Jan. 28, 1964 A. GROSSMAN 3,119,474

LOCK CONSTRUCTION FOR NARROW STILE GLASS ENTRY DOORS

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FIG. 1.

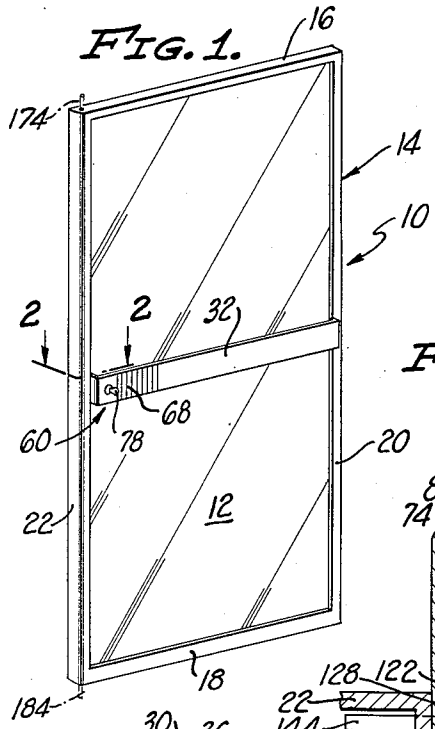


FIG. 2.

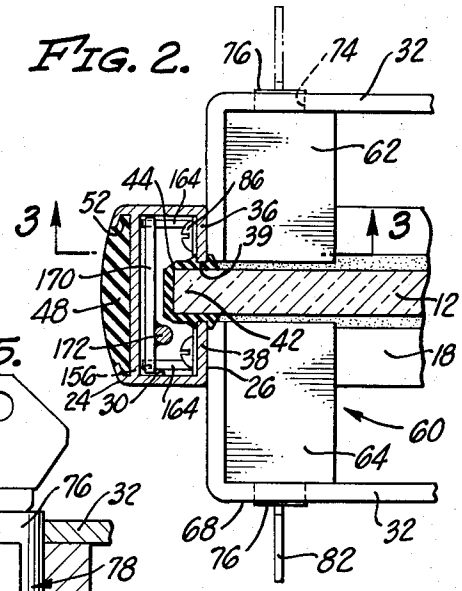


FIG. 5.

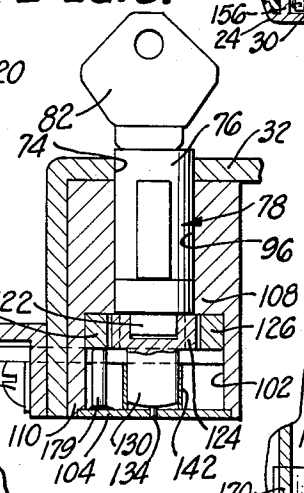


FIG. 4.

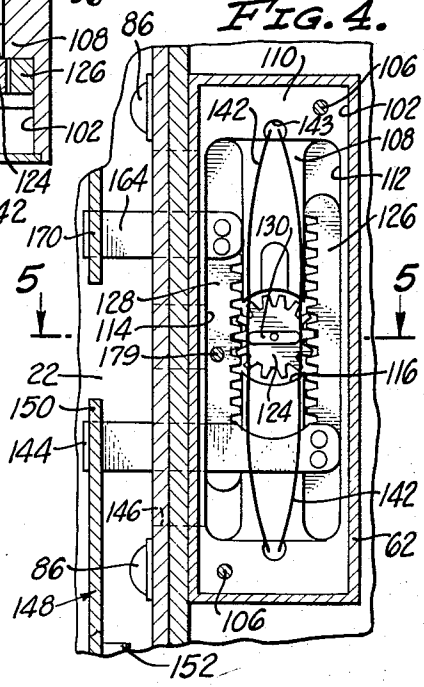
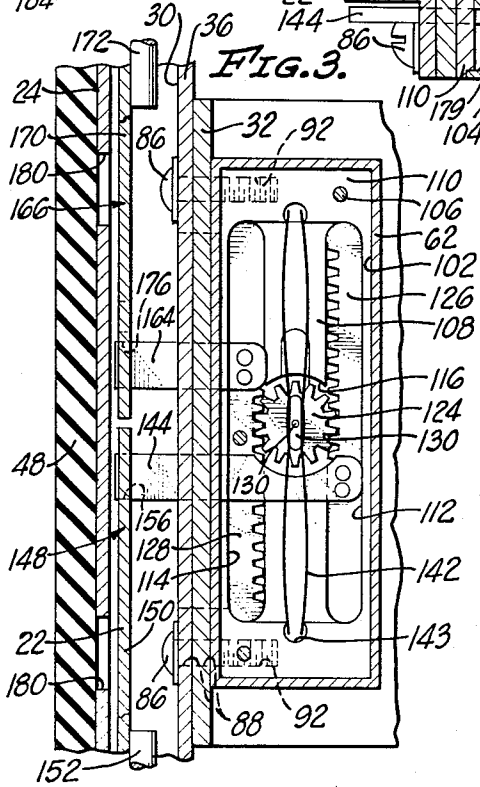


FIG. 3.



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LOCK CONSTRUCTION FOR NARROW STILE GLASS ENTRY DOORS

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This invention relates to a lock construction for a narrow stile entry door characterized by the fact that the greater portion of the door consists of a sheet or pane of glass.

The primary utilization of such entry doors is in commercial establishments and the like where the fact that individuals approaching the door can see therethrough constitutes both a convenience and a safety factor preventing possible injury because of a person's approaching the door and being struck thereby. Therefore, it is most desirable that the glass area be as large as possible and such doors are conventionally provided with a peripheral sash construction hinged at one side with top and bottom rails and extremely narrow stiles which can be fabricated from any type of material but which are usually constituted by aluminum extrusions or the like.

Because such entry doors are located in business establishments and the like, it is, of course, necessary to provide locks so that the doors may be adequately secured. Due to the fact that the stiles which would ordinarily receive the locks are so narrow, it has been customary to resort to either one of two expendients. One of the conventional expedients is the location of the lock on the bottom rail of the door which, as a natural consequence, necessitates that the person locking or unlocking the door squat or bend over in order to operate the lock. A more expensive but somewhat more convenient alternative construction involves the cutting of the edge of the glass adjacent the stile. The modification of the door glass in the above described manner is an extremely expensive expedient and is basically unsatisfactory because the glass is weakened in a critical contact area and because the resultant product is not a particularly attractive construction.

It is, therefore, an object of my invention to provide a narrow stile glass entry door which is characterized by the provision of top and bottom rails and narrow vertical stiles, one of which is hingedly secured to the frame encompassing the door and the other of which is located adjacent the jamb opposite the hinged stile and which may be referred to as the free or swinging stile, said door being characterized by the provision of a lock which is mounted intermediate the upper and lower extremities of the free stile, the lock housing being secured in overlying relationship with the pane or sheet of glass encompassed by the rails and stiles and the lock housing being secured to the inner edge of the stile.

Therefore, the lock is located in a convenient position but the modification of the pane or glass to accommodate the lock is obviated due to the securement of the lock housing on the inner edge of the stile.

Another object of my invention is the provision of a door construction of the aforementioned character wherein the lock housing of the invention is applied in overlying relationship with the opposite sides of the pane of glass so that the door may be locked or unlocked from opposite sides thereof.

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

FIG. 1 is a perspective view of an entry door constructed in accordance with the teachings of my invention;

FIG. 2 is a transverse, sectional view taken on the broken line 2—2 of FIG. 1;

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

FIG. 4 is a view corresponding to FIG. 3 but showing the component parts of the lock construction in different position; and

FIG. 5 is a transverse, sectional view taken on the broken line 5—5 of FIG. 4.

Referring to the drawing, and particularly to FIG. 1 thereof, I show a glass entry door **10** which is characterized by the utilization of a relatively large pane or sheet of glass **12**. The pane or sheet of glass is encompassed in a sash **14** which consists of top and bottom rails **16** and **18** and stiles **20** and **22**, the upper and lower extremities of the stiles being secured in operative relationship with the adjacent extremities of the rails.

The stile **20** at the right-hand edge of the door **10** is customarily secured by means of a hinge to the adjacent jamb of a door frame, not shown. The other stile **22** constitutes the free or swinging stile of the sash **14** of the door.

In order to enhance the esthetic effect of the door and to utilize to full advantage the fact that a person approaching the door can see through the pane of glass, the thickness of the free stile **22** is reduced to a minimum, that is, the dimension of the stile **22** from the outer edge **24** to the inner edge **26** thereof is kept as small as possible while maintaining the structural rigidity and strength of the sash **14**. As a result of the minimal thickness of the stile **22**, it is impossible to mount a conventional lock construction on the stile **22** and, as previously indicated, the alternative expedients of mounting the lock in the bottom rail **18** or of cutting an opening in the pane **12** of glass are resorted to with the consequent difficulties of operation and expense of installation.

It should be noted at this juncture, that, while the concept of my invention is particularly adaptable to the solution of the problem of providing a lock for narrow stile doors, the teachings thereof may be applied to entry doors having relatively wide stiles since certain of the advantageous aspects of the lock and stile construction of the invention may be incorporated in doors having relatively wide stiles.

In order to practice the teachings of my invention the free stile **22**, whether constituted by an aluminum extrusion or by some other type of structural member, must incorporate a bore **30** which extends from at least one extremity of said stile to a point intermediate the extremities of the stile **22** adjacent the grab rail **32**. In the present construction the bore **30** extends from one extremity of the stile **22** to the other extremity thereof and said bore or passage **30** in the stile **22** is a natural consequence of the extrusion process. However, it is conceivable that in other equivalent constructions the bore might extend only from one extremity to an intermediate point in the stile and be formed in another manner, such as by drilling or the like.

The stile **22**, as best shown in FIGS. 2–4 of the drawings, has its inner edge **26** divided into an inner portion **36** on one side of the pane **12** of glass and an outer portion **38** on the other side of said pane of glass by a slot **39** which receives the adjacent edge **42** of said pane of glass and the glazing strip **44** which encompasses said edge. A finish molding **48** is mounted, as best shown in FIGS. 2 and 3 of the drawings, in an elongated receptacle **52** provided on the outer edge **24** of the stile **22**.

Of course, it is not intended that the teachings of the invention be limited to any particular type of stile construction or to any particular extrusion configuration. It will be obvious to those skilled in the art that the principles of the invention may be applied to various extrusion and stile configurations without material alteration of the

component parts of the lock construction manufactured in accordance with the teachings of the invention.

In the present embodiment of the invention the lock construction is generally indicated at **60** and consists of two housings **62** and **64** mounted in a manner to be described in greater detail below, on the portions **36** and **38** of the inner edge **26**. The housings **62** and **64** underlie the grip or handle section **68** of the grab bar **32** and are thus concealed from view. Of course, a handle may be located in overlying relationship with each of the housings **62** and **64** on opposite sides of the door **10** in substitution for the grab bars **32** on the opposite sides of said door.

Each of the housings **62** and **64** is of identical construction and the component parts of the lock embodied in each of said housings are also identical. Therefore, only the component parts disposed in the inner housing **62** will be described, it being understood that the component parts of the other housing **64** are of identical configuration and construction and operate in the same manner.

The handle section **68** of each grab bar **32** is provided with a transverse bore or opening **74** in which is mounted the protruding portion of the rotary plug **76** of a cylinder lock **78** of conventional construction. The plug **76** associated with the housing **62** is adapted to receive a key **82** to permit the operation of the cylinder lock **78** in a conventional manner.

The housing **62** may, of course, be formed integrally as a casting with the handle section **68** of the grab bar **32**, but, in the present embodiment of the invention, said housing is constituted by a separate casting fabricated from aluminum which is secured, as best shown in FIGS. 2–4 of the drawings, by means of screws **86** to the associated portion **36** of the inner edge **26** of the stile **22**. It will be noted that the screws **86** also serve to secure the associated extremity of the grab bar **32** to the adjacent portion **36** of the stile inner edge **26**, the screws **86** passing through coincident openings **88** in the stile and grab bar extremity and being received in correspondingly threaded bores **92** in the housing **62**.

Therefore, the housing **62** is mounted in overlying relationship with the adjacent surface of the pane **12** of glass and is concealed behind the overlying handle section **68** of the grab bar **32**. This particularly structural relationship of the housing **62** with the inner edge **26** of the stile and the adjacent extremity of the grab bar **32** results in strength and rigidity and a convenient location not achieved by prior art constructions. Moreover, where the housing constitutes an integral part of the grab bar **32** or handle, not shown, the installation of the handle or grab bar results in simutlaneous installation of the lock housing **62**.

Moreover, the lock housing **62**, being disposed in overlying relationship with the adjacent surface of the pane **12** of glass, can receive the various operative parts of the lock mechanism which could not be received within the narrow bore **30** of the stile **22** and, in addition does not entail the modification of the pane **12** of glass in any way whatsoever.

The cylinder lock **78** is mounted in a bore **96** of the housing **62**, as best shown in FIG. 5 of the drawing, said bore communicating with a chamber **102** which has a cover plate **104** constituting a wall thereof. The cover plate **104** is secured in overlying relationship with the chamber **102** by means of screws **106** at the upper and lower extremities thereof.

A centrally located rib **108** divides the wall **110** of the chamber **102** opposite the cover plate **104** into two elongated recesses **112** and **114**, as best shown in FIGS. 3–5 of the drawings. The centrally located rib **108** has a circular recess **116** formed therein intermediate its extremities, said recess communicating with the inner extremity of the bore **96** in the housing **62**. A tongue **122** is provided on the inner extremity of the plug **76** and projects into

the circular recess **116** where it engages a corresponding opening in a pinion **124**.

The pinion **124** is, as best shown in FIGS. 3–5 of the drawing, engaged with first and second racks **126** and **128** located, respectively, in the elongated recesses **112** and **114**. The pinion **124** incorporates a lug **130** which projects into the chamber **102** and has a pin **134** provided thereupon engageable in a corresponding bearing opening in the cover plate **104**. Therefore, rotation of the pinion **124** by the tongue **122** of the plug **76** will be accompanied by corresponding rotation of the lug **130**.

A pair of leaf springs **142** has its opposite extremities mounted in recesses **143** at the upper and lower extremities of the wall **110** of the chamber **102** and the leaf springs have their intermediate portions encompassing the lug **130** on the pinion **124**, thus tending to maintain the pinion **124** and the associated racks **126** and **128** in the inoperative positions shown in FIG. 3 of the drawing.

Mounted on the rack **126** is a lower actuating arm **144** which extends, as best shown in FIGS. 3 and 4 of the drawing, through corresponding slots **146** in the left-hand wall of the housing **62**, the associated extremity of the grab bar **32** and the portion **36** of the inner edge **26** of the stile into the elongated bore **30**. Secured to the left-hand extremity of the actuating arm **144** is an actuating linkage **148** constituted by a plate **150** and a connecting rod **152** which has a lower bolt **154**, shown in phantom in FIG. 1 of the drawing, projecting from the lower extremity of the stile **22** for engagement with a corresponding strike in the door frame sill, not shown.

The left-hand extremity of the actuating arm **144** actually engages a corresponding opening **156** in the plate **150**, as best shown in FIGS. 2 and 3 of the drawing, and the plate actually spans the substantially rectangular bore or passage **30** in the stile **22** and has its opposite edges guided by the side walls of the bore **30**.

It is conceivable that in some installations only a lower bolt may be provided. In this regard, it should also be pointed out that a corresponding lower actuating arm **144** is provided in the outer housing **64** which engages an opening **156** in the plate **150**, as best shown in FIG. 2 of the drawing. Therefore, the lower linkage **148** connected to the lower bolt **154** can be operated from either the inner or outer housing **62** and **64**, respectively.

While the particular embodiment of the invention disclosed involves the utilization of two cylinder locks, it is, of course, not intended that the teachings of the invention be limited to the actuation of the bolt by a particular type of lock. Moreover, it is conceivable that instead of the lock incorporating a cylinder lock a knob or other actuating element may be connected to the pinion **124** to operate the same from the interior side of the door **10**.

An upper actuating arm **164** is mounted on the rack **128** and engages an upper linkage **166** which consists of an upper plate **170** and an upper connecting rod **172** secured to an upper bolt **174** protruding from the upper extremity of the bore **30** for engagement with a corresponding strike, not shown, on the head of the door frame. The left-hand extremity of the arm **164** engages in a corresponding opening **176** in the upper plate. A pin **179** is secured in the housing **62** and retains the rack **128** in operative relationship with the housing.

Of course, an arm corresponding to the arm **164** mounted in the housing **62** is provided in the housing **64** and engages the upper plate **170** in the same manner as the arm **164** in the housing **62**. It will be noted that the wall constituting the outer edge **24** of the stile **22** is provided with openings **180**, as best shown in FIG. 3 of the drawing, to permit access to the heads of the mounting screws **86**.

When the components of the locking mechanism are in the position shown in FIG. 3 of the drawing, the bolts **154** and **174** are retracted into the associated bore **30**. The pair of springs **142** maintains the pinion **124** in the position, shown in FIG. 3 of the drawing, wherein the

rack 126 associated with the lower actuating arm 144 is at the upper extremity of the recess 112 and the rack 128 associated with the upper arm 164 is at the bottom of the recess 114.

When the key 82 is inserted in the plug 76 of the cylinder lock 78, the plug can be rotated to cause corresponding rotation of the tongue 122 on the inner extremity thereof. The rotation of the tongue 122 is accompanied by corresponding rotation of the pinion 124 and the lug 130 thereupon.

When this occurs the rack 126 connected to the lower arm 144 is urged downwardly in the associated recess 112 to simultaneously carry the linkage 148 constituted by the plate 150 and the rod 152 downwardly in the bore 30 and thus project the bolt 154 from the lower extremity of said bore. Similarly, the rotation of the pinion 124 causes the rack 128 in the recess 114 to be urged upwardly in said recess and to carry the upper arm 164 upwardly, thus urging the upper linkage 166 and the plate 170 and rod 172 constituting the same upwardly on the bore 30 to project the upper bolt 174 from the upper extremity of said bore.

It will be noted that the rotation of the pinion in the above described manner is accompanied by simultaneous deflection of the springs 142, thus placing the lug 130 on said pinion under a spring load. In FIG. 4 of the drawing, the lug 130 is shown in a horizontal position intermediate its movement into the locked position in which it returns to a vertical orientation as shown in FIG. 3. When in locked condition, the rack 126 has its lower extremity disposed in the bottom of the recess 112 and the rack 128 has its upper extremity disposed at the top of the recess 114.

Operation of the locking mechanisms in either the outer housing 64 or inner housing 62 is accompanied by corresponding movement of the component parts of the mechanism which is not being actuated so that the pinion, racks and arms of the associated mechanism move in the same manner and to the same extent as they do in the mechanism being operated.

It is thus readily apparent that the principles of my invention render feasible the incorporation of a locking mechanism and, more particularly, the actuators therefor, in a convenient position in a narrow stile door without modification of the pane of glass incorporated in the door. Therefore, the advantages of a wide stile, in terms of lock function, are achieved while the esthetic and practical advantages of the narrow stile are preserved. Moreover, the structural integration of the stile, handle and lock housings provides an uncluttered, clean effect and a structural rigidity not achieved by prior art constructions.

I claim:

1. In a glass door construction, the combination of: a sash consisting of top and bottom rails and spaced stiles operatively connected to the opposite extremities of said top and bottom rails, one of said stiles incorporating a longitudinal bore and having an opening in the inner edge thereof intermediate its extremities, a bolt disposed in one extremity of said bore and adapted to be projected from or retracted therein to correspondingly lock or unlock said door; a single sheet of glass mounted in said sash; an actuating linkage in said bore having an extremity connected to said bolt; a housing mounted in overlying relationship with said sheet of glass and secured to said stile adjacent said opening; and a bolt actuator in said housing having a portion extending through said opening operatively connected to the other extremity of said linkage whereby operation of said bolt actuator will cause corresponding movement of said linkage and said bolt.

2. In a glass door construction, the combination of: a sash consisting of top and bottom rails and spaced stiles operatively connected to the opposite extremities of said top and bottom rails, one of said stiles incorporating a longitudinal bore and having an opening in the inner edge thereof intermediate its extremities, a bolt disposed in one extremity of said bore and adapted to be projected from or retracted therein to correspondingly lock or unlock said door; a sheet of glass mounted in said sash; an actuating linkage in said bore having an extremity connected to said bolt; a lock housing mounted in overlying relationship with said sheet of glass and secured only to the inner edge of said stile in overlying relationship with said opening; a bolt actuator in said housing having a portion extending through said opening and operatively connected to the other extremity of said linkage whereby operation of said bolt actuator will cause corresponding movement of said linkage and said bolt; and a handle operatively connected to said stile and disposed in overlying relationship with said housing.

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