inclined is within the range of 20 to 200.

[0020] Also preferably, the angle β , at which the longitudinal lines that define the second locking element end profile are inclined is within the range of 20 to 200.

[0021] The angles α and β , in the system for closing a cylinder insert, may have various values and be implemented incrementally where the increments result from the obtainable precision with which the elements of the system are manufactured. It may be assumed that these elements, at the current level of technology, may be manufactured with an accuracy of 0.01 mm. Therefore, between the individual levels of manufacture of the elements, these angles α and β may have values, for example, every 1° to 3° . This makes it possible to obtain at least seven different values thereof. This means that six of seven keys with different angles α will not fit the locking element with a specific angle β . This also means that thanks to the locking element according to the invention the available number of key and insert combinations may increase seven times with a given configuration of strikers, and this is of particular interest when building so called master systems.

[0022] According to the second invention, a key for a lock cylinder insert has a head and a shank with two side faces. The key is provided with a blade with coding cut-outs. On the key shank, at the side opposite to the key head, a guiding channel is formed which is open outwardly onto one of the side faces of the key shank. The guiding channel begins at the end of the key opposite to the head and extends along the longitudinal direction of the key shank. The guiding channel has a form of an undercut groove, the parallel longitudinal lines of which, that define the guiding channel profile formed in the key shank, are inclined at an angle α different than 0° relative to the key insertion direction. The term "undercut groove" should be understood as a groove made in a material, where the width of the groove in the cross-section within the material is greater than at its edge.

[0023] Preferably, the guiding groove, having a form

of an undercut groove, has a dovetail shape in cross-section.

[0024] Also preferably, the guiding groove, having a form of an undercut groove, has a T-shaped groove cross-section.

[0025] Further preferably, the angle α at which the longitudinal lines that define the guiding channel profile are inclined relative to the longitudinal axis of the key shank where the axis is parallel to the key insertion direction is within the range of 2° to 20° .

[0026] Still further preferably, the plane in which the angle α lies is parallel to the key insertion direction and perpendicular to the side face of the key in which the guiding channel is formed.

[0027] Also preferably, the guiding channel is formed in the side face of the key shank, in a groove constituting a portion of the key profile. Key profile should be understood as a shape of the cross-sectional shape of the key shank, in the case when the side faces of the key shank longitudinal grooves are formed that correspond to the shape of the key channel in the rotary core.

[0028] According to the third invention, a blank key for a lock cylinder insert has a head and a shank with two side faces. Coding cut-outs are made during duplication of the key ordered by an authorized person. On the shank of the blank key, at the side opposite to the blank key head, a guiding channel is formed open outwards to one of the side faces of the blank key shank. The guiding channel begins at the end of the blank key opposite to its head and extends along the longitudinal direction of the blank key shank. The guiding channel has a form of an undercut groove and the parallel longitudinal lines of which, that define the guiding channel profile formed in the blank key shank, are inclined at an angle α different than 0° , relative to the blank key insertion direction.

[0029] Preferably, the guiding groove, having a form of an undercut groove, has a dovetail shape in cross-section.

[0030] Also preferably, the guiding groove, having a form of an undercut groove, has a T-shaped groove cross-section.

[0031] Further preferably, the angle α at which the longitudinal lines, that define the guiding channel profile, are inclined relative to the longitudinal axis of the blank key shank is within the range of 2° to 20° .

[0032] Still further preferably, the plane in which the angle α lies is parallel to the blank key insertion direction and perpendicular to the side face of the blank key in which the guiding channel is formed.

[0033] Also preferably, the guiding channel is formed in a side face of the blank key shank, in a groove that constitutes a portion of the blank key profile.

[0034] The object of the invention is shown in an embodiment in the drawing wherein:

Fig. 1 shows a portion of a key in a side view.

Fig. 1a shows a portion of a blank key in a side view.

Fig. 2 shows a portion of a key in cross-section along line A-A of fig. 1.

Fig. 3 shows a portion of a key in cross-section along line B-B of fig. 1 in a first embodiment.

Fig. 3a shows a portion of a key in cross-section along line B-B of fig. 1 in a second embodiment.

Fig. 3b shows a portion of a key in cross-section along line B-B of fig. 1 in a third embodiment.

Fig. 4 shows a portion of a cylinder insert and a key before the latter is inserted into the key channel, in a longitudinal section through the key channel.

Fig. 5 shows a portion of a cylinder insert and a key before the latter is inserted into the key channel, in a longitudinal section through the key.

Fig. 6 shows a locking element in a perspective side view.

Fig. 7 shows a locking element in a side view.

Fig. 8 shows a locking element with the key shank slid over, in a cross-section, for the angles $\alpha = \beta$ with a cross-section of the guiding channel along line C-C.

Fig. 9 shows a locking element with the key shank slid over, in cross-section, for the angles $\alpha \neq \beta$.

Fig. 10 shows angles of implementation of the angle α of various values in the key shank.

Fig. 11 shows a portion of the key shank in a perspective view, with a guiding channel formed in a groove that constitutes a portion of the key profile.

Fig. 12 shows a key in a perspective view at the side of the end opposite to the head, with a broken-out section to show a locking element and a guiding channel formed in a groove constituting a portion of the key profile.

[0035] As shown exemplarily in the embodiment of the invention in fig. 4, a cylinder insert 2 has a rotary core 22, positioned within a body 21 of the cylinder insert 2, with a key channel 23 intended for insertion of a key 1. Into the key channel 23 strikers 25 protrude, when in the key channel 23 there is no key 1 inserted. The strikers 25 comprise at least core pins 25a and body pins 25b supported by springs 26, that force the strikers 25 towards the axis of the rotary core. The strikers 25 are controlled by cut-outs in the blade 13 of the key 1. The cut-outs of the proper key 1, suitable to cooperate with the cylinder insert 2 position the core pins 25a and the

body pins 25b of the strikers 25 in the line of division between the body 21 and the rotary core 22. The division line between the core pins 25a and the body pins 25b in this situation enables rotation of the rotary core 22 relative to the body 21 of the cylinder insert 2 of the lock in which it is positioned and enables unlocking or locking of the latter. The cylinder insert 2 also comprises a driver 24 positioned on the rotation axis of the rotary core 22 and interacting with the mechanism of the lock in which the cylinder insert 2 is seated.

[0036] In the rotary core 22 a locking element 3 is arranged that may slide angularly relative to the insertion direction of the key 1, as shown in the embodiment of the invention illustrated in fig. 5. The direction of sliding movement of the locking element 3 is perpendicular to the insertion direction of the key 1 in the embodiment of the invention shown in fig. 5. But it is clear that in other embodiments of the invention it may extend at a different angle.

[0037] As shown in fig. 5, fig. 6, and fig. 7, locking element 3 has a first end 31 positioned at the side of the body 21 of the cylinder insert 2, which locks in a cavity 28 in the body 21 of the cylinder insert 2 due to the operation of a spring 4.

[0038] The locking element 3 also has a second end 32, positioned at the opposite side of the locking element 3. The second end 32 of the locking element 3 protrudes into the key channel 23.

[0039] The second end 32 of the locking element 3 is shaped so that its cross-section corresponds to the cross-section of the guiding channel 14 formed in the shank 12 of the key 1. The guiding channel 14 begins with the end of the key 1 opposite to the head 11 of the key 1 and extends along the longitudinal direction of the shank 12 of the key 1. The second end 32 of the locking element 3 and the guiding channel 14 define a matchingly shaped linearly parallel and slideable connection to enable linear movement of the second end 32 of the locking element 3 along the longitudinal axis of the guiding channel 14, but does not allow for movement of the second end 32 transversely or angularly relative to the longitudinal axis of the guiding channel 14.

[0040] As shown in fig. 1 and fig. 1a, in an embodiment of the invention, a key 1 and a blank key 100 have heads 11, 111 and shanks 12, 112 each with two side faces 10, 110. In the side faces longitudinal grooves may be present 10a, as shown in fig. 11. Similar grooves may be also formed in the side faces 110 of the blank key 100. Longitudinal grooves 10a have a function of diversifying the key profiles (their cross-section) and making inserting of an improper key 23 into the key channel difficult.

[0041] The key 1 is provided with a blade 13 with coding cut-outs. Blank key 100, shown in the embodiment of the invention illustrated in fig. 1a, is analogously constructed as the key 1, and thus it comprises a head 111 and a shank 112 and the only difference consists on that in the blade 113 of the blank key 100 no coding cut-outs are made.

[0042] On the shank 12 of the key 1 and on the shank 112 of the blank key 100 at the side opposite to the head 11, 111 of the key 1 and the blank key 100 guiding channels 14, 114 are formed that open outwards onto one of the side faces 10, 110 of the shank 12, 112 of the key 1 and the blank key 100. The guiding channels 14, 114 begin at the ends of the key 1 and blank key 100 opposite to their heads 11, 111 and extend along the longitudinal direction of the shanks 12, 112 of the key 1 and the blank key 100. The guiding channel 14, 114 has a form of an undercut groove the parallel longitudinal lines of which, that define the guiding channel profile 14, 114 made in the shank 12, 112 of the key 1 and the blank key 100, are inclined at an angle α different than 0° , relative to the insertion direction of the key 1 and of the blank key 100, as shown in the embodiment according to fig. 2.

[0043] As shown in fig. 3, fig. 3a, and fig. 3b, the guiding channel 14, 114 may have various cross-sectional shapes.

[0044] In fig. 3 an embodiment of the invention can be seen wherein the guiding channel 14, 114 in a form of an undercut groove has a cross-section of a T-shaped groove.

[0045] In fig. 3a an embodiment of the invention can be seen wherein the guiding channel 14, 114 in a form of an undercut groove has a cross-section of a dovetail shape.

[0046] In fig. 3b an embodiment of the invention can be seen wherein the guiding channel 14, 114 in a form of an undercut groove has a cross-sectional shape of a wheel opened with a slot outside the shank 12, 112 of the key 1 and the blank key 100.

[0047] The second end 32 of the locking element 3 and the guiding channel 14 in the shank 12 of the key 1 define a matchingly shaped, linearly parallel slidable connection, and the parallel longitudinal lines that define the profile of the second end 32 of the locking element 3 are inclined at an angle β , different than 0° , relative to the key insertion direction 1, as shown in the embodiment of the invention illustrated in fig. 7 and fig. 8.

[0048] The longitudinal lines that define the guiding channel profile 14 made in the shank 12 of the key 1 are inclined at an angle α , different than 0° , relative to the key insertion direction 1, as shown in fig. 2, fig. 8 fig. 9, and fig. 10.

[0049] The angles α and β are positioned in the same plane and they may have different values, and solely in the case when $\alpha = \beta$ it is possible to insert the key 1 into the key channel 23 of the cylinder insert 2 to the full depth and to unlock the locking element 3. Such embodiment of the invention is shown in fig. 8.

[0050] Fig. 9 shows an embodiment of the invention in which the angle α is smaller than the angle β . In this case it is not possible to insert the key 1 into the key channel 23 of the cylinder insert 2 to the full depth. It should be clear that this does not mean that the two details, namely, the cylinder insert 2 and the key 1, are incorrectly manufactured, but it solely indicates that they do not match

and with this pair: key-insert it is not possible to unlock the insert.

[0051] Fig. 10 shows embodiments of the invention with different angles $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ through α_n , at which the profile of the guiding channel 14 may be made. Similarly, at analogous angles $\beta_1, \beta_2, \beta_3, \beta_4$, and β_n the profile of the second end 32 of the locking element 3 should be made to provide a coding system of a key 1 and locking element 3 in the cylinder insert 2. A key 1 with a profile of the guiding channel 14 inclined at some other angle, for example, α_3 , will match the locking element 3 with the profile of the second end 32 formed at the angle β_3 , and it will be clear that $\alpha_3 = \beta_3$.

Claims

1. A system for closing a cylinder insert comprising a key (1) and a cylinder insert (2), wherein the key (1) has a head (11) and a shank (12), the cross-section of which is contained within a contour of a rectangle, with two side surfaces (10), provided with a blade (13) with coding cut-outs, and on the shank (12) of the key (1), at the side opposite to the head (11) of the key (1), a guiding channel (14) is provided open outwards to one of the side faces (10) of the shank (12) of the key (1), beginning at the end of the key (1) opposite to the head (11) of the key (1) and extending along the longitudinal direction of the shank (12) of the key (1), and the cylinder insert (2) has, in the body (21) of the cylinder insert (2), a rotary core (22) with a key channel (23) intended for insertion of the key (1), and into the key channel (23) strikers (25) protrude, comprising at least core pins (25a) and body pins (25b) supported by springs (26), the strikers (25) being controlled by cut-outs in the blade (13) of the key (1), and in the rotary core (22) a locking element (3) is arranged which may slide approximately perpendicularly to the insertion direction of the key (1), and a first end (31) of the locking element (3) is locked within a cavity (28) in the body (21) of the cylinder insert (2), while a second end (32) of the locking element (3) that protrudes into the key channel (23) is shaped so that its cross-section corresponds to the cross-section of the guiding channel (14) made in the shank (12) of the key (1), **characterized in that** the second end (32) of the locking element (3) and the guiding channel (14) define a matchingly shaped, parallel linearly slidable connection that enables linear movement of the second end (32) of the locking element (3) along the longitudinal axis of the guiding channel (14), but prevents movement of the second end (32) transversely or angularly relative to the longitudinal axis of the guiding channel (14), wherein the parallel longitudinal lines that define the profile of the second end (32) of the locking element (3) are inclined at an angle β , different than 0° , relative to the insertion direction of the

key (1), while the parallel longitudinal lines that define the guiding channel profile (14) made in the shank (12) of the key (1) are inclined at an angle α , different than 0° , relative to the insertion direction of the key (1), and the angles α and β are in the same plane and may have various values, and solely in the case when $\alpha = \beta$ it is possible to insert the key (1) into the key channel (23) of the cylinder insert (2) to the full depth and to unlock the locking element (3).

2. The closing system according to claim 1, wherein the angle α is within the range of 2° to 20° .
3. The closing system according to claims 1 or 2, wherein the angle β is within the range of 2° to 20° .
4. The closing system according to any one claims 1-3, wherein the plane in which the angle α and the angle β are laid is parallel to the direction of insertion of the key (1) and perpendicular to the side face (10) of the key (1) in which the guiding channel (14) is made.
5. A key (1) for a lock cylinder insert (2), having a head (11) and a shank (12) with two side faces (10), provided with a blade (13) with coding-cut-outs, and on the shank (12) of the key (1), at the side opposite to the head (11) of the key (1) a guiding channel (14) is made that opens outwards to one of the side faces (10) of the shank (12) of the key (1), **characterized in that** the guiding channel (14) begins at the end of the key (1) opposite to its head (11) and extends along the longitudinal direction of the shank (12) of the key (1), and the guiding channel (14) has a form of an undercut groove and the parallel longitudinal lines thereof, that define the profile of the guiding channel (14) made in the shank (12) of the key (1), are inclined at an angle α different than 0° relative to the insertion direction of the key (1).
6. The key (1) for a lock cylinder insert (2) according to claim 5 wherein the guiding channel (14) having a form of and undercut groove has across-sectional shape of a dovetail or a T-shaped groove.
7. The key (1) for a lock cylinder insert (2) according to claims 5 or 6, wherein the angle α is within the range of 2° to 20° .
8. The key (1) for a lock cylinder insert (2) according to any one of claims 5-7 wherein the plane in which the angle α lies is parallel to the insertion direction of the key (1) and perpendicular to the side face (10) of the key (1) in which the guiding channel (14) is made.
9. The key (1) for a lock cylinder insert (2), according to any one of claims 5-8 wherein the guiding channel (14) is made in a longitudinal groove (10a), consti-

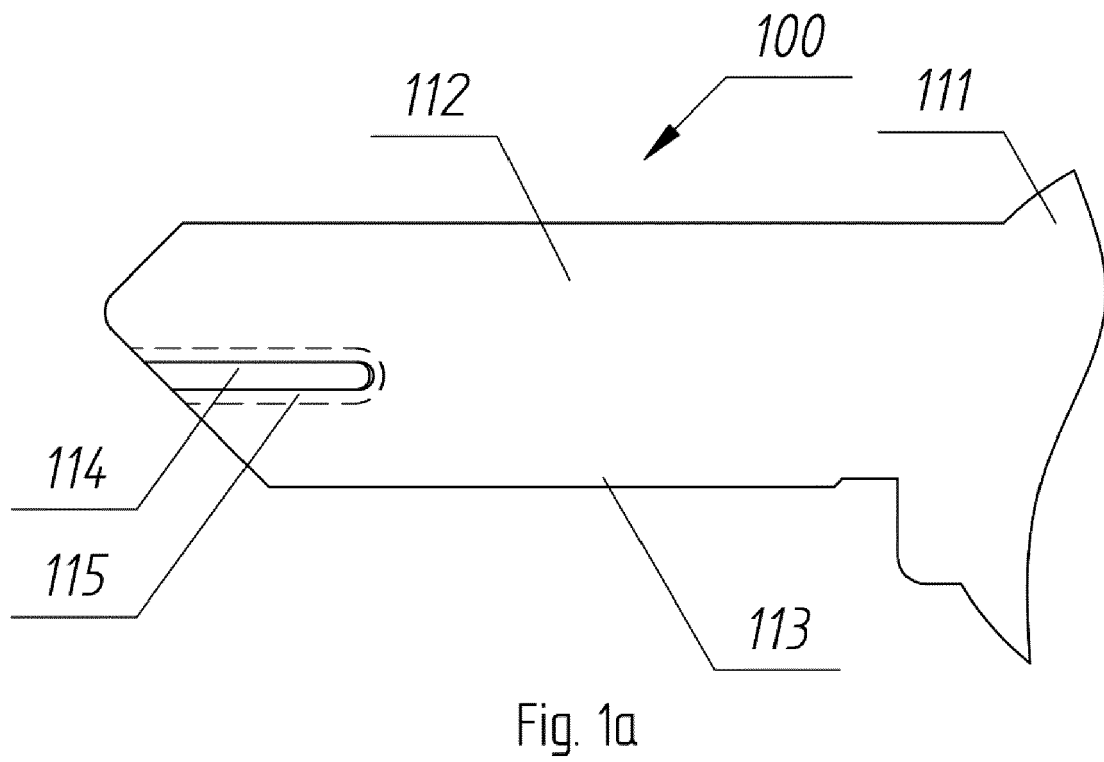
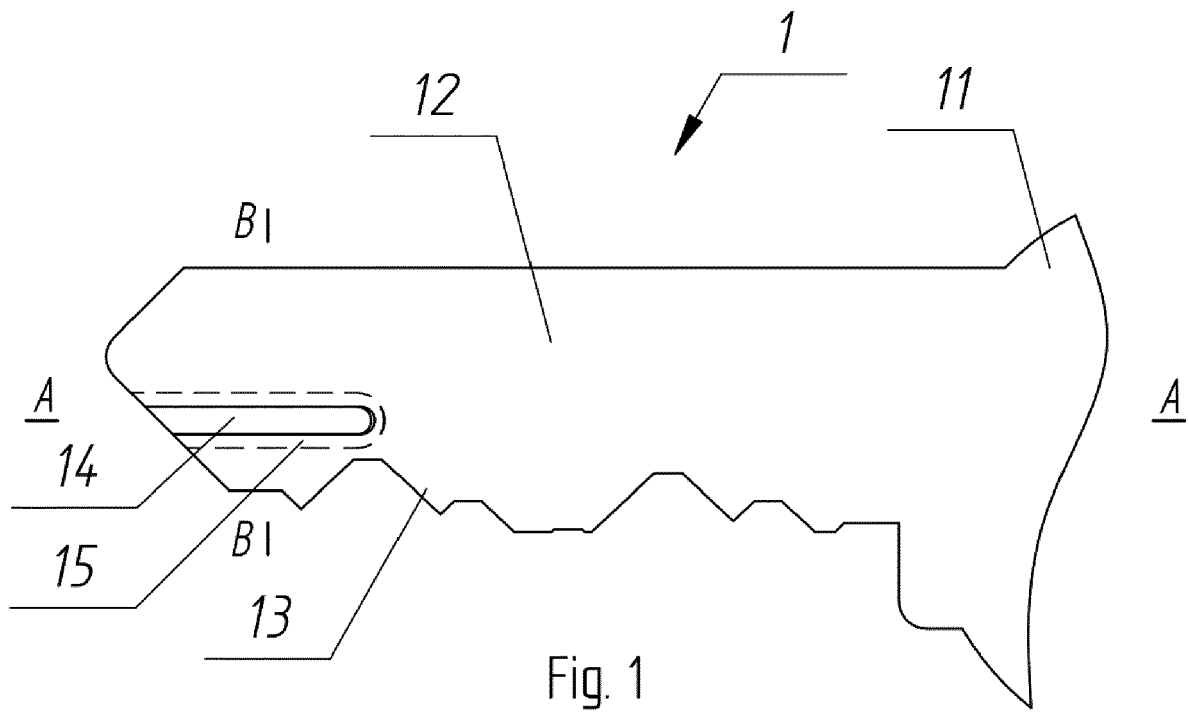
tuting a portion of the profile of the key (1).

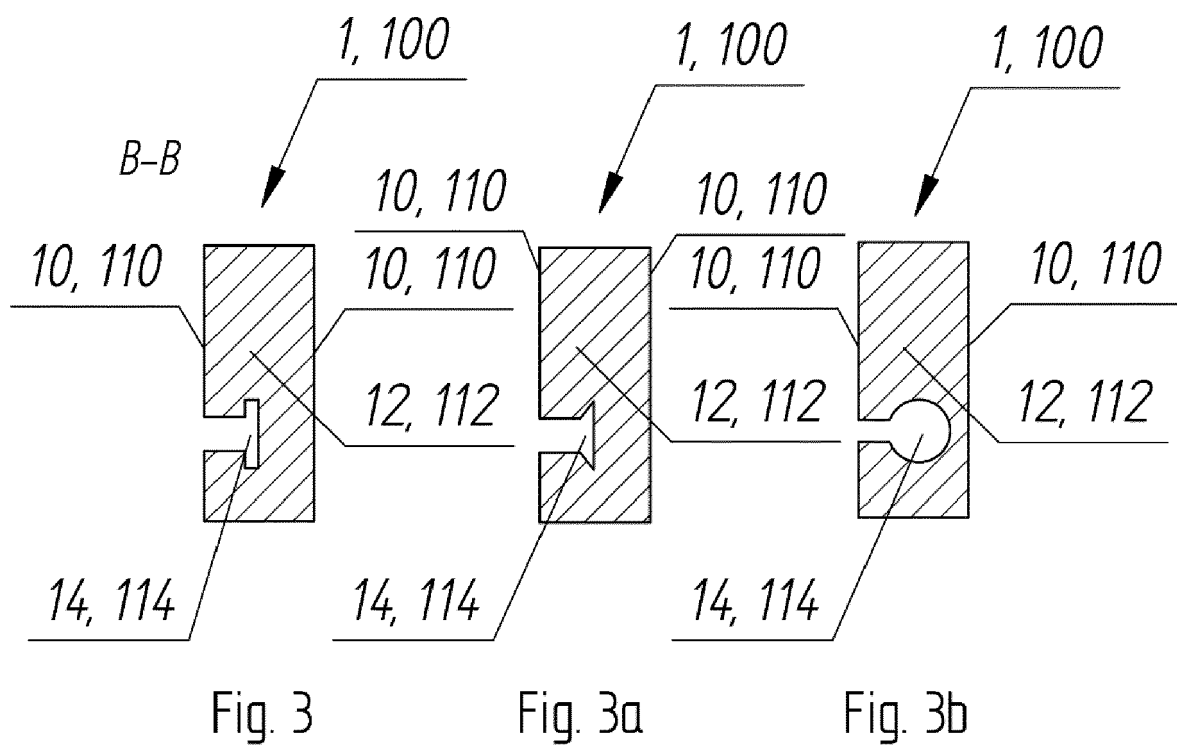
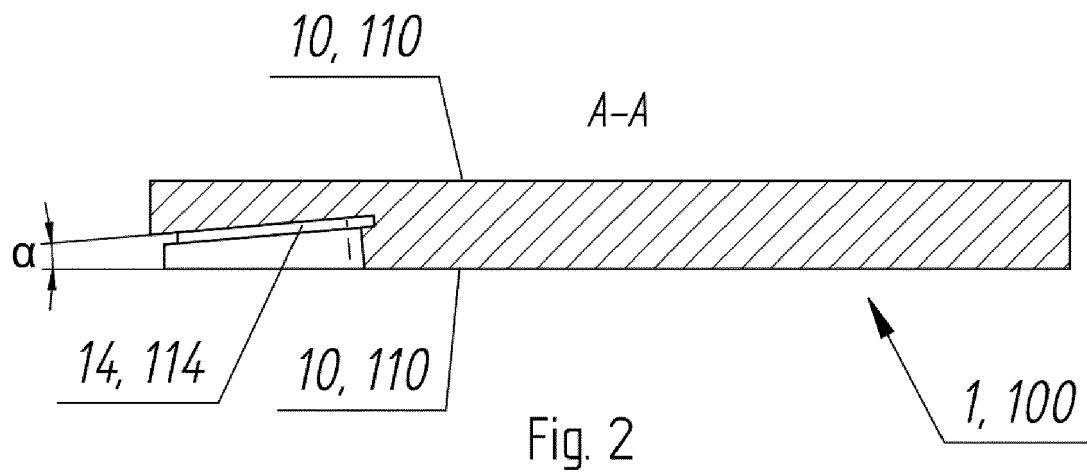
10. A blank key (100) for a lock cylinder insert (2), having a head (111) and a shank (112) with two side faces (110), provided with a blade (113) intended for providing coding-cut-outs, wherein on the shank (112) of the blank key (100), at the side opposite to the head (111) of the blank key (100), a guiding channel (114) is made that opens outwards to one of the side faces (110) of the shank (112) of the blank key (100), **characterized in that** the guiding channel (114) begins at the end of the blank key (100) opposite to its head (111) and extends along the longitudinal direction of the shank (112) of the blank key (100), and the guiding channel (114) has a form of an undercut groove and the parallel longitudinal lines thereof, that define the profile of the guiding channel (114) made in the shank (112) of the blank key (100), are inclined at an angle α different than 0° relative to insertion direction of the blank key (100).
11. The blank key (100) for a lock cylinder insert (2) according to claim 10 wherein the guiding channel (114) having a form of and undercut groove has across-sectional shape of a dovetail or a T-shaped groove.
12. The blank key (100) for a lock cylinder insert (2) according to claims 10 or 11 wherein the angle α is within the range of 2° to 20° .
13. The blank key (100) for a lock cylinder insert (2) according to any one of claims 10-12 wherein the plane in which the angle α lies is parallel to the insertion direction of the blank key (100) and perpendicular to the side face (110) of the blank key (100) in which the guiding channel (114) is made.
14. The blank key (100) for a lock cylinder insert (2) according to any one of claims 10-13 wherein the guiding channel (114) is made in a longitudinal groove that constitutes a portion of the profile of the blank key (100).

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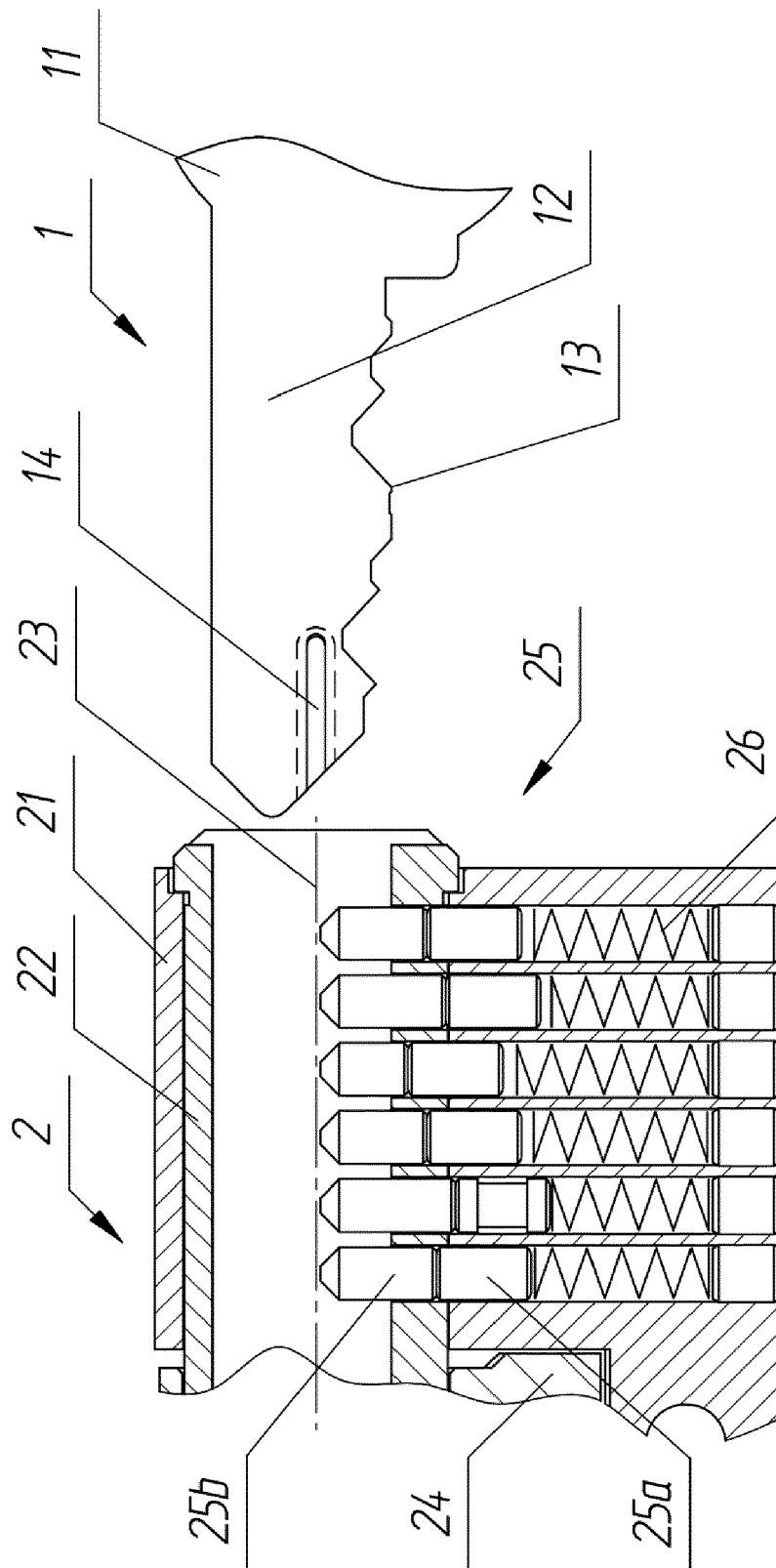
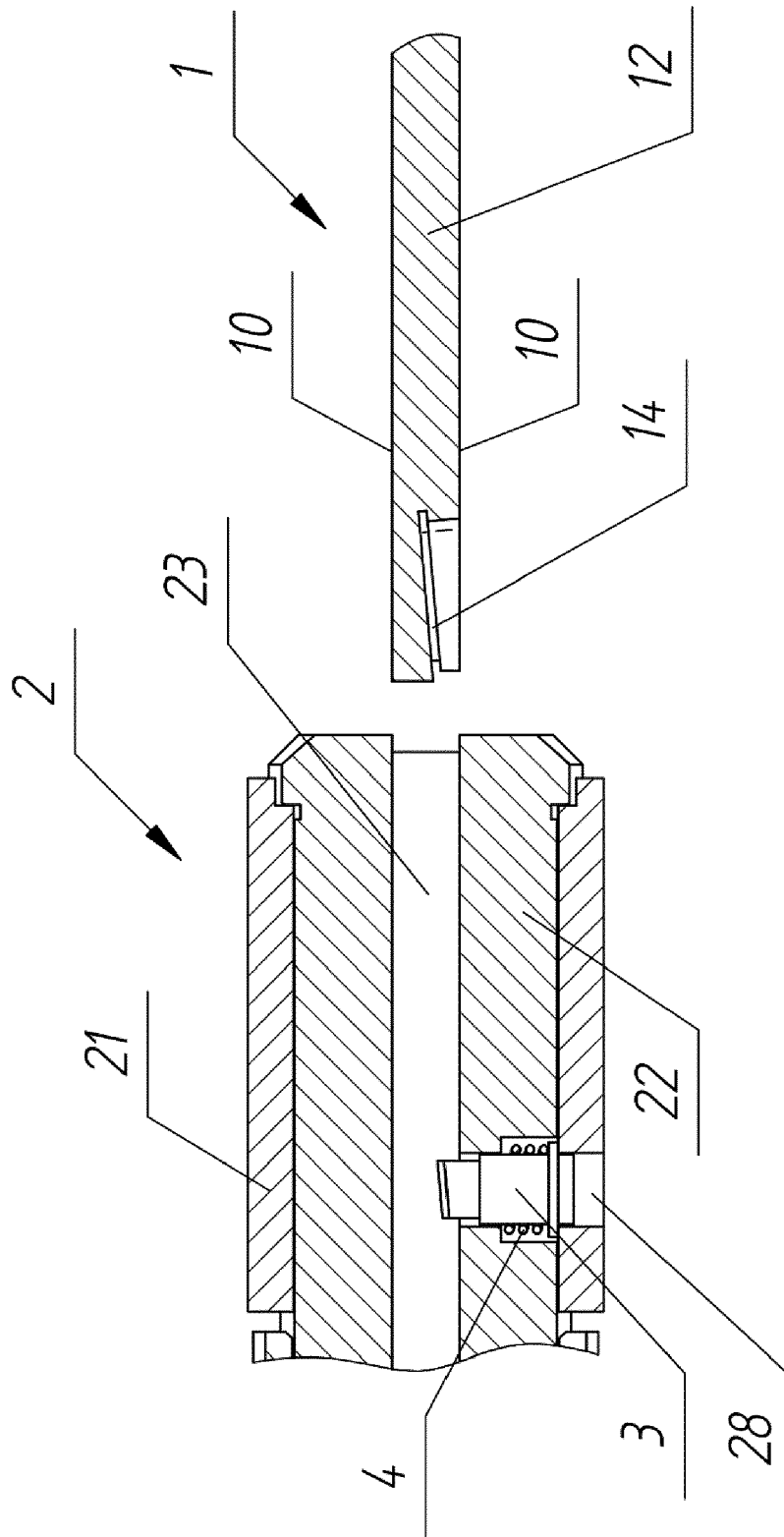
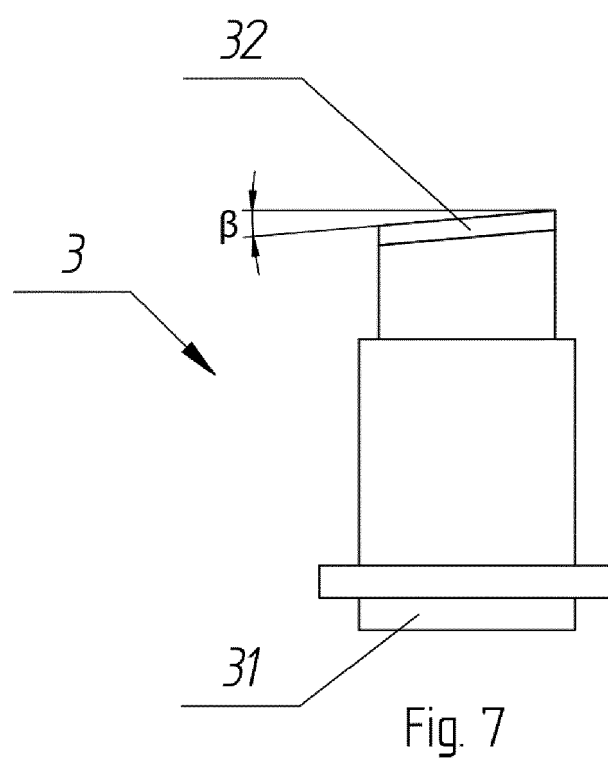
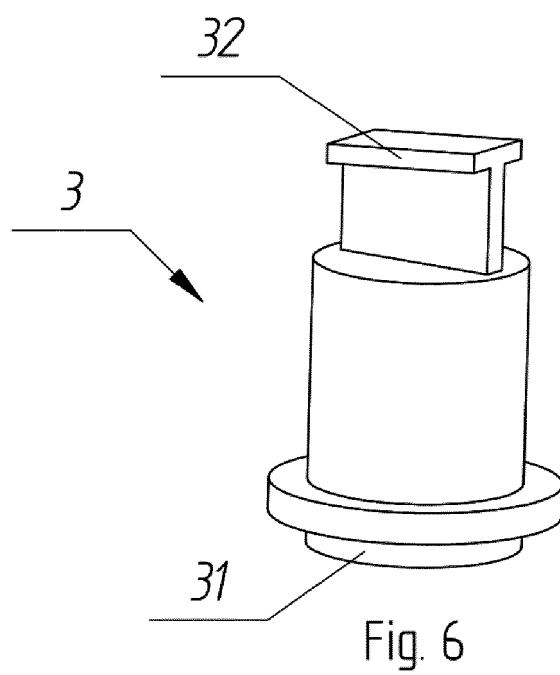
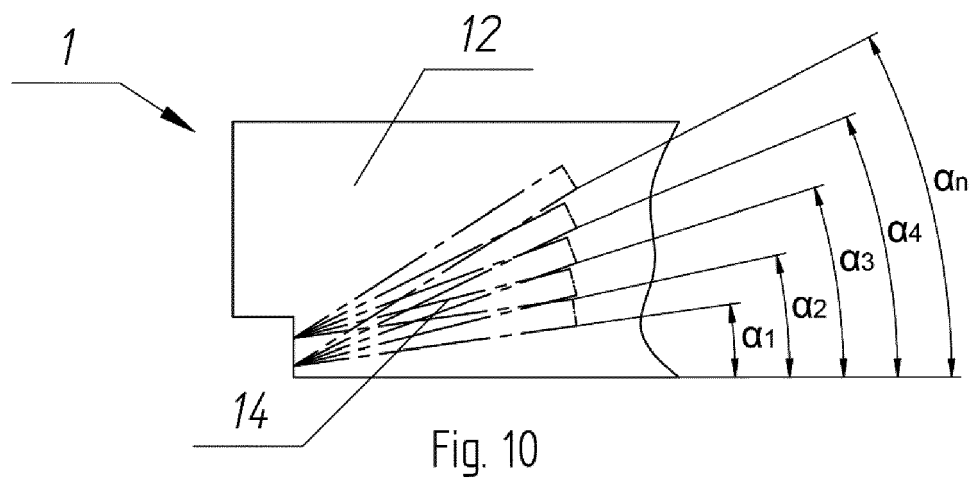
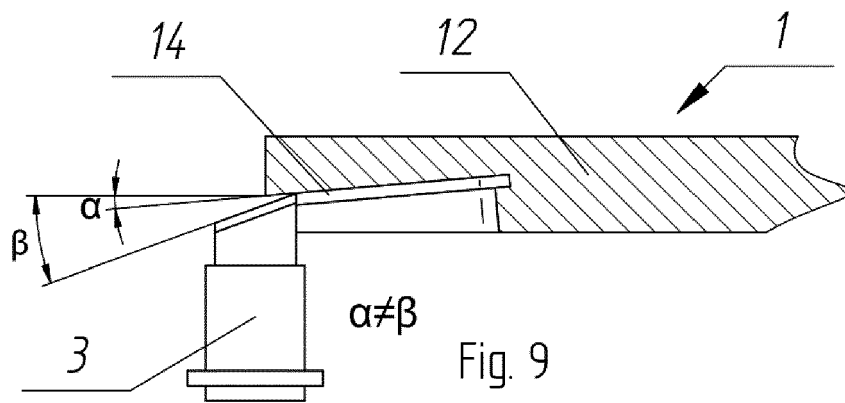
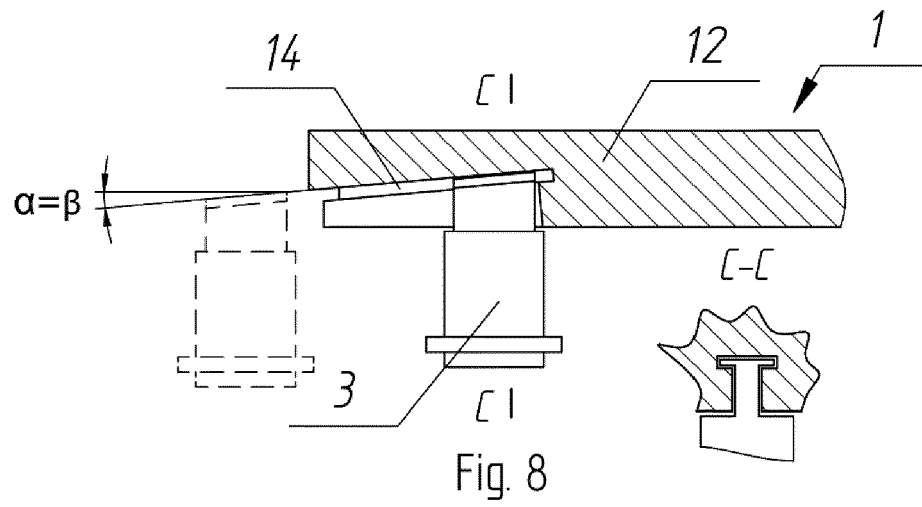


Fig. 4







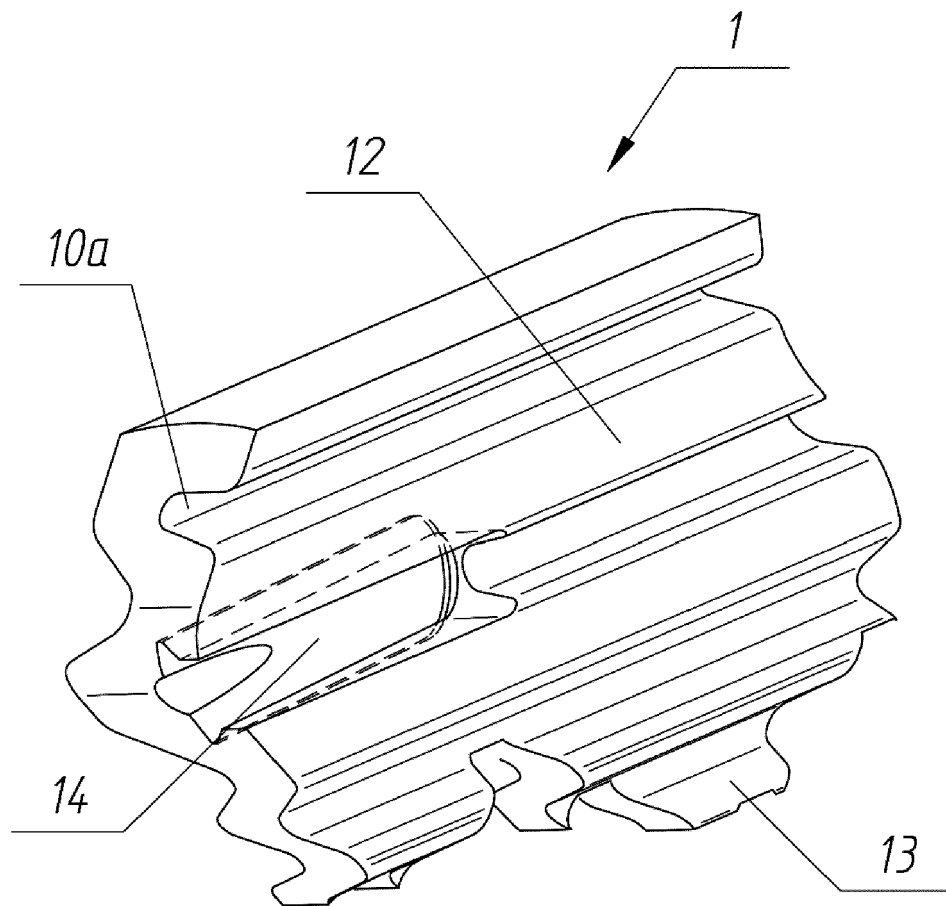


Fig. 11

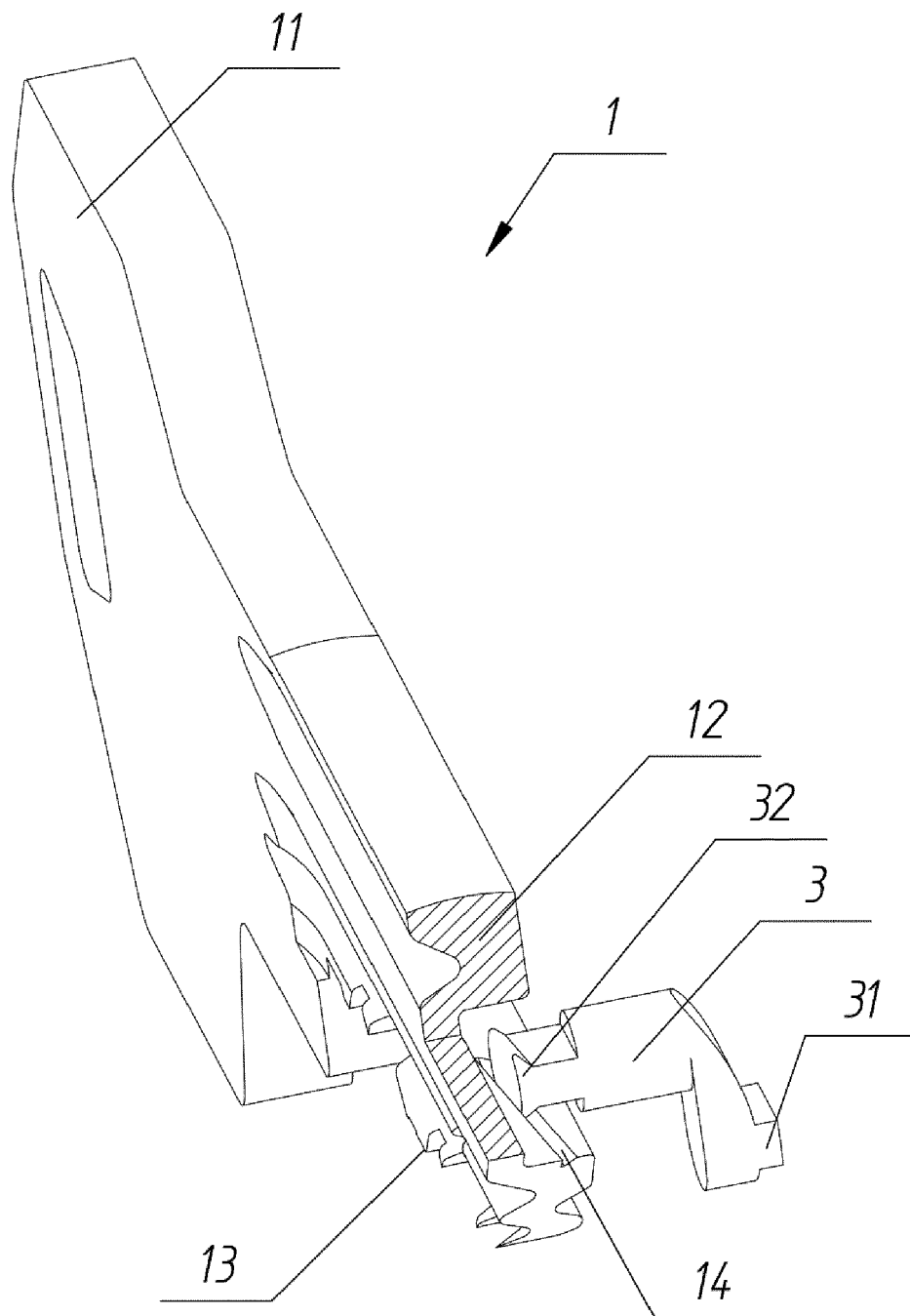


Fig. 12



EUROPEAN SEARCH REPORT

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