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(54) Catch locking mechanism featuring a key mechanism with lock failsafe system and high resistance against forced entry.

(57) A catch locking mechanism comprises a housing, a slidable member, at least part of which is positioned inside the housing, a key cylinder arranged to receive, in use, a key, a catch arranged to engage, in use, a mating socket, fixing means for securing the catch to the slidable member, and biasing means arranged to adjust, in use, the position of the slidable member. The key cylinder is arranged such that, in use, the key received is only removable from the key cylinder at predetermined positions, between which the key cylinder is arranged to rotate.

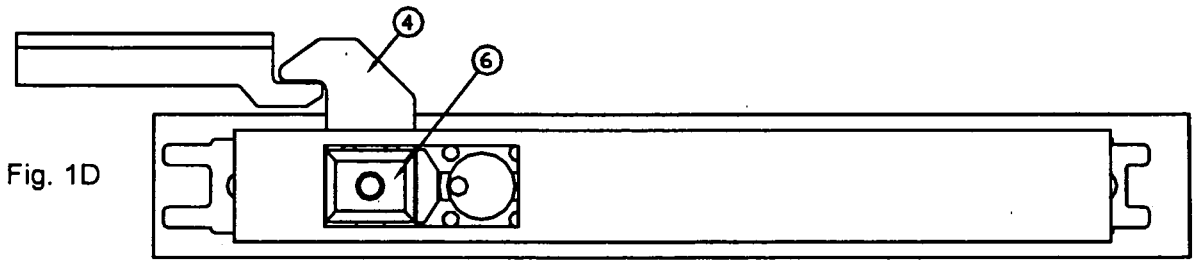

Fig. 1D

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Description

[0001] The invention relates to a catch locking mechanism featuring a key mechanism with a lock fail system ensuring that when performing a key locking action, the catch fully engages on the mating socket before the key can be removed from the lock, and in addition it incorporates a catch with a high resilience to forced entry.

[0002] Catch locking mechanisms of the type incorporating key mechanisms are very popular in securing the movable frame of a door/window against the fixed frame. The most common embodiment of such a catch locking mechanism is one that consists essentially of a casing which houses a slidable member, a catch, a key with a key cylinder, a socket and a mechanism for fastening the casing on the door/window frame. The locking mechanism casing is mounted on the movable door/window frame and provides a housing for the slidable member, on which the catch is attached, and the latter engages on a mating socket fixed on the adjacent door/window fixed frame. When forcing the slidable member to move, the catch moves along with it resulting in its disengagement from the mating socket. At this position the door/window moving frame is free to open. To secure the door/window moving frame against the door/window fixed frame the slidable member is forced to move in the opposite direction and thus engage the catch on the mating socket. At this position the movement of the slidable member can be LOCKED via the use of the key cylinder, which presents a rigid obstacle along the movement path of the slidable member.

[0003] Catch locking mechanisms such as those described above are primarily used in cases where it is very important that the door/window stays locked at all times unless a key is used to unlock it. Good examples of this are door/windows located in public places and in places used by children. In the current state of art catch locking mechanisms incorporating key mechanisms block the movement of the slidable member without making sure that it is in the right place to ensure the proper engagement of the catch with the socket. As a result it is possible to turn the key to its LOCKED position without actually achieving the locking of the door/window.

[0004] Since catch locking mechanisms of the type relating to this invention are used in high security cases, it is very important to have a high resilience against the application of force to open the door/window when in the locked position. In the current state of art the catch locking mechanisms suffer from a relatively weak joint between the slidable member and the catch that tends to break under the application of low tensile loads.

[0005] An aim of the invention described herein is to eliminate the drawbacks outlined in the fore-going preamble. According to the present invention there is provided a catch locking mechanism comprising:

a housing;
a slidable member, at least part of which is positioned inside the housing;
a key cylinder arranged to receive, in use, a key;
a catch arranged to engage, in use, a mating socket;
fixing means for securing the catch to the slidable member; and
biasing means arranged to adjust, in use, the position of the slidable member,

wherein the key cylinder is arranged such that, in use, the key received is only removable from the key cylinder at predetermined positions, between which the key cylinder is arranged to rotate.

[0006] When turning the key to its LOCKED position, the catch is forced to fully engage with the mating socket, and unless this has been achieved it will not be possible to remove the key from the key cylinder, while achieving a high force joint between the catch and the slidable member which is able to withstand high tensile loads applied on the catch.

[0007] Further advantages of this invention include the simplicity in terms of design, construction and assembly, which results in lowering the cost of investment and production.

[0008] An example of the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figures 1a-1e are top, side, end, bottom and cross-sectional (along line A-A) views, respectively, of a catch locking mechanism according to the present invention;
Figure 1f shows an example of a key that can be used in the device of figures 1a-1e;
Figures 2a and 2b are cross-sectional side and bottom views of the catch locking mechanism of figures 1a-1e when the catch is not engaging with the mating socket and the key cylinder is in an UNLOCKED position;
Figures 3a-3d are top, side, end and bottom views, respectively, of the catch locking mechanism casing of figures 1a-1e;
Figures 4a-4d are top, cross-sectional (along line C-C), bottom and side views of the lock slidable member of figures 1a-1e;
Figures 4e-4h are end, cross-sectional (along line A-A), cross-sectional (along line B-B) and end views, respectively, of the slide member of figure 4d;
Figures 5a-5d are top, bottom and side views, respectively, of key cylinder of figures 1a-1e;
Figures 6a-6c are top, bottom and side views of the catch of figures 1a-1e;
Figure 7 illustrates an example of the way in which the catch is fixed on the slidable member;
Figure 8 illustrates the way in which the key cylinder is mounted on the slidable member;
Figure 9 shows the position of a pin when the key cylinder is in the UNLOCKED position;
Figure 10 shows the position of a pin when the key

cylinder is in the LOCKED position; and
Figure 11 illustrates the way in which the key failsafe mechanism operates when the catch is disengaged from the socket.

[0009] Figure 1 provides an illustration of a catch locking mechanism, which comprises a casing 1, a slidable member 2, a key cylinder 3 with a key 15, a catch 4, a mating socket 45, a set of retaining brackets 5, a nut 6, a spring 8, a U-shaped socket 9, a set of pins 10, a screw 11 and a set of countersunk screws 12.

[0010] The catch locking mechanism is assembled by inserting the U-shaped socket 9 inside the frame 1 and fixing it by means of the two pins 10 and then inserting the slidable member 2 inside the casing 1. The key cylinder 3 is then inserted inside the slidable member 2, the catch 4 is secured in the slidable member 2 socket by means of the screw 11 and nut 6, and the brackets 5 are fastened via the screws 12. The catch locking mechanism is then fully assembled.

[0011] Figure 3 shows a series of views of a T-shaped casing 1. The casing 1 consists of a large rectangular opening 23 at the top, two chamfered holes 24 at each end, two rectangular openings 26 (one at each side), one rectangular opening 27 at the bottom, a hollow section 25 running along its length, and two extending flat members 28 (one at each end).

[0012] Figure 4 shows a series of views of a slidable member 2. The slidable member 2 consists of a circular hole 29 with two grooves 44, a U-shaped ramp 22 leading to a series of teeth 14, a spring socket 31, a screw socket and hole 30, a mechanical stop 36, a U-shaped socket 42 and a series of teeth 32 for locking the catch 4.

[0013] Figure 5 shows a series of views of a key cylinder 3. The key cylinder consists of a series of spring loaded key plates 33, a retaining spring-loaded plate 34, a projecting pin 19 and two mechanical stops 35.

[0014] Figure 6 shows a series of views of a catch 4. The catch consists of an L-shaped flat plate 37, comprising of two holes 43 leading to an oval slot 41, and a rectangular shaped plate 38, consisting of a series of teeth 39 and two projecting pins 40 leading to the oval slot 41, riveted together via the two pins 40. Two pins 40 are provided, instead of the usual one, for riveting the L-shaped flat plate 37 on the rectangular shaped plate 38, thus resulting to higher resilience of the catch against forced opening of the door/window when in the locked position.

[0015] Figure 7 illustrates the way in which the catch 4 is fixed on the slidable member 2. The catch teeth 39 mate with the slider teeth 32 while being held together by a force generated from the tightening of the screw 11 on the nut 6. The adjustment in the position of the catch 6 with respect to the slidable member 2 can be accommodated by loosening the screw 11 and moving the catch plate 38 with respect to the slidable member teeth 32, so that the next mating position is found.

[0016] Figure 8 illustrates the way in which the key cylinder 3 is mounted on the slidable member 2. The key cylinder 3 is inserted inside the slidable member hole 29 by compressing the spring loaded retaining plate 34 and it is kept in place via the expansion of the spring loaded retaining plate 34. When inserting the key 15 in the key cylinder 3, the key plates 33 are forced to move inwards, thus allowing the key cylinder to freely rotate within the slidable member hole 29. Once it has completed a rotation of 180 degrees the key cylinder stop 35 rests against the slidable member stop 36 and it is no longer possible to continue rotating. When removing the key 15 from the cylinder 3 the key plates 33 are forced to expand outwards into the slidable member groove 44, and if the key cylinder 3 has not completed the 180 degrees rotation, the spring plates will hit the walls of the slider member hole 29 and it will not be possible to remove the key.

[0017] Since the catch 4 is securely attached to the slidable member 2 by means of the screw 11 and the nut 6, when the slidable member 2 moves it forces the catch 4 to move along with it. This movement can be achieved by applying a downward force on the slidable member teeth 14 which results in the compression of spring 8, thus allowing the alignment and subsequent insertion of the slidable member 2 inside the U-shaped socket 9, resulting to the disengagement of the catch 4 from socket 45. This position is illustrated in Figure 2.

[0018] By applying a horizontal force on the slidable member U-shaped ramp 22, the slidable member 2 moves away from the U-shaped socket 9, falls off at part 17, makes an audible sound powered by the spring 8 and results in the engagement of the catch 4 with the socket 45. This position is illustrated in Figure 1.

[0019] Figure 9 shows the position of a pin 19 when the key cylinder 3 is in the UNLOCKED position. At this position the lock can be operated without the need of the key 15 as described above, such that the catch 4 is engaged with the socket 45. By inserting the key 15 into the key cylinder 3 and rotating it through 180 degrees the LOCKED position is reached, as shown by figure 10. In this position the slidable member 2 is not able to move in the direction that will disengage the catch 4 from the socket 45, since the casing part 20 lies in the path of the pin 19, thereby acting as a resilient obstacle which secures the slidable member 2 in the LOCKED position.

[0020] Figure 11 provides an illustration of the way in which the key failsafe mechanism operates when the catch 4 is disengaged from the socket 45. By rotating the key 15 from the UNLOCKED to the LOCKED position, the key cylinder pin 19 rests against the casing part 20 and forces the slidable member 2 to move away from the U-shaped socket 9, fall off at part 17, make an audible sound powered by the spring 8, reach its LOCKED position (as shown in figure 10) and engage the catch 4 in the socket 45.

[0021] Unless the catch 4 properly engages with the socket 45 the key cylinder 3 will not be able to complete its 180 degree rotation and thus not allow the removal of key 15 from the key cylinder 3, as explained earlier. By

virtue of this failsafe system, it is not possible to reach the LOCKED position without the slidable member 2 moving to the designated position that allows proper engagement between the catch 4 and the socket 45.

Claims

1. A catch locking mechanism comprising:

a housing;
a slidable member, at least part of which is positioned inside the housing;
a key cylinder arranged to receive, in use, a key;
a catch arranged to engage, in use, a mating socket;
fixing means for securing the catch to the slidable member; and
biasing means arranged to adjust, in use, the position of the slidable member,

wherein the key cylinder is arranged such that, in use, the key received is only removable from the key cylinder at predetermined positions, between which the key cylinder is arranged to rotate.

2. A catch locking mechanism according to claim 1, wherein the slidable member further comprises:

a first recess for receiving the key cylinder, the first recess comprising a mechanical stop; and
a second recess for receiving the catch, the second recess comprising a plurality of teeth for securing the position of the catch in use;

wherein the slidable member is arranged to slide, in use, between a position where the catch engages the mating socket and a position where the catch does not engage the mating socket.

3. A catch locking mechanism according to claim 1 or 2, wherein the key cylinder further comprises:

a plurality of spring-loaded plates which act to restrict, in use, the insertion and removal of the key according to the position of the key cylinder;
at least one mechanical stop; and
a pin which projects from the surface of the cylinder.

4. A catch locking mechanism according to any preceding claim, wherein the catch further comprises;
an L-shaped plate comprising two or more holes; and
a rectangular plate comprising two or more pins whose positions corresponds with those of the holes of the L-shaped plate, and a plurality of teeth for securing the position of the catch in use,
wherein the L-shaped plate and the rectangular plate are attached via the pins and holes such that, in use, the catch is securely held in position.

5. A catch locking mechanism according to any preceding claim, wherein the key cylinder is rotatable, in use, between an UNLOCKED position, and a LOCKED position where the pin which projects from the cylinder is arranged to engage, in use, with the housing such that the position of the slidable member is secured.

6. A catch locking mechanism according to any preceding claim, wherein the rotation of the key cylinder from the UNLOCKED position to the LOCKED position causes the slidable member to slide, in use, between a position where the catch does not engage the mating socket and a position where the catch engages the mating socket.

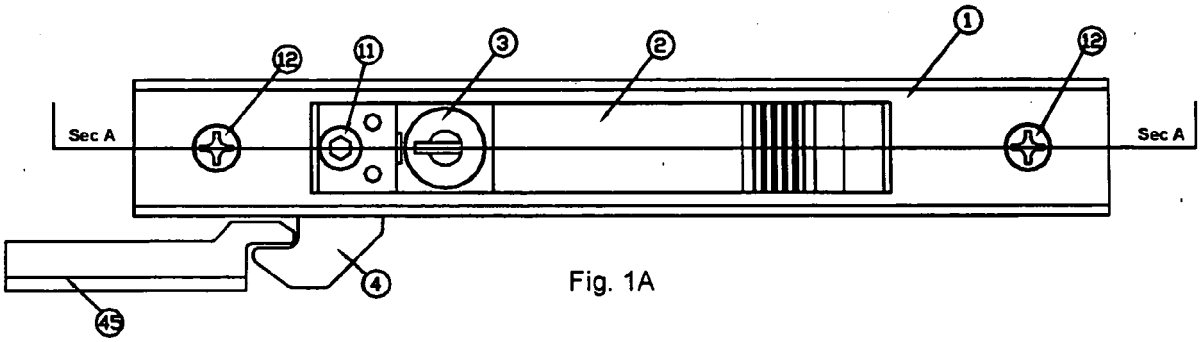


Fig. 1A

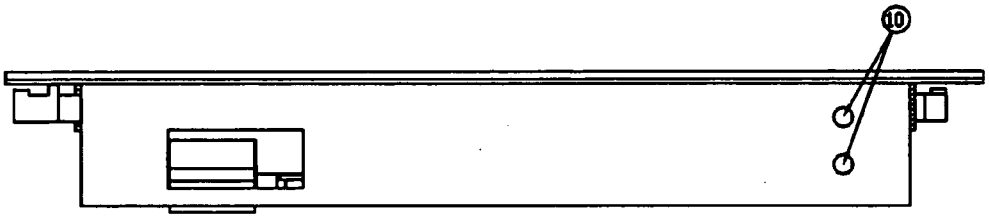


Fig. 1B

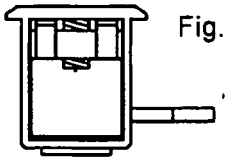


Fig. 1C

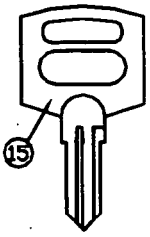


Fig. 1F

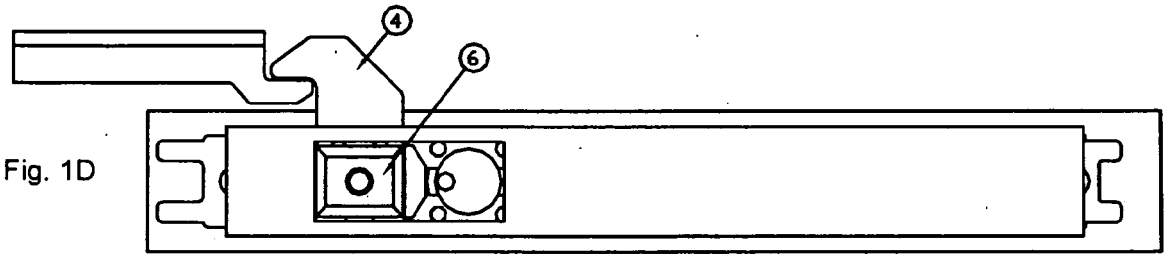


Fig. 1D

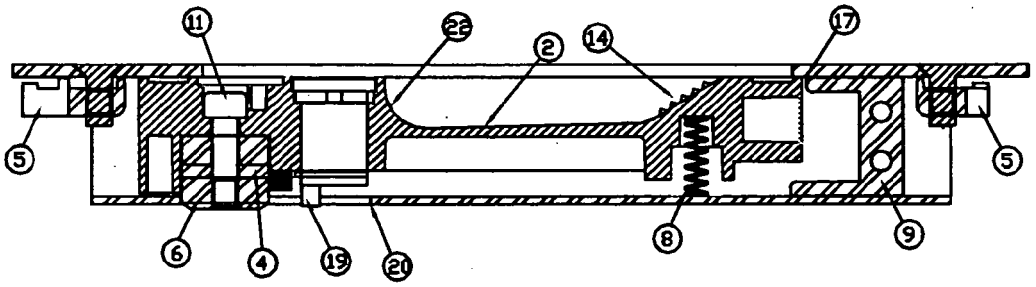


Fig. 1E

Fig. 2A

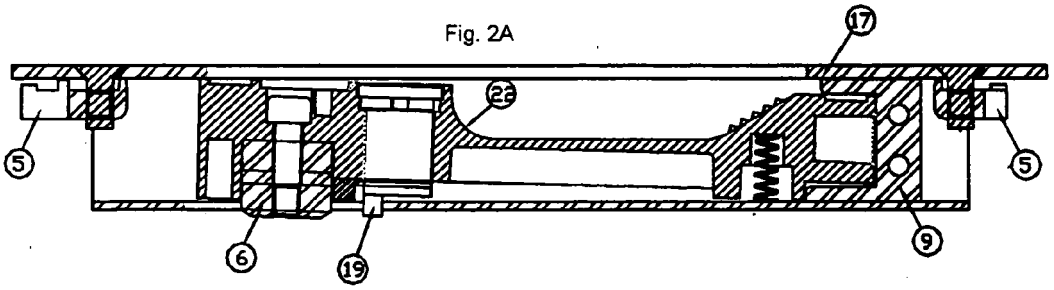


Fig. 2B

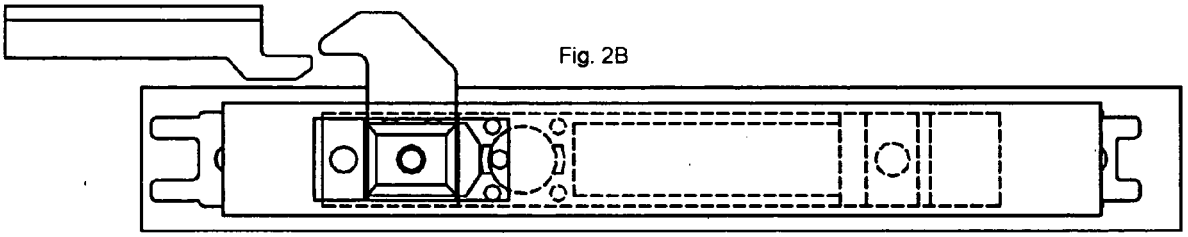


Fig. 3A

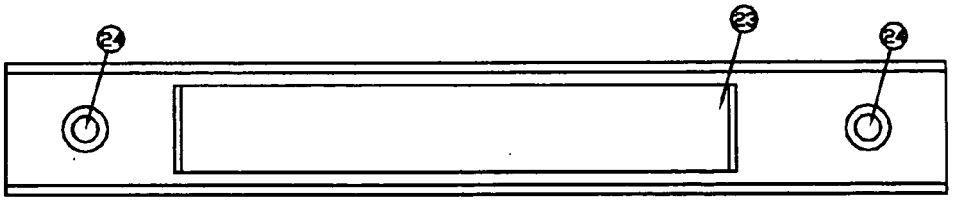


Fig. 3B

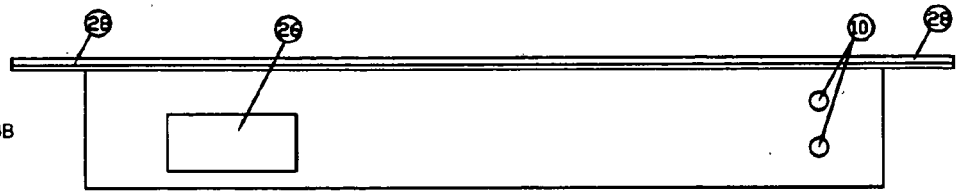


Fig. 3C

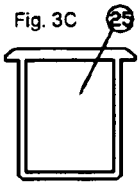
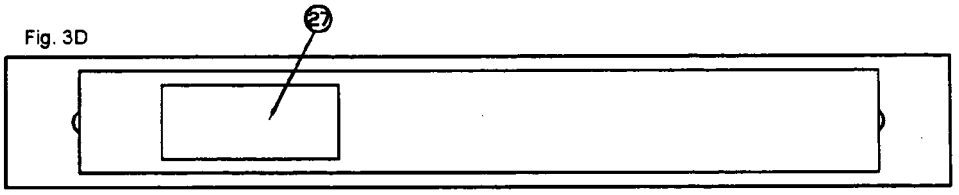


Fig. 3D



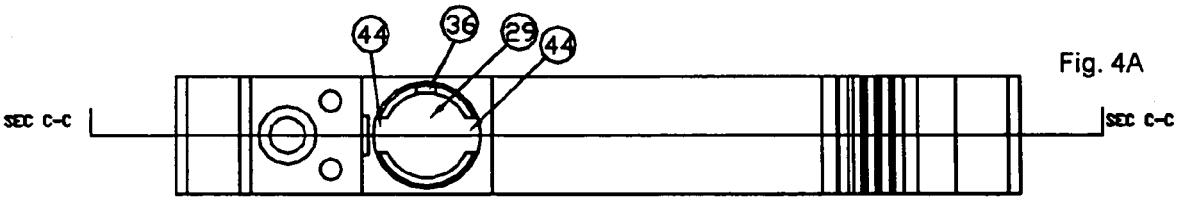


Fig. 4A

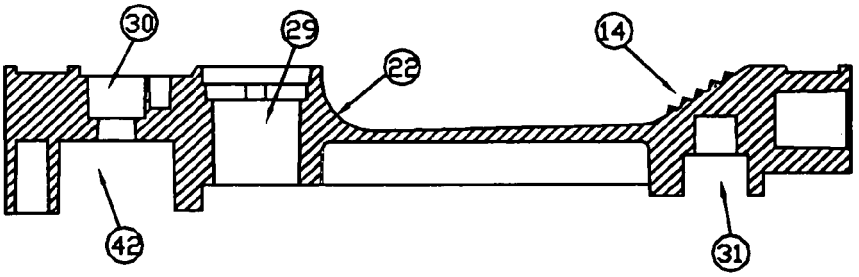


Fig. 4B

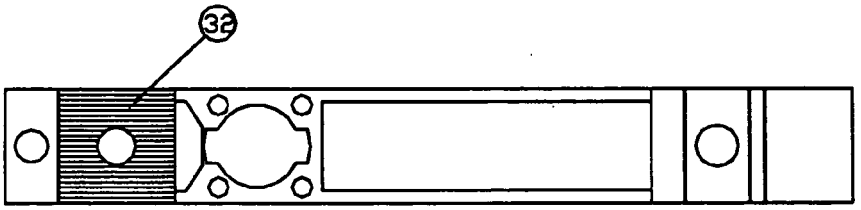


Fig. 4C

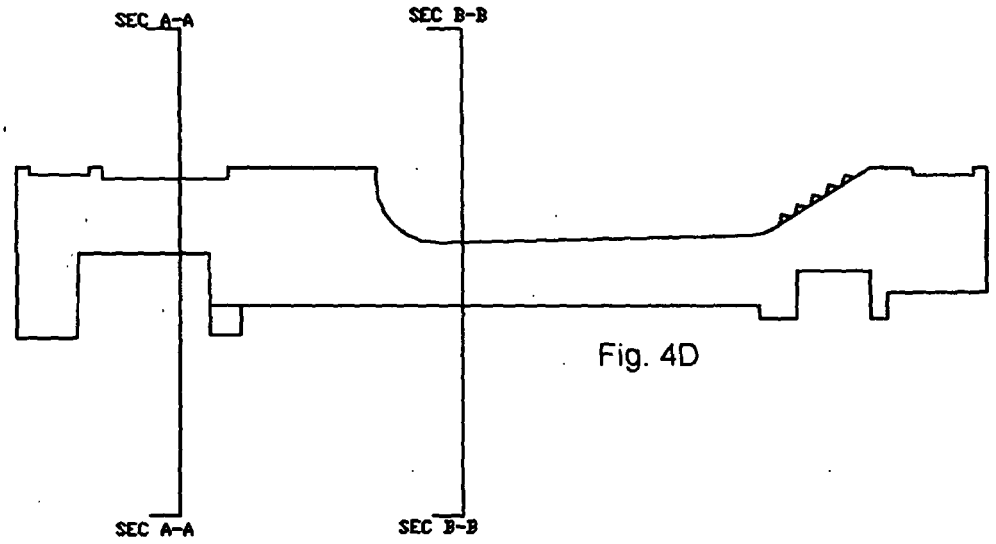


Fig. 4D

Fig. 4E

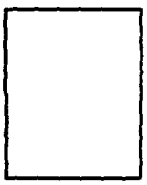


Fig. 4F

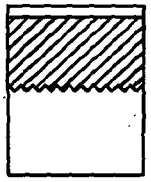


Fig. 4G

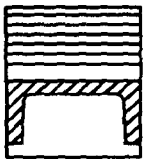
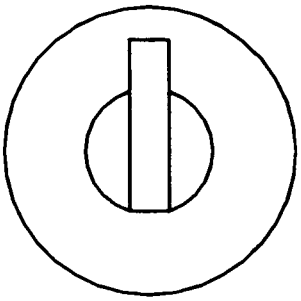


Fig. 5A



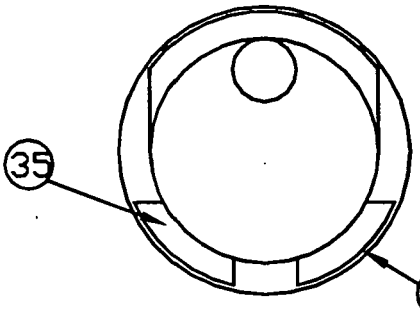
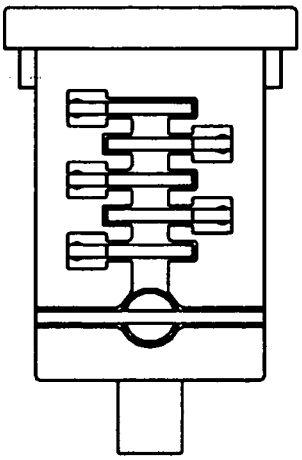


Fig. 5B

Fig. 5C



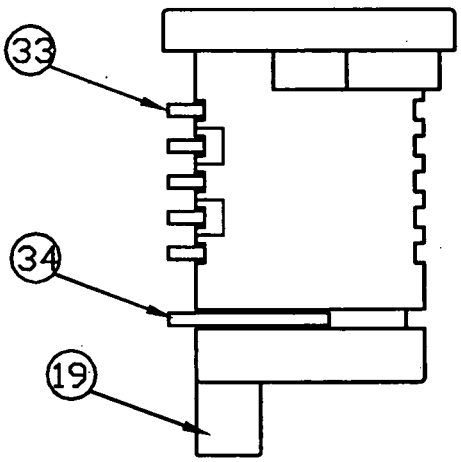


Fig. 5D

Fig. 6A

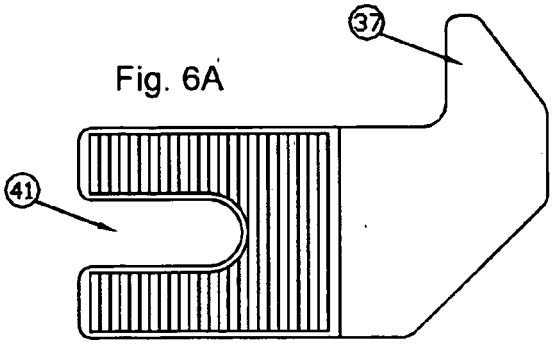


Fig. 6B

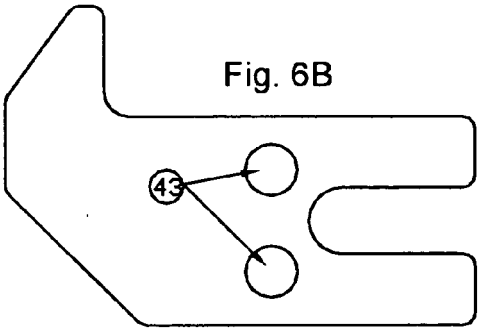
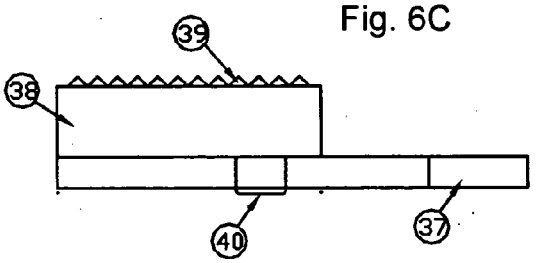


Fig. 6C



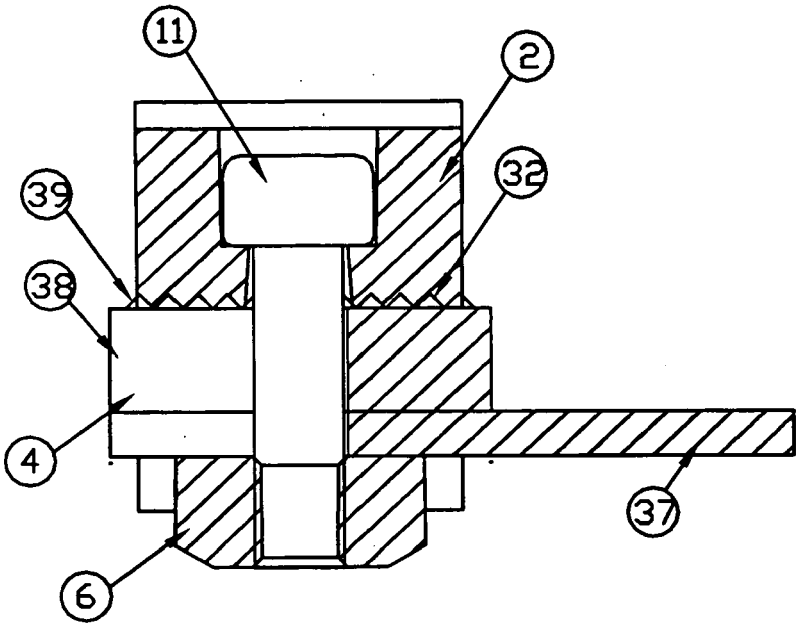


Fig. 7

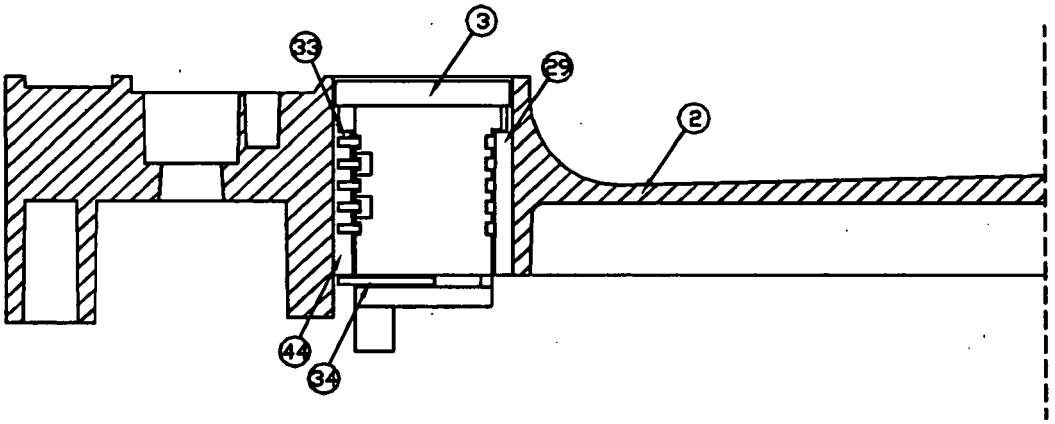


Fig. 8

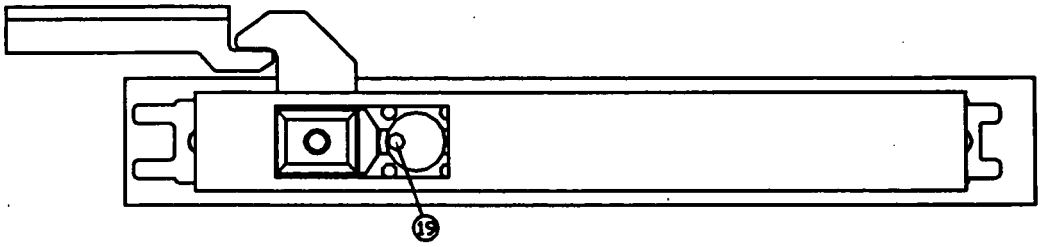


Fig. 9

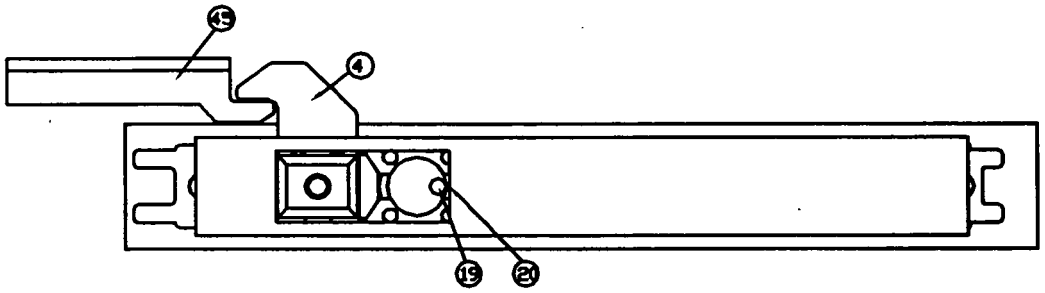


Fig. 10

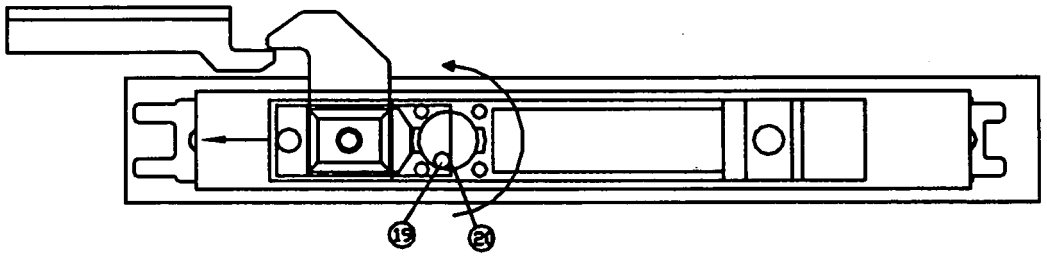


Fig. 11