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(71) Applicant: **Jiangyin Orient Gangsheng Metal Products Co., Ltd**
Jiangyin Jiangsu 214429 (CN)

(72) Inventors:
- **JIANG, Yang**
  Jiangyin, 214429 (CN)
- **WU, Yujun**
  Jiangyin, 214429 (CN)

(74) Representative: **Huang, Liwei**
Cäcilienstraße 12
40597 Düsseldorf (DE)

(54) A LOCKING CORE HAVING DOUBLE PINS IN ONE HOLE

(57) The invention discloses a lock core having double pins in one hole, which belongs to the technical field of lock cores. The present invention provides a lock core, comprising a casing and at least one plug, the plug is provided with multiple inner pin holes, and the casing is provided with outer pin holes that match the inner pin holes, a pin mechanism is arranged inside an outer pin hole and corresponding inner pin hole. The present invention designs a new type of pin mechanism having double pins, together with a oval-shaped pin hole, and thus achieves a locking core having double pins in one hole. A hole contains two pins which are staggered, and the two pins are aligned with two inner guide strips respectively. Meanwhile, a single-pin mechanism is provided, so that the single pin is aligned with the centerline of the two inner guide strips. Besides, the length of the inner pin of double-pin mechanism may be different from each other. The matching points between the lock core and the key includes two rows as well as one point, which can greatly improve the anti-theft ability of the lock core.

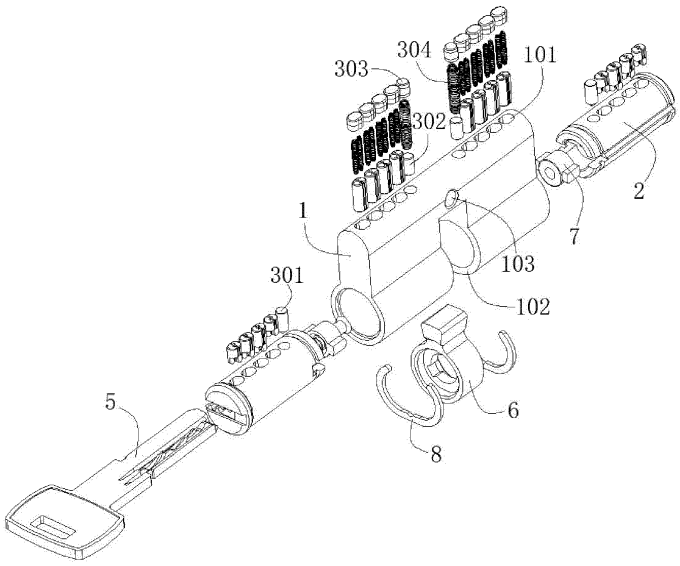

Fig. 1

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Description

Technical field

[0001] The invention belongs to the technical field of lock cores, and in particular relates to a lock core having double pins in one hole.

Background

[0002] The existing lock core is provided with pin holes on the plug and the casing, and a pin mechanism is arranged in each pin hole, wherein generally a single-pin mechanism is provided in each pin hole. Increasing the number of matching points of the teeth of key is one of the ways to improve the anti-theft ability of the lock core. However, since the length of lock core needs to match the thickness of door panel, the length of lock core needs to be controlled within a certain range, thus the lengths of the casing and the plug are not suitable to be changed. When the length range is unchanged, it is not convenient to increase the matching points of the teeth of key. Therefore, multiple rows of teeth are designed to improve the anti-theft ability of the lock core.

[0003] For a lock core with multiple rows of teeth, multiple rows of pin mechanisms may be designed. The anti-theft capability is improved by increasing the number of the pin mechanisms and increasing the matching points between the pins and the teeth of key, that is, the technical solution disclosed in the patent application FR 2637644A1. However, this method is not convenient in the production and processing of the casing, plug and key, and is not convenient in the installation of the pin mechanisms. It requires high processing accuracy and the cost is high.

Summary

[0004] The present invention provides a locking core having double pins in one hole. The present invention designs a new type of pin mechanism having double pins, together with a oval-shaped pin hole, and thus achieves a locking core having double pins in one hole. A hole contains two pins which are staggered, and the two pins are aligned with two inner guide strips respectively. Meanwhile, a single-pin mechanism is provided, so that the single pin is aligned with the centerline (middle line) of the two inner guide strips. Besides, the length of the inner pin of double-pin mechanism may be different from each other. The matching points between the lock core and the key includes two rows as well as one point, which can greatly improve the anti-theft ability of the lock core.

[0005] The objective problem of the present invention is solved by the following technical solution:

A lock core, comprising a casing and at least one plug, wherein the plug is provided with a keyway, the plug is provided with multiple inner pin holes, and the casing is provided with outer pin holes that match the inner pin holes , a pin mechanism is arranged inside an outer pin hole and corresponding inner pin hole; characterized in that a set of inner guide strips is provided on a wall of the keyway, wherein the set of inner guide strips comprises at least two inner guide strips; each inner pin hole penetrates both of the two inner guide strips and reaches the keyway; the multiple inner pin holes include a circular hole, and multiple oval holes or multiple rounded rectangular holes; the outer pin hole has the same cross section as the corresponding inner pin hole; the pin mechanism in the circular hole is a single-pin mechanism, where the pin has a circular cross section; the pin mechanism in the oval or rounded rectangular hole is a double-pin mechanism; the double-pin mechanism comprises a first cover that is fixedly installed in the outer pin hole, an outer pin set that is able to slide in the outer pin hole, and an inner pin set that is able to slide in the inner pin hole; the outer pin set comprises two outer pins which are able to slide against each other, a first spring is provided and fixed between the first cover and each outer pin, the inner pin set comprises two inner pins, which are able to slide against each other, a protrusion is provided on the bottom side of each inner pin; and under the same first cover, the protrusions of the two inner pins are aligned with the two inner guide strips respectively, the two inner pins are magnetically connected to the two outer pins respectively.

[0006] Optionally, for different double-pin mechanisms, the lengths of the inner pins are varying.

[0007] Optionally, on an vertical surface of each inner pin, a sliding groove and a sliding edge are provided, so that the two inner pins are able to slide through the sliding edge and the sliding groove.

[0008] Optionally, the single-pin mechanism includes a single inner pin, a single outer pin and a second cover; the second cover is fixedly installed in a circular hole in the casing, the single outer pin is able to slide in the circular hole in the casing, a second spring is provided and fixed between the single outer pin and the second cover, the single inner pin is able to slide in a circular hole in the plug, the single outer pin and the single inner pin are magnetically connected. Since the circular hole in the casing and/or pin has a circular cross section, the single outer pin and/or the single inner pin therein also preferred to have a circular cross section.

[0009] Optionally, the outer pin has a cross section of a half circle or a half ellipse; and the corresponding inner pin has an end surface, which is in contact with the outer pin and thus is also a half circle or a half ellipse.

[0010] Optionally, the present invention further comprises a key, the key includes a key body and a key handle; the key body is provided with a bitting portion, and the bitting portion includes a set of positioning grooves, wherein the set of positioning grooves comprises at least two positioning grooves; each positioning groove is aligned with an inner guide strip; multiple sockets are provided on the positioning grooves, wherein each socket is matched with a protrusion of an inner pin; the sockets

on two different positioning grooves are preferred to be staggered; a middle recess is located between two positioning grooves, wherein the middle recess is matched with the single inner pin.

[0011] Optionally, the bottom of the sliding edge extends to the bottom surface of the protrusion, and an arc end is provided at the bottom of the sliding edge and the bottom of the protrusion.

[0012] Optionally, the first spring and/or the second spring meet the following: each spring comprises a middle portion and two end portions, an elastic portion is provided between the middle portion and each end portion, the spacing of the middle portion as well as the spacing of the end portion is smaller than the spacing of elastic portion .

[0013] Optionally, the outer pin is provided with a notch, so that the bottom end of the first spring is fixedly installed in the notch.

[0014] Optionally, a slot is provided in the casing, for example in the middle of the casing or at one side of the casing, and a rotatable locking element is installed in the slot.

[0015] Optionally, the plug is provided with a transmission portion, the transmission portion is connected to the rotatable locking element.

[0016] Optionally, a through hole is provided in the casing, for example in the middle of the casing, and the through hole is a threaded hole.

[0017] Optionally, a groove for clip ring is provided on the plug and is located close to the rotatable locking element, and a clip ring is installed between the groove for clip ring and the casing.

[0018] Optionally, the present invention furthering comprises a set of outer guide strips; in the keyway, the set of outer guide strips and the set of inner guide strips are respectively arranged on two opposite innner walls, the set of inner guide strips and the set of outer guide strips are rotationally symmetrical around the centerline of the keyway.

[0019] Optionally, the same bitting pattern is provided on both surfaces of the key body, so that the bitting portion is rotationally symmetrical, and each positioning groove is aligned with an inner guide strip or an outer guide strip.

[0020] The present invention has the following beneficial effects:

1. The present invention designs a new type of pin mechanism having double pins, together with a oval-shaped pin hole, and thus achieves a locking core having double pins in one hole. A hole contains two pins which are staggered, and the two pins are aligned with two inner guide strips respectively. Meanwhile, a single-pin mechanism is provided, so that the single pin is aligned with the centerline (middle line) of the two inner guide strips. Besides, the length of the inner pin of double-pin mechanism may be different from each other. The matching points between the lock core and the key includes two rows as well as one point, which can greatly improve the anti-theft ability of the lock core.

2. By the design of the double-pin mechanism, the number of pins in the same space can be improved. By improving the number of pins, the anti-theft ability of the lock core can be improved.

3. The present invention provides a key which has the same pattern on both sides, and thus can be used on both sides. The bitting portion contains only concave grooves, without any protruding teeth, which can avoid damage to the key caused by bumping, thereby improving the service life of the key.

4. The pin holes on the casing and the plug(s) are arranged as a single row, which is simple in structure, and easy in production.

[0021] The implementation of the present invention will achieve at least one of the above advantages, and does not have to achieve all the above advantages at the same time.

Description of the drawings

[0022] In order to more clearly illustrate the technical solutions of the embodiments of the present invention, the following briefly introduces the drawings for describing the embodiments. Evidently, the drawings in the following description are only some embodiments of the invention. For those skilled persons in the art, other drawings can also be obtained based on these drawings without creative efforts.

Fig. 1 is a schematic structural diagram of a lock core having double pins in one hole, according to the present invention;

Fig. 2 is a structural diagram of the plug of lock;

Fig. 3 is a structural diagram of double-pin mechanism;

Fig. 4 is a structural diagram of an inner pin;

Fig. 5 is a structural diagram of a key;

Fig. 6 is a structural diagram of the first spring;

[0023] In the drawings, the parts represented by reference signs are listed as follows:
1 - casing, 2 - plug, 3 - single-pin mechanism, 4 - double-pin mechanism, 5 - key, 6 - rotatable locking element, 7 - transmission portion, 8 - clip ring, 101 - outer pin hole, 102 - slot, 103-through hole, 201 - keyway, 202 - inner pin hole, 203 - outer guide strip, 204 - inner guide strip, 205 - circular hole, 206 - oval hole, 301 - single inner pin,

302 - single outer pin, 303 - second cover, 304 - second spring, 401 - first cover, 402 - outer pin, 403 - first spring, 404 - inner pin, 405 - sliding groove, 406 - sliding edge, 407 - protrusion, 408 - middle portion, 409 - end portion, 410 - elastic portion, 411 - notch, 501 - key body, 502 - key handle, 503 - positioning groove, 504 - socket, 505 - middle recess.

Detailed Embodiments

[0024] The technical solutions in the embodiments of the present invention will be clearly and completely described below, with reference to the accompanying drawings in the embodiments of the present invention. Evidently, the described embodiments are only part of the embodiments of the present invention, not all of them. Based on the embodiments described in the present invention, all the other embodiments obtained by those skilled persons without any creative efforts fall within the scope of protection of the present invention.

[0025] Referring to Figures 1 to 4, the present invention is a lock core, comprising a casing 1 and at least one plug 1. The Fig. 1 shows a set of plugs 2 comprising two plugs 2. The plug 2 is provided with a keyway 201 . The plug 2 is provided with a plurality of inner pin holes 202, and the casing 1 is provided with outer pin holes 101 that match the inner pin holes 202. A pin mechanism is arranged inside an outer pin hole 101 and corresponding inner pin hole 202.

[0026] In the keyway 201, a set of outer guide strips 203 and a set of inner guide strips 204 are respectively arranged on two opposite innner walls, i.e. the upper and lower inner walls. The set of inner guide strips 204 and the set of outer guide strips 203 are so shaped that they are centosymmetric (around a center point).

[0027] The set of inner guide strips 204 and the set of outer guide strips 203 forms a pattern, which is rotationally symmetrical around the centerline (the middle line) of the keyway 201. In another word, the set of inner guide strips 204 and the set of outer guide strips 203 are central symmetrical relative to a center point of the keyway 201. The set of outer guide strips 203 contains at least two outer guide strips 203. The set of inner guide strips 204 contains at least two inner guide strips 204.

[0028] Each inner pin hole 202 is so located that the position of the inner pin hole 202 overlaps two of the inner guide strips 204. That is to say, each inner pin hole 202 runs across two inner guide strips 204. The inner pin holes 202 and the keyway 201 communicate. In another word, each inner pin hole 202 penetrates both of the two inner guide strips 204 and then reaches the keyway 201.

[0029] As shown in Figure 1, the set of plugs 2 has two plugs 2. As shown in Figure 2, Each plug 2 is provided with multiple inner pin holes 202. The multiple inner pin holes 202 include a circular hole 205, and multiple oval holes 206 or multiple rounded rectangular holes 206. For example, the rounded rectangular hole 206 is a rectangular hole with two semicircles located at two opposite ends respectively. As an example, the hole 206 is bean-shaped, or has a shaped like a kidney. The pin mechanism in the circular hole 205 is a single-pin mechanism 3, where the pin has a circular cross section. The pin mechanism in the oval or rounded rectangular hole 206 is a double-pin mechanism 4.

[0030] The shape of outer pin hole(s) 101 should correspond to the shape of the corresponding inner pin hole(s) 202. Thus, the outer pin hole (101) has the same cross section as the corresponding inner pin hole (202). That is to say, a group of outer pin holes 101 may also include a circular hole, and multiple oval holes or multiple rounded rectangular holes.

[0031] A double-pin mechanism 4 comprises a first cover 401 that is fixedly installed in the outer pin hole 101, an outer pin set that is able to slide in the outer pin hole 101, and an inner pin set that is able to slide in the inner pin hole 202.

[0032] The outer pin set comprises two outer pins 402 which are able to slide against each other. As an example, an outer pin 402 may has a cross section of a half circle, or a half ellipse, or a similar shape. A first spring 403 is provided and fixed between the first cover 401 and the outer pin 402. See the Figure 3.

[0033] The inner pin set comprises two inner pins 404, which are able to slide against each other. As a example, an inner pin may has a cross section of a half circle, or a half ellipse, or a similar shape.

[0034] As shown in the Figs. 3 and 4, on an vertical surface of each inner pin 404, a sliding groove 405 and a sliding edge 406 are provided, so that the two inner pins 404 are able to slide through the sliding edge 406 and the sliding groove 405. See Fig. 3, the sliding groove 405 of one inner pin matches (and engages with) the sliding edge 406 of the other inner pin, vice verse.

[0035] A protrusion 407 is provided on the bottom side of each inner pin 404. And the positions of the protrusions 407 of the two inner pins 404 are aligned with the two inner guide strips 204 respectively. The protrusions 407 of the two inner pins 407 contact each other (for example, along the sliding edge 406).

[0036] The two inner pins 404 are magnetically connected to the two outer pins 402 respectively.

[0037] Among the multiple double-pin mechanisms 4, the lengths of the inner pins are varying, the lengths of the outer pins are the same. The lengths of the first springs 403 are the same, and the lengths of the first covers 401 are the same. The "length" here means e.g. the length (height) along the vertical direction in Figures 1 and 3.

[0038] As shown in Fig. 1, the single-pin mechanism 3 includes a single inner pin 301, a single outer pin 302 and a second cover 303. The second cover 303 is fixedly installed in a circular hole in the casing 1. The single outer pin 302 is able to slide in the circular hole in the casing 1. A second spring 304 is provided and fixed between the single outer pin 302 and the second cover 303. The single inner pin 301 is able to slide in a circular hole 205

in the plug 2. The single outer pin 302 and the single inner pin 301 are magnetically connected.

[0039] Since the circular hole in the casing (plug) has a circular cross section, the single outer pin 302 (the single inner pin 302) therein also preferred to have a circular cross section. Preferably, both ends of the single outer pin 302 are flat. Meanwhile, one end of the single inner pin 301 is flat, and the other end thereof has a pattern, for example, a protrusion (rounded protrusion). The pattern (rounded protrusion) is matched with the pattern on the key.

[0040] As shown in FIG. 5, the present invention may further comprise a key 5. The key 5 includes a key body 501 and a key handle 502. The two surfaces (upper and lower surfaces) of the key body 501 are provided with a bitting portion which is rotationally symmetrical around the centerline (middle line) of the key body 501. In another word, the upper and lower surfaces are provided with a central symmetrical bitting portion. The bitting portion includes a set of positioning grooves 503. Each positioning groove 503 is aligned with an inner guide strip 204 or an outer guide strip 203. Besides, each positioning groove 503 fits an inner guide strip 204 or an outer guide strip 203. That is, the width (and the position) of the positioning groove 503 is matched with the width (and the position) of a corresponding inner guide strip 204 or a corresponding outer guide strip 203. Multiple sockets 504 are provided on the positioning grooves 503, wherein each socket 504 is matched with a protrusion 407. Multiple sockets 504 on two different positioning grooves 503 are preferred to be staggered. At least one middle recess 505 is located between two positioning grooves 503. A middle recess 505 is matched with the single inner pin 301.

[0041] As shown in the Figs. 3 to 4, the bottom of the sliding edge 406 extends to the bottom surface of the protrusion 407. Both the bottom of the sliding edge 406 and the bottom of the protrusion 407 are provided with an arc end, and the arc end is so designed as to facilitate the entering and exiting of the key 5. That is to say, the bottom of the inner pin 404 (which may includes the bottom of the sliding edge 406 and the bottom of the protrusion 407) is rounded to permit the key to slider over the pin easily.

[0042] As shown in Fig. 6, the first spring 403 comprises a middle portion 408 and two end portions 409, an elastic portion 410 is provided between the middle portion 408 and each end portion 409. The spacing (i.e. the distance of adjacent coils) of the middle portion 408 is smaller than the spacing of elastic portion 410. Also, the spacing of the end portion 409 is smaller than the spacing of elastic portion 410. The second spring 304 has the same or similar structure as the first spring 403.

[0043] As shown in Fig. 3, the outer pin 402 is provided with a notch 411, so that the bottom end of the first spring 403 can be fixed/installed in the notch 411.

[0044] As shown in Fig. 1, a slot 102 is provided in the middle of the casing 1, and a rotatable locking element 6 is installed in the slot 102.

[0045] As shown in Fig. 1, on one side of each plug 2, which is facing the other plug 2, is provided with a transmission portion 7. The transmission portion 7 is connected to the rotatable locking element 6, and thus can drive the rotation of the rotatable locking element 6. The transmission portions 7 of two plugs 2 are connected by a rivet.

[0046] As shown in Fig. 1, a through hole 103 is provided in the middle of the casing 1, and the through hole 103 is a threaded hole.

[0047] As shown in Fig. 1, a groove for clip ring is provided on the plug 2 and close to the rotatable locking element 6, and a clip ring 8 is installed between the groove for clip ring and the casing 1.

[0048] The major axis (length direction) of the oval or rounded rectangular hole 206 is parallel to the axis direction of the lock plug 2 .

[0049] The working status of the lock core of the present invention is described as follows:

The key 5 is inserted into the keyway 201, so that the two positioning grooves 503 on one side of the key 5 are sliding along the two inner guide strips 204 in the lock core 2. The two positioning grooves 503 on the other side of the key 5 are sliding along the two outer guide strips in the lock core 2.

[0050] When a pattern in the bitting (e.g. a convex slope, for example the convex slope formed between a socket 504 and a middle recess 505) comes into contact with the inner pin 404 (the protrusion 407 of the inner pin 404) or the single inner pin 301, the inner pin 404 or the single inner pin 301 will be lifted up, so that the corresponding first spring 403 or second spring 304 will be compressed.

[0051] The two protrusions 407 (of two inner pin 404) under the same first cover 401 should be matched with the patterns (e.g. sockets 504) on the two positioning grooves 503 respectively. The positions of the two protrusions 407 are preferred to be staggered. An example can be seen in Fig. 1 and Fig. 3, the two inner pin 404 are arranged one in front of the other, and the two corresponding protrusions 407 are located on the left and right respectively, and match the patterns (e.g. sockets 504) of the two positioning grooves 503 respectively. Preferably, each protrusion 407 is parallel to the axis direction of plug 2, i.e. parallel to the sliding (entering/existing) direction of the key 5.

[0052] When the two protrusions 407 (of two inner pin 404) slide relative to each other, the sliding is guided by the sliding grooves 405 and the sliding edges 406.

[0053] When the bitting of the key matches the patterns of the lock core (for example, all the protrusions 407 of the inner pin 404 match the sockets 504, and all the single inner pins 301 matches the middle recesses 505), the interfaces (gaps) between the inner pins and the outer pins are aligned with the edge of the plug (aligned with the shear line), so that the plug can be rotated, and thus activate the unlocking or locking. For example, the rotation can be transmitted by the transmission portion 7 from the plug 2 to the rotatable locking element 6. Thus, the

rotation of key 5 and plug 2 can drive the rotatable locking element 6 to rotate, so as to achieve unlocking or locking.

[0054] When the bitting of the key does not match the patterns of the lock core. For example, the protrusion 407 of an inner pin 404 (or the length of an inner pin 404) does not match the socket 504, the inner pin 404 (or the corresponding outer pin 402) will be located between the casing 1 and the plug 2, in another word, the pin is located both in the casing 1 and the plug 2 (that is, part of the pin is located in the casing 1 and the other part of the pin is located in the plug 2), which prevent the plug 2 from rotating. That is, due to the interference of the pin between the casing 1 and the plug 2, the plug cannot be rotated anymore.

[0055] In the description of the present invention, the terms like "one embodiment", "example", "specific example", etc. means that the specific features, structures, materials or characteristics described in the present invention or the embodiment is contained in at least one embodiment or example. In the present invention, the reference to the above schematic terms does not necessarily refer to the same embodiment or example. Besides, the specific features, structures, materials or characteristics described may be combined in a suitable manner in any one or more embodiments or examples.

[0056] The preferred embodiments of the present invention disclosed above are only intended to help elaborate the present invention. The preferred embodiment does not describe all the details, nor does it limit the invention to the specific embodiments described. Evidently, according to the content of this description, many modifications and changes may be made. The present invention selects and describes these embodiments, just to better explain the principles and practical applications of the present invention, so that those skilled in the art can well understand and use the present invention. The invention is limited only by the claims with their scope and equivalents.

Claims

1. A lock core, comprising a casing (1) and at least one plug (2), wherein the plug (2) is provided with a keyway (201), the plug (2) is provided with multiple inner pin holes (202), and the casing (1) is provided with outer pin holes (101) that match the inner pin holes (202), a pin mechanism is arranged inside an outer pin hole (101) and corresponding inner pin hole (202); **characterized in that**

   a set of inner guide strips (204) is provided on a wall of the keyway (201), wherein the set of inner guide strips (204) comprises at least two inner guide strips (204);
   each inner pin hole (202) penetrates both of the two inner guide strips (204) and reaches the keyway (201);
   the multiple inner pin holes (202) include a circular hole (205), and multiple oval holes (206) or multiple rounded rectangular holes (206); the pin mechanism in the circular hole (205) is a single-pin mechanism (3), where the pin has a circular cross section; the pin mechanism in the oval or rounded rectangular hole (206) is a double-pin mechanism (4);
   the double-pin mechanism (4) comprises a first cover (401) that is fixedly installed in the outer pin hole (101), an outer pin set that is able to slide in the outer pin hole (101), and an inner pin set that is able to slide in the inner pin hole (202);
   the outer pin set comprises two outer pins (402) which are able to slide against each other, a first spring (403) is provided and fixed between the first cover (401) and each outer pin (402),
   the inner pin set comprises two inner pins (404), which are able to slide against each other,
   a protrusion (407) is provided on the bottom side of each inner pin (404), and
   under the same first cover (401), the protrusions (407) of the two inner pins (404) are aligned with the two inner guide strips (204) respectively, the two inner pins (404) are magnetically connected to the two outer pins (402) respectively.

2. The lock core according to claim 1, wherein for different double-pin mechanisms (4), the lengths of the inner pins are varying.

3. The lock core according to claim 1, wherein, on an vertical surface of each inner pin (404), a sliding groove (405) and a sliding edge (406) are provided, so that the two inner pins (404) are able to slide through the sliding edge (406) and the sliding groove (405).

4. The lock core according to any preceding claim, wherein the single-pin mechanism (3) includes a single inner pin (301), a single outer pin (302) and a second cover (303); the second cover (303) is fixedly installed in a circular hole in the casing (1), the single outer pin (302) is able to slide in the circular hole in the casing (1), a second spring (304) is provided and fixed between the single outer pin (302) and the second cover (303), the single inner pin (301) is able to slide in a circular hole (205) in the plug (2), the single outer pin (302) and the single inner pin (301) are magnetically connected.

5. The lock core according to any preceding claim, wherein the outer pin (402) has a cross section of a half circle or a half ellipse; and the corresponding inner pin (404) has an end surface, which is in contact with the outer pin (402) and thus is also a half circle or a half ellipse.

6. The lock core according to any preceding claim, further comprising a key (5), the key (5) includes a key body (501) and a key handle (502);

the key body (501) is provided with a bitting portion, and the bitting portion includes a set of positioning grooves (503), wherein the set of positioning grooves (503) comprises at least two positioning grooves (503); each positioning groove (503) is to be aligned with an inner guide strip (204);
multiple sockets (504) are provided on the positioning grooves (503), wherein each socket (504) is matched with a protrusion (407) of an inner pin (404); the sockets (504) on two different positioning grooves (503) are preferred to be staggered;
a middle recess (505) is located between two positioning grooves (503), wherein the middle recess (505) is matched with the single inner pin (301).

7. The lock core according to any preceding claim, wherein the bottom of the sliding edge (406) extends to the bottom surface of the protrusion (407), and an arc end is provided at the bottom of the sliding edge (406) and the bottom of the protrusion (407).

8. The lock core according to any preceding claim, wherein the first spring (403) and/or the second spring (304) meet the following: each spring comprises a middle portion (408) and two end portions (409), an elastic portion (410) is provided between the middle portion (408) and each end portion (409), the spacing of the middle portion (408) as well as the spacing of the end portion (409) is smaller than the spacing of elastic portion (410).

9. The lock core according to any preceding claim, wherein the outer pin (402) is provided with a notch (411), so that the bottom end of the first spring (403) is fixedly installed in the notch (411).

10. The lock core according to any preceding claim, wherein a slot (102) is provided in the casing (1), for example in the middle of the casing (1) or at one side of the casing (1), and a rotatable locking element (6) is installed in the slot (102).

11. The lock core according to claim 10, wherein the plug (2) is provided with a transmission portion (7), the transmission portion (7) is connected to the rotatable locking element (6).

12. The lock core according to any preceding claim, wherein a through hole (103) is provided in the casing (1), for example in the middle of the casing (1), and the through hole (103) is a threaded hole.

13. The lock core according to claim 10 or 11, wherein a groove for clip ring is provided on the plug (2) and is located close to the rotatable locking element (6), and a clip ring (8) is installed between the groove for clip ring and the casing (1).

14. The lock core according to any preceding claim, furthering comprising a set of outer guide strips (203); in the keyway (201), the set of outer guide strips (203) and the set of inner guide strips (204) are respectively arranged on two opposite innner walls, the set of inner guide strips (204) and the set of outer guide strips (203) are rotationally symmetrical around the centerline of the keyway (201).

15. The lock core according to claim 14 citing claim 6, wherein the same bitting pattern is provided on both surfaces of the key body (501), so that the bitting portion is rotationally symmetrical, and each positioning groove (503) of the key (5) is to be aligned with an inner guide strip (204) or an outer guide strip (203) in the keyway (201).

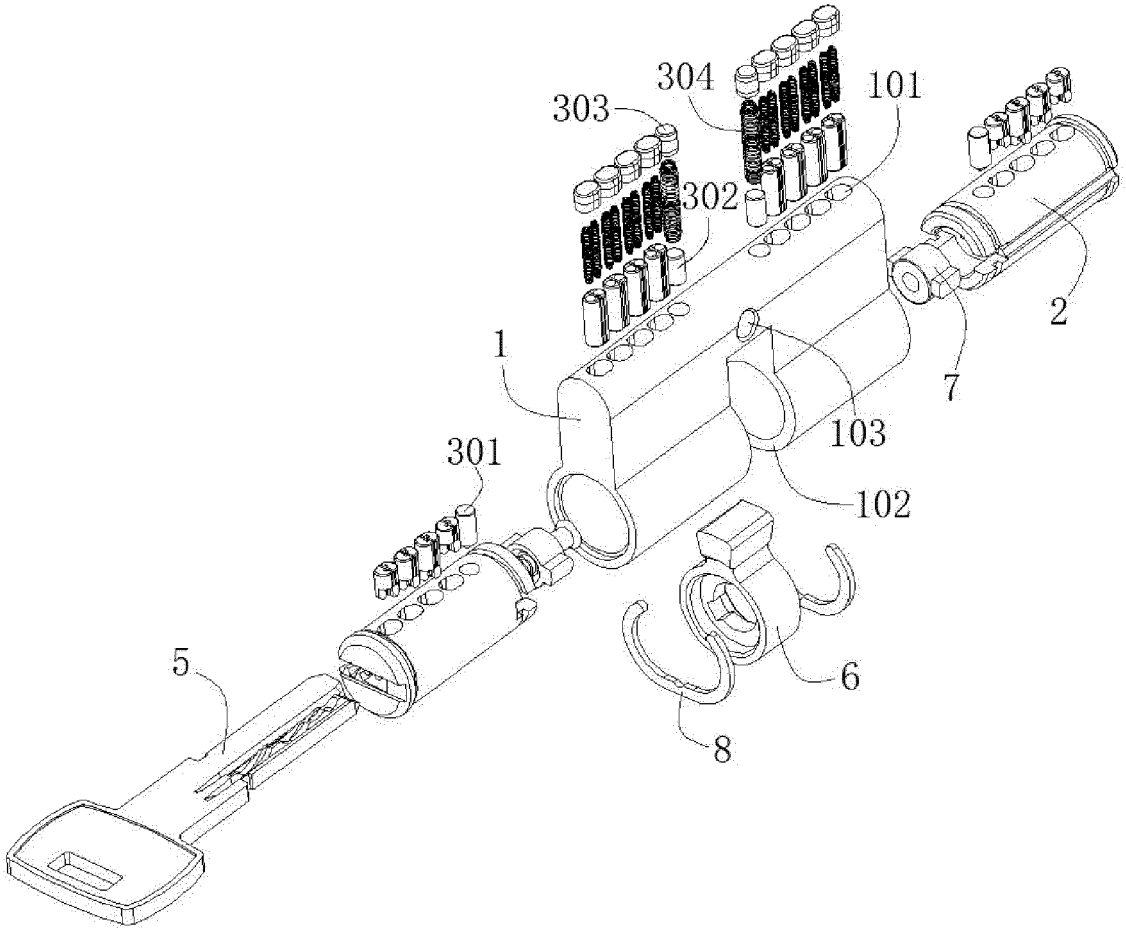

Fig. 1

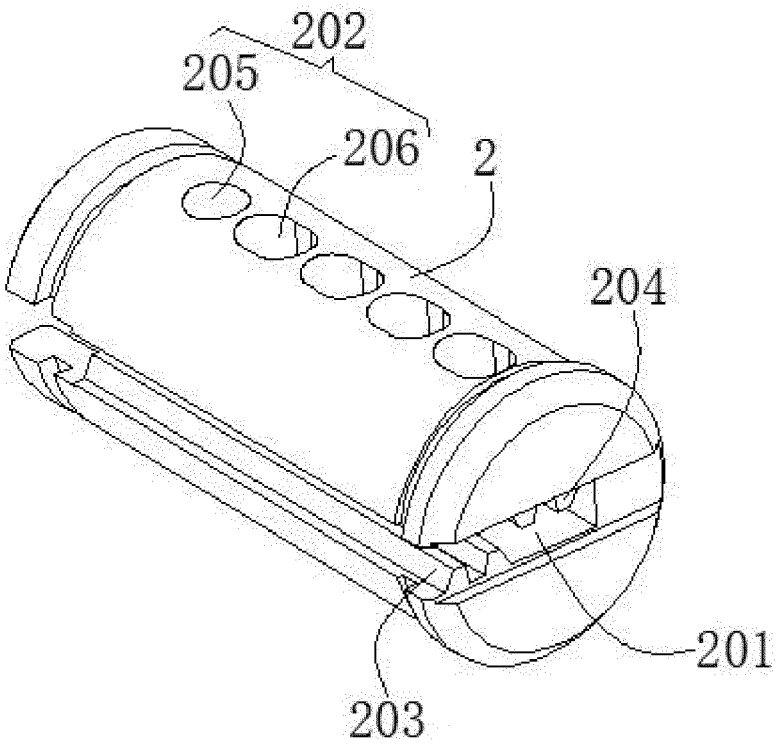

Fig. 2

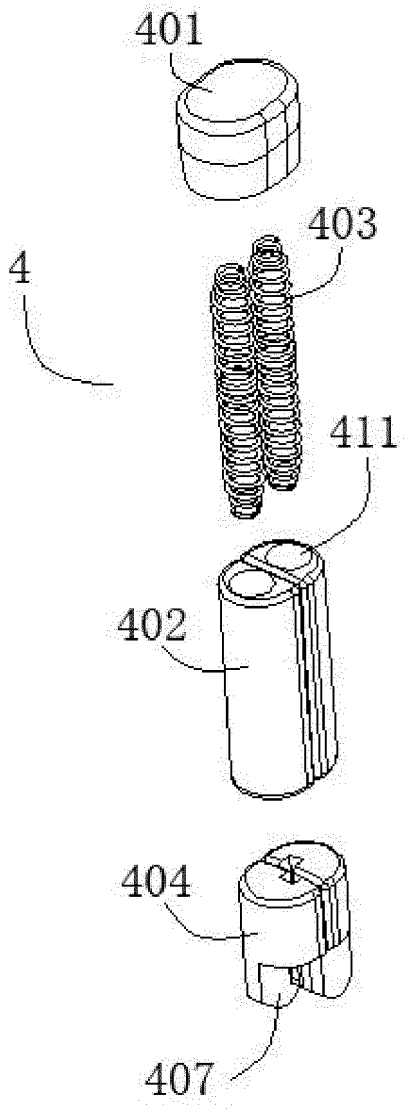

Fig. 3

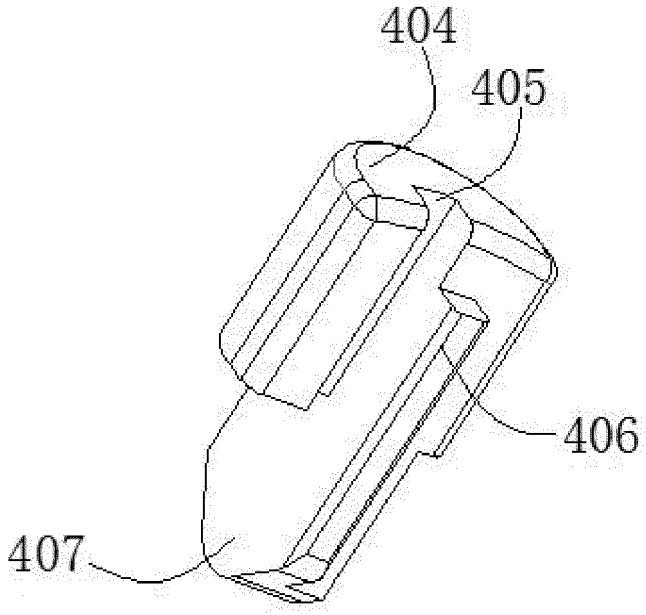

Fig. 4

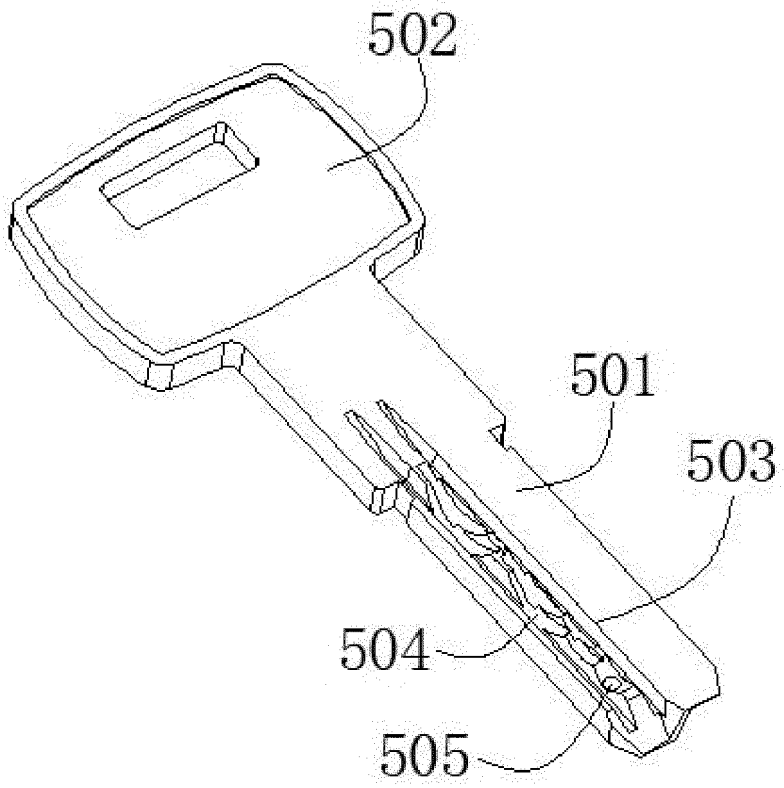

Fig. 5

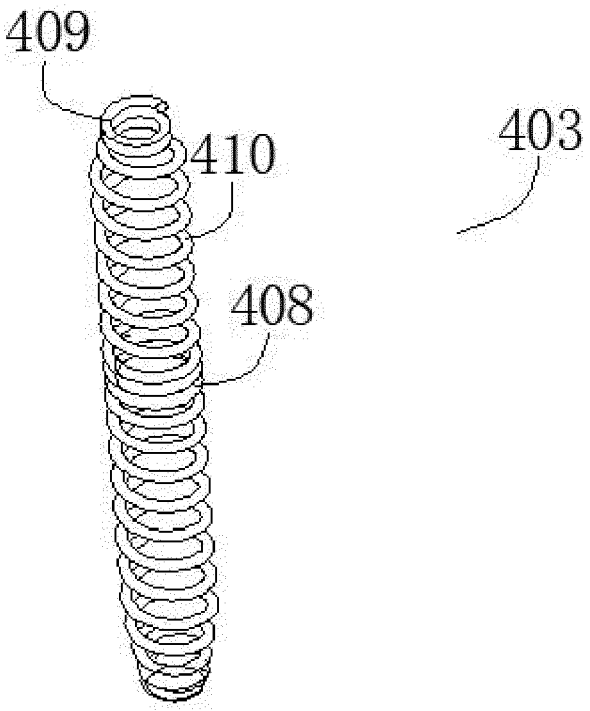

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 23 19 7848

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 090 726 A2 (TALLERES ESCORIAZA SA [ES]) 19 August 2009 (2009-08-19) * the whole document *	1-15	INV. E05B27/08 E05B47/00 E05B27/00
A	WO 2004/048724 A1 (MUL T LOCK TECHNOLOGIES LTD [IL]; ALMAGOR AVI [IL] ET AL.) 10 June 2004 (2004-06-10) * the whole document *	1-15	
A	WO 2007/085526 A1 (CISA SPA [IT]; DARCHINI LUCIANO [IT] ET AL.) 2 August 2007 (2007-08-02) * the whole document *	1-15	
A	JP 2005 290909 A (HORI LOCK KOGYO KK) 20 October 2005 (2005-10-20) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 February 2024	Geerts, Arnold

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20-02-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2090726 A2	19-08-2009	EP 2090726 A2	19-08-2009
		EP 2511455 A1	17-10-2012
		ES 2704623 T3	19-03-2019
		PT 2511455 T	12-02-2019
		US 2009193862 A1	06-08-2009
WO 2004048724 A1	10-06-2004	AU 2003302446 A1	18-06-2004
		BR 0316566 A	04-10-2005
		CA 2506045 A1	10-06-2004
		CN 1714214 A	28-12-2005
		CO 5650182 A2	30-06-2006
		EC SP055891 A	20-09-2005
		EP 1573156 A1	14-09-2005
		ES 2426988 T3	28-10-2013
		HK 1086314 A1	15-09-2006
		HR P20050592 A2	31-12-2006
		IL 153068 A	30-12-2010
		JP 4624797 B2	02-02-2011
		JP 2006507435 A	02-03-2006
		KR 20050085122 A	29-08-2005
		MX PA05005455 A	26-08-2005
		PT 1573156 E	06-09-2013
		TW I322845 B	01-04-2010
		UA 80844 C2	12-11-2007
		US 2006207303 A1	21-09-2006
		WO 2004048724 A1	10-06-2004
		ZA 200504217 B	30-08-2006
WO 2007085526 A1	02-08-2007	NONE	
JP 2005290909 A	20-10-2005	JP 4357338 B2	04-11-2009
		JP 2005290909 A	20-10-2005

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- FR 2637644 A1 **[0003]**