

(No Model.)

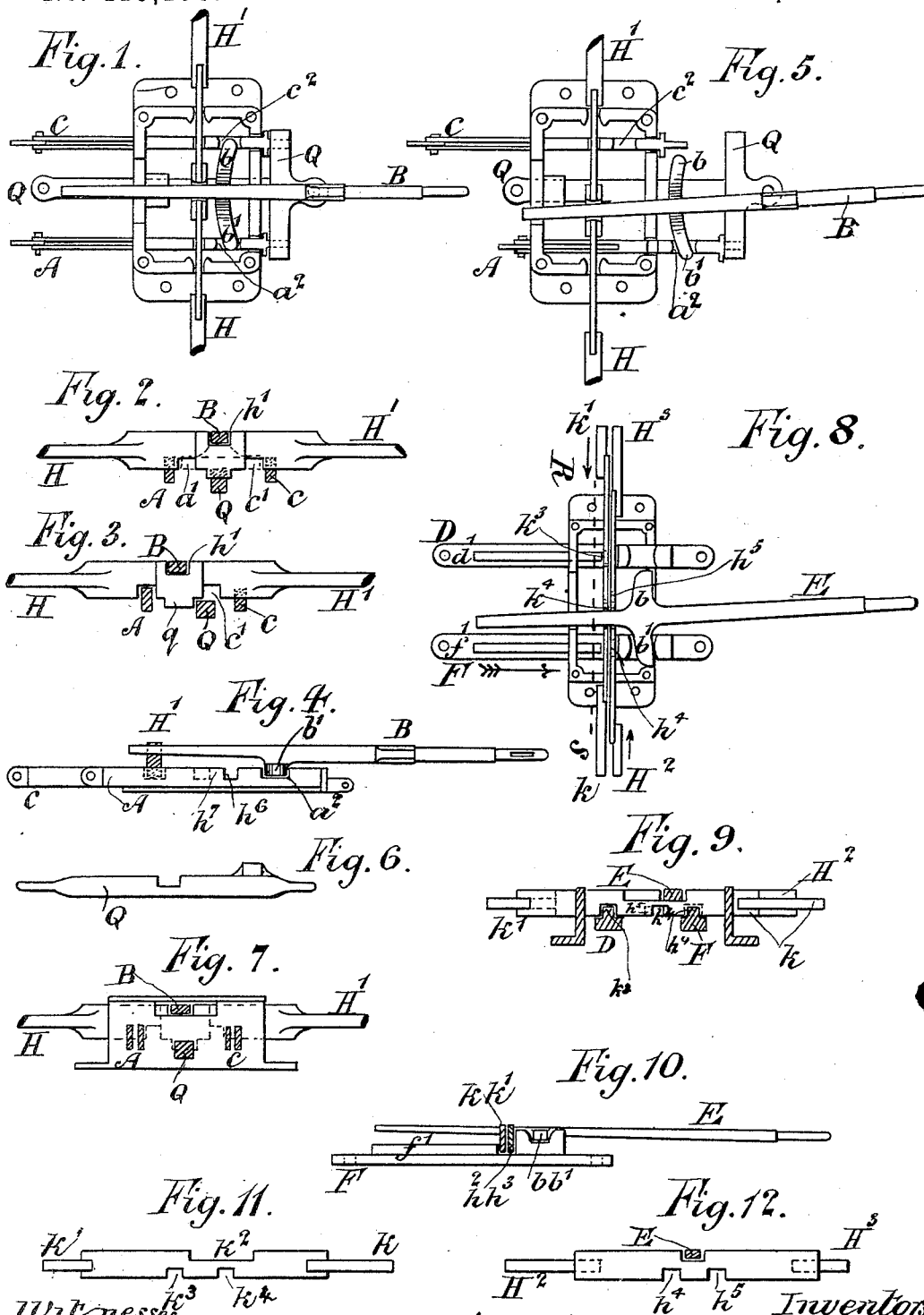
2 Sheets—Sheet 1.

J. HILL, W. SMITH & J. P. O'DONNELL.

INTERLOCKING SIGNAL APPARATUS.

No. 419,170.

Patented Jan. 7, 1890.



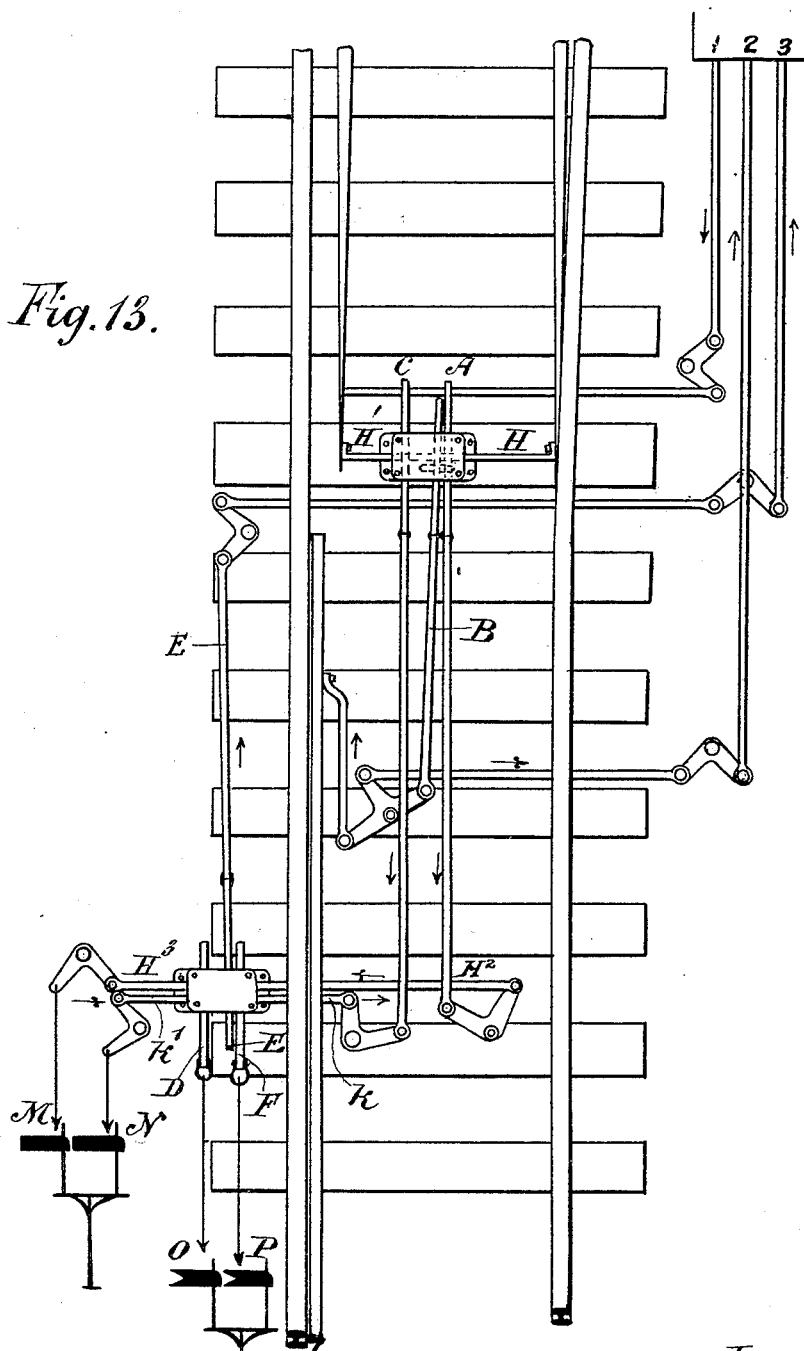
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Fig. 13.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEPH HILL, OF WALWORTH, WILLIAM SMITH, OF HERNE HILL, AND  
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ENGLAND.

## INTERLOCKING SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 419,170, dated January 7, 1890.

Application filed August 6, 1889. Serial No. 319,861. (No model.) Patented in Belgium January 25, 1888, No. 80,379; in France February 6, 1888, No. 188,585; in England February 13, 1888, No. 2,176; in Canada May, 21 1888, No. 31,410; in Germany July 27, 1888, No. 47,718, and in Italy December 8, 1888, No. 23,959.

*To all whom it may concern:*

Be it known that we, JOSEPH HILL, engineer, of 85 Merrow Street, Walworth, WIL-  
LIAM SMITH, engineer, of 150 Mayall Road,  
Herne Hill, and JOHN PATRICK O'DONNELL,  
signal engineer, of Cambridge Villa, Cam-  
bridge Road, New Malden, all in the county  
of Surrey, England, have invented certain  
new and useful Improvements in the Work-  
ing and Ground-Interlocking of Railway  
Point and Signal Apparatus, (for which we  
have received Letters Patent in Great Britain,  
No. 2,176, dated February 13, 1888; in Ger-  
many, No. 47,718, dated July 27, 1888; in  
France, No. 188,585, dated February 6, 1888;  
in Belgium, No. 80,379, dated January 25, 1888;  
in Italy, No. 23,959, dated December 8, 1888,  
and in Canada, No. 31,410, dated May 21, 1888;) and we do hereby declare that the following  
is a full, clear, and exact description of the  
invention, which will enable others skilled  
in the art to which it appertains to make and  
use the same.

By our invention certain of the cabin-frame  
levers can each perform the work generally per-  
formed by two adjacent levers. The economy  
is effected in such a way that increased safety  
is introduced with the economy gained in  
the saving of, first, each lever; of, second, the  
frame-interlocking arrangements, and of,  
third, the signalman's labor.

As regards point-detecting and point and  
signal mutually interlocking, our principal ap-  
paratus has a separate plunger for each of the  
two positions of the switch-points. Neverthe-  
less, the conformation of the stretcher-bar (as  
in H H') and the method of actuating the two  
plungers (slide-bars A and c) in the case of the  
present invention distinctly differs from ap-  
paratus hitherto styled or classed as "double  
duplicate or duplex point locks and detectors."  
There will, moreover, be found one distinctive  
and unique feature common to all possible  
variations in the form of our apparatus—  
namely, the automatic determination of the  
proper sequence of signaling, locking, and  
unlocking of railway points and signals by  
the sidewise movement (throw) of the

stretcher-bar H H' (otherwise called "tie-  
rod") or a prolongation of the same.

Figure 1 shows an approved and simple  
form of complete single primary machine in  
plan with the stretcher-bar H in an interme-  
diate position, while Fig. 5 represents the  
same machine after the stretcher-bar H H'  
has correctly completed its sidewise move-  
ment to the left and after the selector-bar B  
has been carried out of gear with c into gear  
with A and has drawn A, thereby detecting  
and locking the stretcher-bar H H'.

Fig. 2 shows an elevation of our unique  
stretcher-bar H H', with the bars A B c Q  
shown in section in their relative positions, as  
in Fig. 1—viz., in an intermediate position. In  
this figure h' is the aperture by which B is car-  
ried and the bearing on and through which B  
slides during its draft and return motion. a'  
is the detecting and locking aperture of the  
stretcher-bar H H', which performs its func-  
tions in connection with the cross-action and  
counterpart formation of the slide-bar A.  
Similarly c' is the detecting and locking aper-  
ture of the stretcher-bar H H', which per-  
forms its function in connection with the  
cross-action and counterpart formation of the  
other slide-bar c. The block-piece q on the  
bottom will be omitted when no normal lock-  
ing-bolt is employed.

Fig. 3 shows an elevation of our unique  
stretcher-bar H H', with the bars A B c Q  
shown in section in their relative position, as  
in Fig. 5—viz., after the stretcher-bar H H'  
has correctly completed its sidewise move-  
ment to the left, and after the selector-bar B  
has been carried out of gear with c into gear  
with A and has drawn A, thereby detect-  
ing and locking H. In Fig. 3 will be seen  
the method of locking the points by the bolt  
Q acting against the block-piece q, thereby  
obstructing the movement of the stretcher-  
bar H H'. The slide-bar A in section is also  
shown as locking the stretcher-bar by means  
of the thickened portion h', Fig. 4, passing  
through the aperture a', Figs. 2 and 3.

Fig. 4 is an elevation of the bars A, B, and  
c, free of the case, and of the bolt Q omitted.

A, B, and *c* are in the position shown in the plan of Fig. 5. The selector-bar B engages on one side with A or on the other side with *c* (according as the switch-points are actuated) by means of its underneath fixed double arm or projection or bow-piece *b* *b'* entering, Fig. 1, a counterpart opening or excavation or gap *a*<sup>2</sup> or *c*<sup>2</sup> on the upper faces of A and *c*.

Fig. 13 gives a field view of a method of applying the above apparatus. Therein three cabin-frame levers suffice to work four signals M N O P and one pair of points. No. 1 lever, by rod and crank connections, can work the points only when all signals stand at "danger." When the points stand right for the left-hand main line, then No. 2 lever can work the left-hand stop-signal M. The selector-bar B being in gear with A and drawing the same, whereby the points are both detected and locked, only while B is drawn can the lever No. 3 work the selector-bar E of the secondary machine D E F, and thereby lower the right or the left hand distant signal O or P to "safety," in conformity with M or N, previously lowered. The return actions of the three cabin-frame levers, as will be readily seen, must be in the order 3 2 1. After the points have been moved over to the left, and thus set right for the right-hand branch line, the cabin-frame lever No. 2 will work the stop-signal N, and lever No. 3 following the distant signal P. In the above arrangement it may be observed that the switch-points would only remain locked while their left or right hand stop-signal stood at "danger." A secondary machine D E F only differs from a primary machine in that its selector-bar E in Fig. 13 is carried into and out of gearing with the signal slide-bars D and F of its set otherwise than by an actual switch-point stretcher-bar—for instance, H H', in connection with the primary machine A B *c*.

Fig. 8 is an enlarged plan of a secondary set D E F. H<sup>2</sup> H<sup>3</sup> is the carrying-bar, by means of which the selector-bar E is carried out of gear with F and into gear with D. *d'* and *f'* upon slide-bars D and F, respectively, are raised locking pieces or ribs which prevent the bars D and F from being actuated by the selector-bar E until they are released, respectively, F by the movement of the blade K K' in the direction of the arrow, and D by the movement of the blade H<sup>2</sup> H<sup>3</sup>, also in the direction of the arrow. The movement of K K' places a notch K<sup>4</sup> opposite to and corresponding to the rib *f'*, and as the notch *h*<sup>4</sup> is then right for the free passage of rib *f'* the selector-bar E is therefore free to draw the slide-bar F, which, in Fig. 13, lowers the distant signal P. The movement of K K' corresponds to the previous movement of the stop-signal N. Similarly to draw D, the blade H<sup>2</sup> H<sup>3</sup> must be moved in the direction of the arrow, thereby placing the bow-piece *b* of the selector-bar in gear with D and out of gear

with F. It has also placed the notch *h*<sup>5</sup> opposite to and corresponding to the rib *d'*, and as the notch K<sup>3</sup> is normally right for the free passage of the rib *d'* the selector-bar E is therefore free to draw the slide-bar D, which, in Fig. 13, lowers the distant signal O. The movement of H<sup>2</sup> H<sup>3</sup> corresponds to the previous movement of the stop-signal M. In either and both cases, when the slide-bars A and *c* are drawn, the ribs *d'* and *f'* lock both the slides H<sup>2</sup> H<sup>3</sup> K K', and in doing so back-lock the respective stop-signals M N, according to which of these is lowered, thereby preventing its return to "danger" until the respective distant signal has itself been placed to "danger" and the rib (either *d'* or *f'*) returned clear of the notches in the blades H<sup>2</sup> H<sup>3</sup> K K'. While the blade H<sup>2</sup> H<sup>3</sup> actually carries the selector-bar E into and out of gear, the blade K K', having a wide gap K<sup>2</sup>, Fig. 11, does not carry at all, but simply releases, by means of its notches, as described, normally the slide-bar D, and when worked the slide-bar F.

Fig. 9 is a section across R S, in the direction of the arrow, of the secondary machine D E F.

Fig. 10 is a side view of the blades E F free of the case.

Figs. 11 and 12 are elevations of the blades K K' and H<sup>2</sup> H<sup>3</sup>, showing the gaps and notches referred to in Fig. 8.

Another distinct feature of novelty consists in adding to a primary machine a fourth slide-bar or blade Q, specially devoted to the functions of "normal" locking. This bar Q, in Figs. 5, 6, and 7, will preferably be connected to a rocker-bar, lock-bar, treadle-bar, or safety-bar, where one is used in connection with point-locking, and will of necessity be worked by its own cabin-frame lever by rod-and-crank connections leading to either end. The feature of novelty in this extra bolt or normal locking-bolt Q, which locks the points independently, while all signals stand at "danger" consists more especially in its right and left hand arms, whereby it is bound to move with or precede the movement of A or *c* in the event of an attempt being made to draw B, or of B being drawn, from its normal position, while Q stood in its unlocking position; furthermore, the right and left hand arms of Q would insure the correct and full return of A or *c* with B to their normal position in the event of the normal locking-bar Q being moved from its normal or locking position to its unlocking position, while B with A or *c* remained not fully returned home. This novel construction and use of the normal locking-bar Q equally applies to any such system of interlocking points and signals as may resemble our system in the employment of the similitude of our bars A and *c* without the intervention of our actual selector-bar B, or with the intervention, if any, of a mechanical equivalent or mechanical substitute for our selector-bar B.

Our other features of novelty may be considered as more or less subsidiary to the above arrangements and apparatus or to consist in modifications (or more or less subterfuges) of the above arrangements and apparatus, whereby the same or similar advantages are gained.

Having fully described our invention, what we desire to claim, and secure by Letters Patent, is--

1. The combination, with the stretcher-bar H H', coupling the points and provided with notches *a'*, *c'*, and *h'*, of the selector-bar B, sliding in notch *h'* and provided with lateral projections *b b'*, the slide-bars A and *c*, adapted to be locked by the stretcher-bar and to pass through said notches *a' c'*, and lever mechanism for opening and closing the points, thereby moving the notches in front of their respective slide-bars and causing the projections on the selector-bar to engage with said slide-bars according to the direction of movement of the points, substantially as set forth.

2. The combination, with the stretcher-bar H H', coupling the points and provided with notches *a'*, *c'*, and *h'*, of the selector-bar B, sliding in notch *h'* and provided with lateral projections *b b'*, the slide-bars A and *c*, adapted to be locked by the stretcher-bar and to pass through said notches *a' c'*, lever mechanism for opening and closing the points, thereby moving the notches in front of their respective slide-bars and causing the projec-

tions on the selector-bar to engage with said slide-bars according to the direction of movement of the points, and the locking-bolt Q, arranged parallel with bars A and *c* and provided with cross-arms adapted to engage with said bars, said bolt being locked by the stretcher-bar until the points have been fully opened or closed, substantially as and for the purpose set forth.

3. The combination, with the primary apparatus between the rails, comprising the stretcher-bar H H', provided with notches *a' c' h'*, the selector-bar provided with lateral projections *b b'*, and the slide-bars A and *c*, adapted to pass through said notches *a' c'*, respectively, when unlocked by the motion of the points of the secondary apparatus comprising the notched slides H<sup>2</sup> H<sup>3</sup> and K K', operatively connected with said bars A and *c*, respectively, the selector-bar E, and the slide-bars D and F, provided with projections normally locking them with their respective slides until one is caused to engage with the selector-bar by the movement of the notched slide H<sup>2</sup> H<sup>3</sup> and the other released by the movement of the notched slide K K', substantially as and for the purpose set forth.

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