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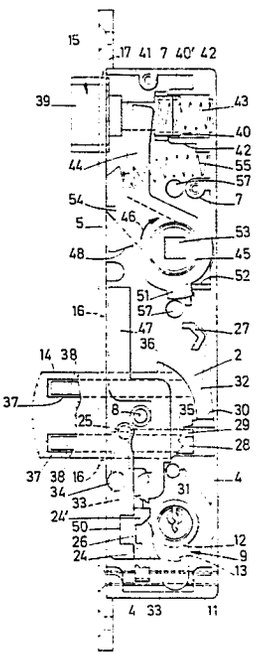
(71) Applicant: **van Parys, Remi Emiel, Zultseweg, 80, B-8790 Waregem (BE)**

(72) Inventor: **van Parys, Remi Emiel, Zultseweg, 80, B-8790 Waregem (BE)**

(74) Representative: **Pirson, Jean et al, c/o Bureau GEVERS SA 7 rue de Livourne Bte 1, B-1050 Brussels (BE)**

(54) Lock.

(57) The cylinder mechanism (9) controls through an arm (24) the swinging of a night bolt (14), controls through a lever (53) a slider (28) which blocks by means of a finger (29) said bolt in open position and in closed position, and controls through a sliding part (47) and a lever (44) swingable about the handle holder (45), the sliding of the day bolt (15). Loose pins (38) lie inside the night bolt (14). The day bolt (15) is also operatable by a handle and is also swingable in a particular position about the lengthwise axis thereof.



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"Lock"

This invention relates to a lock which comprises a lock case, a night bolt which is swingably mounted inside the lock case and in an endmost position thereof, namely the closing position, projects with the one end through an opening in the lock case outside said case, and in another endmost position, namely the opening position, is swung inside the lock case, a cylinder lock mechanism which is mounted on the lock case and enters with the rotating operating member thereof said lock case, and a transmission between said operating member and night bolt to swing by rotating of the operating member in the one and respectively in the other direction, the night bolt out of and back in said lock case.

By lock case is meant in this application but a frame on which all of the movable parts of the lock are mounted. Said lock case is generally a completely-enclosed box but it can also be provided with large openings in the walls and be comprised structurally of a plurality of parts. Generally that wall of the lock case through which projects said bolt is a separate elongated plate which extends with both ends thereof outside the remainder of the lock case. The lock case is then fastened on a door by means of said projecting ends.

Locks with swinging night bolts are already in use as they have some advantages relative to the known locks with a rectilinear-sliding night bolt.

First of all a better closing is obtain able with a swinging bolt than with a rectilinear-sliding

bolt. The length of a rectilinear-sliding bolt is always limited by the size of the lock case along the movement direction. Said size is for example relatively small when the lock case has to be built-in into a sectional part from an aluminium door which is comprised of a frame wherein glass enters. This results in such a bolt in the closing position, projecting with but a short portion inside the lock case or with but a short portion outside said case. In both cases the closing obtained with said bolt is not very strong. With a large enough force being exerted on the door, the bolt can either spring out of the lock case or spring out of the receiving opening which is provided in the sectional part facing said lock. A swinging bolt can be designed for the same lock case width, with a longer length than the sliding bolt in such a way that in the closing position, the swinging bolt lies with a larger portion inside the lock case and also projects with a larger portion outside said lock case, which results in a better locking.

In the second place a swinging bolt can be provided with a hook-like end which allows the use of the lock with sliding doors whereby the bolt has to hook behind a wall in the closing position.

Locks with swinging night bolt have but a night bolt only, so that also during the day such night bolt has to be used if it is desired to retain the door the lock is mounted on closed.

It is actually possible to mount beside a lock with only a swinging night bolt also a lock with only a day bolt which can then be operated by means of a door handle. Said day bolt cannot however be operated by the cylinder lock mechanism and thus a key, so that to open the completely closed door wherein both locks are mounted, it is necessary to rotate both the key of the cylinder lock mechanism and the door handle.

The invention has for object to obviate said drawbacks and to provide a lock with swinging night bolt which is lockable without using the night bolt but whereby the complete unlocking of the lock can be obtained through the cylinder lock mechanism and a key.

For this purpose the lock comprises both a day bolt which is mounted to be slidable to-and-fro through an opening in the lock case wall, and a transmission between the operating member of the cylinder lock mechanism and the day bolt to move said day bolt by rotating the operating member in a particular direction.

In a particular embodiment of the invention, the lock comprises a holder for a door handle rod, said holder being rotatably mounted inside the lock case about an axis which runs substantially in parallel relationship with the swinging axis of the night bolt, and a transmission between said holder and the day bolt, said transmission may coincide partly with that transmission between the operating member of a cylinder lock mechanism and said day bolt.

In said embodiment the day bolt can be brought to the open position both with a handle and with a key. This key-opening may for instance occur following the bringing to the open position of the night bolt.

The invention has also for object to provide a lock of the above-defined type whereby the swinging bolt can be operated in a very simple way.

For this purpose the rotating operating member of the cylinder lock mechanism comprises a ring provided with a projection, said projection cooperating with the transmission between said operating member and the night bolt.

Usefully the transmission between the operating member of the cylinder slot mechanism and the night bolt comprises an arm which is hingedly made fast with the one end thereof to the night bolt in eccentric relationship with the swinging fastening of said night bolt to the lock case, which arm is provided at the other end thereof with a notch wherein the operating member projection comes to lie when in the open position of the night bolt, the operating member is rotated in the closing direction and when in the closed position of the night bolt, said operating member is rotated in the opening direction to drive along the arm by the further rotating in said direction and thus to swing the night bolt.

The invention also relates to a lock which comprises a lock case, a night bolt which is movably mounted inside the lock case an in one end position, namely the closed position, projects with one end thereof through an opening in the lock case outside said lock case and in another end position, namely the open position, lies inside the lock case, an operating member to be swung with a key which is swingably mounted in the lock case, and a transmission between said operating member and the night bolt.

The operating member can be part of a cylinder lock. The night bolt can be linearly slidable as well as swingable.

Between the door wherein the lock is mounted and the facing fixed jamb of the door opening there remains a small crack open even when the door is closed. In some cases said crack runs as a strainght line from the one door side to the other, in such a way that a saw can be passed through the crack to saw through the bolt in closed position.

To make such an operation somewhat more difficult, it is already known to manufacture the night bolt from various laminations which are fastened together. This does not only make the bolt manufacture more intricate but also does not completely prevent the sawing-through of the bolt.

The invention has now for object to provide a lock with night bolt whereby the sawing-away of that portion projecting outside the lock case in the closed position, of the bolt is substantially impossible.

For this purpose the night bolt, as least in the portion thereof lying in the closed position directly on the outer side of the lock case, is provided with at least one recess running in that direction along which the bolt projects outside in said closed position, while the lock comprises a round pin which enters loosely said recess.

When sawing through the night bolt, the saw will roll over the pin. Such a loose-lying pin is difficult to saw through.

In an useful embodiment of the invention,

the pin is made from steel which has been surface-nitrated.

Finally the invention also pertains to a lock which comprises a lock case, a bevelled day bolt which is movably mounted inside the lock case and in one end position, namely the closed position, projects with the bevelled end thereof through an opening in the lock case outside said lock case, but in another end position, namely the open position, enters the lock case, a resilient element which pushes the day bolt outwards, and a lever which cooperates with the day bolt to bring same inside the lock case against the action of said resilient element.

The invention has for object to provide such a lock whereby the day bolt can be swung over 180° in a relatively simple way after mounting, to bring the bevel on the desired side.

For this purpose the day bolt comprises a bevelled head, a tie rod connecting thereto and an end projecting outside said rod which is connected by said rod to the head and which cooperates with the lever, the lock case comprises a guide wherein said end fits slidingly but not swingably during the sliding from the open to the closed position of the day bolt, and the lock comprises a resilient stop which is mounted inside the lock case, said stop being stronger and thus more difficult to distort than the spring element cooperating with said day bolt, resilient stop which is engaged by a lever portion in the day bolt closed position, in such a way that the lever which pushed the projecting bolt end away against the action of the spring element as the bolt is slid open, is retained normally by the resilient stop in the closed position of the bolt and thus prevents in turn the further movement outwards of said bolt while being able to resiliently deflect the stop under a high enough outside force on the bolt, to allow moving the bolt until the head thereof lies completely outside the lock case and the end thereof is released from the guide and the bolt can thus be swung.

Other details and features of the invention will stand out from the following description given by way of non limitative example and with reference to the accompa-

nying drawings, in which :

Figure 1 is a top view from a lock according to the invention as mounted on a door, whereby both bolts are shown in closed position.

Figure 2 is a front view of the lock shown in figure 1, but without the door.

Figure 3 is a side view from the lock shown in figures 1 and 2, but with the key and handle plates removed in addition to the door.

Figure 4 is a side view of a lock similar to figure 3 but with a side wall of the lock case being further removed and whereby another embodiment of the night bolt is shown with parts broken away.

Figure 5 is a side view of part of the lock shown in figure 4, whereby the night bolt is shown in open position.

Figure 6 is a cross-section along line VI-VI in figure 5 but without the cylinder look mechanism.

In the various figures, the same reference numerals pertain to similar elements.

The lock shown in the figures comprises a lock case 1 which forms a closed box and is comprised of two parallel rectangular side walls 2 and 3, an upstanding rim 4 which stands on two short sides and one long side of side wall 2 and against which bears side wall 3, and a fastening plate 5 which connects to the fourth side of side wall 2 and also connects to rim 4. Said fastening plate 5 projects sidewise outside side walls 2 and 3 and also projects with both ends outside the remainder of lock case 1. With said projecting ends said fastening plate 5 is made fast as shown in figure 1 to an upstanding section 6 from a door. The fastening plate 5 lies on the outer side of section 6 while the remainder of the lock case is arranged inside an opening of the section and for the major part thereof within the section proper. While the side wall 2, the rim 4 and the fastening plate 5 form an unit, the side wall 3 is comprised of a removable plate which is secured against the rim 4 by means of screws 23 which are are screwed into projections 7 and 8 standing on side wall 2.

The lock further comprises a cylinder lock mechanism 9 which is of a structure known per se and will only be described here as far as necessary to understand the working of the lock. The housing 10 of the cylinder lock 9 is secured by means of a screw 11 which passes through the fastening plate 5, to the lock case 1. Said housing projects on either side through openings in the side walls 2 and 3. Inside lock case 1 that is between side wall 2 and 3, said cylinder lock 9 comprises a rotatable operating member which is formed by a ring 12 whereon stands a projection 13.

Said operating member 12, 13 controls through transmission means two bolts, namely a night bolt 14 and a day bolt 15. The night bolt 14 and the day bolt 15 project in closed position respectively through openings 16 and 17 in plate 5. In open condition, bolts 14 and 15 still lie precisely partly inside said openings but mainly on the outer side and in any case in such a way that they do not project outside the lock case 1.

In closed position bolts 14and 15 enter with the ends thereof corresponding recesses provided in a stiffening plate 18 and in a section 19 said plate 18 is made fast to. Said section 19 is part as it is clear from figure 1, of the fixed door frame. The lock case 1 is so mounted in the section 6 of the door proper that the covering plate 5 lies on that side facing section 19 when the door lies in the closed condition, as it is shown in figure 1. Those portions of cylinder lock 9 projecting outside lock case 1 also project outside section 6 on the front and back side of the door. Said projecting portions of cylinder lock 9 are further surrounded by a small key plate on either side. Both key plates are pulled together by two screws 21 which lie respectively above and below cylinder lock 9. The key plates 20 are consequently pushed against section 6. As it appears particularly clearly from figure 2, the screws 21 go through the one key plate 20 wherein the screw heads are sunk, while the screws are screwed with the other end thereof in the other key plate 20 which is provided on that side facing the lock case, with suitably-threaded holes. The top screw 21 runs cross-wise through lock case 1, namely through openings

22 in side walls 2 and 3 thereof. The bottom screw 21 runs precisely on the outer side of lock case 1. That key plate 20 wherein the heads of screws 21 are sunk, is arranged on the door inner side. Consequently the key-plate fastening is not visible from the outer side and the small key plate located on the outer side cannot be removed either. Both key plates 20 are moreover provided with bevelled outer edges which converge away from lock case 1. The thickness of the small key plates 20 is moreover such that when said key plates are pushed as shown in figure 1 against section 6, the cylinder lock 9 does not or substantially not project outside said key plates 20. Without removing key plates 20, it is thus also impossible to grip with pliers a cylinder lock end that projects outside section 6. Due to the bevelled edges thereof, the small key plates 20 cannot either be gripped with pliers, so that they cannot be forcefully removed either.

The night bolt 14 is swingably mounted inside lock case 1. The axis said bolt swings about is formed by the above-mentioned projection 8 that stands on side wall 2. Said bolt 14 is swung from the open position to the closed position or vice versa by the operating member 12, 13 of the cylinder lock mechanism 9 through a transmission. Said transmission comprises an arm 24 which is made fast to that side facing side wall 3, of night bolt 14, eccentrically relative to the rotation axis 8 of bolt 14. Said fastening is obtained by means of a small shaft 25 which stands on arm 24 and is loosely rotatably fitted inside an opening provided in bolt 14. Said small shaft 25 runs as well as rotation axis 8 of bolt 14 and the rotation axis of operating member 12, 13 for the cylinder lock at right angle to side walls 2 and 3. The arm 24 extends along the inner side of fastening plate 5 of lock case 1, which plate forms a guide during the alternating sliding of arm 24. That end of arm 24 removed from shaft 25 is provided with an overthickness 24' which projects both towards side wall 2 and away from fastening plate 5. In that portion of said overthickness removed from fastening plate 5 is provided a notch 26 which opens on that overthickness edge which is removed from plate 5. Actually

said latter end of arm 24 forms sidewise a two-pronged fork. Said latter end with notch 26 lies in the open position of night bolt 14, next to but partly over operating member 12, 13 of cylinder lock mechanism 9. In the figures said operating member has been shown in the neutral position whereby thus the key can be removed from the cylinder lock. In such a position the projection 13 is directed downwards. When said operating member 12, 13 is then caused to swing by means of a suitable key in the closing direction, that is counterclockwise, said projection 13 enters notch 26 and arm 24 is carried along by further rotation. Said arm moves thereby in the direction away from small shaft 25. It is clear that arm 24 causes thereby the night bolt 14 to swing about the shaft 8 thereof. This swinging movement to the closed position is limited by the wall of opening 16. In figures 1 to 4 the bolt 14 has been shown in closed position. Said bolt lie in closed position before the operating member 12, 13 has made a complete swinging.

When now the operating member 12, 13 is caused to swing in the other direction, the projection 13 enters again notch 26 which then lies next to but partly below ring 12. By further rotating, the arm 24 is returned to the orginal position thereof whereby thus also the night bolt 14 swings back to its original position. The swinging in said direction is limited by a stop 27 which stands on side wall 2.

Both in closed and in open position the bolt 14 is still retained by a blocking mechanism. Said blocking mechanism comprises a slider 28 which is slidable to-and-fro along the cross-wise direction of lock case 1 over side wall 2 and is provided with an upstanding finger 29 running away from side wall 2. During the sliding movement thereof, said slider 28 is guided by two ribs 30 and 31 which stand on side wall 2. A leaf spring 32 which is secured by stops 27 and 52, pushes slider 28 constantly in the direction of night bolt 14. That portion of slider 28 on which stands finger 29 extends for the major part along side wall 2, between same and bolt 14, up to a small distance from fastening plate 5. The slider 28 can be pushed away from said plate 5 against

the action of leaf spring 32 , by means of a lever 33. Said lever is hingedly fastened between the ends thereof by means of a small shaft 34 on side wall 2, directly adjacent fastening plate 5. The one leg of lever 33 extends between night bolt 14 and side wall 2 and lies precisely opposite that end of slider 28 facing plate 5. The bolt 14 is retained notably by ribs 30 and 31 at a distance from side wall 2 in such a way that as already noted, a portion of slider 28 and thus also a portion of lever 33 can lie movably between bolt 14 and side wall 2. The other leg of lever 33 extends between arm 24 and side wall 2 and lies with the one end thereof right next to ring 12 from said operating member 12, 13 of cylinder lock mechanism 9. By rotating said operating member 12, 13 as well in the closing direction as in the opening direction, projection 13 pushes said last-mentioned leg of lever 33 away whereby said lever swings about the shaft 34 thereof and causes slider 28 to slide against the action of spring 32. When said projection 13 does not engage any more lever 33, said lever 33 can be swung back to the original position thereof by slider 28 which is pushed in turn under the action of leaf spring 32 in the direction of fastening plate 5. During each revolution of operating member 12, 13 and thus of night bolt 14, the lever 33 thus pushes slider 28 as far as possible away from fastening plate 5. After the swinging of bolt 14 and when operating member 12, 13 lies back in the neutral position, with projection 13 directed downwards, said lever 33 does not exert a force any more on slider 28 whereby thus said slider 28 engages that portion of bolt 14 lying inside lock case 1 and can retain said bolt portion. For this purpose, the last-named portion of night bolt 14 is provided with a notch 35 and a protrusion 36. The protrusion 36 is so located that when night bolt 14 lies in the open position as shown in figure 5 and slider 28 is pushed with the finger 29 thereof against said bolt 14, the finger 29 lies right next to protrusion 36 in the direction along which bolt 14 is swung from the open position to the closed position. Finger 29 prevents as long as slider 28 is not pushed away by lever 33, the swinging of night bolt 14 lying in the open position. Notch 35 in night bolt 14 is so

located that when night bolt 14 lies in the closed position as shown in figure 4 and slider 28 is moved farthest away in the direction of said night bolt 14, the finger 29 fits precisely into notch 35. The wall of said notch that lies on the side along which the notch moves during the swinging to open position of bolt 14, then also forms a protrusion which is retained by finger 29. Bolt 14 in closed position is prevented from swinging as long as slider 28 has not been moved by lever 33. In the completely closed position of bolt 14, it is impossible, even if it were possible to reach the end of bolt 14 projecting outside lock case 1, to cause bolt 14 to swing by hitting said end.

That portion of night bolt 14 which lie in closed position outside lock case 1 can take various shapes. Due to said bolt 14 swinging, the last-mentioned portion thereof can form a hook as shown in figures 1 to 3. It is required for example with sliding doors that bolt 14 by the closing hooks behind a portion of section 19 and stiffening plate 18. In the embodiment as shown in figures 5 and 6, the bolt 14 is not of hook-shape in such a wy that it can only be used on hinged doors.

To prevent sawing through that portion of night bolt 14 which lies in closed position outside lock case 1, at least one cylinder-like hollow 37 is provided in said bolt 14, hollow inside which lies loosely a round pin 38. In the embodiment of night bolt 14 as shown in figures 4to 6, two such hollows 37 are cut-out in said bolt 14. Said hollows extend in the lengthwise direction of bolt 14, that is thus in the direction along which the bolt extends in closed position outside lock case 1. Both hollows 37 open on that end of bolt 14 which even in closed position still lies inside lock case 1 and run up to some distance from the other end. Said hollows thus lie partly in that portion of bolt 14 extending in closed position outside lock case 1 and certainly right adjacent to fastening plate 5. Inside each hollow 37 lies a round pin 38 which has substantially the same length as the hollow and thus lie in every case in that hollow portion which lies outside lock case 1 in closed position of bolt 14. Pins 38 are made from steel which has

been surface-nitrated. When sawing through that portion of bolt 14 projecting outside lock case 1 in closed position, the saw as it reaches the pins 38, will roll over same. The pins 38 will be substantially impossible to saw through.

The day bolt 15 is comprised of a sidewise-bevelled head 39, an enlarged end 40 and a connecting rod 41 which connects end 40 to head 39. A portion 40' fits precisely between a guide formed by two walls 42 standing on side wall 2 of lock case 1 and connecting to the rim thereof. A spiral spring 43 which bears on ridge 4 and lies between both walls 42, pushes end 40 in the direction of fastening plate 5 and thus pushes day bolt 15 outwards. In the closed position thereof head 39 lies partly in the opening 17 in plate 5 and partly outside lock case 1. Portion 40' from end 40 still lies precisely between both walls 42. In open position the head 39 lies completely inside lock case 1 and spring 43 is completely compressed. As during the complete sliding of bolt 15, the square portion 40' of end 40 lies between both walls 42 and the head 39 constantly lies with a portion thereof inside opening 17, the bolt 15 cannot be swung. In closed position, a further sliding of bolt 15 outwards is normally prevented by a lever 44 which is in turn retained by a resilient stop. The lever 44 is freely rotatable about a shaft 45 which is supported by ends of smaller cross-section in both side walls of lock case 1. The one end of lever 44 lies next to rod 41 against end 40. By rotating lever 44 in the direction as shown by arrow 46 in figure 4, a portion of lever 44 pushes end 40 against the action of spring 43 away from plate 5 and it is thus possible to move the day bolt from the closed position to the open position. When lever 44 is left completely free, it is pushed by spring 43 and end 40 to the position as shown in figure 4 whereby day bolt 15 lies in the closed position. Thereby lever 44 engages with a projection 51 said resilient stop which is formed by one end of said leaf spring 32 which pushes slider 28 against night bolt 14. Said end of leaf spring 32 is stronger and less distortable than spiral spring 43 with the result that under the action of said spring 43 alone the lever cannot swing further in the direc-

tion opposite the direction shown by arrow 46. When the action of spring 43 is however helped by an additional pulling force exerted on bolt 15, the projection 51 can then distort leaf spring 32. Lever 44 still swings further until head 39 lies completely outside lock case 1 and portion 40' of end 40 lies between walls 42. Thereby however as further explained below, the night bolt 14 has to be in closed position. The bolt can then easily be swung about the lengthwise axis thereof over 180°. When releasing bolt 15 after such swinging, the leaf spring 32 pushes lever 44 and thus also bolt 15 back to the position as shown in figure 4.

The swinging of lever 44 can occur in two ways. As already mentioned above, the day bolt 15 can be operated by the cylinder lock mechanism 9. The lever 44 is then part of the transmission between day bolt 15 and operating member 12, 13 of said cylinder lock mechanism 9. A sliding part 47 is also part of said transmission. Said sliding part 47 is a small batten which runs on the side of lever 44, with the one end along the inner side of fastening plate 5, is bent in the location of bolt 14 to run from the side opposite arm 24 about shaft 8 and lies with the end thereof next to arm 24 on the side of cylinder lock mechanism 9. In the location of night bolt 14 said sliding part 47 runs between said bolt 14 and side wall 3 of lock case 1. That end of sliding part 47 which lies on the side of lever 44, lies facing a protrusion 48 from lever 44. When the day bolt 15 lies in closed position and the night bolt in open position, as shown in figure 5, the last-mentioned end of sliding part 47 engages however protrusion 48 so that with a sliding of part 47 towards day bolt 15, the lever 44 is swung in the direction shown by arrow 46. The sliding in said latter direction from the position of sliding part 47 as shown in figure 5 is caused directly by the projection 13 of operating member 12, 13 of the cylinder lock mechanism 9, when said operating member is swung clockwise, that is thus in a direction opposite to the direction followed to bring night bolt 14 to the closed position. As it appears from figure 5, the projection 13 first engages lever 33 which may also be swung. Thereby actually the slider 28 is displaced

and the night bolt 14 unlocked but this is no drawback. As soon as lever 33 has been swung far enough, the projection 13 engages the end of sliding part 47, which end is bent in the direction of lever 33, lies between said lever 33 and side wall 3 and extends somewhat outside arm 24. On the side of cylinder lock mechanism 9, the sliding part 47 further comprises a projection 49 projecting towards fastening plate 5, which is slidable inside a recess 50 which is provided in that side facing side wall 3 of arm 24. It goes without saying that said recess opens on that edge of arm 24 removed from plate 5, above the projecting portion, provided with notch 26, of the overthickness 24' of said arm 24. During the above-mentioned sliding of part 47, the projection 49 moves freely in recess 50 in such a way that the sliding is not hampered by arm 24. The recess 50 is further so located that when arm 24 moves away from day bolt 15, which occurs during the swinging to the closed position of the night bolt 14, one end of said recess engages projection 49 and consequently arm 24 carries along sliding part 47. Thereby the sliding part 47 is released from lever 44. Said sliding part 47 then lies with the end thereof at a distance from the protrusion 48 of lever 44 as shown in figure 4. When the night bolt lies in the closed position, it is thus no more possible by means of the cylinder lock mechanism 9, to operate lever 44 and thus day bolt 15. Due to the sliding part 47 no longer engaging protrusion 48 of lever 44, said lever can be swung by distorting the resilient stop 32. In the open position of night bolt 14, the sliding part 47 prevents such swinging which explains why the night bolt has to lie in closed position to be able to swing the day bolt 15.

The second way to operate the day bolt 15 occurs through a door handle. Said door handle is of a known structure and will not be described in detail here. Said handle has not been shown either in the drawings for clearness sake. Only the holder for the handle rod proper has been shown. Said holder is formed by said shaft 45 the lever 44 swings about, which shaft 45 is provided therefor with a square opening 53. To said shaft 45 connects between lever 44 and side wall 2, an arm 54 which extends in the direction

of fastening plate 5 of lock case 1 and the end of which is bent over in the direction of side wall 3. Said bent end lies between that portion connecting to bolt 15, of lever 44 and fastening plate 5. In rest position said bent end lies however against the inner side of plate 5 at a slight distance from lever 44 which is large enough to allow the slight swinging which is required to bring day bolt 15 to that position where it can be swung. Said end is pushed against plate 5 by a spiral spring 55 which lies between arm 54 and rim 4 of lock case 1. The lever 44 can swing completely independently from arm 54 and thus operate day bolt 15. When the arm 54 swings also which is only possible in the direction shown by arrow 46 from that position shown in figure 4, said bent end of arm 54 engages lever 44 in such a way that the arm 54 causes the lever 44 to swing together and operates through said lever 44, the day bolt 15.

In the usual way a small handle plate 55 is further mounted on either side of section 6 wherein the lock is mounted, about the handle rod proper. Both handle plates 55 are fastened to one another and to section 6 in the same way as the key plates 20. This occurs by means of two screw 56 which are scewed cross-wise through the one handle plate 55 and which are screwed in threaded openings on that surface facing section 6 of the other handle plate 55. Said latter handle plate is moreover also mounted on the outer side of the door in such a way that no screws are visible there either. But for the handle-rod opening, the handle plates are identical in shape and size to the key plates 20. In side walls 2 and 3 are provided openings 57 for two screws 56. Said screws 56 can as well as the one screw 21 run through the lock case 1 without being hampered by the parts located inside said case 1 and without hampering the movement of said parts.

The above-described lock has a high safety against breaking-in and is easy to operate. The day bolt can be controlled as well by a handle as by the cylinder lock mechanism which controls the night bolt.

It must be understood that the invention is in no way limited to the above embodiments and that many

changes can be brought therein without departing from the scope of the invention as defined by the appended claims.

CLAIMS

1. Lock comprising a lock case, a night bolt which is swingably mounted inside the lock case and in an endmost position thereof, namely the closing position, projects with the one end through an opening in the lock case outside said case, and in another endmost position, namely the opening position, is swung inside the lock case, a cylinder lock mechanism which is mounted on the lock case and enters with the rotating operating member thereof said lock case, and a transmission between said operating member and night bolt to swing by rotating of the operating member in the one and respectively in the other direction, the night bolt out of and back in said lock case, which further comprises a day bolt which is mounted to be slidable to-and-fro through an opening in the lock case wall, and a transmission between the operating member of the cylinder lock mechanism and the day bolt to move said day bolt by rotating the operating member in a particular direction.

2. Lock as defined in claim 1, which comprises a spring element which is mounted inside the lock case and cooperates with one of the elements formed by the day bolt and the transmission, and constantly tries to push the day bolt out of the lock case.

3. Lock as defined in either one of claims 1 and 2, in which the operating member of the cylinder lock mechanism comprises a ring with a projection standing thereon and the transmission between said operating member and the day bolt comprises a sliding part which cooperates with the projection of the operating member and a lever which is hingedly mounted inside the lock case, cooperates with the one thereof with the bolt and cooperates with the other end thereof with the sliding part.

4. Lock as defined in any one of claims 1 to 3, which comprises a holder for a door handle rod, said holder being rotatably mounted inside the lock case about an axis which runs substantially in parallel relationship with the swinging axis of the night bolt, and a transmission between said holder and the day bolt, said transmission may coincide partly with the transmission between the operating

member of a cylinder lock mechanism and said day bolt.

5. Lock as defined in claim 4, in which the operating member of the cylinder lock mechanism comprises a ring and a projection standing thereon, and the transmission between said operating member and the day bolt comprises a sliding part which cooperates with the projection of the operating member and a lever which is hingedly mounted inside the lock case, cooperates with one end thereof with the day bolt and cooperates with the other end thereof with the sliding part, which lever is rotatable about the handle-rod holder, while to said holder connects an arm which by the rotating of the holder in the direction whereby the day bolt is brought to open position, cooperates with one end thereof with the lever to cause same to swing together.

6. Lock as defined in either one of claims 4 and 5, in which both lock case side walls directed cross-wise to the rotation axis, are provided on either side of the handle-rod holder with an opening for a screw and the lock comprises on either side of the lock case, a small handle plate and two screws which fasten the handle plates together, which screws pass through the one handle plate, run cross-wise through said openings in the lock case, cross-wise through said lock case, and are screwed in the other handle plate.

7. Lock as defined in any one of the preceding claims, in which that portion of the night bolt projecting outside the lock case in the closed position forms a hook the free end of which lies in that plane wherein the night bolt swings.

8. Lock as defined in any one of the preceding claims, in which the lock case side walls are provided on that side opposite the outer side of the cylinder lock mechanism, with an opening for a screw for the fastening of key plates.

9. Lock as defined in claim 8, which comprises two key plates and two screws connecting said key plates together, running cross-wise through the one key plate and being screwed with the end thereof in the other key plate, whereby at least one screw runs through the opening in the

lock case side walls cross-wise through said case.

10. Lock as defined in claim 9, which is mounted on a door, the key plates having bevelled edges which converge way from the door, while the key-plate thickness on either door side is substantially equal to the length of said portion of the cylinder lock mechanism that projects on said door side.

11. Lock comprising a lock case, a night bolt which is swingably mounted inside the lock case and in an endmost position thereof, namely the closing position, projects with the one end through an opening in the lock case outside said case, and in another endmost position, namely the opening position, is swung inside the lock case, a cylinder lock mechanism which is mounted on the lock case and enters with the rotating operating member thereof said lock case, and a transmission between said operating member and night bolt to swing by rotating of the operating member in the one and respectively in the other direction, the night bolt out of and back in said lock case, in which the rotating operating member of the cylinder lock mechanism comprises a ring provided with a projection, said projection cooperating with the transmission between said operating member and the night bolt.

12. Lock as defined in claim 11, in which the transmission between the operating member of the cylinder slot mechanism and the night bolt comprises an arm which is hingedly made fast with the one end thereof to the night bolt in eccentric relationship with the swinging fastening of said night bolt to the lock case, which arm is provided at the other end thereof with a notch wherein the operating member projection comes to lie when in the open position of the night bolt, the operating member is rotated in the closing direction and when in the closed position of the night bolt, said operating member is rotated in the opening direction to drive along the arm by the further rotating in said direction and thus to swing the night bolt.

13. Lock as defined in claim 12, in which the arm lies against that lock case wall wherein is provided the opening for the outwards swinging of the night bolt,

which wall forms a guide for the arm during the movement thereof.

14. Lock as defined in either one of claims 12 and 13, in which the operating member of the cylinder lock mechanism comprises a ring and a projection standing thereon, while the transmission between said operating member and the day bolt comprises a sliding part which cooperates with the projection of the operating member, and a lever which is hingedly mounted inside the lock case and cooperates with the one end thereof with the day bolt and cooperates with the other end thereof with the sliding part, while the arm of the transmission between said operating member and the night bolt is provided with a notch and said sliding part has a projection which enters said notch, whereby the notch also extends in the open position of the night bolt and closed position of the day bolt further along in the sliding part movement direction for the opening of the day bolt, than said projection in such a way that said sliding part can cause the opening of the day bolt without moving the arm, but as said arm is moved during the swinging of the night bolt to the closed position, said sliding part is carried along with the arm and is released in this way from said lever of the transmission between the operating member and the day bolt.

15. Lock comprising a lock case, a night bolt which is swingably mounted inside the lock case and in an endmost position thereof, namely the closing position, projects with the one end through an opening in the lock case outside said case, and in another endmost position, namely the opening position, is swung inside the lock case, a cylinder lock mechanism which is mounted on the lock case and enters with the rotating operating member thereof said lock case, and a transmission between said operating member and night bolt to swing by rotating of the operating member in the one and respectively in the other direction, the night bolt out of and back in said lock case, in which the night bolt is provided on that portion thereof remaining inside the lock case, on a side wall running in parallel relationship to the rotation axis, with at least one protrusion,

while the lock has a slider which is slidable to-and-fro relative to the bolt inside the lock case, which slider comprises a blocking finger, which finger as it engages the night bolt, lies in the night bolt closed position on that side of the protrusion to which the night bolt has to swing for the opening, said lock further comprising a spring element which pushes the slider as far as possible towards the night bolt, and a transmission between the operating member of the cylinder lock mechanism and the slider for moving temporarily the slider away from the night bolt by the rotating of the operating member in the direction for the night bolt opening, in such a way that the slider blocking finger will not retain the bolt any more.

16. Lock as defined in claim 15, in which the operating member of the cylinder lock mechanism comprises a ring and a projection standing thereon, and the transmission between said operating member and the slider comprises a lever which is rotatably mounted inside the lock case, cooperates with the one end thereof with the slider and cooperates with the other end thereof with the operating member projection.

17. Lock as defined in either one of claims 15 and 16, in which the slider lies between two ribs on the lock case wall, which ribs form guides for the slider.

18. Lock as defined in any one of the claims 15 to 17, in which the night bolt protrusion forms the wall of a notch.

19. Lock as defined in any one of claims 15 to 18, in which the night bolt comprises a second protrusion which in the open position of the night bolt, lies against the slider finger, when said finger connects to the night bolt, and on such a side of said finger that the swinging of the night bolt to the closed position is prevented by said finger, while the transmission between the slider and the operating member of the cylinder lock mechanism is so arranged that even by the swinging of the operating member for bringing the night bolt to the closed position, said transmission moves the slider away from the bolt.

20. Lock comprising a lock a lock case, a

night bolt which is movably mounted inside the lock case and in one end position, namely the closed position, projects with one end thereof through an opening in the lock case outside said lock case and in another end position, namely the open position, lies inside the lock case, an operating member to be swung with a key which is swingably mounted in the lock case, and a transmission between said operating member and the night bolt, in which the night bolt, at least in the portion thereof lying in the closed position directly on the outer side of the lock case, is provided with at least one recess running in that direction along which the bolt projects outside in said closed position, while the lock comprises a round pin which enters loosely said recess.

21. Lock as defined in claim 20, in which the bolt is provided with two recesses which run in parallel relationship to one another and inside each recess lies a round pin.

22. Lock as defined in either one of the claims 20 and 21, in which the pin is made from steel which is surface-nitrated.

23. Lock as defined in any one of claims 20 to 22, in which the recess opens only on that night bolt end which lies inside the lock case even in the closed position.

24. Lock comprising a lock case, a bevelled day bolt which is movably mounted inside the lock case and in one end position, namely the closed position, projects with the bevelled end thereof through an opening in the lock case outside said lock case, but in another end position, namely the open position, enters the lock case, a resilient element which pushes the day bolt outwards, and a lever which cooperates with the day bolt to bring same inside the lock case against the action of said resilient element, in which the day bolt comprises a bevelled head, a tie rod connecting thereto and an end projecting outside said rod which is connected by said rod to the head and which cooperates with the lever, the lock case comprises a guide wherein said end fits slidingly but not swingably during the sliding from the open to the closed position of the day bolt, and the lock comprises a resilient stop which is mounted inside the

lock case, said stop being stronger and thus more difficult to distort than the spring element copperating with said day bolt, resilient stop which is engaged by a lever portion in the day bolt closed position, in such a way that the lever which pushed the projecting bolt end away against the action of the spring element as the bolt is slid open, is retained normally by the resilient stop in the closed position of the bolt and thus prevents in turn the further movement outwards of said bolt while being able to resiliently deflect the stop under a high enough outside force on the bolt, to allow moving the bolt until the head thereof lies completely outside the lock case and the end thereof is released from the guide and the bolt can thus be swung.

25. Lock as defined in claims 15 and 24, in which the resilient stop forms one end of the spring element which pushes the lock slider against the night bolt.

26. Lock as defined in claims 14 and 24, in which the sliding part is releasable from said lever, in such a way that in the released condition, the swinging of said lever is possible by a deflecting of the resilient stop.

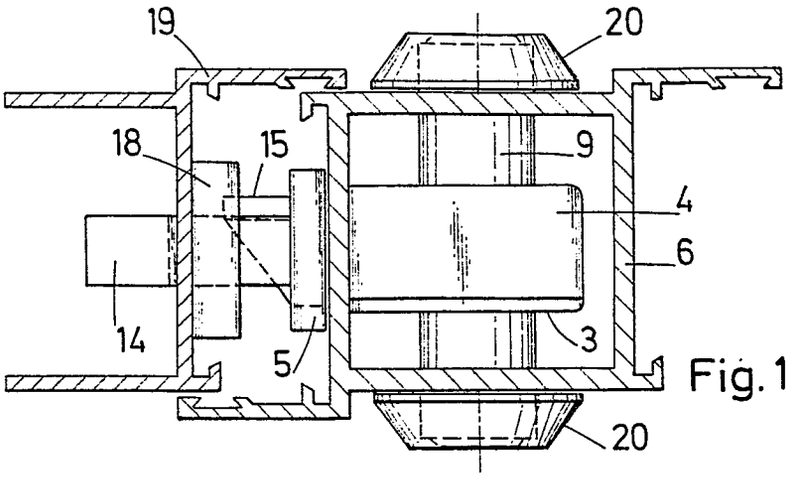


Fig. 1

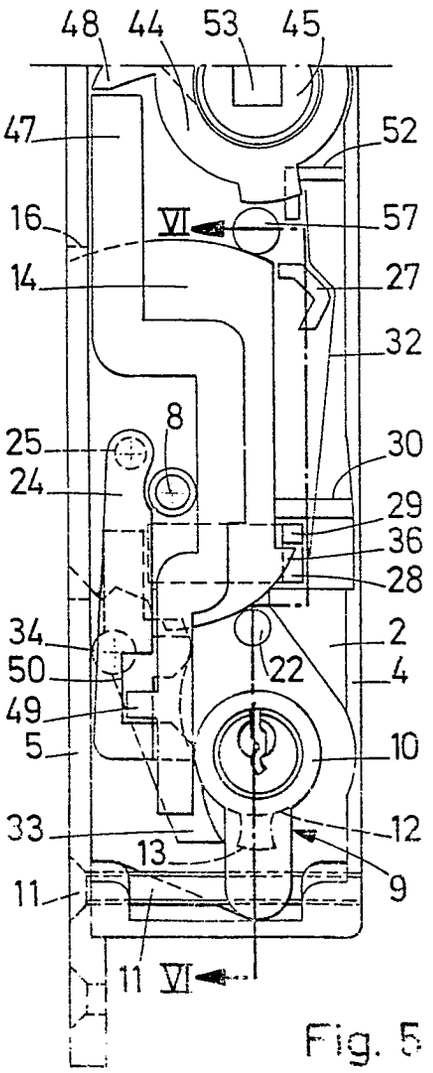
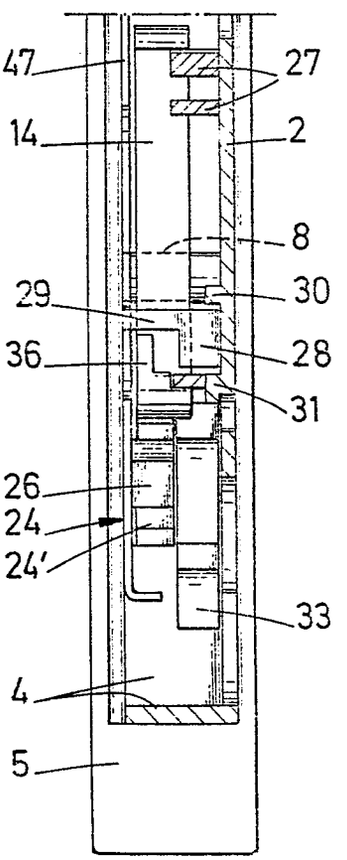


Fig. 5

Fig. 6



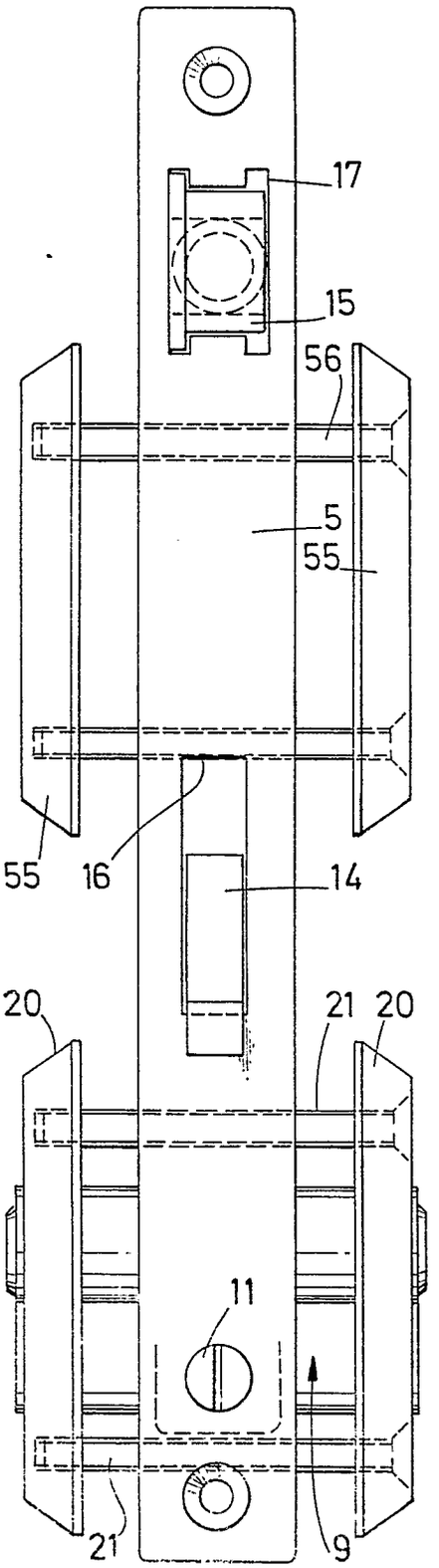


Fig. 2

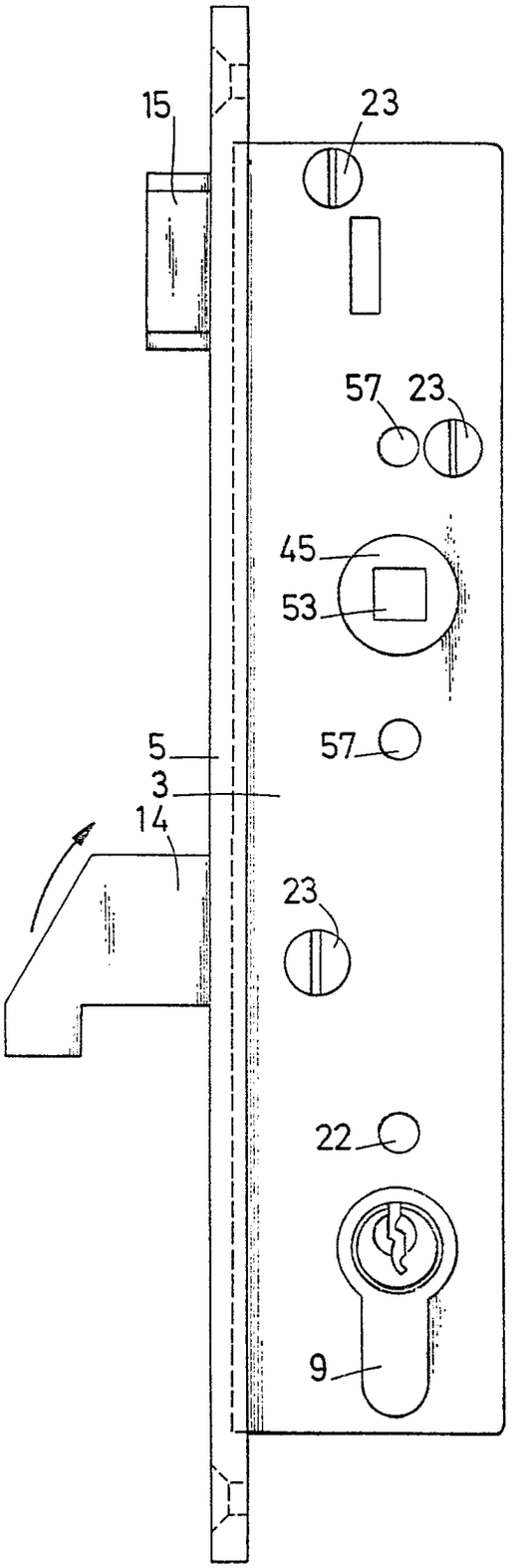
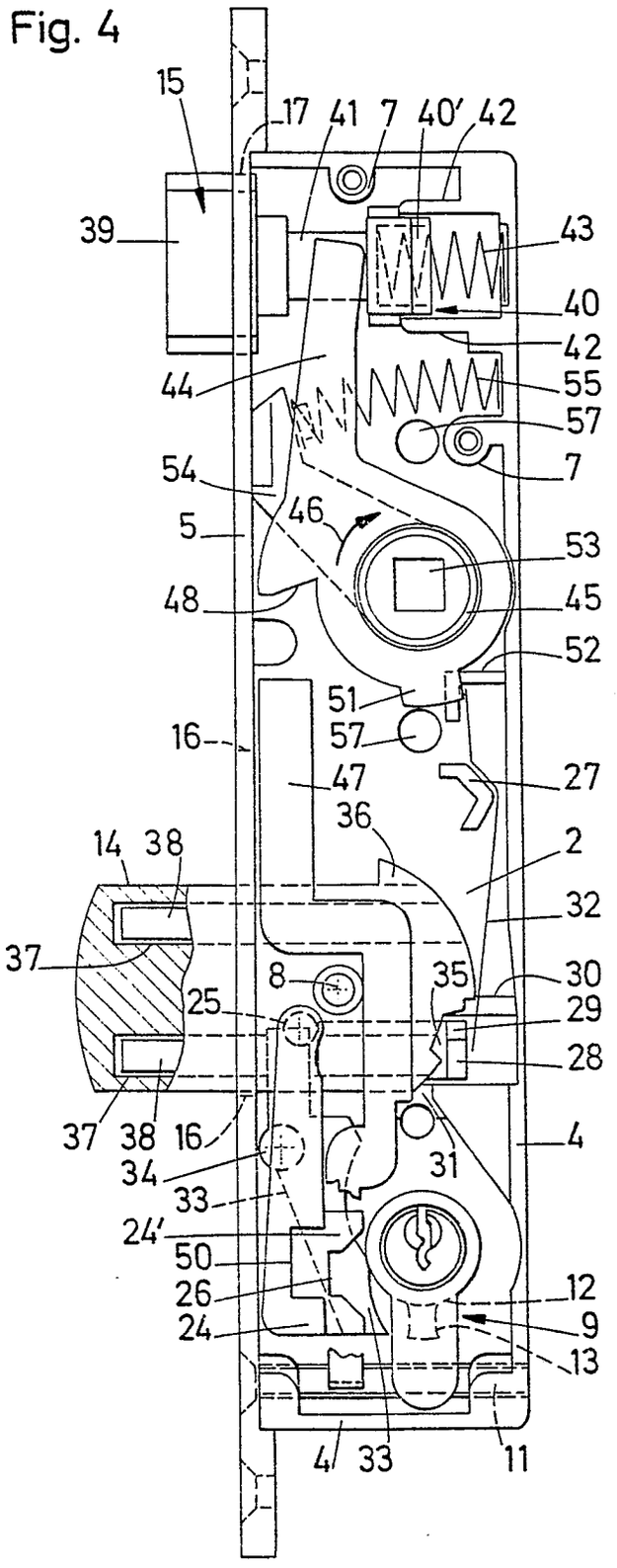


Fig. 3

Fig. 4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European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 79 103 996.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	DE - A - 2 152 199 (A. RITE MANUFACTURING CO.) * page 12, line 20 to page 14, line 10; fig. 1 to 5 *	1-5, 7, 11-14
X	DE - A1 - 2 442 467 (W. KARRENBERG) * complete document *	1-5, 7,11, 12,14
A	GB - A - 1 338 720 (A. RITE MANUFACTURING CO.) * page 2, lines 106 to 123; fig. 1 to 7 *	20-22
A	DE - A - 2 527 341 (W. KARRENBERG) * page 14, 1. paragraph; fig. 4 *	20-22
A	DE - B2 - 2 423 135 (WESTFÄLISCHES METALLWERK F. SCHNEIDER) * column 2, lines 7 to 14; fig. 1 *	6, 8-10
A	DE - U - 7 328 563 (PRESS- UND STANZWERK F.R. BRUMME) * complete document *	1-5

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

E 05 B 15/10
E 05 B 59/00

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

E 05 B 15/00
E 05 B 25/00
E 05 B 59/00
E 05 B 61/00
E 05 B 63/00
E 05 B 65/00
E 05 C 1/00
E 05 C 3/00
E 05 G 1/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
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O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	01-02-1980	WUNDERLICH

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