Jan. 28, 1958 J. C. RAINMAN 2,821,422

LOCK FOR FOLDING DOORS

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Fig. 12.

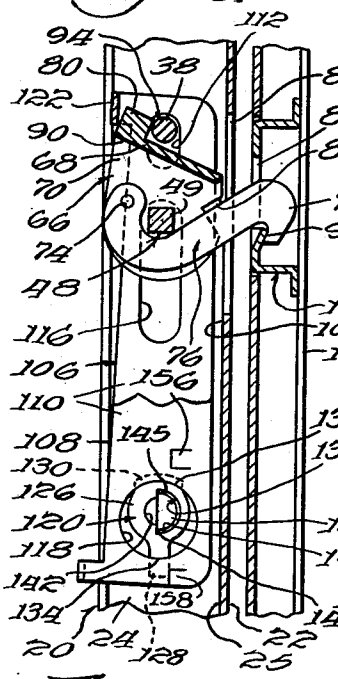


Fig. 13.

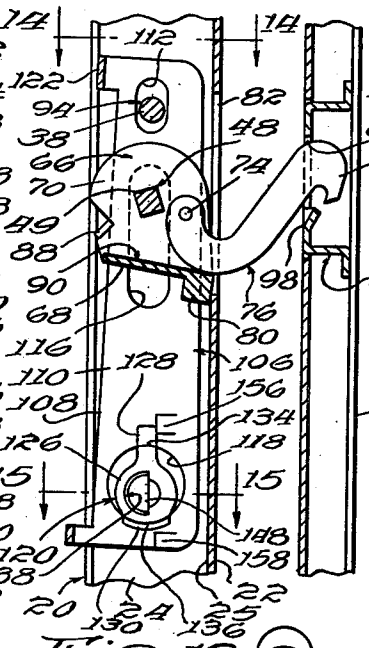


Fig. 14.

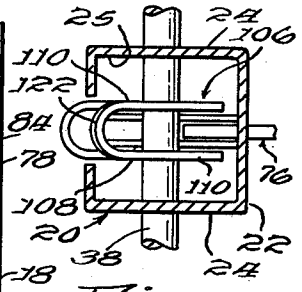


Fig. 15.

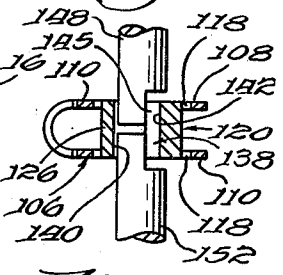


Fig. 16.

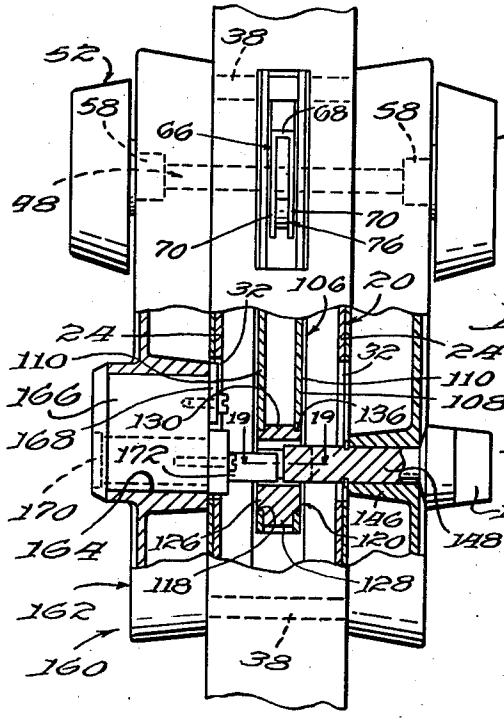


Fig. 17.

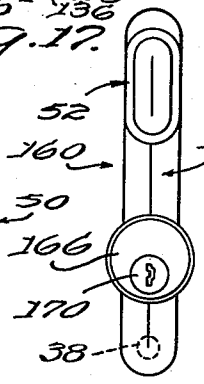


Fig. 18.

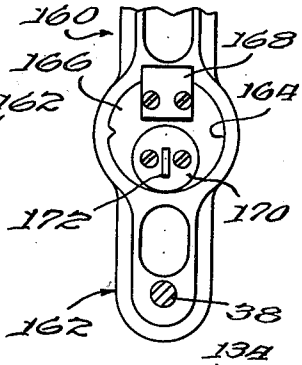


Fig. 19.

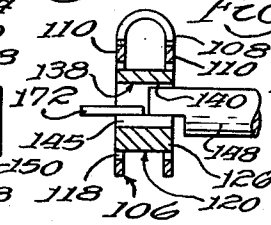
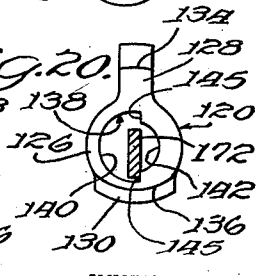


Fig. 20.



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Fig. 5.

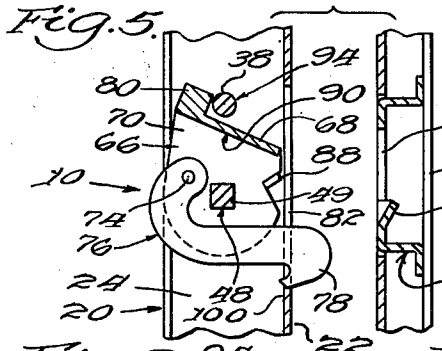


Fig. 6.

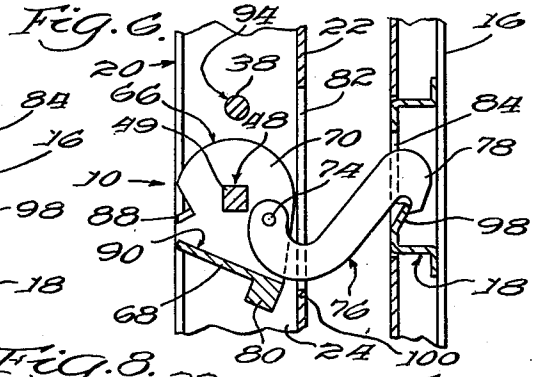


Fig. 7.

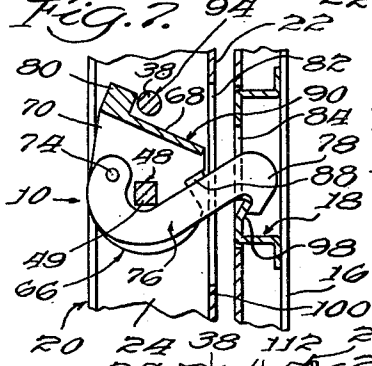


Fig. 8.

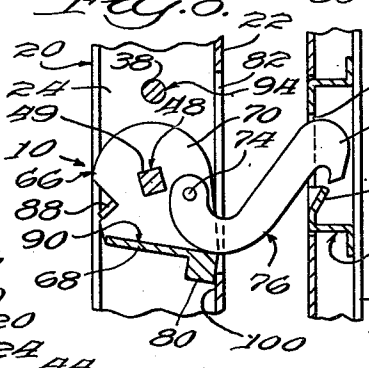
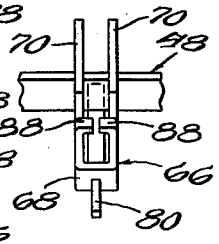


Fig. 9.



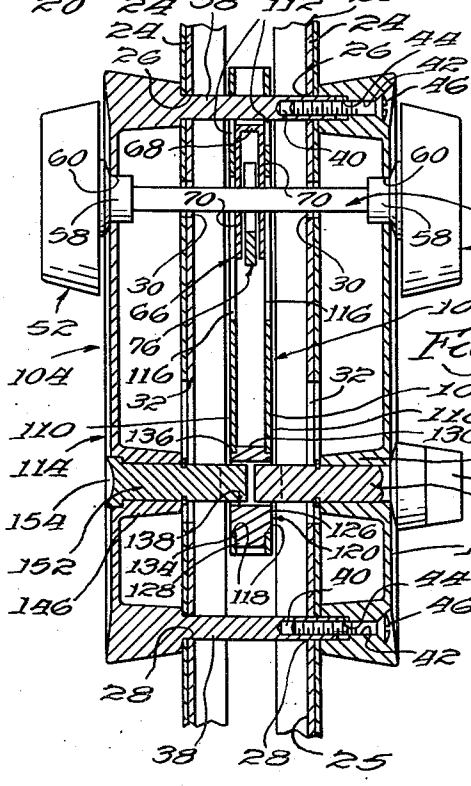
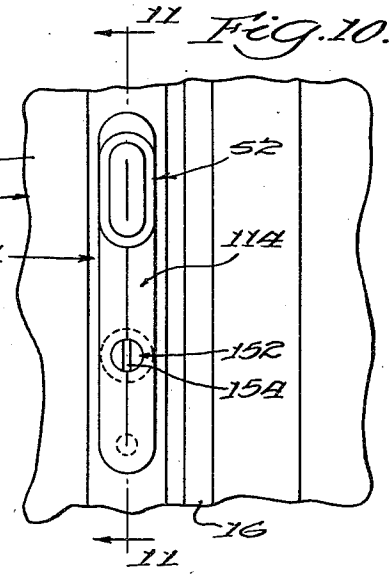


Fig. 11.

Fig. 10.



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Fig. 12.

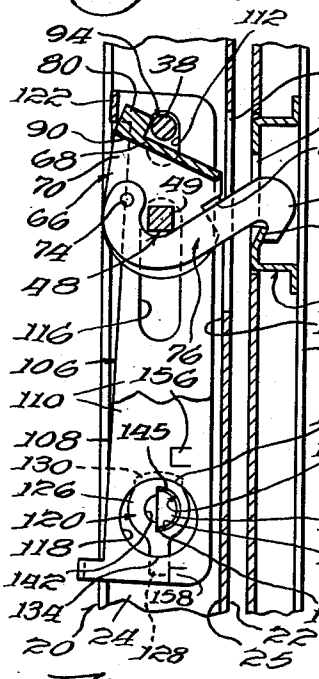


Fig. 13.

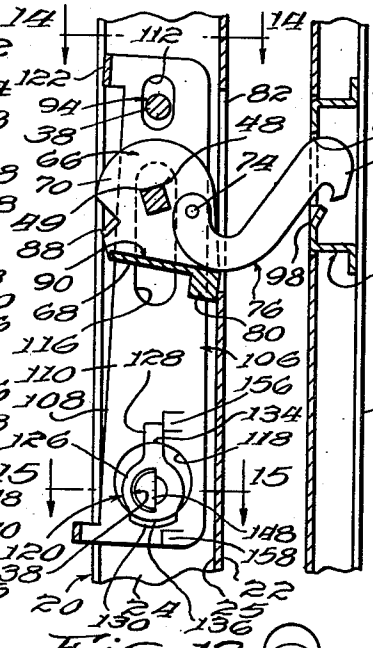


Fig. 14.

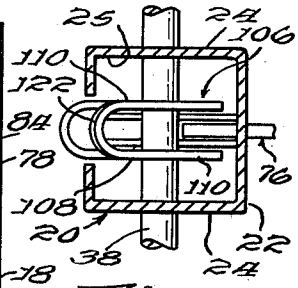


Fig. 15.

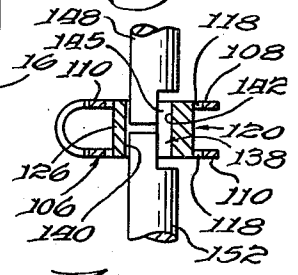


Fig. 16.

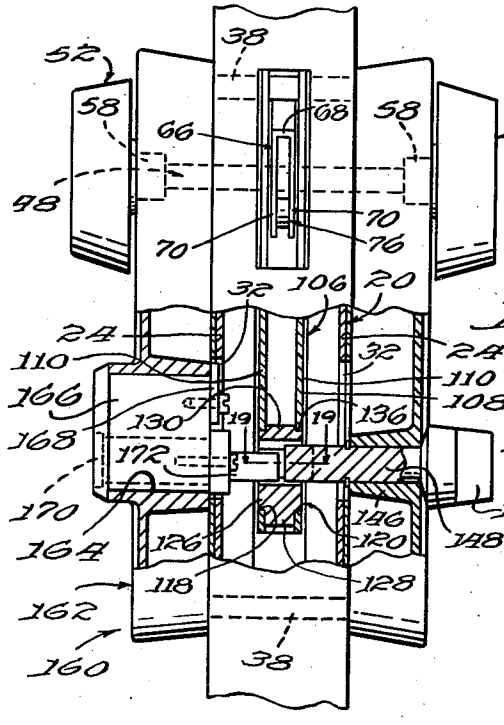


Fig. 17.

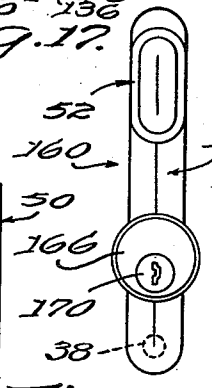


Fig. 18.

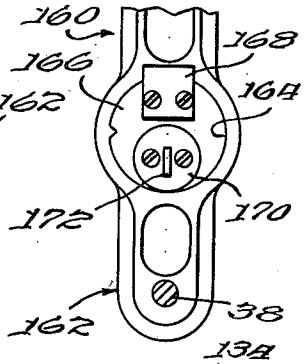


Fig. 19.

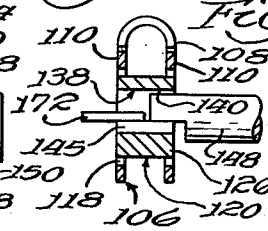
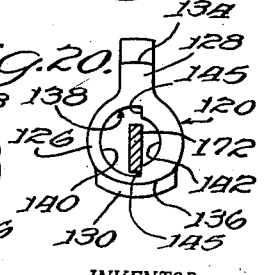


Fig. 20.



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United States Patent Office 2,821,422 Patented Jan. 28, 1958

2,821,422

LOCK FOR FOLDING DOORS

Joseph C. Rainman, Tujunga, Calif., assignor to Kwikset Locks, Inc., Anaheim, Calif., a corporation of California

Application June 13, 1955, Serial No. 514,902

13 Claims. (Cl. 292—113)

This invention relates to a door lock and, more particularly, to a door lock adapted to be utilized in conjunction with longitudinally movable, rather than hinged, doors.

In order to describe the construction and mode of operation of the door lock of my invention, it will be illustrated as incorporated for use in a door of the folding type, but it is, of course, not intended that the lock of my invention be limited to this particular application since it is conceivable that it will have uses with many other types of longitudinally moving doors.

However, longitudinally movable, accordion-type folding doors of the character wherein the exterior surfaces of the door are constituted by a web of fabric pose certain lock and latch problems which it is the intention of the present invention to overcome. For instance, since the conventional accordion-type folding door is covered with a web of fabric on each side thereof, it is frequently quite difficult to bring the edge or stile of the door into alignment with the edge or stile of a companion door or with the jamb of an opening in which the door is located due to the fact that there is an inherent spring in the material or fabric covering the door which tends to resist the final increment of closing movement of the door. When a conventional lock or latch is utilized, this poses quite a problem since a final effort to close the door must be made simultaneously with energization of the latch or lock to maintain the door in closed position. When children or women utilize these doors and attempt to close the same, the inherent spring of the doors frequently prevents their being closed.

It is, therefore, an object of my invention to provide a door lock for longitudinally movable doors of accordion-type construction, said door lock including a bolt which, when inoperative, is retracted within the stile or edge of the door but which can be extended to approximately its full length beyond the edge of the door or the stile of the door to engage a strike located in the jamb of the door opening or in the adjacent stile or edge of another door. When the strike has been engaged, the bolt can then be retracted into the stile or edge of the door in which it is located to draw the stile or edge of the door toward the adjacent jamb or toward the adjacent stile or edge of a companion door. Therefore, the lock of my invention serves, not only to lock the door, but also serves to completely close the door prior to the locking thereof.

Since folding doors of the character under consideration have an inherent spring to them which tends to cause them to move toward open position, there is a continual load upon the bolt of a lock for said doors tending to create a frictional load between the strike with which the bolt is engaged and the bolt itself which also, to a certain extent, resists opening of the lock.

It is, therefore, an object of my invention to provide a door lock for accordion-type folding doors which includes positive releasing means for releasing the bolt from locked position, thus lifting the bolt from engagement with an associated strike and instantaneously returning the lock to unlocked condition.

Another object of my invention is the provision of a lock of the aforementioned character which includes a bolt having a hook-shaped portion thereupon engageable with an associated strike, said bolt being extensible through an axial opening in the edge of the door with which it is associated to engage the strike by being raised into a position in which it will be juxtaposed to the opening in said strike.

An additional object of my invention is the provision of a bolt of the aforementioned character which can, after having been engaged in locking engagement with a strike, be lifted into a higher position to release the hook-shaped portion thereof from operative and locking engagement with its associated strike, thus permitting instantaneous release of the bolt and return of the door to unlocked condition.

A further object of my invention is the provision of a lock of the aforementioned character which includes a movable carrier having the bolt pivotally mounted therein and bodily movable thereby, the bolt being additionally movable with respect to the carrier to permit it to assume a lowermost, unlocked and an intermediate, locked position.

Another object of my invention is the provision, in a lock of the aforementioned character, of dogging means adapted to maintain the bolt in locked position so that the bolt cannot be raised out of operative relationship with the strike with which it is associated by "jimmying" or other techniques.

Another object of my invention is the provision of a lock of the aforementioned character which includes releasing means engageable with the bolt to dislodge the bolt from operative relationship with its associated strike subsequently to the release of the locking dog from engagement with the bolt.

A further object of my invention is the provision of a lock of the aforementioned character which can be readily adapted for latching, privacy latching, and keyed locking so that the basic construction of the lock will be similar in all applications and so that the lock can be readily modified from a plain latch to a privacy or keyed lock set. This materially reduces the cost of fabrication of any one of these particular types of latches or locks since the same basic assembly is used in all.

A further object of my invention is the provision of a relatively simple and easily manufactured lock which can be easily and readily installed in the edges or stiles of doors of the longitudinally movable type.

Other objects and advantages of my invention will be apparent from the following specification and the accompanying drawings which are for the purpose of illustration only and in which:

Fig. 1 is a utility view showing the accordion-type folding door with which the lock of my invention can be utilized;

Fig. 2 is an enlarged fragmentary, front elevational view of a lock constructed in accordance with the teachings of my invention;

Fig. 3 is a vertical sectional view taken on the broken line 3—3 of Fig. 2;

Fig. 4 is a transverse sectional view taken on the broken line 4—4 of Fig. 2;

Fig. 5 is an enlarged sectional, fragmentary view showing the lock of my invention in unlocked condition with the bolt thereof disposed in its lowermost, inoperative position;

Fig. 6 is a view similar to Fig. 5 showing the lock with the bolt in extended position and engaged upon the strike located in an adjacent jamb of the door opening prior to

the withdrawing of the bolt into its retracted position to complete the locking thereof;

Fig. 7 is a view similar to Figs. 5 and 6 showing the lock in locked condition;

Fig. 8 is a view similar to Figs. 5–7 showing the bolt raised into its third, uppermost position in which it releases the strike with which it is associated;

Fig. 9 is an enlarged fragmentary view of the carrier incorporated in the lock of my invention;

Fig. 10 is a fragmentary, front elevational view of a privacy lock set incorporating the teachings of my invention;

Fig. 11 is a vertical sectional view taken on the broken line **11—11** of Fig. 10;

Fig. 12 is a vertical sectional view showing the privacy set of Fig. 10 in locked condition;

Fig. 13 is a view similar to Fig. 12 showing the privacy lock set in releasing condition;

Fig. 14 is a transverse, sectional view taken on the broken line **14—14** of Fig. 13;

Fig. 15 is a transverse, sectional view taken on the broken line **15—15** of Fig. 13;

Fig. 16 is a partly sectional view showing a keyed lock set constructed in accordance with the teachings of my invention;

Fig. 17 is a front elevational view of the exterior escutcheon plate constituting a part thereof;

Fig. 18 is an enlarged, fragmentary view of a portion of the locking mechanism of the keyed lock set of Fig. 16;

Fig. 19 is a longitudinal, partly sectional view taken on the broken line **19—19** of Fig. 16; and

Fig. 20 is an enlarged, partially sectional view showing the actuating cam of the locking mechanism incorporated in the keyed lock set of Fig. 16.

Referring to the drawings and particularly to Figs. 1–4 thereof, I show a lock **10** constructed in accordance with the teachings of my invention and adapted particularly for use in conjunction with a longitudinally movable, accordion-type folding door **12** of the character shown in Fig. 1 of the drawings. The folding door **12** is suspended from a lateral edge thereof in the door opening **14** and the opposite external surfaces thereof are constituted by webs of fabric **15** which are laid over and supported upon a collapsible accordion-type frame, not shown. Mounted in the jamb **16** of the door opening **14** is a strike plate **18**. Although there is shown in Fig. 1 of the drawings only one accordion-type folding door **12** which is adapted to be moved into closed relationship with the opening **14** and to abut on the jamb **16** thereof, it is, of course, common practice to use a pair of accordion-type folding doors **12** and to provide the strike in the stile or edge of one of the doors.

The movable edge of the door **12** is constituted by an elongated channel-shaped stile **20** having a front wall **22** and side walls **24** which define a vertically oriented recess **25**. The stile **20** is, as best shown in Fig. 3 of the drawings, provided with upper and lower pairs of mounting openings **26** and **28**, respectively, which are formed in the side walls **24** thereof and which constitute the means, as shall hereinafter be described in greater detail, for mounting the component parts of the lock **10** in operative relationship with the stile **20**.

Formed in the side walls **24** of the stile **20** adjacent the upper pair of mounting openings **26** is a pair of spindle receiving openings **30** and a much larger pair of openings **32** is provided below the spindle receiving openings **30** for the reception of locking components when the lock **10** is adapted for use as a keyed lock set, as in Fig. 16 of the drawings.

Inner and outer escutcheon plates **34** and **36**, respectively, are mounted on the stile **20**. The outer escutcheon plate **36** is provided with laterally extending bosses **38** which project through the upper and lower pairs of mounting openings **26** and **28** and which are provided with tapped bores **40** in their innermost ends. The inner escutcheon plate **34** is provided with bores **42** which are counterbored, as at **44**, for the reception of the ends of the bosses **38**, the bores **42** being adapted to receive mounting screws **46** which extend into the tapped bores **40** in the inner extremities of the bosses **38** to maintain the inner and outer escutcheon plates **34** and **36** in operative relationship with each other and in operative relationship with the stile **20** upon which they are mounted.

Spindle means **48** extends through the pair of spindle receiving openings **30** in the stile **20** and is, as best shown in Figs. 5–8 of the drawings, provided with a square portion **49** of square cross section, for a purpose which will be described in greater detail below. The inner and outer ends of the spindle means **48** have inner and outer actuators **50** and **52** mounted thereupon, the outer actuator being fastened to the end of the spindle means by a pin **54** and the inner actuator **50** being secured to the inner extremity of the spindle means **48** by a set screw **56**. The actuators **50** and **52** are both provided with integral cylindrical bosses **58** which extend through openings **60** in the escutcheon plates **34** and **36** and which are journaled therein.

Spacer sleeves **62** encompass the opposite ends of the spindle means **48** and serve to journal the spindle means **48** in the spindle receiving openings **30** in the side walls **24** of the stile **20**.

Mounted upon the intermediate square portion **49** of the spindle means **48** for rotatable movement with the spindling means **48** is a carrier **66**, said carrier being, as best shown in Fig. 3 of the drawings, substantially U or channel-shaped in vertical section, the U-shaped configuration of the carrier being defined by a transverse top wall **68** having spaced lobes or ears **70** formed integrally therewith and depending therefrom. Pivotally supported between the ears **70** on a pivot pin **74** is a bolt **76** which has a hook-shaped portion **78** on its outer extremity for engagement with the strike **18**, in a manner to be described in greater detail below.

The inner extremity of the bolt **76** is of arcuate configuration, as best shown in Figs. 5–8 of the drawings, and the pivot pin **74** supporting the same is located to one side of the axis of rotation of the spindle means **48**.

Formed integrally with the top wall **68** of the carrier **66** is a stop lug **80** which extends perpendicularly to the plane of the top wall **68** of the carrier **66** and which is adapted to limit rotational movement of said carrier, in a manner to be described in greater detail below. It will be noted that the stile **20** is provided with a substantially rectangular, axially oriented bolt receiving opening **82** through which the bolt **76** can be extended or retracted, said opening being generally aligned with a smaller opening **84** in the strike **18**.

A pair of bolt dogging ears **88**, as best shown in Figs. 5–9 of the drawings, are formed integrally with the carrier **66** and extend across the space between the lobes **70** of the carrier **66** to engage the top of the bolt **76** and maintain the bolt **76** in locked condition. Furthermore, the top wall of the carrier **66** also serves as bolt releasing means **90** for the bolt **76** to dislodge the bolt **76** from its locked position.

During the operation of the lock **10** the carrier **66** is movable from its original erect position shown in Fig. 5 of the drawings. The carrier is located in said erect position by the impingement of the stop lug **80** upon the upper boss **38** of the outer escutcheon plate **36**, said upper boss thus serving as an upper stop abutment **94** in the stile **20**. When the carrier **66** is located in the aforementioned erect position with the bolt **76** disengaged from the strike **18**, the bolt will assume a first, lowermost, unlocked position wherein the hook portion on the outer extremity thereof engages the lower edge of the axially oriented bolt receiving opening **82** in the stile **20**. It is readily apparent that the free relative

movement of the bolt **76** with reference to the carrier **66** permits the bolt **76** to fall into its first, lowermost, unlocked position and it is also apparent that if the stop lug **80** did not engage the upper abutment **38** to limit rotation of the carrier **66** the bolt **76** would be drawn further into the elongated recess **25** within the stile **20** and thus drop within the said recess and be difficult to extricate therefrom.

During the locking operation the stile **20** is urged longitudinally toward the jamb **16** of the door opening **14** against the previously referred to inherent resilience of the door **12** until the stile **20** is located in a position, such as that shown in Fig. 5, wherein the stile **20** is still spaced a considerable distance from the jamb **16** and the strike **18** mounted therein. In the utilization of prior art lock or latch constructions for doors of the character here under consideration, it has been necessary to tug on the stile of the door until the stile was in close proximity to the jamb or to the stile of an adjacent door in order that registry of the bolt of the lock or latch with the strike in the stile or jamb might be obtained.

However, with the construction of my invention, when the position of the stile shown in Fig. 5 has been obtained, either of the actuators **52** or **50** can be rotated to cause concomitant rotation of the spindle means **48** and simultaneous rotational movement of the carrier **66**. When such rotational movement of the carrier **66** occurs, the carrier causes the bolt **76** to be moved from the position shown in Fig. 5 to that shown in Fig. 6 wherein the bolt **76** is extended across the distance between the stile and the jamb to engage the lip **98** of the strike **18** by passing through the opening **84** in the strike **18**.

When the bolt carrier **66** is rotated from its erect position, shown in Fig. 5 of the drawings, to the inverted position, shown in Fig. 6 of the drawings, the pivot pin **74** upon which the bolt **76** is mounted is carried from a point to the left of and slightly above the axis of rotation of the spindle means **48** to a point to the right of and slightly below the axis of rotation of the spindle means **48**, as seen in Figs. 5 and 6 of the drawings. Thus, the rotational movement of the carrier **66** causes the bolt **76** to be moved from its lowermost unlocked position to an intermediate upper position wherein the curved, hook-shaped outer extremity **78** of the bolt **76** engages the angularly oriented lip **98** of the strike **18** and is cammed upwardly until the hook-shaped portion **78** of the bolt **76** engages the said lip of said strike.

Since the bolt **76** is adapted for free pivotal movement with respect to the carrier **66**, the final movement of the bolt **76** into locked position occurs independently of the rotation of the carrier **66** which ceases prior to the locking engagement of the bolt **76** upon the strike **18**. The final locking movement of the bolt **76** is caused by the camming action of the hook-shaped portion **78** on the outer extremity thereof on the inclined lip **98** of the strike **18**.

However, when the hook-shaped portion **78** on the outer extremity of the bolt **76** engages the lip **98** of the strike **18**, there is still a considerable space between the stile **20** of the door **12** and the jamb **16** of the door opening **14**. To eliminate this space, the carrier **66** is once again rotated into its erect position, as shown in Fig. 7, to retract the major portion of the bolt **76** into the recess **25** defined by the stile **20**, thus causing the stile **20** to be drawn into closer contiguity with the jamb **16** of the door opening **14** and thus accomplishing the final closing action of the door. In this manner, the lock **10** of my invention serves to accomplish the difficult final closing of the door **12** and the problems encountered with prior art devices in registering the stile of the door with an adjacent jamb or with the stile of an adjacent door are eliminated.

When the carrier **66** returns to its erect position, the stop lug **80** thereupon, of course, impinges upon the upper stop abutment **94** and further rotational movement of the carrier **66** is prevented. With the carrier **66** located in its erect position and with the bolt **76** engaged upon the strike **18**, the dogging lugs **88** impinge upon the upper edge of the bolt **76** to dog said bolt in locked position and to prevent the bolt from being sprung out of locked engagement with the strike **18**. The relatively small space between the stile **20** of the door **12** and the jamb **16** of the door opening **14** is conventionally sealed by an elongated gasket mounted on the outer wall **22** of the stile **20** and the space shown between these members in Fig. 7 of the drawings is thus closed.

Since the pivot pin **74** is located beyond and above the axis of rotation of the spindle means **48** and since the dogging lugs **88** impinge on the upper edge of the bolt **76**, there is a dead locking action on the bolt **76** which retains it in locked engagement upon the lip **98** of the strike **18**.

In order to release the bolt **76** from locking engagement with the lip **98** of the strike **18**, the bolt carrier **66** is rotated from its erect to the inverted position shown in Fig. 8 of the drawings. Since it is necessary to lift the bolt **76** and, more particularly, the hook-shaped portion **78** on the outer extremity thereof out of engagement with the lip **98** of the strike **18**, the bolt carrier **66** must be rotated beyond the position assumed by it when the bolt **76** is located in its upper locking position, as shown in Fig. 6 of the drawings. Therefore, the bolt carrier **66** is rotated beyond the aforementioned position to cause the releasing means **90** constituted by the interior of the top wall **68** of said carrier to engage the lower edge of the bolt **76** and to raise it upwardly into its third, uppermost unlocking or releasing position wherein the bolt **76** is lifted bodily out of engagement with the lip **98** of the strike **18** to sever the locking and operative relationship between said bolt and said strike.

In order to limit travel of the carrier **66** beyond a predetermined point, the stop lug **80** thereupon engages a lower locking abutment **100** constituted by the inner surface of the front wall **22** of the stile **20** immediately adjacent the lower edge of the axial bolt receiving opening **82** in the stile **20**.

Of course, the rotation of the carrier **66** from its erect to its inverted position permits the extension of the bolt **76** through the opening **82** and thus the stile **20** and the jamb **26** are spaced from each other a distance indicated in Fig. 8 of the drawings prior to the unlocking of the bolt **76** by the movement thereof through the medium of the carrier **66** into the uppermost unlocking or releasing position. In this manner, the load and tension on the bolt **76** is released prior to the unlocking thereof.

After the bolt **76** has been moved by the action of the carrier and, more particularly, the releasing means **90** thereupon constituted by the interior of the top wall **68** of said carrier from its locked engagement upon the strike **18**, the carrier **66** can be rotated into its original erect position shown in Fig. 5 of the drawings. When so rotated the stop lug **80** will ultimately engage upon the upper stop abutment **94** to prevent rotation of said carrier beyond the predetermined erect point. At this juncture the bolt **76** will return to the lowermost unlocked position wherein it engages the lower edge of the opening **82** in the stile **20** and in which it is ready, once again, for the locking and unlocking cycle described hereinabove.

There is thus provided by the invention a locking mechanism which is particularly adapted for utilization in conjunction with longitudinally movable doors and which is also especially adapted for use in conjunction with longitudinally movable doors of the accordion type since it incorporates a bolt movement which permits the bolt to be utilized in both closing the door in which it is installed and prior to finally locking the same. Other

features of the lock of the invention include the dead locking of the same by dogging means incorporated in the carrier for the bolt, means for limiting rotation of the carrier at its erect and inverted positions, and means for releasing the bolt from operative and locking engagement with a strike in a positive manner.

One of the most desirable aspects of the lock of my invention is the fact that the constituent parts thereof, previously described hereinabove, can be utilized without any modification whatsoever in privacy and lock set applications wherein there is incorporated, in conjunction with the basic construction previously described, means for locking the door from the interior thereof or key actuated means for unlocking the door from the exterior thereof.

For instance, the basic construction previously discussed can be incorporated in a privacy set **104**, best shown in Figs. 10–15 of the drawings, adapted for use in conjunction with doors utilized in the door openings to bedrooms, bathrooms, and the like, wherein it is desired to provide positive locking means energizable from the interior side of the door to permit minimum privacy conditions to be established and to prevent opening of the door from the exterior thereof except by emergency means.

The privacy lock set **104** includes the same working parts as the lock previously described hereinabove and the identical working parts incorporated in the privacy lock set **104** will be designated in the description hereinbelow by the same numerals previously utilized in designating said parts in the previously discussed embodiment of the invention.

The major distinction of the privacy lock set **104** over the lock **10** lies in the provision of positive locking means **106** constituted by an elongated, vertically oriented, channel-shaped locking bar **108** which, as best shown in Fig. 15 of the drawings, is substantially U-shaped in transverse cross section and the spaced legs **110** of which straddle the bolt carrier **66** to permit vertical movement of the locking means **106** with respect to said carrier.

The locking bar **108** is provided, in its oppositely disposed legs **110** adjacent the upper extremities thereof, with coincident elongated openings **112** encompassing the upper boss **38** on an outer escutcheon plate **114**. Aligned, elongated openings **116** are provided in the legs **110** and encompass the spindle means **48** while aligned, circular openings **118** are provided in the lower extremity of the locking bar **108** for the reception of portions of a locking bar actuating cam member **120**.

Provided on the upper extremity of the locking bar **108** is an integral, laterally extending dogging lug **122**, best shown in Figs. 12–14 of the drawings, adapted to engage the stop lug **80** on the bolt carrier **66** to prevent rotation thereof from its erect position and thus to prevent unlocking of the bolt **76**, in a manner to be described in greater detail below.

The actuating cam member **120**, as best shown in Figs. 11–13 and 20 of the drawings, includes a substantially circular body **126** having a radial lug **128** formed integrally therewith and a radial rib **130** also formed integrally with said circular body and extending therefrom in a direction opposite to the radial lug **128**.

Formed on the opposite sides of the radial lug **128** are arcuate lands **134** which engage the edges of the coincident circular openings **118** in the legs **110** of the locking bar **108**. Since the width of the rib **130** is less than the width of the body **126**, the rib **130** defines, in conjunction with the body **126**, arcuate lands **136** also engaging the edges of the circular openings **118**, as best shown in Fig. 11 of the drawings.

A transverse bore **138** is formed in the body **126** of the actuating cam member **120** for the locking bar **108**, said transverse bore being divided, as best shown in Fig. 20 of the drawings, into two semi-circular bores, a major bore **140** and a minor bore **142**. Oppositely disposed shoulders **145** at the juncture between the major and minor bores **140** and **142**, respectively, define the limits of said semi-circular bores.

The inner escutcheon plate **144** is provided with an inwardly directed boss **146** having a bore therein and the outer escutcheon plate **114** is provided with a similar boss **146** having a similar bore therein, the inner escutcheon plate mounting a spindle **148** extending through said bore and having an actuating button **150** thereupon. The inner extremity of the spindle **148** is half-round and, as best shown in Fig. 15 of the drawings, fits within the major semi-circular bore **140** with its flat side **148** engaging the shoulders **145** defining the limits of said major semi-circular bore. An outer spindle **152** is journaled in the bore in the boss **146** of the outer escutcheon plate **114** and is provided with a screw head **154**, as best shown in Fig. 10 of the drawings, to permit the emergency rotation of the cam actuating member **120** by virtue of the engagement of its inner half-round end in the major semi-circular bore **140**, as best shown in Figs. 11 and 15 of the drawings.

In order to limit rotation of the actuating cam member **120** by either the inner or outer spindles **148** or **152**, respectively, upper and lower stop tabs **156** and **158** are provided on the locking bar **108**, as best shown in Figs. 12 and 13 of the drawings.

The elongated locking bar **108** is, as best shown in Figs. 12 and 13 of the drawings, movable between a lowermost, locked position and an uppermost, released position by the action of the actuating cam member **120**, in a manner to be described hereinbelow. Since the axis of rotation of the spindles **148** and **152** is eccentrically located with respect to the arcuate lands **134** and **136** on the radial lug **128** and defined by the radial rib **130**, when the actuating cam member is rotated into the position shown in Fig. 13 wherein the radial lug is in the uppermost position, the locking bar **108** will be raised by the engagement of the lands **134** with the edges of the oppositely disposed circular openings **118**. When the radial lug **128** reaches its uppermost position, as shown in Fig. 13 of the drawings, it engages the upper stop tab **156** on the locking bar **108** to prevent further rotation thereof.

Conversely, when it is desired to lock the privacy lock set **104**, the spindle **148** can be rotated to dispose the radial lug **128** in its depending position, as best shown in Fig. 12 of the drawings, and to cause the arcuate lands **136** to engage the edges of the openings **118** thus permitting downward movement of the locking bar **108** and the disposition of the dogging lug **122** on the upper extremity of the locking bar **108** adjacent the stop lug **80** on the bolt carrier **66**. The juxtaposition of the dogging lug **122** of the locking bar **108** adjacent to the stop lug **80** on the carrier **66** locks the stop lug **80** between the carrier and the upper abutment **94** constituted by the laterally extending boss **38** on the outer escutcheon plate **114** thus preventing movement of the carrier **66** and preventing dislodgement of the bolt **76** from locking engagement with the strike **18**.

However, rotation of the actuating button **150** will cause rotation of the spindle **148** and concomitant rotation of the actuating cam member **120**, thus returning the radial rib **130** to the lower position shown in Fig. 13 of the drawings and returning the radial lug **128** to its uppermost position to cause the arcuate lands **134** formed thereupon to raise the locking bar **108** into its uppermost, unlocked position thus releasing the dogging lug **122** on the locking bar **108** from engagement with the stop lug **80** on the carrier **66**. When this occurs the carrier **66** can be freely rotated by the action of the spindle means **48** to release the bolt **76** from operative and locking engagement with the strike **18**.

Should the need arise, emergency unlocking of the locking bar **108** can be accomplished by the rotation of the screw head **154** on the outer extremity of the outer spin-

dle 152. When the locking bar 108 is disposed in its locked position, the radial lug 128 of the actuating cam member 120 engages the bottom stop tab 158 to prevent rotation of the cam member 120 beyond a predetermined point.

The operation of the carrier 66 and the bolt 76 in locking and unlocking the bolt 76 in operative relationship with or from the strike 18 is identical with the operation of these members in the previously discussed embodiment 10 of the invention.

As previously indicated, the lock of my invention is also adapted for use as a keyed lock set 160, shown in Figs. 16–20 of the drawings. The major difference between the keyed lock set 160 and the previously discussed privacy set 104 lies in the provision of an outer escutcheon plate 162 which is provided with an enlarged bore 164 intermediate the upper and lower ends thereof for the reception of a cylinder lock 166 of conventional construction. The cylinder lock 166 is, as best shown in Figs. 16 and 18 of the drawings, retained in the bore 164 by the action of a retainer plate 168 and the plug 170 of said lock has an actuating blade 172 mounted thereupon.

Therefore, when the locking bar 108 is shifted into its lowermost locked position, as shown in Fig. 12, by the action of the control button 150, the cylinder lock 166, by virtue of the blade 172 in the plug 170, can be utilized, when a proper key is inserted in the plug 170, to rotate the actuating cam member 120 and return the locking bar 108 to uppermost unlocked position. The movement of the locking bar 108 from its locked to unlocked positions is accomplished by the impingement of the blade 172 on one of the shoulders 145 to rotate the actuating cam member 120 and return the radial lug 128 thereupon to its uppermost position, as shown in Fig. 13 of the drawings.

In all other respects the operation of the keyed lock set 160 is substantially identical with that of the previously discussed embodiments 104 and 10 of the invention. It can be readily seen, therefore, that by the provision of the lock of my invention in conjunction with various auxiliary components, it is possible to modify said lock for use as a privacy or keyed lock set. Moreover, the lock of my invention is characterized by its simplicity of construction and ease of operation and by the fact that the bolt thereof can be utilized to draw a door in which it is installed into closed position adjacent the jamb or stile with which it is associated.

In addition, positive releasing and unlocking means is provided in the lock for releasing the bolt of the lock from operative relationship with its associated strike.

Other inherent advantages and features of the invention will have been made apparent hereinabove.

I claim as my invention:

1. In a door lock for a folding door, the combination of: spindle means; inner and outer actuators secured to said spindle means; a rotatable carrier mounted on said spindle means; an elongated bolt member pivotally mounted on said carrier for free movement with respect thereto; and a dog on said carrier for engaging said bolt member to prevent dislodgement of said bolt member from its locked position.

2. In a door lock for a folding door, the combination of: spindle means; inner and outer actuators secured to said spindle means; a rotatable carrier mounted on said spindle means; an elongated bolt member pivotally mounted on said carrier for free movement with respect thereto, said bolt member being positionable by said carrier in a lowermost, released position, an intermediate, locked position or an uppermost unlocking position; and a dog on said carrier for engaging said bolt member to prevent dislodgement of said bolt member from its upper locked position.

3. In a latch disposable in the edge of a longitudinally translatable door, said edge having a bolt receiving opening therein, the combination of: spindle means extending transversely through said edge; actuator means for rotating said spindle means; a rotatable carrier on said spindle means; an elongated bolt extensible or retractible through said opening and pivotally movable on said carrier independently of the movement thereof into a lowermost retracted position engaging the lower edge of said opening; a stop abutment in the edge of said door; and a lug on said carrier engageable with said stop abutment to limit rotation of said carrier and prevent dislodgement of said bolt from said lowermost position.

4. In a latch disposable in the edge of a longitudinally translatable door, said edge having a bolt receiving opening therein, the combination of: spindle means extending transversely through said edge; actuator means for rotating said spindle means; a rotatable carrier on said spindle means; an elongated bolt pivotally mounted in said carrier for free movement with respect thereto, said bolt having a hook portion on its outer extremity for engagement with a strike plate and being extensible by rotation of said carrier through said opening into a second position in which the hook engages said strike plate to lock said door; and a dog on said carrier engageable with said bolt to prevent free pivotal movement of said bolt with respect to said carrier.

5. In a latch disposable in the edge of a longitudinally translatable door, said edge having a bolt receiving opening therein, the combination of: spindle means extending transversely through said edge; actuator means for rotating said spindle means; a rotatable carrier on said spindle means; an elongated bolt pivotally mounted in said carrier for free movement with respect thereto, said bolt having a hook portion on its outer extremity for engagement with a strike plate and being extensible by rotation of said carrier through said opening into a second, intermediate position in which the hook engages said strike plate to lock said door; and releasing means on said carrier directly engageable with said bolt to disengage said hook portion thereof from said strike plate, said releasing means being urged into engagement with said bolt by the rotation of said carrier to lift said bolt into its uppermost, releasing position.

6. In a latch disposable in the edge of a longitudinally translatable door, said edge having a bolt receiving opening therein, the combination of: spindle means extending transversely through said edge; actuator means for rotating said spindle means; a carrier secured to said spindle means and rotatable between erect and inverted positions thereby; an elongated bolt pivotally mounted on said carrier for free rotation with respect thereto at a point displaced from the axis of rotation thereof; upper and lower abutments in said edge of said door; and a stop on said carrier engageable with said upper abutment to prevent rotation of said carrier beyond its erect position and engageable with said lower abutment to prevent rotation of said carrier beyond its inverted position.

7. In a latch disposable in the edge of a longitudinally translatable door, said edge having a bolt receiving opening therein, the combination of: spindle means extending transversely through said edge; actuator means for rotating said spindle means; a carrier secured to said spindle means and rotatable between erect and inverted positions thereby; an elongated bolt pivotally mounted on said carrier for free rotation with respect thereto at a point displaced from the axis of rotation thereof, the pivotal mounting point of said bolt in said carrier being disposed inwardly of and above the axis of rotation of said carrier when said bolt is retracted and outwardly of said axis when said bolt is extended; and a dog on said carrier engageable with said bolt when said carrier is disposed in its erect position and said bolt in its locked, intermediate position.

8. In a lock for a longitudinally translatable door having a bolt receiving opening in its edge, the combina-

tion of: spindle means extending transversely through said edge; actuator means for energizing said spindle means; a carrier movable by said spindle means in said edge; and a bolt mounted on said carrier for bodily movement thereby between extended and retracted positions in said opening and being freely pivotally movable with respect to said carrier into engagement with a strike plate, retraction of said bolt by said carrier moving said edge toward said plate to complete the closing of said door.

9. In a lock for a longitudinally translatable door having a bolt receiving opening in its edge, the combination of: spindle means extending transversely through said edge; actuator means for energizing said spindle means; a carrier movable by said spindle means between erect and inverted positions in said edge, said carrier having a stop thereupon; a bolt mounted on said carrier for movement thereby between extended and retracted positions in said opening and being movable with respect to said carrier into engagement with a strike plate, retraction of said bolt by said carrier moving said edge toward said plate to complete the closing of said door; and upper and lower stop abutments in said edge engageable by said stop when said carrier is disposed, respectively, in its erect and inverted positions to prevent rotation of said carrier beyond said positions.

10. In a lock for a longitudinally movable door having a stile provided with transverse and bolt receiving openings, the combination of: spindle means extending through said transverse opening; actuator means for said spindle means; a carrier movable by said spindle means and having bolt dogging and releasing means thereupon; and a bolt extensible or retractible through said bolt receiving opening by said carrier and being movable relative to said carrier, said bolt being engaged by said dogging means to maintain it in locked position and by said releasing means to move it into unlocked position.

11. In a lock for a longitudinally movable door having a stile provided with transverse and bolt receiving openings, the combination of: spindle means extending through said transverse opening; actuator means for said spindle means; a carrier movable by said spindle means and having bolt dogging and carrier stop means thereupon; a bolt extensible or retractible through said bolt receiving opening by said carrier and being movable relative to said carrier, said bolt being engaged by said dogging means to maintain it in locked position; and stop abutments in said stile engageable by said stop means to limit movement of said carrier by said spindle means.

12. In a lock for a longitudinally movable door having a stile provided with transverse and bolt receiving openings, the combination of: spindle means extending through said transverse opening; actuator means for said spindle means; a carrier movable by said spindle means and having carrier stop means and bolt releasing means thereupon; a bolt extensible or retractible through said bolt receiving opening by said carrier and being movable relative to said carrier, said bolt being engaged by said releasing means to move it into unlocked position; and stop abutments in said stile engageable by said stop means to limit movement of said carrier by said spindle means.

13. In a lock for a longitudinally movable sliding door having an edge with a transverse opening and an axial bolt receiving opening therein, the combination of: a movable carrier mounted in said edge having a stop lug thereon; actuator means operatively connected to said carrier for moving the same; a bolt extensible or retractible through said axial opening pivotally mounted in said carrier for movement thereby and in respect thereto; and a vertically reciprocatable locking member engageable with said stop lug on said carrier to prevent movement thereof and thus cause said carrier to maintain said bolt in locked condition.

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