(No Model.)

A. G. CUMMINGS.

INTERLOCKING APPARATUS.

No. 270,024. Patented Jan. 2, 1883.

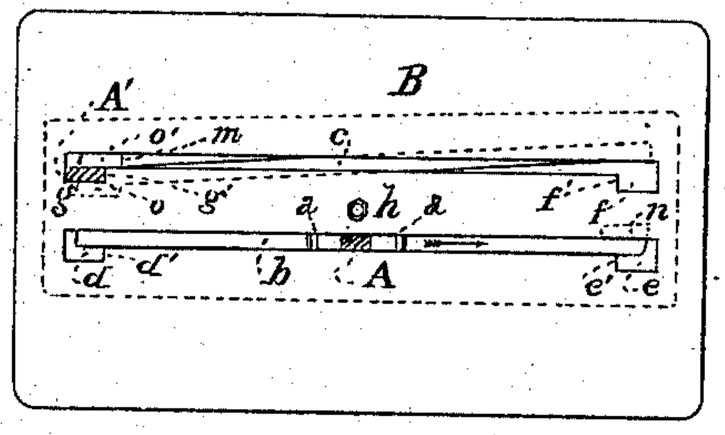


Fig. 3.

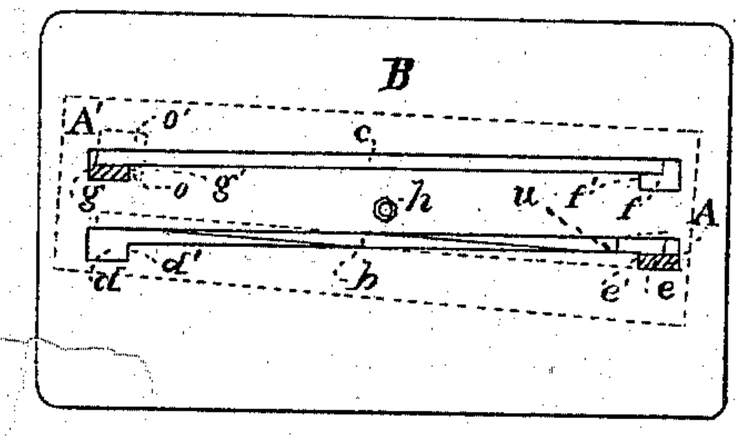


Fig. 4.

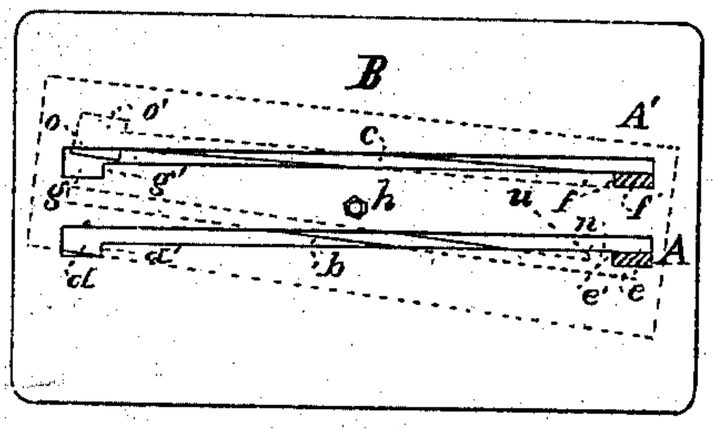


Fig. 5.

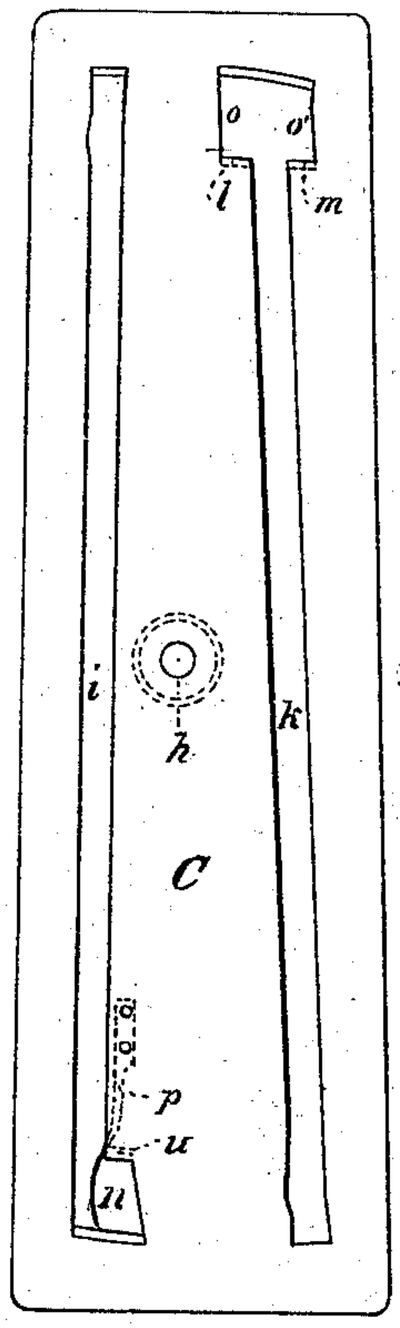
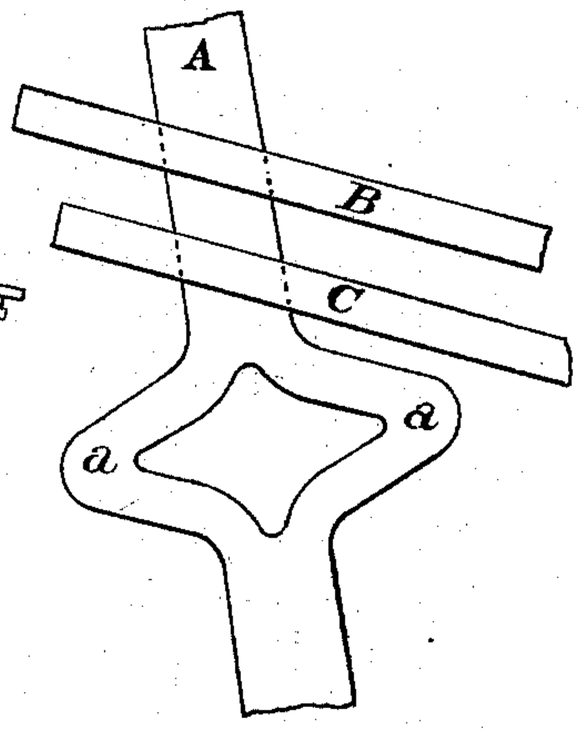


Fig. 6.

Fig. 7.



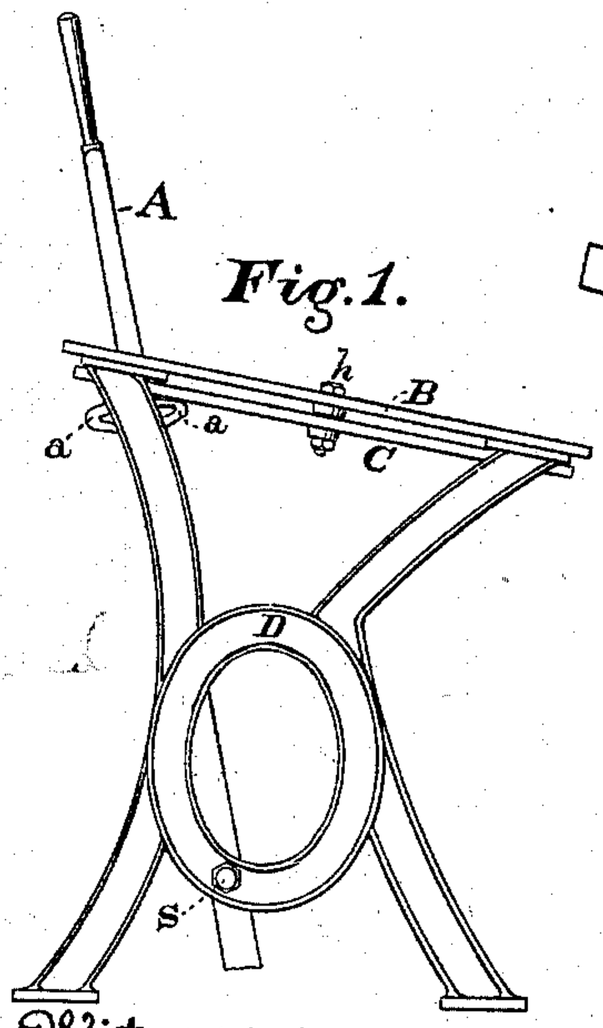


Fig. 1.

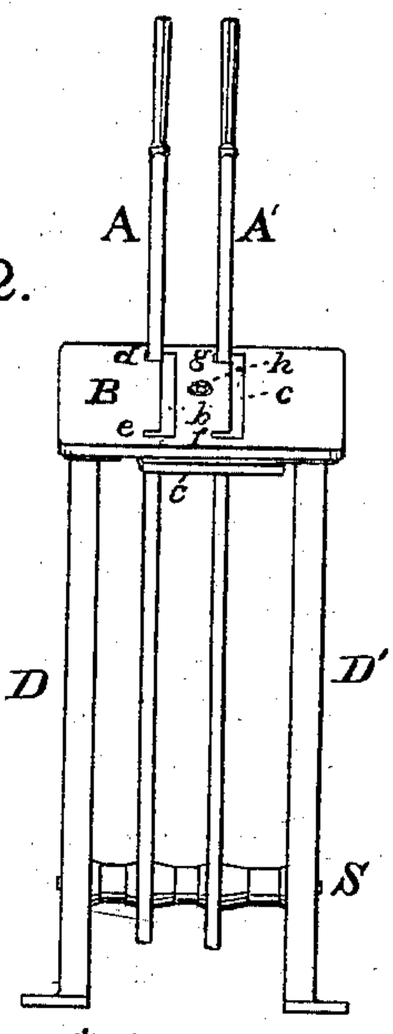


Fig. 2.

Witnesses.
By: C. Fraley
J. Walter Douglass.

Inventor.
Albert Gallatin Cummings;
by Henry Baldwin Jr. Atty.

UNITED STATES PATENT OFFICE.

ALBERT G. CUMMINGS, OF HARRISBURG, ASSIGNOR TO THE PENNSYLVANIA STEEL COMPANY, OF STEELTON, PENNSYLVANIA.

INTERLOCKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 270,024, dated January 2, 1883.

Application filed June 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALBERT GALLATIN CUMMINGS, of Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Interlocking Apparatus, of which improvements the following is a specification.

My invention relates to the operation of railroad switches and signals; and its object is to provide a device simple in construction and positive in its action, whereby the switch-lever and signal-lever shall be interlocked, so that the switch-lever cannot operate to shift the switch until the signal has first been set to indicate "danger," and so long as either one of the levers is unlocked and free to be operated the other lever is locked and secured in its position by the operation of the one which is unlocked or moving.

To these ends my invention consists in combining with the switch and signal levers a fixed guide-plate and an oscillating locking-plate, so that the levers are respectively controlled by the guide-plate, while their movements under such control actuate the locking-plate, which in its turn prevents the operation of both levers simultaneously, and co-operates with the guide-plate in making the control of the movements of the levers positive. The guide-plate is provided with recesses and slots in which the levers can be moved laterally and longitudinally in right lines, the recesses having shoulders against which the levers will be locked in their normal or reversed positions. The locking-plate is provided with slots and recesses, which permit it to accommodate itself to the movements of the levers, and in thus accommodating itself to perform its special functions. The levers not only oscillate the locking-plate at the proper time, but they also prevent its movement except at the proper time, and while moving in right lines each lever moves under lateral tension, which is applied at the beginning and removed at the end of each throw. Both levers may be free to move laterally at the same time, but in no case can both of them be moved longitudinally at the same time, the combination of the levers with the slotted and recessed fixed guide-plate and the slotted and recessed oscillating locking-plate being such that the simultaneous lateral movement of both of the levers into or out of the recesses would always leave one of them locked by the locking-plate against longitudinal movement until the one which is not so locked has reached the opposite end of the guide-plate and is locked against longitudinal movement by one of the shoulders in the recess. In practice, only one lever is moved either laterally or longitudinally at a time, and consequently the operation of this combination is such, in whatever position the levers may be, that one or the other of them is always either locked against longitudinal movement by the locking-plate before the other lever is thrown, or else is so locked at the very commencement of the throw of the other lever, and remains so locked during and at the end of this throw.

In the accompanying drawings, which form part of this specification, Figure 1 is a side elevation of an interlocking apparatus embodying my improvements, and Fig. 2 is an end elevation of the same. Figs. 3, 4, and 5 are plan views, on an enlarged scale, of the guide-plate or top of the frame, showing also the levers in cross-section and the oscillating locking-plate in dotted lines, said levers and locking-plate being thus indicated in the relative positions which they respectively occupy at different points of their movements, as hereinafter more particularly explained. Fig. 6 is a plan view, on a still larger scale, of the oscillating locking-plate; and Fig. 7 is a side view, on the same scale as Fig. 6, of portions of a lever and of the locking devices.

D D D′ represent a frame, which may be of any ordinary form suitable for supporting the guide-plate B, which is permanently secured across the top of the frame. A strong rod or pin, S, with proper spacing-thimbles, serves to tie the frame together at its lower end, and affords a separate fulcrum for each of the switch and signal levers A A′. This frame is of cast-iron, and is firmly secured in its proper position upon a bed-piece in the ordinary manner. It will be observed that the frame is shown as having its upper surface inclined, the object of which is to give it the advantage of readily

shedding rain or snow or other accumulations. The connections leading from the lower ends of the levers respectively to the switch and signal are not shown, as their construction is well understood.

The guide-plate B is provided with two parallel slots, *b* and *c*, in which the upper ends of the levers A A′ respectively move lengthwise of the guide-plate, and at each end of each of these slots is a lateral recess, *d e f g*, into and out of which the levers are moved, as hereinafter described. It is to be observed that as the levers move longitudinally in parallel lines, so they move laterally in one direction, whether right or left. The fulcrum of each of the levers is perpendicular to the lateral recesses *d e* and *f g*, while the slots *b* and *c* are located so far to one side of these perpendiculars respectively that when the lever is moved into the slot its deflection from a straight line will give the lever a positive bearing upon the side of the slot, and under this lateral tension it will constantly tend to spring back into whichever one of the recesses it may be moved opposite to, and the shoulders *d′ e′ f′ g′* of the respective recesses will then hold the lever in its normal or its reversed position, according to the direction of its movement.

Beneath the guide-plate B, and parallel thereto, is the locking-plate C, Fig. 6, centrally suspended from the guide-plate by the pivot *h*, upon which it oscillates. This oscillating locking-plate C is provided with two longitudinal slots, *i* and *k*, of equal length, but not parallel with each other, one of them being in line with the adjacent side of the locking-plate, while the other is at an angle to that line, diverging therefrom twice its own width. The levers A A′ pass through these slots *i* and *k*, respectively, and in their movements oscillate the plate C within the limits allowed by this divergence, as hereinafter described. The straight slot *i* is enlarged at one end by a recess, *n*, which forms an abrupt lateral shoulder, *u*, projecting at right angles to the side of the slot. A curved spring, *p*, is secured to the bottom of the plate C, partially beneath the recess *n*, as indicated by dotted lines in Fig. 6, for a purpose to be hereinafter described. The inclined slot *k* is enlarged at the end of it which is farthest from the recess *n* in the slot *i* into a wider recess, *o o′*, which forms abrupt lateral shoulders *l m*, projecting one on each side of the slot.

Each of the levers A A′ consists of a strong flat bar of metal properly pivoted near its lower end upon the rod or fulcrum-pin S, and having proper portions of its length fitted to move snugly but not too tightly in and out of the slot *b* and recesses *d e* and slot *c* and recesses *f g* in the guide-plate B, and along the slots *i k* and recesses *n*, *o o′* in the locking-plate C, through both of which plates the levers pass, as seen in Figs. 1 and 2. At that part of each of the levers which is just beneath the locking-plate C, I make an enlargement, *a*, Figs. 1 and 7, by spreading the metal, as shown, in width, but not in thickness, which enlargement will pass freely through the slots *i k* of the locking-plate. It will be seen that when either of the levers is at the end of its throw the enlargement *a a* will be entirely below the locking-plate; but whenever the lever is moved into and along its slot in the guide-plate, then the enlargement *a a* enters the corresponding slot in the locking-plate and gives an increased width of bearing in that slot as the lever reaches the point about which the locking-plate oscillates, and by this increased bearing the locking-plate is prevented from moving at this part of the throw of the lever, so as to release the other lever, as it will be readily understood it might do but for the increase of bearing given to compensate the approach of the lever to the center or pivot of oscillation of the plate.

The operation of the device is as follows: The lever A is connected with the signal and the lever A′ with the switch in the usual manner, and we will assume them to be respectively in the positions shown in Figs. 1 and 2, the switch being set for the main line and the signal indicating "safety." In this position the switch-lever A′ will be firmly held against longitudinal movement by the shoulder *g′* of the recess *g* in the guide-plate B, its lateral movement being prevented by contact with the side *o′* of the end recess in the locking-plate C. The signal-lever A is at the same time firmly held against longitudinal movement by the shoulder *d′* of the recess *d*, but is free to be moved laterally out of the recess. With the levers in this position it will further be understood that the shoulder *m* of the recess *o o′* is across the slot *c* of the guide-plate, and is thus locked upon the lever A′. If, now, both levers were simultaneously moved sidewise into the slots *b c*, then in such movement the lever A would oscillate the locking-plate C upon its pivot, the shoulder *m* of the recess *o o′* still, however, remaining across the slot *c* in the guide-plate and still locking the lever A′ in this slot, while the slot *b* in the guide-plate and the slot *i* in the locking-plate would be brought into coincidence, and, being unobstructed, would permit the free movement of the lever A in those slots. This movement is indicated in Fig. 3, the lever A having been moved through one-half of its arc, as shown, and the enlargement *a a* on the lever restraining the oscillation of the locking-plate, and preventing the release thereby of the switch-lever from the shoulder *m*. The locking of the lever A′ cannot be disturbed until the lever A has completed its longitudinal throw and has been sprung under its tension into the recess *e* in the guide-plate, when the lateral movement of the lever A, in entering said recess *e*, further oscillates the locking-plate C upon the pivot *h*, so as to bring the slot *k* of the locking-plate into coincidence with the slot *c* of the guide-plate B and throw the shoulder *u*

of the locking-plate C across the slot *b* of the guide-plate B, so as to close the slot *b* against backward movement of the signal-lever A. This position is shown in Fig. 4. The levers in this position are held against longitudinal movement in the recesses *g* and *e*, respectively, at the opposite ends of the guide-plate, and each of them is free to be moved laterally out of the recesses *g* and *e;* but they cannot both be moved along the slots simultaneously, as the longitudinal movement of either one of them instantly locks the other—that is to say, the signal being now (Fig. 4) set at "danger," the switch is to be shifted, for which operation the lever A′ must be moved out of the recess *g* into the slots *c k*, and along those slots until it reaches the end of its throw and springs into the recess *f*, when the plate C will be oscillated to its extreme position, and thus bring the lever A′ against the shoulder *f′*, locking it in that position. Meanwhile, immediately upon bringing the lever A′ into the slots *c k*, the lever A has been locked against longitudinal movement, because this movement of A′ secures the shoulder *u* of the slot *i* in its position across the slot *b*, and this locking of A against longitudinal movement cannot be disturbed again until the lever A′ has been restored to its normal position; but the lever A may still be moved laterally simultaneously with A′. Fig. 5 shows this operation and the reversed position of the levers, as Fig. 1 shows their normal position; and it is in bringing the levers to this reversed position that the spring *p* comes into operation. This spring is fitted upon the locking-plate in such position as to extend under the recess *n* and bear against the side of the lever A, so as to constantly tend to throw the locking-plate into a straight line, and thus to press the lever A away from the shoulder *u* of the recess *n*. It will be seen that whenever the lever A′ is moved out of the recess *g* and along the slots *c* and *k*, as above described, this spring will tend to press the lever A toward the straight side of the slot *i;* but when the lever A′ has been moved into the recess *f*, and the locking-plate oscillates to its extreme position, the lever A will push the spring away and bear against the shoulder *u* until the position of the locking-plate is so far changed as to relieve the spring and allow it again to press the lever away from the recess *n*.

I have shown the slotted and recessed plates B and C as the best form for controlling and holding the levers; but it is obvious that these slots and recesses may be varied in their relative positions to adapt them to other positions of the levers, and that any other form of catches or holders may be substituted for the recesses at the sides of the slots. I therefore do not desire to limit my invention to the precise arrangement shown, nor to any details of construction of the several parts, so long as the locking of the levers is accomplished by their lateral movement in conjunction with a centrally-pivoted oscillating plate.

The spring *p* can be omitted and the interlocking of the levers may still be perfectly secured, requiring only to have the locking-plate C moved over by hand with the signal-lever whenever the latter is withdrawn from the recess *e*. It will be noticed that the positive locking of each lever is effected by the lateral movement which unlocks the other or controlling lever, and not by the throw of the lever in the slots, although the locking so effected is maintained by the presence of the levers in the respective slots.

It will be understood that it would be possible to have the slots *b*, *c*, *i*, and *k* barely wide enough to allow the longitudinal movement of the levers; but as such appliances are exposed to the weather and to the accumulation of obstructions upon them, and, moreover, do not require nice fitting, I deem it more practicable to make the slots wide enough to admit of some play for the levers, depending upon the enlargements *a a* to prevent any appreciable oscillation of the locking-plate.

Having thus described the nature and object of my improvements, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a switch-lever, a signal-lever, a fixed slotted and recessed guide-plate, and an oscillating slotted and recessed locking-plate, substantially as and for the purposes described.

2. The combination, with the oscillating locking-plate, of the enlargements *a a* on the levers, substantially as and for the purposes described.

3. The locking-plate C, perforated, slotted, and recessed, as described, so that it may be pivoted to the guide-plate and oscillated upon the pivot, substantially as and for the purposes described.

ALBERT GALLATIN CUMMINGS.

Witnesses:
JNO. M. MAJOR,
J. H. SHOPP.