Dec. 27, 1966 M. P. FALK 3,293,892

LOCK ADAPTER

Filed Oct. 9, 1964 3 Sheets-Sheet 1

FIG. 1

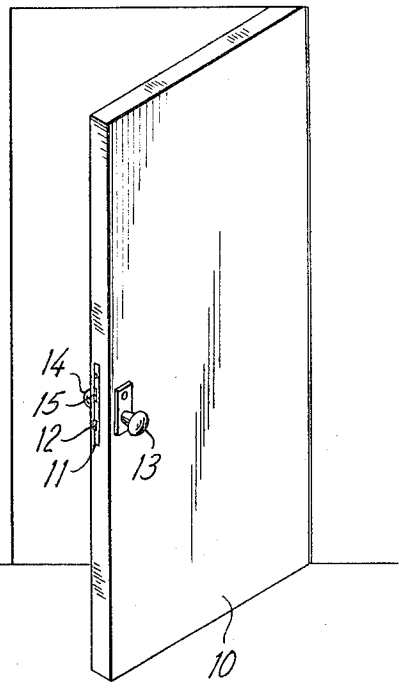


FIG. 2

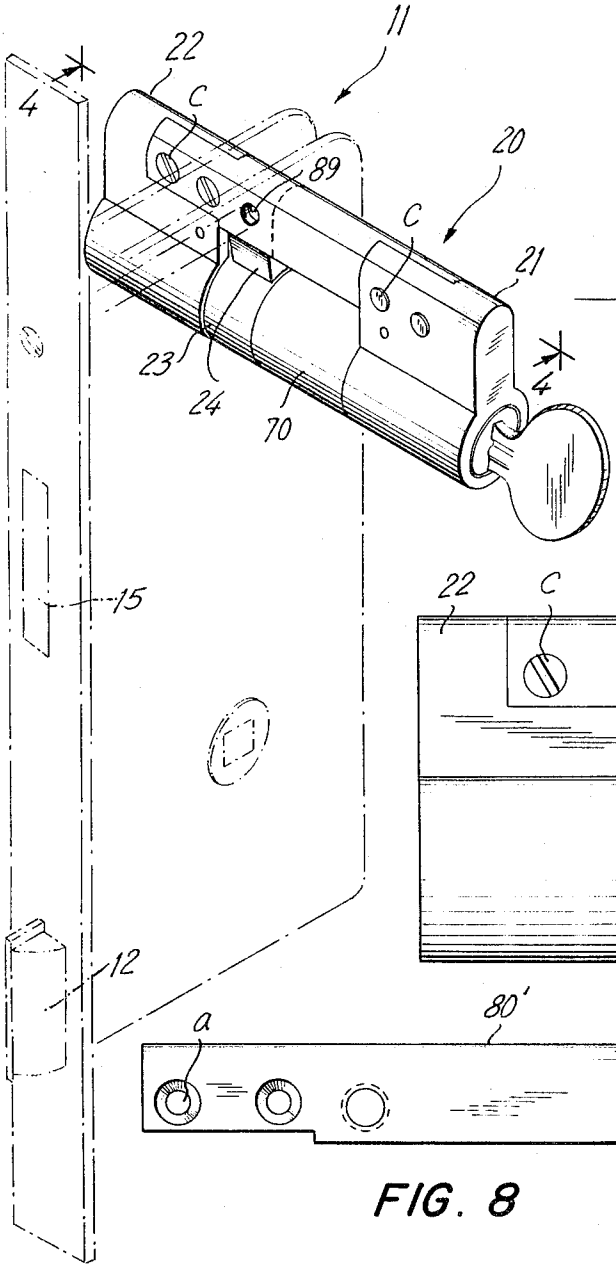


FIG. 7

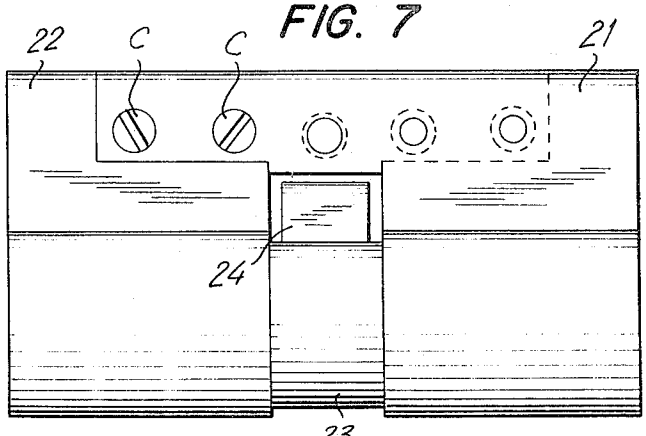


FIG. 8

INVENTOR
MYRON P. FALK
BY Mark Bassecher
ATTORNEY

Dec. 27, 1966 M. P. FALK 3,293,892

LOCK ADAPTER

Filed Oct. 9, 1964 3 Sheets-Sheet 2

FIG. 9

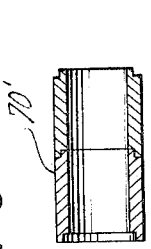


FIG. 3

FIG. 10

INVENTOR
MYRON P. FALK
BY Mark Rasseches
ATTORNEY

Dec. 27, 1966 M. P. FALK 3,293,892

LOCK ADAPTER

Filed Oct. 9, 1964 3 Sheets-Sheet 3

FIG. 4

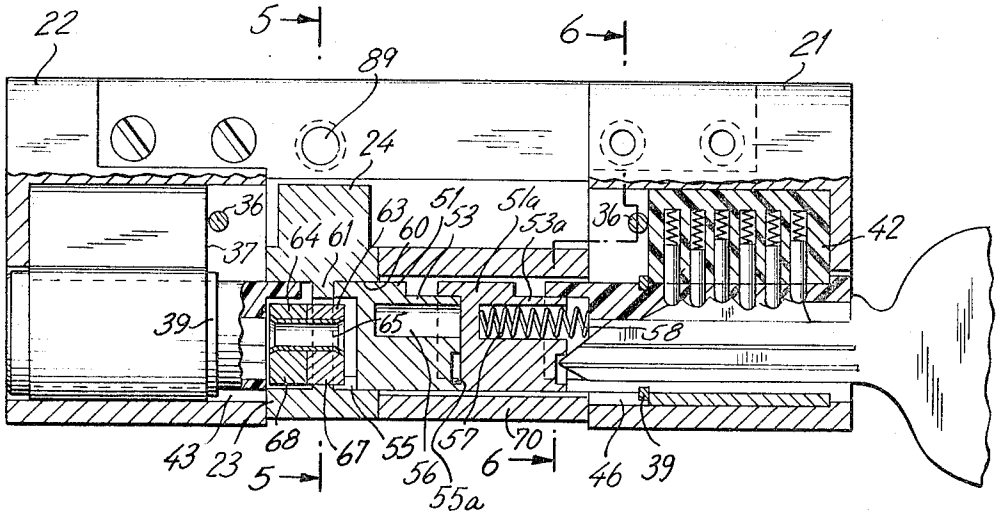


FIG. 5

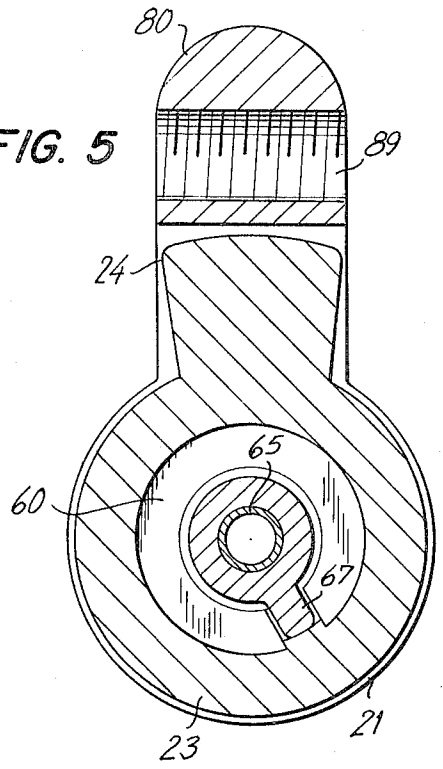
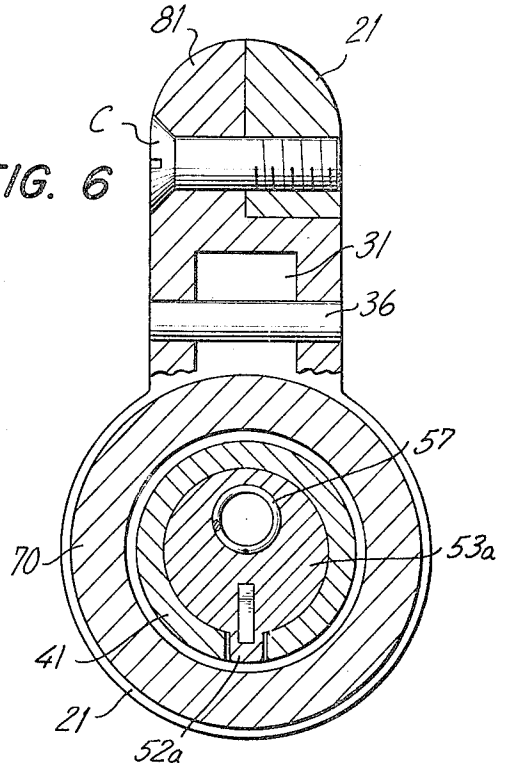


FIG. 6



INVENTOR
MYRON P. FALK
BY Mark Bauerschen
ATTORNEY

United States Patent Office

3,293,892

Patented Dec. 27, 1966

3,293,892

LOCK ADAPTER

Myron P. Falk, Leominster, Mass., assignor to Independent Lock Company, Fitchburg, Mass., a corporation of Massachusetts

Filed Oct. 9, 1964, Ser. No. 402,712
3 Claims. (Cl. 70—364)

This invention relates to a lock assembly, and more particularly to a lock assembly adaptable to convert so-called mortise locks to operation by lock mechanisms of the so-called pin or disk tumbler type.

Still more particularly, this invention relates to a lock assembly for modernizing mortise locks, closet locks or the like to provide additional security, the assembly being characterized by its ability to be installed within doors of a wide variety of thicknesses, without the necessity for stocking parts to correspond with the varying thickness of doors.

Accordingly, it is an object of this invention to provide an improved lock operating mechnaism.

A further object of the invention is to provide improved mechanism for converting lock assemblies of the so-called mortise type, wherein a series of standard, interchangeable parts may be employed for extending or diminishing the effective length of the conversion assembly, whereby a minimum of stock parts need be maintained and yet the device may be adaptable to doors of a wide variety of thicknesses.

Still another object of the invention is the provision of a simple lock assembly for the conversion of mortise locks or the like, including a plurality of standardized parts which may be cumulatively included in a single assembly, thereby to augment the effective length of the assembly, as required.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, forming a part hereof, in which:

FIGURE 1 is a perspective view of a door having a lock assembly in accordance with the invention;

FIGURE 2 is a magnified perspective view of a lock assembly in accordance with the invention, with portions of a standard mortise lock shown in dot and dash;

FIGURE 3 is an exploded perspective view of a conversion lock assembly in accordance with the invention;

FIGURE 4 is a vertical section through a lock assembly in accordance with the invention taken on the line 4—4 of FIGURE 2;

FIGURE 5 is a magnified vertical section taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a magnified discontinuous section taken on the line 6—6 of FIGURE 4;

FIGURE 7 is a front elevational view of a lock assembly similar to that of FIGURE 2, foreshortened to accommodate itself to a narrower door;

FIGURE 8 is a front elevational view of one form of connector bar for use in a lock assembly of the type described;

FIGURE 9 is a vertical section through a nesting, extendible ferrule assembly in accordance with an embodiment of the invention;

FIGURE 10 is a fragmentary, sectional view similar to FIGURE 4 showing the position of the parts with a key inserted into the outer locking mechanism.

In accordance with the invention, there is shown in FIGURE 1 a usual door **10** having a conventional mortise lock assembly **11**. As best seen from FIGURE 2, latch member **12** is selectively operable by inner and outer knobs **13**, **14**, respectively, in the usual manner. Additionally and conventionally, the mortise assembly is

provided with a latch bolt **15** which initially was operated by a bit key lock which, as is well known, is of relatively low security and is easily picked. Recently it has become the custom to replace low security locks operated by bit keys with high security pin tumbler or disk tumbler lock assemblies. However, in view of the wide variety of door thicknesses encountered, it has heretofore been required that a large replacement stock be maintained to fit a wide variety of longitudinal sizes of lock assemblies, the assembly illustrated in the appended drawings being adapted, through the inclusion or elimination of certain parts, to obviate this problem by permitting the illustrated lock assembly to fit a wide range of door thicknesses.

In accordance with the invention, there is disclosed in FIGURE 2 an adapter lock assembly **20** including an outer housing **21** and an inner housing **22** insertible transversely through the usual passage formed through a conventional mortise lock assembly **11**. The latch assembly includes a cam **23** rotatable between the housings and having a driver lobe **24** meshing with the mortise or closet lock for operating the latch bolt **15**, it being understood that rotation of the cam **23** carrying the lobe **24** will serve to shift the latch bolt **15** between locking and unlocking positions.

It will be understood that, as desired, the cam may, on its inner end, be driven either by a key actuated lock assembly or, alternatively, by a knob, the rotation of which is not dependent upon the possession of a key. In the illustrated embodiment, however, both the inner and outer housings **21**, **22** incorporate key driven assemblies. The inner and outer housings **21**, **22** are identical and, hence, a description of one of the housings will suffice.

As best seen in FIGURE 3, housing **22** comprises a metal, preferably die-cast frame having a central bore **30** including an offset, radially extending clearance way **31**. A pin tumbler assembly **32**, conventional in all respects except that the same is preferably fabricated of nylon or a like long chain polyamide, may be inserted endwise into seated position within the housing by sleeving the outer end **33** of the assembly **32** into the inner end of the housing **22** until the inner end **34** of the pin tumbler chamber engages against the outer end portion of the housing **22**, forming a stop therefor.

The assembly **32** is retained in its mounted position within the housing **22** by subsequent insertion of a transversely extending pin member **36** which, as best seen in FIGURE 4, lies adjacent the inner end **37** of the tumbler extension **30** to block movement in an inward direction of the assembly **32**.

The assembly **32** includes the usual rotatable lock plug **38** which is supported against endwise removal from the lock assembly by a snap ring **39** riding in locking groove **40** on the plug. A lock plug **41** is likewise mounted in the pin tumbler assembly **42** carried by the outside housing **21**.

Plugs **38** and **41** are generally cylindrical at their inner ends **43**, **44**, respectively, and include axially extending slots **45**, **46**, respectively—see FIGURE 4. Plugs **38** and **41** are selectively and alternatively keyed in driving relationship with the cam **23** by link assemblies next to be described.

The outer link assembly **50** serves to key the plug **41** to the cam **23** through the use of one or more extender members **51**, **51***a*. While the illustrated embodiment incorporates two extender members **51**, **51***a*, it will be readily appreciated from the following explanation that where the width of the door is greater, it will be necessary to employ additional extenders **51***a* and where the device is used with a narrower door, extenders may be eliminated.

The extenders **51**, **51***a* include radially projecting drive portions **52**, **52***a*, extending from a cylindrical collar portion **53**, **53***a* at the outer ends of the extenders **51**, **51***a*, respectively. As best seen in FIGURE 4, the collar **53***a* of extender **51***a* nests within the cylindrical inner portion **44** of the plug **41**, with the portion **52***a* drivingly sleeved within the slot **46** of said plug (FIGURE 4).

The inner portions **54**, **54***a* of the extenders comprise discontinuous cylindrical members having at their innermost ends, drive slots **55**, **55***a*—see FIGURE 4. The tubular inner ends **54**, **54***a* are thus substantially identical to the inner tubular portions **43**, **44** of the lock plugs **38**, **41**. Hence, the reduced portion **53** of the extender **51** is received in the annular end portion **54***a* of extender **51***a*, the drive portion **52** entering slot **55***a* in such interfit, thereby drivingly to link extenders **51** and **51***a* for common rotation.

The extenders **51**, **51***a* include axially extending blind bores **56**, **56***a*, the bore **56***a* having compression coil spring **57** housed therein for purposes which will appear hereafter, it being understood that the length of the spring **57** is such that the outer end **58** thereof projects beyond the extender member **51***a*.

Cam member **23** is provided with an axial passage **60** extending therethrough. Interposed within the axial passage **60** is a parti-annular shoulder portion **61** which is preferably formed integrally with the cam member, the shoulder being provided with an axially extending slot **62** for purposes which will appear hereafter.

Within the cam there is axially slidably supported a pair of driver wafers **63**, **64**, which wafers are rotatably secured together by a slip ferrule **65** extending through axial apertures formed in the wafers **63**, **64**. Each of the wafers **63**, **64** includes a drive lug **67**, **68**, respectively, which lugs project radially from the wafers. When the wafers **63**, **64** are disposed within the annular passage **60** through the cam **23**, it will be observed that the wafers may be axially shifted to positions wherein the lug **67** or the lug **68** is in registry with the slot **62** formed in the shoulder **61** and, hence, one or the other wafer is selectively keyed for rotation with the cam.

It will be further observed that when the wafers are shifted axially to the left, as viewed in FIGURES 3 and 4, the wafer **64** enters into the cylindrical portion **43** of the plug **38**, as shown in FIGURE 4.

The extender members **51**, **51***a* are disposed within a filler ferrule **70** having an inner bore **71**, the ends **72**, **73** of the ferrule being disposed against the inner end of the outer housing **21** and an annular end shoulder **69** of the cam member **23**. As previously explained, the number of extender members **51**, **51***a* will be a function of the thickness of the door and hence it will be obvious that where more extenders are provided, the length of the ferrule **70** must be likewise varied to accommodate the same.

The assembly is completed by a connector bar **80** having offset end portions **81**, **82** adapted to interfit recessed portions **83**, **84**, respectively, of the housings **21**, **22**, respectively. In the embodiment of FIGURES 1 to 7, the connector bar is provided with a pair of spaced apertures *a* adjacent the ends thereof, which apertures are disposed a distance apart calculated to register with the spacing of threaded apertures *b* formed in the recessed portions **83**, **84** of the housings.

From the foregoing it will be obvious that bolts *c* threaded through the apertures *a* and into the threaded portions *b* effect the desired integration of the parts.

As best seen from FIGURE 4, the length of the connector bar is calculated to maintain the housings **21**, **22** a predetermined distance apart, which distance is sufficient to provide slight clearance for the interposed cam **23** and ferrule **70**, to permit relative rotation of these parts.

It will be observed from FIGURE 4 that after assembly of the device, sufficient clearance in an axial direction is provided to permit the extenders **51**, **51***a* to shift or reciprocate in unison toward plug **41** or toward the cam **23**. The outer end **58** of spring **57** carried by extender **51***a* bears against the end portion of the plug **41** and urges the extenders away from the plug and into a position in which the annular end portion of the innermost extender **51** bears against the annular shoulder **61** within the cam **23**. This position is shown in FIGURE 4 of the drawings and it will be observed that when the device is in such position, the wafers **63**, **64** have been shifted axially to the left, as shown in the drawings, to a position whereat the drive portion **67** of the wafer **63** is simultaneously seated in the slot **55** of extender **51** and the slot **62** of the cam **23**. In this position, rotation of plug **41** (or rotation of a knob, if a lock assembly on the inside is not desired), will be communicated through the keyed extenders **51***a*, **51**, and through the wafer **63** to the cam **23**, and a rotation of the cam will result.

It will be further observed that a complete rotation of the cam will not be impeded by relatively rotatable wafer **64** since the same has been shifted by the pressure of spring **57** to a position wherein the drive portion **68** thereof is cleared from any engagement within the slot **62** of the cam. Thus, although the plug **38** cannot be rotated, it will be observed that a full rotation of the cam may be effected.

When it is desired to operate the device through the use of the outside plug **38**, a key is inserted therein, with the result that the tip of the key passes entirely through the keyway of plug **38** and engages against wafer **64**, shifting the wafers laterally to the right, to the position shown in FIGURE 10. It will be observed that in said position, the drive key **68** of wafer **64** is simultaneously disposed in the drive slot **45** of plug **38** and the drive slot **62** of the cam **23** and, hence, rotary motion of said plug will be transmitted through the wafer **64** to the cam **23**. It will be further observed that such inward axial shifting movement has, through the abutting relation of the wafers, cleared the drive key **67** of wafer **63** from its position within drive slot **62** and, hence, the inner extender **51** is no longer drivingly coupled to the cam **23**, such coupling being accomplished only when the drive key **67** of the wafer **63** lies both in the slot **62** of the cam and in the slot **55** of the extender.

From the foregoing it will be observed that the insertion of a key into the outer plug assembly simultaneously couples the outer plug to the cam and decouples the entire inner assembly from any connection with the cam. This feature is extremely important in the conversion of mortise locks of the type described since such locks commonly require substantially a 360° rotation of the cam member to throw the latch bolt.

In FIGURE 7 I have shown a device which is similar to the device described, with the exception that the filler ferrule **70** has been omitted and a shortened connector bar has been employed. The inner and outer housings of the embodiment of FIGURE 7 are identical to those of the previously described embodiment except that the ferrule is eliminated, a shorter connector bar is employed, and extenders are eliminated.

It will be equally appreciated that should it be desired to make a device wider than that shown in FIGURE 4, a longer ferrule and additional extenders may be employed. Moreover, the nesting relationship of the parts permits accommodation to minor variations within the range of those provided by the length of the extenders and ferrules provided.

In FIGURE 8 there is shown an embodiment of a connector bar assembly wherein the length of the connector bar may be readily varied to suit a particular application. Thus, the connector bar **80'** includes a plurality of attachment apertures *a'*, certain of said apertures being separated from each other by weakened break-off lines **90**. It will be readily appreciated that where a connector bar as shown in FIGURE 8 is employed, only a limited stock of bars need be carried by the lock-

smith, the bars being varied to suit a particular application by breaking or fracturing an increment or increments of the bar sufficient to reduce the length thereof to that which is dictated by the thickness of a particular door.

A further alternative for providing bars adaptable to varying door thicknesses is to form the same of a plurality of overlapping parts, whereby the length of the bar may be foreshortened by superimposing variable increments of the parts, and the scope of the appended claims is to be broadly construed to cover such construction. The attachment bolts for securing the connector bar to the housing may be used to keep the parts of such overlapping connector bar in a desired relation.

In FIGURE 9 there is shown a composite ferrule assembly wherein, instead of a single length of ferrule, the ferrule **70'** is comprised of a group of nesting ferrules which may be joined to each other in end-to-end engagement to provide any desired length, separation of the ferrule elements being prevented by attachment of the connector bar between the housings.

It will be understood that in all instances, the connector bar **80** is provided with an additional threaded aperture **89** to receive locking bolt **91** which is threaded inwardly from the edge of the door through the mortise lock assembly, said bolt serving to support the lock assembly within the door.

From the foregoing it will be observed that through the novel lock assembly hereinabove described, a locksmith is enabled, by maintaining only a limited stock of parts, to provide a modern lock assembly to supplant the locking mechanisms of the old closet or mortise type. Moreover, the locksmith is not required to maintain an inventory of assemblies for doors of varying thicknesses but, rather, by reason of the novel construction of the device, is required to stock only a few parts, readily assemblable to meet substantially any varying condition of door thickness.

The fabrication of a lock for a door of a greater or lesser thickness thus becomes a matter of including additional identical elements in the assembly rather than stocking a multiplicity of differential elements.

Having thus described the invention and illustrated its use, what is claimed as new and is desired to be secured by Letters Patent is:

1. A lock assembly comprising first and second housings, a cam driver in each said housing, the driver of said first housing including a lock plug, a latch operator cam rotatably mounted between said housings, a spacer ferrule interposed between said cam and said second housing, said ferrule having an inner bore, a support bar fixed to said housings and maintaining said housings in abutting relation, respectively, with said cam and said ferrule, a pair of independently rotatable abutting link means for connecting said cam drivers selectively and alternatively to said cam, one said link means being longitudinally extensible, and including at least two relatively longitudinally movable cylindrical segments rotatably mounted in said ferrule, one said segment including a drive portion slidably extending from one segment to the other segment and locking said segments against relative rotation, each said link means having at its inner end a generally cylindrical wafer member, said wafer members being relatively rotatable and disposed in end-to-end abutting position, each said wafer member including a radially extending drive portion, a complemental drive portion on said cam adjacent said drive portions of said wafers, said wafers being axially reciprocable with respect to said cam to engage one only of said wafers in driving connection with said cam, spring means interposed between said second housing and said one link means for biasing said one link means toward said cam, normally to engage the wafer of said one link means with said cam, and clear the wafer member of said other link means from said cam, said other link means including portions positioned to be engaged and inwardly shifted by a key inserted into said plug, thereby to connect said wafer of said other link means with said cam and clear said wafer of said one link means therefrom.

2. A lock assembly comprising inner and outer housings, a connector bar releasably attachable to said housings to space said housings apart a distance in accordance with the length of said bar, said bar including overlapping sections, connector means for securing said bar to said housings with said sections in a variety of overlapped positions, thereby to vary the effective length of said bar a rotatable cam driver means in said inner one of said housings, a lock plug in said outer housing, a latch operator cam rotatably mounted between said plug and said cam driver means, an extender assembly interposed between said one housing and said cam, said extender assembly including a tubular ferrule having an inner cylindrical bore, the ends of said ferrule abutting, respectively, said one housing and said cam, an axially extensible link drivingly connected to said cam driver means and yieldingly biased into driving connection with said cam, said link including a plurality of nested cylindrical elements rotatably and axially movably mounted in said bore of said ferrule, the number of said elements being determined by the length of said connector bar, said elements being keyed to each other, to said cam and to said driver means, said cam including a cylindrical portion rotatably supported at the end of said ferrule abutting said cam.

3. As a new article of manufacture, a lock assembly kit adaptable for doors of a variety of thicknesses, comprising independent inner and outer driver housings, each having a rotatable driver member, each said housing having an axially extending mounting surface, a connector bar having axially extending co-planar mounting surfaces facing in opposite directions, threaded fastener means extending between said housings and said bar and clamping a mounting surface of each said housing against a different mounting surface of said bar, means for varying the effective length of said connector bar and, hence, the spacing of said housings, latch operator cam means rotatably mounted between said housings, an extender assembly interposed between one said driver and said cam means, said extender assembly including a plurality of tubular ferrule sections nested in end-to-end relation to define an axial bore, the number of such sections varying in accordance with the effective length of said bar, link means mounted within said axial bore of said ferrule for rotative and axial movement therein, said link means including a plurality of nesting cylindrical segments in driving connection with each other, with said driver member and with said cam, the number of said segments varying in accordance with the length of said ferrule, said cam being mounted for rotation on said ferrule.

References Cited by the Applicant

UNITED STATES PATENTS

199,048	1/1878	Felter	70—375 X
2,213,262	9/1940	Segal	70—461
2,829,513	4/1958	Fresard et al.	70—379 X
3,209,568	10/1965	Patriquin	70—373

FOREIGN PATENTS

579,013	6/1933	Germany.
680,417	8/1939	Germany.
1,150,903	6/1963	Germany.
708,097	4/1954	Great Britain.

EDWARD C. ALLEN, *Primary Examiner.*

P. TEITELBAUM, *Assistant Examiner.*