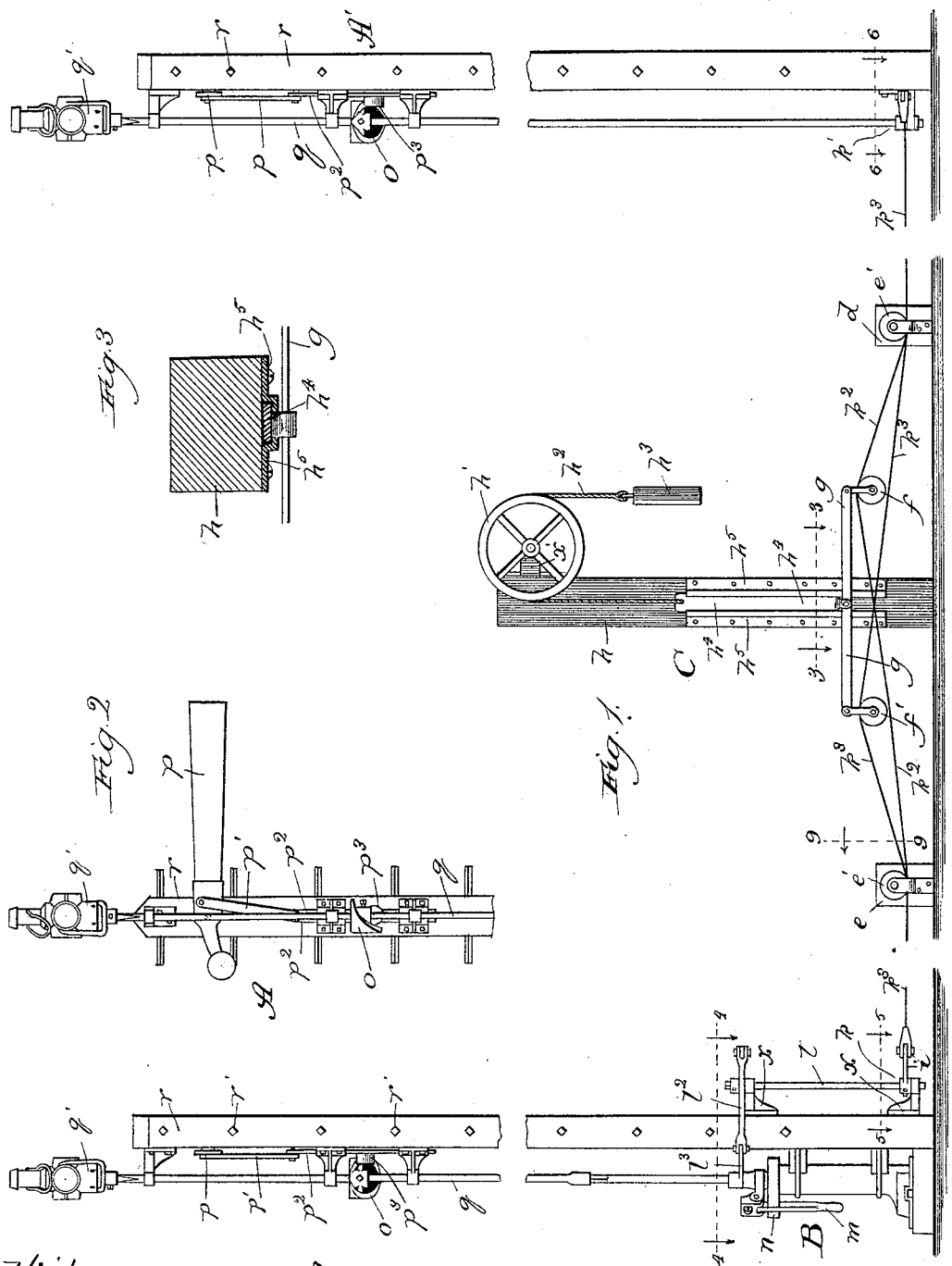
(No Model.) 2 Sheets—Sheet 1.

A. A. STROM.

COMPENSATOR FOR SIGNAL LINES.

No. 385,884. Patented July 10, 1888.



Witnesses:
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Inventor:
Axel A. Strom,
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Attys.

(No Model.) 2 Sheets—Sheet 2.

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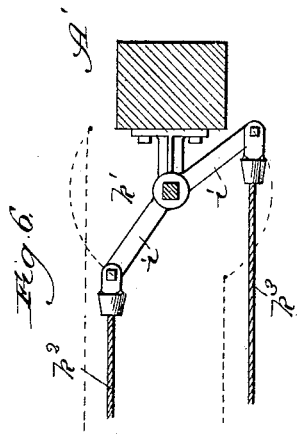

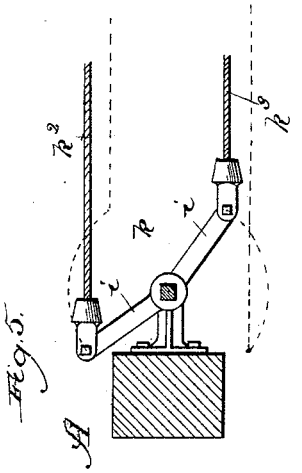

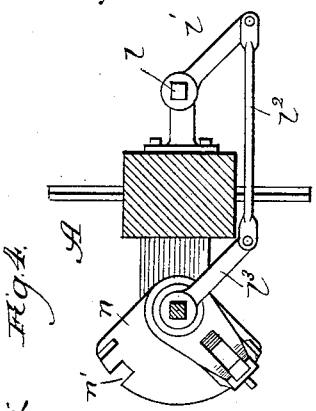

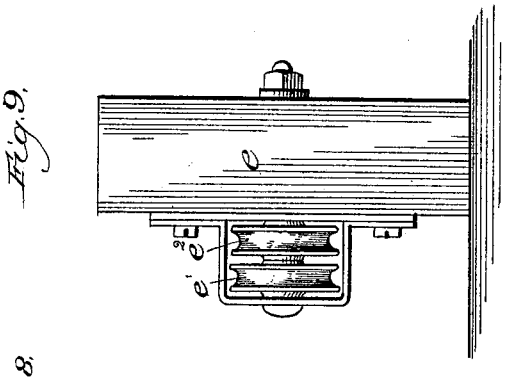

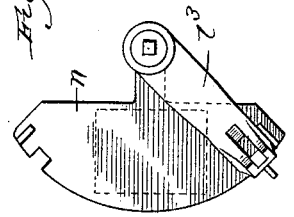

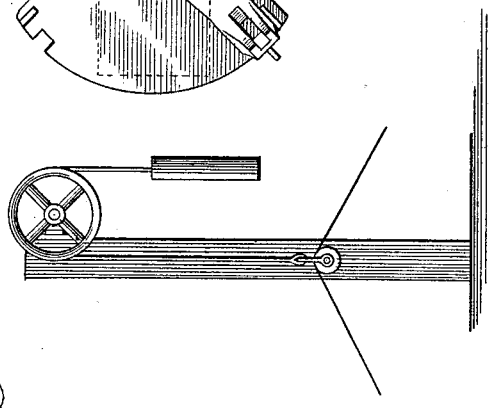

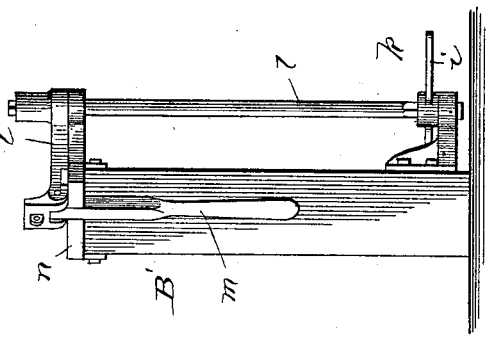

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UNITED STATES PATENT OFFICE.

AXEL A. STROM, OF AUSTIN, ILLINOIS.

COMPENSATOR FOR SIGNAL-LINES.

SPECIFICATION forming part of Letters Patent No. 385,884, dated July 10, 1888.

Application filed March 19, 1888. Serial No. 267,623. (No model.)

To all whom it may concern:

Be it known that I, AXEL A. STROM, a citizen of the United States, residing at Austin, 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 an improvement in the class of railroad signaling devices commonly designated by the term "semaphore;" and it relates more particularly to a so-called "long-distance" semaphore, in contradistinction to the "home" semaphore, the latter being a signaling device located at the place of its operation, as near the station-house, at the switch, crossing, or the like, the condition of which is to be signaled to approaching trains, and the former being some distance away—say several thousand feet—at another switch or crossing or at a curve, and actuated from the home device.

The main object of my present improvement is to provide a long-distance semaphore the signaling feature or features on which shall be caused to assume any of the desired positions by reliably-operating mechanism of simple construction.

To this end my invention consists in the general construction of my improved device, and it also consists in details of construction and combinations of parts.

In the drawings, Figure 1 presents in broken elevation two semaphores connected by an intermediate automatically-acting compensator, the semaphore at the left, which constitutes the home signal, having its spindle forming a continuation of the spindle of a switch-stand provided to operate it, and that at the right being the long-distance signal. Fig. 2 is a view in front elevation of a broken portion of a form of semaphore employed in connection with my improvement; Fig. 3, a section taken on the line 3 3 of Fig. 1, enlarged and viewed in the direction of the arrows; Fig. 4, a section taken on the line 4 4 of Fig. 1, enlarged and viewed in the direction of the arrows; Figs. 5 and 6, sections taken on the lines 5 5 and 6 6, respectively, of Fig. 1, enlarged and viewed in the direction of the arrows; Fig. 7, a view in elevation of a standard and lever device, forming, as a modification, a substitute for the home semaphore mechanism shown in Fig. 1, for operating the long-distance semaphore; Fig. 8, a plan view showing the top portion of the device illustrated in Fig. 7; Fig. 9, a view looking in the direction of the arrows on the line 9 9 of Fig. 1 and enlarged, and Fig. 10 a view in elevation showing a modification of the compensator.

A and A′ are semaphores, each involving the construction set forth in an application for Letters Patent of the United States, Serial No. 267,622, filed concurrently with the present application, and therefore forming no part of my present invention, which is not confined to any particular construction of semaphore. The construction shown involves in each device A and A′ a post, *r*, provided with laterally-projecting rungs *r*′, to permit ready climbing of the post, a rotatory spindle, *q*, supported and confined in bearings in one side of the post, and carrying at its upper end a signal-lantern, *q*′, and a weighted signal-arm, *p*, pivoted to the post behind the spindle, and connected by a link, *p*′, with a vertically-reciprocating rod or bar, p^2, guided in suitable bearings on the post behind the spindle, and carrying at its lower end a roller or thimble, p^3, engaged by a cam, *o*, on the spindle. Turning of the spindle in one direction causes the cam to engage with the thimble to force downward the rod or bar p^2, and thereby, through the link *p*′, lower the semaphore-arm *p* to the "safety" position from its normally-horizontal position, to which it is returned on being released from the cam by turning the spindle in the opposite direction, and maintained in such position by the weight on the rear end of the arm.

As shown in Fig. 1, the spindle of the semaphore A, or "home" semaphore, (so termed by reason of its being near the place of operation, in contradistinction to the long-distance semaphore A′, which is two thousand feet, more or less, away from the first-named,) forms a continuation of the spindle of a switch-stand, B, at one side of the semaphore-post of an ordinary construction, and surmounted by a segmental table, *n*, having peripheral recesses *n*′ at the extremities of the throws of the drop-lever *m*, connected with the spindle, and operating, by turning the latter, to adjust the switch-rails, with which the spindle is suit-

ably connected in a common manner. On the side of the post of the semaphore A opposite that at which the switch-stand is located is a vertical rotatory spindle, *l*, supported toward its upper and lower ends in suitable bearings, *x*, extending from the post. Near its upper end the spindle *l* carries a crank-arm, *l'*, connected by a link, l^2, with a crank-arm, l^3, on the spindle of the semaphore A. The lower end of the spindle *l* carries a lever or double crank, *k*, the arms *i* of which extend equal distances from the spindle, and are preferably bent slightly toward each other, as shown, to extend their rotary sweep with reference to the adjacent post.

The spindle of the semaphore A' is provided near its lower end, opposite the lever *k*, with a similar lever or double crank, *k'*, and the corresponding arms of the two levers *k* and *k'* are connected by cables k^2 and k^3, or equivalent means, which thereby, with the said levers, form a practically endless cable, one strand of which serves, through corresponding arms of the two levers, to permit rotation of both semaphore spindles in one direction, and the other, through the opposite corresponding arms, the rotation of the spindles in the opposite direction, the respective movements of the spindles bringing the signals to their different positions of "safety" and "danger."

As the material of which the cables are formed is subject to expansion and contraction under the atmospheric influence to which it is exposed, it is necessary to provide means to take up any expansion in order that there may be no lost motion, or to counteract the contraction to prevent interference therefrom with or inaccuracy in the operation of the semaphores, and more particularly the long-distance semaphore, defectiveness in the operation of either of which is obviously liable to be productive of disastrous consequences. Accordingly I provide between the long-distance semaphore and the device from which it is operated a compensator, C, comprising a rigid post or standard, *h*, supporting toward its upper end in a laterally-projecting bearing, *x'*, a sheave, *h'*, or equivalent device, a cable, h^2, extending around the sheave and carrying a counter-balance or weight, h^3, at one extremity, a bar, h^4, secured to the opposite end of the cable h^2 and movable vertically in lateral guides h^5 on the post, and a draft-equalizing bar, *g*, pivoted centrally to the lower end of the bar h^4, and carrying at opposite extremities and at opposite sides of the extremities pendent sheaves *f* and *f'*. The cables pass from one semaphore, A, (upon intermediate guide-sheaves, not shown, if the distance between the semaphores be sufficiently great to require the cables to be supported at intervals,) respectively under tension-pulleys *e'* and e^2 on a post, *e*, between the home semaphore and compensator, and from the latter under similar pulleys on a post, *d*, to the semaphore A'. Between the posts *e* and *d* the cable k^3 passes from the pulley *e'* on the former over the pulley *f'* to the corresponding pulley on the latter, and the cable k^2 passes from the pulley e^2 on the post *e* over the pulley *f* to the pulley e^2 on the post *d*.

As will be seen, the weight h^3, owing to its tendency to raise the bar h^4 and equalizing-bar *g*, takes up whatever slack there may be in the cables, or (owing to the pivotal nature of the equalizing-bar *g*) in either of them, and any contraction that may take place in the cables will cause them to be lengthened to that extent by the consequent pulling effect on the equalizing-bar, and through it and the bar h^4 on the weight, the resistance of which is much less than the resistance to rotation presented by the spindles which the cables connect when the spindles are locked in their set positions.

The operation is as follows: Turning the lever *m* at the switch-stand B to set the switch-rails and the semaphore A simultaneously through the lever *k*, cables k^2 and k^3, and lever *k'*, sets the semaphore A', and whichever the direction of turning the lever *m* it is locked at the end of the throw, thus also locking the semaphores by being dropped into the adjacent recess *n'* in the periphery of the table *n*.

My invention includes the omission of the home semaphore A and the substitution of a standard or post, B', Fig. 7, from which to operate the long-distance semaphore, and carrying a peripherally-recessed table, *n*, and a drop-lever, *m*, connected by a crank-arm, l^3, directly with the rotatory spindle *l*, which is provided at its lower end with the double crank *k*, from which the cables connect the operating-standard with the semaphore A'.

The modification of the compensator shown in Fig. 10 presents a construction included within the spirit of my invention, and comprising simply a cable passing over a sheave on the standard or post, weighted at one end and carrying at its opposite end a suitable sheave device to take the place of the sheaves *f* and *f'*, and over which the cables pass.

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

1. The combination of a long-distance semaphore, A', having a double crank, *k'*, on its rotatory spindle, a home operating device having a standard provided with a rotatory spindle, *l*, carrying a double crank, *k*, cables k^2 and k^3, connecting corresponding arms of the said double cranks, and a compensator, C, for the cables, located between the long-distance semaphore and home operating device, substantially as described.

2. The combination of a long-distance semaphore, A', provided on its rotatory spindle with a double crank, *k'*, having its arms bent toward each other away from the semaphore-post, a home operating device having a standard provided with a rotatory spindle, *l*, carrying a double crank, *k*, having its arms bent toward each other away from the standard, cables k^2 and k^3, connecting corresponding arms of the said double cranks, and a compensator, C, for the cables, located between the

long-distance semaphore and home operating device, substantially as described.

3. The combination of a long-distance semaphore, A′, having a double crank, k', on its rotatory spindle, a home operating device having a standard provided with a rotatory spindle, l, carrying a double crank, k, a peripherally-recessed table, n, and a drop-lever, m, connected with the spindle l, cables k^2 and k^3, connecting corresponding arms of the said double cranks, and a compensator, C, for the cables, located between the long-distance semaphore and home operating device, substantially as described.

4. The combination of a long-distance semaphore, A′, having a double crank, k', on its rotatory spindle, a home semaphore, A, having a rotatory spindle, l, carrying a double crank, k, and connected with the rotatory spindle of the semaphore A by a link, l^2, joining crank-arms l' and l^3, respectively on the spindle l and the spindle of the semaphore A, cables k^2 and k^3, connecting corresponding arms of the said double cranks, and a compensator, C, for the cables, located between the semaphores A and A′, substantially as described.

5. In combination with a long-distance semaphore, A′, and a home operating device, connected together by cables k^2 and k^3, a compensator, C, having a standard, h, and a cable, h^2, supported on the standard and carrying a weight at one end, and connected at its opposite end with suitable sheaves, over which the said cables pass, substantially as described.

6. In combination with a long-distance semaphore, A′, and a home operating device, connected together by cables k^2 and k^3, a compensator, C, having a standard, h, a reciprocating bar, h^4, on the standard, controlled by a weight, h^3, a pivotal equalizing-bar, g, on the lower end of the said reciprocating bar, and sheaves f and f' on the bar g, over which sheaves, respectively, the cables k^3 and k^2 pass, substantially as described.

7. In combination with a long-distance semaphore, A′, and a home operating device, connected together by cables k^2 and k^3, a compensator, C, comprising a standard, h, a sheave, h', on the standard, a reciprocating bar, h^4, guided on the standard, a cable, h^2, passing over the sheave h' and carrying at one end a weight, h^3, and connected at its opposite end with the bar h^4, and an equalizing-bar, g, pivoted toward the lower end of the said reciprocating bar and carrying at opposite sides toward the extremities sheaves f and f', over which, respectively, the cables k^2 and k^3 pass, substantially as described.

8. In combination with a long-distance semaphore, A′, and a home operating device, connected together by cables k^2 and k^3, an intermediate compensator, C, comprising a standard, h, a sheave, h', on the standard, a reciprocating bar, h^4, guided on the standard, a cable, h^2, passing over the sheave h' and carrying at one end a weight, h^3, and connected at its opposite end with the bar h^4, and an equalizing-bar, g, pivoted toward the lower end of the said reciprocating bar, and carrying at opposite sides, near the extremities, sheaves f and f', over which, respectively, the cables k^2 and k^3 pass, and posts e and d, respectively adjacent to the sheaves f and f', and provided each with tension-pulleys e' and e^2 for the said cables, substantially as described.

9. The combination of a long-distance semaphore, A′, having a double crank, k', on its rotatory spindle, a home semaphore, A, and a rotatory spindle, l, carrying a double crank, k, and connected with the rotatory spindle of the semaphore A by a link, l^2, joining crank-arms l' and l^3, respectively on the spindle l and the spindle of the semaphore A, cables k^2 and k^3, connecting corresponding arms of the said double cranks, a compensator, C, located between the semaphores, and comprising a standard, h, a sheave, h', on the standard, a reciprocating bar, h^4, guided on the standard, a cable, h^2, passing over the sheave h' and carrying at one end a weight, h^3, and connected at its opposite end with the bar h^4, and an equalizing-bar, g, pivoted toward the lower end of the said reciprocating bar, and carrying at opposite sides, near the extremities, sheaves f and f', over which, respectively, the cables k^2 and k^3 pass, and posts e and d, respectively adjacent to the sheaves f and f', and provided each with tension-pulleys e' and e^2 for the said cables, substantially as described.

AXEL A. STROM.

In presence of—
J. W. DYRENFORTH,
CHAS. E. GORTON.