

[54] **DOOR LOCK**
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[57] **ABSTRACT**

The door lock of the present invention comprises a spring loaded, retractable latch which can be arrested in a retracted position by means of a bolt that can be released by means of a release member. The release member is connected to the bolt by means of a contact piece positioned on the frame of the door, the release member and the contact piece being adjustably relative to each other.

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22 Claims, 7 Drawing Figures

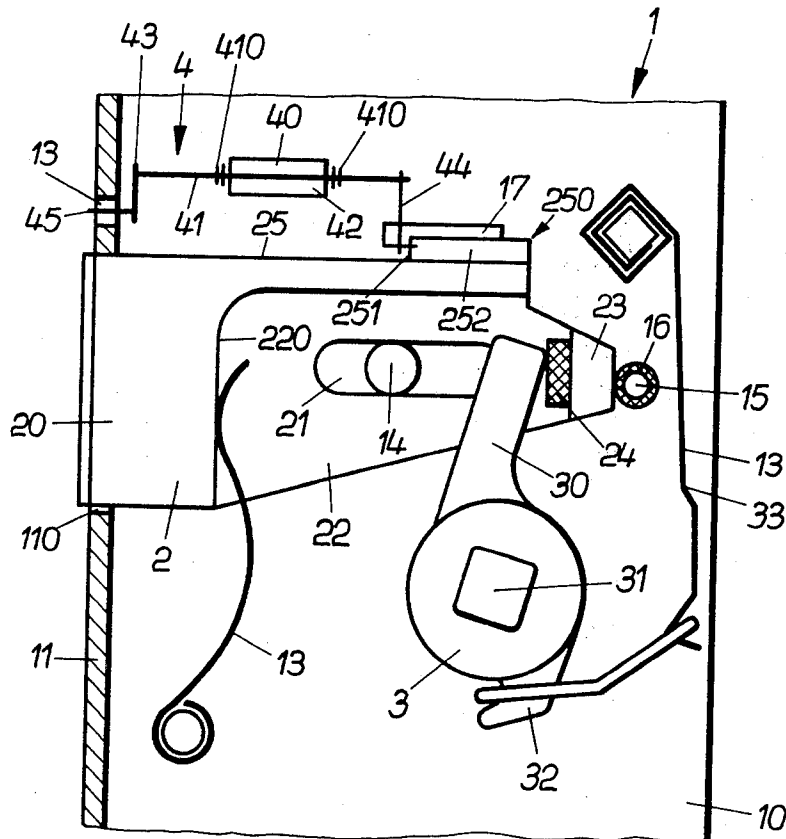


Fig. 1

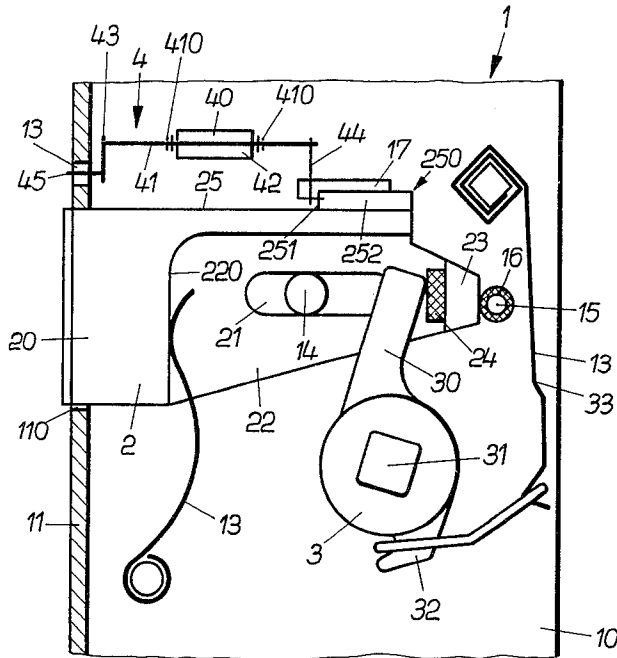


Fig. 2

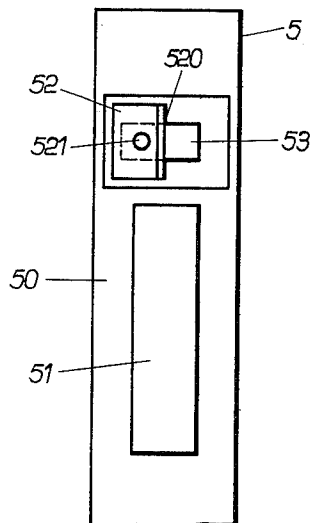
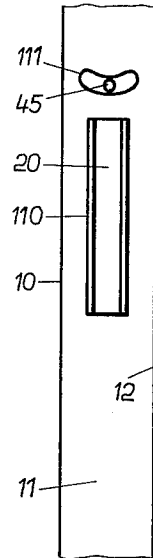


Fig. 5

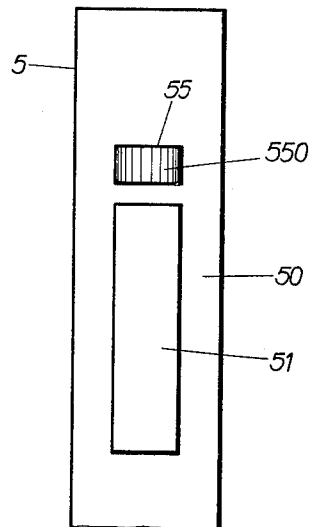


Fig. 6

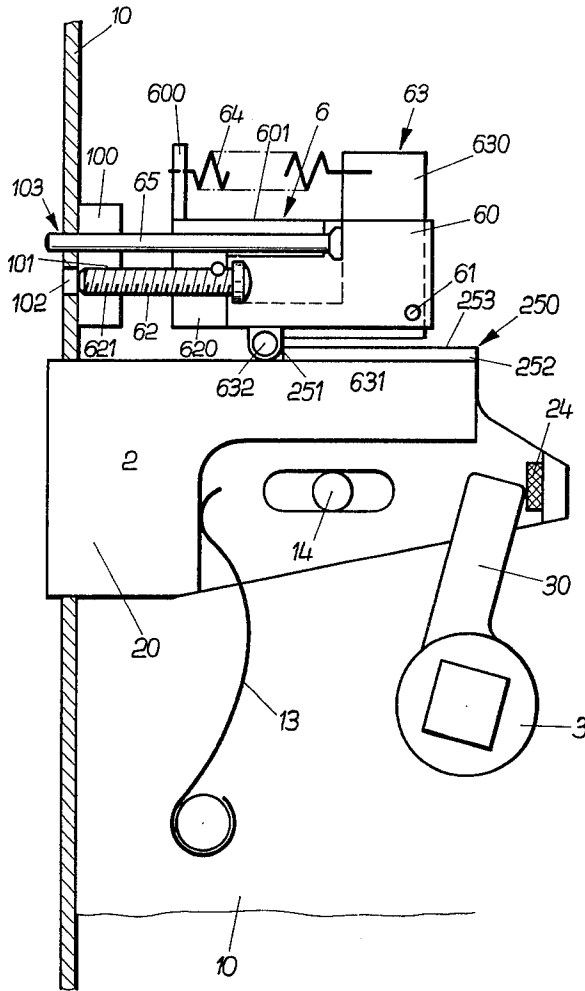


Fig. 3

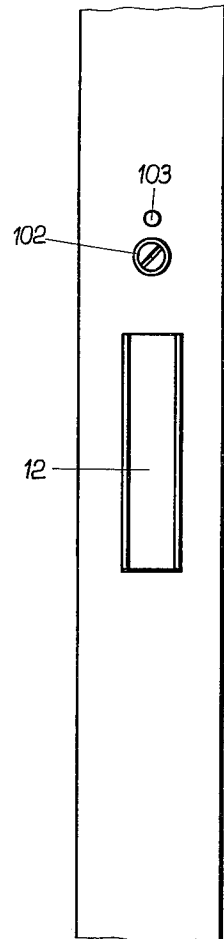


Fig. 4

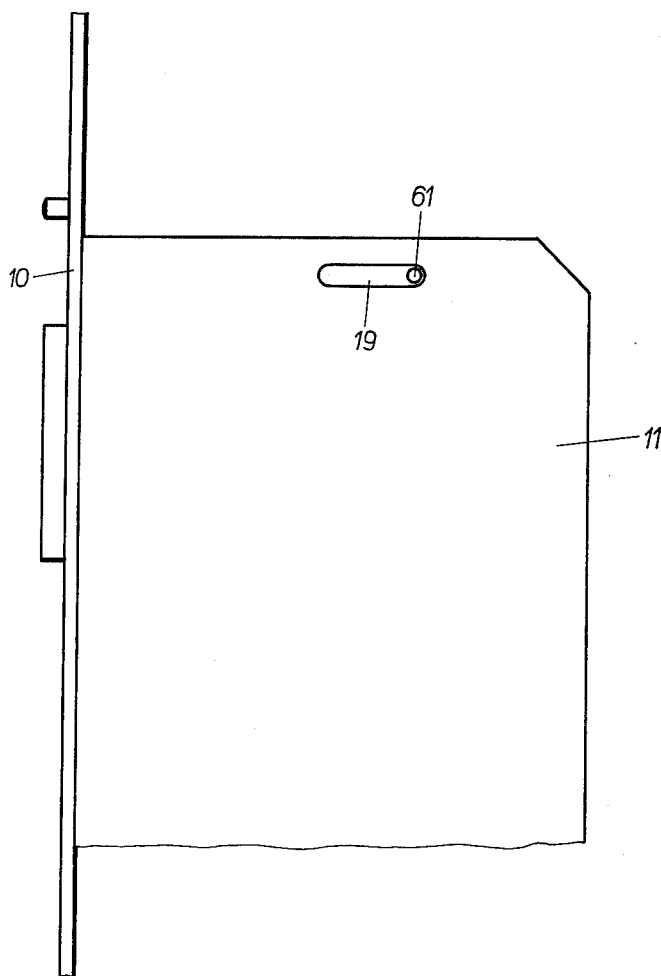


Fig. 7

DOOR LOCK

This invention relates to a door lock, wherein a spring-loaded latch can be arrested in a retracted position by means of a bolt and which can be released by a releasing member connected with the bolt by means of a contact piece positioned on the door frame.

Doors comprising this type of lock can be closed noiselessly and effortlessly, as the latch of the door does not strike against the locking crosspiece positioned on an unyielding door frame, and need not be pushed back by this crosspiece. In this type of lock, the latch, already retracted and arrested in this position when the door is opened, is only released when the door is closed, thus enabling the latch to click into a slit positioned behind the locking crosspiece.

Known locks of the aforementioned type have several disadvantages, which is the reason why they are not found in practical use.

They cannot be adjusted and therefore not suitable when faced with the present variations to actual measurements found in the building trade.

It is also one of the objects of the invention to equip these known locks with known bolts so that the manufacture of the lock remains economical; the main object of the invention is to develop the above described lock in such a way that it can be used for right as well as left hinged doors, is easily adjustable when fitted in completed buildings and can be fitted within a very wide range of specification variations found in the building trade, still guaranteeing smooth functioning; additionally, this lock should also be installable afterwards, that is, it can be exchanged for conventional locks.

In accordance with the invention, this can be attained by the adjustability of the relative positioning of the releasing member to the contact piece.

The adjustability of one or even both parts has the effect that differences between door and frame can be accommodated by moving one of the parts. Should the door gape widely, the bolt or its releasing member and contact piece of the bolt nab should be moved towards each other; should the door gape only slightly, then, without much trouble, only one of the parts needs to be moved. The movability of the latching bolt of the door or its releasing member must be possible towards the lock's front plate or away from it; the movability of the contact piece, positioned on the door frame, must allow supplementary or alternative adjustment towards or away from the release member of the bolt.

Should both — release member of the bolt and contact piece — be movable, then adjustments within very wide limits can be effected.

A further advantage is attained in the invention, wherein the contact piece can also be displaced vertically, thus permitting correct adjustment when having to allow for an incorrectly fitted bolt nab.

The release member is especially easily adjusted if it comprises a pivot, an adjusting screw or similar, a further characteristic of the invention.

According to the invention the door latch and bolt are two separate parts, which are connected with each other through pressure. The correlation between bolt and latch is such, that the bolt is prevented by means of the door latch or any of its part from entering the bolt's locking position during every positioning of the door latch — other than during the retracting position

of the door latch — with the exception when the door latch in its opening position permits the bolt to lock.

For this purpose the door latch comprises an abutting edge for the bolt when engaging, and comprises at least one sliding surface for the released bolt, a surface which rests against the abutting edge.

According to a preferred embodiment of the invention, bolt, release member and door latch are collectively adjustable in the direction for the latch's movements; thus permitting an adjustment of the latch guaranteeing a reliable closure. Should adjustment be desired solely of the release member, on its own, towards or away from the contact piece, which is within the scope of the invention, the bolt could be released but a reliable closure of a widely gaping door could not be guaranteed.

This basic principle can be illustrated in different embodiments.

In one of the embodiments the release member and bolt consist of a single part, which is slidable within the carrier, if carrier adjustment is required, and can be pivoted if movement of the bolt is required.

Thereby the release member and bolt can consist of a pivot within the carrier, adjustable in an axial direction; the pivot comprising a crank on either end, of which one has been formed into a bolt and the other, after a further angling, into a release member.

This embodiment enables the lock to be used on left as well as right hinged doors, as release member and bolt — according to a further characteristic of the invention — can be rotated in both directions as they are centrally positioned when the latch is retracted and arrested.

Normally, sufficient adjustment can be achieved by moving the release member and bolt within the carrier, thus the carrier of the bolt can be firmly mounted. Only in exceptional cases, as in buildings which show unusually great variations to building specifications, an additional transposition of the carrier can be achieved by the use of supports, protracted aperture displacers or similar means, wherein the carrier must be firmly mounted onto the lock casing once the carrier's final position has been ascertained.

In order to ensure that the bolt can always be brought into its locking position — according to a second characteristic of the invention — a sliding component is firmly connected to the latch. This sliding component comprises a rectangular profile — adjoining the bolt's abutting edge — and two sliding surfaces positioned at the side and in the direction of the latch's movement to meet the outwardly projected bolt, which in itself is spring-loaded to enable the bolt to rest against one or the other of the two sliding surfaces and to make it inclined to come to rest in a center position.

In the other embodiments of the invention, characterised by their simple assembly and easy access, bolt and release member are adjustable by means of their carrier. The bolt can be pivoted at the carrier and the release member is slidable.

It is most advantageous to relate the bolt to a cranked lever, wherein one extension forms or carries the bolt whilst the other lies within range of the release member which has been fashioned as a pin displaceable within its axis.

Herein the cranked lever comprises a spring bearing against the carrier member with its other end.

A pivot, coupled to the carrier member and housed within the winding mechanism of the lock casing, serves as transpositioner for bolt, release member and door latch; and is aligned parallel to the direction of the latch's movement and accessible through an opening in the front plate of the lock.

In both instances the bolt nab, fixed onto the door frame, comprises a contact piece which is angularly shaped in the case of a pivotable release member as described in the first embodiment, and is wedge shaped in the case of an axially slidable release member as described in the second embodiment.

The aforementioned and further embodiments of the invention are illustrated in the accompanying drawings, wherein:

FIG. 1 shows a plan view of a lock with pivotable and adjustable contact piece of the bolt;

FIG. 2 is a frontal view of FIG. 1;

FIG. 3 is a further embodiment of the invention;

FIG. 4 is a frontal view of FIG. 3;

FIG. 5 is a bolt nab, especially for the embodiment shown in FIGS. 1 and 2;

FIG. 6 is a bolt nab, especially for the embodiment shown in FIGS. 3 and 4; and

FIG. 7 is a fragmentary side elevational view of the embodiment shown in FIG. 3.

The lock casing shown in FIGS. 1 and 2 consists of a mounting plate 10, a front plate 11 and a cover plate 12.

The mounting plate 10 comprises all parts, firmly mounted or slidably or pivotably arranged, which belong to the lock and its bolt; the expression "bolt" describes in accordance with the invention the arresting mechanism of the latch. It is of no importance to the invention if another, traditional door bolt is used in conjunction with the lock which enables the door to be locked from the inside.

Door latch 2, positioned slidably on the mounting plate 10 comprises an activated frontal part 20 which projects through an opening 110 of the front plate. This front plate comprises a recess 22, thereby forming abutting edge 220 which the spring 13 bears against. Bolt 14, affixed to the mounting plate, protrudes through slit 21 of the latch 2 and guides the latch during its movements.

Abutting part 23 of latch 2 when opening the door is pressed by lever arm 30 against spike 15 of mounting plate 20. Spike 15 is surrounded by a cushion 16.

On the upper edge 25 of the ledge a sliding part is provided, which can be manufactured together with the latch as one part. This sliding part comprises a frontal abutting edge 251, two sliding side surfaces 252 and an upper sliding surface 253, and only actively employs the two sliding side surfaces 252 in this embodiment.

Latch bolt 4 comprises carrier 40 which at point 42 is firmly and unmovably mounted onto mounting plate 10 by means of screws, for instance; if widely varying divergences have to be compensated for, the carrier member can be unscrewed and after adjustment positioning has been completed, can then again be fixed firmly onto the mounting plate.

Carrier 40 serves as a journal or bearing for pivot 41, which is slidable and pivotable within the carrier; in the embodiment this can be achieved by means of double nuts 410, which after loosening and subsequent sliding adjustment of the pivot, can then be tightened again.

Both ends of pivot 41 comprise cranks 43 and 44. The frontal crank 43 comprises as a further angling release member 45, whilst crank 44 bears against frontal abutting edge 251. Release member 45 positions itself centrally (FIG. 2) when the latch is arrested, thus enabling the latch to be pivoted freely to the left or right. Thus, the lock can be fitted onto left or right abutting doors without any adjustment.

The door frame always carries a so-called bolt nab 5 (FIG. 5), comprising slit 51 in which movable part 20 of the latch comes to rest when the door is closed. In principle it is irrelevant where bolt 4 and its counterpart on the bolt nab are positioned; it is preferable if both are affixed close to the latch to avoid the provision of cumbersome transference tolerances.

In the described embodiment contact piece 52 is positioned above latch 2. It is angularly shaped, wherein protruding edge 520 serves as an abutting edge. Horizontal slit 53 serves in conjunction with screw 521 as an adjustment for the abutting edge. Contact piece 52 can therefore be moved so that release member 45 will only bear against this abutting edge when latch 2 is approximately opposite slit 110. As edge 520 has to pivotably release member 45 it is advantageous to adjust angle part 52 in that latch 2 is only released when completely positioned opposite the slit.

Should the length of the protruding part of the release member 45 be insufficient to touch edge 520, release member 45 as shown in FIG. 1 is adjusted to the left and held, for instance, by means of double nut 410.

An additional adjustment between release member 45 and contact piece 520 is possible if the angle plate in FIG. 5 is not only horizontally but also vertically slidable and if edge 520 runs diagonally downwards or upwards; thus edge 520 can be brought closer or further away from the tip of release member 45. This adjustability only serves to bring contact piece 52 into alignment with the center positioning of the release member.

As latch and bolt are held together by pressure, a displacement of the bolt results in a correlated displacement of the latch's starting position.

According to the embodiment shown in FIGS. 1, 2 and 5, the lock functions as follows:

Lock and bolt nab are provisionally fitted, wherein notice is taken of the distance between both contact pieces — release member 45 of bolt 4 and edge 520 of contact piece 52. If release member 45 of the bolt does not abut against edge 520 of the contact or angle piece 52 when the door is closed, then — after removal of the lock — pivot 41 is screwed further outwards and, if necessary, also angle plate 52 is displaced until both respective parts make contact.

After adjustment is completed the lock is finally fitted.

When opening the door it is usual that the door handle is depressed downward, wherein latch takes the position as illustrated in FIG. 1. Bolt 44 is pivoted into its center position by means of one of springs 17. Bolt 44 comes to rest in front of abutting edge 251 and arrests latch 2 even after the release of the door handle; the release of the door handle also causes lever 30 to bear against spike 14, the latch cannot follow as parts 251 and 44 and keep it arrested.

When closing the door a slight push suffices to ensure closure. Just before the door abuts the door frame, release member 45 pushes against edge 520 of contact

piece 52, hangs there and is pivoted to the left or right dependent on the type of door (left or right abutting), as shown in FIG. 2. After a sufficiently large pivot movement bolt 44 — which is connected to release member 45 — clears edge 251, latch 2 clicks forward and comes to rest in slit 51. Thereby the bolt glides along one of the surfaces 252. Latch 2 abuts noiselessly with cushion 24 against lever 30.

When the door is opened and the latch retracted, the bolt slides along one of the sliding surfaces 252 until it positions itself in front of edge 251, thereby arresting the latch as a bolt.

The embodiment shown in FIGS. 3, 4, 6 and 7 only differs from the aforementioned embodiment in its bolt and contact piece, whilst the parts of the lock are identical and therefore identified by the same numerals.

Bolt 6 consists of a carrier 60 and an of angle lever 63 having a pin (61) fits with each end into a slit 19 on the two casing plates 10 and 12. Angle lever 63 bears the actual bolt 632, which is designed as a rivet and positioned at arm 631 of the angle lever. At arm 630 spring 64 exerts a force which at its other end bears against carrier 60 at point 600.

At carrier 60 a pivot 62 is placed rotatably in the pivot's threadless part 620. the threaded part 621 activates counterthread 101, a strengthened part 100 of the lock's front plate 10.

Release member 65 abuts side-arm 630 of angle lever 63 and enters carrier 60 by the provision of a bore-channel.

Front plate 10 of the lock comprises an opening 102 giving access to pivot 62; the release member 65 protrudes through opening 103 of the front plate.

FIG. 6 shows contact piece 55 shaped as a horizontally extending wedge surface; also this wedge surface can be displaced and tightened by means of screw 550.

This lock functions as follows:

Lock and bolt nab are fitted. A subsequent check is made if release member and contact piece are in correct contact position. If this is not the case, then pivot 62 is adjusted by means of a screw driver or similar, inserted through opening 102, thus moving carrier 60 against or away from the lock's front plate; wherein bolt 632 and latch 2 move on their own accord with or against the pressure of spring 13, thus retaining the original correlation of the components within the lock.

If the distance between release member 65 and its contact piece 55 is adjusted correctly — wedge surface 55 has previously been brought into correct alignment — the fitting of the lock is completed.

It can be seen that the embodiment does not require alterations for its adjustment and that new adjustments can always be effected.

The lock functions as follows:

The drawing shows the door open with arrested latch 2.

If the door is to be closed, a slight push will suffice.

The door moves towards the door frame, release member 65 abuts wedge surface 55 and is retracted at the last moment before closure by wedge surface 66. Wherein angle lever 63 moves clockwise against the action of spring 64, thus moving bolt 632 upwards over abutting edge 251, coming to rest on the sliding surface 253 of sliding component 250. As bolt 632 has been shaped as a rivet, roll or hollow roll, this movement is extremely smooth.

Thus latch 2 is released and can click forward under pressure of spring 13. At this moment latch 2 is positioned opposite slit 51 of bolt nab 5 and can enter easily into slit 51, thus closing the door. Furthermore, latch 2 abuts and before with its cushion 24 lever arm 30; this movement is completely noiseless.

If the door is opened, latch 2 retracts by means of lever arm 30, bolt 632 slides along surface 253 of sliding component 250 until it rests in front of abutting edge 251, thus arresting latch 2. Lever arm 30 swings back after release of the door handle and rests against rivet 14, which can also be cushioned.

I claim:

1. A door lock, for a door having a door frame, comprising in combination,

a spring-loaded retractable latch,

a bolt movable to and from a locking position for arresting said latch in retracted position,

a release member carried by the door and movable between active and inactive positions and operative to engage the bolt to move the bolt to its locking position when the release member is moved to its inactive position and, respectively, to release the bolt for movement from its locking position when the release member is moved to its active position,

a contact piece positioned on said door frame for engaging said release member to move it to its active position when said door is being shut, and means operable for adjusting the position of said release member with relation to the door, thereby adjusting the relative position of said release member and said contact piece when the door is shut.

2. The door lock according to claim 1, wherein the door latch and the bolt are separate components connected with each other through pressure.

3. The door lock according to claim 2 wherein the correlation between the bolt and the latch is such, that the bolt is prevented by means of the door latch in any of its positions except the retracted position of the door latch from entering the bolt's locking position, and that the latch in its opened position permits the bolt to lock.

4. The door lock according to claim 1 wherein the latch comprises one abutting edge for the bolt when engaged and comprises at least one sliding surface for the bolt when released, the sliding surface resting against the abutting edge.

5. The door lock according to claim 1 wherein the bolt, the release member and the door latch are adapted to be adjusted collectively in the movement direction of the latch.

6. The door lock according to claim 4, wherein the latch is firmly connected to a sliding component, the adjoining abutting edge of the bolt having a rectangular profile and two sliding surfaces positioned in the direction of the movement of the latch to meet the outwardly projected bolt to enable the bolt to rest against either one of the two sliding surfaces and to make it come to rest in a central position.

7. The door lock according to claim 1 wherein the bolt is firmly but slidably fixed onto a the carrier that is adjustable within the movement direction of latch.

8. The door lock according to claim 7, wherein the bolt is coupled to a lever having one extension that carries the bolt and another extension that cooperates with the release member which is in the form of a pin displaceable within its axis.

9. The door lock according to claim 8, wherein the lever is spring-loaded by means of a spring which bears against the carrier.

10. The door lock according to claim 7 wherein the carrier is coupled to a screw which is housed within the winding mechanism of the lock casing.

11. The door lock according to claim 10, wherein the screw is aligned parallel to the direction of the movement of latch and is accessible through an opening in the front plate of the lock.

12. The door lock according to claim 7 wherein there is further included a contact piece for the release member of the bolt nab, positioned on the door frame, said contact piece comprising a wedge surface.

13. The door lock according to claim 12 wherein the contact piece is adjustable.

14. A door lock, for a door having a door frame, comprising in combination,

a spring-loaded retractable latch,

a bolt for arresting said latch in a retracted position, a carrier mounted on said door and supporting said bolt,

a release member, said release member and said bolt consisting of a single part slidable within the carrier for adjustment of the carrier, and pivotable for movement of said bolt for arresting said latch in the retracted position and, respectively, releasing said latch, and

a contact piece positioned on said door frame and operable for releasably engaging said release member, said release member and contact piece being adjustable in relation to each other.

15. The door lock according to claim 14, wherein the release member and the bolt consist of a pivot within

the carrier, the pivot being adjustable in an axial direction; the pivot having a crank at both ends of which one end defines the bolt and the other end, after a further angling, defines the release member.

16. The door lock according to claim 15, wherein the release member and the bolt take a central position when the latch is arrested and retracted, from which position both the bolt and the release mechanism are pivotable in two opposite directions.

17. The door lock according to claim 16, wherein the carrier, to attain wide adjustment possibilities, is adapted to be fixed, within the direction of the movement of the door latch, in a plurality of alternative positions.

18. The door lock according to claim 14 wherein there is further included spring means for loading the bolt on both sides, said spring means being arranged on a mounting and a cover plate.

19. The door lock according to claim 14 wherein the release member of the bolt is pin-shaped and protrudes through a curved slit of a front plate and bears against a contact piece of the bolt nab on the door frame.

20. The door lock according to claim 19, wherein the contact piece is adjustable at the bolt nab.

21. The door lock according to claim 20, wherein the contact piece is shaped as an angle plate and comprises a longitudinal rabbet, and wherein a prominent edge serves as an impact surface for the release member.

22. The door lock according to claim 14 wherein the main parts of the lock abutting a movable component of the lock are equipped with a cushion made of a resilient material.

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