(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 094 461**
B1

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **30.12.86**

(51) Int. Cl.⁴: **E 05 C 19/00**, E 06 B 5/10, E 05 D 5/06

(21) Application number: **82302544.0**

(22) Date of filing: **19.05.82**

(54) **Locking device.**

(43) Date of publication of application:
23.11.83 Bulletin 83/47

(45) Publication of the grant of the patent:
30.12.86 Bulletin 86/52

(84) Designated Contracting States:
AT BE CH DE FR IT LI LU NL SE

(56) References cited:
DE-A-2 936 603
DE-C- 225 909
NL-C- 46 685
US-A-1 723 305

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Courier Press, Leamington Spa, England.

EP 0 094 461 B1

Description

This invention relates to a locking device primarily, but not solely, for security doors, windows, and drawers. The term "door" is used herein to mean any openable closure for an aperture.

My specification GB—A—2 000 215 describes a security door which closes against rebates in a door-frame and which has a core comprising a sheet steel layer covered on the outer side by a resilient rubber or cork layer. This door has been very successful in resisting attack. However, the ability of the door to resist attack is not dependent only on the strength of the door itself but also depends on the strength of the locking device and, to some extent, the hinges. A locking device comprising a single bolt, which engages in a recess in the door-frame, has very little resistance to breaking-open of the door. It is expensive to provide a plurality of bolts.

Dutch patent specification NL—C—46685, corresponding to the precharacterizing part of claim 1, is directed to a draught sealing slip which engages against a thin wooden ridge on the door frame and can therefore function as a locking device. The arrangement of the sealing strip does not provide any resistance to breaking open of the door but on the contrary weakens the edge surface of the door, which has to be provided with a large recess to receive the draught sealing strip.

What is desired is a locking device which is simple to construct and to operate and which provides enhanced resistance to breaking open.

The present invention provides a locking device as claimed in claim 1.

In one aspect the invention provides a locking arrangement comprising the said locking device in combination with the said members.

The resistance of the locking device to breaking-open depends, among other things, on the length and strength of the hinge. Thus, the required resistance can simply be achieved by making the hinge of sufficient length; increasing the length enhances the distribution of shock waves emanating from a percussion attack.

The pivoting means may comprise resilient means urging the second leaf into one said position and a bolt for pushing the leaf into the other said position, or may comprise two bolts pushing the leaf from opposite sides. However, in a preferred embodiment a single bolt (e.g. a spring-biassed latch bolt) for pushing the leaf in one direction is connected to the leaf so as to be able to pull the leaf in the opposite direction by operation of a key or knob device.

In its application to a door, the invention provides the combination of the locking device, a door, and a door-frame, the door constituting one of the said first and second members (preferably the first), and the frame constituting the other. In a preferred embodiment, designed to resist attack from both sides of the door, the door closes against rebates in the frame, resiliently deformable material being interposed between the inner side of the door and the opposed surfaces of the frame; the step on the second member is faced with resiliently deformable material; the said first member constitutes a vertical part of the door, the opposite vertical part of the door being connected to the frame by a hinge extending along a major part (preferably the whole) of the height of the door, the leaves of the hinge having flanges which project into the door and into the frame and at least one of which is covered on only one side with resiliently deformable material; and the door has a core layer comprising a layer of sheet metal and a layer of resiliently deformable material. The door (and the frame) may have the structure described in my specification GB—A—2 000 215; however, since the door is now to resist attack from both sides, it is preferable for a layer of resiliently deformable material to be positioned on each of the sides of the sheet metal layer. If the door is attacked with a sledge-hammer, for example, the resiliently deformable material will dissipate much of the shock, thus reducing damage to the rigid parts.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which

Figure 1 is a fragmentary exploded perspective view of a locking device;

Figure 2 is a horizontal section through part of the locking device;

Figure 3 is a horizontal section through a door and a door-frame provided with the locking device;

Figure 4 is a fragmentary exploded perspective view of another embodiment of locking device;

Figure 5 is a horizontal section through this embodiment; and

Figure 6 is a horizontal section through an alternative embodiment of a door hinge.

Referring first to Figures 1 to 3, the door-frame 1 has two door-posts 2*a*, 2*b* provided with rebates 3*a*, 3*b*. The door 4 is mounted on a hinge 6 on the post 2*b* and closes against rubber strips 7*a*, 7*b* fixed in the rebates 3*a*, 3*b*. The hinge 6 is a piano-type hinge, preferably extending substantially the whole height of the door. Its leaves 8*a*, 8*b* are bent to form flanges 9*a*, 9*b* which project into the door 4 and the door-post 2*b* respectively. The inner side of the flange 9*a* and the outer side of the flange 9*b* are covered by respective rubber strips 11*a*, 11*b*. The door 4 is mainly of wood and has a core layer 12 comprising a steel sheet 13 on the inner side and a layer 14 of fire-resistant cork on the outer side.

In the rebate 3*a* the post 2*a* is provided with a striking plate 16 which cooperates with the locking device (described below) mounted on the door. The striking plate 16 is, for example, 60 cm in height and defines an elongate recess delimited by a sloping base 17 and a step 18 faced with a rubber strip 19. The base 17 slopes at an angle of about 25° relative to the perpendicular to the door (when closed).

The locking device mounted on the door 4 comprises a piano hinge 21 more or less equal in

height to the striking plate 16. The hinge 21 has two leaves 22*a*, 22*b*, one being narrower than the other. The narrower leaf 22*b* is screwed to the door at points spaced along its height, and its free edge has a flange 23*b* which projects into the door and whose inner side is covered by a rubber strip 24. The inner longitudinal edge portion 26 of the leaf 22*a* is connected along the whole of its length to the leaf 22*b* by the hinge pin 27 so that the outer longitudinal edge portion 28 is pivotable through about 25° between an unlocking position (shown in broken line in Figure 3) in which it is clear of the striking plate 16 and a locking position (full line) in which it is capable of engaging the step 18 to prevent the door from opening. The edge portion 28 has a flange 23*a* which increases the friction between the leaf 22*a* and the step 18 and thus hinders escape of the leaf 22*a* from the recess in the striking plate 16 if force is applied to the inside of the door 4.

The movement of the leaf 22*a* between the unlocking and locking positions is controlled by a bolt 29 connected to the leaf 22*a* by a screw 30 extending through a slot 31 in the leaf 22*a*. The bolt 29 extends from a lock 32 embedded in the door and can be locked in the projecting position by a conventional mechanism (not shown). The bolt 29 is a latch bolt which is biassed by a spring 33 (shown schematically) into the projecting position in which it pushes against the leaf 22*a*. Thus, as the door 4 is closed the leaf 22*a* will initially be in the locking position, it will then be forced towards the door against the action of the spring 33 on contact with the striking plate 16, and finally it will automatically engage in the recess in the striking plate 16.

The door is unlocked bywithdrawing the bolt 29 by means of a conventional mechanism (not shown) so that the head of the screw 30 pulls the leaf 22*a* into the unlocking position. It is to be noted that any violent attack directed at the locking device would tend to break the connection between the bolt 29 and the leaf 22*a* by means of the screw 30, so that it would then become virtually impossible to free the leaf 22*a* by brute force alone, thereby defeating the attack. The greater the force applied to the inner side of the door 4, the more firmly is the leaf 22*a* engaged with the step 18, so that the leaf is prevented from escaping. The sloping base 17 of the recess in the striking plate 16 supports the leaf 22*a* against bending.

Referring now to Figures 4 and 5, which illustrate an alternative embodiment of the locking device, parts which are similar to those described above will be denoted by the same reference numerals. In this embodiment the bolt 29 is bifurcated and its upper and lower limbs 29*a*, 29*b* have aligned vertical holes 41*a*, 41*b* receiving a pin 42 which passes through a bracket 43 fixed to the leaf 22*a*, thereby connecting the bolt 29 to the leaf 22*a*. The lock 32 in this embodiment is a mortice lock.

The step 18 of the striking plate 16 is not faced with a rubber strip, but the inner edge of the striking plate 16 is formed with a flange 46 which extends into a slot containing a rubber strip 47 behind the flange 46.

Apart from the features just described, the locking device shown in Figures 4 and 5 is similar to that shown in Figures 1 to 3.

Figure 6 illustrates an alternative form of hinge 6', which is again a piano-type hinge extending substantially the whole height of the door. The leaf 48*a* adjacent the door 4 is bent in the middle to form a flange 49*a* which projects into a recess in the door, its inner side being covered by a rubber strip 51*a* in the recess. The other leaf 48*b* is bent at its free end to form a flange 49*b* which projects into a recess in the door-post 2*b*, its outer side being covered by a rubber strip 51*b*. This hinge is easier to manufacture and fit and uses less material than the hinge 6 shown in Figure 3.

Claims

1. A locking device comprising an elongate hinge (21) having a first leaf (22b) for fixing to a first member and a second leaf (22a), the leaves (22a, b) being hinged together along adjacent longitudinal edges, and means for pivoting the second leaf (22a) between an unlocking position in which it is substantially parallel to the first leaf (22b) and a locking position in which it is at an acute angle to the first leaf (22b) and in which its free longitudinal edge portion (28) is capable of engaging an elongate step on a second member to prevent motion of the members past each other, characterised in that the leaves (22a, 22b) are of metal, and that the first leaf (22b) has a longitudinal flange (23b) which is covered on one side by resiliently deformable material (24) and which is to be received by a slot in the first member.

2. A locking device as claimed in claim 1, in which the pivoting means comprises a bolt (29) movable transversely with respect to the second leaf (22a) so as to push the second leaf (22a) from the unlocking position to the locking position.

3. A locking device as claimed in claim 2, in which the bolt (29) is connected to the second leaf (22a) so as to be able to pull the second leaf (22a) from the locking position to the unlocking position.

4. A locking device as claimed in claim 3, in which the bolt (29) is bifurcated, having two limbs (29a, 29b), and the bolt (29) is connected to the second leaf (22a) by a bracket (43) fixed to the leaf (22a) and a pin (42) which extends between the two limbs (29a, 29b) of the bolt (29) and through the bracket (43).

5. A locking device as claimed in any of claims 1 to 4, in which the acute angle is less than 45°.

6. A locking device as claimed in any of claims 1 to 5, in which the free edge portion (28) of the second leaf (22a) has a terminal flange (23a) projecting in the direction from the locking position to the unlocking position.

7. A locking device as claimed in any of claims 1 to 6, further comprising an elongate plate (16) for

fixing to the second member, the plate (16) being shaped so as to define the step (18) on the second member.

8. A locking device as claimed in claim 7, in which the plate (16) has a longitudinal flange (46) which is covered on one side by resiliently deformable material (47) and which is to be received by a slot in the second member.

9. A locking device as claimed in claim 7 or 8, when dependent on claim 6, in which the terminal flange (23a) is narrower than the step (18).

10. A locking device as claimed in any of claims 7 to 9, in which the step (18) is faced with resiliently deformable material (19).

11. A locking device as claimed in any of claims 1 to 10, in combination with the said first and second members, one member constituting part of a door (4), the other member constituting part of a door-frame (1), the or each longitudinal flange (23b, 46) covered on one side by resiliently deformable material (24, 47) being received in a slot in the associated member, the resiliently deformable material (24, 47) being in contact with one lateral surface of the slot.

12. A locking device as claimed in claim 11, in which the said first member constitutes a vertical part of the door (4), the opposite vertical part of the door (4) being connected to the frame (1) by a hinge (6; 6') extending along a major part of the height of the door (4).

13. A locking device as claimed in claim 12, in which the said hinge (6; 6') has two leaves (8a, 8b; 48a, 48b) having respective longitudinal flanges (9a, 9b; 49a, 49b) projecting into respective slots in the door (4) and the frame (1) respectively.

14. A locking device as claimed in claim 13, in which each flange (9a, 9b; 49a, 49b) is covered on one side with resiliently deformable material (11a, 11b; 51a, 51b) which is in contact with one lateral side of the associated slot.

15. A locking device as claimed in any of claims 11 to 14, in which the door (4) closes against rebates (3a, 3b) in the frame (1), resiliently deformable material (7a, 7b) being interposed between the inner side of the door (4) and the opposed surfaces of the frame (1).

16. A locking device as claimed in any of claims 11 to 15, in which the door (4) comprises a core layer (12) and a layer of wood on each side of the core layer (12), the core layer (12) comprising a layer (13) of sheet metal and a layer (14) of resiliently deformable material.

Revendications

1. Dispositif de fermeture comprenant une charnière de forme allongée (21) comportant une première lame (22b) pour sa fixation à un premier élément de construction et une seconde lame (22a), les lames (22a, b) étant articulées le long de bords longitudinaux adjacents, ainsi que des moyens pour faire pivoter la seconde lame (22a) entre une position de déverrouillage dans laquelle elle est sensiblement parallèle à la première lame (22b) et une position de verrouillage dans laquelle elle forme un angle aigu avec la première lame (22b) et dans laquelle une partie de son bord longitudinal libre (28) peut s'engager contre un gradin de forme allongée sur un second élément de construction pour interdire tout mouvement des éléments de construction l'un par rapport à l'autre, caractérisé en ce que les lames (22a, 22b) sont en métal et en ce que la première lame (22b) comporte un rebord longitudinal (23b) qui est recouvert d'un côté d'une matière déformable élastiquement (24) et qui est destiné à être reçu dans une fente pratiquée dans le premier élément de construction.

2. Dispositif de fermeture selon la revendication 1, dans lequel les moyens destinés à faire pivoter la seconde lame comprennent une cheville (29) mobile transversalement par rapport à la seconde lame (22a) de manière à pousser la seconde lame (22a) de sa position de déverrouillage vers sa position de verrouillage.

3. Dispositif de fermeture selon la revendication 2, dans lequel la cheville (29) est raccordée à la seconde lame (22a), de manière à être en mesure de tirer la seconde lame (22a) depuis sa position de verrouillage vers sa position de déverrouillage.

4. Dispositif de fermeture selon la revendication 3, dans lequel la cheville (29) est bifurquée, comportant deux branches (29a, 29b) et en ce que la cheville (29) est raccordée à la seconde lame (22a) par une patte d'attache (43) fixée à la lame (22a) et par une broche (42) qui s'étend entre les deux branches (29a, 29b) de la cheville (29) et d'un côté à l'autre de la patte d'attache (43).

5. Dispositif de fermeture selon l'une quelconque des revendications 1 à 4, dans lequel l'angle aigu est inférieur à 45°.

6. Dispositif de fermeture selon l'une quelconque des revendications 1 à 5, dans lequel la partie de bord libre (28) de la seconde lame (22a) comporte un rebord terminal (23a) qui fait saillie dans la direction allant de la position de verrouillage vers la position de déverrouillage.

7. Dispositif de fermeture selon l'une quelconque des revendications 1 à 6, comprenant en outre une plaque de forme allongée (16) destinée à être fixée au second élément de construction, la plaque (16) étant façonnée de manière à former le gradin (18) sur le second élément de construction.

8. Dispositif de fermeture selon la revendication 7, dans lequel la plaque (16) comporte un rebord longitudinal (46) qui est recouvert d'un côté d'une matière déformable élastiquement (47) et qui est destiné à être reçu dans une fente pratiquée dans le second élément de construction.

9. Dispositif de fermeture selon la revendication 7 ou 8 en combinaison avec la revendication 6, dans lequel le rebord terminal (23a) est plus étroit que le gradin (18).

10. Dispositif de fermeture selon l'une quelconque des revendications 7 à 9, dans lequel le gradin (18) est revêtu de matière déformable élastiquement (19).

11. Dispositif de fermeture selon l'une quelconque des revendications 1 à 10, en com-

binaison avec lesdits premier et second éléments de construction, l'un des éléments de construction constituant une partie d'une porte (4), l'autre élément de construction constituant une partie d'une bâti (1), le ou chaque rebord longitudinal (23b, 46) recouvert d'un côté de matière déformable élastiquement (24, 47) étant reçu dans une fente pratiquée dans l'élément de construction associé, la matière déformable élastiquement (24, 47) étant en contact avec l'une des surfaces latérales de la fente.

12. Dispositif de fermeture selon la revendication 11, dans lequel ledit premier élément de construction constitue une partie verticale de la porte (4), la partie verticale opposée de la porte (4) étant raccordée au bâti (1) par une charnière (6; 6') qui s'étend le long de la majeure partie de la hauteur de la porte (4).

13. Dispositif de fermeture selon la revendication 12, dans lequel ladite charnière (6; 6') comporte deux lames (8a, 8b; 48a, 48b) présentant des rebords longitudinaux respectifs (9a, 9b; 49a, 49b) qui font saillie dans des fentes respectives pratiquées respectivement dans la porte (4) et le bâti (1).

14. Dispositif de fermeture selon la revendication 13, dans lequel chaque rebord (9a, 9b; 49a, 49b) est recouvert, sur un côté, de matière déformable élastiquement (11a, 11b; 51a, 51b) qui est en contact avec l'un des côtés latéraux de la fente associée.

15. Dispositif de fermeture selon l'une quelconque des revendications 11 à 14, dans lequel la porte (4) se ferme contre des feuillures (3a, 3b) formées dans le bâti (1), une matière déformable élastiquement (7a, 7b) étant interposée entre le côté interne de la porte (4) et les surfaces opposées du bâti (1).

16. Dispositif de fermeture selon l'une quelconque des revendications 11 à 15, dans lequel la porte (4) comprend une couche de coeur (12) et une couche de bois de chaque côté de la couche de coeur (12), la couche de coeur (12) se composant d'une couche de tôle (13) et d'une couche de matière déformable élastiquement (14).

Patentansprüche

1. Schließvorrichtung bestehend aus einem länglichen Scharnier (21), welches ein erstes Scharnierblatt (22b) zum Anschluß an ein erstes Konstruktionselement und ein zweites Scharnierblatt (22a) aufweist, wobei die Scharnierblätter (22a, 22b) an ihren Längsseiten schwenkbar verbunden sind, ferner aus Schwenkmitteln, durch die das zweite Scharnierblatt (22a) von einer unverriegelten Position, in welcher dieses zweite Scharnierblatt im wesentlichen parallel zum ersten Scharnierblatt (22b) ausgerichtet ist, in eine Verriegelungsposition bringbar ist, in der dieses Scharnierblatt zum ersten Scharnierblatt (22b) in einem spitzen Winkel angeordnet ist und in welcher die freie Längskante (28) des ersten Scharnierblatts (22b) in einen längliche Raste des zweiten Konstruktionselements eingreifend, deren gegenseitige Verschiebung verhindert, dadurch gekennzeichnet, daß die Scharnierblätter (22a, 22b) aus Metall bestehen und zum ersten Scharnierblatt (22b) ein Längsflansch (23b) gehört, der auf einer Seite mit einem elastisch verformbaren Material (24) beschichtet ist und in einen Schlitz des ersten Konstruktionselementes eingreift.

2. Schließvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß zur Schwenkvorrichtung ein Riegel (29) gehört, der im Hinblick auf das zweite Scharnierblatt (22a) derart in Querrichtung bewegt werden kann, daß dadurch das zweite Scharnierblatt (22a) aus der unverriegelten Position in die verriegelte Position gedrückt wird.

3. Schließvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß der Riegel (29) mit dem zweiten Scharnierblatt (22a) verbunden ist und dadurch das zweite Scharnierblatt (22a) aus der verriegelten Position heraus in die unverriegelte Position drücken kann.

4. Schließvorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß der Riegel (29) gabelförmig ausgeführt ist, aus den beiden Zinken (29a, 29b) besteht und über eine an dem zweiten Scharnierblatt (22a) befestigte Halterung (43) und einen Stift (42), der durch die beiden Zinken (29a, 29b) des Riegels (29) und durch die Halterung (43) geführt wird, mit dem zweiten Scharnierblatt (22a) verbunden ist.

5. Schließvorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß der spitze Winkel kleiner als 45 Grad ist.

6. Schließvorrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der zum zweiten Scharnierblatt (22a) gehörende freie Kantenbereich (28) einen Endflansch (23a) hat, der von der Verriegelungsposition aus in Richtung der Position vorsteht, die nicht verriegelt ist.

7. Schließvorrichtung nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß sie mit einer länglichen Platte (16) für die Befestigung an dem zweiten Konstruktionselement versehen ist, wobei die Formgebung dieser Platte (16) die Raste (18) im zweiten Konstruktionselement bildet.

8. Schließvorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß zur Platte (16) ein Längsflansch (46) gehört, der auf einer Seite mit einer Beschichtung (47) aus einem elastisch verformbaren Material versehen ist und der in eine Ausnehmung im zweiten Konstruktionselement eingesetzt wird.

9. Schließvorrichtung nach Anspruch 7 oder 8, dadurch gekennzeichnet, daß der Endflansch (23a) schmaler als die Raste (18) ist.

10. Schließvorrichtung nach einem der Ansprüche 7 bis 9, dadurch gekennzeichnet, daß die Raste (18) mit einem elastisch verformbaren Material ausgekleidet ist.

11. Schließvorrichtung nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß in der Kombination des erwähnten ersten und zweiten Konstruktionselements eines dieser Konstruktionselemente eine Tür (4) und das andere Kon-

struktionselement ein Teil eines Türrahmens (1) ist, der oder jeder Längsflansch (23b, 46) an einer Seite mit einem elastisch verformbaren Material (24, 47) beschichtet ist und in das jeweils zugehörige Konstruktionselement eingesetzt wird und das elastisch verformbare Material an einer Seitenfläche des Schlitzes anliegt.

12. Schließvorrichtung nach Anspruch 11, dadurch gekennzeichnet, daß das erste Konstruktionselement den vertikalen Teil der Tür (4) bildet, während der gegenüberliegende vertikale Teil der Tür (4) über das Scharniersystem (6, 6'), das sich längs dem größten Teil Höhe der Tür (6) erstreckt, mit dem Türrahmen (1) verbunden ist.

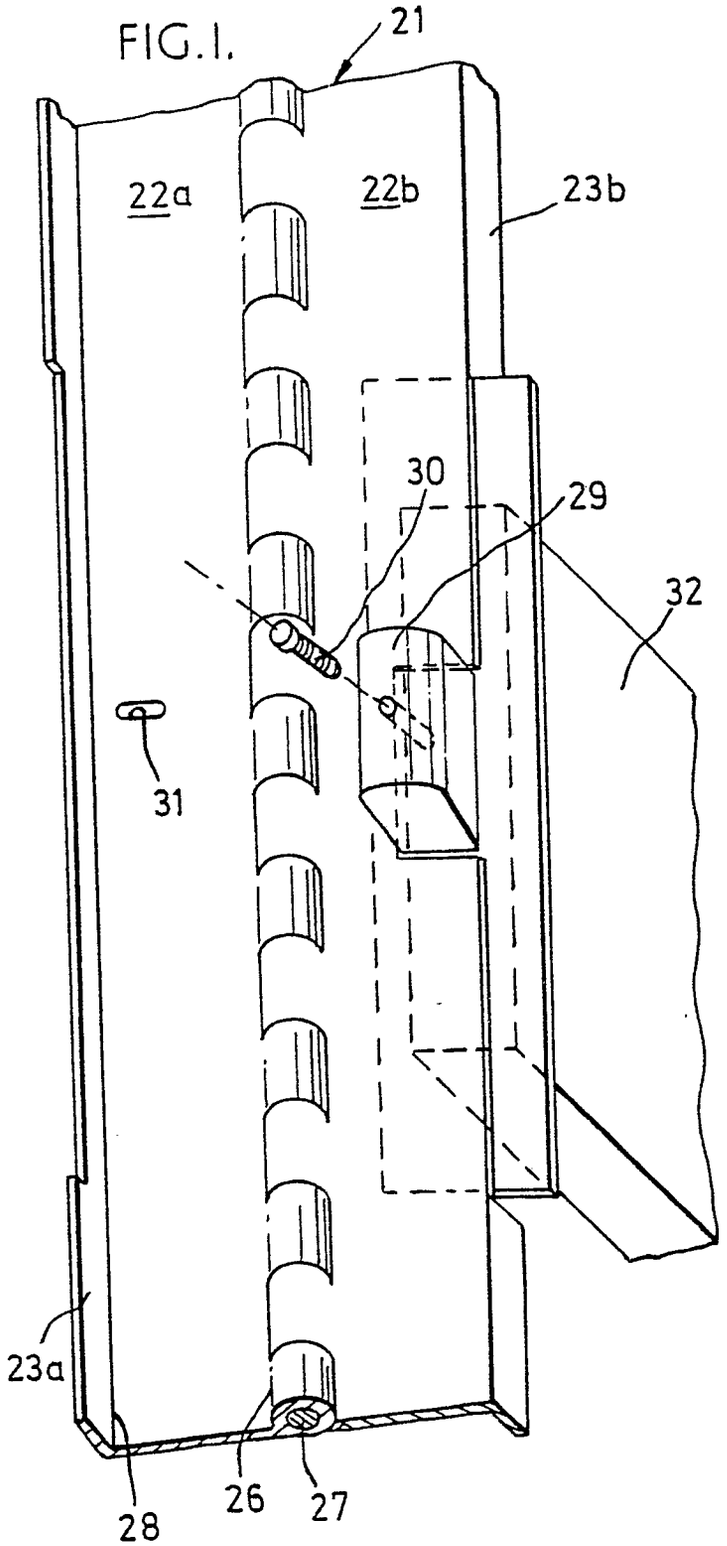
13. Schließvorrichtung nach Anspruch 12, dadurch gekennzeichnet, daß das vorerwähnte Scharniersystem (6, 6') jeweils zwei Scharnierblätter (8a, 8b; 48a, 48b) hat, die jeweils wieder zwei Längsflanschen (9a, 9b; 49a, 49b) haben, welche ihrerseits wiederum bis in die jeweils zutreffenden Schlitze der Tür (4) und des Türrahmens (1) hineinragen.

14. Schließvorrichtung nach Anspruch 13, dadurch gekennzeichnet, daß ein jeder diese Flanschen (9a, 9b; 49a, 49b) auf einer Seite mit einem elastisch verformbaren Material (11a, 11b; 51a, 51b) beschichtet ist, das seinerseits wiederum mit einer Seitenfläche des Schlitzes in Berührungskontakt steht.

15. Schließvorrichtung nach jedem der Ansprüche 11 bis 14, dadurch gekennzeichnet, daß die Tür (4) beim Schließen gegen die zum Türrahmen (1) gehörenden Falze (3a, 3b) anschlägt und zwischen den Innenseiten der Tür (4) und den gegenüberliegenden Flächen des Türrahmens (1) elastisch verformbares Material (7a, 7b) vorgesehen und vorhanden ist.

16. Schließvorrichtung nach jedem der Ansprüche 11 bis 15, dadurch gekennzeichnet, daß die Tür (4) aus einer Kernschicht (12) und aus einer Holzschicht, die auf jede Seite der Kernschicht (12) aufgebracht ist, besteht, wobei zur Kernschicht (12) eine Metallblechbeschichtung (13) und eine Beschichtung (14) aus elastisch verformbaren Material gehören.

FIG.1.


21
22a
22b
23b
30
29
32
31
23a
28
26
27

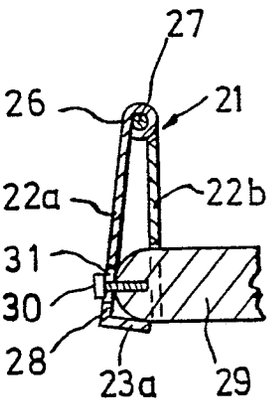
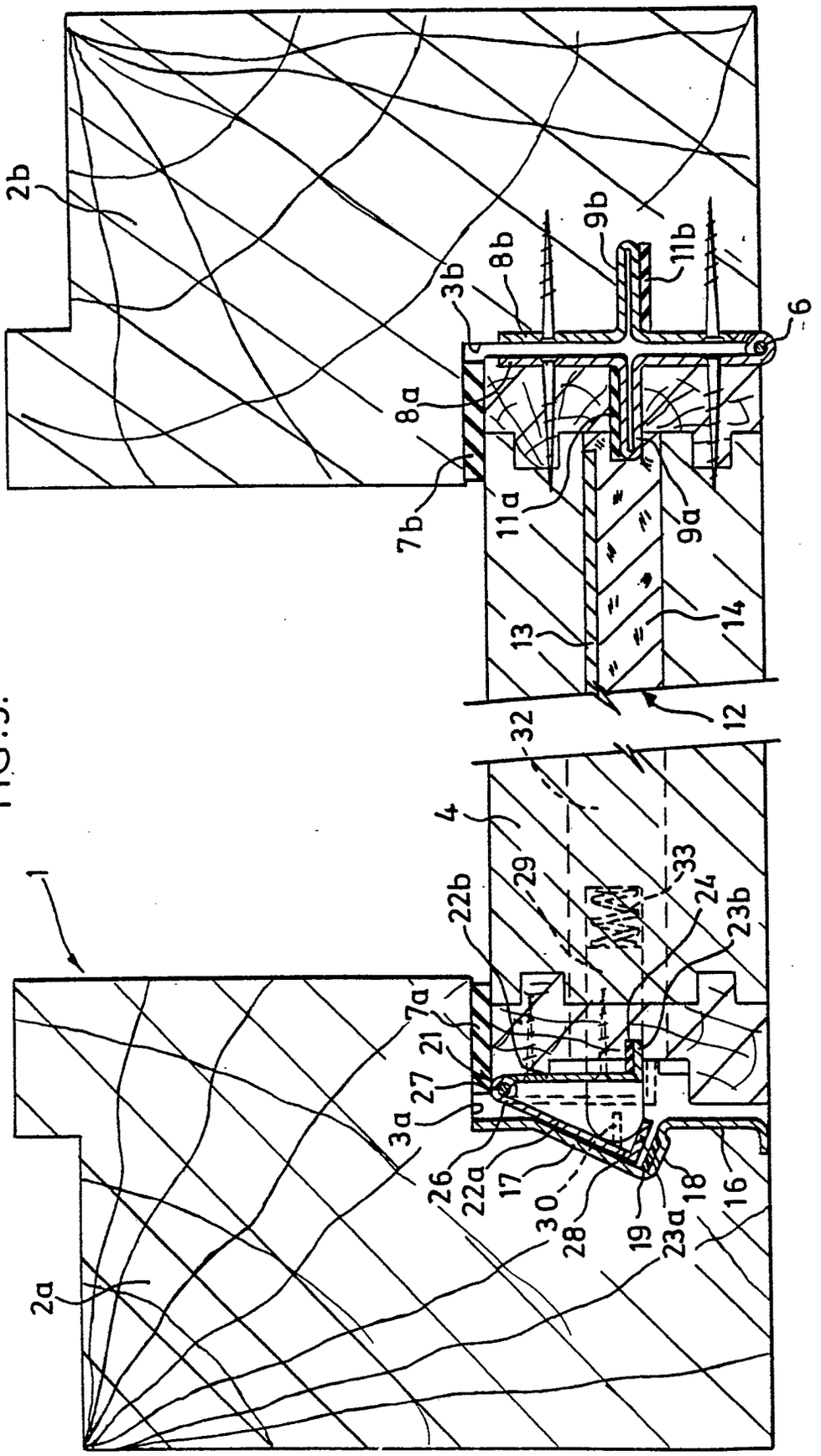

27
26
21
22a
22b
31
30
28
23a
29

FIG.2.

FIG.3.


2b
3b
8b
9b
11b
6
8a
7b
11a
9a
13
14
12
32
4
29
33
24
23b
22b
1
7a
21
27
3a
26
22a
17
30
28
19
23a
18
16
2a

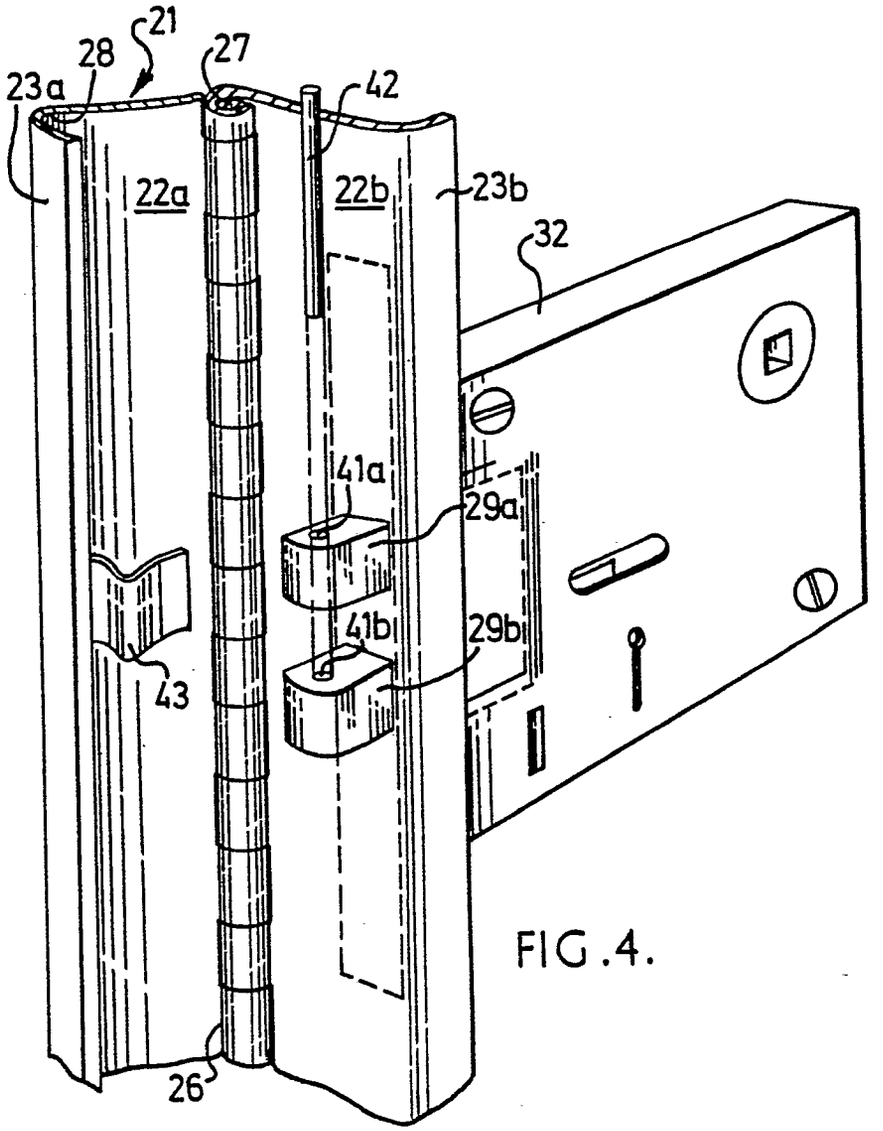


FIG.4.

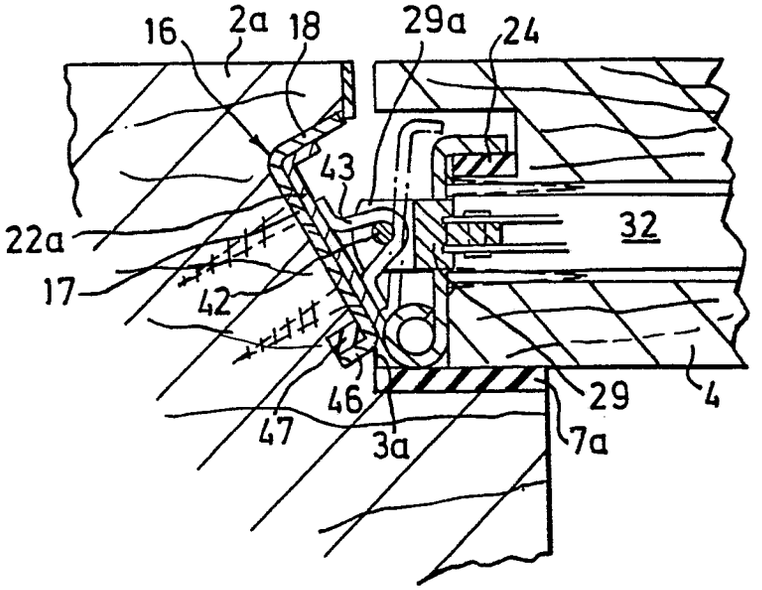

16
2a
18
29a
24
43
22a
32
17
42
46
29
4
47
3a
7a

FIG .5.

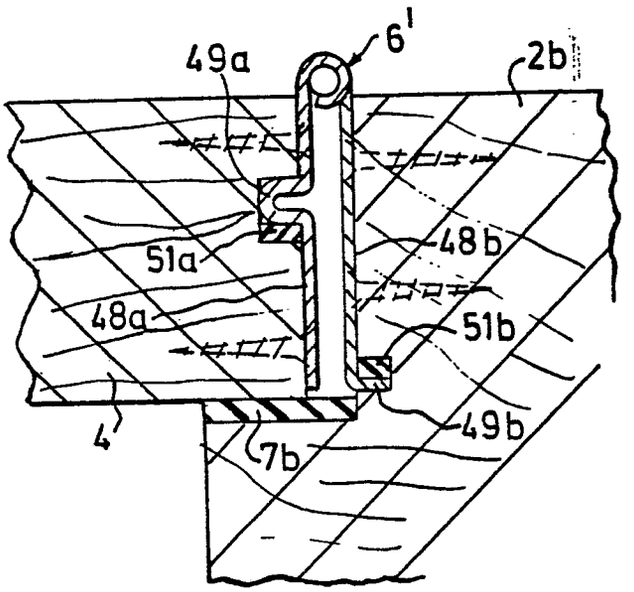

6'
49a
2b
51a
48b
48a
51b
4'
49b
7b

FIG.6.