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Meinow

[11] **3,844,595**

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[54] **DOOR LOCK ARRANGEMENT FOR AUTOMOBILES**

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[30] **Foreign Application Priority Data**

Oct. 28, 1971 Germany 2153707

[52] **U.S. Cl.** **292/216**

[51] **Int. Cl.** **E05c 3/00**

[58] **Field of Search** ..... 292/216, DIG. 26, DIG. 27, 292/280; 70/141, 451

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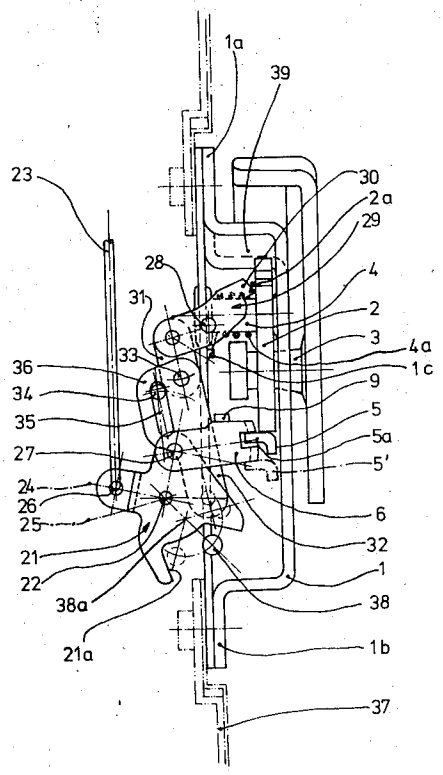
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Assistant Examiner—Peter Nerbun
Attorney, Agent, or Firm—Ernest F. Marmorek

[57] **ABSTRACT**

A lock arrangement for hinged doors comprising a lock member adapted to be mounted on the smaller front side of the door and a latch member adapted to be mounted on the door post facing the front side of the door for cooperating with the lock member, operating means for the lock member including actuating devices and a safety means including also actuating devices, a supporting plate for the lock member adapted to be mounted on the front side of the door, and means releasably coupled with the operating devices and with the associated actuating devices and means coupling the safety means with the associated actuating devices, both actuating devices are arranged for being mounted in a freely accessible position with respect to the front side of the door, and permitting the establishing of the coupling before the mounting of the supporting plate on the front side of the door.

8 Claims, 5 Drawing Figures



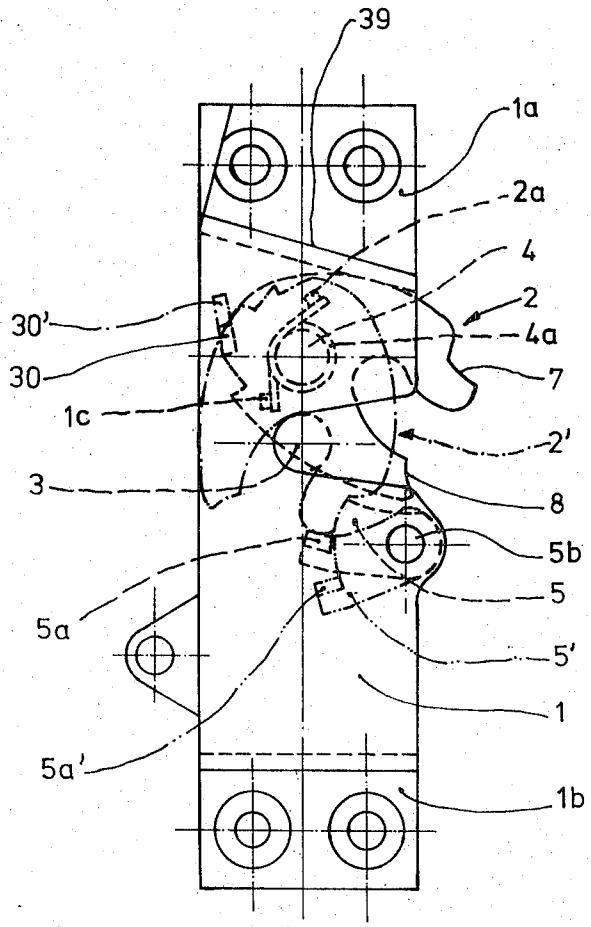


Fig.1

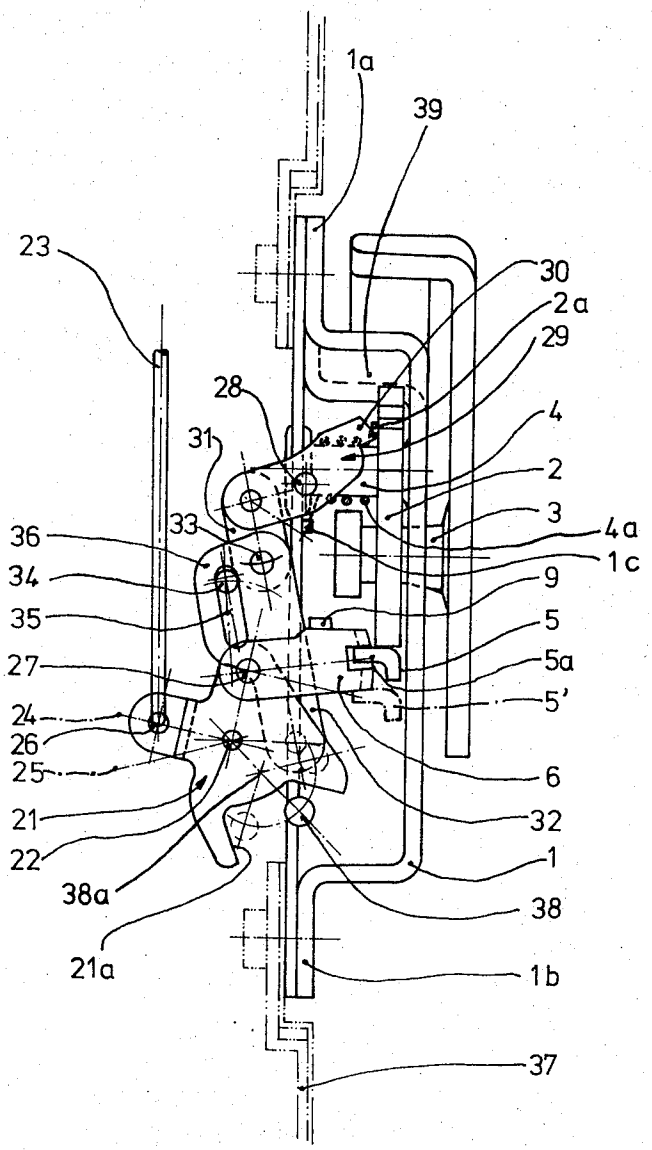
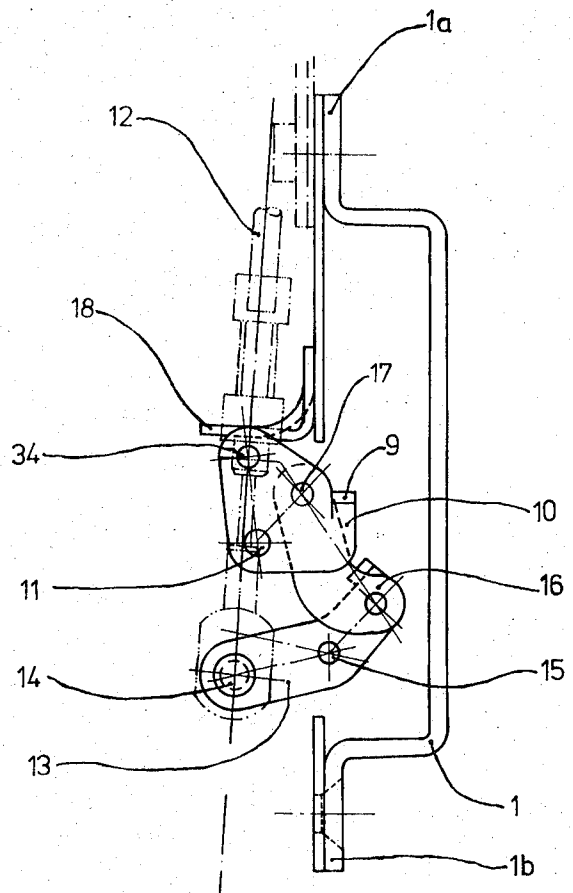

1a
39
23
30
2a
29
28
4
31
2
3
4a
33
1c
36
9
34
5
35
5a
27
5'
24
6
26
25
32
21
1
22
38a
38
21a
1b
37

Fig. 2

Fig.3



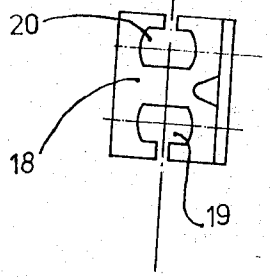


Fig.4

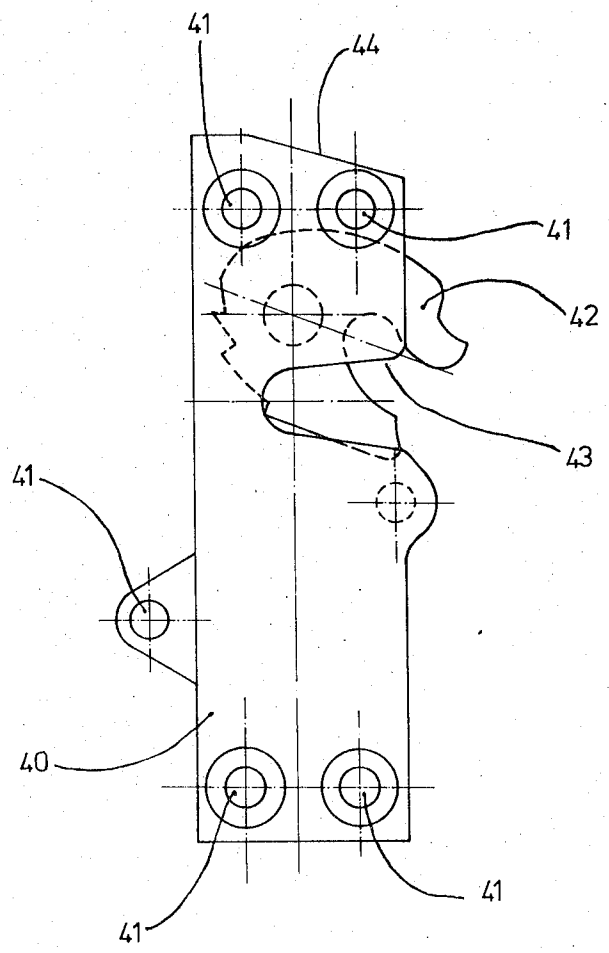


Fig. 5

DOOR LOCK ARRANGEMENT FOR AUTOMOBILES

FIELD OF THE INVENTION

The present invention relates generally to locks for hinged doors and, more particularly, it relates to lock arrangements for the hinged doors of automobiles, wherein a lock member mounted on the door cooperates with a latch member mounted on the door post and which is provided with a first operating means and with a safety device coupled with a second operating means.

BACKGROUND OF THE INVENTION

Usually the above type lock arrangements have as their latch member a rotating catch which cooperates with a lug means provided on the door post. As a first operating means usually mechanical devices, such as handles shaped as a bar are used and as second operating means usually a safety bar is provided which, for example, may terminate in a knob in the region of the lower edge of the side door window.

Known lock arrangements of this type, are mounted within the door in a recess from the side of the front of the door. After having been placed into position from the side, prior to which it is required that a door upholstery be removed, the necessary connection between the operating and safety devices is made.

Such known lock arrangements present difficulties not only during the mounting due to the fact that the necessary connections have to be made from the wide side of the door which requires the removal of the upholstery, as above mentioned, and also in that they project frequently into the inner space of the door itself which, in motor vehicles, usually is necessary to be reserved for the receiving of the window when it is let down. Furthermore such lock arrangements represent a danger under circumstances of an accident, since their operating means are rigid and in a collision they may undergo a deformation, as a result of which, they may prevent the opening of the vehicle door.

A known lock arrangement is exemplified by German Published Application OLS 2,022,336 which, however, cannot be placed into its final position from the front edge of the door, as it is apparent from the description on page 3, second paragraph, where it is stated that the locking surface 7 is a part of the internal door surface 8 which is turned about the frontal side.

SUMMARY OF THE INVENTION

It is therefore, an object of the present invention to provide a door lock arrangement for automobiles which is free from the shortcomings of the above described known door lock arrangements.

According to the present invention are rotating latch member is journaled on a supporting member secured to the smaller door front surface adjacent the operating and safety devices and the couplings between the operating and safety devices on one hand and, between their actuating devices on the other hand, are arranged in a releasable manner and on places which are easily accessible and, wherein the actuating devices permit an establishing of the couplings prior to the securing of the supporting plate onto the front smaller side surface of the door.

The mounting of the door lock arrangement according to the present invention can be accomplished in a manner which does not require the removal of the upholstery of the door. For instance, the first actuating means possess in the region of the coupling Bowden-type controls having such dimensions that their one end prior to the securing of the supporting plate on the front surface of the door can be pulled out through an opening provided in the front surface of the door in order that it could be connected to the actuating devices. The Bowden-type controls comprise flexible actuating means and have the advantage that in the event the door is deformed in case of an accident, they will not become jammed and, thereby, will not prevent an opening of the door.

The actuating devices do not have to be necessarily Bowden-type controls since it is within the scope of the present invention to provide other type of cable arrangements, such as the second actuating means may include an operating bar pivotably coupled with the safety devices and which, after having been connected with the safety devices, can be shoved into the door through an opening provided in the front side of the door. In some cases the operating bar can be provided with an operating knob which is secured in its operating position by screw connection or by adhesive means after the operating bar has been placed into the door.

From the view point of space requirements within the door, one aspect of the present invention has its special advantage in that the supporting member is in the form of a lock housing placed onto the front surface of the door and from which the coupling means serving for the coupling between the operating and the safety devices on one hand and between the actuating devices on the other hand, project at the backside thereof. According to this aspect of the present invention the lock housing sits practically on the front surface of the door so that only certain parts of the operating and safety devices project into the inside of the door through an opening provided in the front surface of the door and where they are coupled with their actuating devices. In this case then there is provided a recess in the door post which is shaped to accommodate the lock housing.

In order that the dimensions of the lock arrangement in this case could be kept at a minimum, the couplings for the actuating means are provided on the operating and safety devices themselves and which are pivotable about an axis and which, after the supporting member has been secured to the front side of the door surface, that is, in the mounted position of the lock arrangement, will run substantially perpendicularly to the plane of the door. The members carrying the coupling means will run also at least parallel with respect to the plane of the door so that even if they project into the inner space of the door, they will take up very little space.

In this regard an advantageous aspect of the present invention provides that the latching member is in the form of a rotating latch under spring bias which cooperates with a ratchet or lock pawl which, in turn, is acted upon by the operating devices as well as by the safety devices. The rotating catch and the ratchet are mounted on the supporting member in a swivelled fashion by means of a swivel axis which, after the supporting member has been secured onto the front surface of the door, will run perpendicular with respect to it

while, at the same time, all swivel or pivot axis of the operating and safety devices will run substantially perpendicular with respect to the plane of the door.

It is especially advantageous according to the present invention that the rotating catch is mounted directly in the vicinity of the supporting member at a side thereof facing the door post. Such arrangement can withstand high longitudinal and transverse forces, since such forces will not be transmitted to the operating and safety devices of the door.

According to a further aspect of the present invention the lock arrangement for the door may include a lock cylinder. For this purpose an opening is provided in the member supporting the coupling means for the safety arrangement which then after the securing of the supporting member on the front surface of the door by means of a stud, will cooperate with the lock cylinder running substantially parallel with the pivotal axis of such member. Such lock cylinder is also inserted from the outside of the door after the lock arrangement has been already inserted into its space, as above described.

It should be pointed out that the operating means for operating the lock arrangement from the outside as well as the operating means for operating the arrangement from the inside are constructed, according to the present invention, in such a manner that they can be mounted into their operating position without removing the upholstery of the door. The invention includes also additional means which assure that there is a rattle-free coupling between the lock housing placed on the smaller front surface of the door and between the latching or lug means on the door post. For instance, the lock housing may have a slanted abutting surface for a rubber buffer provided on the door post.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will become more readily apparent from the following description of a preferred embodiment thereof shown, by way of example, in the accompanying drawings in which:

FIG. **1** is a view of the lock arrangement according to the present invention mounted on the smaller front side of the door when viewed from such front side of the door;

FIG. **2** is a side view of the lock arrangement according to the present invention and, as illustrated in FIG. **1**;

FIG. **3** illustrates the parts of the lock arrangement according to the present invention lying behind those of FIG. **2**;

FIG. **4** is a detail view of a member appearing in FIG. **3**; and

FIG. **5** is a similar view as FIG. **1**, illustrating a different embodiment of the supporting member according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIGS. **1–4** illustrating one embodiment of the present invention, it is seen that directly in the vicinity of the supporting member **1**, which in the present embodiment can take the form of a lock housing which can have side walls (not shown in the drawings) made from a synthetic material, a rotating catch or locking member **2** which in FIG. **1** is shown in open position by the reference numeral **2** and also in closed position by the dashed lines and by the reference numeral **2'**. The rotating catch **2** which cooperates with a latch member **3** provided on the door post, which itself is not shown on the drawings, is secured in a pivotable fashion, by means of a swivel axle **4** to the supporting member **1** in a region thereof closer to the front surface of the door and is biased by a spring **2***a*. Due to the shortness of the swivel axle **4**, large forces can be accommodated without fear that the lock arrangement becomes damaged. This is true more so that the construction and arrangement of the operating and safety means are such that such large forces will not become transmitted into these devices. The spring **2***a* is secured at **2***b* in a projection on catch **2** while at **1***c* on a projection of the supporting member **1**.

In particular the construction is such that the rotating catch **2** and the associated ratchet wheel thereof are made as an integral member and wherein a ratchet pawl **5** which, in its open position is identified by the reference numeral **5'**, is also pivotably mounted on a swivel axle **5***b* on the supporting member **1** and in the same plane as the rotating catch **2**. The axles **4** and **5***b* are the only axles present in the entire lock arrangement and which, in their mounted position, are substantially perpendicular with respect to the front surface of the door, that is, they are parallel with respect to the plane of the door.

All other parts of the lock arrangements which are coupled with the supporting member **1**, and also all individual members of the operating and safety means, are arranged perpendicularaly with respect to the front surface of the door.

Considering now the details of the entire lock arrangement and starting with the ratchet pawl **5**, it is noted that it has a nose portion **5***a* with which in the released position of the lock, projects into the fork-shaped region of the releasing lever **6**, as seen in FIG. **2**. The released position is attained since by means of the releasing lever **6** being in engagement with the ratchet pawl **5**, the ratchet pawl **5** can move out of the region of the bosses **7** and **8** provided on the rotating catch **2** as can be seen in FIG. **1**. It is noted that boss **7** serves for locking the rotating catch **2** while boss **8** is a stop boss like a ratchet. The actual release of the locking arrangement by swivelling out of the ratchet pawl **5** is performed by the nose portion **9** of the lever plate **10** which, as can be seen in FIG. **3**, is pivotally mounted about a pivot axle **11** running perpendicularly to the plane of the door in the mounted position of the locking arrangement. Such pivoting occurs not directly by the Bowden-type control **12**, which serves as the first actuating means for the operating means of the locking arrangement, but it occurs over a two-armed lever **13** at the left end **14** of which, as can be seen in FIG. **3**, the Bowden control **12** which can be a cable control, is releasable and pivotably connected with one end thereof and upon the operation of the Bowden control **12**, it will pivot also about a pivotal axle **15** secured to the supporting member **1** so that it will pivot about its pivotal axle **11** over its right end in FIG. **3** and over a lever **16** coupled thereto and which lever **16** is also secured pivotably at **17** to the lever plate **10**. A pulling on the Bowden control **12** will result in a pivoting of the two-armed lever **13** in the clockwise direction which, in turn, causes a pivoting of the lever plate **10** together with its boss **9**, and as a result, the releasing lever **6** will cause the ratchet pawl **5** to disengage the rotating catch

2. It is noted that the mechanical coupling and cooperation of the parts shown in FIG. 1 with those of FIG. 2 occurs through the nose 9 and pin 34 which are both mounted on the lever plate 10. Under the effect of spring 2*a*, the rotating catch 2 will be brought into its open position illustrated in FIG. 1 by the solid line.

So far the case has been considered when the door safety means is in the released position, that is an opening of the lock arrangement can be effected by operating the Bowden control 12 which abuts on a bridge 18 which is shown in more detail in FIG. 4. A second Bowden control arrangement is present as can be seen by the two recesses 19 and 20 in the bridge 18 so that also from the outside as well as from the inside the door can be opened by means of the Bowden control devices.

The safety position of the lock arrangement is obviously in a state where an opening of the lock arrangement cannot be had without the activation of the safety means. An essential component of the safety arrangement is a lever disc 21 which is pivotably mounted about a pivot axle 22 and is under the effect of the safety lever 23 which is the actuating means for the safety means. Both pivoting positions thereof are defined by the axles 24 and 25 which represent the position of the connecting line between the pivoting axis 22 and the recess 26 for the releasable coupling of the safety means with the safety lever 23. The axle position 24 represents the released condition of the lock while the axle position 25 corresponds to the closed or safety position of the lock.

The safety lever 23 runs in its mounted position of the lock arrangement substantially perpendicularly within the door. Its upper end lies at the height of the lower edge of the side window freely accessible for operation by fingers. In the released position illustrated in FIG. 2 of the lock arrangement, the disc 21 is pivoted into its upper position defined by the axle position 24, so that the releasing lever 6 pivotably mounted on it at 27 will engage with its forked portion the projection 5*a* of the ratchet pawl 5. By operating the lever plate 10 by means of the Bowden control 12, the projection 9 on the lever plate 10 will carry with it over the releasing lever 6 the ratchet pawl 5 and will move it out of the region of the rotating catch 2.

On the other hand, if the safety lever 23 is depressed, then the lock arrangement becomes closed or secured as indicated by the axle position 25 of the disc 21, so that the forked portion of the releasing lever 6 will move out of the region of the projection 5*a* of the ratchet pawl 5 so that an operation of the Bowden control 12 remains ineffective.

The illustrated lock arrangement further contains parts which assure that when the door is slammed and when the door arrangement is at a released position, a release will occur. For this purpose, a second releasing lever 29 is pivotably mounted at 28 and has a nose portion 30 with which it engages a recess of the rotating catch 2, similarly as the situation was in FIG. 1. In the event the door is slammed, the rotating catch 2 will be pivoted into its position indicated by 2′ in FIG. 1, thereby the second releasing lever 29 will be pivoted about its pivotal axis 28 so that its nose 30 will assume the position indicated by 30′ in FIG. 1. By means of levers 31 and 32 which are pivotably coupled with each other, the lever disc 21 becomes pivoted about its pivotal axle 22 in the clockwise direction from its safe position, identified by axle position 25, into its released position identified by the axle position 24. Notwithstanding the fact that originally by the pressing of the safety lever 23 the lock arrangement has been brought into its safe position, upon slamming of the door the release lever 6 becomes brought by means of the rotating catch 2 into the region of the nose 5*a* of the ratchet pawl 5, so that an opening of the door from the outside or from the inside is made possible by the effect of the Bowden control 12 and its associated operating handle.

In the event the lever disc 21 is pivoted into the safe position which is identified by the axle position 25, and the door is closed at the simultaneous operation of the Bowden control 12, which, for example, may be connected with the door handle by means of a pressure lever, then the safe position of the door arrangement will be retained. For this purpose the levers 31 and 32 with their common pivotal connection 33 form a collapsible lever at 33 under the effect of the stud 34. The stud 34 is seated, as can be seen in FIG. 3, on the lever plate 10 which is pivotable about its pivot axle 11. By operating the Bowden control 12, a pivoting of the lever plate 10 in a clockwise direction takes place so that the stud 34 which projects into the longitudinal slot 35 of the guide member 36 carried by the pivot axle 33, will press the pivot axle 33 in the direction to the right in FIG. 2. As a result, the nose portion 30 of the second releasing lever 29 will be pivoted out of the region of the recess formed in the rotating catch 2. From this, one can see that the rotating catch 2 itself cannot serve as the releasing member.

Obviously it is within the scope of the present invention to use other type of latching mechanism since the gist of the illustrated embodiment of the present invention resides in that a supporting member for a locking arrangement is in the form of a housing 1 which can be mounted on the front side of the door as indicated at 37 and, wherein an opening is provided through which the components of the safety and operating devices of the lock arrangement can be inserted into the door. Also according to the gist of the present invention at least those components of the safety and operating devices project into the inner space of the door which carry the coupling means for the operating devices, such operating or actuating devices being in the form of a pair of Bowden controls, one being identified by 12 the other not being shown in the drawing, and which carry the safety lever 23. The invention also provides that the various operating devices are pivotably mounted on the components carrying the coupling devices, such as the safety lever 23 being engaged into an earlike portion of the disc 21. It is possible that the safety lever 23 be secured on the disc 21 before the mounting of the supporting member 1 onto the front frame 37 of the door and then the safety lever 23 can be passed into the door through an opening in the front frame 37. Conversely the Bowden control can be placed into the door itself and in order to establish a coupling of them with the operating devices of the lock arrangement, they will be pulled through with their coupling end portions through the opening made in the front frame 37 of the door as above mentioned. The couplings are first established and only then is the supporting member 1 secured to the door. There is no necessity for mounting measures from the side and there will be no necessity for removing the upholstery of the

door even when mounting the lock arrangement in this case.

According to a further aspect of the present invention, in order to attain a compact construction for the lock arrangement, the pivot axles **4** and **5***b* run perpendicularly to the front surface of the door from the rotating catch **2** and from the ratchet pawl **5**, while the remaining pivot axles of the lock arrangement are arranged perpendicularly with respect to the plane of the door. This constructional feature in connection with the supporting of the rotating catch **2** and of the ratchet pawl **5** has its advantage in that these parts are directly supported on the supporting member **1** and therefore, can receive large forces from the lock arrangement which forces could not otherwise be introduced into the remaining parts. With respect to such remaining parts of the lock arrangement the present arrangement has its advantage in that the coupling points between the safety and operating means on one hand, and between the actuating members on the other hand, are freely accessible from the backside of the lock arrangement when the supporting member **1** is shown lying on its front side.

Inasmuch as only one portion of the safety and operating means project into the door, there will be plenty of place left for the receiving therein of a movable window.

The arrangement of the pivot axles of the remaining parts of the lock arrangement perpendicularly with respect to the plane of the door has its further advantage in that a lock cylinder can be directly built into the lock arrangement. From such lock cylinder in FIG. **2** only the excenter stud **38** is shown which engages into the profile **21***a* of the disc **21** and permits by the selective pivoting of this disc **21** about its pivot axle **22** in the clockwise direction of counterclockwise direction to release or lock the lock arrangement. Inasmuch as the lock cylinder is placed into this lock arrangement, one obtains a central, space-wise very economical lock arrangement which does not prevent the placing of a movable window into the door and which by using Bowden controls will assure a safe opening of the door even if the door itself is deformed.

FIG. **5** shows the front view of a lock arrangement similar to FIG. **1**, with most parts similar to those of FIG. **1** although carrying different reference characters, and wherein the supportIng member **40** is secured through the threaded screw holes **41** to the front side of the door and is provided with a fork-type rotating catch **42.** As has been already mentioned in connection with FIGS. **1–3**, this supporting member **40** has recess **43** which, in the closed position of the door, is surrounded by a latch member indicated by **3** in FIGS. **1** and **2** and mounted on the door post.

While the supporting member **1** in the embodiment illustrated in FIGS. **1–3** has substantially a rectangular shape and is provided with appropriate holes for the mounting screws and lugs with projections **1***a* and **1***b*, the screws for securing the locking arrangement of FIG. **5** pass through the supporting member **40** within the region of the housing shaped support. In the embodiment illustrated in connection with FIGS. **1–3** the support **1** is illustrated in the form of a housing and has a slanted surface **39** directed in the direction of the door opening. Similarly, in the embodiment shown in FIG. **5**, a slanted surface **44** is provided which cooperates with an elastic insert, not shown, in order to provide a rattle-free and solid closing of the door.

Instead of a safety lever **23**, one may employ here also a Bowden-type control.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent is as follows:

1. A lock arrangement for doors that are hinged at one end thereof, said lock arrangement components being mounted through the end of the door that is opposite the hinged end thereof without removal of the interior door paneling, said lock arrangement comprising a lock member adapted to be mounted on the end of the door that is opposite to the hinged end thereof and a latch member adapted to be mounted on a door post opposite to the end of the door that receives the lock member for cooperating with said lock member, operating means for said lock member, first actuating means associated with said operating means, means for releasably coupling said operating means with said associated first actuating means, a safety means, second actuating means associated with said safety means, means for releasably coupling said safety means with said associated second actuating means, a common supporting member for said lock member, for said operating means and for said safety means, said supporting member being adapted to be mounted on the end of the door opposite the hinged end thereof, said coupling means comprising parts of said operating and safety means, axle means pivotally supporting said coupling means, said axle means, in the mounted position of said supporting member, lying perpendicularly with respect to a general plane of the door, said parts of said coupling means having portions for establishing said coupling projecting from the back side of the lock arrangement and thereby being in a freely accessible position from the back side of the lock arrangement, said first and second actuating means being constructed and arranged for permitting establishing of coupling before the mounting of said supporting member on the end of the door opposite the hinged end thereof.

2. A lock arrangement for doors that are hinged at one end thereof, said lock arrangement components being mounted through the end of the door that is opposite the hinged end thereof without removal of the interior door paneling, said lock arrangement comprising a lock member adapted to be mounted on the end of the door that is opposite to the hinged end thereof and a latch member adapted to be mounted on a door post opposite to the end of the door that receives the lock member for cooperating with said lock member, operating means for said lock member, first actuating means associated with said operating means, means for releasably coupling said operating means with said associated first actuating means, said first actuating means at the region of its coupling with the associated operating means comprising Bowden control means, said Bowden control means have a dimension adapting access to said Bowden control means through an aperture defined in the front surface of said door prior to the mounting of said supporting member and allowing one end of said Bowden control means to pass through said opening for establishing said coupling, a safety

means, second actuating means associated with said safety means, means for releasably coupling said safety means with said associated second actuating means, a common supporting member for said lock member, for said operating means and for said safety means, said supporting member being adapted to be mounted on the end of the door opposite the hinged end thereof, said coupling means comprising parts of said operating and safety means, axle means pivotally supporting said coupling means, said axle means in the mounted position of said supporting member, lying perpendicular with respect to a general plane of the door, said parts of said coupling means having portions for establishing said coupling projecting from the back side of the lock arrangement and thereby being in a freely accessible position from the back side of the lock arrangement, said first and second actuating means being constructed and arranged for permitting establishing of coupling before the mounting of said supporting member on the end of the door opposite the hinged end thereof.

3. The locking arrangement as claimed in claim **2,** wherein said second actuating means comprises a safety lever pivotably coupled with said safety means, means for coupling said operating bar means with said safety means and being adapted to pass through an opening in said door front surface.

4. The lock arrangement as claimed in claim **2,** wherein said supporting member comprises a lock housing adapted to be mounted on said front surface of the door.

5. The lock arrangement as claimed in claim **2,** wherein said coupling means comprise parts of said operating and safety means which are pivotably mounted about axle means, said pivotable axle means in the mounted position of said supporting member lying perpendicularly with respect to a general plane of the door.

6. The lock arrangement as claimed in claim **5,** wherein said lock member comprises a rotating ratchet pawl, spring means for biasing said rotating ratchet pawl, said rotating ratchet pawl comprising a latch pawl means for cooperating with said operating and safety means, pivotable axle means for mounting said rotating ratchet pawl on said supporting member, further pivotable axle means for mounting said latch pawl means on said supporting member, said axle means of said rotating ratchet pawl and said latch pawl means when said supporting member is mounted on said door front surface lying substantially perpendicular with respect to said door front surface, the axles for mounting said operating and safety means lying substantially perpendicular with respect to a general plane of said door.

7. The lock arrangement as claimed in claim **6,** wherein said rotating catch means is mounted on said supporting member at a region thereof facing said door post and immediately adjacent and region.

8. The lock arrangement as claimed in claim **7,** wherein said safety means comprises a member carrying said coupling means, said member comprising a recess, said member having a pivotable axis, a lock cylinder adapted for being mounted substantially parallel with said pivotable axle and having an excenter stud cooperating with said recess.

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