Aug. 6, 1957 H. F. GEORGE 2,801,869

LATCHING MECHANISM

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Fig. 1.

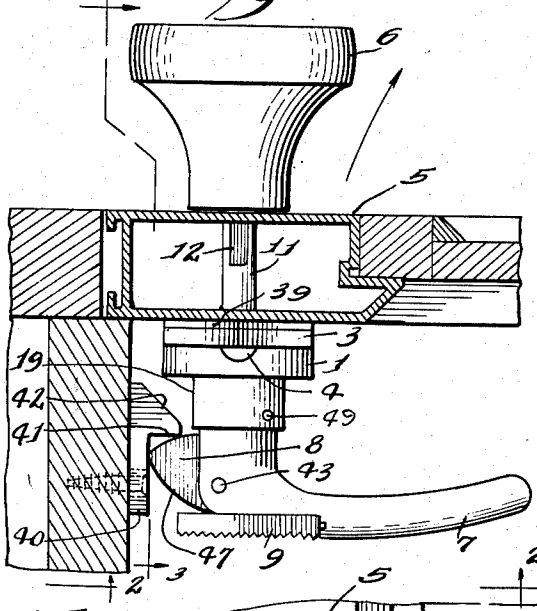


Fig. 3

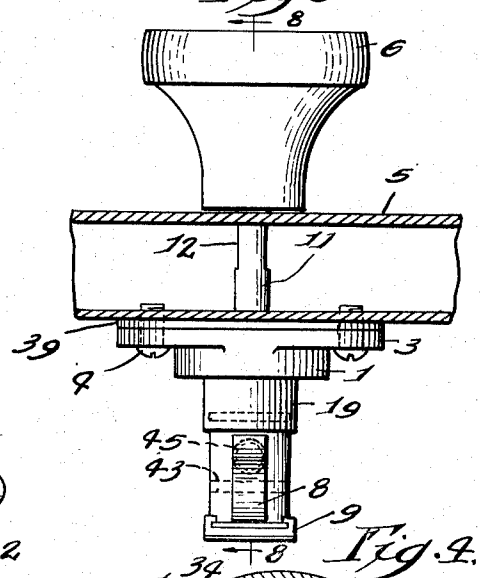


Fig. 2.

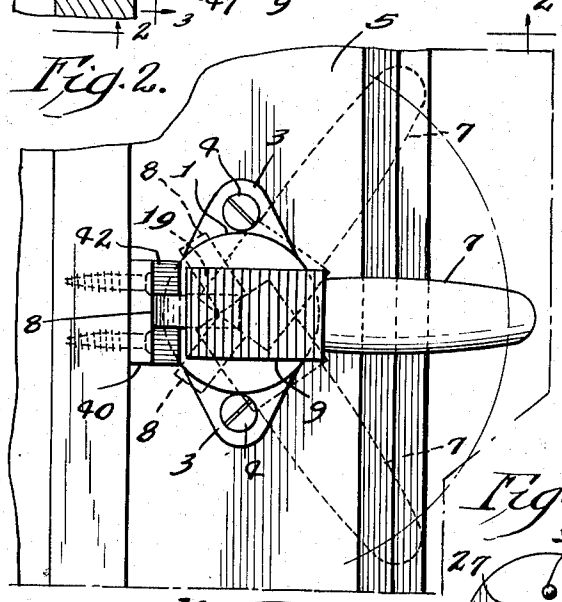


Fig. 4.

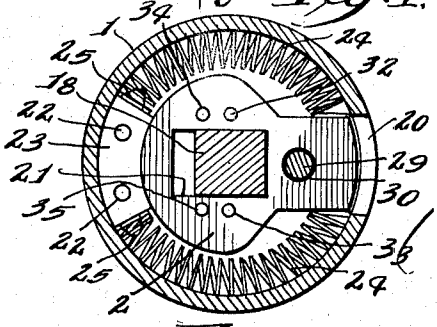


Fig. 5.

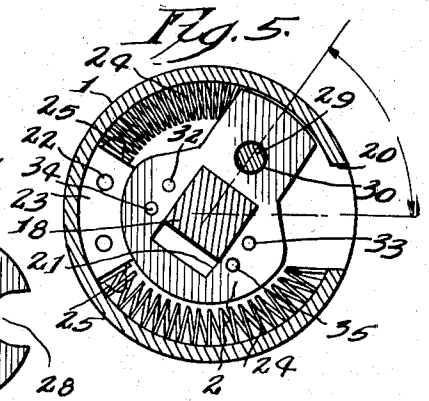


Fig. 7.

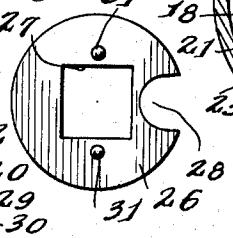
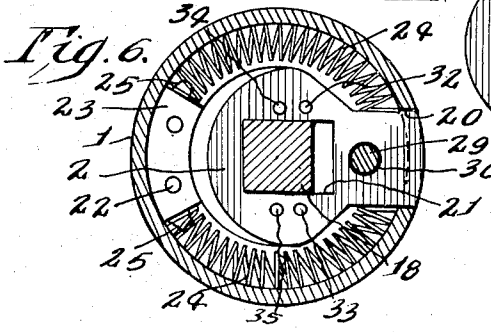


Fig. 6.



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Fig. 8.

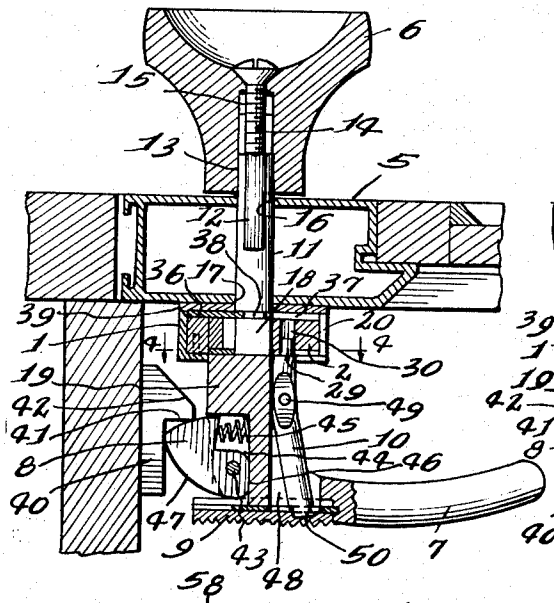


Fig. 9.

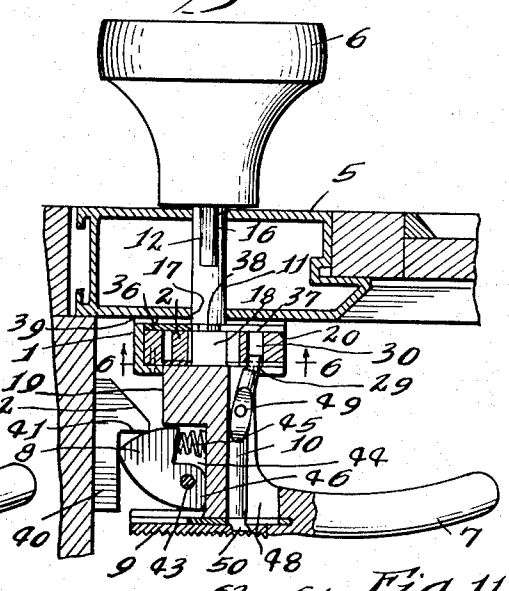


Fig. 10.

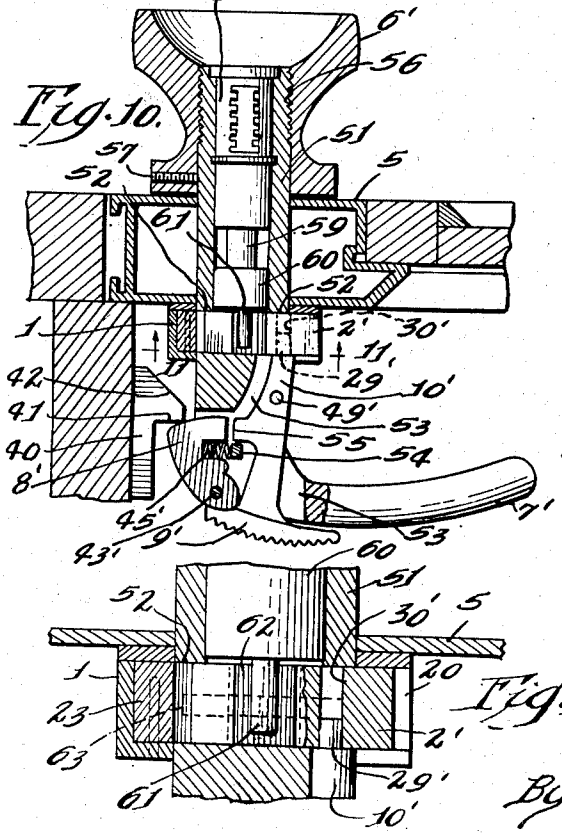


Fig. 11.

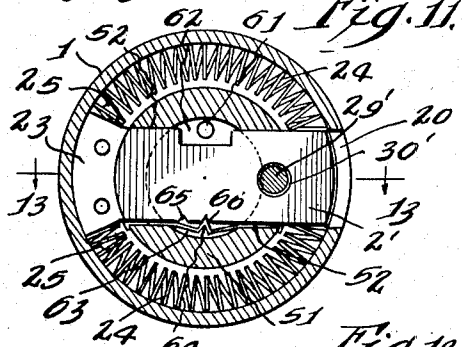


Fig. 12.

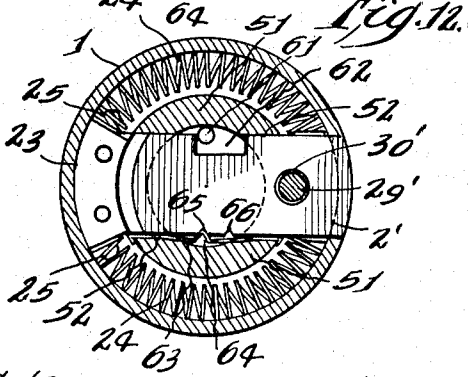


Fig. 13.

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United States Patent Office

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LATCHING MECHANISM

Harry F. George, Chicago, Ill.

Application May 5, 1955, Serial No. 506,195

4 Claims. (Cl. 292—226)

This invention relates to improved latching mechanism for doors and the like, and is adapted for use in both metal and wood doors, and in such other connections to which it may be adapted.

The present invention is an improvement over those disclosed in my copending application Serial No. 446,718, filed July 30, 1954, and Patent 2,764,014 granted to me September 25, 1956.

Among the objects of my invention are: to provide a new and improved latching mechanism; to provide a latching mechanism that is of reliable and compact construction, is positive in action, efficient in operation, and economical to manufacture; to provide a latching mechanism having a novel form of locking means; to provide a latching mechanism having means for manually locking and unlocking the door from the inside with relation to access from the outside of the door, and in which there may be omitted or applied, as desired, key-operated means for locking and unlocking the door from the outside; to provide latching mechanism having locking means operable from the inside of the door, and in which it is impossible to lock oneself out accidentally; to provide a novel construction and arrangement of lock bolt or bar and associated parts; to provide latching mechanism that may be factory assembled, turns left or right, may be applied to left and right hand doors of either metal or wood, that requires no mortising, is easy and quick to apply to the door, and is fool-proof in operation; and such further objects, advantages and capabilities, inherently possessed by my invention, as will later more fully appear.

My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while I have shown therein preferred embodiments I wish it understood that the same are susceptible of modification and change without departing from the spirit of the invention.

In the drawings,

Fig. 1 is a top plan view of a latching mechanism embodying my invention, and showing the same applied to a metal door, the door and associated parts being shown in cross section.

Fig. 2 is a side elevation looking upwardly toward the bottom of Fig. 1, from the line 2—2 of Fig. 1, and showing the inside handle in normal latching position in solid lines, and swung laterally to unlatched positions in dotted lines.

Fig. 3 is an edge elevation looking from the zig-zag line 3—3 of Fig. 1.

Fig. 4 is an enlarged section on the line 4—4 of Fig. 8, and showing the lock bar in unlocked position.

Fig. 5 is a view similar to Fig. 4, but showing the lock bar in unlocked position and swung with the shaft in a counterclockwise direction, as viewed in Fig. 2, to unlatched position.

Fig. 6 is a view similar to Fig. 4, but showing the lock bar in locked position.

Fig. 7 is an enlarged detail face view of a spring washer having detents for releasably holding the lock bar in locked and unlocked positions.

Fig. 8 is a section on the line 8—8 of Fig. 3, and showing the lock bar and associated parts in unlocked position.

Fig. 9 is a view similar to Fig. 8, but showing the lock bar and associated parts in locked position.

Fig. 10 is a longitudinal section, partly in elevation, showing my latching mechanism in latched position, and locked from the inside, and showing means for locking and unlocking the same by a key from the outside.

Fig. 11 is an enlarged, transverse section on the line 11—11 of Fig. 10, but showing the lock bar in unlocked position.

Fig. 12 is a view similar to Fig. 11, but showing the lock bar in locked position.

Fig. 13 is a fragmentary section on the line 13—13 of Fig. 11, but showing the lock bar partly in edge elevation and partly in central section.

As shown in the drawings for illustrative purposes, this invention comprises, in general, a cup-shaped housing 1 having a circular hollow interior within which is slidably mounted a lock bar 2, the housing having a pair of oppositely disposed extending ears 3, through which extend screws, bolts, or the like, 4 for securing the housing to the inner side face of the door 5, a shaft, spindle, tube, or the like, extending through the housing and door, and having secured thereto at its outer end a knob 6 or 6', and having formed on its inner end an inner handle 7 or 7' having a pivoted spring-pressed latching nose 8, a slidable and manually operable plate 9 or 9', and a lock-operating lever 10 or 10' pivoted intermediately of its ends to the shaft, spindle, tube, or the like, and movably connected at its ends to the plate 9 or 9' and the lock bar 2, whereby when the door is latched in closed position the door may be locked and unlocked from the inside, with relation to the outer knob 6 or 6', by sliding plate 9 or 9', and when desired a tumbler lock may be incorporated for operation by a key from the outside, so that the door may be locked and unlocked both from the inside and the outside.

In the form shown in Figs. 1–9, the lock cylinder and outside key are omitted, and the main shaft or spindle is indicated at 11, which shaft for a distance along its outer end portion is formed longitudinally along both sides wtih flattened faces 12 to engage similar flattened faces on the opposite sides of the hole 13 axially formed in the knob 6 to rotate the shaft when the knob is rotated. Extending axially a distance into the outer end of the shaft 11 is a hole 14 threaded to receive the threaded screw 15 which at its outer end is formed with a conical head rotatably fitting in a countersunk seat in the knob 6, to enable proper adjustment of the knob, shaft and door. Shaft 11 extends through registering openings 16 and 17 in the opposite side walls of the marginal metal tubing of the door, or through a suitable opening in a wood door if the door may be made of wood.

Beyond the inner face of the door, the shaft 11 passes centrally through the hollow interior of the housing 1, that portion of the shaft within said hollow interior being square in cross section as shown at 18 in Figs. 4–6. Where it emerges from the housing 1, the shaft 11 is increased in diameter to form the neck 19, from which it extends inwardly and laterally to form the inner handle 7. It is thus seen that the shaft 11 is integral, or fixed as one piece, from the inner handle 7 to the end that extends into and is fixed to the knob 6, whereby the inner handle 7, the shaft 11, and the knob 6 will be rotatable together as a unit.

The housing 1, in one of its side walls, as shown in

Figs. 4–6, 8 and 9, is formed with an opening **20**, of a size slightly larger than the adjacent end of the lock bar **2**, so that said adjacent end may slide into and out of said opening upon movement of the lock bar for locking and unlocking purposes, as later more fully explained. The lock bar **2** is formed with a rectangular opening **21**, longer in one direction than the other, to permit the lock bar **2** to have sliding movement transversely of the square portion **18** of the shaft **11**, so that the lock bar may move into and out of the opening **20** in the housing side wall, and also rotate with shaft **11** when the lock bar is out of engagement with opening **20**, see Figs. 4–6. Fixed by pins, or the like, **22** to the interior of the housing **1**, on the side opposite from opening **20**, is an arcuate lug **23** of a thickness to form a stop for the rear end of the lock bar **2** when the forward end of the lock bar has been moved inwardly to clear the side edges of opening **20**. The lock bar at this time may rotate with shaft **11** upon rotation of either handle **7** or knob **6**.

Positioned in each of the curved spaces between the side wall of the housing **1** and the lock bar **2**, is a coil spring **24**, seated at its near end over a projection **25** fixed to the lug **23**, and at its front end seated against the side edge of the forward end portion of the lock bar **2**. Rotation of the lock bar with the shaft in one direction or the other, will compress the coil spring **24** on that side, see Fig. 5, and when the turning force applied to either handle **7**, or knob **6**, is released, the compressed spring **24** will exert its stored energy to return the front end of the lock bar into registry with opening **20**, as seen in Fig. 4. Positioned over the lock bar **2**, on the turning handle **7** side thereof, is a slightly bent spring washer **26**, having a square opening **27** through which extends the square portion **18** of shaft **11**, so that the washer **26** turns with the shaft but does not move laterally thereof. Formed in the edge of washer **26** toward opening **20**, is a recess **28** to receive the inner reduced end **29** of lever **10** which is seated in a hole **30** formed in the front end portion of lock bar **2**. Formed in the spring washer **26**, one on each side of opening **27**, preferably on the center line of the washer extending at right angles to the direction of movement of the lock bar **2**, is a pair of indentations formed by a prick punch or the like to cause the opposite face of the washer to protrude in the form of a pair of small projections **31**, which seat in a pair of indentations **32** and **33** formed in the adjacent face of lock bar **2** to releasably hold the lock bar in unlocked position, and which projections **31** seat in a pair of indentations **34** and **35** also formed in the adjacent face of the lock bar to releasably hold the lock bar in locked position. As will be understood, these projections and indentations serve as detents for the purposes stated.

After the parts have been assembled in the hollow interior of the housing **1**, as described above, they are held in place therein by a circular plate **36** having a radial slot **37** of a width less than the diameter of the cylindrical portion of shaft **11**, the edges of the plate at the two sides of the slot being pushed into place in a circumferential groove **38** formed in the shaft **11**, see Figs. 8 and 9, to hold the housing and its contained parts together as a unit. This enables the housing and its interior parts to be assembled at the factory. A cover plate **39**, of the same contour as the inner face of he housing **1** and ears **3**, and having a central hole to receive shaft **11**, is applied over the circular plate **36**, and secured between the the housing and the door by screws **4**, as will be understood in Figs. 1–3.

Secured in appropriate position to the door frame, or other suitable support, is a striker plate **40** having a shoulder **41** and a beveled front edge **42**. The latching nose **8** is pivoted at **43**, in a recess **44** in the enlargement **19** of the shaft **11**, there being a compression spring **45** mounted between a cut-away inner face of the latching nose **8** and the bottom of recess **44**, to normally hold the latching nose in its out-ward position but permit it to be

pushed inwardly of the recess as it rides over the beveled edge **42** of the striker plate when the door is shut without first turning the handle **7** or knob **6**. As soon as the nose **8** passes over the beveled edge **42** and clears the shoulder **41**, spring **45** forces the nose outwardly and into position behind said shoulder. The nose **8**, when in the position shown in Figs. 8 and 9, is prevented from swinging further to the rear by the stop **46**. The rear edge of nose **8** is curved at **47** to facilitate its sliding over the beveled edge **42** of the striker plate during closing of the door, and at its front edge is formed with a lesser curve to facilitate its being forced back of shoulder **41** by spring **45**. To release the latching nose **8** from behind the shoulder **41**, the inner handle **7** or the outer knob **6** may be turned either clockwise or counterclockwise, to swing the handle **7** into one or the other of the dotted line positions shown in Fig. 2, which will swing the nose **8** laterally away from the shoulder **41**, and permit opening of the door. The latching and unlatching of the door will be understood from the above.

To enable locking of the door so that it cannot be unlocked from the outside, but can be unlocked only from the inside, there is formed in the enlargement **19** of the shaft **11**, on the side opposite from the nose **8**, a longitudinal recess **48** extending from the housing **1** to and through the inner handle **7**. In this recess the lever **10** is pivoted at **49**, the reduced end **29** of this lever being seated in the slightly larger hole **30** in the lock bar **2**. The other end of lever **10** is pivotally connected at **50** to the locking plate **9** which is slidably mounted on the inner handle **7** for movement therealong. The end of locking plate **9** opposite from the free end of handle **7** is extended a sufficient distance that if the plate **9** be inadvertently moved to locking position when the operator is on the outside and the door open, the slamming or pushing of the door shut will cause the extended end of plate **9** to cam over the beveled edge **42** of the striker plate **40** and move the locking plate **9** to the right as viewed in Figs. 8 and 9, and through movement of the lever **10** cause the lock bar **2** to slide inwardly into unlocked position, thus preventing the operator from inadvertently locking himself out.

From the above it will be clear that, with the locking plate **9** in the position shown in Fig. 8, and the door open, the door may be readily latched merely by pushing the door to closed position, and it may be unlatched from either the inside or the outside by turning the handle **7** or the knob **6** as the case may be. It is also seen that when the door is closed, and the handle **7** and knob **6** released, the sliding of the locking plate **9** to the left to the position shown in Fig. 9, will, through movement of the lever **10**, slide the lock bar **2** into the opening **20** into locked position, it being understood that the face of the housing has a short slot sufficient to permit movement of the end of the lever in both directions of its movement. It is now impossible to unlatch or unlock the door from the outside, the unlocking of the door being possible only from the inside by sliding of the locking plate **9** to its unlocking position. The locking plate **9** on its exposed face is preferably roughened to facilitate its operation by the operator's finger.

In the form shown in Figs. 10–13, a lock cylinder has been added so that the door may additionally be locked and unlocked by a key from the outside. The lock bar **2'** in Figs. 10–13 is slightly different from the lock bar **2** in Figs. 1–9, in order to enable operation by the lock cylinder with a key from the outside, but its manual operation from the inside by the locking plate **9'** is accomplished in the same manner as in Figs. 1–9.

In the form of Figs. 10–13, the shaft or spindle **11** of Figs. 1–9, from where its square portion **18** joins the enlarged neck **19**, to its end within the knob **6**, has substituted for it a tubular shaft **51** which has formed therethrough a transverse slot or opening **52** to receive the lock bar **2'** for sliding movement therein, into and out of

the opening 20 of the housing 1. The housing 1, opening 20, lug 23, and springs 24, are the same in both forms. The tubular shaft 51 passes axially through the housing, the slot or opening 52 therein being located within the housing as seen in Figs. 10–13 to receive the lock bar 2' which operates within the housing. The tubular shaft 51 on the inner side of the lock bar 2', immediately therebelow as viewed in Fig. 10, is solid, to and including the inner handle 7', except for a longitudinally extending slot 53 within which lever 10' is pivotally mounted on pin 49', this lever, at its lock bar end, being formed with a reduced portion 29' seated loosely in hole 30' formed in the lock bar 2'.

At its opposite end lever 10' has fixed thereto a roughened and extended finger piece 9' which under a push or pull by the operator's finger will swing the lever 10' in one direction or the other to appropriately slide the lock bar 2' into or out of locking position. Also pivotally mounted in the slot 53, upon a pin 43', is a latching nose 8' which is normally urged outwardly by a compressed spring 45' seated in a recess in the nose 8' and having abutment at its rear end against a lug 54 extending into the slot 53. Formed on the lever 10', on the opposite side of its fulcrum pin 49' from the lock bar 2', is a projection 55, directly opposite and closely adjacent the upper inner edge portion of the latching nose 8' when the lock bar 2' is in the locking opening 20, as seen in Fig. 10. This construction prevents the operator from accidentally locking himself outside should the finger piece 9' be inadvertently moved to locking position when the door is open. Should the latter happen, and the door be slammed or pushed shut, the latching nose 8' will ride over the beveled edge 42 of the striker plate which will push the rear inner edge of the nose farther into the slot 53 and strike the projection 55, which will swing the lever 10' counterclockwise, as viewed in Fig. 10, and move the lock bar 2' into unlocked position and permit rotation of the tubular shaft 51 by either the outer knob 6' or the inner handle 7'. As soon as the latching nose 8' passes inwardly behind the shoulder 41 the compression spring 45' will force the nose behind said shoulder into latched position.

The outer end of tubular shaft 51 is threaded at 56 to threadably receive the knob 6', which is further secured on the shaft by a set screw or the like 57. Mounted in the inner bore of tubular shaft 51 is a lock cylinder 58, of the conventional tumbler type, having in its outer end the usual key slot. Rotation of the key in the slot will rotate the lock stem 59 which has fixed on its inner end a cylindrical head 60 formed on its inner face with an eccentrically located, longitudinally extending, crank pin 61. The lock bar 2', on one of its side edges, is formed with a recess 62 into which the crank pin 61 extends, so that, as the lock stem is rotated in the tubular shaft, the crank pin 61 will, by striking one end or the other of the recess 62, move the lock bar 2' into or out of the opening 20 in the housing for locking or unlocking purposes, depending on the direction of movement. The length of the recess 62 is sufficient to permit the lock bar 2' to be moved into and out of engagement with the housing opening 20, independently of the crank pin 61, by movement of the lever 10' and finger piece 9'. When the lock bar is in unlocked position, and the key removed from its slot, the crank pin 61 and the recess 62 will stand in the relative positions shown in Fig. 11. Fig. 12 shows the relative position of these parts when the lock bar 2' is in locking position, and the key removed from its slot.

To releasably hold the lock bar 2' in locked and unlocked positions, a leaf spring member 63 is secured at its ends to the tubular shaft 51, in the slot 52, along the edge of the lock bar opposite to the edge having the recess 62. This leaf spring member is formed with a small projection 64 intermediate of its length, which projection automatically snaps into notch 65 in the lock bar 2' when

the lock bar is in locked position, and into notch 66 in the lock bar when the lock bar is in unlocked position. This construction forms a detent means to releasably hold the locked bar in the position to which it has been moved, and yet permit it to be moved out of such position by the finger piece 9' on the inside of the door, or by the key on the outside of the door.

It is thus seen that I have provided a latching mechanism which, by manipulation on the inside of the door can be locked against opening of the door from the outside; and which may be so set from the inside as to be locked against opening of the door from the outside except by an outside key, which key may selectively lock and unlock the door from the outside regardless of the setting of the inside locking means, and with which latching mechanism it is impossible for the operator to inadvertently lock himself out by setting the inside means to locking position when the door is open.

Having described my invention, I claim:

1. Latching mechanism, comprising, a shaft, a lock bar connected with the shaft for rotation therewith and for transverse sliding movement with relation thereto, a stationary member having an opening into and out of which the lock bar is movable for locking and unlocking purposes, a lever fulcrumed to said shaft to extend longitudinally thereof, said lever at one end being connected to move the lock bar upon swinging movement of the lever and having at its other end a finger member for manually swinging the lever, a laterally extending projection on the lever between the lever fulcrum and the finger member, and a latching nose pivotally mounted on the shaft for swinging laterally with relation to said shaft, a portion of said latching nose removed from its pivot being directly opposite said projection so that when said nose is swung inwardly of the shaft it will contact said projection when the lock bar is in locking position and swing the lever to move the lock bar into unlocked position.

2. Latching mechanism, comprising, a shaft adapted to extend through a door, a turning member secured to one end of said shaft, a latching nose pivotally mounted on said shaft for swinging movement laterally thereof, a stationary housing through which said shaft extends, said housing being adapted to be secured to the inner face of a door, a lock bar in said housing, said lock bar being connected with said shaft for rotation therewith and for radial sliding movement with relation thereto, said housing having an opening in a side wall thereof into and out of which said lock bar is movable, a lever fulcrumed to said shaft at a point between said housing and the inner face of said turning member, one end of said lever being connected to the lock bar to slide it into and out of said opening upon swinging movement of the lever, a finger member on the other end of said lever for swinging the lever, said finger member being positioned adjacent the inner face of the turning member for movement laterally of the shaft, a stationary striker plate over which said latching nose slides to cause it to swing inwardly, and a projection on said lever between said fulcrum and said finger member, said projection being in a position to be contacted and moved by the latching nose as it swings inwardly for swinging the lever to move the lock bar out of said opening and prevent the operator from being accidentally locked out when the door swings shut.

3. Latching mechanism, comprising, a shaft adapted to extend through a door, said shaft having an outer turning member and an inner turning member, a stationary member adapted to be secured to the inner face of a door and having an opening adjacent said shaft, a lock bar connected with said shaft for rotation therewith and for radial sliding movement with relation thereto, said lock bar being slidable into and out of said opening, a latching nose pivotally mounted on said shaft for lateral swinging movement with relation thereto, a

lever fulcrumed to said shaft at a point between said lock bar and said inner turning member, said lever on one side of said fulcrum being connected to the lock bar for movement of the lock bar into and out of said opening upon swinging of the lever, a finger member on the lever on the opposite side of said fulcrum for swinging the lever, and a lateral projection on the lever between said fulcrum and finger member adjacent said latching nose, so that upon inward swinging movement of the nose it will contact said projection and swing the lever to move the lock bar out of said opening.

4. Latching mechanism for a door and the like, comprising, a shaft adapted to extend through a door, said shaft having an outer and an inner turning member secured thereto, a stationary housing through which said shaft extends, said housing being adapted to be secured to the inner face of a door and having an opening in a side wall closely adjacent said shaft, a lock bar rotatable with said shaft and radially slidable with relation thereto, said lock bar being slidable into and out of said opening for locking and unlocking purposes, said shaft having a longitudinally extending slot, a lever extending longitudinally of the shaft in said slot from the lock bar to the inner face of the inner turning member, said lever being fulcrumed to the shaft and having one end articulated with the lock bar for moving the lock bar into and out of the housing opening, said slot adjacent the inner turning member having a lateral extension opening through the opposite face of the shaft, a latching nose pivotally mounted on said shaft in said lateral extension of said slot for swinging movement therein, and a lateral projection on the lever between its fulcrum and the end of the lever away from the lock bar, said projection being in lateral alinement with a portion of the latching nose and closely adjacent thereto, so that upon inward swinging movement of the nose it will contact the projection when the lock bar is in locking position and swing the lever to move the lock bar into unlocked position to prevent the operator from being accidentally locked out when the door swings shut.

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