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(54) **LATCH BOLT AND LATCH ASSEMBLY**

VERRIEGELUNGSBOLZEN UND RIEGELANORDNUNG

PÊNE DEMI-TOUR ET ENSEMBLE VERROU

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Description

[0001] This invention relates to a latch bolt and to a latch assembly including such a latch bolt. The invention is particularly, but not exclusively, concerned with what are known as "panic" latching arrangements.

[0002] It is well known to provide a panic latching arrangement on a door, to allow people to open the door, for example, by pressing on an activation bar mounted across the inside of the door. The door may be latched in a closed position by locking rods extending vertically from the region of the activation bar to the top and bottom of the door and/or by a latch bolt extending sideways into a door frame at approximately the same height as the activation bar. A mechanism is required to cause the pressing of the bar to release the locking rods and/or latch bolt. Typically, the latch bolt is resiliently biased into an extended latching position in which it is in a keep with a front release face of the latch engageable with the keep to prevent opening of the door; the latch bolt is retractable against the resilient bias, when the activation bar is pressed, to a position where it no longer engages in the keep; also, on closing the door with the latch bolt in its extended position a rear latch face of the latch bolt desirably engages a door strike plate or the like and is thereby driven into the retracted position against its resilient bias to allow the latch bolt to pass into the doorway past a forward edge of the keep and thereafter move into its extended position with the latch bolt in the keep. It is desirable that the movement of the latch bolt is consistent and smooth.

[0003] EP1061209A1 discloses a lock fitting comprising a bolt shank wherein the shank is covered by an insert which absorbs the noise of the bolt shank clashing with the strike plate.

[0004] It is an object of the invention to provide an improved latch bolt in which retraction of the latch bolt when returning towards the keep is facilitated, and in which a smooth release of the latch bolt when retracted out of the keep is facilitated.

[0005] It is another object of the invention to provide a latch assembly including such a latch bolt.

[0006] According to the invention there is provided a latch bolt comprising a front release face for engaging a keep when the latch bolt is in a latching position to effect latching and a rear latch face which includes a distal portion that is inclined to provide a taper towards a distal end of the latch bolt, wherein the rear latch face has a ridged portion that extends outwardly towards the distal end of the bolt partway between the top and bottom of the bolt and projects further outward from the rear latch face than the remaining part of the rear latch face, wherein the front release face projects forwardly further along its top and bottom edge regions than therebetween.

[0007] We have found that by providing the outwardly extending ridged portion on the rear latch face, the smooth retraction of the latch bolt when returning towards the keep is facilitated.

[0008] In accordance with the invention, the front release face projects forwardly further along its top and bottom edge regions than therebetween. With such an arrangement, the smooth release of the latch bolt when retracted out of a keep is facilitated, even if there is some pressure exerted on the keep by the front release face as may arise especially when the latch is being released in an emergency.

[0009] It will be understood that the bolt will usually be mounted on the side edge of a door with the rear latch face disposed in an upright plane. It is in that usual application that the "top" and "bottom" of the bolt are so positioned; nonetheless, it is of course possible for the bolt of the invention to be used in another orientation. Also, it should be understood that in this specification the "front" face of the latch bolt is to be regarded as the face that faces generally in the direction of movement of the latch when a door or the like is opened, and the rear face is to be regarded as the face that faces generally in the direction of movement of the latch when a door or the like is closed.

[0010] The ridged portion preferably extends outwardly towards the distal end approximately midway between the top and bottom of the bolt.

[0011] The ridged portion is preferably of curved cross-section. There may then be a single point contact of the latch bolt with the keep as the bolt is returning towards the keep and that encourages smooth retraction of the bolt. The curved cross-section is preferably symmetrical about a centre-line. Preferably the curving is continuous. Preferably the curving is smooth.

[0012] Preferably, the portions of the front latch face on either side of the ridged portion are substantially flat. The portions on opposite sides of the same part of the ridged portion are preferably coplanar.

[0013] The ridged portion preferably extends to the distal edge of the latch bolt.

[0014] The latch face may have a flat face that lies substantially within a single plane but in a preferred construction the latch face has a root portion and a distal portion inclined to the root portion and tapering towards the front release face. The distal portion is preferably in a plane inclined to the direction of movement of the latch bolt between its latching and released positions. The root portion is preferably in a plane parallel to the direction of movement of the latch bolt between its latching and released positions. The ridged portion preferably extends outwardly over at least a portion of both the root portion and the distal portion of the latch face. The ridged portion preferably extends over the whole length of the distal portion of the latch face. The ridged portion may extend over the whole length of the root portion of the latch face.

[0015] It is within the scope of the invention for the ridged portion to comprise a plurality of separate ridged portions, which may be aligned in end-to-end relationship, but in a preferred embodiment described with reference to the drawings the ridged portion is continuous.

[0016] The front release face is preferably of generally

concave shape to provide the top and bottom edge regions that project further forwardly. In that case the front release face can be provided with a smooth profile.

[0017] The front release face may have a root portion and a distal portion inclined to the root portion and tapering towards the rear latch face. The distal portion is preferably in a plane inclined to the direction of movement of the latch bolt between its latching and released positions. The root portion is preferably in a plane parallel to the direction of movement of the latch bolt between its latching and released positions. The distal portion of the front release face preferably projects forwardly further along its top and bottom edge regions than therebetween. The root portion of the front release face preferably projects forwardly further along its top and bottom edge regions than therebetween.

[0018] The latch bolt preferably has a root portion of substantially constant thickness and a distal portion that tapers from the root portion to a distal edge. The interface of the distal portion and the root portion of the rear latch face and/or the interface of the distal portion and the root portion of the front release face may be in the region of the plane of the interface of the distal portion and the root portion of the latch bolt.

[0019] The latch bolt may further include a mounting portion extending in a direction away from the distal end of the latch bolt for mounting the latch bolt for linear movement between its latching and released positions. The mounting portion may include a rearwardly projecting spigot for ensuring that the bolt is maintained in the desired alignment.

[0020] Usually it will be most economical for the latch bolt to be made in one piece but it should be understood that it may be made from a plurality of separate parts connected together.

[0021] The present invention further provides a latch bolt as defined above and a mechanism for retracting the latch bolt from a latching position to a released position. The latch bolt may be mounted for linear movement between the latching and released positions. There may be further provided a keep for engagement in use by the latch bolt. The latch bolt may take any of the forms defined above.

[0022] The latch bolt is particularly, but not exclusively, for use in "panic" latching arrangements.

[0023] By way of example an embodiment of the invention will now be described with reference to the accompanying schematic drawings, of which:

Fig. 1 is an isometric view of a shuttle unit assembly, including a latch bolt, of a panic latching assembly;
Fig. 2 is an isometric view to a larger scale of the latch bolt;
Fig. 3 is an end view of the latch bolt; and
Fig. 4 is a bottom view of the latch bolt.

[0024] Referring first to Fig. 1, there is shown a latch bolt 1 fixed to a shuttle unit 2 which forms part of a latch

assembly of a panic latching arrangement on a door. Typically the latch assembly is mounted on the side of a door and is actuated by pressing an activation bar mounted across the inside of the door. In a first latching position of the shuttle unit 2, the latch bolt 1 projects outwards from the side edge of the door and is received in a keep. Springs 3A and 3B bias the shuttle unit 2 and the latch bolt 1 to this position in which a front releasing face of the bolt 1 engages against an adjacent part of the keep if a force is exerted tending to open the door, the engagement of the front releasing face with the keep retaining the door in a closed position. When the activation bar is pressed, a mechanism of the latch assembly causes the shuttle unit 2 to be retracted sideways in a linear direction parallel to the axes of the springs 3A and 3B retracting the latch bolt 1 and withdrawing it from the keep to allow the door to be opened. After opening, the door may be closed and, as it is closed, a rear latch face of the latch bolt 1, which is inclined to the direction of movement of the latch bolt, cammingly engages a strike on the door frame to move the latch bolt 1 against its resilient bias into a retracted position; once the latch bolt is aligned with a recess in the keep it moves outwardly into the keep due to its resilient bias. Latch assemblies of this kind are well known and, whilst one particular form of shuttle unit is shown in the drawings it will be understood that other conventional or unconventional mechanisms may be used since the nature of those mechanisms is not especially relevant to the present invention. Rather, the special features of the present invention are related to the shape of the latch bolt and that will now be described, by way of example, with reference also to Figs. 2 to 4.

[0025] The latch bolt 1 may be made in one piece and has a rear latch face 5, a front releasing face 6, a top 7, a bottom 8, a distal end 11 and a root end 12 having a rearwardly projecting spigot 13 to ensure the bolt is fitted in the correct alignment. The root end 12 is received in, and fixed in, a matching recess in the shuttle unit 2. The rear latch face 5 is divided into a root portion 5A and a distal portion 5B. Similarly, the front releasing face 6 is divided into a root portion 6A and a distal portion 6B. As can be seen most clearly in Fig. 4, the root portions 5A and 6A are parallel to one another and to the direction of movement of the latch bolt between its latched and releasing positions, but are inclined to taper towards one another along their distal portions 5B and 6B to the distal end 11.

[0026] The rear latch face 5 is provided with a ridge 14 which projects outwardly from the face 5 midway between the top 7 and the bottom 8 of the bolt and which extends continuously along the whole length of the face. The ridge 14 is of smoothly and continuously curved cross-section. The curved cross-section is symmetrical about a centre-line. The portions of the rear latch face 5A and 5B away from the ridge are flat and the portions on opposite sides of the same part of the ridge 14 are coplanar.

[0027] The front releasing face 6 is of a smoothly

curved concave shape to provide top and bottom edge regions that project further forwardly than the regions therebetween. The curving is most clearly seen in Fig. 3 where the curvature of the root portion 6A can be seen and where reference numerals 16 and 17 indicate the forwardly projecting edge regions. It should be understood that the same concave shape is provided on the distal portion 6B, as can be seen from close inspection of Fig.2.

[0028] In use, when the door on which the latch assembly is mounted is in a closed, latched position, the latch bolt 1 is in the keep and the front releasing face 6 of the latch bolt engages the keep if a force is exerted to open the door. If, for example in an emergency, the activation bar is pressed, then the latch bolt is moved out of the keep. During that movement, the distal portion 6B of the releasing face 6 slides across an adjacent part of the keep. The edge regions 16 and 17 of the releasing face 6 engage the keep and maintain the correct orientation of the latch bolt 1, and the inclination of the distal portion 6B of the releasing face to the direction of movement of the latch bolt also generates forces tending to retract the latch bolt. We have found from tests that the force needed to retract the latch bolt 1 is reduced by the concave shaping of the bolt, even if pressure is exerted on the door. After opening, when the door is closed the rear latch face 5 of the latch bolt 1 cammingly engages a strike on the door frame to move the latch bolt 1 against its resilient bias into a retracted position; once the latch bolt 1 is aligned with a recess in the keep it moves outwardly into the keep due to its resilient bias. The ridge 14 on the rear latch face 5 of the latch bolt 1 and the inclination of the distal portion 5B of the latch face 5, facilitates the smooth camming engagement of the latch bolt 1.

[0029] Accordingly, by providing a latch bolt 1 with front and rear faces 6 and 5 as described above, the reliability of both the retraction of the bolt when a door is opened and the latching of the bolt when a door is closed are enhanced.

[0030] While the invention has been described with reference to a panic latching arrangement, it should be understood that the latch bolt may also be used on other latches. Reference should be made to the claims for determining the true scope of the present invention. It will also be appreciated by the reader that integers or features of the invention that are described as preferable, advantageous, convenient or the like are optional and do not limit the scope of the independent claims.

Claims

1. A latch bolt (1) comprising a front releasing face (6) for engaging a keep when the latch bolt (1) is in a latching position to effect latching and a rear latch face (5) which includes a distal portion (5B) that is inclined to provide a taper towards a distal end (11)

of the latch bolt (1), wherein the rear latch face (5) has a ridged portion (14) that extends outwardly towards the distal end (11) of the bolt (1) partway between the top (7) and bottom (8) of the bolt and projects further outward from the rear latch face (5) than the remaining part of the rear latch face, **characterized in that** the front release face (6) projects forwardly further along its top and bottom edge regions (16, 17) than therebetween.

2. A latch bolt according to claim 1, in which the front release face (6) is of generally concave shape to provide the top and bottom edge regions (16, 17) that project further forwardly.
3. A latch bolt according to claim 1 or 2, in which the front release face (6) has a root portion (6A) and a distal portion (6B) inclined to the root portion (6A) and tapering towards the rear latch face (5).
4. A latch bolt according to claim 3, in which the distal portion (6B) of the front release face (6) is in a plane inclined to the direction of movement of the latch bolt (1) between its latching and released positions.
5. A latch bolt according to claim 3 or 4, in which the distal portion (6B) of the front release face (6) projects forwardly further along its top and bottom edge regions (16, 17) than therebetween.
6. A latch bolt according to claim 4 or 5, in which the root portion (6A) of the front release face (6) projects forwardly further along its top and bottom edge regions (16, 17) than therebetween.
7. A latch bolt according to any preceding claim, in which the ridged portion (14) extends outwardly towards the distal end approximately midway between the top (7) and bottom (8) of the bolt.
8. A latch bolt according to any preceding claim, in which the ridged portion (14) is of curved cross-section and the portions of the rear latch face (5) on either side of the ridged portion (14) are substantially flat.
9. A latch bolt according to any preceding claim, in which the ridged portion (14) extends to the distal edge of the latch bolt (1).
10. A latch bolt according to any preceding claim, in which the rear latch face (5) has a root portion (5A) and a distal portion (5B) inclined to the root portion and tapering towards the front release face.
11. A latch bolt according to claim 10, in which the distal portion (5B) is in a plane inclined to the direction of movement of the latch bolt between its latching and

released positions.

12. A latch bolt according to claim 10 or 11, in which the ridged portion (14) extends outwardly over at least a portion of both the root portion (5A) and the distal portion (5B) of the rear latch face (5).
13. A latch bolt according to any preceding claim, in which the latch bolt (1) has a root portion of substantially constant thickness and a distal portion that tapers from the root portion to a distal edge.
14. A latch assembly including a latch bolt (1) according to any preceding claim and a mechanism (2) for retracting the latch bolt (1) from a latching position to a released position.
15. An assembly according to claim 14, in which the latch bolt (1) is mounted for linear movement between its latching and released positions.

Patentansprüche

1. Riegelbolzen (1), umfassend eine vordere Entriegelungsseite (6) zum Eingriff in ein Schließblech, wenn der Riegelbolzen (1) sich in einer verriegelnden Position befindet, um eine Verriegelung zu bewirken, und eine hintere Verriegelungsseite (5), die einen distalen Teil (5B) umfasst, der abgeschrägt ist, um eine Verjüngung zu einem distalen Ende (11) des Riegelbolzens (1) hin bereitzustellen, wobei die hintere Verriegelungsseite (5) einen gerippten Teil (14) besitzt, der sich am Weg zwischen der Oberseite (7) und der Unterseite (8) des Bolzens nach außen zum distalen Ende (11) des Bolzens (1) hin erstreckt und von der hinteren Verriegelungsseite (5) weiter nach außen ragt als der restliche Teil der hinteren Verriegelungsseite, **dadurch gekennzeichnet, dass** die vordere Entriegelungsseite (6) entlang ihrer oberen und unteren Randbereiche (16, 17) weiter vorspringt als dazwischen.
2. Riegelbolzen gemäß Anspruch 1, wobei die vordere Entriegelungsseite (6) eine im Allgemeinen konkave Form besitzt, um die oberen und unteren Randbereiche (16, 17) bereitzustellen, die weiter vorspringen.
3. Riegelbolzen gemäß Anspruch 1 oder 2, wobei die vordere Entriegelungsseite (6) einen Fußteil (6A) und einen distalen Teil (6B), der zum Fußteil (6A) abgeschrägt ist und sich zur hinteren Verriegelungsseite (5) hin verjüngt, besitzt.
4. Riegelbolzen gemäß Anspruch 3, wobei der distale Teil (6B) der vorderen Entriegelungsseite (6) in einer Ebene zur Richtung der Bewegung des Riegelbol-

zens (1) zwischen dessen verriegelnden und entriegelten Positionen abgeschrägt ist.

5. Riegelbolzen gemäß Anspruch 3 oder 4, wobei der distale Teil (6B) der vorderen Entriegelungsseite (6) entlang seiner oberen und unteren Randbereiche (16, 17) weiter vorspringt als dazwischen.
6. Riegelbolzen gemäß Anspruch 4 oder 5, wobei der Fußteil (6A) der vorderen Entriegelungsseite (6) entlang seiner oberen und unteren Randbereiche (16, 17) weiter vorspringt als dazwischen.
7. Riegelbolzen gemäß einem vorhergehenden Anspruch, wobei der gerippte Teil (14) sich etwa auf halbem Weg zwischen der Oberseite (7) und der Unterseite (8) des Bolzens nach außen zum distalen Ende hin erstreckt.
8. Riegelbolzen gemäß einem vorhergehenden Anspruch, wobei der gerippte Teil (14) einen gekrümmten Querschnitt besitzt und die Teile der hinteren Verriegelungsseite (5) an beiden Seiten des gerippten Teils (14) im Wesentlichen flach sind.
9. Riegelbolzen gemäß einem vorhergehenden Anspruch, wobei der gerippte Teil (14) sich zum distalen Rand des Riegelbolzens (1) hin erstreckt.
10. Riegelbolzen gemäß einem vorhergehenden Anspruch, wobei die hintere Verriegelungsseite (5) einen Fußteil (5A) und einen distalen Teil (5B), der zum Fußteil abgeschrägt ist und sich zur vorderen Entriegelungsseite hin verjüngt, besitzt.
11. Riegelbolzen gemäß Anspruch 10, wobei der distale Teil (5B) in einer Ebene zur Richtung der Bewegung des Riegelbolzens zwischen dessen verriegelnden und entriegelten Positionen abgeschrägt ist.
12. Riegelbolzen gemäß Anspruch 10 oder 11, wobei der gerippte Teil (14) sich über wenigstens einen Teil sowohl des Fußteils (5A) als auch des distalen Teils (5B) der hinteren Verriegelungsseite (5) nach außen erstreckt.
13. Riegelbolzen gemäß einem vorhergehenden Anspruch, wobei der Riegelbolzen (1) einen Fußteil mit im Wesentlichen konstanter Dicke und einen distalen Teil, der sich vom Fußteil zu einem distalen Rand verjüngt, besitzt.
14. Riegelbolzeneinheit, die einen Riegelbolzen (1) gemäß einem vorhergehenden Anspruch und einen Mechanismus (2) zum Zurückziehen des Riegelbolzens (1) von einer verriegelnden Position in eine entriegelte Position umfasst.

15. Einheit gemäß Anspruch 14, wobei der Riegelbolzen (1) für eine lineare Bewegung zwischen seinen verriegelnden und entriegelnden Positionen gelagert ist.

Revendications

1. Pêne demi-tour (1) comprenant une face de libération avant (6) destinée à venir en prise avec un élément de retenue lorsque le pêne demi-tour (1) se trouve dans une position de verrouillage pour effectuer un verrouillage, et une face de verrouillage arrière (5) qui comprend une partie distale (5B) qui est inclinée afin de fournir une conicité vers une extrémité distale (11) du pêne demi-tour (1), où la face de verrouillage arrière (5) présente une partie striée (14) qui s'étend vers l'extérieur vers l'extrémité distale (11) du pêne (1) en partie entre le dessus (7) et le dessous (8) du pêne, et fait davantage saillie vers l'extérieur à partir de la face de verrouillage arrière (5), que la partie restante de la face de verrouillage arrière, **caractérisé en ce que** la face de libération avant (6) fait davantage saillie vers l'avant le long de ses régions de bords haut et bas (16, 17) qu'entre celles-ci.
2. Pêne demi-tour selon la revendication 1, dans lequel la face de libération avant (6) présente une forme généralement concave pour fournir les régions de bords haut et bas (16, 17) qui font davantage saillie vers l'avant.
3. Pêne demi-tour selon la revendication 1 ou 2, dans lequel la face de libération avant (6) présente une partie racine (6A) et une partie distale (6B) inclinée vers la partie racine (6A) et s'amincissant vers la face de verrouillage arrière (5).
4. Pêne demi-tour selon la revendication 3, dans lequel la partie distale (6B) de la face de libération avant (6) se situe dans un plan incliné par rapport à la direction du déplacement du pêne demi-tour (1) entre ses positions de verrouillage et de libération.
5. Pêne demi-tour selon la revendication 3 ou 4, dans lequel la partie distale (6B) de la face de libération avant (6) fait davantage saillie vers l'avant le long de ses régions de bords haut et bas (16, 17) qu'entre celles-ci.
6. Pêne demi-tour selon la revendication 4 ou 5, dans lequel la partie racine (6A) de la face de libération avant (6) fait davantage saillie vers l'avant le long de ses régions de bords haut et bas (16, 17) qu'entre celles-ci.
7. Pêne demi-tour selon l'une quelconque des revendications précédentes, dans lequel la partie striée

(14) s'étend vers l'extérieur vers l'extrémité distale approximativement à mi-chemin entre le dessus (7) et le dessous (8) du pêne.

8. Pêne demi-tour selon l'une quelconque des revendications précédentes, dans lequel la partie striée (14) présente une section transversale incurvée, et les parties de la face de verrouillage arrière (5) des deux côtés de la partie striée (14), sont sensiblement plates.
9. Pêne demi-tour selon l'une quelconque des revendications précédentes, dans lequel la partie striée (14) s'étend vers le bord distal du pêne demi-tour (1).
10. Pêne demi-tour selon l'une quelconque des revendications précédentes, dans lequel la face de verrouillage arrière (5) présente une partie racine (5A) et une partie distale (5B) inclinée vers la partie racine, et s'amincissant vers la face de libération avant.
11. Pêne demi-tour selon la revendication 10, dans lequel la partie distale (5B) se situe dans un plan incliné par rapport à la direction du déplacement du pêne demi-tour entre ses positions de verrouillage et de libération.
12. Pêne demi-tour selon la revendication 10 ou 11, dans lequel la partie striée (14) s'étend vers l'extérieur sur une partie au moins de la partie racine (5A) et de la partie distale (5B) de la face de verrouillage arrière (5).
13. Pêne demi-tour selon l'une quelconque des revendications précédentes, dans lequel le pêne demi-tour (1) présente une partie racine dont l'épaisseur est sensiblement constante, et une partie distale qui s'amincit à partir de la partie racine vers un bord distal.
14. Ensemble verrouillage comprenant un pêne demi-tour (1) selon l'une quelconque des revendications précédentes, et un mécanisme (2) destiné à rétracter le pêne demi-tour (1) à partir d'une position de verrouillage vers une position de libération.
15. Ensemble selon la revendication 14, dans lequel le pêne demi-tour (1) est monté pour un déplacement linéaire entre ses positions de verrouillage et de libération.

FIG. 1

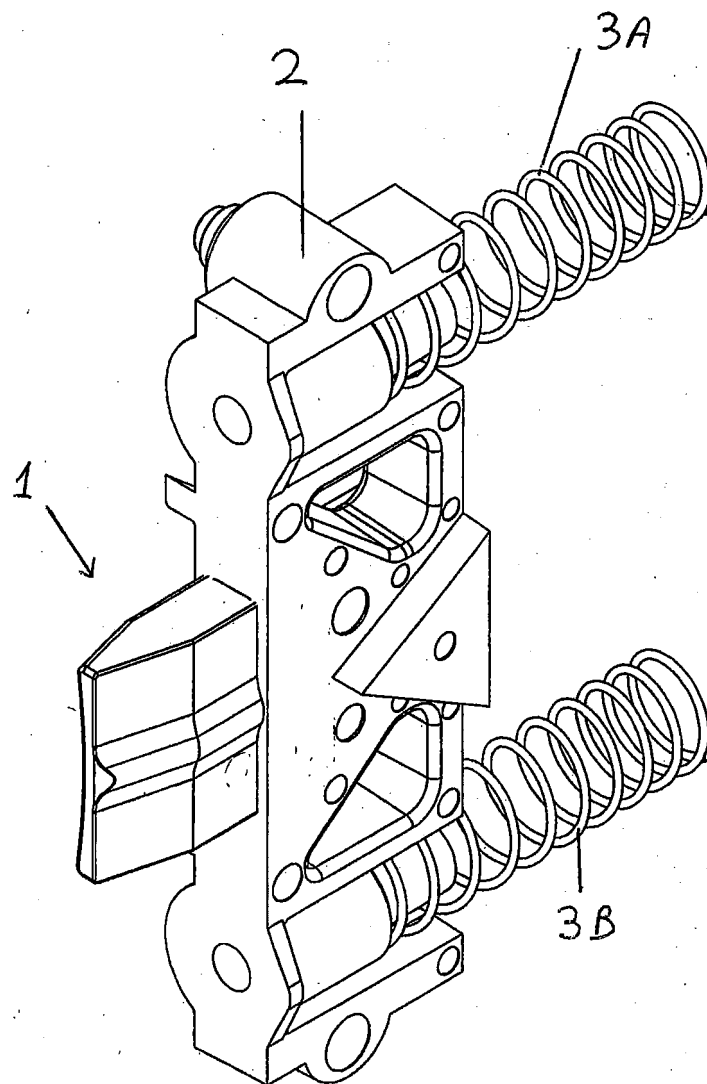


FIG. 2

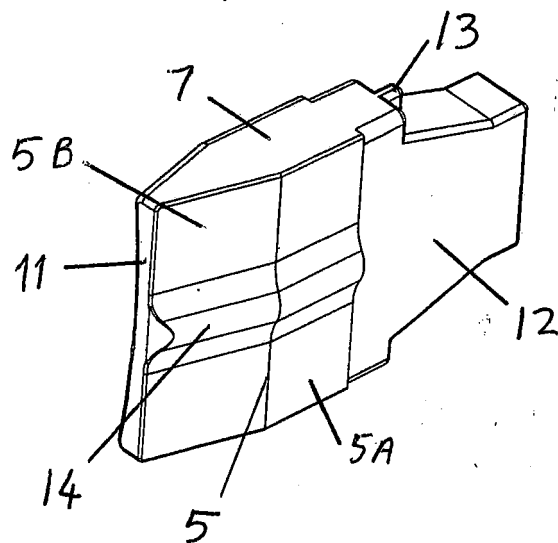


FIG. 3

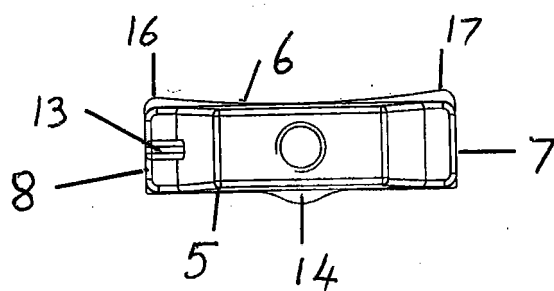
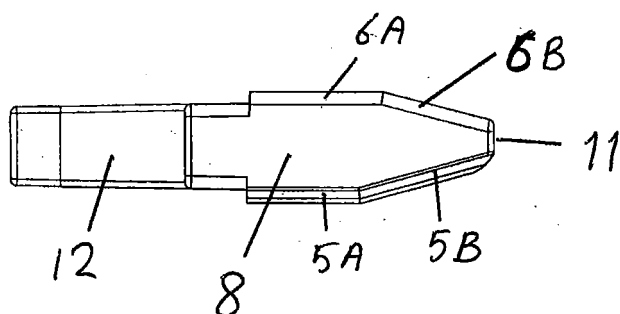


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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