

SPECIFICATION

Lock structure

This invention relates to lock structures.

More particularly, the invention relates to lock structures of the type employed with doors of the vertically opening type, such as those employed for example in automobile garages. A further possible usage for such doors is in food-markets and the like, for the purpose of closing-off particular sections to the public at certain times whilst in no way inhibiting public access to the remaining departments. A particular example of such usage is in relation to the fresh meat departments of supermarkets and the like, which at the present time are required by law in Australia to deny access to the public after a specified hour. Another example is in relation to the off-license departments of some supermarkets, in the United Kingdom, for the sale of alcoholic beverages, since depending on the terms of the license issued by the authorities, such a department may have to be closed whilst the rest of the supermarket is open.

Lock structures of this general character are well known. However, lock structures of this general type existing and presently in use suffer from a number of defects, in terms of both their actual mode of construction, their principle of operation and hence their possible applications.

More specifically, lock structures of this type presently known and in use suffer by reason of the excessively high number of moving and operating parts needed to give rise to the desired result. This high number of moving parts gives rise to problems in terms of such factors as: complexity of construction or assembly, simplicity of operation, increased frequency or likelihood of breakdown (more components employed which are susceptible to damage), and hence an overall increase in cost. Furthermore, known lock structures of this type have been found to be to a certain extent deficient insofar as the degree of security afforded thereby is concerned.

In accordance with the present invention there is provided a lock structure for use with a door of the vertically opening and closing type, said lock structure including: a first fascia member adapted to be positioned on said door, said fascia member having means provided thereon for receiving and retaining a key-operated cylinder lock therein; and a second backing plate member adapted for co-operation with said fascia member and said cylinder lock (when received as said), said second member including a plurality of retractable locking bars and further including means operable selectively to extend and retract said locking bars laterally of said lock structure to allow for opening and closing of said door, said means operable to extend and retract said locking bars being in the form of an annular rotatable member, said annular rotatable member further including two axially projecting members located thereon, each said projecting member being adapted to co-operate with a respective associated shaped aperture provided on a respective said locking bar whereby

said bars are movable laterally of said lock structure in response to rotary movement of said annular member, said annular member being adapted to co-operate with said cylinder lock in two different positions to provide two separate and distinct modes of operation for said lock structure, a first mode wherein said annular member is rotatable and said locking bars are extendable and retractable only pursuant to actuation of said cylinder lock by said key, and a second mode wherein said annular member is rotatable and said locking bars are extendable and retractable either pursuant to actuation of said lock by said key or by manual means disposed or located on said annular member.

A particular advantage exhibited by a preferred lock in accordance with the present invention, an advantage not achievable with the previously known arrangements, resides in the fact that the present preferred lock possesses the capability both for what may be termed "internal free-latching", as to be explained later in this specification, and also for internal key operation.

In order that the present invention may be more clearly understood and more readily put into practical effect there will now be described in detail a preferred lock structure for use in conjunction with a door of the vertically opening and closing type. The ensuing description is given by way of non-limitative example only and is with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of a lock structure in accordance with the invention;

Figure 2 is a rear perspective view of a fascia member for the lock structure of Figure 1;

Figure 3 is a perspective view of a second or backing plate member of a lock structure in accordance with the invention;

Figure 4 is a view of a drive member adapted for location in the member of Figure 3, the drive member being operable to allow for selective operation of the lock structure, either manually or by means of an appropriate key;

Figure 5 is a view taken along the line 5—5 of Figure 1, illustrating the operative interconnection of the respective components making up the lock structure in accordance with the invention;

Figures 6 and 7 show, in an exploded view, an arrangement wherein the drive member is rotatable, in accordance with a first mode of operation, either manually or in response to operation of the cylinder lock by a key, whereby to allow for opening and closing of the door;

Figures 8 and 9 show an alternative arrangement for the drive member in relation to the cylinder lock, representing a second mode of operation wherein the lock structure is actuated only in response to the operation of the cylinder lock by a key; and

Figures 10 and 11 show yet a further arrangement for the drive member and backing-plate in relation to the cylinder lock, again representing the second mode of operation for the lock structure as in Figures 8 and 9.

Referring now to Figures 1 to 5 of the drawings, a lock structure in accordance with the present invention includes two major components, namely a first member or fascia plate 1 and a second member or backing-plate 2. Preferably, the fascia plate 1 is adapted to be positioned on the external surface or weather side of a vertically opening door of the type under consideration. In an especially preferred embodiment the fascia plate 1 is in the form of a shaped casting which is adapted to be inserted into a correspondingly shaped surface with apertures provided in or on the appropriate door. However, it should be understood that other means may be employed for the attachment of the fascia plate 1 to a door.

As shown for example in Figure 2, the fascia plate 1 has means provided thereon for receiving and retaining a key-operated cylindrical lock therein. In a referred embodiment such a means takes the form of a cylindrically shaped housing 3 provided on the inner side of the fascia plate 1. Preferably, the housing 3 is integral with the fascia plate 1 and is shaped so as to receive and retain therein the barrel portion of a key-operated cylindrical lock. In an especially preferred embodiment, as shown for example in Figure 2, the housing 3 includes a splined portion for engagement with a lock barrel.

The cylindrical lock employed may be of any known type, such as for example either of the segmented pin-tumbler or the disc-tumbler type. The lock itself is housed substantially entirely within the fascia plate of the overall lock structure.

The backing-plate 2 as shown for example in Figure 3 is adapted to co-operate with the fascia plate 1. Interconnection between the members 1 and 2 may be achieved in any known manner, such as for example by the use of screws, pins or the like. In a preferred embodiment the backing-plate 2 takes the form of a casting of a shape complementary to that of the fascia plate 1.

The backing-plate 2 of the lock structure includes means actuated by the lock provided in the fascia plate 1 whereby to allow for opening or closing of a door to which the present lock structure is attached. In order to allow for operation of the lock structure, the backing-plate 2 further includes three moving parts, namely two locking bars 4 and 5 and a drive element 6. The two locking bars 4 and 5 are arranged to be movable laterally of said backing-plate 2 through slots 7 provided in the sides thereof. Movement of these locking bars 4 and 5 in such a manner, in response to operation of the lock in the fascia plate 1, serves to bring the door into a condition suitable for opening or closing. More particularly, the locking bars 4 and 5 are adapted to be co-operable with additional locking means (not shown) extending laterally of said door and adapted to allow for or preclude vertical movement of the door.

In a preferred embodiment, as shown in Figure 4 the drive element 6 is in the form of a rotatable annular member adapted to co-operate with the cylindrical lock in said fascia plate 1. The annular

member 6 includes two diametrically opposed projecting members 8 thereon, with those members 8 serving as drive projections operable to actuate the overall locking mechanism in response to rotation of the drive element 6. More particularly, the drive projections 8 on the drive element 6 engage with shaped apertures 9 (see Figures 6 to 11) provided in the locking bars 4 and 5, such that rotation of the drive element 6 in turn gives rise to lateral movement of the locking bars 4 and 5, hence allowing for opening or closing of the door.

In an especially preferred embodiment, the drive element 6 provided in the backing-plate 2 includes two rigidly connected rotatable annular members 10 and 11, with the means for connecting said two annular members 10 and 11 in themselves constituting the drive projections 8. One of the annular members 10, adapted to be located in and project through the backing-plate 2, includes a recess 12 therein said recess extending around substantially a quarter of the circumference of said member 10. This recess 12 is adapted to co-operate with a drive pin 13 projecting from the barrel 14 of the lock, as shown in Figures 6 to 11, and serves to limit the degree of rotation of the barrel 14 of the lock, thereby in turn controlling the extent of lateral movement which may be imparted to the two locking bars 4 and 5. The drive element 6 further includes a separate notch or recess 16 provided in the annular member 10 thereof, this separate recess 16 being adapted to co-operate with the drive pin 13 of the lock barrel whereby to give rise to rotation of said drive element 6 responsive to rotation of the lock barrel.

The principle of operation of the present arrangement will now be described in more detail in relation to Figures 6 to 11 of the drawings. Insertion of the correct key into the lock serves to prime the overall mechanism. Rotation of the key in turn leads to rotation of the cylindrical barrel of said lock, which in turn gives rise to rotation of the drive element 6 of the backing-plate 2 of the lock structure. Dependent then upon the direction of rotation of the drive element 6, the locking bars 4 and 5 are appropriately moved through the slots provided in the sides of the backing-plate 2. These locking bars 4 and 5 in turn co-operate with rods (not shown) extending to each side of the door. Retraction of these rods, in response to movement of the locking bars 4 and 5, serves to unlock the door and bring that door into a condition whereby opening may be achieved simply by pushing the door in a vertical direction.

The actual operation of the lock structure, and hence opening or closing of the relevant door, may be achieved by means other than the key. In this regard it should be noted that the cylindrical lock employed is preferably of symmetrical design, with the same disc or tumbler arrangement existing regardless of the direction of the entry of the key into the key-slot whereby to allow for operation thereof by the appropriate key from

either end of the lock barrel. In other words, the door which the lock structure is situated upon may be opened, by means of a key, from either side thereof (as for example either inside or outside a vehicle garage or the like enclosure).

However, and dependent upon the actual spatial orientation of the lock barrel in the overall lock structure, and also the orientation of the backing-plate 2 in relation to the fascia plate 1, a further means or manner of operating the lock may be provided. In this regard the backing-plate 2 is so shaped as to be capable of interconnection with the fascia plate in two ways, one being the inverse of the other. For purposes of ready reference these two configurations will be hereinafter described by reference to the "arrow-head" shape shown in phantom outline on Figures 6 to 11. By way of example Figures 6 to 9 will be referred to as relating to the "arrow-down" configuration, whilst Figures 10 and 11 will relate to the inverse configuration, the "arrow-up" configuration.

Turning firstly to the so-called "arrow-down" configuration, Figures 6 and 7 show an arrangement wherein the key-slot of the lock barrel is in a substantially horizontal relationship to the ground, floor surface or the like. With such an arrangement it is possible to operate the lock structure, and thereby allow for opening and closing of the door, without the use of a key. For example, with the key slot in the position shown in Figure 6 the drive element 6 may be rotated by manual means. In order to assist such manual operation the annular member of the drive element 6, including the recess 12, further includes two arms 17 and 18 projecting laterally therefrom, said arms 17 and 18 being accessible for manual rotation (from inside the garage or like enclosure). As can be seen from a comparison of Figures 6 and 7, rotation of the drive element 6 in a clockwise direction in turn gives rise to the lateral movement of the locking bars 4 and 5 by reason of the interaction between the drive projections 8 of the drive element 6 and the apertures 9 of the locking bars. The lock barrel cannot move, but the recess 12 allows for relative movement between the lock barrel and the drive element 6. This is the so-called "internal free-latching" operation referred to earlier. With this arrangement the lock may be actuated to lock the lock structure from inside the garage or the like either by the key or by physical rotation. Such a capability is clearly of practical significance insofar as the prospective user is concerned.

However it should be noted that, whilst the locking bars 4 and 5, are adapted to be movable, in the free-latching mode, in response to rotation of the drive element 6, once the locking bars 4 and 5 are moved to their fully extended or locking position those same bars cannot be forced back to their unextended position by the application of manual pressure thereto. Rather, retraction of the locking bars can only occur in response to further rotation of the drive element 6 or alternatively by key operation of the lock itself. In other words, the

locking bars 4 and 5, by reason of the shape of the aperture 9 in the locking bars and the co-operation thereof with the drive projection 8, cannot be retracted manually whereby to actuate the lock. Indeed, the attitude of the drive projection 8 and the shaping of the aperture 9 of the locking bars 4 and 5 give rise to what may be termed an "over-centre" or perhaps more correctly "under-centre" locking effect, in that with the configuration envisaged (see Figure 6) the application of an endwise force to the locking bars 4 and 5 at the outermost extremities thereof will bring the drive projections 8 into contact with the associated recesses 9 so as to give rise to a resultant force tending to prevent inward or opening movement of the locking bars 4 and 5. This, then, is the so-called "under-centre" locking effect, with the interaction of apertures 9 and projection members 8 preventing retraction of the locking bars except in response to rotary movement of the annular member 6, whether that rotary movement is achieved by means of the correct key inserted into the cylinder lock or through manual means associated with the annular member and located internally of the door. Such an arrangement is in marked contrast to the previously known and employed locks of this type, wherein it was indeed possible, with little or no effort, to retract the locking bars manually. The increased security afforded by the arrangement in accordance with the present invention should be evident.

On the other hand, when the drive element 6 is again in the "arrow-down" configuration but with the key-slot vertically oriented, as shown in Figures 8 and 9 for example, manual turning of the drive means 6 is not possible. Clearly, with such an arrangement there is no possibility, apart from when the lock is operated by the use of the key, for relative movement between the drive element 6 and the lock itself. Hence, with the lock held stationary, the drive element will also be immovable, with the result that the lock can *only* be operated by the key.

Turning now to Figures 10 and 11, the so-called "arrow-up" configuration is shown therein. With this configuration the drive pin 13 can be seen to be in engagement with the separate recess 16 provided on the drive element 6. As such, the drive element 6 can only rotate in response to key-operation of the lock, wherein the lock barrel is rotated in response to rotation of the key therein. Such an arrangement is of particular significance in relation to mesh doors of the vertically opening type, as are frequently employed in Supermarkets, other shops etc.

The preferred arrangement in accordance with the present invention exhibits a number of important advantages not provided by the previously known arrangements. Firstly, the capacity for separate and selective operation from the rear, either by means of a rotating latch and/or by key, ascribes a previously not available versatility to the lock structure. Thus versatility increases the possible application for a structure in accordance with the present invention, and also

provides increased security. Secondly, the preferred lock in accordance with the present invention in effect utilises a minimum of moving or operative parts, thereby substantially reducing the costs involved in manufacture and assembly whilst at the same time reducing the possible causes for breakdown or damage. Thirdly, increased security is achieved by the specific shape of the apertures 9 provided in the locking bars 4 and 5 and their actual co-operation with the drive projections 8, whereby the locking bars 4 and 5 are prevented from being retracted by manual means once they are placed in their extended or locking position.

15 CLAIMS

1. A lock structure for use with a door of the vertically opening and closing type, said lock structure including: a first fascia member adapted to be positioned on said door, said fascia member having means provided thereon for receiving and retaining a key-operated cylinder lock therein; and a second backing plate member adapted for co-operation with said fascia member and said cylinder lock (when received as said), said second member including a plurality of retractable locking bars and further including means operable selectively to extend and retract said locking bars laterally of said lock structure to allow for opening and closing of said door, said means operable to extend and retract said locking bars being in the form of an annular rotatable member, said annular rotatable member further including two axially projecting members located thereon, each said projecting member being adapted to co-operate with a respective associated shaped aperture provided on a respective said locking bar whereby said bars are movable laterally of said lock structure in response to rotary movement of said annular member, said annular member being adapted to co-operate with said cylinder lock in two different positions to provide two separate and distinct modes of operation for said lock structure, a first mode wherein said annular member is rotatable and said locking bars are extendable and retractable only pursuant to actuation of said cylinder lock by said key, and a second mode wherein said annular member is rotatable and said locking bars are extendable and retractable either pursuant to actuation of said lock by said key or by manual means disposed or located on said annular member.

2. A lock structure as claimed in claim 1, wherein said annular member includes a first recess extending over substantially a quarter of the circumference thereof, said first recess being adapted to co-operate with a drive pin projecting from the barrel of said key-operated cylinder lock whereby to limit the degree of rotary movement of said barrel, thereby in turn limiting the lateral

extension and retraction of said locking bars.

3. A lock structure as claimed in claim 2, wherein said annular member includes a second recess provided thereon, said second recess being selectively engageable with said drive pin on said lock barrel whereby to preclude manual operation of the said locking bars and allow for extension and retraction of said locking bars only in response to actuation of said lock by said key.

4. A lock structure as claimed in any one of claims 1 to 3 wherein said annular member is adapted for manual operation whereby to manually induce said lateral extension and retraction of said locking bars.

5. A lock structure as claimed in any one of the preceding claims, wherein said means for receiving and retaining said lock is in the form of a shaped housing projecting from the inside surface of said fascia member, said housing being adapted to receive and retain the barrel of said lock therein.

6. A lock structure as claimed in claim 5, wherein said housing is formed integrally with said fascia member.

7. A lock structure as claimed in any one of the preceding claims, further including a cylinder lock of symmetrical design to allow for operation by said key from either end of the barrel of the lock.

8. A lock structure as claimed in claim 7, wherein the cylinder lock is of the segmented pin tumbler type.

9. A lock structure as claimed in claim 7, wherein the cylinder lock is of the disc tumbler type.

10. A lock structure as claimed in any one of claims 1 to 6, further including a cylinder lock of the segmented pin tumbler type.

11. A lock structure as claimed in any one of claims 1 to 6, further including a cylinder lock of the disc tumbler type.

12. A lock structure as claimed in any one of the preceding claims, wherein said fascia member is in the form of a shaped extension for insertion into a correspondingly shaped aperture provided in said door.

13. A lock structure as claimed in any one of claims 5 to 12, wherein said housing includes a splined portion for receiving said lock barrel.

14. A lock structure as claimed in any one of the preceding claims, wherein said second member is of a shape complementary to said fascia member, said fascia member and said second member being inter-connected by fastening means.

15. A lock structure as claimed in any one of the preceding claims, wherein said locking bars are arranged to be extendible and retractable laterally of said second member through slots provided in the side walls thereof.

16. A lock structure substantially as described herein and with reference to and as shown in the accompanying drawings.



provides increased security. Secondly, the preferred lock in accordance with the present invention in effect utilises a minimum of moving or operative parts, thereby substantially reducing the costs involved in manufacture and assembly whilst at the same time reducing the possible causes for breakdown or damage. Thirdly, increased security is achieved by the specific shape of the apertures 9 provided in the locking bars 4 and 5 and their actual co-operation with the drive projections 8, whereby the locking bars 4 and 5 are prevented from being retracted by manual means once they are placed in their extended or locking position.

15 CLAIMS

1. A lock structure for use with a door of the vertically opening and closing type, said lock structure including: a first fascia member adapted to be positioned on said door, said fascia member having means provided thereon for receiving and retaining a key-operated cylinder lock therein; and a second backing plate member adapted for co-operation with said fascia member and said cylinder lock (when received as said), said second member including a plurality of retractable locking bars and further including means operable selectively to extend and retract said locking bars laterally of said lock structure to allow for opening and closing of said door, said means operable to extend and retract said locking bars being in the form of an annular rotatable member, said annular rotatable member further including two axially projecting members located thereon, each said projecting member being adapted to co-operate with a respective associated shaped aperture provided on a respective said locking bar whereby said bars are movable laterally of said lock structure in response to rotary movement of said annular member, said annular member being adapted to co-operate with said cylinder lock in two different positions to provide two separate and distinct modes of operation for said lock structure, a first mode wherein said annular member is rotatable and said locking bars are extendable and retractable only pursuant to actuation of said cylinder lock by said key, and a second mode wherein said annular member is rotatable and said locking bars are extendable and retractable either pursuant to actuation of said lock by said key or by manual means disposed or located on said annular member.

2. A lock structure as claimed in claim 1, wherein said annular member includes a first recess extending over substantially a quarter of the circumference thereof, said first recess being adapted to co-operate with a drive pin projecting from the barrel of said key-operated cylinder lock whereby to limit the degree of rotary movement of said barrel, thereby in turn limiting the lateral

extension and retraction of said locking bars.

3. A lock structure as claimed in claim 2, wherein said annular member includes a second recess provided thereon, said second recess being selectively engageable with said drive pin on said lock barrel whereby to preclude manual operation of the said locking bars and allow for extension and retraction of said locking bars only in response to actuation of said lock by said key.

4. A lock structure as claimed in any one of claims 1 to 3 wherein said annular member is adapted for manual operation whereby to manually induce said lateral extension and retraction of said locking bars.

5. A lock structure as claimed in any one of the preceding claims, wherein said means for receiving and retaining said lock is in the form of a shaped housing projecting from the inside surface of said fascia member, said housing being adapted to receive and retain the barrel of said lock therein.

6. A lock structure as claimed in claim 5, wherein said housing is formed integrally with said fascia member.

7. A lock structure as claimed in any one of the preceding claims, further including a cylinder lock of symmetrical design to allow for operation by said key from either end of the barrel of the lock.

8. A lock structure as claimed in claim 7, wherein the cylinder lock is of the segmented pin tumbler type.

9. A lock structure as claimed in claim 7, wherein the cylinder lock is of the disc tumbler type.

10. A lock structure as claimed in any one of claims 1 to 6, further including a cylinder lock of the segmented pin tumbler type.

11. A lock structure as claimed in any one of claims 1 to 6, further including a cylinder lock of the disc tumbler type.

12. A lock structure as claimed in any one of the preceding claims, wherein said fascia member is in the form of a shaped extension for insertion into a correspondingly shaped aperture provided in said door.

13. A lock structure as claimed in any one of claims 5 to 12, wherein said housing includes a splined portion for receiving said lock barrel.

14. A lock structure as claimed in any one of the preceding claims, wherein said second member is of a shape complementary to said fascia member, said fascia member and said second member being inter-connected by fastening means.

15. A lock structure as claimed in any one of the preceding claims, wherein said locking bars are arranged to be extendable and retractable laterally of said second member through slots provided in the side walls thereof.

16. A lock structure substantially as described herein and with reference to and as shown in the accompanying drawings.