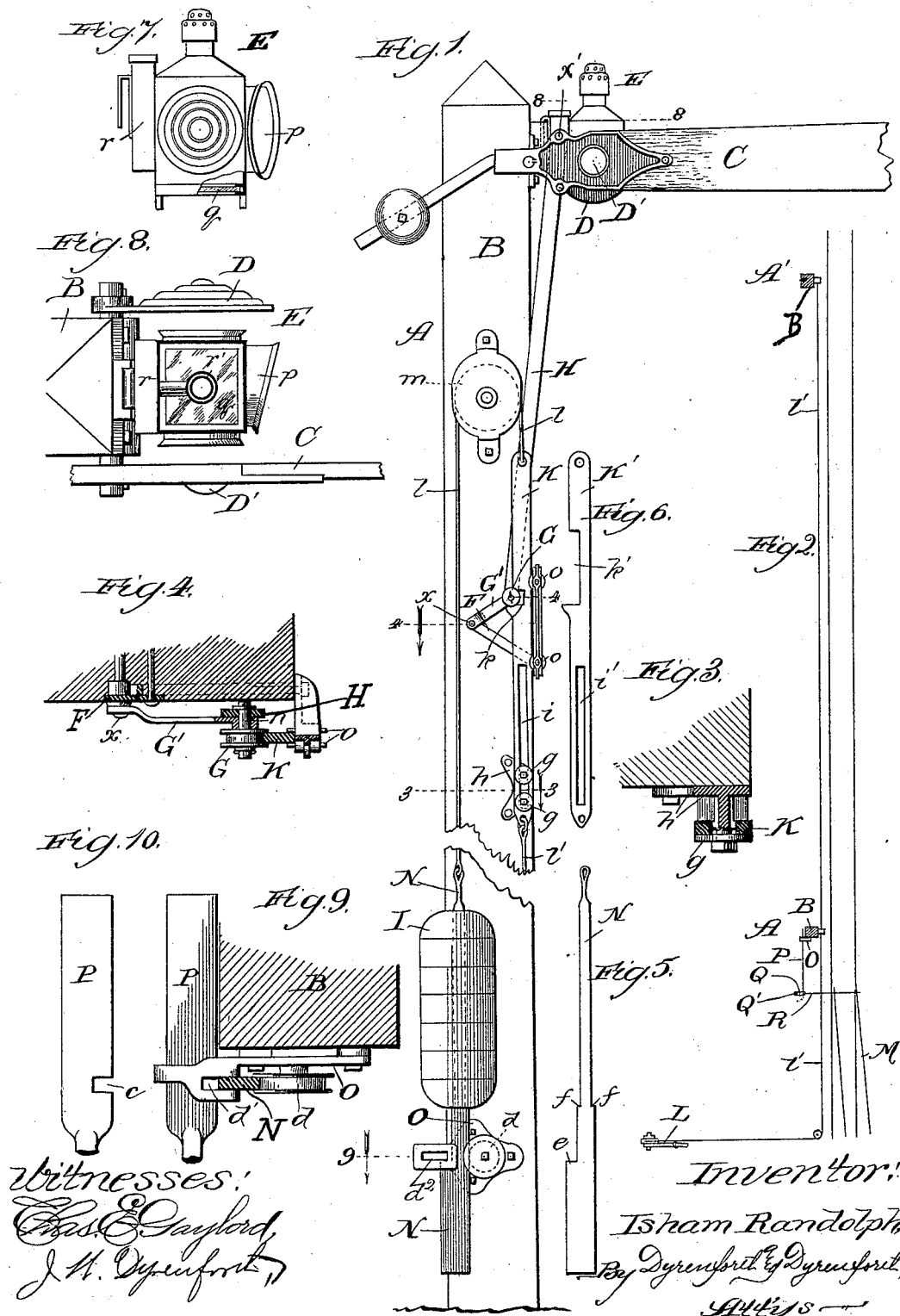


(No Model.)

I. RANDOLPH.
SEMAPHORE.

No. 421,085.

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UNITED STATES PATENT OFFICE.

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SEMAPHORE.

SPECIFICATION forming part of Letters Patent No. 421,085, dated February 11, 1890.

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To all whom it may concern:

Be it known that ISHAM RANDOLPH, a citizen of the United States, residing at Englewood, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Semaphores, of which the following is a specification.

My invention relates to improvements in the class of semaphores employed for railroad-signaling purposes, and to the kind involving a post having pivotally supported upon it a vertically-swinging arm movable to a horizontal position for "danger" and capable of being lowered therefrom to "safety."

Various of the details constituting features of my improvement may be employed to advantage when applied to a "home" semaphore only, though I intend them also for use where a "distant" semaphore is connected with it to be operated by the home semaphore, while other details are designed for use only where a distant semaphore is so connected with a home semaphore.

Among the more important objects of my improvement are the following: To provide a new construction of compensator for use solely as such only where employed for the home semaphore, and serving the further purpose, when used on both a home and a distant semaphore, connected for their co-operation, to effect the movement of the former previous to the latter to "safety," and of the latter previous to the former to "danger," and to provide effectively-operating means for locking the home semaphore at "danger" and to prevent its being adjusted to "safety" until the switch to which the semaphore relates has been set for the main track, and to prevent the switch from being opened until the semaphore has been moved to "danger."

In the accompanying drawings, Figure 1 is a view in broken elevation of a home semaphore provided with my improvements. Fig. 2 is a diagram representing a home and a distant semaphore connected together and indicating the location and manner of operation of the locking device. Figs. 3 and 4 are sections taken, respectively, on the lines 3 3 and 4 4 of Fig. 1, viewed in the direction of the arrows and enlarged. Figs. 5 and 6 are views in elevation of different details. Fig. 7 is a broken view, in side elevation, of a semaphore-

lamp; Fig. 8, a broken sectional plan view of the semaphore shown in Fig. 1, but enlarged over the latter, the section being taken through lamp on the line 8 8 of the first figure; Fig. 9, a section taken on the line 9 of Fig. 1, enlarged, and viewed in the direction of the arrow; and Fig. 10, a broken plan view of the switch-locking bar shown in Fig. 9.

A is the home semaphore involving a post B, supporting the pivotal vertically-swinging arm C (which may be weighted near its rear end, as shown, to counterbalance it) and mechanism through which to produce the movements of the arm. The semaphore-arm is supported at one side of the post B, and at the opposite side I provide a lens D, which should also be pivotally supported on the post and on the pivot of the arm C.

Between the lens D and arm C is the signal-lamp E, of a usual construction of such lamps, except that it is provided on its rear side, at which it is suspended on the post, with an oil-reservoir *r*, communicating with the burner *r'*, (see Fig. 8,) and has a glass or transparent bottom *g*, Fig. 7, and a lens *p*, extending beyond the front side or side nearest the track, at an angle toward the semaphore-arm to throw light directly on the latter, whereby, with the transparent bottom permitting the light to shine below the lamp, the post and arm are rendered refulgent in a degree tending the more to attract notice to it.

F is a triangular bracket having a pivot-pin *x* near its vertex and carrying in suitable bearings, lateral of its diverging extremities, flanged anti-friction rollers *o*. The bracket F is secured to the post B in the position illustrated, (being preferably let into the post along its diverging arms,) and on its pivot-pin *x* it supports an arm *G'*, shorter than the diverging arms of the bracket and carrying at its free end an anti-friction roller *G* like the rollers *o*, and the shaft *n* of which extends beyond the roller toward the bracket and has pivoted upon it one end of a link H, the opposite end of which is connected with the arm C, forward of its fulcrum, at *x'*.

A pulley *m* is supported on the post B to guide a rope *l*, cable, or chain, carrying at one end a weight I, (which may involve a peculiar construction, as hereinafter described,)

and being connected at its opposite extremity with the upper end of a bar K, movable between the rollers *o o*, at one of its lateral edges (embraced by the roller-flanges) and the roller G at its opposite edge, (also embraced by the flanges of that roller,) where it is provided with a recess *k*, serving a purpose hereinafter explained. Toward the lower end of the bar K, from which it is connected by a rope *l'*, cable, or chain with the operating-lever L, as indicated in the diagrammatic view presented in Fig. 2, it is provided with a longitudinal slot *i*, through which extends a bearing *h*, fastened to the post B and supporting washers *g*, which thus bear against the outer side of the bar K and hold it in its reciprocating movements against the post.

The operation of the mechanism thus far described is as follows: As illustrated, the arm C is in its normal or "danger" position. To move it to "safety," the lever L is actuated to pull downward on the bar K through the medium of the rope *l'*, (and against the resistance of the weight I, which returns the arm to "danger" when the lever L is released.) The notch *k* on the bar K engaging the roller G turns the latter downward through the arc of a circle, and thereby pulls down the semaphore-arm, owing to the connection of the latter with the shaft of the roller G, through the medium of the link H. When the bar K has been lowered so far as to bring the notch *k* sufficiently low to have passed the roller G, (owing to the movement of the latter through the arc of a circle,) further pulling on the rope *l'* will move downward the bar K without affecting the arm C, since the bar will slide between the rollers *o o* and G, owing to the connection of the semaphore-arm with the arm G', and not with the bar K. Thus since to effect movement of the arm C the notch *k* must move into a position to engage the roller G, whether the rope *l* or the rope *l'*, or both, become lengthened or shortened in their use, the semaphore-arm will not thereby be affected, so that the roller G on its pivotal arm G' acts as a compensator.

My improvement as thus far described is especially designed, however, for use with a distant semaphore A', Fig. 2, constructed exactly like the semaphore A as to its post, arm C, and mechanism for actuating the arm, except as to the weight, which, like that on the home semaphore, may be of any ordinary construction, and except as to the bar connecting the weight with the lever L, which bar for the distant semaphore is illustrated in Fig. 6 and therein denoted as K', the difference between the bars K and K' being that the latter has a lateral recess or notch *k'* longer than the recess or notch *k* in the former.

With the home semaphore connected with the distant semaphore the operation is as follows: The connection is made by causing the medium *l'* to extend (of course, as usual, over suitably-located guide-pulleys, not shown) to

the distant semaphore A', as indicated in Fig. 2, at which it is connected with the lower end of the bar K' thereon, whereby when the bar K is lowered in the manner described, the bar K' will be simultaneously and correspondingly lowered. When the semaphore-arm of the home device is in the "danger" position, at which it is illustrated, and the notch *k* in the bar K in position to engage the roller G, all as described, the roller G on the bracket F of the distant semaphore A' is at or near the center of the longer notch *k'* of the bar K', so that the downward movement of the bar K' will not affect the signal-arm of the distant semaphore until that of the home semaphore has been lowered to "safety" and the notch in the bar K has passed its roller G. Then the notch *k'* will have engaged at its upper end with its roller G, and further drawing on the rope *l'* from the lever L will pull down farther both bars K K', the former, as described, without more affecting the home-signal arm, and the latter thereby pulling the semaphore-arm of the distant signal to "safety." Obviously when the lever L is released to permit the weights I to raise the signal-arms of the two semaphores to "danger," the arm of the distant semaphore will be first so raised by the access first into the notch *k'* of the bar K' of the adjacent roller G, after which the bar K will reach an elevated position, bringing its notch *k* coincident with its roller G, and the continued rise of the bar K with the said adjacent roller in its notch will cause the arm of the home semaphore to be raised to "danger." Thus, as will readily be seen, of the two semaphores the distant one is caused first to show the danger-signal and the home first the safety-signal.

It is desirable to provide a lens D' in the arm C to permit the operator on that side of the semaphore to see through it the light of the lamp E.

The weight I of the home semaphore preferably involves a construction which shall prevent throwing of the switch M, Fig. 2, till the semaphore is caused to display the danger-signal, and which shall prevent the indication by the semaphore of "safety" till the switch has been thrown to the corresponding position.

N is a bar suspended at its upper end from the rope *l*, and having shoulders *f* and *e* at different elevations from its lower end, the former affording a seat for the weight (which may be formed in separately adjustable and removable sections, as shown) and the latter an offset. Directly below the bar N and secured to the post B is a guide O, carrying a flanged anti-friction pulley *d*, and having a slot *d'* opposite the pulley, between which and the slot (in perpendicular line with the weight-carrying bar) the bar N moves. The guide O is also provided with a horizontal slot *d''* at a right angle to and opening laterally into the slot *d'* to receive a bar P, provided with a lat-

eral notch *c*, and extending horizontally from the crank *Q* of the switch-operating spindle *Q'* and at a right angle with relation to the switch-connecting bar *R*.

5 When the switch *M* is set for the side track, or the turning of the spindle *Q'* forces the bar *P* forward sufficiently far to bring the notch *c* coincident with the shoulder *e*, thereby allowing the bar *N* to be raised to permit
10 the semaphore to be moved to "safety," the switch cannot then, owing to the notch *c* embracing the bar *N*, be set for the main track, or closed, until the semaphore has been moved to "danger," thereby bringing the shoulder *e*
15 coincident with or below the bottom of the notch *c*.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a semaphore, the combination, with
20 the post *B*, pivotal signal-arm *C*, and operating-lever *L*, of an arm *G'*, pivotally supported at one end and provided at its opposite end with an anti-friction roller *G*, a link
25 *H*, connecting the arm *C* with the arm *G'*, a reciprocating bar *K*, having a recess *k* and connected from one end with the operating-lever, and a weight *I*, connected with the opposite end of the bar *K*, substantially as
and for the purpose set forth.

30 2. In a semaphore, the combination, with the post *B*, pivotal signal-arm *C*, and operating-lever *L*, of a bracket *F*, secured to the post and provided with anti-friction rollers
35 *o*, an arm *G'*, pivotally supported on the bracket and carrying at its free extremity an anti-friction roller *G*, a link *H*, connecting the arm *C* with the arm *G'*, a reciprocating bar *K*,
40 confined laterally on the post between the rollers *o* and *G*, and having a recess *k'*, and connected from its lower end with the operating-lever, and a weight *I*, connected with the bar *K* from its upper end by a rope *l*,
passing over a pulley *m* on the post, substantially as and for the purpose set forth.

45 3. In combination, a home semaphore *A*

and a distant semaphore *A'*, each having a post *B*, a pivotal signal-arm *C*, an arm *G'*, pivotally supported at one end and provided at its opposite end with an anti-friction roller
50 *G*, and a link *H*, connecting the arm *C* with the arm *G'*, a reciprocating bar *K* on the post of the home semaphore, having a recess *k* and connected from one end with the operating-lever by a rope *l'*, and a weight *I*, connected
55 with the opposite end of the bar *K*, a reciprocating bar *K'* on the post of the distant semaphore, having a recess *k'* and connected from one end with the rope *l'*, and a weight *I*, connected with the opposite end of the bar
60 *K'*, substantially as and for the purpose set forth.

4. In combination, a semaphore *A*, having a post *B*, a pivotal signal-arm *C*, an operating-lever *L*, a bracket *F*, secured to the post and carrying a pivotal arm *G'*, provided with an
65 anti-friction roller *G*, a link *H*, connecting the arm *C* with the arm *G'*, a reciprocating bar *K*, confined on the post against the said bracket and having a recess *k*, a rope *l'*, connecting the bar *K* from its lower end with the
70 operating-lever, a weight *I*, connected with the opposite end of the said bar by a rope *l*, passing over a pulley *m* and having a bar *N* extending beyond its lower end and provided with a shoulder *e*, a bracket *O*, having a slot
75 *d'*, in which the bar *N* is vertically movable and in which it is confined against lateral play, and a horizontal slot *d²*, opening laterally into the slot *d'*, and a switch-operating spindle *Q'*, having a horizontally-reciprocating
80 notched bar *P*, connected with its crank *Q* and extending at or substantially at a right angle to the switch-connecting bar *R* into the slot *d²*, substantially as and for the purpose set forth.

ISHAM RANDOLPH.

In presence of—

J. W. DYRENFORTH,
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