April 7, 1959 G. E. SWANSON 2,880,603

LATCHING AND LOCKING MECHANISM

Filed Oct. 20, 1954

FIG. 1

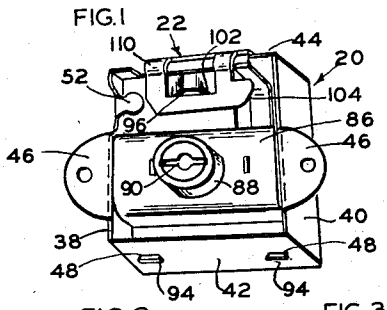


FIG. 12

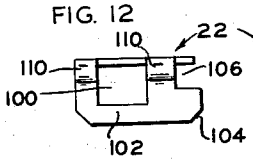


FIG. 13

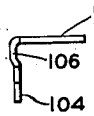


FIG. 2

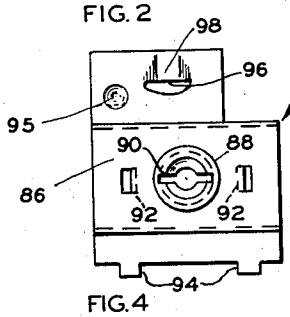


FIG. 3

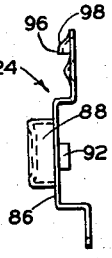


FIG. 14

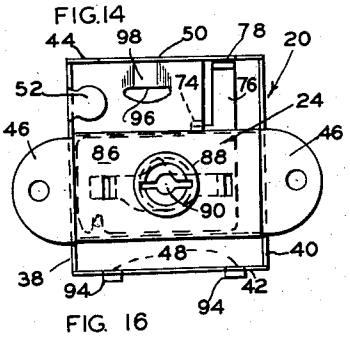


FIG. 15

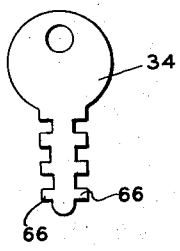


FIG. 4

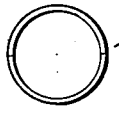


FIG. 5

FIG. 16

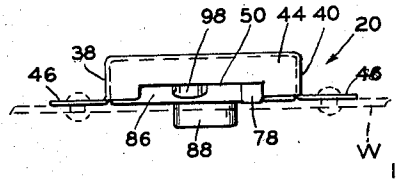


FIG. 6

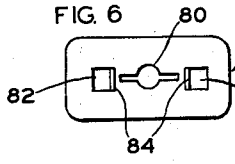


FIG. 7

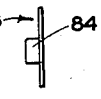


FIG. 17

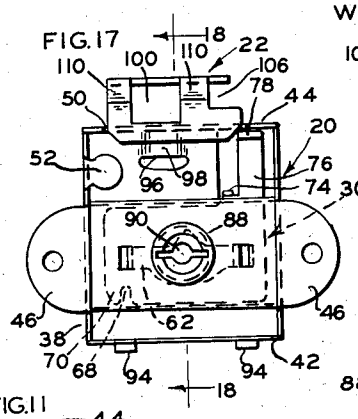


FIG. 18

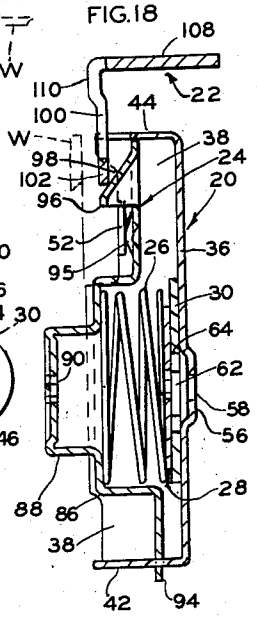


FIG. 8

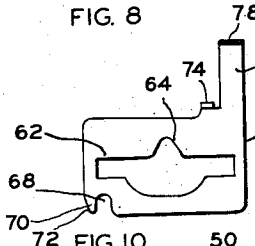


FIG. 9

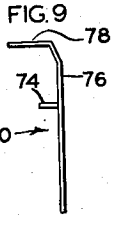


FIG. 10

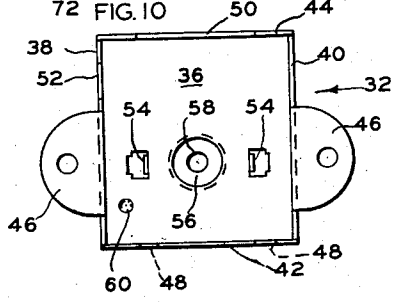
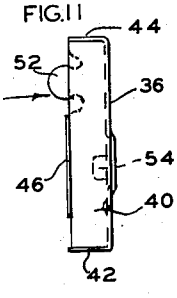


FIG. 11



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ATTORNEY

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2,880,603

LATCHING AND LOCKING MECHANISM

Gunnar E. Swanson, Middletown, Conn.

Application October 20, 1954, Serial No. 463,575

5 Claims. (Cl. 70—70)

This invention relates to latching and locking mechanism and, more particularly, to latching and locking mechanism which can be used to particular advantage, but without limitation, as the lock for a box, for a showcase, or for luggage or the like.

It is the general object of the invention to provide a mechanism of the aforementioned type which is simple to fabricate and assemble and which can be economically manufactured in quantity production but which is nonetheless sturdy in construction and simple and foolproof in operation.

In keeping with simplicity and manufacturing economy, it is a specific object of the invention to provide a locking and latching mechanism comprising elements which may be produced as sheet metal stampings and assembled as a compact unit without using fastening means such as screws or the like.

Other objects and advantages of the invention will become apparent by reference to the following description taken in connection with the accompanying drawing wherein I have shown in detail a preferred embodiment of the invention. It should be understood, however, that various changes can be made from the construction shown and, therefore, the drawing is not to be construed as limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawing,

Fig. 1 is a perspective view showing the lock in engaged condition, i.e. showing the latching and locking unit engaged and locked to the strike;

Fig. 2 is a front view of the latching bolt or latching bolt plate;

Fig. 3 is a side view of the latching bolt plate;

Fig. 4 is a front or end view of the spring which is employed in the latching and locking unit;

Fig. 5 is a side view of the spring;

Fig. 6 is a front view of the ward;

Fig. 7 is a side view of the ward;

Fig. 8 is a front view of the combined tumbler and locking bolt;

Fig. 9 is a side view of the tumbler-locking bolt;

Fig. 10 is a front view of the housing or case for the latching and locking unit;

Fig. 11 is a side view of the case;

Fig. 12 is a front view of the strike;

Fig. 13 is a side view of the strike;

Fig. 14 is a front view of the assembled latching and locking unit;

Fig. 15 is a view of the key;

Fig. 16 is a top view of the latching and locking unit;

Fig. 17 is similar to Fig. 14 but shows the strike engaging the latching and locking unit; and

Fig. 18 is a vertical cross-sectional view taken as indicated by the line 18—18 of Fig. 17.

In Fig. 1, and in various other views of the drawing, the latching and locking mechanism is indicated generally by the reference numeral 20. The unit 20 has been shown as positioned for engagement by a strike 22 when the said strike is moved downwardly. In the following description, the terms "top," "bottom," and "side" are used for convenient reference to the drawing and are not meant as terms of limitation, it being understood that the latching and locking unit 20 and the strike 22 can be positioned otherwise than shown.

The latching and locking unit 20 comprises, in front to rear order, a latching bolt or latching bolt plate 24, a helical spring 26, a ward 28, a combined tumbler and locking bolt plate 30 and a housing or case 32. A key 34 is provided for locking and unlocking the unit 20.

Referring now to the elements of the latching and locking unit 20 and with initial reference to the case 32, it will be seen that the same comprises a rear wall 36, forwardly projecting side walls 38 and 40 and forwardly projecting bottom and top walls 42 and 44. In keeping with simple and economical manufacturing practice, all of the aforedescribed walls are formed integrally as a sheet metal stamping, and in the stamping, a pair of ears 46, 46 are formed on the side walls 38 and 40. The ears 46, 46 are bent to extend laterally outwardly from the forward edges of said side walls and are provided with suitable screw or rivet-receiving openings for the purpose of mounting the latching and locking unit 20 on the inner face of a wall W of a box or the like in the manner shown generally in Fig. 16.

The bottom wall 42 is provided with a pair of spaced apart openings 48, 48 adjacent the rear wall which, as will be more fully explained, receive a pair of ears on the latching bolt plate 24 so that the said latching plate can be pivoted. The top wall 44 has a recess or notch 50 extending along its forward edge and which forms a rectangular opening with the box wall W as shown in Fig. 16 through which opening a portion of the strike 22 projects when the latching and locking unit 20 and the said strike are engaged. An ear 52 is defined on the side wall 38 and projects forwardly therefrom. As will be more fully described hereinafter, the ear 52 is bent laterally inwardly of the case 32 to engage the latching bolt plate 24 so as to secure the same and the other elements of the unit 20 in assembled relationship.

The rear wall 36 of the case 32 has two spaced apart aligned appendages or ears 54, 54 which are struck from the said rear wall to project forwardly thereof and to provide guide means for restilinear movement of the combined tumbler and locking bolt 30, as will be described. A rearwardly projecting recess 56 is defined in the rear wall 36 between the guide ears 54, 54 and a central opening 58 is provided in the recess. The opening 58 is adapted to receive and journal the free end of the key 34 as it is turned to move the tumbler-locking bolt 30. A forwardly projecting detent 60 is provided on the rear wall 36 for selective engagement by the tumbler in its "locked" and "unlocked" positions.

The said combined tumbler and locking bolt 30 comprises a generally rectangular sheet metal stamping having a longitudinal slot 62 which receives the ears 54, 54 so that the tumbler-locking bolt 30 can be guided in rectilinear movement along the back wall 36 of the case 32. Such rectilinear movement is from side to side with respect to the said case. The tumbler-locking bolt 30 is adapted to be moved in the aforementioned manner by the key 34, the said tumbler-locking bolt having a cam notch 64 along the top edge of the slot 62 which notch will receive either of the end bits 66, 66 on the said key when the key is inserted in the case 32 so that its free end is journalled in the opening 58. As viewed in the various figures of the drawing, clockwise rotation of the key 34 will shift the tumbler-locking bolt toward the

right to an unlocked position while counterclockwise turning of the key will shift the tumbler toward the left to a locked position.

As previously mentioned, the detent 60 on the rear wall 36 of the case is provided to engage the tumbler 30 in locked and unlocked positions. To this end, a notch 68 is defined in the bottom edge of the member 30 adjacent the left-hand end thereof. The notch 68 will embrace the detent 60 in the left-hand or locked position of the tumbler-locking bolt 30. In shifting toward the right to the unlocked position, that portion 70 of the tumbler 30 adjacent and to the left of the notch 68 will pass over the detent 60 to the right-hand side thereof with a snap action. A cam surface or edge 72, forming a part of the left-hand edge of the tumbler 30, is provided on the portion 70 to facilitate movement of the tumbler from unlocked to locked position with a snap action.

The tumbler-locking bolt 30 has a forwardly projecting stop ear 74 on its top edge adjacent the right-hand end thereof. The stop 74 is located on the tumbler 30 so that, in the locked or left-hand position thereof, the said stop will be engageable by the rear face of the latching bolt plate 24 so that the said latching bolt plate cannot be pivoted rearwardly in the case 32 to disengage the strike 22 as will be more fully explained hereinafter. When the tumbler 30 is in the unlocked or right-hand position, the stop 74 cannot be engaged by the latching bolt plate 24. Additional locking means is provided on the tumbler 30 in the form of a bolt arm 76 projecting upwardly from the top edge of the said tumbler and at the right-hand end thereof. At its upper end, the bolt arm 76 is bent forwardly as at 78, which forwardly projecting portion will engage the strike 22, as will be described, to provide a positive locking connection therewith in the locked position of the tumbler.

The ward 28 comprises a generally rectangular sheet metal stamping provided with a conventional keyhole slot 80 adapted to receive a double bit key such as the key 34. The ward 28 is positioned on hte tumbler 30 with its keyhole slot 80 in registry with the key-receiving aperture 58 in the case 32 by means of a pair of longitudinally spaced openings 82, 82 which receive the ears 54, 54 projecting forwardly from the rear wall 36 of the case and which extend through the slot 62 in the tumbler 30. The openings 82, 82 are located on the ward 28 so that the ears 54, 54 will be received in the longitudinally outer edges of the said openings, thereby assuring that the ward will not shift to the left and to the right with the tumbler 30. The said openings 82, 82 are defined by striking ears 84, 84 to project forwardly of the ward.

The helical spring 26 is seated on the ward 28 to extend forwardly therefrom, the rearmost convolution of the said spring embracing the ears 84, 84 and being located inwardly of the housing ears 54, 54. When the spring 26 is compressed against the ward 28, the tumbler 30 will be biased toward the rear wall 36 of the case 32, increasing the frictional resistance to movement of the said tumbler along the said rear wall and thereby assuring snap action of the tumbler portion 70 in passing over the detent 60. The means compressing the spring 26 include the latching bolt plate 24 which will now be described.

Similarly to the other elements previously described, the latching bolt plate 24 is initially formed as a generally rectangular sheet metal stamping. However, the upper right-hand corner of the latching piate 24 is cut away to provide operating clearance for the bolt arm 76 on the tumbler 30, as will be more fully explained hereinafter. An intermediate portion 86 of the latching bolt plate 24 is offset forwardly and a forwardly projecting key cylinder 88 is defined centrally in the offset portion 86. The key cylinder 88 has a keyhole slot 90 adapted to receive the key 34.

The forwardly offset portion 86 on the latching bolt plate 24 provides a seat for the spring 26 and has rearwardly struck ears 92, 92 located on opposite sides of the key cylinder 88 to engage the spring 26 and prevent undesirable lateral movement thereof. It will be quite apparent that when the key 34 is inserted in the slot 90 it will extend through the helical spring 26 and through the keyhole opening 80 in the ward 28 so that either of its oppositely extending end bits 66, 66 will engage the tumbler 30 within the cam notch 64 to effect movement thereof as desired.

The latching bolt plate 24 has a pair of spaced apart downwardly extending appendages or ears 94, 94 along its bottom edge which are inserted within the apertures 48, 48 in the bottom wall 42 of the case 32 so that the said plate may be pivoted with respect to the said case. When the aforesaid pivoted or hinged connection between the latching bolt plate 24 and the case 32 has been effected, the said plate will fit entirely within the forwardly projecting walls of the case and can be pivoted inwardly thereof. The spring 26 opposes such inward pivotal movement of the latching bolt plate 24. The outward or forward extent of pivotal movement of the plate 24 is limited by the ear 52 provided on the side wall 38 of the case. That is, after the latching bolt plate 24 has been connected to the case 32, the ear 52 is bent laterally inwardly to engage a boss or detent 95 on the front face of the said plate with the plate located within the forwardly projecting walls of the case so that the said plate cannot be disengaged from the case. Since the latching bolt plate 24 retains the ward 28 and the tumbler 30 in properly assembled position by compressing the spring 26, it will be seen that all of the elements of the latching and locking unit 20 are secured in assembled relationship by the bent ear 52. Accordingly, it is unnecessary to provide screws or rivets or to resort to other fastening means.

It will be quite apparent that the spring 26 biases the latching bolt plate 24 outwardly or forwardly against the ear 52. This may be referred to as the forward or shot position of the latching bolt plate. It should also be apparent that the said latching bolt plate can be depressed or moved rearwardly against the said spring for the purpose of engaging and disengaging the strike 22. The means provided on the plate 24 for engaging the strike comprises a forwardly extending bolt projection 96 having an inclined cam face 98 adjacent the top edge of the said plate 24. The bolt projection 96 is adapted to engage within an opening 100 provided in the strike 22 when the said strike and the latching and locking unit 20 are brought together as shown in Fig. 1. In bringing the strike 22 and the unit 20 together in the manner illustrated in Figs. 17 and 18, that is, when the strike is inserted through the notch 50 on the top wall 44 of the case 32, a bar 102, defined between the opening 100 and the bottom edge of the strike 22, will engage the cam face 98 on the bolt projection 96 thereby depressing the latching bolt plate 24 so that the strike bar 102 will pass over the said projection. After the bar 102 has passed the projection 96, the said projection will engage the strike within the opening 100, being biased to the said engaged position by the spring 26.

The right-hand portion of the bottom edge of the strike bar 102 is inclined as indicated at 104 to provide a cam for engaging the forwardly bent end portion 78 of the locking bolt arm 76 on the tumbler 30. A notch 106 is provided in the right-hand edge of the strike 22 above the cam edge 104 for receiving the forwardly projecting portion 78 of the locking bolt arm 76. The specific utility of the cam edge 104 and the notch 106 will be described in the explanation of the operation.

The strike 22 may be described in further detail as comprising a sheet metal stamping which is bent into substantially L-shape. The downwardly projecting portion of the strike has the opening 100, the bar 102, the cam edge 104 and the notch 106. The rearwardly projecting

portion comprises a substantially rectangular plate 108 which is to be secured within the door or the article to be locked. In other words, the rearwardly extending portion 108 provides a mounting plate for the strike 22. It should be noted that the strike is crimped or rolled at 110 between the downwardly and rearwardly projecting portions thereof. If the lock mechanism is installed, for example, in a box as shown in Fig. 16, the crimped portion 110 engages or will be adjacent the edge of the wall W of the box to prevent deflection thereof and to assure that the strike 22 and latching and locking unit 20 will properly engage each other.

The operation of the entire lock will be more fully understood from the following explanation which encompasses a brief description of the steps of assembling the latching and locking unit 20.

The first step of the assembly is accomplished by placing the tumbler 30 in the housing 32 with the tumbler slot 62 receiving the ears 54, 54 and with the detent notch 68 adjacent the detent 60. Then, the ward 28 is placed on the tumbler 30 with the openings 82, 82 receiving the ears 54, 54 and with the keyhole slot 80 in registry with the key-receiving opening 58 in the wall 36 of the case.

Then, the spring 26 is located on the ward 28 and the latching bolt plate 24 is pivoted to the case 32. In the final step, the plate 24 is depressed while the ear 52 is bent over the said plate to hold the elements of the unit 20 in assembled relationship.

Having assembled the unit 20, the key 34 can be inserted therein to move the tumbler-locking bolt 30 into locked or into unlocked position as desired. Assuming that the tumbler is moved to its locked position as shown in Fig. 14, and assuming that the strike 22 is disengaged from the unit 20, the forwardly projecting stop 74 on the tumbler 30 will be disposed behind and engageable by the latching bolt plate 24. The said stop 74 will thus prevent or limit rearward pivoting movement of the latch bolt plate 24 so that the bolt projection 96 cannot be depressed sufficiently for the strike bar 102 to pass thereover to engage the bolt projection within the strike opening 100. Also in the locked position of the tumbler 30, the forwardly projecting portion 78 of the locking bolt arm 76 will be disposed in the opening provided by the notch 50 in the top wall 44.

It is an important feature of the present invention that the strike 22 is adapted to move the tumbler from locked to unlocked position when the strike 22 and latching and locking unit 20 are brought into engagement. More specifically, the cam edge 104 on the strike 22 is constructed and arranged to engage the forwardly projecting portion 78 of the locking bolt arm 76 on the tumbler 30 as the strike 22 is inserted through the elongated notch 50 on the top wall 44 of the case 32. By engaging the said portion 78, the cam edge 104 will thrust the tumbler 30 toward the right to its unlocked position as illustrated in Fig. 17. When the tumbler 30 is thrust to the right, the stop 74 cannot be engaged by the latch bolt plate 24 so that the said plate can be depressed. As the tumbler is thrust to unlocked position, the strike bar 102 engages the cam face 98 on the bolt projection 96 to depress the latching bolt plate 24 thereby permitting the said strike bar to pass over the bolt projection. When the bolt projection engages the strike within the opening 100, the said projection will hold the latching and locking unit 20 and the strike 22 together, despite the fact that the tumbler 30 is in unlocked position. The unit 20 and strike 22 can be disengaged and separated merely by depressing the latching bolt plate 24. The key cylinder 88 provides a convenient button release projecting through the box wall W for manually depressing the latching plate 24.

Obviously, the unit 20 and the strike 22 can again be engaged by bringing them together with the tumbler in the unlocked position. When the tumbler is in unlocked position and the unit 20 and strike 22 are engaged, the cam edge 104 on the strike will not engage the locking bolt arm 76 and the strike bar 102 can freely cam the bolt plate 24 rearwardly.

In all events, after the bolt projection 96 engages the strike within the opening 100, the unit 20 and the strike 22 can be locked in retaining engagement. This is accomplished by turning the key 34 counterclockwise and thereby shifting the tumbler 30 toward the left to engage the forwardly projecting portion 78 of the locking bolt arm 76 within the notch 106 on the strike 22. Then, the strike cannot be withdrawn from the latching and locking unit and, additionally, the tumbler stop 74 makes it impossible to depress the latching bolt plate 24. The unit 20 and strike 22 cannot be disengaged until the key 34 has been turned clockwise to shift the tumbler 30 toward the right to its unlocked position.

The foregoing fully describes a lock constructed in accordance with my invention and wherein the lock may be easily and economically fabricated and assembled. It is an important feature of the construction that the lock is foolproof and substantially damage-proof in operation. That is, the latching and locking unit and the strike can be brought into retaining engagement with each other whether the combined tumbler and locking bolt is in unlocked position or in locked position prior to engaging the strike. Therefore, no damage can be done to the latching and locking unit or to the strike by engaging each other with the tumbler-locking bolt in locked position.

I claim as my invention:

1. A lock comprising in combination, a latching and locking unit including a housing having a rear wall provided with guide means and having a plurality of forwardly projecting walls one of which is provided with an opening spaced from the rear wall, a latching bolt plate retained within the housing but movable forwardly and rearwardly therein and having a bolt projection on its forward face adjacent the said opening, a spring biasing said latching plate forwardly, a strike adapted for movement through the said opening and having means engageable with the bolt projection in the forward position of the latching plate to releasably retain the latching and locking unit, and a key-operated tumbler plate disposed between the latching plate and said rear wall in engagement with said guide means for lateral movement in the housing transversely of the said opening between a locked position and an unlocked position, said tumbler having a forwardly projecting stop engageable with said latching plate in the locked position of the tumbler to prevent rearward movement of the said latching plate, and said tumbler also having means engageable with the strike in the locked position of the tumbler to prevent withdrawal of the strike through said opening.

2. A lock comprising in combination, a latching and locking unit including a housing having a rear wall provided with at least one forwardly projecting ear and having a plurality of forwardly projecting walls one of which is provided with an opening spaced from the rear wall, a latching bolt plate retained within the housing but movable forwardly and rearwardly therein and having a bolt projection projecting forwardly and provided with an inclined cam surface adjacent said opening, a spring biasing said latching plate forwardly, a strike adapted for movement through said opening and having an opening adapted to receive said bolt projection to releasably retain the said unit when said latching plate is in its forward position, said strike also having means engageable with the said cam surface to move the latching plate rearwardly as the strike is moved through the opening in the said one forwardly projecting wall, and a key-operated tumbler disposed between said latching plate and the rear wall of the housing and having a slot receiving said ear for guided lateral movement of the tumbler in the housing transversely of the said opening between a locked position and an unlocked position, said tumbler having a forwardly projecting stop engageable with said latching plate in the

locked position of the tumbler to prevent rearward movement of the latching plate, said tumbler also having a locking bolt arm provided with a forwardly projecting portion engageable with the strike in the locked position of the tumbler to prevent withdrawal of the strike through the opening in said one forwardly projecting wall.

3. A lock comprising in combination, a latching and locking unit including a housing having a rear wall provided with guide means and having a plurality of forwardly projecting walls one of which is provided with an opening spaced from the rear wall, a latching bolt plate retained within the housing but movable forwardly and rearwardly therein and having a bolt projection projecting forwardly adjacent said opening, a spring biasing said latching plate forwardly, a key-operated tumbler disposed between said latching plate and the rear wall of the housing in engagement with said guide means for lateral movement in the housing transversely of the said opening between a locked position and an unlocked position, said tumbler having a locking bolt arm provided with a forwardly projecting portion disposed adjacent said opening in the locked position of the tumbler, and a strike movable through said opening for retaining engagement with the bolt projection, said strike having a notch arranged to receive the forwardly projecting portion of said locking bolt arm in the locked position of the tumbler to prevent withdrawal of the strike through the said opening and also having a cam edge engageable with the forwardly projecting portion of the locking bolt arm to shift the tumbler from locked position to unlocked position when the strike is moved into the housing through said opening.

4. A lock comprising in combination, a latching and locking unit including a housing having a rear wall provided with guide means and having a plurality of forwardly projecting walls one of which is provided with an opening spaced from the rear wall, a latching bolt plate retained within the housing but movable forwardly and rearwardly therein and having a bolt projection projecting forwardly and provided with an inclined cam surface adjacent said opening, a spring biasing said latching plate forwardly, a key-operated tumbler plate disposed between said latching plate and the rear wall of the housing in engagement with said guide means for lateral movement in the housing transversely of the said opening between a locked position and an unlocked position, said tumbler having a forwardly projecting stop engageable with the latching plate in the locked position of the tumbler to prevent rearward movement of the latching plate, said tumbler also having a locking bolt arm provided with a forwardly projecting portion disposed adjacent said opening in the locked position of the tumbler, and a strike moveable through said opening and having an opening arranged to receive said bolt projection for retaining the said unit and having a notch arranged to receive said forwardly projecting portion of the locking bolt arm in the locked position of the tumbler to prevent withdrawal of the strike through the opening in the said one forwardly projecting wall, and said strike having means engageable with the cam surface to move said latching plate rearwardly as the strike is moved into the housing and also having a cam edge engageable with the forwardly projecting portion of the locking bolt arm to move the tumbler from locked to unlocked position during movement of the strike into the housing.

5. A lock comprising in combination, a latching and locking unit including a housing having a rear wall and a plurality of forwardly projecting walls one of which is provided with an opening spaced from the rear wall, a latching bolt plate retained within the housing but movable forwardly and rearwardly therein and having a bolt projection on its forward face adjacent the said opening, a spring biasing said latching bolt forwardly, a strike adapted for movement through the said opening and having means engageable with the bolt projection in the forward position of the latching plate to releasably retain the latching and locking unit, and a key-operated tumbler plate supported in said housing between the latching plate and said rear wall for lateral movement in the housing transversely of the said opening between a locked position and an unlocked position, said tumbler having a forwardly projecting stop engageable with said latching plate in the locked position of the tumbler to prevent rearward movement of the latching plate, and said tumbler also having means engageable with the strike in the locked position of the tumbler to prevent withdrawal of the strike through said opening.

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