

Sept. 26, 1967

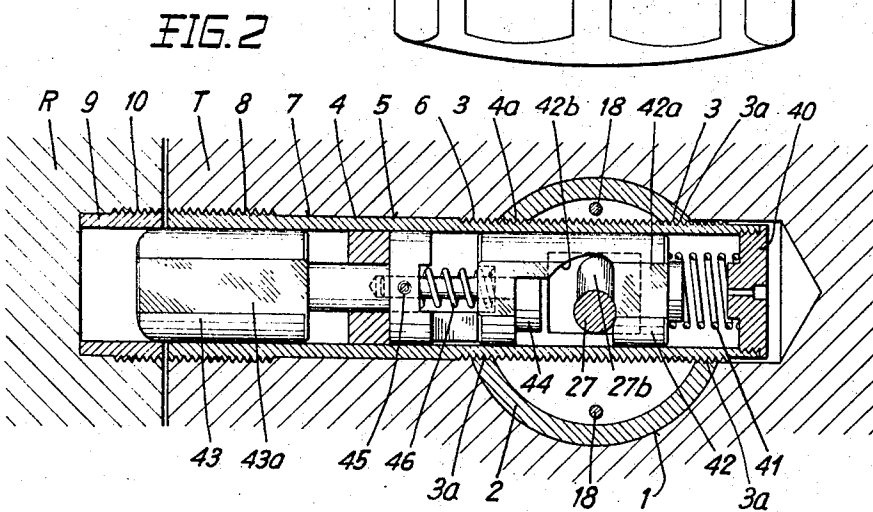
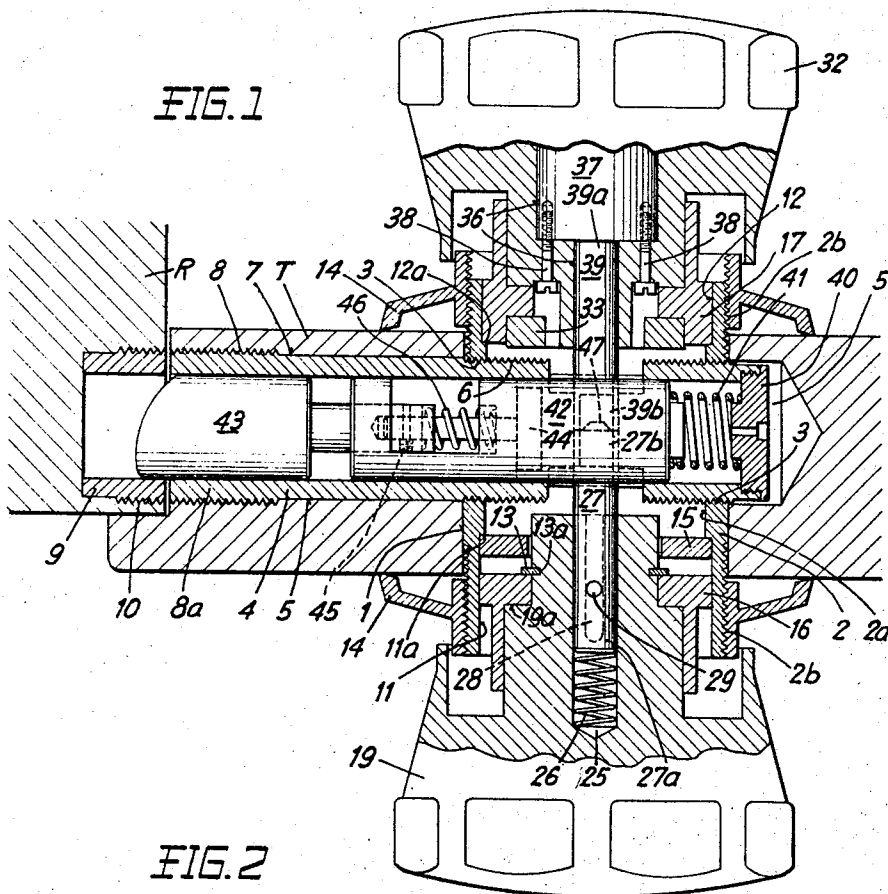
K. KÖHLER

3,343,860

INSERTED DOOR LOCK

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4 Sheets-Sheet 1



INVENTOR:
KARL KÖHLER
By *Werner W. Kleemann*
His Attorney

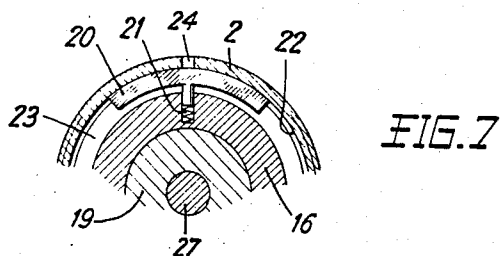
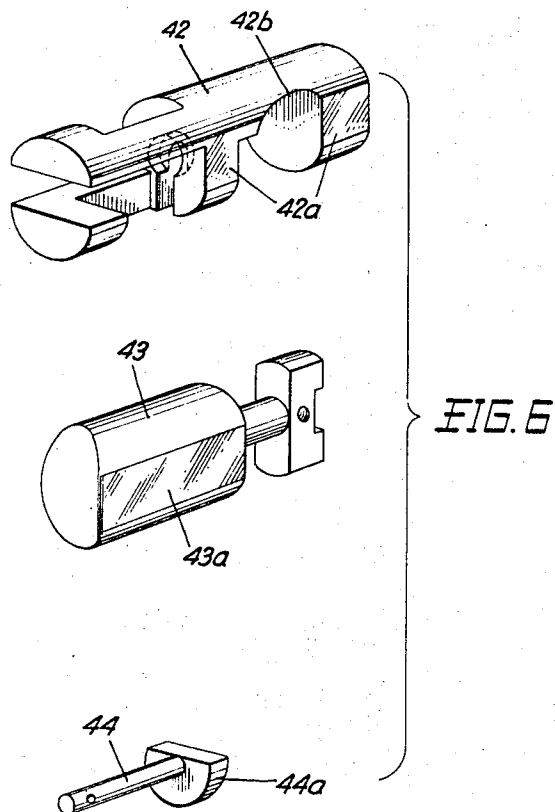
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4 Sheets-Sheet 3



INVENTOR:
KARL KÖHLER
By Werner W. Klemm
His Attorney

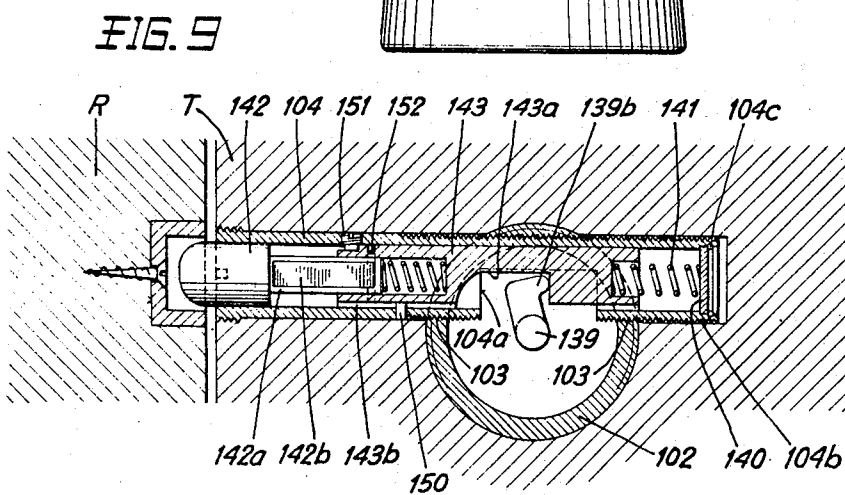
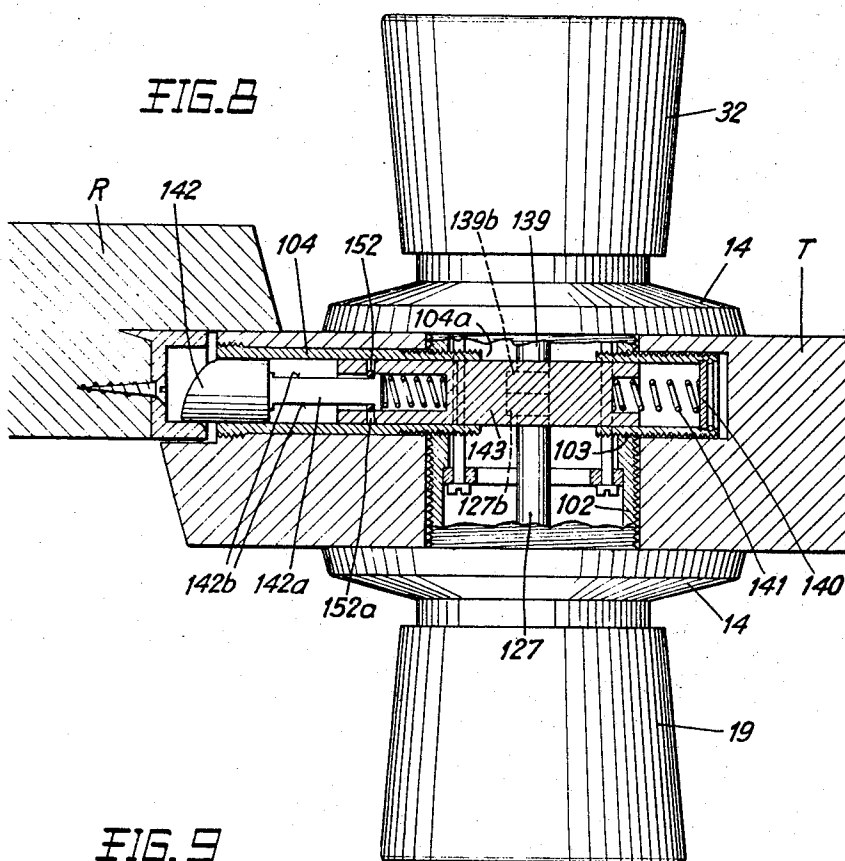
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4 Sheets-Sheet 4



INVENTOR:
KARL KÖHLER
By Werner W. Korman
His Attorney

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3,343,860

INSERTED DOOR LOCK

Karl Köhler, Tannenblickweg 7, Zollikofen,
Bern, Switzerland

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15,018/63

3 Claims. (Cl. 292—169)

The present invention has reference to an improved inserted or inset door lock incorporating a latch mechanism displaceably and non-rotatably guided in a lengthwise cylindrical housing and possessing at least one spindle which extends centrally through a likewise cylindrical transverse housing at which there is also rotatably mounted at least one handgrip for actuating the aforesaid spindle, with the lengthwise housing extending through transverse openings of the transverse housing.

An inserted door lock of this type of physical construction is already known to the art in which both housings as well as a number of other components consist of punched and pressed sheet metal portions, and wherein the latch mechanism during production of the lengthwise housing is pushed into the latter once and for all, so that upon the appearance of a defect such must be thrown away together with the aforesaid housing. The wall thicknesses of the housings must be small, such bringing with it the danger of jamming of the mechanism contained therein, particularly if such housings are tightly embedded in the associated bores of the doors manufactured of wood. Additionally, the lengthwise housing possesses a relatively large diameter, requiring a large guard or shield at the door.

Accordingly, it is a primary object of the present invention to provide an improved door lock of the above-mentioned physical construction providing the advantage, among others, that the time required for the fixing of the lock in a door is considerably reduced and that the use of screws is dispensed with, whereby in the door only a throughpassing transverse bore and a blind lengthwise bore have to be prepared.

A further important object of the present invention has reference to an improved door lock which provides a considerably increased robustness, high degree of operational reliability, ease of dismounting, and, last but not least, is insensitive against the "working" or "breathing" of the wood of the door in which the lock is inserted.

Still another noteworthy object of this invention has reference to an improved door lock of the mentioned type which is featured by its relatively simple construction, high degree of security, its robustness, as well as it being relatively economical to manufacture and easy to dismount as well as mount.

Generally speaking, the door lock of the present invention is manifested by the features that these transverse openings of the transverse housing are threaded or tapped holes, the common axis of which is disposed at a distance from the common axis of the spindle (or the spindles) and the transverse housing, that the lengthwise housing is threaded by means of an external threading provided thereat into the threaded holes and possesses at least one lateral opening through which the spindle or the spindles come into engagement with the latch mechanism.

Other features, objects and advantages of the invention will become apparent by reference to the following detailed description and drawings in which:

FIGURE 1 is a horizontal cross-sectional view taken through a first embodiment of the inventive door lock;

FIGURE 2 is a vertical cross-sectional view of the door lock of FIGURE 1, taken in the axial plane of the lengthwise housing;

FIGURE 3 is a vertical cross-sectional view of the

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door lock of FIGURE 1, taken in the axial plane of the transverse housing;

FIGURE 4 is a cross-sectional view taken along the line IV—IV of FIGURE 3;

FIGURE 5 is a cross-sectional view taken along the line V—V of FIGURE 3;

FIGURE 6 is a perspective view of the three members of the locking latch;

FIGURE 7 is a fragmentary, cross-sectional view showing details of the mounting of a handgrip;

FIGURE 8 illustrates a second embodiment of the inventive door lock, partially in plan view and partially in lengthwise section; and

FIGURE 9 is a vertical cross-sectional view of the door lock of FIGURE 8, taken in the axial plane of the lengthwise housing.

Describing now the drawings, it will be understood that in the embodiment depicted in FIGURES 1 to 7 reference character T designates the door or door wing and reference character R the door frame. An outer cylindrical transverse housing 2 is seated in a throughpassing or continuous transverse bore 1 of the door T. This transverse housing 2 possesses two transverse bores 3 provided with internal threading 3a, the common axis of which is situated at a distance above the axis of the aforesaid transverse housing 2. A lengthwise housing 4 is inserted in an appropriate blind bore 5 of the door T and has an external threading 6 which is in engagement with the threaded bores 3 of the transverse housing 2. Adjacent this external threading 6 the aforesaid lengthwise housing 4 is provided with a smooth cylindrical external outer surface 7 which fits in the blind bore 5 practically without play. Additionally, this lengthwise housing 4 is provided with an external threading 8 at its outer end portion 8a which engages with the wood of the door T. The root or minor thread diameter of this threading 8 is the same size as the diameter of the outer surface 7 and the pitch is the same as that of the threading 6 and the threaded bores 3. The closure plate consists of a sleeve 9 provided with outer threading 10 engaging in the wood of the door frame R.

The transverse housing 2 is provided at both of its ends with short, smooth-walled bores 11 and 12, each of which terminates at a flat annular shoulder 11a and 12a, respectively, the confronting surfaces of which are parallel to the axis of both threaded bores 3. Two screws 18 extend in the axial plane disposed at right angles to the axis of the threaded bores 3 within the lengthwise bore 2a of the transverse housing 2, parallel to its axis and, as shown in FIGURE 3, past the lengthwise housing 4. A retaining ring 15 and a bearing or support ring 16 are suitably pushed into the bore 11. A support ring 17 is loosely pushed into the bore 12. The screws 18 pierce through bore holes 15a of the retaining ring 15 and engage in blind threaded holes 17a of the support ring 17 (FIGURE 3). The retaining ring 15 bears at the shoulder 11a, the support ring 17 bears at the shoulders 12a.

A handgrip 19 is rotatably mounted in the support ring 16 and possesses an external annular groove 13a in which there is inserted a spring or lock washer 13, which in the same manner as an annular shoulder 19a of the handgrip 19 bears against an inner flange of the support ring 16 in order to axially support said handgrip 19 at this support ring 16. Such support ring 16 is thus fixedly retained in axial direction in the transverse housing 2, so that a member 20 (see also FIGURE 7) under the action of a spring 21 engages in an internal annular groove 22 of the transverse housing 2 as well as also in an external annular groove 23 of the handgrip 19. During assembly the snap member 20 is to be completely pressed into the outer annular groove 23, in order that such can be pushed past

the transverse housing 2. After insertion has been completed it snaps under the action of the spring 21 into the inner annular groove 22. If demounting is necessary, then a thin instrument is introduced through the bore 24 of the transverse housing 2 and by means of this instrument the snap member 20 is pressed until it moves out of the groove 22, whereupon the handgrip 19 can be removed.

Furthermore, the handgrip 19 is provided with a central blind bore 25, at the rear of which there is inserted a spring 26 and in which the shaft portion 27a of a spindle 27 is rotatably and displaceably mounted. However, the shaft portion 27a carries a transverse pin 29 engaging in a lengthwise groove or slot 28 bounding at the blind hole or bore 25. As a result, this spindle 27 is rigidly connected for rotation with the handgrip 19. A radial bolt 30 is fixedly inserted in a transverse hole 30a of the handgrip 19. As best shown in FIGURE 5, this radial bolt 30 extends into a recess 31 of the retaining disk 15, so that rotation of the handgrip 19 and this spindle 27 is limited to approximately 180°.

A handgrip 32 is rotatably mounted in a support ring 17 and is fixedly retained axially since its innermost end portion carries a pressed-on ring 33 bearing at the inner surface 17a of the support ring 17. The handgrip 32 is equipped with a radial bolt 34 (FIGURE 4) cooperating with a recess 35 in the support ring 17 in order to limit rotation of the handgrip 32 to approximately 90°. The handgrip 32 additionally possesses a central bore 36 which widens in stepwise manner towards the outside. In the further external portion 36a of this bore 36 there is seated the housing 37 of a suitable commercially available cylindrical lock 37a which is fixedly held by screws 38 or the like. The non-illustrated cylinder of this cylindrical lock 37a is formed of a single piece provided with a spindle 39, the shaft portion 39a of which piercingly extends through the narrower portion 36b of the central bore 36 of the handgrip 32. When the key is removed, such cylinder can assume one or the other of two angular positions, displaced through 90° relative to one another with respect to the lock housing 37. Moreover, the spindles 27, 39 extend through confronting lateral openings 4a of the lengthwise housing 4 and into the latter.

A spring plate 40 is threaded into the inner end portion of the lengthwise housing 4 containing the latch mechanism. A pressure spring 41 bears against this spring plate 40. This pressure spring 41 strives to outwardly press the lock latch unit, further to be considered, in other words into its locking position. This lock latch unit or mechanism is formed of three members 42, 43 and 44, with the latch members 42 and 43 being connected with one another in bayonet-like fashion in order to render possible the use of the lock for doors which close from the left as well as from the right. The outer lock latch member 43 can be connected with the latch members 42 and 44 in two positions displaced through 180° with respect to one another about the lengthwise axis. The latch members 43 and 44 connected with one another by a transverse pin 45 are displaceable with respect to the latch member 42, in order that the outer latch portion or member 43 can move into the closing plate 9 during the snapping action without the latch member 42 cooperating with the spindles 27 and 39 being moved. During this snapping action i.e. when the latch portion 43 moves into the closing plate 9, a pressure spring 46 which acts between the members 42 and 43 is compressed. Further, the lengthwise housing 4 is provided at its inner surface throughout the entire length (with the exception of the internal threading receiving the spring plate 40) with the internal cross-section visible in FIGURE 3 having two oppositely situated flat sides 4b to which fit the flat sides 42a and 43a, respectively, of the lock latch portions 42 and 43, best shown in FIGURE 6, so that the lock latch unit 42, 43, 44 is displaceably, yet non-rotatably mounted in the lengthwise housing 4.

The inner lock latch portion 42 possesses the usual

transverse recess 42b in which operate the spindle arms 27b and 39b. Additionally, this recess 42b possesses a portion in which, on the occasion of the already mentioned rearward displacement of the lock latch members 43 and 44 with respect to the lock latch member 42 against the action of the spring 46, there can move the cylinder segment-shaped head 44a of the lock latch member 44. As best seen by inspecting FIGURE 1, the confronting frontal faces 47 of the spindle arms 27b, 39b are approximately V-shaped in cross-section, one being convex and the other concave, so that the spindle arms 27b, 39b are coupled with one another in form-locking manner whenever they are directed towards one another.

The transverse housing 2 is provided with an external threading 2b at both of its ends, the outer diameter of which is not larger than that of the central portion of this transverse housing 2. Moreover, each external threading 2b has threaded thereon an end ring 14 until such bears against the one or the other flat side of the door T, whereby obviously the thickness of the latter can be varied within rather wide limits.

The heretofore described door lock of the invention operates as follows:

In the illustration of FIGURES 1 to 5 the movable members assume their central position. The lock latch unit 42, 43, 44 is located in its locking position without being locked however. In order to open the door T merely the one or the other handgrip 19, 32 need be rotated in the clockwise direction of FIGURE 2. In so doing, the spindle arms 27b and 39b which are coupled together by means of their confronting frontal faces 47 are rotated in the same direction, these acting upon the lock latch member 42 to pull-back the lock latch unit 42, 43, 44.

It is also possible, starting from the previously mentioned illustrated central position, to also rotate the handgrip 19 through 90° in the counterclockwise direction of FIGURE 2. The spindle arm 27b is then horizontally positioned against the lock latch member 44, the entire lock latch unit 42, 43, 44 thus locked in its locking position. During such rotation the spindle 39 cannot follow along because, first of all, the bolt 34 extending into the handgrip 32 comes to bear at the upper end of the recess 35 of the support ring 17 and, further, since when the key is pulled out the handgrip 32 is rigidly connected with the spindle 39 by means of the cylinder lock 37. Now, in order to again unlock the lock, either the handgrip 19 together with the spindle 27 can be rotated back into the central position, or it is possible to proceed as follows: The key is inserted in the cylinder lock 37 and by means of such the spindle 39 is rotated in counterclockwise direction (FIGURES 2 and 4) through 90°. At the end of this rotation the spindle arms 27b and 39b are again form-lockingly intercoupled by means of their frontal faces 47 and by means of the key the spindle 39 together with the coupled spindle 27 can be rotated back into the central position. Thereafter, either by means of the key or after pulling-out the same, it is possible to further rotate the spindle 39 together with the coupled shank 27 by means of the handgrip 32 in the clockwise direction through 90° (FIGURES 2, 4 and 5), in order to pull back the lock latch unit 42, 43, 44.

By means of the key inserted in the lock it is also possible to rotate the spindle 39 together with the coupled spindle 27 in counterclockwise direction through 90°, in order to lock the lock latch unit 42, 43, 44 in its locked position (FIGURE 2). If, now, the key is pulled out, then by rotating the handgrip 19 in clockwise direction the spindle 39 can only be rotated back to the central position. During this rotation the handgrip is rigidly connected for rotation with the spindle 39 by means of the cylinder lock and finally abuts against the bolt 34 rigidly seated in the handgrip 32 at the lower end of the recess 35. The lock latch unit 42, 43, 44 is indeed now unlocked, yet cannot be pulled back because with a further rotation of the handgrip 19 in clockwise direction the

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spindle 27 uncouples from the spindle 39 which is prevented from undertaking further rotation, the lock latch member 42 coming to bear with the curved portion of its recess 42b at the spindle arm 39b. A pulling back of the lock latch unit 42, 43, 44 is, thus, then only possible by rotating the spindle 39 by means of the key inserted in the cylinder lock 37.

The embodiment depicted in FIGURES 8 and 9 is considerably similar with regard to physical structure and mode of operation as the previously described embodiment, and, thus, like reference numerals have again generally been employed for the same or analogous elements. Also, for such reason, only the differences between these two embodiments will be described. In the first instance, the embodiment of FIGURES 8 and 9 brings about a further reduction in the diameter of the lengthwise housing and an appropriate reduction in the size of the shield or guard to be provided at the door T, also however, a simplification of the latch mechanism.

As a first consideration, and as particularly evident from FIGURES 8 and 9, this embodiment differs insofar as the distance between the common axis of the lengthwise housing 104 and the threaded bores 103 of the transverse housing 102, on the one hand, and the axis of the transverse housing 102, on the other hand, is larger than the external radius of the outer or lengthwise housing 104, which is reduced. The latter possesses an opening 104a at one side facing towards the axis of the transverse housing 102 through which the spindle arms 127b, 139b of the spindles 127 and 139, respectively, can be brought into engagement with the latch unit or mechanism 142, 143 mounted in the lengthwise housing 104.

In the latch mechanism the latch proper is composed of the main lock latch components or members 142, 143. A spring plate 140 is held at the inner end portion 104b of the lengthwise housing 104 by means of a retainer ring 104c. Against this spring plate 140 bears a spring 141 which presses against the latch member 143. This latch member 143 which in rest position bears against a setscrew or stop screw 151, is secured against rotation in that a pin 150 fixedly seated in the lengthwise housing 104 engages in a lengthwise groove 143b provided at the latch member 143. The shaft portion 142a of the latch member 142 is flattened at two sides situated opposite one another. The flat sides 142b slide along the legs of a U-shaped, flexed, spring wire 152 inserted in transverse bores or lateral slots 152a of the latch member 143. Upon removal of this spring wire 152 the latch member 142 can be rotated through 180° with respect to the latch member 143, this rendering possible use of the lock for doors which shut from the outside as well as from the inside. Reference numeral 143a designates a recess, at the walls of which engage the spindle arms 127b, 139b in order to pull back the latch unit, much in the manner already considered.

While there is shown and described present preferred embodiments of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. An inserted door lock comprising, in combination, a lengthwise housing, a latch mechanism displaceably and non-rotatably guided in said lengthwise housing, at least one spindle cooperating with said latch mechanism, a transverse housing, said spindle extending centrally through said transverse housing, a handgrip rotatably mounted at said transverse housing for actuating said spindle, said transverse housing being provided with transverse openings, said lengthwise housing extending through said transverse openings of said transverse housing, said transverse openings being constructed as threaded bores, said threaded bores possessing a common axis which is disposed at a distance from the common axis of said spindle and said transverse housing, said lengthwise housing

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being provided with external threading for threadably engaging said threaded bores of said transverse housing, said lengthwise housing further being provided with at least one lateral opening through which extends said spindle in order to come into operable engagement with said latch mechanism, a portion of said lengthwise housing disposed adjacent said transverse housing possessing a smooth-walled cylindrical surface, said lengthwise housing incorporating an outer end portion provided with external threading, the root diameter of said external threading being at least approximately the same size as the diameter of said smooth-walled cylindrical surface and the pitch of said external threading being the same as the pitch of the external threading of said lengthwise housing and said threaded bores of said transverse housing.

2. An inserted door lock comprising, in combination, a lengthwise housing, a latch mechanism displaceably and non-rotatably guided in said lengthwise housing, at least one spindle cooperating with said latch mechanism, a transverse housing, said spindle extending centrally through said transverse housing, a handgrip rotatably mounted at said transverse housing for actuating said spindle, said transverse housing being provided with transverse openings, said lengthwise housing extending through said transverse openings of said transverse housing, said transverse openings being constructed as threaded bores, said threaded bores possessing a common axis which is disposed at a distance from the common axis of said spindle and said transverse housing, said lengthwise housing being provided with external threading for threadably engaging said threaded bores of said transverse housing, said lengthwise housing further being provided with at least one lateral opening through which extends said spindle in order to come into operable engagement with said latch mechanism, said transverse housing possessing a lengthwise bore and further provided with a respective externally threaded portion at each end, a respective annular shoulder within said lengthwise bore adjacent the region of each end of said transverse housing, said transverse housing having a respective central portion provided with said threaded bores, said transverse housing further including respective smooth-walled bore means each extending to one of said annular shoulders and coaxially arranged with respect to said lengthwise bore, an outer end ring threaded onto each externally threaded portion of said transverse housing and adapted to bear against a door in which said door lock is inserted, a first support ring disposed in one of said bore means, said handgrip being rotatably and non-displaceably mounted in said first support ring, a retaining ring and a second support ring disposed in the other bore means, the outer diameter of both externally threaded portions of said transverse housing at most being as large as the diameter of the outer surface of said central portion of said transverse housing, said outer surface being smooth-walled, screw means extending within said transverse housing and past said lengthwise housing for tensioning said first support ring and said retaining ring against said annular shoulders, snap-action connecting means for releasably fixedly holding said second support ring in axial direction in said other bore means, and a second handgrip rotatably and non-displaceably mounted to said second support ring.

3. A door lock capable of insertion in a door comprising, in combination, a lengthwise housing, a latch mechanism displaceably and non-rotatably guided in said lengthwise housing, at least one spindle cooperating with said latch mechanism, a transverse housing, said spindle extending centrally through said transverse housing, said transverse housing being provided with transverse openings, said lengthwise housing extending through said transverse openings of said transverse housing, said transverse openings being constructed as threaded bores, said threaded bores possessing a common axis which is disposed at

a distance from the common axis of said spindle and said transverse housing, said lengthwise housing being provided with external threading for threadably engaging said threaded bores of said transverse housing, said lengthwise housing being further provided with at least one lateral opening through which extends said spindle in order to operably engage with said latch mechanism, a portion of said lengthwise housing disposed adjacent said transverse housing possessing a smooth-walled cylindrical surface, said lengthwise housing incorporating an outer end portion provided with external threading, the root diameter of said external threading being at least approximately the same size as the diameter of said smooth-walled cylindrical surface and the pitch of said external threading being the same as the pitch of the external threading of said lengthwise housing and said threaded bores of said transverse housing, said transverse housing further possessing a lengthwise bore and further provided with a respective externally threaded portion at each end, a respective annular shoulder within said lengthwise bore adjacent the region of each end of said transverse housing, said transverse housing having a respective central portion provided with said threaded bores, said transverse housing still further including respective smooth-walled bore means each extending to one of said annular shoulders and coaxially arranged with respect to said lengthwise bore, an outer end ring threaded onto each externally threaded portion of said transverse housing and adapted to bear against a door in which said door lock is inserted, a first support ring disposed

in one of said bore means, a handgrip rotatably and non-displaceably mounted in said first support ring for actuating said spindle, a retaining ring and a second support ring disposed in the other bore means, the outer diameter of both externally threaded portions of said transverse housing at most being as large as the diameter of the outer surface of said central portion of said transverse housing, said outer surface being smooth-walled, means extending within said transverse housing and past said lengthwise housing or tensioning said first support ring and said retaining ring against said annular shoulders, snap-action connecting means for releasably fixedly holding said second support ring in axial direction in said other bore means, and a second handgrip rotatably and non-displaceably mounted to said second support ring.

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MARVIN A. CHAMPION, *Primary Examiner*.

EDWARD C. ALLEN, *Examiner*.

J. R. MOSES, *Assistant Examiner*.