

(No Model.)

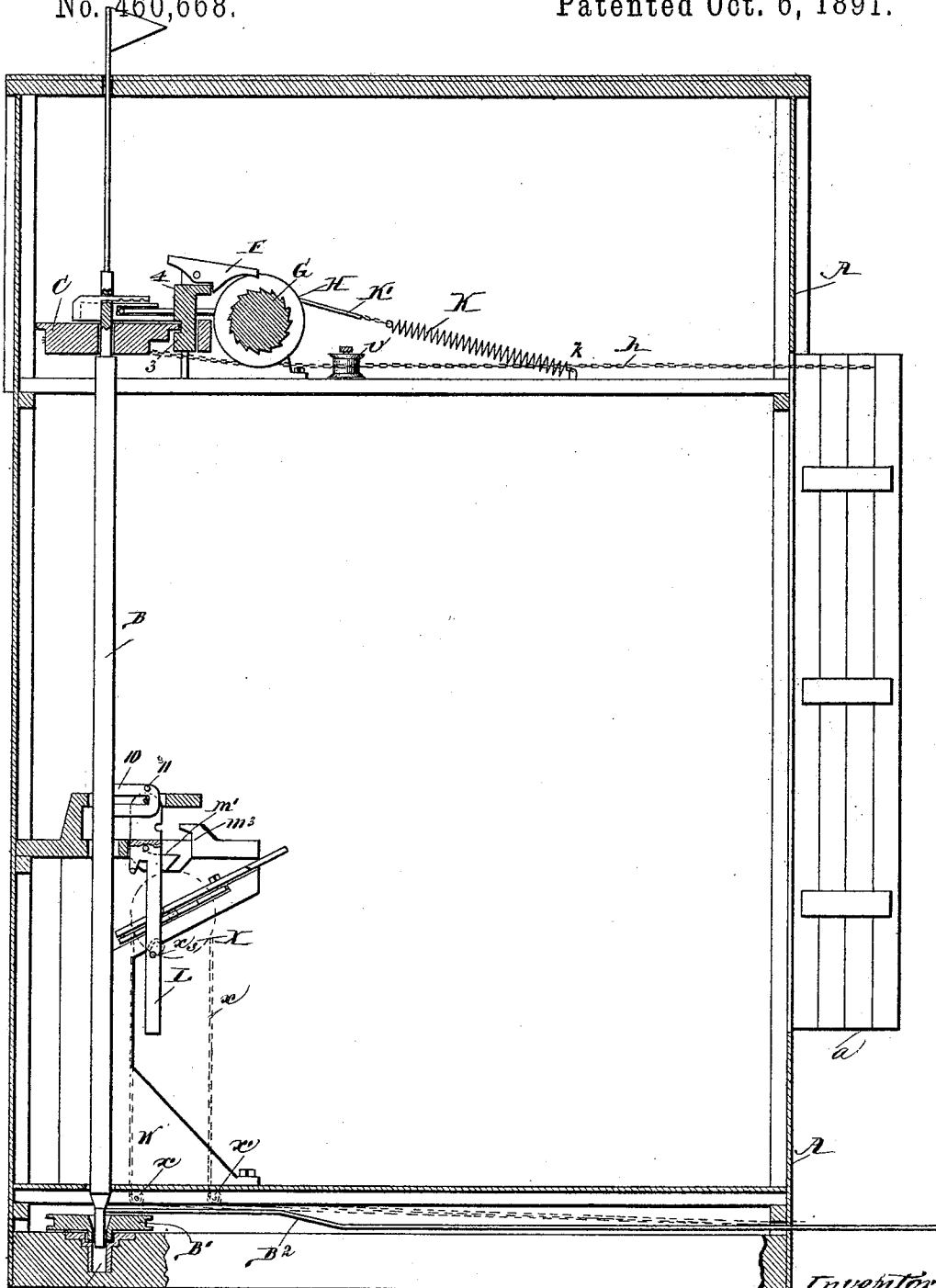
3 Sheets—Sheet 1.

J. N. STRONG.

MECHANISM FOR OPERATING AND CONTROLLING RAILWAY SWITCHES.

No. 460,668.

Patented Oct. 6, 1891.



Witnesses
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Fig. 1.

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3 Sheets—Sheet 2.

Patented Oct. 6, 1891.

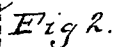
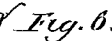


Fig. 3.



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(No Model.)

3 Sheets—Sheet 3.

J. N. STRONG.

MECHANISM FOR OPERATING AND CONTROLLING RAILWAY SWITCHES.

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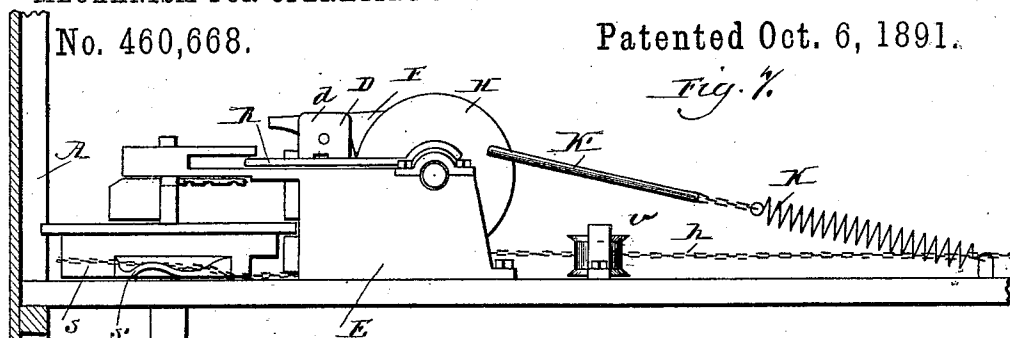


Fig. 7.

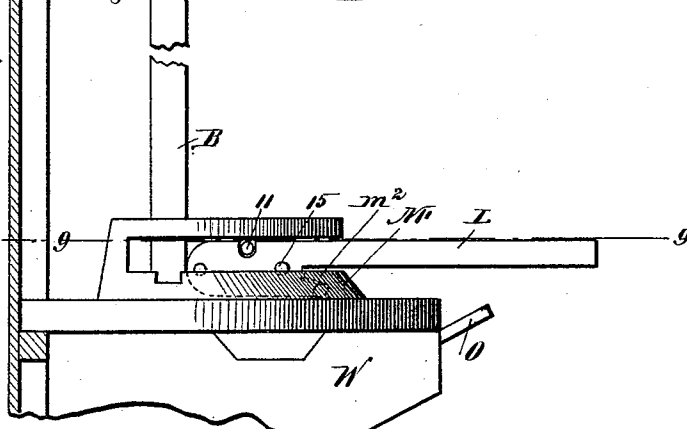


Fig. 11.

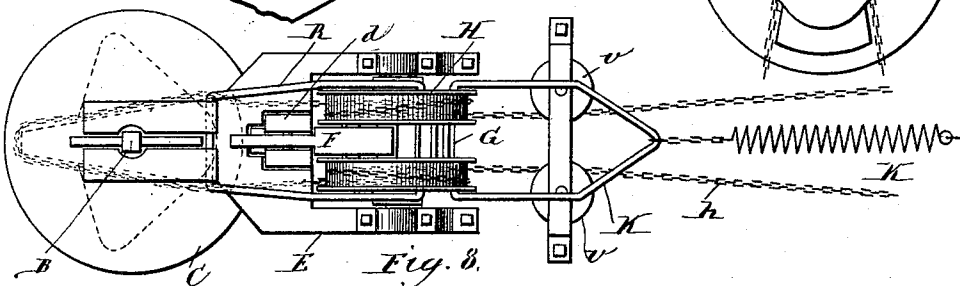
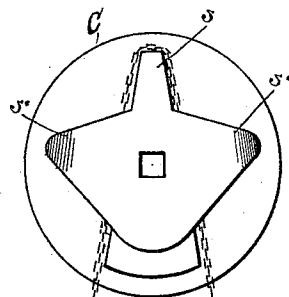


Fig. 8.

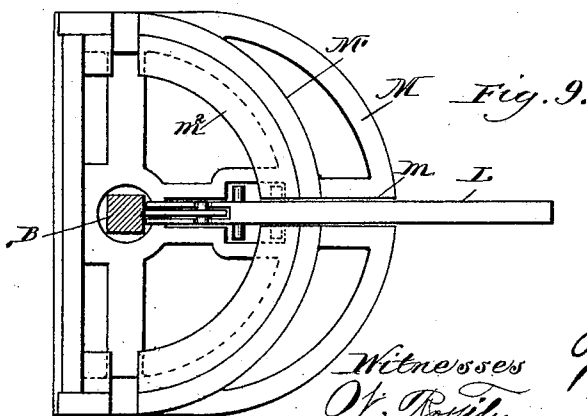


Fig. 9.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR OPERATING AND CONTROLLING RAILWAY-SWITCHES.

SPECIFICATION forming part of Letters Patent No. 460,668, dated October 6, 1891.

Application filed August 22, 1890. Serial No. 362,704. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. STRONG, a citizen of the United States, residing at Washington Heights, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanism for Operating and Controlling Railway-Switches, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

A frequent cause of serious accidents to railway-trains is due to carelessness upon the part of switchmen in misplacing or leaving open the switches. The object of my present invention is to prevent accidents of this character; and this object I have accomplished by placing the switching apparatus within a suitable crib or inclosure, through the door of which it is necessary that the switchman shall pass before it becomes possible for him to operate the switching apparatus. In the preferred form of my invention, also, the door or doors will close automatically and will be locked necessarily by the switchman before he can place the switch-operating mechanism in such condition as to enable him to shift the switch from the closed to the open position; and in the preferred form of my invention, also, this locking of the door by the act of the switchman, preliminary to the shifting of the switch, occurs before the switch-shifting lever is brought to a point where it can be swung to move the switch. As a consequence, it becomes impossible for the switchman, after he has passed into the crib or inclosure and placed the switch-operating mechanism in position for shifting the switch, to leave the inclosure either through carelessness or design until he has restored the switch to a closed position and has placed the switch-operating mechanism in locked condition.

My invention consists, primarily, in providing a switch-operating mechanism with a lug adapted to lock and hold the doors of the crib so long as the switch is in open position; and my invention further consists in various novel features of construction and combination of parts hereinafter described, and defined in the claims, whereby the more certain and effective guarding of the switch-operating mechanism is secured.

Figure 1 is a view in central vertical section through the switch mechanism embodying my invention and through the crib or inclosure wherein it is contained, the doors of the switch being shown as open. Figs. 2 and 3 are enlarged views, in vertical section, through the switch-operating mechanism, the parts being shown in different position. Figs. 4, 5, and 6 are detail views of the switch-lever lock mechanism. Fig. 7 is an enlarged view, in side elevation, of the switch-operating and door-locking mechanism. Fig. 8 is a top view of the switch-operating and door-locking mechanism. Fig. 9 is a view in horizontal section upon line 9 9 of Fig. 7. Fig. 10 is an inverted plan view of the disk and connected parts at the top of the switch-operating shaft. Fig. 11 is a detail view, in side elevation, of the parts shown in Fig. 10.

A designates the crib or house wherein the switch-operating mechanism is inclosed, this house being of any suitable size, shape, construction, or material, and provided with any desired number of doors *a*. Preferably the upper part of the house A between the ceiling and the roof will be furnished with a suitable door, through which the mechanism contained within such space may be readily reached for oiling or repairs.

From top to bottom of the crib or inclosure A extends the switch-operating shaft B, this shaft being sustained in a manner permitting it to have a limited vertical movement imparted thereto by the switch-lever, as will presently appear. This shaft has its lower end adapted to seat within a suitable socket 2 beneath the floor of the crib and to engage with a switch-shifting wheel B', from which a suitable shifting-rod B² or other convenient connection will extend to the movable switch-rails.

Upon the upper end of the shaft B is keyed a wheel or plate C, (or a suitable segment wheel or arm may be substituted for this wheel,) and the outer edge of this wheel engages, by means of suitable blocks or lugs 3 and 4, with a shifting-bar D, that is mounted to slide within suitable grooves 5, formed in the table E and adapted to receive the guide-ribs of the shifting-bar D. The upper portion of this shifting-bar D is furnished with the arms *d*, wherein is mounted the locking-

pawl F, the rear portion of this pawl being preferably extended to limit the upward throw of the pawl, and the front portion of the pawl being preferably furnished with one or more shoulders or stops 6 to limit its downward movement. The forward end of this pawl F is adapted to engage with a ratchet-wheel G, carried by a shaft *g*, that is journaled in suitable bearings of the table E, and upon this shaft B, and connected to ratchet-wheel G, is also mounted one or more wheels or pulleys H, over which will pass the chains or cables that hold the door in locked position. If two doors are employed, as in the construction illustrated, then preferably two chain-wheels H will also be used. The chains *h*, that pass over the peripheries of the wheels H, are connected to these wheels and also to the doors *a* of the crib or inclosure, and by preference a spring K, having one end fixed, as at *k*, to some permanent part of the structure and having its opposite end attached to a yoke K', the arms of which are attached to the wheels H, serves to turn these wheels normally to such position as to wind the chain *h* upon the wheels in such manner as to bring the doors *a* to the closed position. Instead of the spring K a weight might obviously be used. Two anti-friction rollers *v* may be employed, if desired, for the chains *h*.

The normal position of my switch-operating mechanism is that illustrated in Fig. 1 of the drawings—that is to say, the switch is closed 1, 2 in line with the main track, the operating-shaft B is raised to the extreme of its movement, and the wheel or disk C sustains the locking dog or pawl F out of engagement with the teeth of the ratchet-wheel G. Consequently, while the spring K tends to hold the wheels to the position shown in Fig. 2, and thereby retain the doors *a* in position, still these doors can be readily opened against the force of the spring, and in so doing the wheels H will be freely turned. Hence so long as the switch is in closed position the switchman is allowed free ingress and egress to and from the crib.

The operating-shaft B is provided with a slotted arm 10, to which is connected the inner end of the switch-lever L, this lever having, preferably, a yoke-shaped end, through which passes a suitable pin *l*, that passes also through the slot or opening of the arm 10. The arm 10 is also provided, by preference, with a stop-pin 11 to limit the upward movement of the lever L. The lever L is adapted to move within the slot *m* of a suitable segment plate or ring M, mounted upon the top of the switch-stand W, and from the sides of the lever L project the trunnion-pins 15, adapted to enter the cut-away spaces or grooves *m'*, formed in that portion of the segment plate or ring M at the sides of the slot *m*. From the upper face of the segment plate or ring M also rises the inwardly-projecting ledge M', the overhanging portion *m²* of which is adapted to be struck by the outwardly-extending

arm 16 of the switch-lever L, and thereby insure the accurate horizontal movement of the lever as it is swung from side to side for the purpose of operating the shaft B. The outwardly-extending arm 16 of the lever L is also by preference furnished with laterally-extending portions 17, which prevent the lifting of the lever L above its horizontal position. A further function of the pins 11, that project from the shaft-arm 10, is to enter the slots or notches 18, formed in the upper face of the lever L, and thus prevent the outward movement of the lever after it has been swung to its horizontal position.

From the foregoing description it will be seen that the function of the switch-lever L is not merely to impart a partial rotation to the shaft B, but as well, also, to impart a vertical movement to this shaft sufficient to cause the lifting of the plate C, and through the medium of this plate and the shifting-bar D to cause the locking-pawl F to be thrown out of engagement with the teeth of the ratchet-wheel G, so as to permit the rotation of the wheels H, and consequently allow the opening of the doors. Thus it will be seen by reference to Fig. 1 of the drawings that when the switch-lever L is in the vertical position there shown the vertical shaft B will be raised and the locking dog or pawl F will be held out of engagement with the ratchet-wheel G, so that the switchman can freely enter the crib or inclosure in order to operate the switch; but when the switch-lever is in such vertical and locked position the switch will be closed and must remain closed until the switch-lever has been raised to the horizontal position seen in Fig. 7 and has been swung to the right or to the left. After the switchman has entered the crib or inclosure and has released the switch-locking lever O, in manner to be presently described, he will swing upward the free end of the switch-lever, and in so doing the weight of the shaft B and connected parts will cause the trunnion-pins 15, projecting from the sides of this switch-lever, to ride along the bottom edge or lower wall of the grooves or slots *m'* and force the pins 17 up the front portions *m³* of these slots, and as the pins 17 ride up the front portions of the slots the rear end of the switch-lever L will be forced inward, so that when the lever reaches a horizontal position the pins 11 that project laterally from the arm 10 of the shaft B, will enter the notches 18 of the lever L and not only prevent this lever from being lifted above the horizontal position, but also prevent it from being drawn in outward direction. So, also, the lifting of the lever above the horizontal position will be prevented by the engagement of the laterally-projecting portions 17 upon the outwardly-extending arm 16 with the overhanging edges *m²* of the ring M', through the slot of which the lever L passes as it is lifted. As the lever is thus brought to horizontal position the shaft B will descend to such extent as to permit the locking pawl or

dog F to pass into engagement with the teeth of the ratchet-wheel G. Hence, it will be seen that when the operating-lever L has been brought into such position that it will serve to turn the shaft B, and consequently to shift the switch from its closed position, the dog or pawl F will check the movement of the wheels H and so prevent the opening of the door *a* to permit the switchman to pass from the crib or inclosure.

The form of switch-lever lock which I prefer to employ for securely guarding the operating-lever L is more particularly illustrated in Figs. 4, 5, and 6 of the drawings. This lock consists of a lever O, that is pivoted, as at *o*, in the upper part of the switch-stand W and adjacent to the vertical path of the switch-lever L as it is swung in vertical direction, and by preference I employ a spring N, with free ends bearing against the back edge of the locking-lever O to hold this lever normally parallel with the path of movement of the operating-lever L. Adjacent to the rear end of the locking-lever O, and normally parallel therewith, is pivoted the supplemental lever or dog O', from which projects a pin *o'* into a slot *o''*, formed in the rear end of the locking-lever O. The locking-lever O is provided, preferably, with two teeth or projections *o³* and *o⁴* at opposite sides of its pivot-point, and the supplemental locking-lever O' is provided with a single tooth or projection *o⁵*, these several teeth or projections *o³*, *o⁴*, and *o⁵* extending into and normally obstructing the upward swinging movement of the switch-lever L, the tooth or projection *o⁵* of the supplemental locking-lever being located, preferably, between the teeth *o³* and *o⁴* of the locking-lever O. From this construction it will be seen that if the switch-lever L is in the vertical and locked position shown in Fig. 1 and the switchman has passed into the crib or inclosure to operate the switch it is only necessary for him, in order to release the switch-lever L, to swing the locking-lever O first in the direction of the arrow, Fig. 4, so as to cause the projection *o³* of the locking-lever O to pass away from the path of the switch-lever L and permit this lever to be drawn outward until it is engaged by the tooth or projection *o⁵* of the supplemental locking-lever O'. The switchman will then shift the locking-lever O in the opposite direction and thereby cause the supplemental locking-lever O' to turn upon its pivot-point in such manner as to throw the tooth or projection *o⁵* of this supplemental lever, and as well, also, the tooth or projection *o⁴* of the locking-lever O, out of the path of the switch-lever L, which can thereupon be swung upward and moved inward until it is arrested by the engagement of the pins 11 with the notches 18 and until the pins 17 contact with the overhanging rim *m²* of the ring M'. The switch-lever will then be in position to be freely swung from side to side to open and shift the switch, as desired, the shaft B will be in its

lowermost position, the doors of the crib will be closed by the action of the coiled spring K, and will be securely locked by reason of the engagement of the dog or pawl F with the ratchet-wheel G.

From the foregoing description it is manifest that with the parts above defined properly manipulated the possibility of the switchman leaving the switch open is avoided; but as it is desirable to guard to a certainty against the carelessness of the switchman and as well, also, the malicious mischief of others, I have provided the additional mechanism next to be described.

Upon the upper end of the shaft B is fixed the guard-arm P, adapted to move vertically through a slot *p*, formed in the rearwardly-extending portion E' of the table E. In this portion E' of the table is formed a horizontal groove or channel *e*, wherein moves the check bar or wire R, (see Fig. 3,) the arms of which are connected to the sides of the wheels H, so that the check-bar moves back and forth over the portion E' of the bed as the wheels H are rotated. When the doors are in unlocked and open condition, the check-bar R will extend beneath the guard-arm P, and if attempt be made to operate the switch-lever while the doors are thus open it will be found impossible, because the check-rod R will prevent the descent of the guard-arm P and the shaft B, and consequently will prevent the upward movement of the switch-lever to a horizontal position, in which alone it can be operated. Moreover, it will be found that during any such attempt the notches 20 upon the under side of the guard-arm P will engage with the check-rod R and prevent the dropping of shaft B (even if the doors be closed) until the switch-lever has been returned to its vertical locked position, and thus in proper manner and with the crib-doors closed swung upwardly to horizontal position. On the other hand, when the doors are locked and the shaft B in its lowermost position and the locking dog or pawl F in engagement with the ratchet-wheel G it will be impossible to lift the shaft B a sufficient distance to raise the pawl F out of engagement with the ratchet-wheel G, because the lever L can only be put down to raise the ratchet-wheel G when the switch is in closed position.

The chains or cables *h*, that connect the doors *a* to the wheels H, are, by preference, extended around these wheels and passed thence and attached to a door-closing arm or bar *s*, (a suitable wheel may be employed,) attached to the shaft B below the plate C. This arm *s* may be of any convenient form; but in the accompanying drawings I have shown it of rhomboidal shape, as I have found this form most effective in practice, and beneath the arm *s* and fixed to the shaft B is a chain-supporter *s'*, also, by preference, of the shape shown. Hence it will be seen that if attempt were made to hold open the doors *a* of the crib or inclosure and with them in such position

to operate the switch it would be found that as the shaft B was turned by the switch-lever to open the switch the turning of this shaft would impart a partial rotation to the door-closing arm S, causing this arm to force the chain *h* to impart sufficient rotation to the wheels H to insure the closing of the door. Manifestly, therefore, it will be found impossible either to unlock and open the switch so long as the doors of the crib are open or to open the doors of the crib so long as the switch is in open position.

It will be observed that the switch-wheel at the base of the shaft B is provided with a square seat or socket, wherein will fit the squared lower end of the shaft B, so that notwithstanding the vertical movement of this shaft the turning of the switch-wheel cannot be effected independently of the shaft. By preference, also, I provide the switch-wheel with means—such, for example, as a chain or cable leading from the crib or inclosure—whereby a danger-signal may be operated at any desired distance from the crib or inclosure. Hence it will be seen that when the switch is in closed position the danger-signal may be in proper condition to indicate this fact, and when the switch is open the danger-signal will be necessarily shifted to expose it to the engineer of the passing train. In Figs. 1 and 2 of the drawings I have also shown in dotted lines a wheel X, that will be journaled at one side of the switch-stand, and over this wheel will pass a suitable chain or cable *x*, that will pass, also, over suitable pulleys *x'* and thence to a danger-signal more or less remote from the crib or inclosure. This arrangement of wheel and chain or cable for controlling the danger-signal is more particularly designed for shifting at proper times a vertical danger-signal. The wheel X will be provided with a suitable notch *x²*, adapted to be engaged with a pin *x³*, projecting from the side of the switch-lever L, so that as the switch-lever is raised and lowered a corresponding movement will be imparted to the wheel X in order to properly shift the danger-signal.

The details of construction above set out may be varied within wide limits without departing from the spirit of my invention, and as well, also, features of the invention may be employed without its adoption as an entirety.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with suitable switch-operating mechanism, of an inclosure for said mechanism, having a door (one or more) operative independently of the switch-operating mechanism when the switch is closed, and a lock device connected to the door and to a lever device having two movements, one of which operates the lock and the other the switch, whereby the lock device shall be engaged before the switch can be shifted from

its closed position and shall be disengaged only after the switch is returned to its closed position, substantially as described.

2. The combination, with suitable railway-switch-operating mechanism, of an inclosure for said mechanism, having a door (one or more) operative independently of the switch-operating mechanism when the switch is closed, suitable mechanism controlled by the switch-operating mechanism to lock the door when the switch is to be opened, and a suitable spring or equivalent device for closing the door, substantially as described.

3. In switch-operating mechanism, the combination, with an inclosure for said mechanism, of a shaft whereby the switch will be operated, a switch-lever for turning said shaft, and a suitable lock device connected to the door and to a lever device having two movements, one of which operates the lock and the other the switch, whereby the lock device shall be engaged before the switch can be shifted from its closed position and shall be disengaged only after the switch is returned to its closed position, substantially as described.

4. In switch-operating mechanism, the combination, with a suitable inclosure for said mechanism, of a shaft for operating the switch, a switch-lever for turning said shaft, a suitable lock mechanism for the door or doors of the inclosure, adapted to be thrown into and out of engagement with said shaft, and a suitable switch-lever lock for securely locking the switch-lever until the door or doors of said inclosure have been locked, substantially as described.

5. In switch-operating mechanism, the combination, with a shaft for operating the switch, of a switch-lever for moving said shaft, and a lock mechanism for the door or doors of the inclosure, comprising a suitable wheel or wheels, a chain or cord leading from said wheel or wheels to the door or doors of the inclosure, a pawl and ratchet for dogging the movement of said wheel or wheels, and means whereby said pawl and ratchet may be thrown out of engagement when the switch is to be opened, substantially as described.

6. In switch-operating mechanism, the combination, with a suitable inclosure for said mechanism, having a door or doors, of a shaft for operating the switch, a switch-lever for shifting said shaft, a chain or cable for engagement with the door of the inclosure, a wheel or pulley for winding said chain or cable to close the door, a ratchet-wheel connected to said pulley, a pawl for locking the movement of said ratchet-wheel, and suitable means connected to the switch-operating shaft for throwing said pawl out of engagement with the ratchet-wheel to permit the door to be opened, substantially as described.

7. In switch-operating mechanism, the combination, with an inclosure for said mechanism, having a door, (one or more,) of a vertically-movable switch-operating shaft, a chain

or cable connected to the door, a wheel or pulley for winding said chain or cable, a ratchet-wheel connected to said wheel or pulley, a pawl for engagement with said ratchet-wheel, suitable means for throwing said pawl out of engagement with the ratchet-wheel, and a suitable guard mechanism to prevent the raising and lowering of said shaft to operate the switch when the door of the inclosure is in open position, substantially as described.

8. In switch-operating mechanism, the combination, with an inclosure for said mechanism, having a door, (one or more,) of a vertically-movable switch-operating shaft, a chain or cable connected to said door, a wheel for winding the chain or cable, a ratchet-wheel engaging with said winding-wheel, a pawl adapted to be thrown into and out of engagement with said ratchet-wheel, a plate or disk upon said switch - operating shaft, and suitable mechanism for connecting said disk with the pawl, whereby said pawl may be raised and lowered with the movements of the shaft, substantially as described.

9. In switch-operating mechanism, the combination, with a suitable inclosure for said mechanism, having a door, (one or more,) of a switch-operating shaft, a chain or cable connected to the door, a wheel or pulley for winding said chain or cable, a suitable arm or equivalent connected to said switch-operating shaft, and a chain or cable connected to said arm and to the winding-wheel or pulley, whereby when said shaft is operated to shift

the switch the door will be closed, substantially as described.

10. In switch - operating mechanism, the combination, with a suitable inclosure for said mechanism, having a door, (one or more,) of a vertically - movable switch - operating shaft, suitable lock mechanism for said door, and a switch-lever connected to said shaft and adapted to raise and lower said shaft to throw the lock mechanism into and out of engagement with the door and to turn said shaft to operate the switch, substantially as described.

11. In switch - operating mechanism, the combination, with an inclosure for said mechanism, having a door, (one or more,) and lock mechanism for the door controlled by the switch-operating mechanism, of a switch-operating shaft, a switch-lever, and a switch-lever lock comprising a movable bar having projections adapted to extend into the path of the switch-lever, substantially as described.

12. In switch - operating mechanism, the combination, with the switch-operating shaft and its lever and stand, of a suitable wheel sustained by said stand and adapted to be engaged by the lever when the switch-lever is raised, and a suitable connection leading from said wheel and adapted to operate a danger-signal, substantially as described.

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