No. 638,210. Patented Dec. 5, 1899.

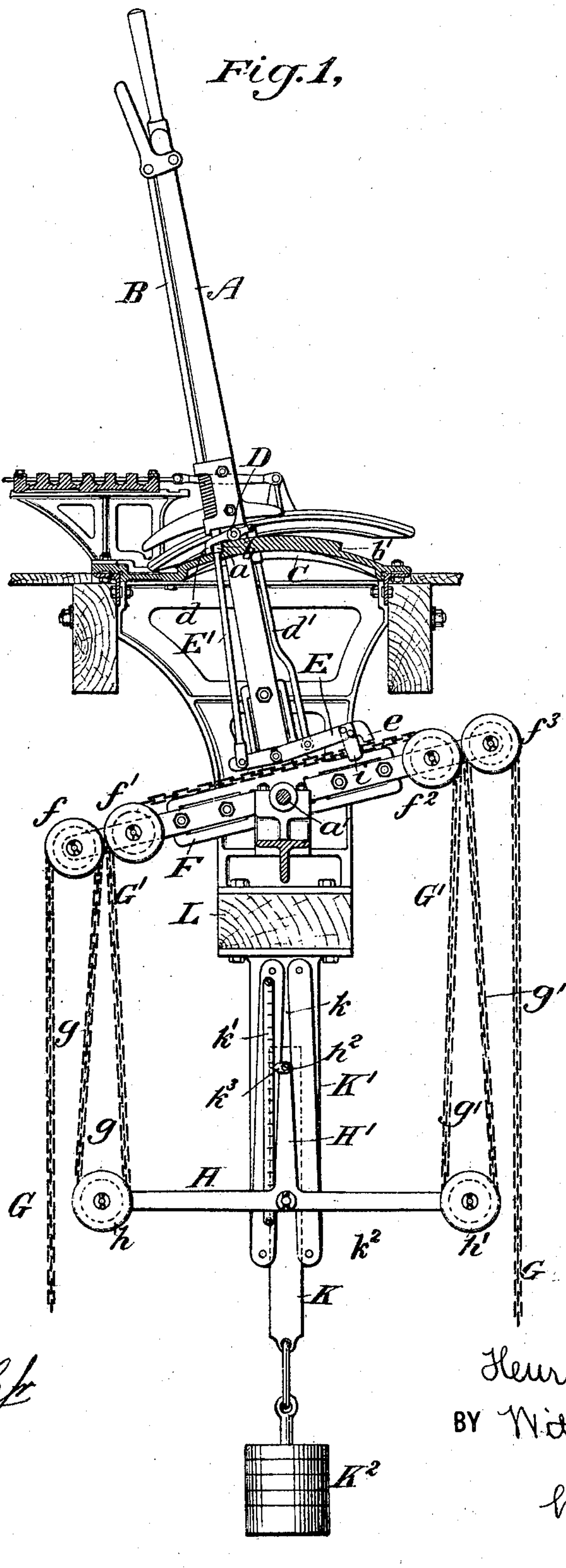
H. BEZER.

COMPENSATOR.

(Application filed July 20, 1894. Renewed Apr. 29, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1,



WITNESSES:

George W. Mills Jr.

Sidney Mann

INVENTOR

Henry Bezer

BY Witter & Kenyon

his ATTORNEYS

No. 638,210.

Patented Dec. 5, 1899.

H. BEZER.

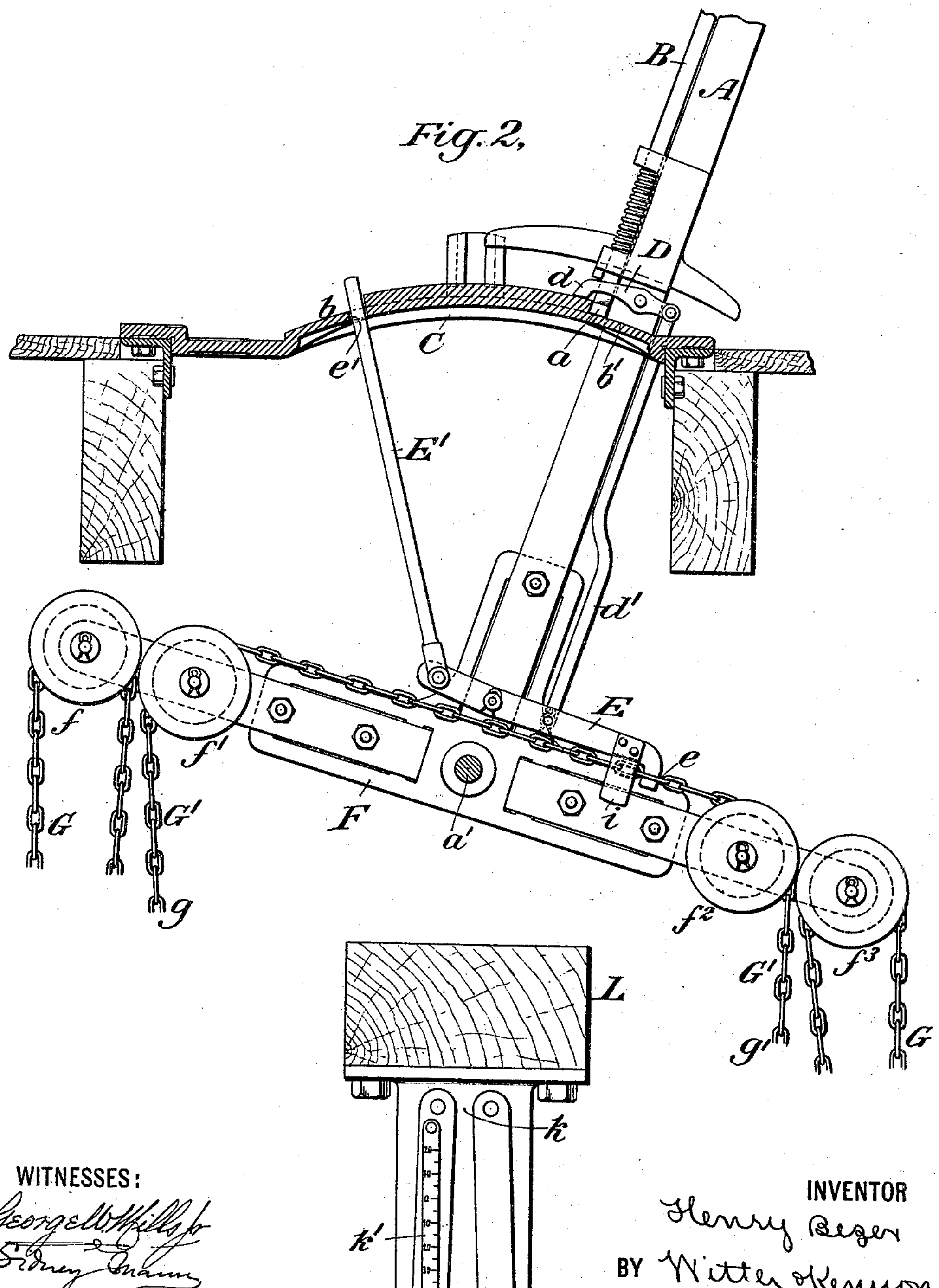
COMPENSATOR.

(Application filed July 20, 1894. Renewed Apr. 29, 1899.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2,



WITNESSES:

George W. Mills Jr

Sidney Mann

INVENTOR

Henry Bezer

BY Witter & Kenyon

his ATTORNEYS

No. 638,210.

Patented Dec. 5, 1899.

H. BEZER.

COMPENSATOR.

(Application filed July 20, 1894. Renewed Apr. 29, 1899.)

(No Model.)

4 Sheets—Sheet 3.

Fig. 3,

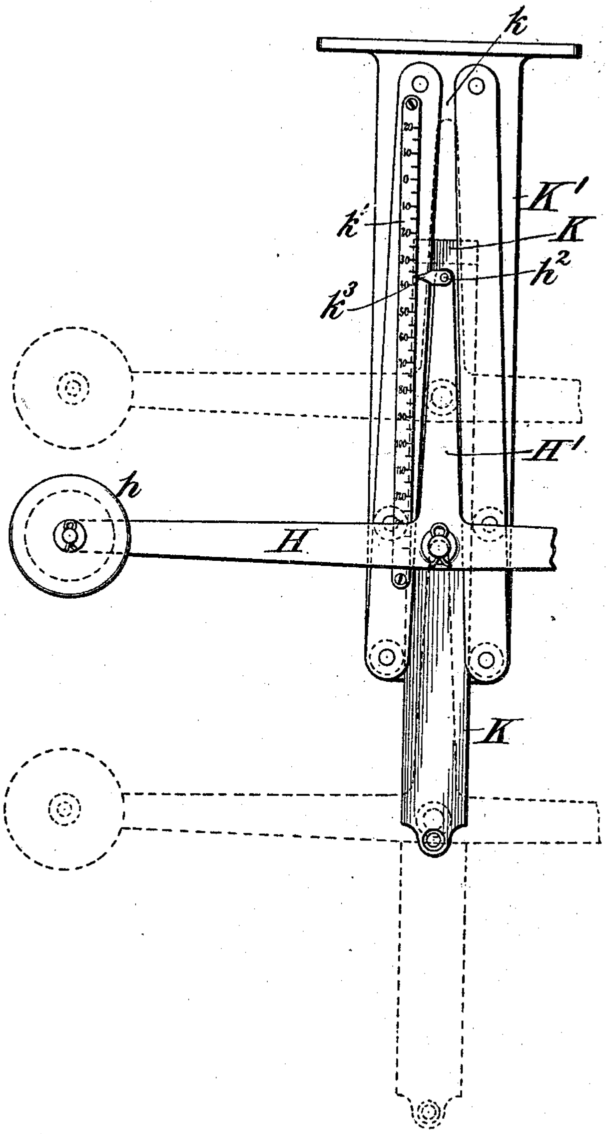
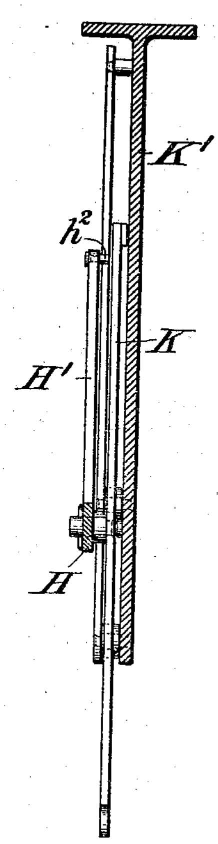


Fig. 4,



WITNESSES:

George W. Wells Jr.

Sidney Mann

INVENTOR

Henry Bezer

BY Witter & Kenyon

his ATTORNEYS

No. 638,210.

Patented Dec. 5, 1899.

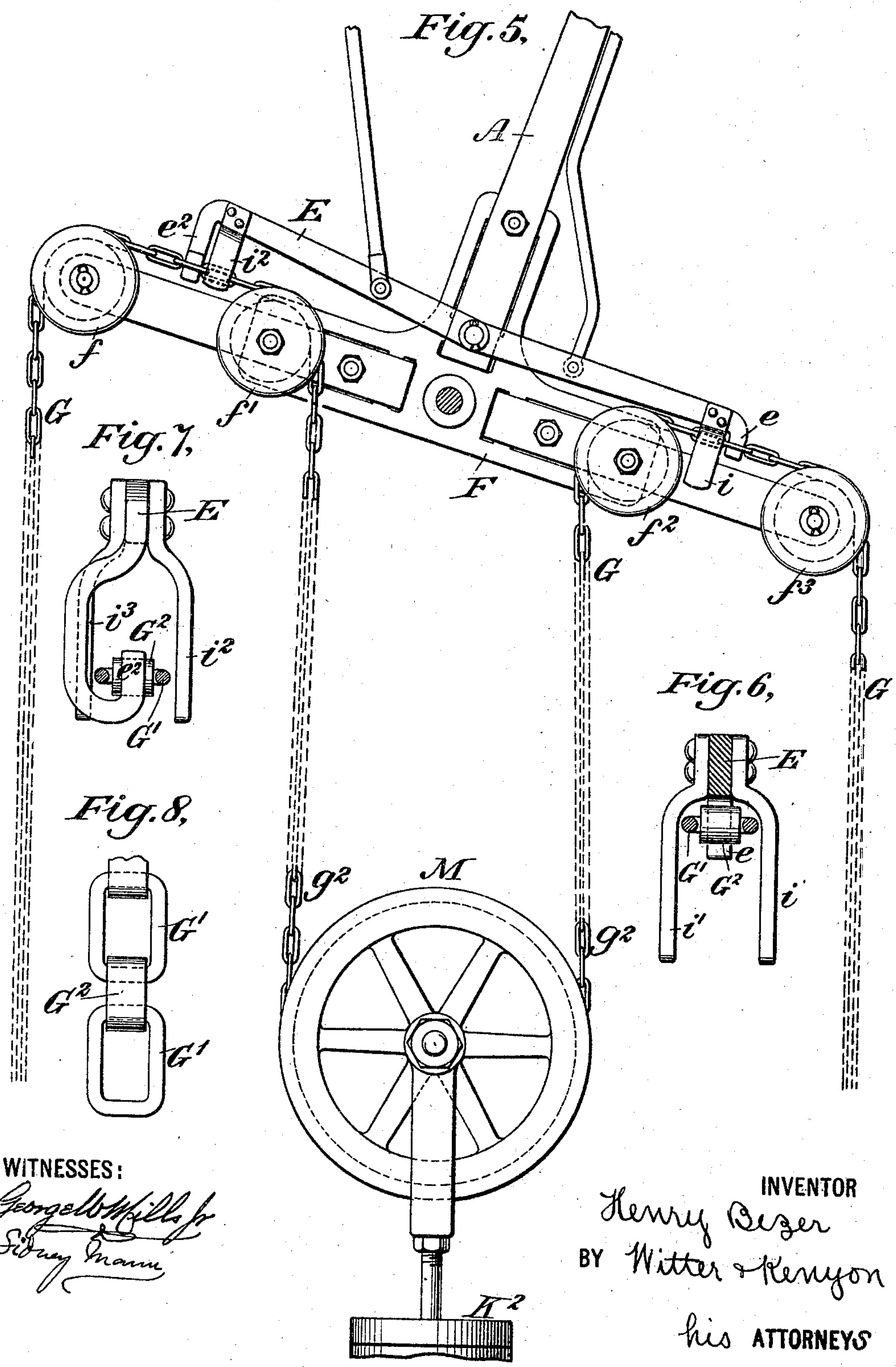
H. BEZER.

COMPENSATOR.

(Application filed July 20, 1894. Renewed Apr. 29, 1899.)

(No Model.)

4 Sheets—Sheet 4.



WITNESSES:

George W. Mills Jr.

Sidney Mann

INVENTOR

Henry Bezer

BY Witter & Kenyon

his ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY BEZER, OF NEW ROCHELLE, NEW YORK.

COMPENSATOR.

SPECIFICATION forming part of Letters Patent No. 638,210, dated December 5, 1899.

Application filed July 20, 1894. Renewed April 29, 1899. Serial No. 715,009. (No model.)

To all whom it may concern:

Be it known that I, HENRY BEZER, a subject of the Queen of Great Britain, and a resident of New Rochelle, Westchester county, State of New York, have invented an Improved Compensator, of which the following is a specification.

My invention relates to compensators for regulating the tension of actuating wires, chains, rods, cables, &c., and is especially designed for use in connection with railway signals and switches.

The object of the invention is to provide means for effectually maintaining the proper tension of the cords, cables, &c., notwithstanding any contraction or expansion thereof due to thermal changes or other causes.

The invention consists of the construction hereinafter set forth.

In the drawings, in which similar letters designate corresponding parts throughout the several views, Figure 1 is a side elevation of a switch or signal lever provided with my compensator. Fig. 2 is an enlarged view, in side elevation, of the device shown in Fig. 1, parts being broken away or omitted and the lever being pulled over. Fig. 3 is a front elevation of a detail of the compensator. Fig. 4 is an edge view of Fig. 3. Fig. 5 is a side elevation of a modification. Figs. 6, 7, and 8 are fragmentary views of details.

Referring to the specific embodiments of the invention as shown in the drawings, A is the operating-lever of an interlocking machine patented to me February 3, 1892, No. 469,645. This lever is provided with a latch B, having an angle-head *a* taking in the notches *b* or *b'* of the segmental plate C when the lever is in either of its extreme forward or backward positions. Pivoted to the lever A is an arm D, having a finger *d* on one end and extending over the angle-head *a* of the latch, so as to be engaged thereby when the latch is lifted. Pivoted upon the other end of the arm D is a link *d'*, pivotally connected to an arm E, pivoted to the lever A and provided with a finger *e* at one end. At the other end of the arm E is pivoted a rod E', whose free end extends up through an aperture *e'* in the notch *b* of the segmental plate C, in which it is freely movable, and is just beneath the head *a* of the latch when the latch is in this notch. The cross-arm F of the lever A is provided with sheaves *f* and f^3, one at each end, and with two other sheaves *f'* and f^2, located one on each side of and equally distant from the pivot *a'*. A cord or cable G, preferably including open chain-links G', as shown in Figs. 1, 2, and 8, is supported by these sheaves, so as to form one or more loops adapted to be engaged by a tension-regulator k^2. In Figs. 1 and 2 I have shown two loops *g* and *g'*, while in Fig. 5 I have shown but one loop g^2. The tension-regulator, which may comprise a weight K^2, as shown, a spring, or other suitable device, exerts its vertical strain in a line passing through the axis *a'*, and the cord or cable being normally not rigidly connected with the lever is free when expanding or contracting to be taken up by the loop or loops under the influence of the tension-regulator, or given out from the loop or loops notwithstanding the tension-regulator, the tension of the cord or cable remaining uniform. It will be observed that by arranging the tension-regulator so that its vertical strain is continuously exerted in a line through the pivot *a'* there will be no opposition exerted by the tension-regulator to the movement of the lever and there will be no lost motion on the part of the lever due to a yielding of the tension-regulator.

It is a great advantage to so arrange the compensator that the tension-regulator never exerts its strain in opposition to the movement of the lever. If it is not so arranged, then when the lever is pulled over it will be necessary to employ extra and wasted energy to overcome the opposition of the tension-regulator, and when the normal strain of the tension-regulator is several hundred pounds it will be seen that considerable lost energy must be expended in simply overcoming this opposition.

There are several ways of so arranging the compensator that the tension-regulator may never exert any strain in opposition to the movement of the lever. According to one way (shown in Figs. 1 and 2) the tension-regulator engages two similar loops of the cord or cable, one on each side of the pivot of the lever, and any opposition which it might exert to the movement of the lever is overcome by positively and automatically locking the tension-regulator, so that it cannot oppose this movement. The other way, as shown in Fig. 5, is by arranging the cord or cable in a single loop in line with the pivot a' and having the tension-regulator engage this loop. These constructions shown in these figures will be now specifically described. Referring first to Figs. 1, 2, 3, and 4, the cord or cable G, preferably comprising a section made up of chain-links G', (shown in detail in Fig. 8,) passes over these sheaves, so as to form a loop g between the sheaves $f f'$ at one end of the arm and the loop g between the sheaves $f^2 f^3$ at the other end of the arm. These loops g and g' engage, respectively, the sheaves h h' of the horizontal member of the T-arm H. The arm H is centrally pivoted to a plate or block K, sliding in the way k of a bracket K', fixed to the beam L, which supports the interlocking machine. The upright member H' of the T-arm H carries on its under side a pin h^2, extending down into the way k, so as to abut the upwardly-converging sides of the way when the arm H is tilted. Upon the upper side of the member H' is a pointer h^3, adapted to move over the graduated scale k' of the way k. The free ends of the cord or cable G are connected to the opposite ends of a lever pivoted upon the signal-post for operating the signal. This connection with the signal or a switch is so well understood that it is not deemed necessary to illustrate it in the drawings nor further describe it. From the lower end of the block K is suspended a weight K^2, which exerts a downward strain upon the block and tends to keep the loops g g' taut at all times. If the cord or cable G expand on account of heat or on account of stretching due to wear or other cause, the weight will take up the extra length by drawing down on the loops g g', and if the cord or cable contract on account of cold or other cause the weight will rise sufficiently to pay out from the loops g g' the extra length required.

The scale k' and pointer h^3 constitute a thermal gage by which it is possible to properly adjust the length of the signal cord or cable when they are first put up, so as to allow for their subsequent expansion or contraction due to changes of temperature. For example, if it is hot weather—say 100°—the signal-wires will be expanded, and the scale having been marked in accordance with the ascertained rate of thermal expansion and contraction the wires will be so adjusted as to bring the pointer upon that point of the scale toward its lower end which marks the temperature of 100°. When now the temperature falls to, say, zero, the wires will contract, lifting the weight and pointer till the latter registers zero, a point at which the weight is fully effective for its purpose. Thus it will be seen that by this means the signal-wires may be so adjusted that however much they may subsequently expand or contract it will never be beyond the power of the weight to effectually keep them taut.

When the signal is to be operated, the latch of the lever is disengaged from the notch b, the lever standing normally in the position shown in Fig. 1. As the angle-head of the latch rises it engages the arm D and lifts the finger d from the notch b. This immediately depresses the arm E and throws its finger e into engagement with a link G', causing the upper end of the rod E' at the same time to project above its aperture e'. If there is no eye of a link directly opposite the finger e, it will press the chain down and find its way into an eye. The chain is now securely locked to the lever A, and, being taut, the movement of the lever as it is pulled over is immediately communicated to the signal without any lost motion or opposition to this movement from the tension-regulator. In this movement the chain on the outer side of the sheave f is pulled in and the other end on the outer side of the sheave f^3 is paid out, and there is a tendency to lift the sheave h and weight, which if not prevented would by paying out from the loop g slack the wire pulled in as fast as the lever were pulled over. This would cause lost motion on the part of the lever. It is obvious that if a weight sufficiently heavy were used—*i. e.*, heavier than the combined resistance offered by the signal and the weight of its operating-wires—the tendency of the weight to rise would be overcome; but there is great objection to the employment of a weight so heavy, because such a weight would maintain the signal-wires under a tension so strong that there would be a constant tendency to stretch and weaken them. Even this heavy weight, however, would not be sufficient to prevent lost motion and lost energy at times when, for example, the signal offered unusual resistance, as when the signal or its exposed connections were clogged with snow and ice. According to my invention, however, a minimum weight may be employed sufficient only to take up the slack of the signal-wires, and this weight, as shown in Fig. 1, is effectually locked against the strain put upon it by the operation of the signal-lever however severe this strain may be. This is accomplished by means of the pin h^2 in the upwardly-converging way k. It will be seen that when the lever is pulled over the upward strain on the pulley h, which of itself tends to lift the weight, throws the arm H' over till the pin h^2 abuts hard against one of the converging sides of the way k. In order for the weight and arm H to rise, the pin h^2 must ride up the way; but in so doing the pin h^2 would be thrown back and the arm H down, which, being against the initial strain exerted by pulling over the lever, is impossible. In the same way when putting the lever back to its normal position the arm H and weight are prevented from rising by the pin h^2 coming against the other side of the way k. Therefore there can be no lost motion due to a slacking of the wire pulled in nor any opposition to the movement of the lever from the tension-regulator, which would be the case if the weighted arm were not locked down. The pin and way thus constitute an effective lock, which locks the weighted arm down and prevents it from permitting any lost motion when either of the signal-wires is pulled in. When the lever is fully pulled over to the position shown in Fig. 2, the head of the latch may drop into the notch b'; but the finger d of the arm D is held up by the ridge of the plate C and cannot enter this notch. The finger e of the arm E is therefore kept in engagement with the chain, and it remains in engagement until the lever is put back to normal position. When the lever is put back, the finger moves over the notch b, but does not fully drop into the notch until the head a of the catch-rod, forced down by its spring, pushes the projecting end of the rod E' down through its aperture e' and forces the finger e out of engagement with the chain and the rod d' upward.

In the arrangement of my compensator shown in Fig. 5 the sheaves f, f', f^2, and f^3 are arranged on the arm F so as to leave a substantial space between the sheaves f and f' and between the sheaves f^2 and f^3, the chain G running over the sheaves, so as to leave a single loop g^2 between the sheaves f' f^2, from which the weight K^2 is suspended by means of a pulley M, directly in line and beneath the pivot of the lever. The arm E has on one side of its pivotal point the finger e and on its other side the hooked finger e^2. (Shown in detail in Fig. 7.) It is also provided with guides i and i' (shown in detail in Fig. 6) near the finger e and with guides i^2 and i^3 (shown in Fig. 7) near the finger e^2. These guides overlap the chain and serve to direct the fingers in their movement in and out of the chain-links. When the latch is lifted from the back notch, the finger e is thrown down into engagement with a link of the chain and the hooked finger e^2 is thrown up into engagement with another link of the chain. The chain is thus locked to the lever at two points, one on each side of the loop g^2, and when the lever is pulled over to the position shown in Fig. 5 or is put back to normal position the strain on the cord or cable G is communicated directly to the signal without any lost motion and without any opposition to the movement of the lever on the part of the tension-regulator.

In the embodiments of my invention as shown in the drawings the cord or cable G has both its ends secured to the device to be operated. If this device is a signal, one of the leads of the cord or cable is generally connected to one side of a centrally-pivoted lever on the signal-post, and the other lead is connected to the other side of this lever. This lever is connected to the semaphore-blade by means of a thrust-rod. The lead which is pulled in by the lever A to effect the initial operation of the signal is generally called the "front" wire and the other lead the "back" wire. In some cases the back wire is entirely omitted, its function of restoring the signal to its initial position being performed by a counterweight on the lever mounted on the signal-post. If it is desired, my invention in either form can be employed in connection with a single lead or the front wire only. In arranging the form of my invention shown in Figs. 1 and 2 for a front wire only, this wire would be preferably carried over all the sheaves just as shown in Fig. 1, except the last one f^3 in the series, at which point it would be securely fastened to the arm F. In case the form of the invention shown in Fig. 5 were to be employed with only a front wire, this wire would run over the sheaves f and f' and the pulley M and end either at the sheave f^2 or f^3, where it would be securely fastened to the arm F.

Various changes might be made in different features of my invention without departing from its broad spirit, which would readily occur to any one skilled in the art, and I do not wish to be limited to the precise form and arrangement shown. For example, the cord or cable might not in some cases be continuously supported by the arm F, the means for connecting the lever A to the cord or cable might not always comprise the finger e and chain, and this means need not in all cases be operated by the latch of the lever.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a compensator, the combination of an actuating cord or cable provided with one or more loops, a tension-regulator engaging said loop or loops, an operating device, and means for connecting and disconnecting the operating device and the cord or cable, said cord or cable being disconnected from the operating device when in normal position, substantially as set forth.

2. In a compensator, the combination of an actuating cord or cable having its ends connected to the device to be operated and provided with one or more loops, a tension-regulator engaging said loop or loops, an operating device, and means for connecting and disconnecting the operating device and the cord or cable, said cord or cable being disconnected from the operating device when in normal position, substantially as set forth.

3. In a compensator, the combination of an operating-lever, an actuating cord or cable provided with one or more loops supported from points on each side of the pivot of the lever and equally distant therefrom, a tension-regulator engaging said loop or loops, and means for rigidly connecting the cord or cable with the lever whereby the movement of the lever may be accomplished without lost motion, substantially as set forth.

4. In a compensator, the combination of an operating-lever, an actuating cord or cable having its ends connected to the device to be operated and provided with one or more loops

supported from points on each side of the pivot of the lever and equally distant therefrom, a tension-regulator engaging said loop or loops, and means for rigidly connecting the cord or cable with the lever whereby the movement of the lever may be accomplished without lost motion, substantially as set forth.

5. In a compensator, the combination of an actuating cord or cable provided with one or more loops, a tension-regulator engaging said loop or loops, an operating device provided with a latch, and means controlled by said latch for connecting and disconnecting the operating device with the cord or cable, substantially as set forth.

6. In a compensator, the combination of an actuating cord or cable having its ends connected to the device to be operated and provided with one or more loops, a tension-regulator engaging said loop or loops, an operating device provided with a latch, and means controlled by said latch for connecting and disconnecting the operating device with the cord or cable, substantially as set forth.

7. In a compensator, the combination of an actuating cord or cable provided with one or more loops and including a plurality of chain-links, a tension-regulator engaging the loop or loops, an operating-lever provided with a latch, and means controlled by the latch for engaging one or more links of the chain, substantially as set forth.

8. In a compensator, the combination of an actuating cord or cable having its ends connected to the device to be operated and provided with one or more loops, a tension-regulator engaging said loop or loops, an operating device, and means for rigidly connecting the operating device with the cord or cable on both sides of the loop or loops at the same time, whereby the cord or cable is locked to the operating device on both sides of the tension-regulator during the movement of the operating device, substantially as set forth.

9. In a compensator, the combination of an actuating cord or cable having its ends connected to the device to be operated and provided with one or more loops, a tension-regulator engaging said loop or loops an operating device provided with a latch, and means controlled by said latch for rigidly connecting the operating device with the cord or cable on both sides of the loop or loops, whereby the movement of the operating device may be accomplished without lost motion, substantially as set forth.

10. In a compensator, the combination of an actuating cord or cable, having its ends connected to the device to be operated and provided with a loop, a tension-regulator engaging the loop, an operating-lever, the loop being supported upon said lever from points on each side of and equidistant from the pivot of the lever, whereby the tension-regulator exerts its vertical strain continuously in a vertical line running through the pivot of the lever and equally on said lever at each side of the pivotal point of said lever, and means for connecting and disconnecting the lever and the cord or cable substantially as set forth.

11. In a compensator, the combination of an actuating cord or cable, having its ends connected to the device to be operated and provided with a loop, a tension-regulator engaging the loop by means of a pulley, an operating-lever, the loop being supported upon said lever from points on each side of and equidistant from the pivot of the lever, whereby the tension-regulator exerts its vertical strain continuously in a vertical line running through the pivot of the lever and equally on said lever at each side of the pivotal point of said lever, substantially as set forth.

12. In a compensator, the combination of an actuating cord or cable having its ends connected with the device to be operated and provided with one or more loops, a tension-regulator engaging said loop or loops, an operating-lever provided with a latch and normally not in rigid connection with the cord or cable, and means which when the latch is lifted from its normal position thereby throws the lever into rigid engagement with the cord or cable and maintains this engagement until the latch is restored to its normal position, substantially as set forth.

13. In a compensator, the combination of an actuating cord or cable which includes a plurality of chain-links, an operating-lever provided with an arm pivoted upon the lever and provided with one or more fingers adapted to engage the chain-links, and means for operating the said arm to engage the chain, substantially as set forth.

14. In a compensator, the combination of an operating-lever, an actuating cord or cable provided with one or more loops and supported by said lever, and a tension-regulator engaging said loop or loops, and means for connecting and disconnecting the lever and the cord or cable, said cord or cable being disconnected from the lever when in normal position, substantially as set forth.

15. In a compensator, the combination of an operating-lever provided with a sheave at each end thereof and two other sheaves located one on each side of and equidistant from the pivot of the lever, an actuating cord or cable provided with one or more loops supported by said sheaves, and a tension-regulator engaging said loop or loops, substantially as set forth.

16. In a compensator, the combination of an operating-lever provided with a sheave at each end thereof and two other sheaves located one on each side of and equidistant from the pivot of the lever, an actuating cord or cable passing over and supported by said sheaves so as to form a loop between the inner sheaves, said cord or cable normally not in rigid connection with the lever, a tension-regulator engaging the loop, and means for

rigidly connecting the lever with the cord or cable on both sides of and beyond the loop, substantially as set forth.

17. In a compensator, the combination of an operating-lever provided with a latch, an actuating cord or cable provided with one or more loops supported by the lever from points on each side of and equally distant from the pivot thereof, a tension-regulator engaging said loop or loops, and means controlled by the latch of the lever for rigidly connecting the lever with cord or cable, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY BEZER.

Witnesses:

NICHOLAS M. GOODLETT, Jr.,
EDWIN SEGER.