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(54) Locking device.

(57) Apparatus for securing an opening vent frame 3 relative to a surrounding fixed frame 14 comprises a keeper 13 mounted on a side edge of the fixed frame 14 and a lock plate 8 housed in a casing 2 mounted on the opposed side edge of the vent frame 3. The plate 8 is moved from a retracted position to an extended position by rotation of an operating handle 10 to engage a leading edge 33 under a selected one of two elongate projections 31a,31b of the keeper 13 in partially open or closed positions of the vent frame 3. Simultaneously, the plate 8 is rotated about an axis normal to the rotational axis of the handle 10 to displace the leading edge 33 towards the outer face 7 of the vent frame 3 so that the vent frame 3 is moved inwards by the engagement of the leading edge 33 with the projection 31a,31b.

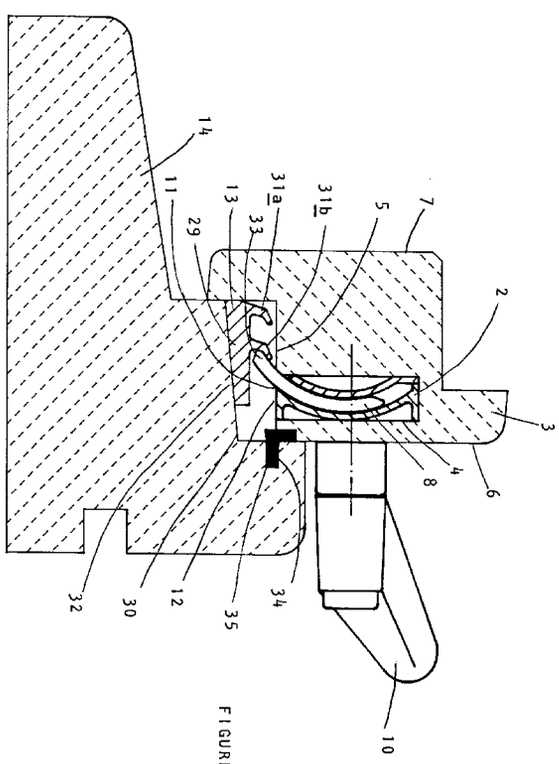

FIGURE 2.

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This invention relates to locking devices for doors, windows and the like closures.

It is known to secure a door or window when closed by means of an espagnolette. A typical espagnolette has a plurality of bolting elements spaced apart along the side edge of the door or window for engagement with corresponding keepers on the surrounding frame in the closed position. Usually the bolting elements are mounted on a bar arranged for longitudinal sliding movement along the side edge of the door or window on rotation of a manually operable handle coupled to the bar through a drive mechanism.

Many of the known espagnolettes are of complex construction and the door or window frame has to be adapted to mount the drive mechanism and bar. For timber frames, extensive machining of the frame is often required for installation and, for metal or plastics frames, special profiles are usually required for installation.

Additionally, many of the known espagnolettes can be forced by breaking the bolting elements and/or keepers and, in certain cases, a low force is sufficient to obtain entry.

The present invention has been made from a consideration of the above problems and disadvantages of known espagnolettes and has for its object the provision of a locking device of simple construction that is easy to install and which is resistant to forcing.

According to the present invention there is provided a locking device for doors, windows and the like closures comprising a casing housing catch means and drive means for converting rotation of manually operable means about a first axis into movement of the catch means between an inoperative position and an operative position for engagement with a keeper to secure the closure closed, the catch means being guided within the casing for rotation about a second axis extending substantially normal to the first axis for the movement between the inoperative and operative positions.

The catch means preferably comprises a curved plate guided for rotation about the second axis during movement between the inoperative and operative positions by internal guide faces on opposed sides of the casing.

The drive means preferably comprises an actuator bush rotatably mounted between the opposed sides of the casing and having a cam received within a cut-out in the retainer plate for moving the retainer plate between the inoperative and operative positions on rotation of the manually operable means.

The manually operable means may comprise a rotatable handle operatively connected to the actuator bush by a spindle. The handle may be lockable to prevent unauthorised actuation of the locking device.

The invention also provides a door, window and the like closure comprising an opening wing mounted on a surrounding frame and having the invented locking device mounted on one of the wing and frame and a keeper mounted on the other of the wing and frame for engagement by the catch means of the locking device to secure the wing closed.

The casing of the locking device is preferably received in a cavity opening to the side edge of the wing or frame and the catch means projects from the side edge in the operative position for engagement with the keeper.

Where the catch means comprises a curved plate, the casing preferably has a slot extending lengthwise of the side edge through which the plate projects in the operative position and the keeper has an upstanding rib or like formation extending substantially parallel to the slot for engagement by a leading edge of the plate.

The rotation of the plate is preferably arranged to urge the wing towards the frame by engagement with the rib in the operative position.

The rib is preferably of curved or bent profile so that the leading edge of the plate engages under the outer free end of the rib in the operative position.

The keeper may have at least one further rib or like formation for engagement by the leading edge of the plate to secure the opening wing in a partially open vent position.

In a preferred arrangement, the locking device is mounted on the opening wing and the keeper is mounted on the surrounding frame in the rebate between the wing and frame.

A plurality of locking devices may be provided at spaced positions around the periphery of the wing and frame with each device linked for operation simultaneously by common manually operable means.

The invention will now be described in more detail by way of example only with reference to the accompanying drawings wherein:-

FIGURE 1 is an exploded isometric view of a first embodiment of locking device according to the invention;

FIGURE 2 is a transverse section through a window fitted with the locking device of Figure 1 and shown secured in the closed position; and

FIGURE 3 is an exploded isometric view showing a second embodiment of locking device according to the invention.

The first embodiment of locking device 1 shown in Figures 1 and 2 of the accompanying drawings has a rectangular casing 2 that is mounted on the opening wing 3 of a door or window in a cavity 4 opening to the side edge 5 of the wing 3 between the inner and outer faces 6 and 7 respectively.

The casing 2 houses a retainer plate 8 and an actuator bush 9 that is rotatable by an operating handle 10 to move the retainer plate 8 out of the casing 2 through a slot 11 in the base 12 to engage a keeper 13 mounted on the surrounding fixed frame 14 to secure selectively the wing 3 in closed or partially open

vent positions.

In this embodiment, the wing 3 and surrounding frame 14 are of timber construction but it will be understood that this is not essential and that the wing 3 and/or frame 14 may be constructed using other materials such as metal or plastics or reinforced plastics, for example aluminium or PVCu with optional internal reinforcement.

The casing 2 is formed by a front plate 15 and a rear plate 16 spaced apart by a projecting wall 17 of the rear plate 16 that terminates at each end of the casing 2 in an outwardly directed base flange 18 for locating the casing 2 in the cavity 4.

The actuator bush 9 is rotatably mounted at each end in respective aligned circular apertures 19 provided in the front plate 15 and rear plate 16 at the centre of the casing 2.

The operating handle 10 is coupled to the actuator bush 9 by a square section spindle (not shown) received in a rectangular through bore 20 formed in the actuator bush 9 for transmitting rotation of the handle 10 to the actuator bush 9.

The retainer plate 8 is of curved profile and is located on either side of the apertures 19 between complementary concave and convex guide faces 21 and 22 provided on the rear plate 16 and front plate 15 respectively.

The centre portion of the actuator bush 9 is received in a cut-out 23 in the retainer plate 8 and has a projecting cam 24 arranged on rotation of the actuator bush 9 in opposed senses to move the retainer plate 8 between an inoperative retracted position within the casing 2 and an operative extended position projecting from the casing 2 through the slot 11.

The rear plate 16 has a respective projecting boss 25 on each guide face 21 that extends through an aligned elongate aperture 26 in the retainer plate 8 and is received in an aligned complementary hole 27 in the front plate 15 to locate the front plate 15 for assembly and to limit actuating movement of the retainer plate 8 by engagement with the opposed ends of the aperture 26.

Each boss 25 has an internally threaded through bore 28 for engagement by a complementary fixing screw (not shown) used to mount the operating handle 10 on the inner face 6 of the wing 3 thereby securing the casing 2 in the cavity 4.

The keeper 13 comprises a base plate 29 for securing by means of screws (not shown) to the frame 14 within the rebate 30 between the frame 14 and wing 3.

Upstanding from the base plate 29, the keeper has two spaced parallel longitudinal ribs 31 extending lengthwise of the side edge 32 of the frame 14 for selective engagement by the retainer plate 8 in the closed and vent positions respectively.

The keeper 13 is of uniform cross-section along its length and is preferably an extrusion of aluminium although extrusions of other metals or alloys or plastics may be used. In this way, keepers of different length may be obtained from a common extrusion for use with retainer plates of different length. This is not essential however and the keeper may be metal casting or plastics moulding.

Each rib 31 is of curved profile in transverse section and, in use, the keeper 13 is mounted with the ribs 31 extending substantially parallel to the slot 11 and inclined towards the inner face 6 of the wing 3.

In use, the retainer plate 8 is driven out of the casing 2 through the slot 11 by actuation of the operating handle 10 and is simultaneously guided for rotation about an axis parallel to the length of the slot 11 by the internal guide faces 21,22 such that the leading edge 33 of the retainer plate 8 is displaced towards the outer face 7 of the wing 3 as it is driven out of the slot 11 to engage under the free end of either the outer rib 31a to secure the wing 3 in the vent position or the inner rib 31b to secure the wing 3 in the closed position.

As a result of such angular displacement of the retainer plate 8, the wing is pulled inwards by engagement of the retainer plate 8 with the keeper 13 and this can be used in the closed position to provide controlled compression of a resilient sealing member 34 mounted in a groove 35 extending around the periphery of the opening in the frame 14 thereby ensuring weathertight sealing of the wing 3. The sealing member 34 may be of any suitable type, for example a strip of neoprene or other suitable elastomer cut to length from an extrusion of the required profile.

The plate 8 is held in the extended position until the bush 8 is rotated in the opposite sense to bring the plate 8 back to the retracted position by location of nose 24a of the cam 24 on a flat seat 23a of the cut-out 23. Additionally, the engagement between the keeper 13 and retainer plate 8 along the length of the leading edge 33 and the concealed location of the . leading edge 33 under the free end of the rib 31 provides a strong interlock that is relatively inaccessible from the outside. As a result, the locking device 1 is resistant to forcing by a tool inserted into the rebate 30 so that security is improved, especially compared with many of the known espagnolettes.

Referring now to Figure 3 of the drawings, this shows a second embodiment of a locking device in which parts corresponding to the first embodiment are indicated by like reference numerals in the series 100.

In this second embodiment, the bush 109 is reversible and the cut-out 123 in the plate 108 is modified to receive the cam 124 in each orientation of the bush 109 to adapt the locking device 101 for right or left hand fitting. In this way, the locking device 101 is non-handed.

As shown, the cam 124 has a flat nose 124a that engages a flat seat 123a of the cut-out 123 to hold the

plate 108 in the extended position until the bush 109 is rotated in the reverse sense to bring the plate 108 back to the retracted position.

The installation and operation of the locking device 101 is generally similar to that of the device 1 and will be understood from the description already given.

It will be understood that the invention is not limited to the embodiments above-described. For example, the locking device and keeper may be arranged to secure the wing in the closed position only.

A plurality of retainer plates may be mounted in a common casing and arranged for actuation by a single operating handle to engage individual keepers. For example, two retainer plates may be provided, one at each end of the casing.

Several locking devices and associated keepers may be provided at spaced apart positions for added security, especially of large wings. Each locking device may have its own operating handle but more preferably the locking devices are linked for simultaneous actuation by a common operating handle.

The operating handle may be of any suitable type and may be lockable to prevent unauthorised release of the retainer plate when engaged with the keeper for added security.

Any suitable actuator means may be provided for transmitting drive from the operating handle to the retainer plate. For example, the actuator bush may be replaced by a gear mechanism.

The length of the retainer plate and keeper may be chosen to meet the strength requirements for any given application of the locking device and this may be achieved without altering the depth of the lock casing which has advantages for selection and fitment of the locking device by the user.

Other applications and variations of the invented locking device can of course be envisaged and are deemed within the scope of the invention which is not limited by the exemplary embodiments described herein.

Thus, according to another aspect, the present invention provides a locking device for securing a vent frame with respect to a surrounding frame, the device comprising a lock casing for mounting on a side edge of one of the vent frame and surrounding frame, the casing housing a striker plate and a driver operable by an actuator to move the striker plate between a retracted inoperative position and an extended operative position projecting from the casing for engagement of an elongate leading edge of the striker plate with a corresponding elongate formation of a keeper mounted on the other of the vent frame and surrounding frame, and the striker plate being guided within the casing for rotation about an axis extending lengthwise of the side edge of the associated frame during movement between the inoperative and operative positions.

Claims

1. A locking device for a door, window or like closure comprises a casing (2;102) housing catch means (8;108) and drive means (9;109) for converting rotation of manually operable means (10) about a first axis into movement of the catch means (8;108) between an inoperative position and an operative position for engagement with a keeper (13) to secure the closure closed characterised in that the catch means (8;108) is guided within the casing (2;102) for rotation about a second axis extending substantially normal to the first axis for the movement between the inoperative and operative positions.

2. A locking device according to Claim 1 characterised in that the casing (2;102) is adapted for mounting on one of an opening wing (3) and a surrounding frame (14) and the locking device further comprises a keeper (13) adapted for mounting on the other of the wing (3) and frame (14) for engagement by the catch means (8;108) to secure the wing (3) closed.

3. A locking device according to Claim 2 characterised in that the catch means (8;108) comprises a curved plate (8;108) guided for rotation about the second axis during movement between the inoperative and operative positions by internal guide faces (21,22;121,122) on opposed sides of the casing (2;102).

4. A locking device according to Claim 3 characterised in that the drive means (9;109) comprises an actuator bush (9;109) rotatably mounted between opposed sides of the casing (2;102), the bush (9;109) having a cam formation (24;124) engageable with the plate (8;108) for moving the plate (8;108) between the inoperative and operative positions on rotation of the manually operable means (10), and the bush (109) optionally being reversible for adapting the device for right or left hand fitting.

5. A locking device according to Claim 4 characterised in that the manually operable means (10) comprises a rotatable and optionally lockable handle (10) operatively connected to the actuator bush (9;109).

6. A locking device according to any one of Claims 3 to 5 characterised in that stop means (25,26;125,126) is provided to limit actuating movement of the plate (8;108).

7. A locking device according to any one of Claims 3 to 6 characterised in that the casing (2;102) has

an elongate slot (11;111) in a base wall (12;112) through which the plate (8;108) projects in the operative position for engagement of a leading edge (33;133) of the plate (8;108) with the keeper (13).

8. A locking device according to Claim 7 characterised in that the leading edge (33;133) of the plate (8;108) is displaced in two mutually perpendicular directions by rotation of the plate (8;108).

9. A locking device according to Claim 8 characterised in that the engagement of the leading edge (33;133) of the plate (8;108) with the keeper (13) generates a pull-in force tending to close the wing (3).

10. A locking device according to any one of Claims 3 to 9 characterised in that the plate (8;108) is selectively engageable with the keeper (13) to secure the wing (3) in the closed position or a partially open vent position.

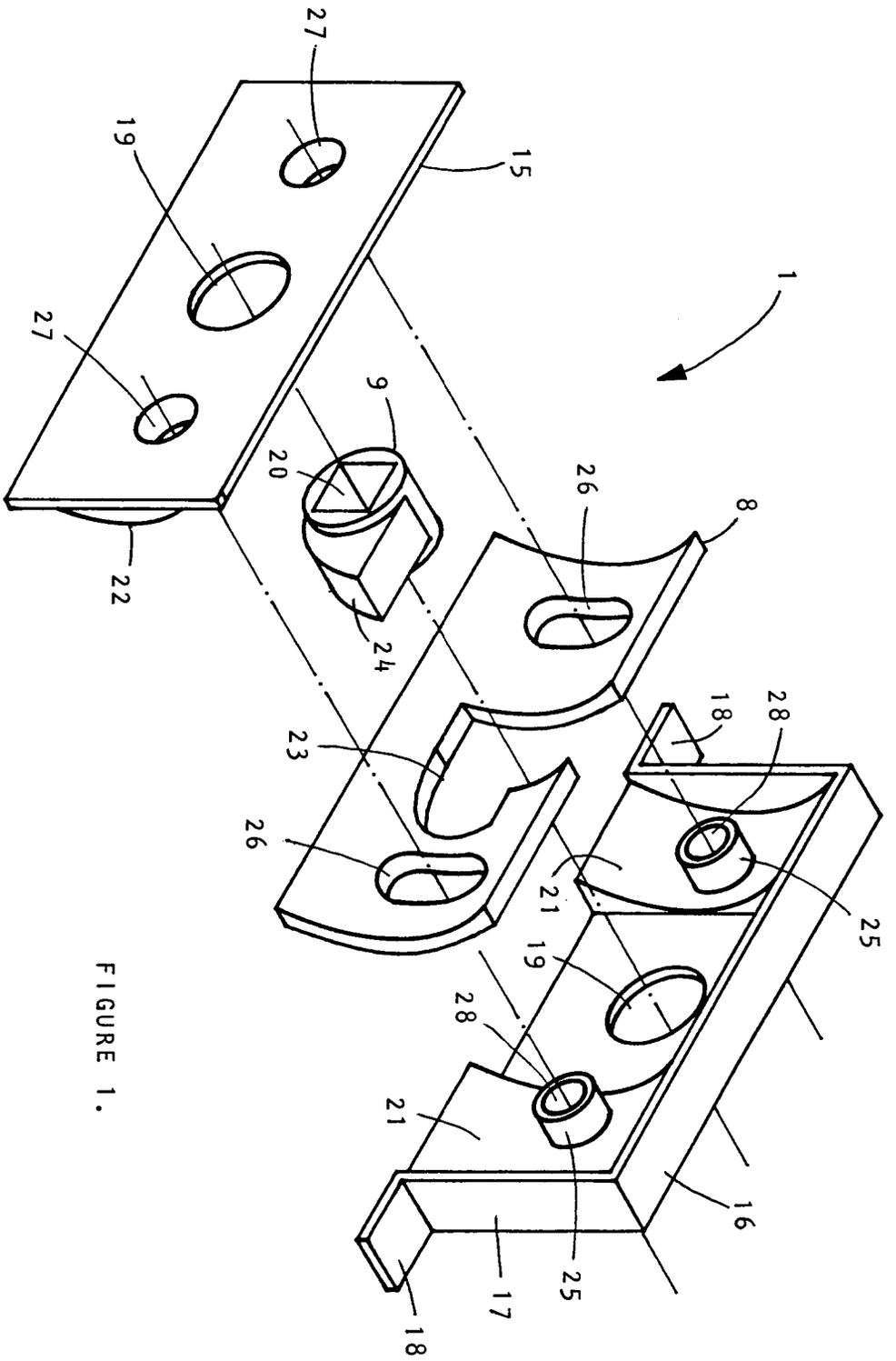

FIGURE 1.

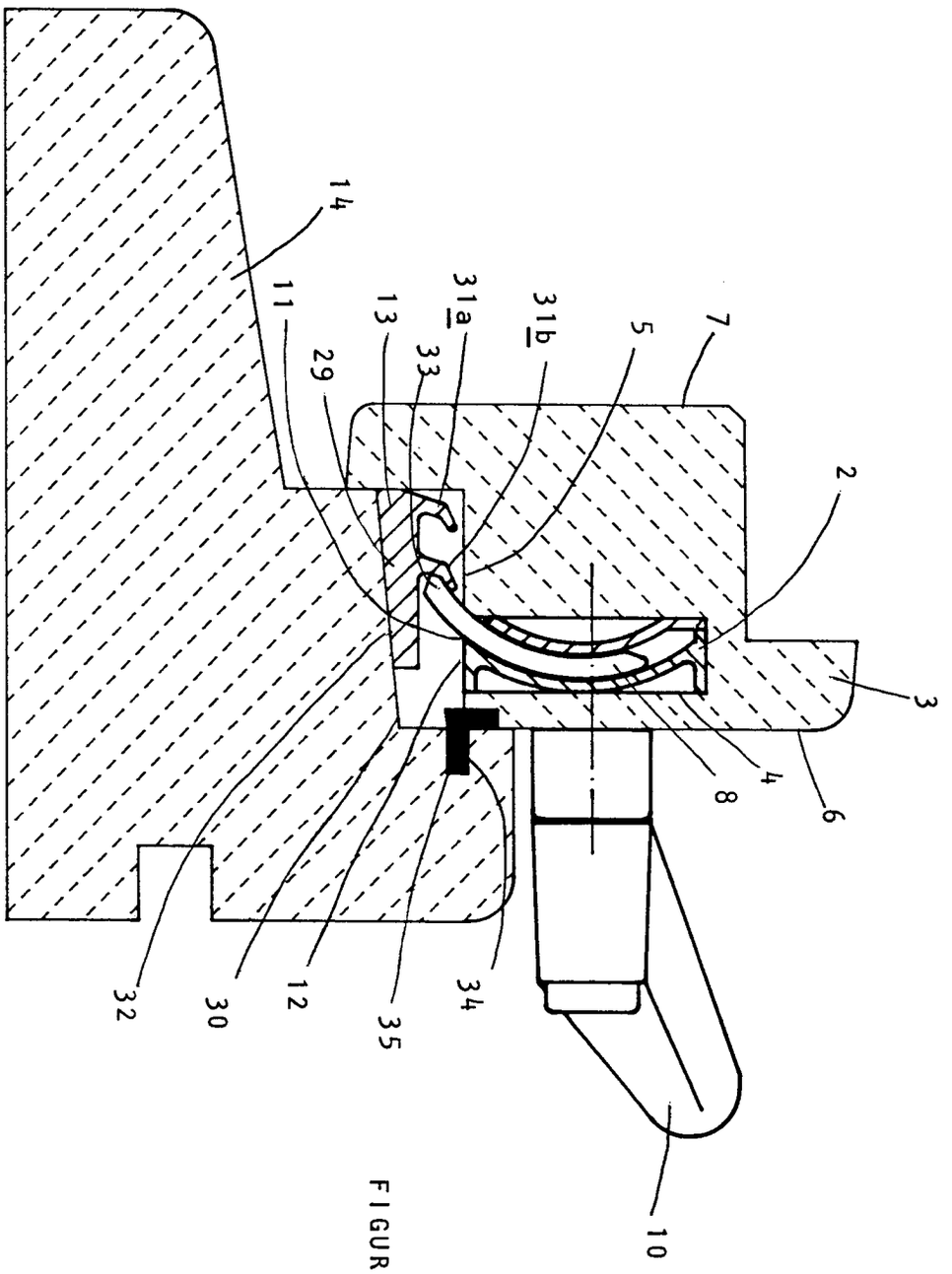

FIGURE 2.

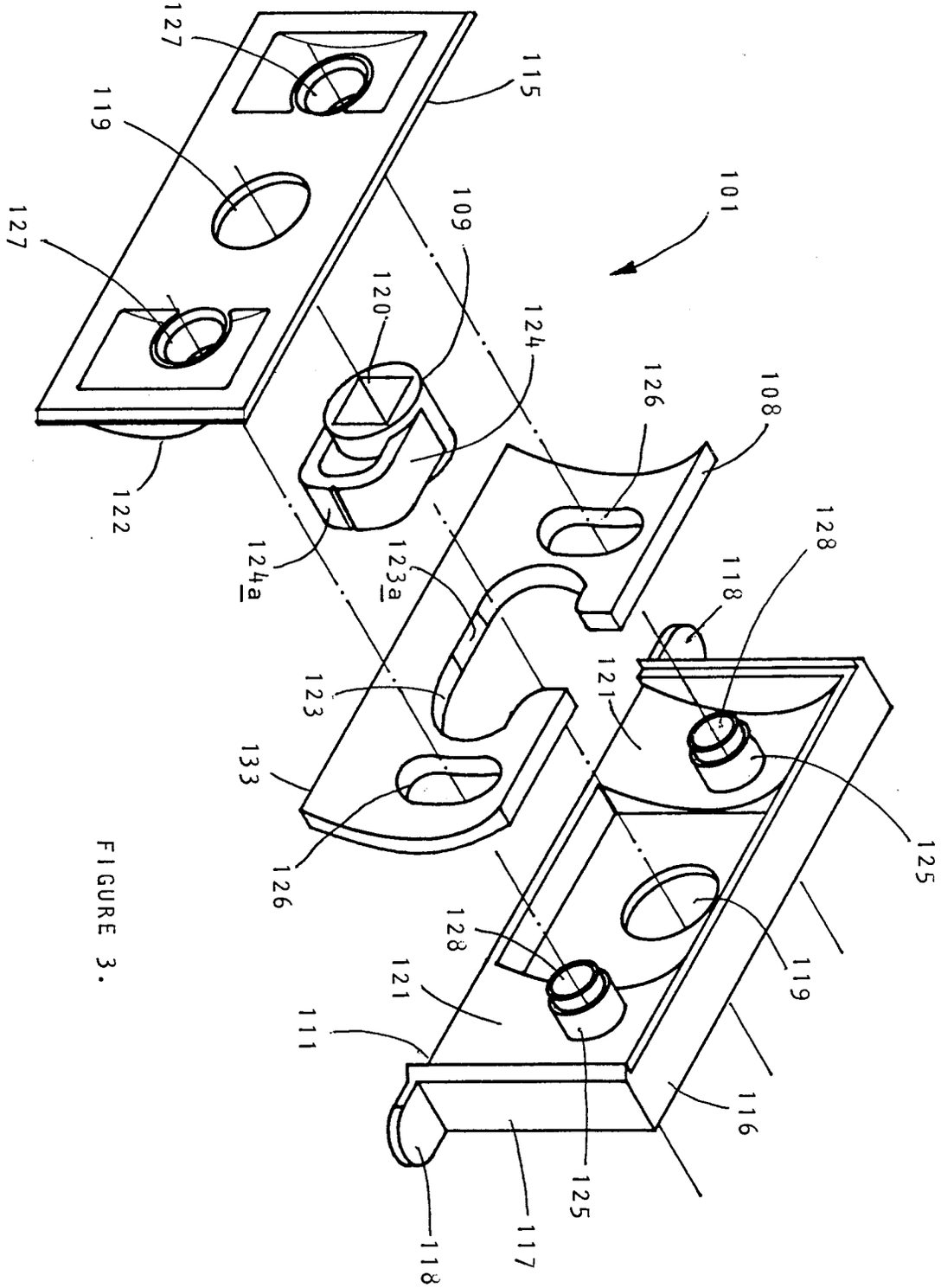
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FIGURE 3.

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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 8182

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US-A-5 092 640 (PLUMMER) * the whole document * ---	1-3,6	E05C3/00
A	FR-A-444 201 (DALMAS) * the whole document * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

E05C
E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 January 1994	Verelst, P

CATEGORY OF CITED DOCUMENTS

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