N. J. BECKNER.

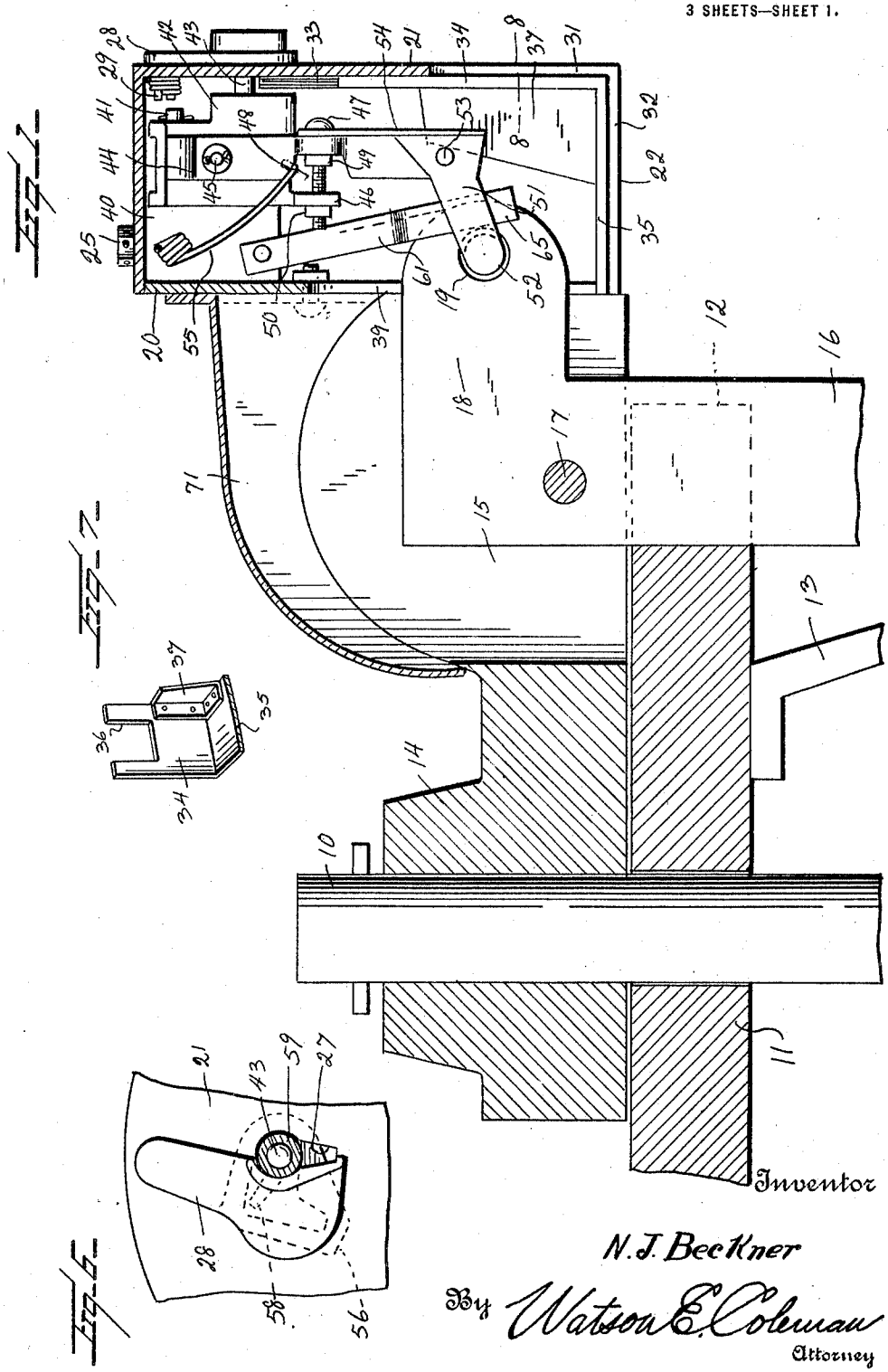
SAFETY SWITCH LOCK.

APPLICATION FILED MAY 7, 1919.

1,316,013.

Patented Sept. 16, 1919.

3 SHEETS—SHEET 1.



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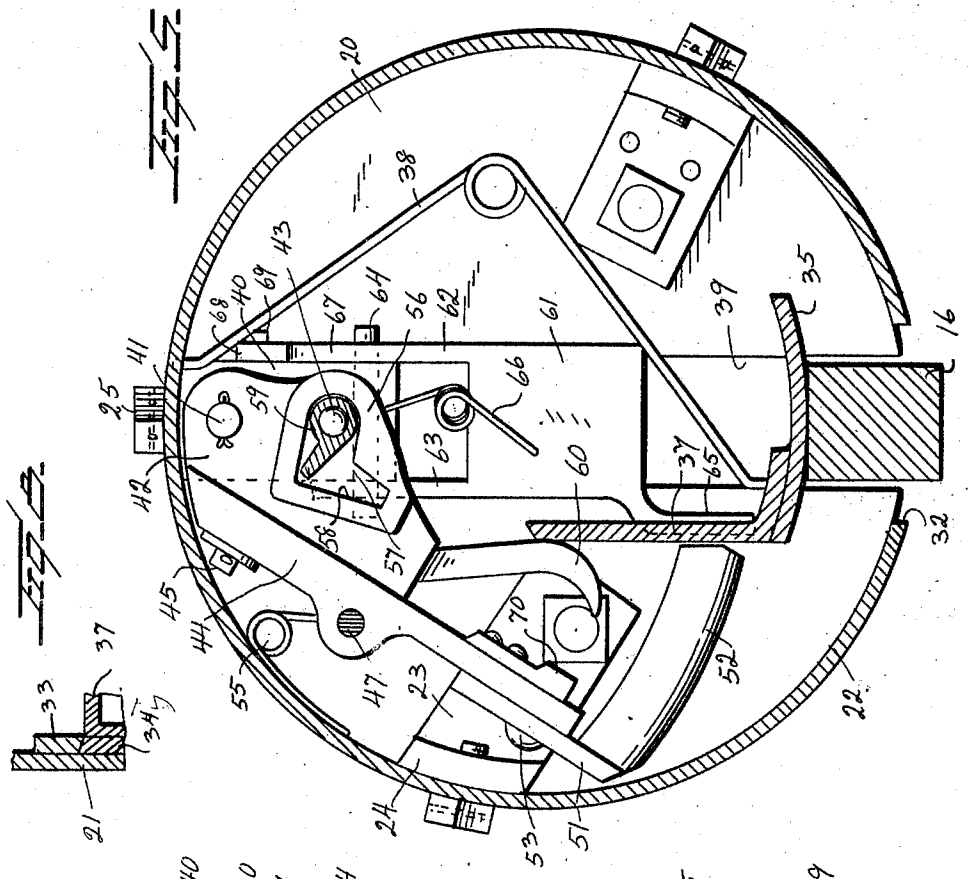

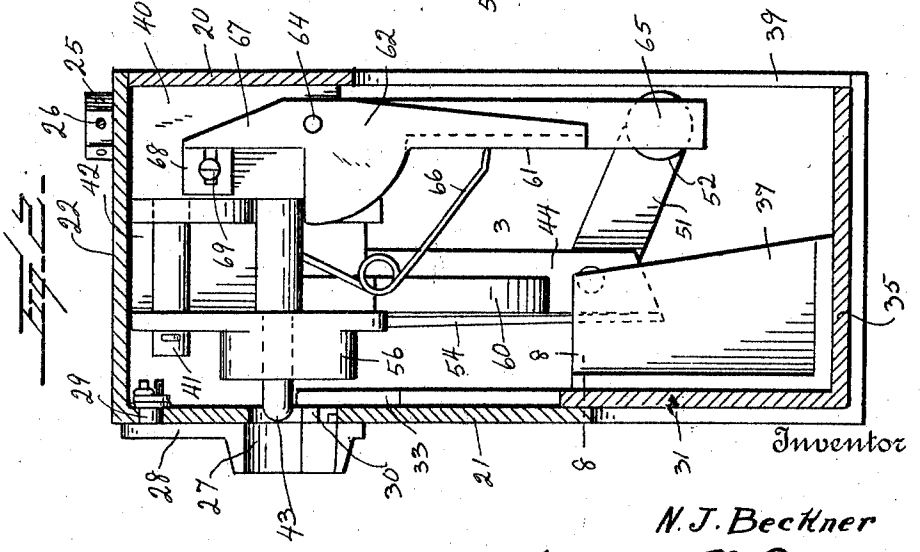

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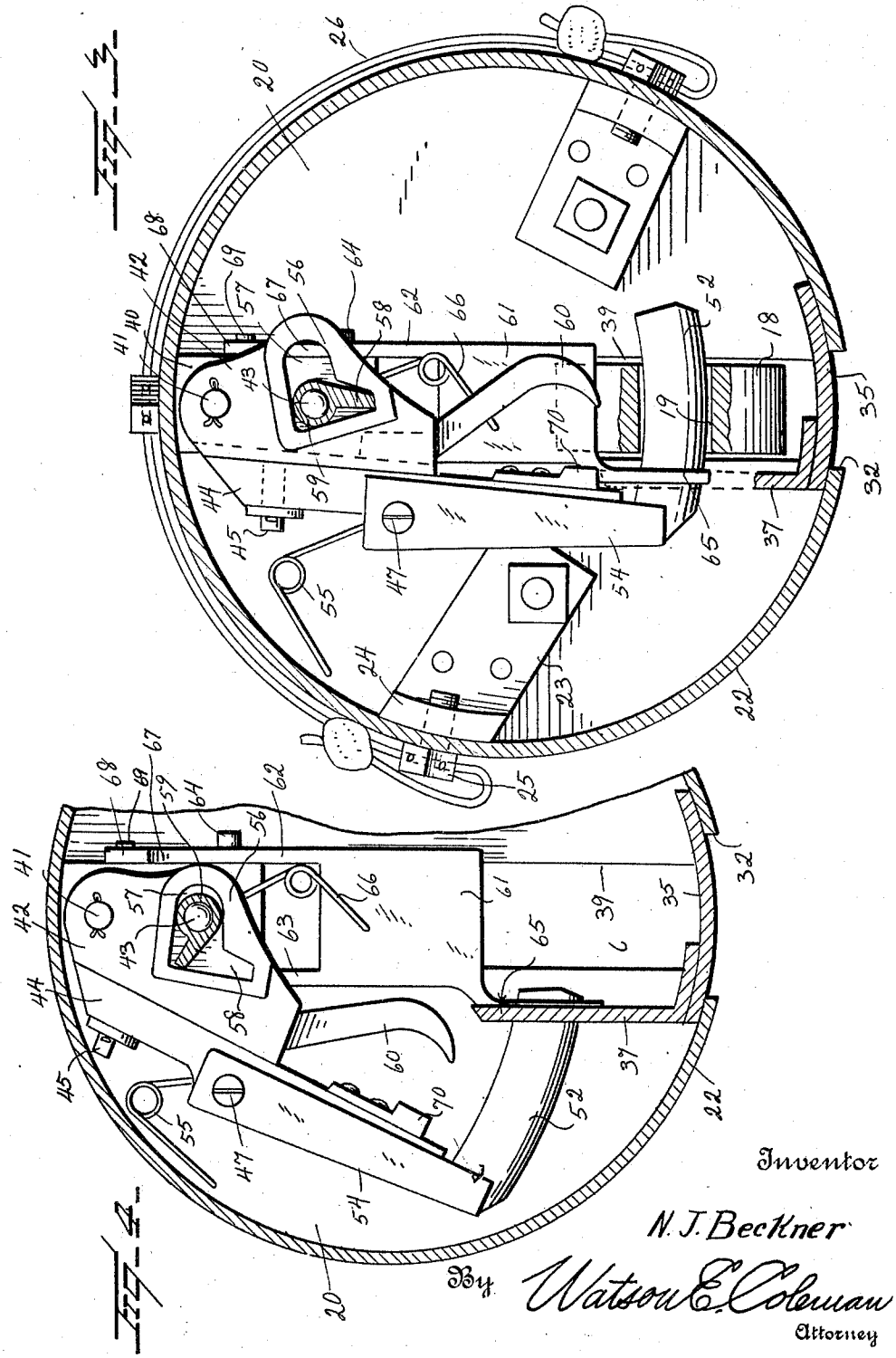

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UNITED STATES PATENT OFFICE.

NOAH J. BECKNER, OF YAKIMA, WASHINGTON, ASSIGNOR TO SAFETY PATENT CO., OF YAKIMA, WASHINGTON, A CORPORATION OF WASHINGTON.

SAFETY SWITCH-LOCK.

1,316,013. Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed May 7, 1919. Serial No. 295,272.

To all whom it may concern:

Be it known that I, NOAH J. BECKNER, a citizen of the United States, residing at Yakima, in the county of Yakima and State of Washington, have invented certain new and useful Improvements in Safety Switch-Locks, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to locks, and particularly to locks used on railway switch stands for the purpose of holding the operating lever or handle of the switch in its lowered and locked position after the switch has been thrown.

In many switch stands in use today, the stand is provided with a central mast operatively connectetd to the switch, and with a table having an arcuate edge and through which the mast passes, the edge of the table being notched, and resting upon this table is a block head or operating member attached to the mast and moving over the upper surface of the table, and pivoted to the block head is a handle or lever adapted to be swung down into a notch when the switch has been fully thrown in one direction or the other. It is common to provide locks for holding the pivoted handle or lever in its depending, vertical position and in engagement with a notch of the table, but oftentimes, a switchman neglects to shift the switch fully and a train is derailed, with consequent loss of life. Furthermore, the switchman often forgets to lock the switch handle against unauthorized actuation. In order to avoid these contingencies, I have devised a lock so designed that it is impossible for the switchman to remove the key from the lock after the key has been inserted and turned until the switch handle has been shifted into a vertical, notch-engaging position, and the switch handle locked.

This is one object of my invention, and a further object is to provide a locking device of this character which is particularly adapted to a certain form of switch stand, in which the locking lever or handle is angularly extended at its upper end to provide a tang perforated for the engagement of a locking bolt, and in which the actuating handle is so mounted that it must of necessity move into the lock casing, and in this connection a futher object is to provide a lock of the character stated wherein the lock, when shifted to its fully unlocked position, carries the key out of alinement with the key hole of the casing so as to prevent the retraction of the key, a detent which shifts into place behind the lock and prevents the return of the lock to its locked position, the lock being shifted from its locked to its unlocked position by the key, and being further shifted to its fully unlocked position acting to bind the key and prevent its removal by the movement of the switch handle or operating member into the lock casing, and the locking bolt being held from any return to its locked position to thereby release the key until the handle has been withdrawn from the lock casing and the tang on this operating handle has been fully inserted.

A further object is to provide a device of this character in which the casing carries a covering member extending over the joint between the handle and the operating arm on the mast so as to prevent rain, snow, or other material from settling in this joint.

Still another object is to provide a construction of this character in which the lock casing is held from detachment from the back plate by capstan bolts, through which is run a sealing wire, preventing the unauthorized removal of the bolts and detachment of the lock casing.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a fragmentary sectional view of a switch stand and a portion of the switch operating handle, the lock casing being shown in vertical section;

Fig. 2 is a vertical sectional view of the lock casing looking at the other side of the lock from that shown in Fig. 1;

Fig. 3 is a vertical transverse sectional view through the lock casing showing the locking mechanism in a closed or locked position;

Fig. 4 is a fragmentary vertical sectional view showing the locking bolt partly opened;

Fig. 5 is a like view to Figs. 3 and 4, but showing the locking bolt fully opened;

Fig. 6 is a fragmentary face view of the front plate showing the key-hole and guard;

Fig. 7 is a fragmentary perspective view of the slide 34; and

Fig. 8 is a fragmentary section on the line 8—8 of Fig. 1.

Referring to Fig. 1, it will be seen that I have illustrated my lock as applied to a particular form of switch stand known as the C., M. & St. P. type, this switch stand including a central shaft or mast 10, a table 11 having radial notches 12, the table being supported by the downwardly extending base 13. Mounted upon the shaft 10 for rotation therewith is an arm 14 which is slotted at its end, as at 15, the upper face of this arm being upwardly curved, and pivoted in this slotted portion 15 of the arm is a switch operating handle 16 pivoted on a pivot bolt 17. This switch operating handle is formed with the outwardly projecting tang 18 having a perforation 19 for the passage of the bolt. When this switch operating handle 16 is in a vertical position, it is disposed within one of the notches 12. When it is turned to a horizontal position, however, it escapes from the notch 12 and then the arm 14 may be turned to turn the shaft 10 and throw the switch. The tang 18 is adapted to receive a padlock, the shank of which is passed through the opening 19 in the tang to hold the handle 16 in its vertical position and locked against unauthorized movement. If often occurs, however, that the switch tender removes the key from the padlock without locking the device, thus permitting the switch to be operated by unauthorized parties.

To avoid this, it is the aim of my invention, as before stated, to provide a locking mechanism wherein the key cannot be removed until the switch has been fully thrown to one position or the other, the switch handle returned to its vertical position in one of the notches 12, and the switch handle absolutely locked. To this end, I provide a housing comprising a base plate 20 and a front plate 21 having a circumferential flange 22 which surrounds the periphery of the base plate 20 and is detachably connected thereto, as by angular brackets 23 bolted, riveted, or otherwise attached to the base plate and having angular ends 24 through which capstan screws 25 are disposed, these capstan screws passing through suitable openings in the circumferential wall 22 of the housing and being held from unscrewing by a sealing rod or wire 26 which passes through openings in the capstan screws. By this means, it is impossible to release the capstan screws and remove the body of the housing from the base plate unless this sealing wire be broken and the wire withdrawn. I do not wish to be limited, however, to this means of connecting the body of the housing to the base plate, as other means might be used.

The front plate 21 is formed adjacent its upper end with a key-hole opening 27, whose form is shown most clearly in Fig. 6, this key-hole opening being normally closed by a guard plate 28 pivoted, at 29, and urged to a closing position by a spring, the guard plate having a stop lug 30 extending through a slot in the front plate, and this guard plate being formed on one side to conform to the peculiar shape of the key. The spring attached to this guard plate normally holds it closed. The front plate 21 is formed with a downwardly extending slot 31 and the circumferential wall 22 is formed with a slot 32 extending clear to the back wall. The inside face of the front wall is formed with upwardly extending guide flanges 33, between which is disposed a slide 34, this slide at its lower end being angularly extended, as at 35, so as to cover the slot 32. The upper end of the slide 34 is cut away, at 36, so that when the slide moves upward to its full extent it will not extend across the key-hole. Attached to the inner face of the slide is an inwardly extending web 37, the lower end of which is attached to the flange 35, the upper end of this inwardly extending web 37 being slightly inclined. A spring 38 acts to urge the slide downward, but the slide may be raised against this spring. The purpose of this construction will be later stated.

The locking mechanism proper is mounted upon the base plate 20. The base plate is diametrically slotted, as at 39, from the intersection of the base plate with the slot 32. Beyond this slot the base plate is provided with the outwardly projecting base block or lug 40, upon which the lock mechanism is supported. From this block 40 projects a pin or spindle 41, and rotatably mounted upon this pin or spindle is a rotatable member 42 formed with upper and lower spaced ears through which the pin 41 passes, both of said ears having openings for the passage of a key stem or spindle 43 projecting from the block 40, thus permitting the rotatable member 42 to be shifted from the position shown in Fig. 3 to the position shown in Fig. 5. Attached to the side face of this member 42, as illustrated most clearly in Figs. 3 and 4, is an arm 44, this arm being pivotally mounted on a pin or stud 45 projecting from the member 42, so that the arm 44 can oscillate in a plane at right angles to the plane of the plate 20. A lug 46 (see Fig. 1) projects from the member 42, and a screw 47 extends inward through the

arm 44 and through this lug. The arm 44 is formed to provide a recess 48 through which the screw 47 passes, and a nut 49 is mounted on this screw within the recess 48. A nut 50 is mounted upon the screw 47 between the base 20 and the lug 46. By means of this screw 47 and the nuts 49 and 50, it is possible to adjust the arm 44 nearer to or farther from the base plate for a purpose which will be later stated.

Pivotally mounted on the end of the arm is the shank 51 of a bolt, the bolt portion of the shank extending at right angles to the shank and parallel to the base plate, this bolt portion being designated 52. The shank 51 outward of the pivot 53 is formed with a flat face, relatively elongated, and bearing against this flat face is a leaf spring 54 which is held at its inner end by means of the screw 47. It will be obvious now that this spring will yieldingly resist any rotation of the shank 51, but that this spring will permit a certain amount of rotation of the shank 51 and will permit the bolt 52, therefore, to move in an arc whose axis is the pin 53. The purpose of this will be later stated. It is to be noted that the arm 44, the shank 51, and the angular portion 52 together constitute the bolt, and that this bolt is made, as illustrated, in two sections so as to secure certain adjustments or certain freedom of movement, as will be later stated. A spring 55 is used for swinging the member 42 on its pivot to carry the locking bolt 52 across the slot 39, and this spring also acts to urge the arm 44 upward and against the screw or bolt 47. Thus, if this screw or bolt be loosened, the spring 55 will urge the arm 44 outward away from the back plate 20, and the extent of this outward movement of the arm 44 will depend upon the extent to which the screw 47 and the nuts 49 and 50 are adjusted.

Mounted upon the outer flange of the member 42 is an approximately triangular wall 56, constituting what I call a key-yoke, this wall defining an approximately triangular key opening 57, against one wall 58 of which the key bit bears in order to unlock the switch handle. A key 59 fits upon the spindle 43, as illustrated in Figs. 3, 4 and 5. When the key is rotated in a clockwise direction, it will bear against this side wall 58 and carry the member 42, the arm 44, and the locking bolt 52 from the position shown in Fig. 3 to the position shown in Fig. 4, which will release the tang of the switch actuating arm 16. It is necessary, however, that the locking bolt be further shifted to the left in Figs. 3, 4 and 5, that is from the position shown in Fig. 4 to that shown in Fig. 5, and to that end I have provided the gate 35 and the flange 37 and form upon the member 42 the downwardly and laterally curved finger 60, this finger having its lower end rounded and curved toward the arm 44 as illustrated in Figs. 3, 4 and 5. Now when the handle 16 is turned up into the slot 32, as illustrated in Fig. 6, it will bear against the gate 35 and shift this gate upward and the flange 37 will engage with the rounded end of the finger 60 and shift the finger 60 with the members 44 and 51 and 52 still farther to the left, from the position shown in Fig. 4 to that shown in Fig. 5. Thus, it will be seen that the rotation of the key shifts the members from the position shown in Fig. 3 to that shown in Fig. 4 and that thereafter the action of the switch handle 16 shifts the members from the position shown in Fig. 4 to that shown in Fig. 5.

In this position of the parts, the yoke 56 is so shifted as to prevent the key from being returned into alinement with the opening 27 in the front plate. Therefore, the key cannot be withdrawn. It is necessary now to hold the bolt in this retracted position until the handle 16 has been turned to its vertical position and the tang 18 again inserted through the slot 39. To this end, I provide a detent 61 which is cut away at its rear end to provide two arms 62 and 63 which embrace the block 40 and which are pivoted thereto by means of a transversely extending pivot pin 64. This detent has a laterally off-set side flange 65 or finger which is elongated beyond the body of the detent so that it may extend across the path of movement of the bolt 52 in the position shown in Fig. 5, and in this position this detent will hold the bolt 52 from any return to its normal or locking position. The detent is urged toward the back plate, that is, is urged toward its locking position by means of a spring 66 which engages the upper face of the detent and engages the key post or spindle 43. Thus, as soon as the bolt 52 has been shifted out of the way, the detent will spring into place in front of the bolt, as illustrated in Fig. 5.

As before stated, the bolt 52 is adjustable toward or from the back plate and the detent 61 must be likewise adjustable. To this end, one of the arms, as the arm 62 of the detent 61, is extended beyond the arm 63 and beyond the pivot 64, and, as illustrated in Fig. 2, is formed with an upwardly projecting finger 67, and mounted adjustably upon the side of the block 40 is a stop 68, illustrated as a slotted piece of metal through which a screw 69 passes. The farther this stop is adjusted toward the back plate, the less will be the movement of the detent toward the back plate, in other words the detent will be held with its forward end farther away from the back plate. Thus, when the bolt 52 is adjusted nearer to or farther from the back plate by actuating the screw 47 and the nuts 49 and 50, the de-

tent stop 68 must also be adjusted so that the finger 65 on the detent will always move under the action of the spring 66 to a position immediately in front of the end of the bolt when the bolt has been thrown to the position shown in Fig. 5. The reason for this adjustment of the bolt 52 and of the detent 61 is that there is a variation in different switch stands in the degree to which the tang 18 will project beyond the arm 14 and the degree to which it will project into the lock, and the locking bolt, therefore, must be adjusted to suit the individual switch stand to which it is attached, and the detent, as before remarked, must, of course, be adjusted to correspond with the adjustment of the locking bolt. The reason for moving the shank 51 of the bolt 52 upon the pin 53 is to permit a play of the bolt 52 which will permit the operating handle from doing any damage to the lock.

In order to prevent the opening of the gate 35 when the parts are in the position shown in Figs. 1 and 3, I mount upon the arm 44 the stop lugs 70 which, when the arm 44 is in the position shown in Fig. 3, will extend over the flange 37 and, therefore, lock the gate from any inward movement. As soon, however, as the arm 44 is shifted to the position shown in Fig. 4, this stop lug will move out of the way of the flange 37 so that when the lever 16 enters the slot 39, it may shift the gate inward, thus throwing the parts to their fully unlocked position, that is the position shown in Fig. 5. Screws, bolts, or other devices are used for attaching the back plate to the block head or operating member 14. Preferably, the back plate will have attached to it a rearwardly extending housing member 71, which is illustrated in Fig. 1 as U-shaped in cross section, and cut away on its inner face to fit the rounded upper face of the block head adjacent the slot 15 and to extend over this slot. This housing 71 permits the tang 18 to be turned upward through the slot 15, but at the same time prevents any rain or snow from settling in the slot 15.

In the actual use of my invention, the parts are locked by the bolt 52 passing through the tang 18, as shown in Figs. 1 and 3. If it be desired to shift the switch, the switchman inserts a key into the key-hole of the front plate and rotates the key from the position shown in Fig. 3 to that shown in Fig. 4. This shifts the member 42 and the arm 44 from the position shown in Fig. 3 to that shown in Fig. 4, sufficiently retracting the bolt as to permit the tang 18 being withdrawn from the housing by a rotation of the handle 16. When the handle 16 has been brought nearly to a horizontal position, it will pass through the slot 32, engage the gate 35, and lift this gate from the position shown in Fig. 4 to that shown in Fig. 5. This lifting of the gate causes the plunger 37 to engage the curved face of the finger 60 and rotate the bolt-carrying arm and the member 42 from the position shown in Fig. 4 to that shown in Fig. 5. As soon as the bolt 52 has passed the position shown in Fig. 5, the detent 61 will be urged toward the back plate as far as the stop 68 will permit, and its finger or extension 65 will be disposed across the end of the bolt 52, thus holding the bolt completely retracted and holding the key in such position that the key cannot be returned to a position in complete register with the key-hole in the front plate and, therefore, the key cannot be withdrawn. As soon, however, as the block head 14 has been shifted to a position where the handle 16 registers with one of the slots 12, then the handle may be shifted to its vertical position. As soon as the tang 18 enters the slot 39, it will bear against the detent 61 to force this detent outward to the position shown in Fig. 1. Thus the detent releases the bolt 52 which, as soon as the opening 19 in the tang 18 registers with the bolt, springs into this opening, thus locking the handle in its depending and notch engaging position.

Of course, as soon as the handle has been turned from its horizontal position to its depending position, the gate 35 returns to its normal position, and as soon as the bolt has been shifted to its fully locked position, the key may be withdrawn because the yoke 56 has shifted sufficiently far to the right as to bring the key opening 57 in the yoke in full register with the key-hole in the front plate.

By making the handle 16 do part of the work of completely shifting the bolt, I do away with the necessity of using a very long key for the purpose, which would otherwise be necessary.

It will be understood that this lock is equally applicable to those switch stands in which the switch stand itself carries a projecting tang and the handle or operating lever of the switch stand is slotted to engage the tang when the handle is in a vertical position. I have heretofore described this lock housing as being mounted on the block head, but, as above stated, this is not absolutely necessary, as it might be mounted on the lever.

I claim:—

1. A switch lock including a bolt, key operated mechanism for partly shifting the bolt away from its locking position, and switch handle operated means for fully shifting the bolt away from its locking position.

2. A switch lock including a switch handle locking bolt, key operated means for partly shifting the bolt to its unlocking position,

switch handle operated means for fully shifting the bolt to its unlocking position, and means for latching the bolt in its retracted position, said means being shifted out of its bolt latching position by the return of the switch handle to its original position.

3. A switch lock including a switch handle engaging bolt, key operated means for retracting the bolt to a position to permit the switch handle to be shifted from an inoperative to an operative position, means actuated by a movement of the handle to its fully operative position causing the full retraction of the bolt, and means for automatically latching the bolt in its retracted position, said means being shifted out of its latching position by a return of the switch handle to an inoperative position.

4. A switch lock including a bolt adapted to engage with a switch handle when the latter is in its inoperative position, key operated means for retracting the bolt from its engagement with the handle to thereby permit the handle to turn from its inoperative to its operative position, means actuated by a shifting of the handle to its fully operative position causing the further retraction of the bolt, said further retraction of the bolt locking the key from removal from the lock, and means for latching the bolt in its retracted position and thereby holding the key from removal, said means being shiftable out of its latching position upon the return of the switch handle to its original inoperative position.

5. A switch lock including a slotted back plate and a front plate having a key-hole, a bolt operatively mounted upon the back plate for lateral swinging movement, said bolt normally extending across the slot and being adapted to engage in the tang of a switch handle, a key yoke attached to said bolt whereby the bolt may be swung laterally by the application of a key, a member movable by the switch handle when the latter is turned to an operative and horizontal position and engaged with said bolt to still further retract it upon said movement of the switch handle, said movement of the bolt causing the yoke to shift the key to a position where it cannot be retracted through the key-hole at the front plate, and means for latching the bolt in its fully retracted position but being shiftable out of the way of the bolt to permit the return of the bolt upon the insertion of the tang of the switch stand handle into the slot in the back plate.

6. A switch lock including a front plate having a key hole, a back plate, a laterally shiftable bolt mounted between the front and back plates, the back plate being slotted for the reception of the tang of a switch stand handle and the bolt being normally adapted to extend across said slot and engage the tang, a key actuated yoke connected to the bolt whereby it may be retracted by a key, a member mounted between the front and back plates and movable inwardly when the bolt has been retracted by the key to still further retract the bolt, and a latch urged to a latching position and moving into a position intersecting the path of movement of the bolt when the bolt has been fully retracted to prevent the return of the bolt to its locking position, said latch member being shiftable out of its latching position upon a reinsertion of the tang of the switch handle into the slot in the back plate when the switch handle has been turned to its vertical, inoperative position to thus permit the return of the bolt to its locking position and the removal of the key.

7. The combination with a switch stand having a notched table, a switch operating block head moving over the table and a handle pivoted thereto and when in a vertical position engaging in one or the other of the notches, the inner end of the handle being provided with an outwardly projecting, perforated tang, of a lock comprising a casing attached to the block head, the casing having a front plate and a back plate, the back plate being slotted to receive said tang and the front plate having a key-hole, a laterally movable bolt mounted within the casing and adapted to be inserted through said tang, the bolt being resiliently urged to its locking position, a key engaging yoke operatively connected to the bolt to shift it and normally disposed in full register with the key-hole, a slidable member mounted in the casing and adapted to be shifted by the handle when the latter is turned into a horizontal position, said slidable member when shifted engaging the bolt to shift it laterally beyond the position to which it is shifted by the key, a latch disposed opposite the slot in the back plate and resiliently urged toward the slot and shifting automatically to a position in the path of movement of the bolt when the bolt has been fully retracted and holding the bolt in its fully retracted position, and the yoke in a position where it will prevent the withdrawal of the key through the key-hole, said latch being shiftable out of its latching position upon the return of the switch handle to a horizontal position and the reinsertion of the tang through the slot in the back plate.

8. The combination with a switch stand having a notched table, a block head moving over the table and a handle pivoted to the block head, the handle having a perforated tang, and when in a horizontal position engaging in a notch of the switch stand, of a lock therefor comprising a casing attached to the block head, the casing having a front wall, a back wall, a circumferential wall, the front wall being provided with a key-hole

and the front and back walls being provided with diametrically extending alining slots, the circumferential wall having a slot connecting said alining slots, an arm pivotally mounted within the casing for lateral swinging movement and having an angularly projecting bolt normally disposed across the slot in the back wall and adapted to engage the perforated tang of the switch handle, a key yoke carried by said arm and normally fully alining with the key-hole in the front plate, the yoke providing means whereby the bolt may be shifted by a key to release the tang and permit the handle to be turned to a horizontal position, a slide mounted upon the front plate and having an angularly projecting portion closing the slot in the circumferential wall, said slide being resiliently urged to its closing position, the slide and the arm having coacting members whereby the arm may be urged laterally beyond the position to which it is shifted by the key to thereby carry the key yoke into a position where it will prevent the withdrawal of the key from the key-hole, and a latch pivotally mounted upon the back plate and extending parallel to the slot therein, said latch being resiliently urged toward the back plate and extending across the path of movement of the bolt when the latter is fully retracted to thereby prevent the return of the bolt to its locking position until the switch handle has been turned to a vertical position and the tang inserted through the slot in the back plate.

9. The combination with a switch stand having a table, a switch operating block head moving over the table and a handle pivoted thereto, the inner end of the handle being provided with an outwardly projecting, perforated tang, of a lock including a bolt-carrying arm pivoted for movement at right angles to the line of movement of the tang, and a bolt pivotally mounted upon the extremity of the arm and having a shank extending at right angles to the arm and pivotally connected to the arm, and a spring yieldingly holding the shank of the bolt at right angles to the arm, said spring permitting the tang to shift the bolt when the arm is initially shifted in one direction or the other.

10. A lock for switch stands including a lock casing formed in sections, headed screws engaging said sections with each other, the heads being perforated, and a sealing wire passing through all of said screws, the ends of said wire being sealed into engagement with each other to thereby prevent the unauthorized detachment of the parts.

11. A switch lock including a pivoted arm, a bolt extending at an angle to the arm and pivoted thereto, and resilient means yieldingly holding the bolt from rotation on its pivot, key actuated means for shifting the bolt to a retracted position and operatively engaging with said arm, and means for preventing the removal of the key until the bolt and arm have returned to locking position.

12. A switch stand lock including a pivoted key actuated arm, a bolt having a shank disposed at an angle to the arm and pivoted thereto for movement in a plane at right angles to the plane of movement of the arm, and resilient means yieldingly holding the bolt from rotation on its pivotal axis.

13. A switch stand lock including a pivoted key actuated arm, a bolt having a shank pivoted to the side face of the arm for movement in a plane at right angles to the plane of movement of the arm, said bolt shank having a head formed with a flat edge face, and a leaf spring attached to the arm and extending over the flat edge face of the bolt and yieldingly restraining the bolt shank from movement on its pivotal axis.

14. The combination with a switch stand having a table, a switch operating block head moving over the table and a handle pivoted thereto, the block head being slotted at its margin from its lower face to its upper face and the handle being pivoted in said slot, of a locking device mounted upon the bolt head and adapted to engage and lock the switch stand handle when the latter is turned to a vertical inoperative position, and a housing extending inward from said lock and extending over the slot in the block head to thereby prevent the entrance of rain into said slot.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

NOAH J. BECKNER.

Witnesses:
FREDERIC B. WRIGHT,
ROBERT A. BOZWELL.