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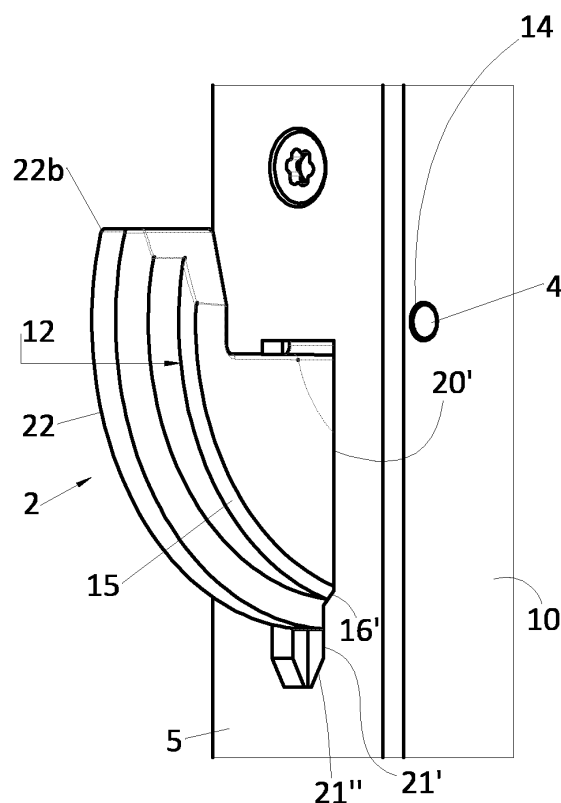
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(54) **HIGHLY BURGLARY-RESISTANT MORTISE LOCK FOR DOOR AND WINDOW**

(57) The mortise lock (1) for a window or door, comprising at least one swinging hook latch (2) and a case (3) for housing the latch (2) having a front plate (5) having a vertical slot (6) for reversible transit of the latch (2) from a position retracted in the case (3) for opening the window or door to a position extracted from the case (3) for closing the window or door, wherein the case (3) supports a hor-

izontal articulation pin (4) for articulating the latch (2), and wherein anti-burglary means are provided comprising a shaped part (12) of the latch (2) configured to couple with mechanical interference to a shaped part (13) of the vertical slot (6) in the event of a break-in involving mechanical failure in the vertical direction of the articulation pin (4).



**Fig 5c**

## Description

**[0001]** The present invention relates to a mortise lock for window or door with high burglary resistance. The mortise lock subject matter of the invention comprises at least one swinging hook latch and a latch case having a front plate having a vertical slot for reversible transit of the latch from a position retracted in the case for opening the window or door to a position extracted from the case for closing the window or door.

**[0002]** There are numerous variants of mortise locks of the above-mentioned type, which can have one or more locking points and which can find applications in a variety of sectors, for example in the area of exterior fittings such as gates and shutters.

**[0003]** Locks of the above type can provide in the simplest versions a single locking point defined by a single swing-hook latch, and in the more advanced versions two or more locking points, defined for example by two swing-hook latch, possibly assisted by two vertically translating tip latches. Security against break-ins can sometimes be inadequate, especially in less advanced versions of locks.

**[0004]** In order to improve security against break-ins, special anti-burglary systems can be integrated into the locks. However, these generally consist of dedicated parts that contribute to increasing the complexity of the locks, which has a negative impact on production costs, whether due to the increased number of components, longer assembly times, or complicated warehouse logistics.

**[0005]** The technical task that the present invention proposes is, therefore, to realise a mortise lock of the type described above that eliminates the complained of technical drawbacks of the known technique.

**[0006]** In the context of this technical task, one aim of the invention is to realise a mortise lock of the type described above that improves burglary resistance without complications in construction.

**[0007]** Another purpose of the invention is to realise a mortise lock of the type described above that improves break-in resistance without increasing production costs.

**[0008]** The technical task, as well as these and other purposes, according to the present invention are achieved by making a mortise lock for a window or door, comprising at least one swinging hook latch and a latch case provided with a front plate having a vertical slot for reversibly transit of said latch from a position retracted in said case for opening said window or door to a position extracted from said case for closing said window or door, wherein said case supports a horizontal articulation pin of said latch, characterised by comprising anti-burglary means comprising a shaped part of said latch configured to couple with mechanical interference to a shaped part of said vertical slot in the event of a break-in involving mechanical failure in a vertical direction of said articulation pin.

**[0009]** Advantageously, in a preferred embodiment of

the invention, in an extracted position of the latch said shaped part of said latch is juxtaposed to said shaped part of said slot.

**[0010]** In this way, at the slightest failure of the latch, the anti-burglary means are activated thanks to the mechanical interference that is immediately created between said shaped part of said latch and said shaped part of said slot.

**[0011]** Typically, a failure in the vertical direction of the articulation pin of the order of 1 mm or even less may already be sufficient for the activation of anti-burglary means.

**[0012]** In a preferred embodiment of the invention said shaped part of said latch and said shaped part of said slot have a conjugate profile.

**[0013]** In this way, the interlocking between said shaped part of said latch and said shaped part of said slot can be much firmer and generally the firmer the greater the vertical break-in force to which the latch is subjected.

**[0014]** The interlock between the two shaped parts can thus be made irreversible.

**[0015]** In a preferred embodiment of the invention said shaped part of said latch comprises at least one shoulder of said latch and said shaped part of said slot comprises a narrowing of said slot.

**[0016]** The present invention also discloses a method of counteracting the break-in of a mortise lock for door and window comprising at least one swinging hook latch and a latch case provided with a front plate having a vertical slot for reversibly transiting the latch from a position retracted in the case for opening the door or window to a position extracted from the case for closing the door or window, wherein said case supports a horizontal articulation pin for articulating said latch, characterised in that said latch and said vertical slot are provided with shaped parts configured to couple with mechanical interference with said latch in the extracted position in order to lock said latch in the extracted position in the event of a break-in resulting in mechanical failure of said articulation pin.

**[0017]** Other features of the present invention are also defined in subsequent claims.

**[0018]** Further features and advantages of the invention will become more apparent from the description of a preferred but non-exclusive form of execution of the mortise lock according to the invention, illustrated by way of indication and not limitation in the accompanying drawings, in which

Figure 1 shows a side elevation view of the lock with latches in the retracted position in the case in normal use of the lock;

Figure 1a shows a front view of the lock with latches in the retracted position in the case in normal use of the lock;

Figure 2 shows a side elevation view of the lock with latches in the extracted position from the case in nor-

mal use of the lock;

Figure 2a shows a frontal view of the lock with latches in the extracted position from the case in normal use of the lock;

Figures 3a and 3b show in side elevation and plan view respectively a swinging hook latch;

Figure 4 shows a front view of a lock case front plate detail;

Figures 5a, 5b and 5c show, respectively, a frontal, side elevation and perspective view of a detail of the lock front plate with the swinging hook latch in the extracted position from the case in normal use of the lock;

Figures 6a, 6b and 6c show respectively a frontal, side elevation and perspective view of a detail of the front plate of the lock with the swinging hook latch in a position extracted from the case but locked in the vertical slot of the front plate as a result of a break-in that resulted in a mechanical failure of the articulation pin.

**[0019]** With reference to the above-mentioned figures, a mortise lock for door and window is shown, indicated overall by reference number 1.

**[0020]** Lock 1 includes at least one swinging hook latch 2 and a case 3 for housing the swinging hook latch 2.

**[0021]** Case 3 supports a horizontal articulation pin 4 for the swinging hook latch 2.

**[0022]** Case 3 is fitted with a front plate 5 having a vertical slot 6 for reversible transit of the swinging hook latch 2 from a retracted position in case 3 for opening the door or window to a position extracted from case 3 for closing the door or window.

**[0023]** Case 3 also has a rear wall 7, a lower wall 8, an upper wall 9 and two vertical sides 10, one right and one left.

**[0024]** The articulation pin 4 is attached to holes 14 drilled in the two vertical sides 10 of the case 3.

**[0025]** In the basic version, lock 1 includes a single swinging hook latch 2.

**[0026]** Lock 1 can of course comprise several locks of similar or even different types.

**[0027]** For example, as illustrated, lock 1 may comprise two swinging hook latches 2 swinging in opposite directions.

**[0028]** Each swinging hook latch 2 can transit reversibly through a corresponding vertical slot 6 of the front plate 5 of the case 3 by pivoting around its horizontal articulation pin 4 from the retracted position to the extracted position from the case 3.

**[0029]** Lock 1 may also include, as shown, two vertically oppositely translating tip latches 11, an upper one that can be extracted from the upper wall 9 of case 3 and a lower one that can be extracted from the lower wall 8 of case 3.

**[0030]** Finally, lock 1 includes a synchronised latch control mechanism 2, 11 which includes a cylinder with a key and possibly a handle.

**[0031]** This control mechanism may be of a known type and will therefore not be described.

**[0032]** Latches 2, 11 can be operated by turning the key in the cylinder or by turning the handle, if provided.

**[0033]** If a handle is provided, latches 2, 11 can be operated by turning the handle and the key in the cylinder can be turned to lock the handle.

**[0034]** Lock 1 advantageously provides anti-burglary means comprising a shaped part 12 of the swinging hook latch 2 configured to couple with mechanical interference the swinging hook latch 2 in the extracted position with a shaped part 13 of the vertical slot 6 of the front plate 5 in the event of a break-in resulting in a mechanical failure of the horizontal articulation pin 4.

**[0035]** Preferably such anti-burglary means are provided for each swinging hook latch 2 with which lock 1 is equipped.

**[0036]** Typically, such anti-burglary means counteract the break-in of the lock 1, which is manifested by a vertical break-in force F exerted on the swinging hook latch 2 in the sense that it retracts into the case 3.

**[0037]** This break-in force F, if of adequate intensity, can cause mechanical failure of the horizontal articulation pin 4 and more specifically failure of the holes 14 in the vertical sides 10 of the case 3 that support the ends of the horizontal articulation pin 4.

**[0038]** In particular, these holes 14 can be slotted in the vertical direction, resulting in a vertical displacement S of the articulation pin 4.

**[0039]** Advantageously, the shaped part 12 of the swinging hook latch 2 and the shaped part 13 of the vertical slot 6 of the front plate 5 are juxtaposed, i.e. they are positioned substantially flush with each other so that they can couple with mechanical interference immediately at the first sign of mechanical failure of the horizontal articulation pin 4.

**[0040]** Even better, the shaped part 12 of the swinging hook latch 2 and the shaped part 13 of the vertical slot 6 of the front plate 5 have a conjugate profile.

**[0041]** In this way, the shaped part 12 of the swinging hook latch 2 can better penetrate and interlock with the shaped part 13 of the vertical slot 6 of the front plate 5, thus securely and permanently locking the door or window.

**[0042]** In construction, the shaped part 12 of the swinging hook latch 2 comprises at least one shoulder 15 of the swinging hook latch 2 and the shaped part 13 of the vertical slot 6 of the front plate 5 comprises a narrowing 16 of the vertical slot 6 of the front plate 5.

**[0043]** Shoulder 15 extends over a side 17 of the swinging hook latch 2 and demarcates the boundary between a first thicker sector 18 of the swinging hook latch 2 interlocked with articulation pin 4 and a second thinner sector 19 of the swinging hook latch 2.

**[0044]** Preferably two shoulders 15, one on each side 17 of the swinging hook latch 2, are foreseen.

**[0045]** Shoulder 15 more precisely extends along an arc of circumference with centre at the articulation pin 4.

[0046] In practice, the first sector 18 with greater thickness is essentially a circular sector while the second sector 19 with lesser thickness, radially external to the first sector 18 with greater thickness with respect to articulation pin 4, extends from the shoulder 15 to a curved front free edge 22 of the swinging hook latch 2.

[0047] The vertical slot 6 of the front plate 5 comprises a first vertical section 20 for the transit of the first sector 18 of the swinging hook latch 2 and a second vertical section 21 for the transit of the second sector 19 of the swinging hook latch 2 connected by the narrowing 16 where the shoulder 15 of the swinging hook latch 3 passes.

[0048] The first vertical section 20 of vertical slot 6 of front plate 5 has width  $W_1$  in the horizontal direction and height  $H_1$  in the vertical direction.

[0049] The second vertical section 21 of the vertical slot 6 of front plate 5 has width  $W_2$  in the horizontal direction and height  $H_2$  in the vertical direction.

[0050] The narrowing 16 of the vertical slot 6 of the front plate 5 has height  $H_3$  in the vertical direction and width  $W_3$  in the horizontal direction which varies in the vertical direction.

[0051] The width  $W_2$  of the second vertical section 21 of vertical slot 6 is less than the width  $W_1$  of the first vertical section 20 of vertical slot 6 of front plate 5.

[0052] The narrowing 16 of the vertical slot 6 of the front plate 5 is bounded by opposite oblique walls 16' of the vertical slot 6 of the front plate 5 which connect the two sections 20, 21 with different widths  $W_1$ ,  $W_2$  of the vertical slot 6 of the front plate 5.

[0053] The height  $H_2$  of the second vertical section 21 of vertical slot 6 of front plate 5 is lower than the height  $H_1$  of the first vertical section 20 of vertical slot 6 of front plate 5 but higher than the height  $H_3$  of the narrowing 16 of vertical slot 6 of front plate 5.

[0054] In the specific case, the first vertical section 20 of the vertical slot 6 of the front plate 5 is bounded by vertical side walls 20' of the vertical slot 6 of the front plate 5 defining a constant width  $W_1$  throughout the extension in height  $H_1$  while the second vertical section 21 of the vertical slot 6 of the front plate 5 is bounded by side walls of the vertical slot 6 of the front plate 5 having opposing vertical upper sections 21' defining a constant width  $W_2$  and opposing oblique lower sections 21' defining a decreasing width  $W_2$ .

[0055] The second sector 19 of the swinging hook latch 2 has a curved front free edge 22 having a radial distance D from the articulation pin 4 increasing from its rear edge 22a to its front edge 22b.

[0056] This is appropriate in order to have a very high maximum overhang A of the swinging hook latch 2 in the extracted position from case 3 in order to consolidate the locking of the window or door and at the same time a small overhang of the swinging hook latch 2 in the retracted position in case 3 in order to be able to limit the depth P of case 3, i.e. the distance between the front plate 5 and the rear wall 7 of case 3.

[0057] The method of counteracting forced entry on a swinging hook latch 2 which results in mechanical failure in the vertical direction of its articulation pin 4, therefore involves promoting coupling with mechanical interference between the two shaped parts 12, 13 with swinging hook latch 2 in the extracted position.

[0058] In practice, if one compares figures 5c and 6c, it is evident that due to the effect of the break-in the latch 2 in the extracted position moves downwards and during this downward movement the shoulder 15 initially impinges against the opposite oblique walls 16' of the vertical slot 6 of the front plate 5 and then progressively wedges between them possibly deforming them.

[0059] This automatically locks the lock with the swinging hook latch 2 in the extracted position and prevents the attacker from gaining access to the room protected by the lock.

[0060] The mortise lock thus conceived is susceptible to numerous modifications and variations, all within the scope of the inventive concept; moreover, all details can be replaced by technically equivalent elements.

[0061] In practice, the materials used, as well as the dimensions, can be any according to requirements and the state of the art.

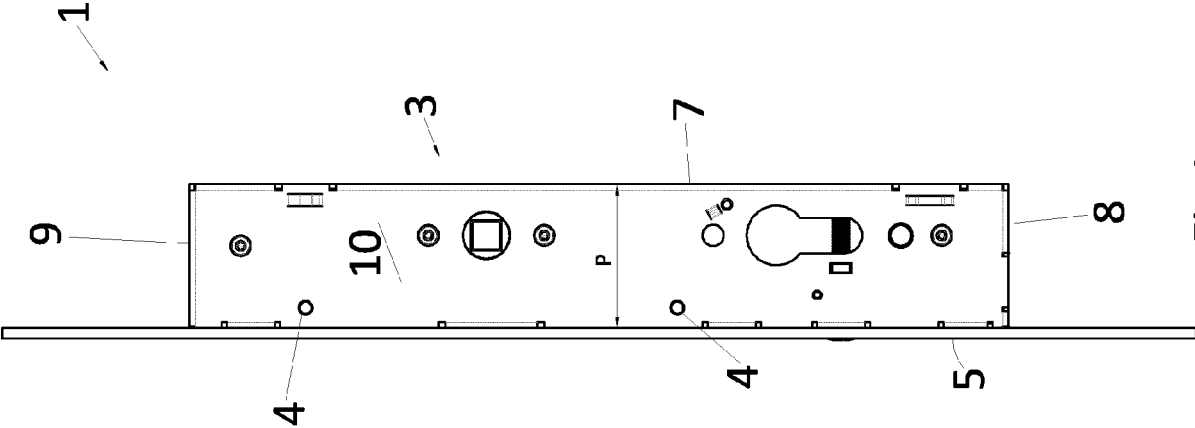
## Claims

1. A mortise lock (1) for a window or door, comprising at least one swinging hook latch (2) and a case (3) for housing said latch (2) provided with a front plate (5) having a vertical slot (6) for reversibly transit of said latch (2) from a position retracted in said case (3) for opening the window or door to a position extracted from said case (3) for closing the window or door, wherein said case (3) supports a horizontal articulation pin (4) for articulating said latch (2), **characterised by** comprising anti-burglary means comprising a shaped part (12) of said latch (2) configured to couple with mechanical interference to a shaped part (13) of said vertical slot (6) in the event of a break-in involving a mechanical failure in a vertical direction of said articulation pin (4).
2. A mortise lock (1) for a window or door according to claim 1, **characterised in that** in the extracted position of said latch (2) said shaped part (12) of said latch (2) is juxtaposed to said shaped part (13) of said slot (6).
3. A mortise lock (1) for a window or door according to any preceding claim, **characterised by** the fact that said shaped part (12) of said latch (2) and said shaped part (13) of said slot (6) have a conjugate profile.
4. A mortise lock (1) for a window or door according to any preceding claim, **characterised in that** said

shaped part (12) of said latch (2) comprises at least one shoulder (15) of said latch (2) and said shaped part (13) of said slot (6) comprises a narrowing (16) of said slot (6).

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5. A mortise lock (1) for a window or door according to the preceding claim, **characterised by** the fact that said shoulder (15) extends on a side (17) of the latch (2) and demarcates the boundary between a first sector (18) with greater thickness of the latch (2) pivoted to the articulation pin (4) and a second sector (19) with smaller thickness of the latch (2). 10
6. A mortise lock (1) for a window or door according to the preceding claim, **characterised in that** said shoulder (15) extends along an arc of circumference having its centre in said articulation pin (4). 15
7. A mortise lock (1) for door and window according to the preceding claim, **characterised by** the fact that said slot (6) comprises a first vertical section (20) for transit of the first sector (18) of the latch (2) and a second vertical section (21) for transit of the second sector (19) of the latch (2) connected by said narrowing (16) where said shoulder (15) of the latch (2) transits. 20 25
8. A mortise lock (1) for a window or door according to any one of claims 5 to 7, **characterised in that** said second sector (19) of said latch (2) has a curved front free edge (22) presenting a radial distance (D) from said articulation pin (4) increasing proceeding from a rear edge thereof (22a) to a front edge thereof (22b). 30 35
9. A mortise lock (1) for a door or window according to any preceding claim, **characterised by** comprising two swinging hook latches (2) swinging in opposite directions and two tip latches (11) vertically translating in opposite directions, and a mechanism for operating the latches (2, 11). 40
10. A method of counteracting the break-in of a mortise lock (1) for a window or door comprising at least one swinging hook latch (2) and a case (3) for housing said latch (2) provided with a front plate (5) having a vertical slot (6) for reversibly transiting said latch (2) from a position retracted in said case (3) for opening the window or door to a position extracted from said case (3) for closing the window or door, wherein said case (3) supports a horizontal articulation pin (4) for articulating said latch (2), **characterised in that** said latch (2) and said vertical slot (6) are provided with shaped parts (12, 13) configured to couple with mechanical interference to said latch (2) in an extracted position in order to lock said latch (2) in an extracted position in the event of a break-in involving a mechanical failure of said articulation pin (4). 45 50 55



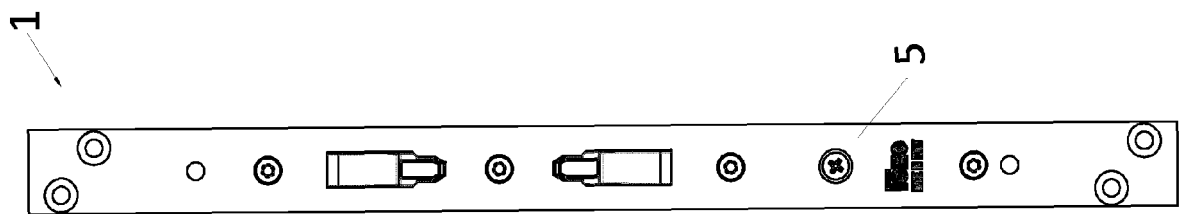


Fig 1a

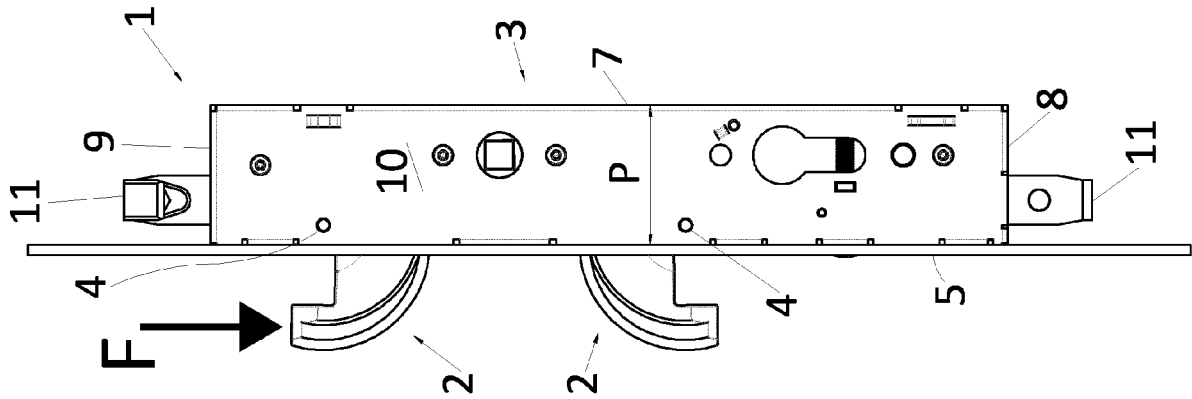
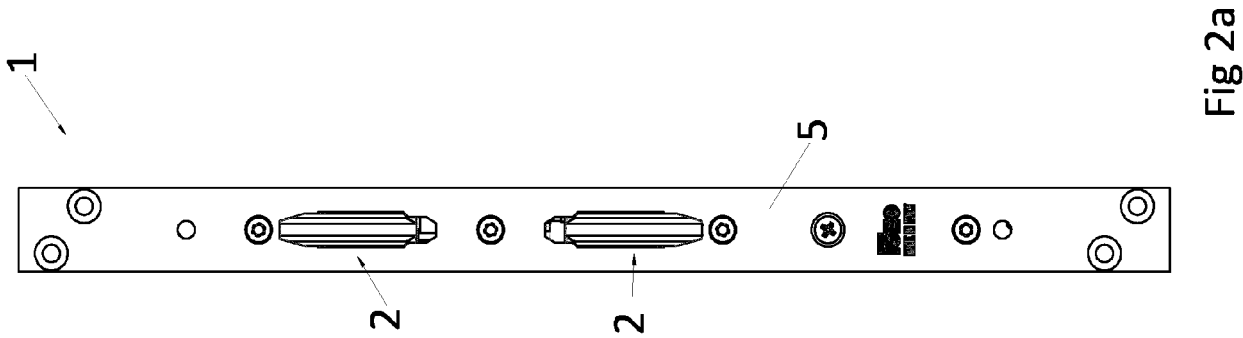


Fig 2



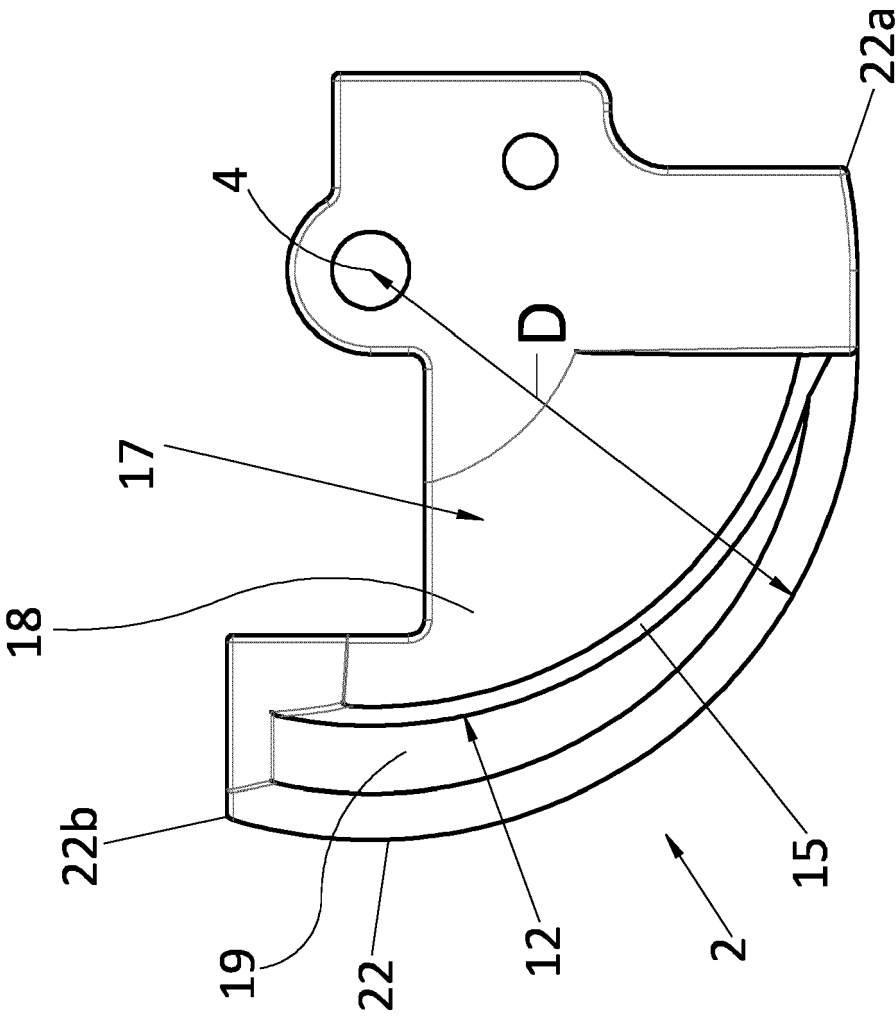


Fig 3a

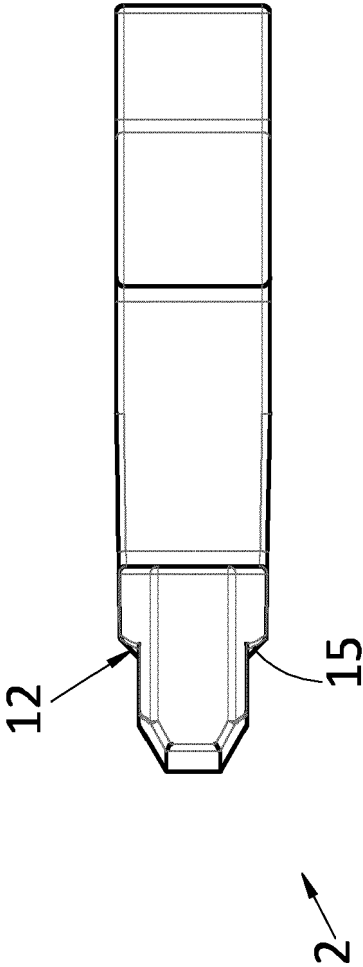
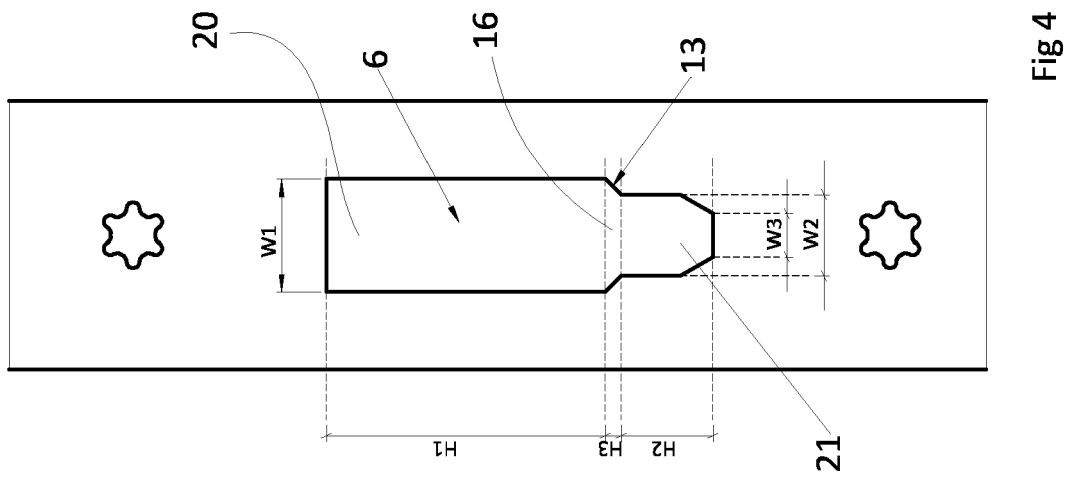


Fig 3b



**Fig 4**

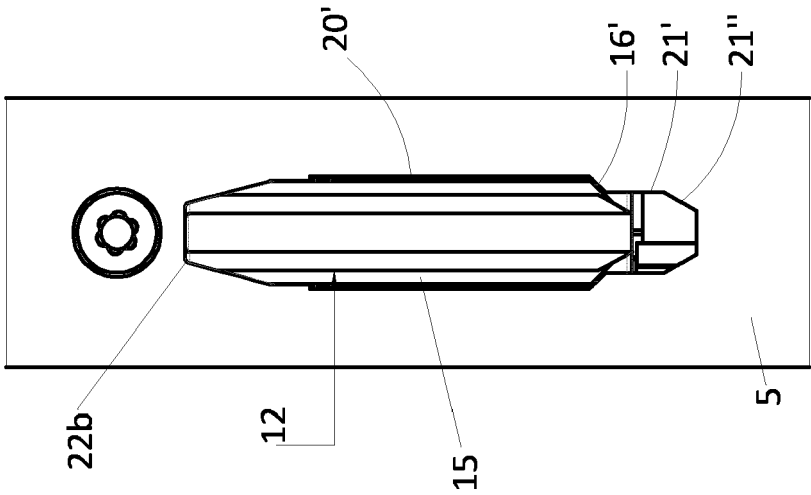


Fig 5a

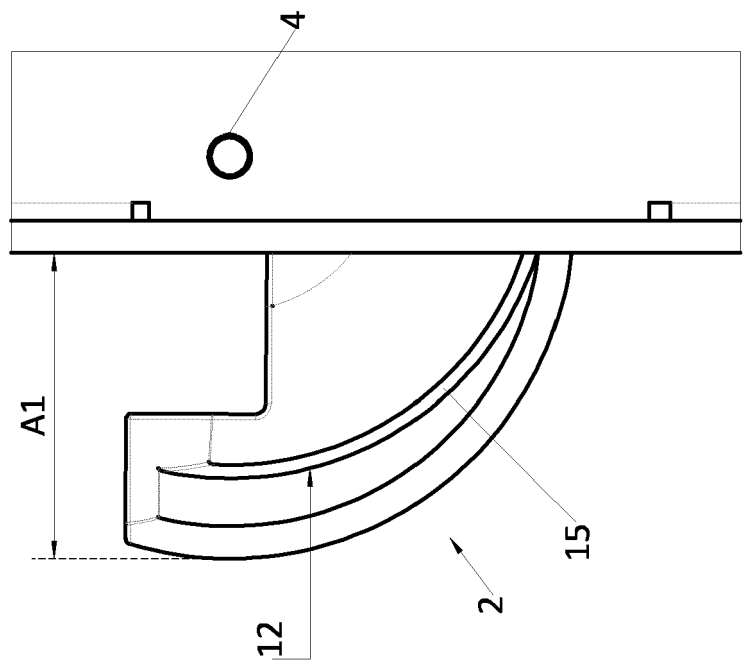
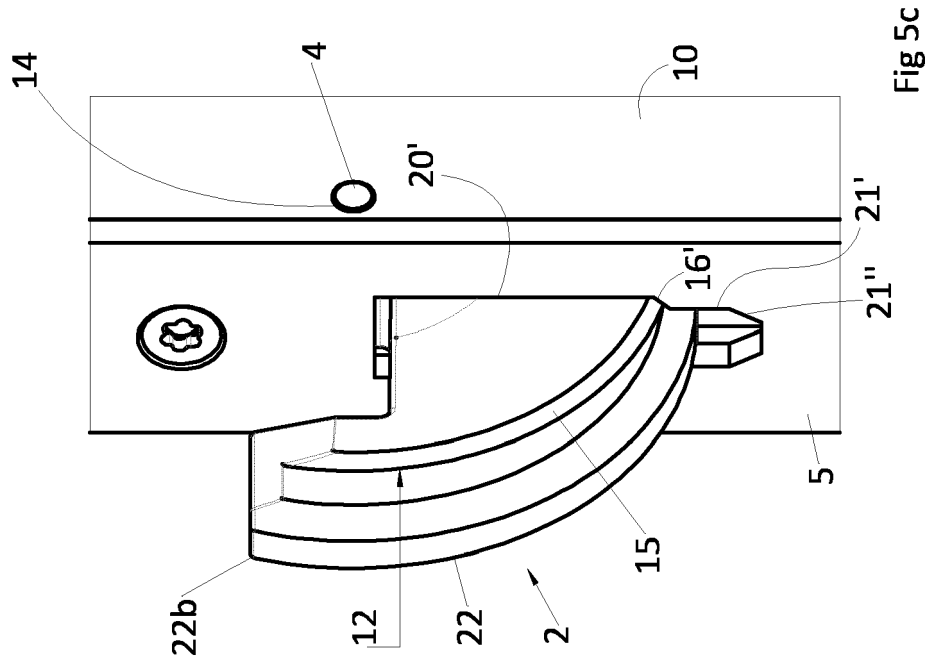


Fig 5b



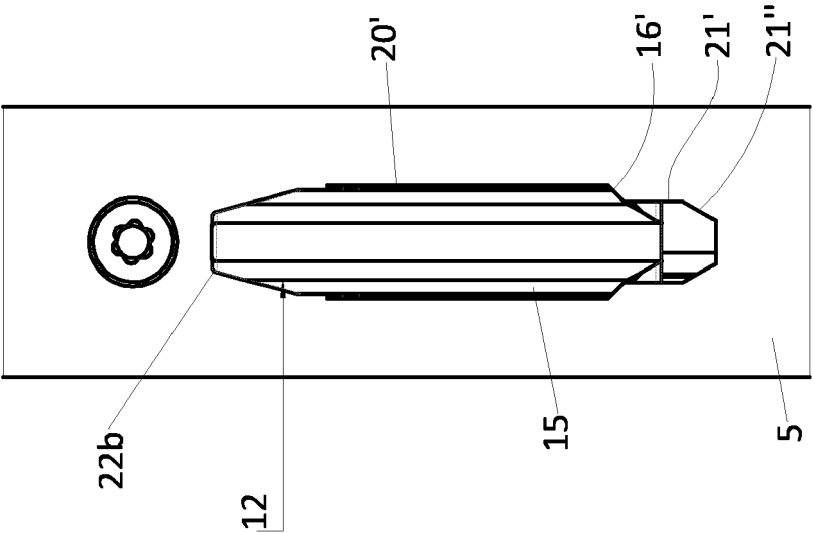


Fig 6a

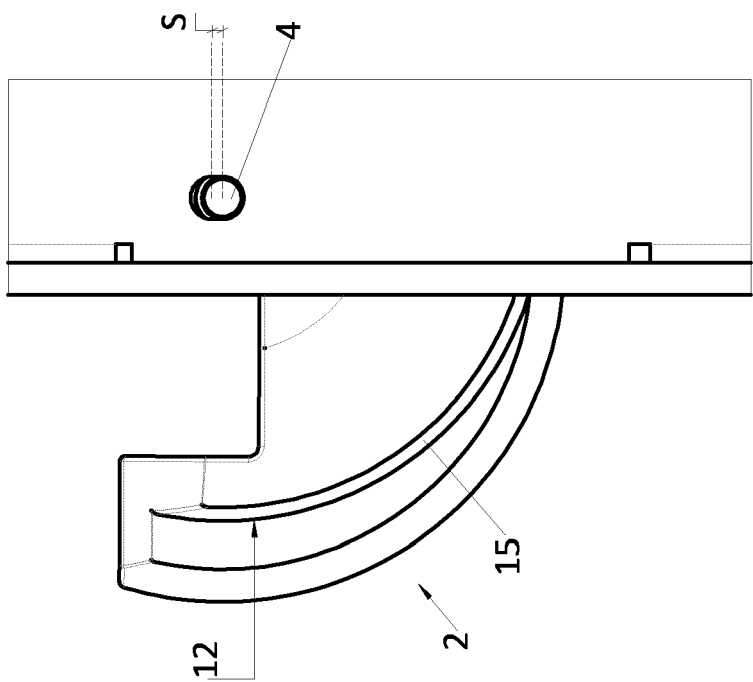


Fig 6b

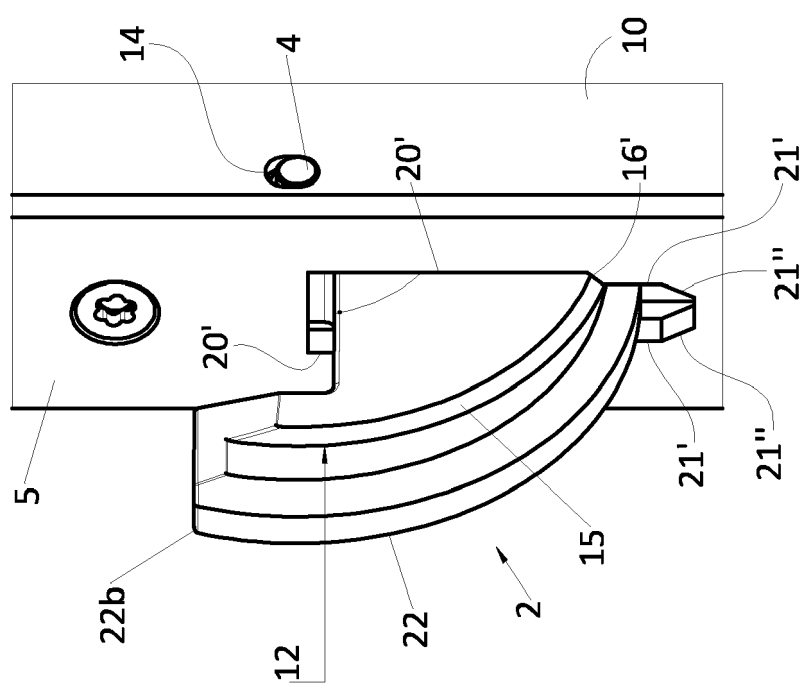


Fig 6c



## EUROPEAN SEARCH REPORT

Application Number

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                                                            |                                                                                                                                                                                                                                                                                       |                                                 |
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| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                            |                                                                                                                                                                                                                                                                                       |                                                 |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                    |                                                                                                                                            | Date of completion of the search<br><b>28 August 2024</b>                                                                                                                                                                                                                             | Examiner<br><b>Koster, Michael</b>              |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                            | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                 |

**ANNEX TO THE EUROPEAN SEARCH REPORT  
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