(No Model.) 2 Sheets—Sheet 1.

J. P. O'DONNELL.

METHOD OF INTERLOCKING RAILWAY POINT AND SIGNAL LEVERS.

No. 419,157. Patented Jan. 7, 1890.

Fig. 1.

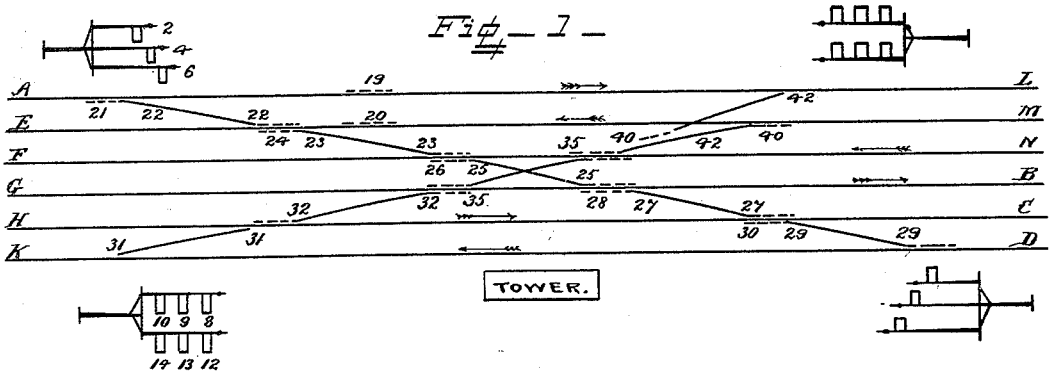


Fig. 2.

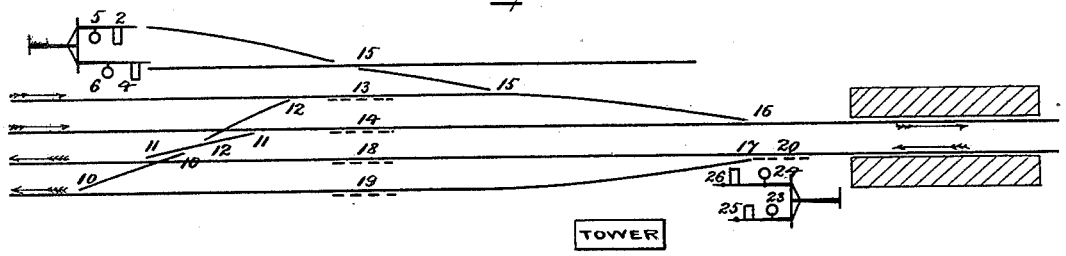


Fig. 3.

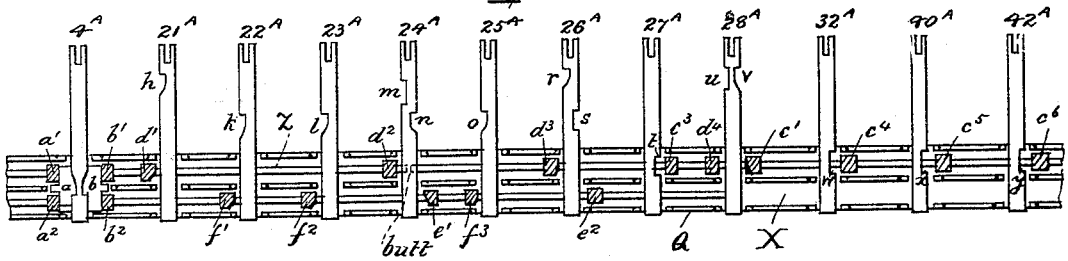


Fig. 3a.

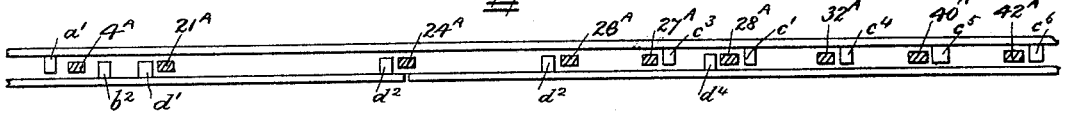
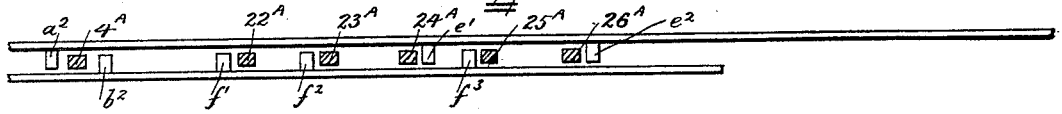


Fig. 3b.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

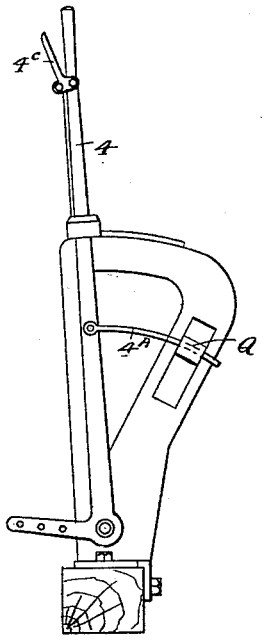


Fig. 5.

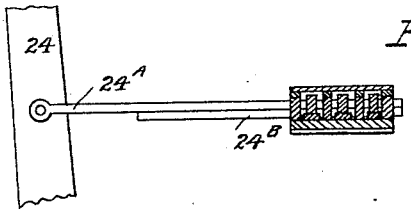
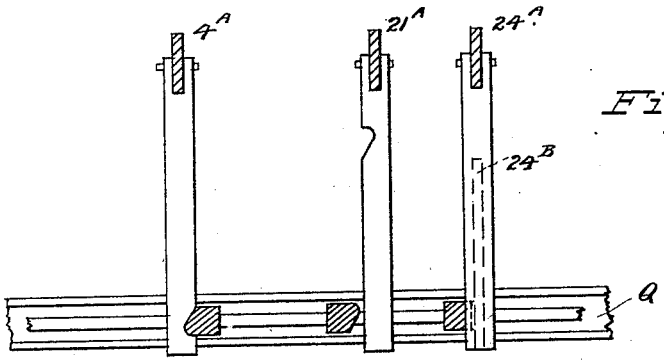


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN PATRICK O'DONNELL, OF NEW MALDEN, COUNTY OF SURREY, ENGLAND.

METHOD OF INTERLOCKING RAILWAY POINT AND SIGNAL LEVERS.

SPECIFICATION forming part of Letters Patent No. 419,157, dated January 7, 1890.

Application filed May 14, 1889. Serial No. 310,787. (No model.) Patented in England June 13, 1887, No. 8,486.

To all whom it may concern:

Be it known that I, JOHN PATRICK O'DONNELL, a subject of the Queen of Great Britain and Ireland, residing at New Malden, in the county of Surrey, England, have invented a certain new and useful method of Interlocking Levers in Railway Point and Signal Apparatus, (for which I have received Letters Patent in England No. 8,486, dated June 13, 1887,) of which the following is a specification.

My invention has reference to obtaining further and more definite protection in traffic movements upon railways by means of my improved system of interlocking the levers in the signal-tower. It is customary, for instance, at the present time to either lock all conflicting points by the respective signals or directly lock all conflicting points by any facing-point lock or other bar-lever whose bar may be fixed either intermediate of or beyond the fouling-points. It is obvious the former affords no absolute protection whatever for points at a distance, while the latter case causes great inconvenience to shunting operations. With my improved system of locking I remedy this by leaving all fouling-points and bars normally free of each other; but when the respective signal has been lowered, (the bars having previously released the signal,) although the signal may be immediately replaced to "danger," still the conflicting points are held locked until the bar-lever has been replaced to its normal position.

Figure 1 is a single-line sketch plan of a signaling-section, three lines of way in one direction and three in the other direction. Fig. 2 is also a single-line sketch plan of a signaling-section, but is introduced to illustrate my method of locking by means of bars 13 14 18 19. The numbers in Figs. 1 and 2 indicate the levers of the locking apparatus in the signal-tower set apart for working the respective points, signals, and safety or locking bars to which they are shown in the plans. Fig. 3 is a plan of a locking-case with cover removed, through which the tappets slide, the said tappets being actuated by the respective levers to which they are attached. The numbers in this figure represent the tappets attached to the levers of the locking apparatus in the signal-tower—for instance, 4^A to lever 4, 21^A to lever 21, and so on. Fig. 3^a is a longitudinal vertical section through the tappets operating in channel Z, and Fig. 3^b is a similar section showing the tappets operating in channel X, both views showing the respective slides and locks operating in connection with said tappets. Fig. 4 is a side elevation of the locking apparatus in the signal-tower. 4^A is the tappet worked by lever 4, and Q the locking-case through which the tappets slide. Fig. 5 is a side view of a tappet 24^A, attached to the lever (partly shown) 24. This tappet 24^A, instead of having a square notch, like *m*, tappet 24^A, Fig. 3, has a rib 24^B on the under side, acting in a similar manner and for a similar purpose to the notch *m*, above referred to. The rib 24^B is therefore an equivalent for the square notch *m*. Fig. 6 is a plan of a locking-case with cover removed, showing how a rib 24^B of tappet 24^A, as in Fig. 5, performs all the duties performed by the square notch *m* of tappet 24^A, Fig. 3.

In Fig. 3 it will be observed the tappets are provided with notches, (the square notches *m s t u w x y*, or equivalent pawls or ribs, are necessary for my novel mode of interlocking; I therefore call them "rotation-tappets,") which free the movements of or are locked by certain locking-pieces.

In Fig. 1 the middle arm of the three-arm bracket-post is worked by 4 in the signal-tower and applies for trains from A to B. Before, however, this lever 4 can be worked to deflect the said arm, it is necessary that the crossing-points worked by levers 22 23 25 should be moved over, and again it is further necessary that the facing-points should be bolted by moving over levers 21 24 26 28, which work the facing-point locks. The method of bolting facing-points and the reasons why such bolting of the stretcher-bar of the facing-points is essential in railway-signaling are so well known in the art as not to require detailed description. In large stations and busy yards where shunting is carried on to any extent, especially where fly-shunting is necessary, it is extremely inconvenient to make switch-points lock each other. It is therefore usually effected by making the respective signal-levers

lock the conflicting switch-point levers. It will be seen, however, that little real safety is insured by the latter method, as when the signal-lever is replaced (that is to say, when the back lock is taken off the releasing-point and point-lock levers) all levers are free to be moved.

In following the traffic movement in Fig. 1 (the facing-points worked by lever 27 are some two hundred yards or more from the signal worked by lever 4) it will be understood that upon the signalman replacing lever 4 to normal he is at liberty and has ample time to replace levers 28 27, possibly splitting the train as it arrives at the switch-points worked by the latter lever. The signalman can also open either of the crossings worked by levers 32 40 42, and so make the roads for any movement through them.

Under most conditions it is not desirable that point-lock levers should release each other, and again it is still less desirable, as previously mentioned, that bar-levers should directly lock point-levers, (other than the immediate facing-point levers to which they apply.) It is therefore to overcome these inconvenient and sometimes dangerous systems that I have arranged my novel mode of interlocking.

In the matter of lever 4, it has no direct interlocking with levers 32 40 42; neither have the point-lock levers 21 24 26 28 any connective releasing with each other—that is to say, they are normally free of each other. When, however, the said lever 4 is released and the signal deflected, my novel method of locking compels the point-lock levers 21 24 26 28 to be replaced in a certain rotation, as will be hereinafter described, which has the effect, as far as safety is concerned, as though facing switch-points worked by levers 27 were situated at the signal worked by lever 4. Again, with respect to the crossing-points worked by levers 32 40 42, they cannot be moved unless point-lock lever 28 has been replaced. Normally point-lock lever 28 does not lock crossing-point levers 32 40 42 until lever 4 has been worked. It is obvious, then, that any possible combinations of shunting movements may take place, switch-point and point-lock levers being normally quite free of each other, and it is only when a passenger-signal lever has been worked that my novel mode of "safety" (otherwise rotation) locking comes into operation.

I will now describe the action of the locking mechanism necessary to effect this desirable result, reference being made for that purpose to Fig. 3. Before tappet 4^A is free to be moved forward the notch V of tappet 28^A must be moved in front of lock c', notch r of tappet 26^A must be moved in front of lock d^3, notch m of tappet 24^A must be moved in front of lock d^2, notch k of tappet 22^A must be moved in front of lock f', notch l of tappet 23^A must be moved in front of lock f^2, notch h of tappet 21^A must be moved in front of lock d', notch n of tappet 24^A must be moved in front of lock e', notch O of tappet 25^A must be moved in front of lock f^3, and square notches s and u of tappets 26^A 28^A must be moved in front of locks e^2 and d^4, respectively. T-locks a and b are loose, and held in position for locking tappet 4^A normal by locks a' a^2 b' b^2. Locks a' c' c^3 c^4 c^5 c^6, which I will call "top locks," are connected together by one slide lying above the tappet. Locks b' d' d^2 (bottom locks) are connected together by another slide, and locks d^3 and d^4 are also connected to a separate slide. The two latter slides butt together under the tappet 24^A. All these locks work in one channel Z. Locks a^2 e' e^2 (top locks) are connected together by one slide, and locks b^2 f' f^2 f^3 (bottom locks) are connected together by another slide. These sets of locks work in channel X. When tappets 21^A, 22^A, 23^A, 24^A, 25^A, 26^A, and 28^A have been moved forward, and tappet 4^A also moved, then tappet 28^A cannot be moved back until tappet 26^A has first been replaced. Tappet 26^A cannot be replaced until tappet 24^A has first been replaced. Tappet 24^A cannot be replaced until tappet 21^A has first been replaced, because when tappet 4^A is moved forward it places square locks in the notches u s m of tappets 28^A 26^A 24^A, and these locks can only be moved out of the said notches by the bevel-locks actuated by the movements of the tappets in the rotation named. In the same way when tappet 4^A is moved forward it places square locks in notches c^3 c^4 c^5 c^6 of tappets 27^A 32^A 40^A 42^A, respectively, thereby effectually locking these tappets until tappet 28^A has first been replaced.

The system of safety-locking in Fig. 2 is carried out in a similar way as that previously described with reference to Figs. 1, 3, and 4—that is to say, that although the levers working points 10 11 12 15 and the levers working the ground safety-bars 13 14 18 19 are normally free of each other, yet when the levers working the respective passenger-signals 25 26 and 2 4 are worked the levers 10 11 12 15 cannot be worked to open the switch-points and foul a respective passenger movement until the levers 19 or 18 or 13 or 14, working the relative safety-bar, have first been replaced, which of course cannot be effected while the train is passing over them. The interlocking of the remaining signals, points, and safety-bars numbered in Fig. 1 by the levers in the signal-tower which actuate them is effected in a similar manner as that previously described with reference to Fig. 2—that is to say, that levers 19 20, working ground-bars, are normally free of conflicting points worked by levers 42 40, &c.—yet when the respective signal-levers are worked the bar-levers must be replaced before the point-levers are free to be actuated. This novel method of interlocking, as will be seen upon reference to Figs. 3 and 6, is effected without the tappets themselves being moved sidewise,

as was the usual method of effecting special locking previous to my present invention.

Sometimes I arrange for special signals for shunting purposes, as the disks upon the bracket signal-post, Fig. 2, worked by levers 5 6 23 24. These levers are quite free of the safety-bar levers 13 14 18 19, respectively, and although the bar-levers may be worked and then the signal-levers, yet when the signal-levers are replaced the point-levers are freed, allowing, if any train is standing upon the bar—say 18 or 19—the front portion to be disconnected. The levers 10 and 11 12 can be worked, actuating the points right for the front portion to be shunted through them without the rest of the train being moved back clear of the bars worked by levers 18 or 19. The latter inconvenient shunt-back movement would have to take place if the bar-levers 18 19 actually locked the point-levers, as was usually done before my present invention.

It is obvious that tappets for effecting my novel method of interlocking may be actuated either by the movement of the lever itself, as hereinbefore described, or they may be actuated by the movement of the catch-handle 4^c, Fig. 4, or by the joint movement of the catch-handle 4^c and lever 4, or by any of the methods well known in the art.

The rib shown in dotted lines in Fig. 6 moves with the lever until the lock can pass the end of it, and the said lock then prevents the return motion of the lever until moved back, so that the lever may slide past it.

What I claim is—

A method of operating railway safety-bar, point, and signal levers, which consists in leaving the safety-bar levers normally free of each other and the safety-bar and point levers normally free of each other until a signal-lever shall have been operated, the signal meanwhile remaining locked until all the safety-bar levers on the line governed by the signal shall have been properly set, then in locking all the safety-bar levers which relate to this line of track and all conflicting switch-levers by the setting of the signal for this line, and then in interlocking these safety-bar and point levers in a certain necessary and prearranged rotation—namely, by resetting first the lever which actuates the first safety-bar in the line of travel, then the lever which actuates the second safety-bar in that line, and so on—the lever last reset unlocking the levers of the switches which conflict with that line of travel.

JOHN PATRICK O'DONNELL.

Witnesses:
WILMER M. HARRIS,
WALTER J. SKERTEN.