

Fig.2

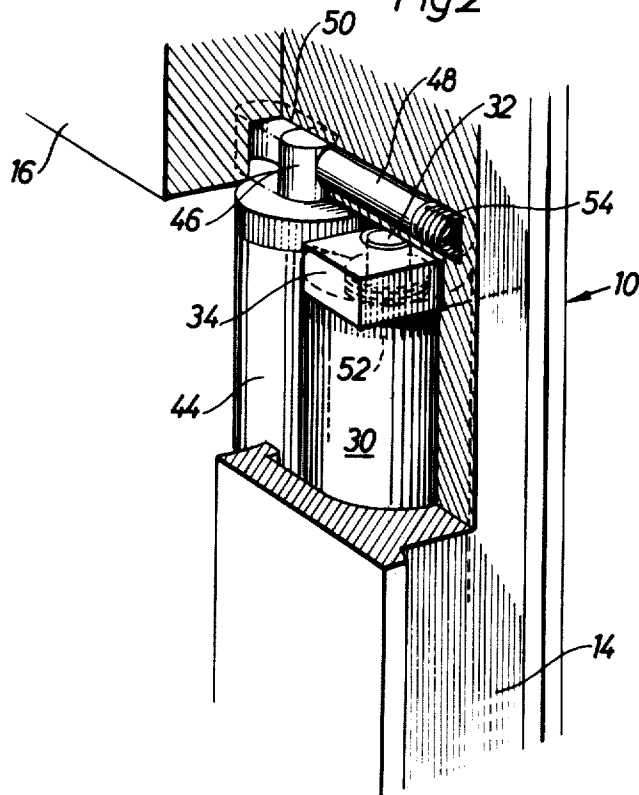


Fig.3

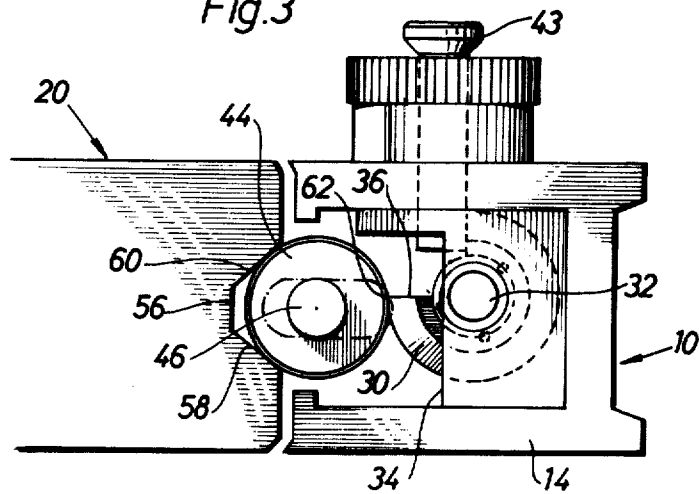


Fig.4

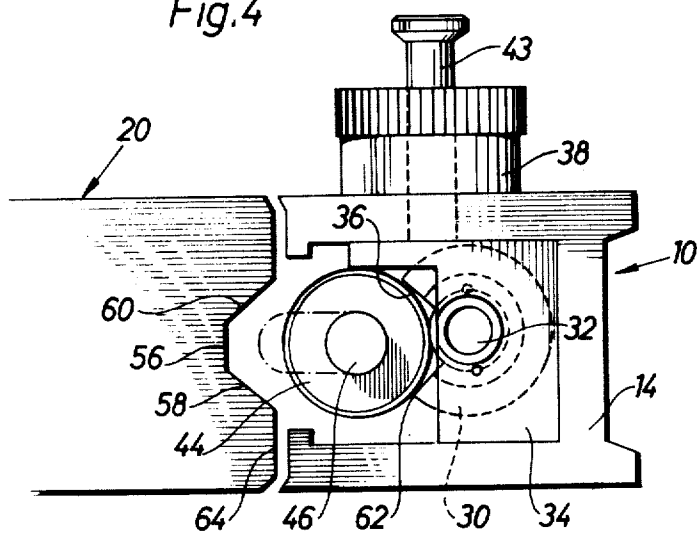


Fig.5

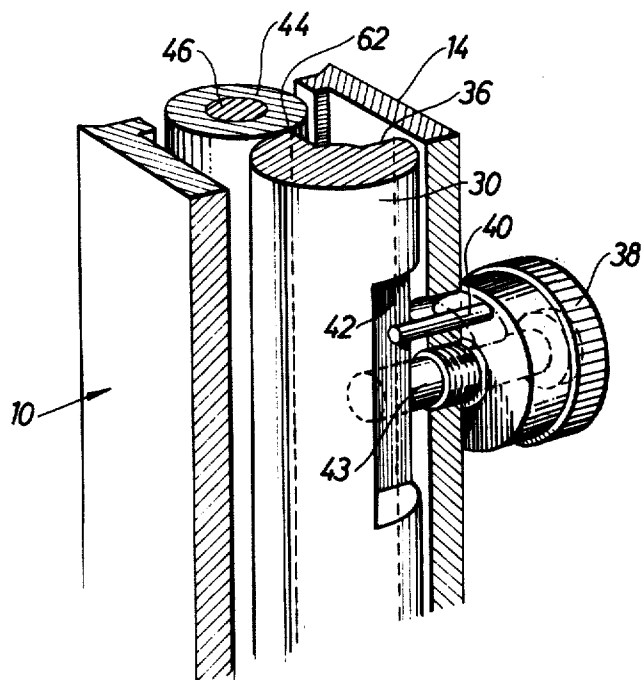
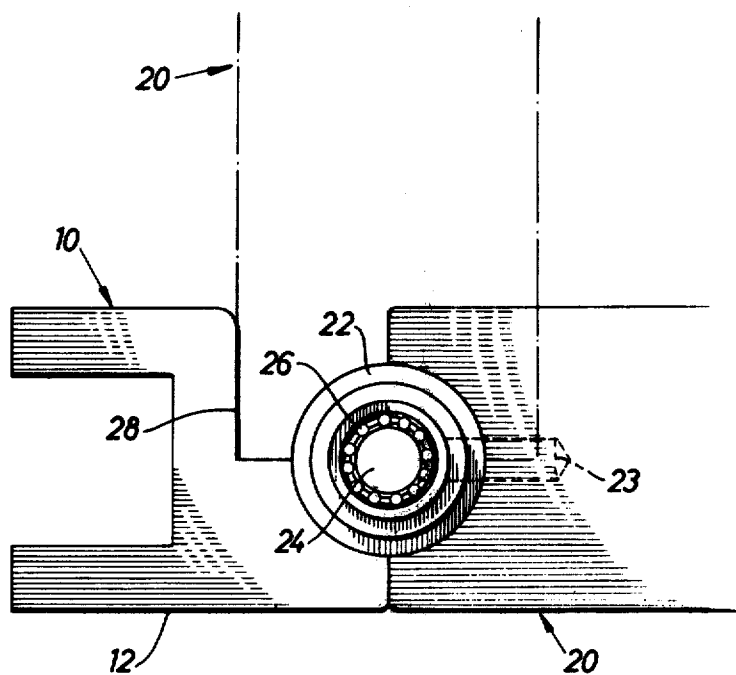


Fig.6



LOCKING DEVICE FOR DOORS

This invention relates to a device for locking a door or the like which on one side is part-rotatable about an axle in a surrounding frame or case. The invention has for its main object to provide a device of this kind which is practically completely safe against burglary due to a locking effect being produced over the entire or at least major part of the longitudinal extension of the door. Another object of the invention is to provide a locking device which is located to the door frame instead of the door proper which results in that the latter can be simplified considerably and the locking mechanism as a whole be made more effective. This is substantially obtained thereby that provided in an elongated recess open towards the door opening and located in the door frame opposite the free narrow face of door are two elongated members of which the one - the operating member - is rotatable about an axis parallel with the axle of the door and has a recess fitting to the other member - the locking member - which is parallelly displaceable transversely to said direction from a locking position where the locking member by the operating member is retained forced into a longitudinal recess in the adjacent narrow side of the door, into an open position where the locking member can enter the recess of the operating member. Due to the feature that both locking members have a great extension in the longitudinal direction of the free narrow side of the door it is practically impossible to force or to break up the locking device embodying the features of the invention.

The invention will hereinafter be described in more detail with reference to an embodiment shown by way of example in the accompanying drawings, in which connection also further features characterizing the invention will be stated.

FIG. 1 is a perspective view of a door frame and a door with an edge portion of the door cut away for clearer illustration;

FIG. 2 is a perspective view of an upper portion of the locking device on a larger scale and with portions of the door frame cut away;

FIGS. 3 and 4 show horizontal sections through the locking device in two different positions, said sections being taken in downward direction above a rotatable knob mounted on the frame;

FIG. 5 is a perspective view of a portion of the locking device surrounding the rotatable knob, the front portion of the door frame being removed; and

FIG. 6 is a top view of the frame and the door adjacent the axle or so-called lifting hinge of the door.

Referring now to the drawings, reference numeral 10 generally denotes a rectangular door frame which is mounted in a door opening and which comprises two vertical frame pieces 12, 14, an upper frame piece 16 and a lower frame piece or door step 18. Suspended in the frame which may be made of metal, plastic or other suitable material is a door 20. This is supported by a shaft or axle 22 extending adjacent the vertical frame piece 12 and having its center line preferably located in the central plane of the door panel 20. The cylindrical shaft 22 is rigidly united with the door 20 by means of transversal screws 23 (FIG. 6) or similar fastening means. The axle has at both ends an extension having the shape of a central dowel 24 extending into the upper or lower frame piece 16, 18, respectively, of the

frame in which pieces each dowel is mounted in a bearing such as a ball bearing 26. The lower one of these bearings carries also the axial load from the door. The frame piece 12 is formed with a step 28 fitting the edge of the door when the door is turned from closed position, indicated by full lines, to open position indicated by dash and dotted lines, as shown in FIG. 6.

The locking device according to the invention is mounted to the opposite vertical side of the door frame. Here, the frame piece 14 has a generally U-shaped profile open towards the door opening, an elongated operating member 30 with its both ends rotatably mounted by means of dowels 32 in projections 34 rigidly united to, or formed in one piece with, the frame. The operating member 30 extends over practically the entire vertical longitudinal side of the frame and has a cylindrical shape with the exception of a recess 36 which suitably occupies one quadrant or a similar portion.

The operating member 30 is actuated from outside by means of a knob 38 (FIGS. 1 and 5) rotatably mounted in the frame piece 14 and preferably located at that side of the door which faces the room. The knob 38 has an eccentrically located pin 40 adapted to cooperate with a recess 42 (FIG. 5) formed in the operating member 30 so that when the knob 38 is turned clockwise the operating member is caused to rotate counterclockwise according to FIG. 3 over about one eighth of a revolution. The operating member 30 can be locked against rotation in both its operative positions by means of a pin 43 which is mounted centrally within and axially displaceable inside the knob 38.

Arranged outside the operating member 30 and in parallel relationship therewith is a locking member 44 having the shape of a cylindrical roll or rod 44 (FIGS. 4 and 5) rotatably mounted on a central pivot rod 46. This pivot rod extends into each of the horizontal frame pieces 16, 18 where it is rigidly united with a transversely extending pin 48 (FIG. 2). Each pin 48 is slidably mounted in a horizontal groove 50 in the frame pieces 16 and 18, respectively. Thus the roll or rod 44 is rotatable about the pivot 46 extending from the top of the frame to the bottom with the transverse pins 48.

The operating member 30 on each of its ends is devised to cooperate with a torsion spring 52 (FIG. 2) which tends to rotate the member clockwise from the position shown in FIG. 4 to that shown in FIG. 3. The locking member 44 is at its ends under the actuation of springs 54 which tend to displace the member towards the left from the position shown in FIG. 4 to that shown in FIG. 3 in which latter position the member is in engagement with a longitudinal recess or groove 56 is formed in the adjacent narrow side of the door. This recess or groove is located symmetrically to the central plane of the door and has two suitably plane lateral surfaces 58, 60 which are so inclined to one another that the width of the recess diminishes towards the bottom of the recess.

When the central locking pin 43 is inserted into engagement with the recess 36 of the operating member 30, said member is locked against rotation. In this position it retains with the edge 62 of the recess 36 the locking member 44 fixed in its outer end position which means that if the door is closed said member is forced against the two surfaces 58, 60 of the door recess 56 according to FIG. 3, the door thus being positively locked against swinging or rotative movement in both direc-

tions. In this position the edge 62 coincides with or is adjacent a plane through the centers of the door axle 22 and the two members 30 and 44.

To open the door the pin 43 must, to begin with, be drawn out and thereafter the knob 38 rotated so that the operating member passes from the position according to FIG. 3 to the position according to FIG. 4. As will be understood from the last-mentioned figure the recess 36 has now been displaced to a position that is symmetrical relative to the locking member 44 so that this member can be withdrawn from the engagement with the recess 56 in the door. The springs 54 continue to force the roll 44 into engagement with the recess 56 in the door, but as their power exercises a minor load only on the door, said spring power can be mastered so that the door 20 can be opened. The locking member 44 now performs a rolling movement along the inclined surface 58 and along the door edge portion 64 adjacent the recess 56, said locking member by parallel displacement being caused to enter the recess 36 of the operating member 30 as is understood from FIG. 4.

As soon as the door has been opened, the locking member or roll 44 is automatically returned to its outer end position due to actuation by the springs 54, and the operating rod 30 due to actuation by the torsion springs 52 is rotated back to the position according to FIG. 3. Then the roll 44 is locked again so that the door cannot be closed unless the pin 40 forces the operating member 30 into the position according to FIG. 4. Thus the locking device of the door cannot be caught unintentionally. However, if desired, the operating member 30 can be blocked in the position shown in FIG. 4 by insertion of the pin 43 of the knob 38 into the recess 42 so that the locking roll 44 thus without any obstacle can be forced into the door recess 56 for closing and opening the door. It will be understood that in this free position the relatively low spring power acting on the locking roll always must be overcome, which means that the door cannot be unlocked by a moderate wind draft, for example.

Mounted on the inner side of the door may be a handle or knob so that the door can be opened in an easy manner. On the opposite side, i.e., the side facing outwards, a lock 66 (FIG. 1) is provided which may consist of a key-actuated bolt of known kind adapted for cooperation with the operating member 30. Since the door is to be opened inwards no particular handle is required on the exterior side.

The locking device and the door are highly burglary-proof since the door is blocked at its free narrow side over a very long portion. By locating the so-called lifting hinge as a shaft extending from end to end in a centre plane of the door, the door cannot be removed by lifting it from the hinge or hinges.

Obviously, the invention is not limited to the embodiment shown, but may be varied in the widest sense within the scope of the basic idea thereof. It may be applied to shutters, hatches and covers as well as windows etc. where the same problem exists as in connection with doors. The locking member 44 must not have a continuously coherent cylindrical surface cooperating with the recess in the door, but may be composed of a plurality of coaxial cylinder bolts in mutually spaced relationship which are displaceable in parallel from a locking position to a releasing position as described 65

above and which then may be mounted on a common pivot rod 46.

Having thus described my invention, what I claim is:

1. A lock for a door which is hingeable in a door frame about an axle mounted in one side of the frame, comprising

two elongate members mounted in the opposite side of the door frame in parallelism to said axle, one of which is an operating member that is rotatable about an axis parallel to the axis of said axle, and the other of which is a locking member reciprocable in a direction transverse to said axes for movement from an open position, in which it is engaged with an elongate recess in said operating member that extends parallel to said axes, into a locking position in engagement with an elongate recess in the free adjacent edge of the door that extends parallel to said axes, and vice versa.

2. A lock as claimed in claim 1, wherein both members extend over at least the major part of the free side of the door.

3. A lock as claimed in claim 1, wherein the locking member has a cylindrical cross-section and is rotatable about its own longitudinal axes.

4. A lock as claimed in claim 1, wherein a spring constantly urges said locking member to locking position.

5. A lock as claimed in claim 1, wherein a spring is connected to said operating member and constantly urges said operating member rotatably into a position in which the recess in said operating member will register with said locking member.

6. A lock as claimed in claim 1, wherein a rotatable knob is mounted in the door frame and has a locking member for locking the operating member against rotation.

7. A lock as claimed in claim 1, wherein the recess formed in the edge of the door has an inwardly diminishing width so that the locking member in locking position by bearing against the two sides of said recess in the door keeps the door fixed against any part-rotational movement in both directions.

8. A lock as claimed in claim 1, wherein the door axle has a cylindrical configuration and extends along one entire narrow side of the door and is rotatably mounted in bearings positioned in the frame outside said narrow side of the door.

9. A lock as claimed in claim 1 wherein an actuating member is rotatably mounted in the door frame to rotate on an axis at right angles to the axis of rotation of said operating member, and a pin is reciprocally mounted in said actuating member for movement transversely to and from engagement with the recess in said operating member, and is adapted when engaged with the last-named recess to lock said operating member in locking engagement with said locking rod.

10. A lock as claimed in claim 9, wherein a second pin is secured in said actuating member eccentrically of the first-named pin, and is engaged in a second elongate recess in said operating member spaced angularly about the axis of the operating member from the first-named recess therein so that upon rotation of the actuating member, the operating member is moved about its axis to and from locking engagement with the locking member.

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