

(No Model.)

3 Sheets—Sheet 1.

S. H. HARRINGTON.
RAILROAD SIGNAL.

No. 433,567.

Patented Aug. 5, 1890.

FIG. 2.

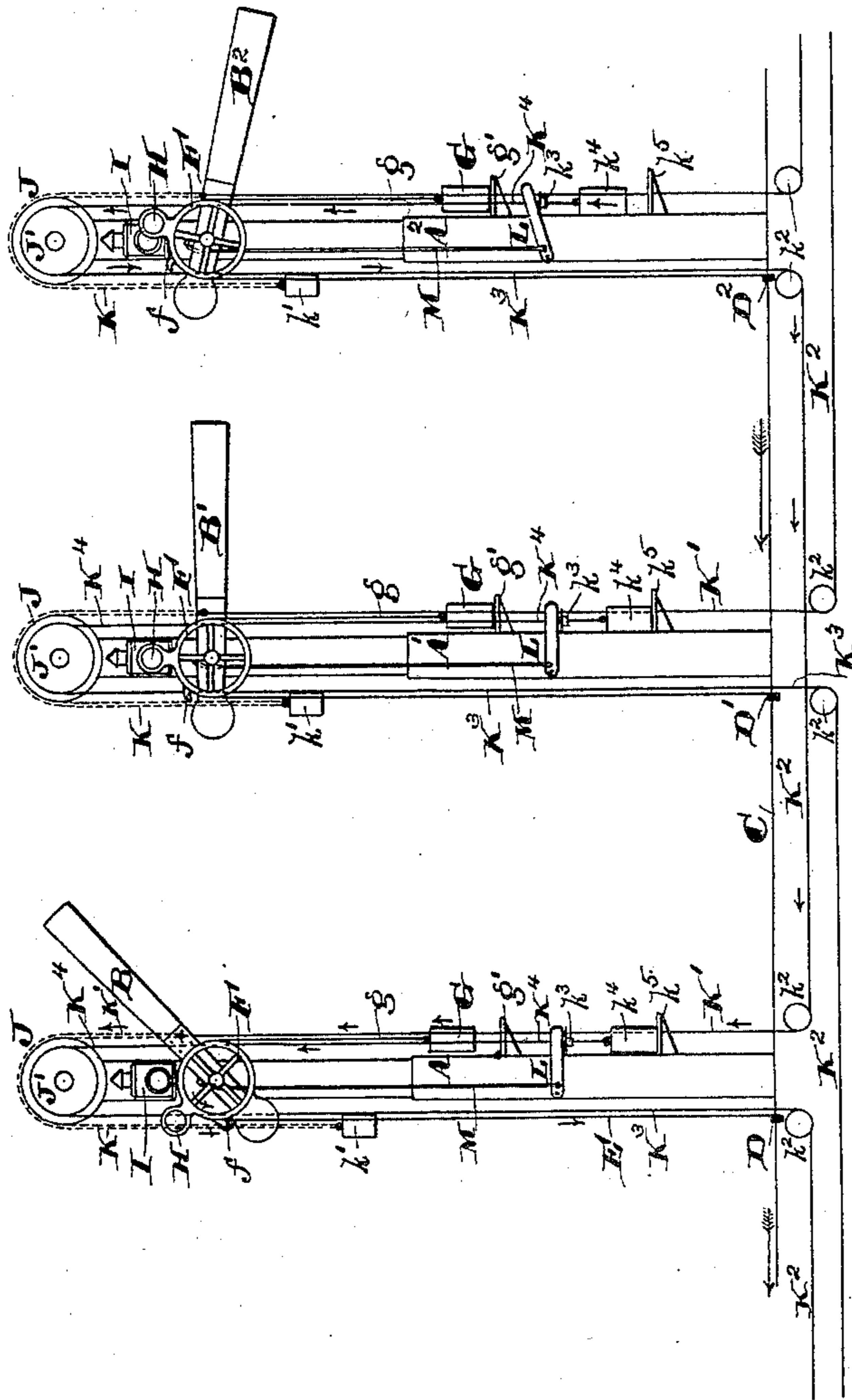
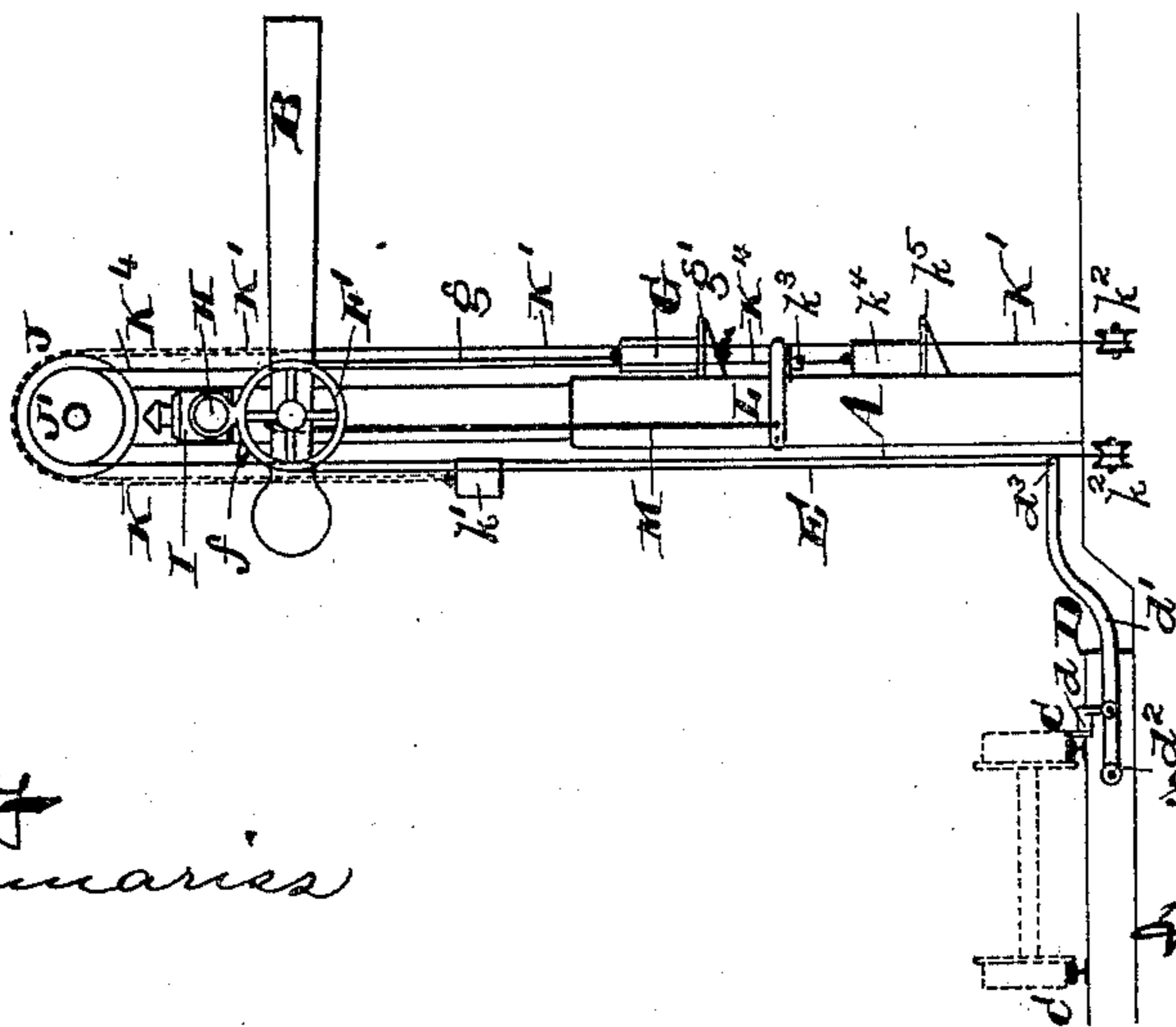


FIG. 1.



Witnesses:

Henry Dwyer

Walter Samaries

Inventor:

Samuel H. Harrington

by his attorney

Francis T. Chambers

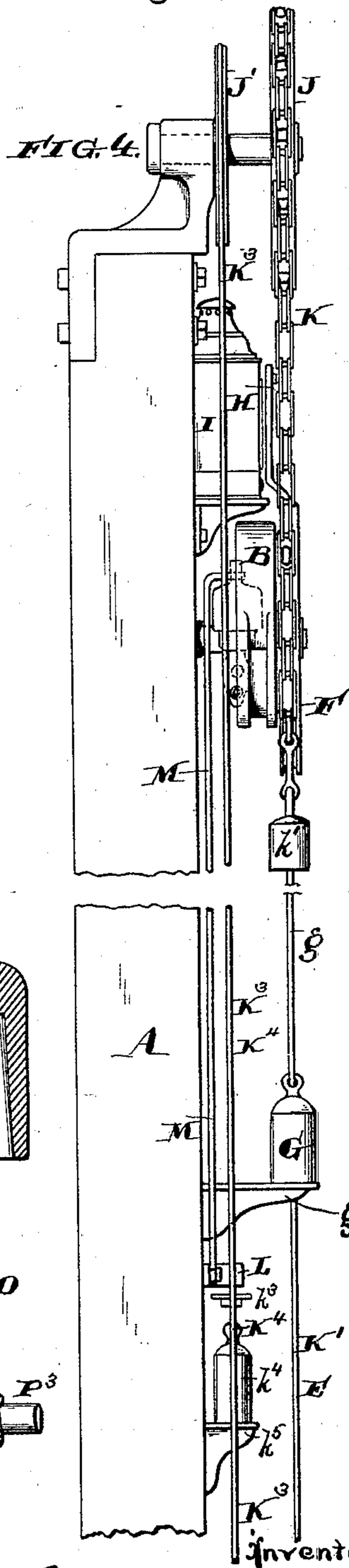
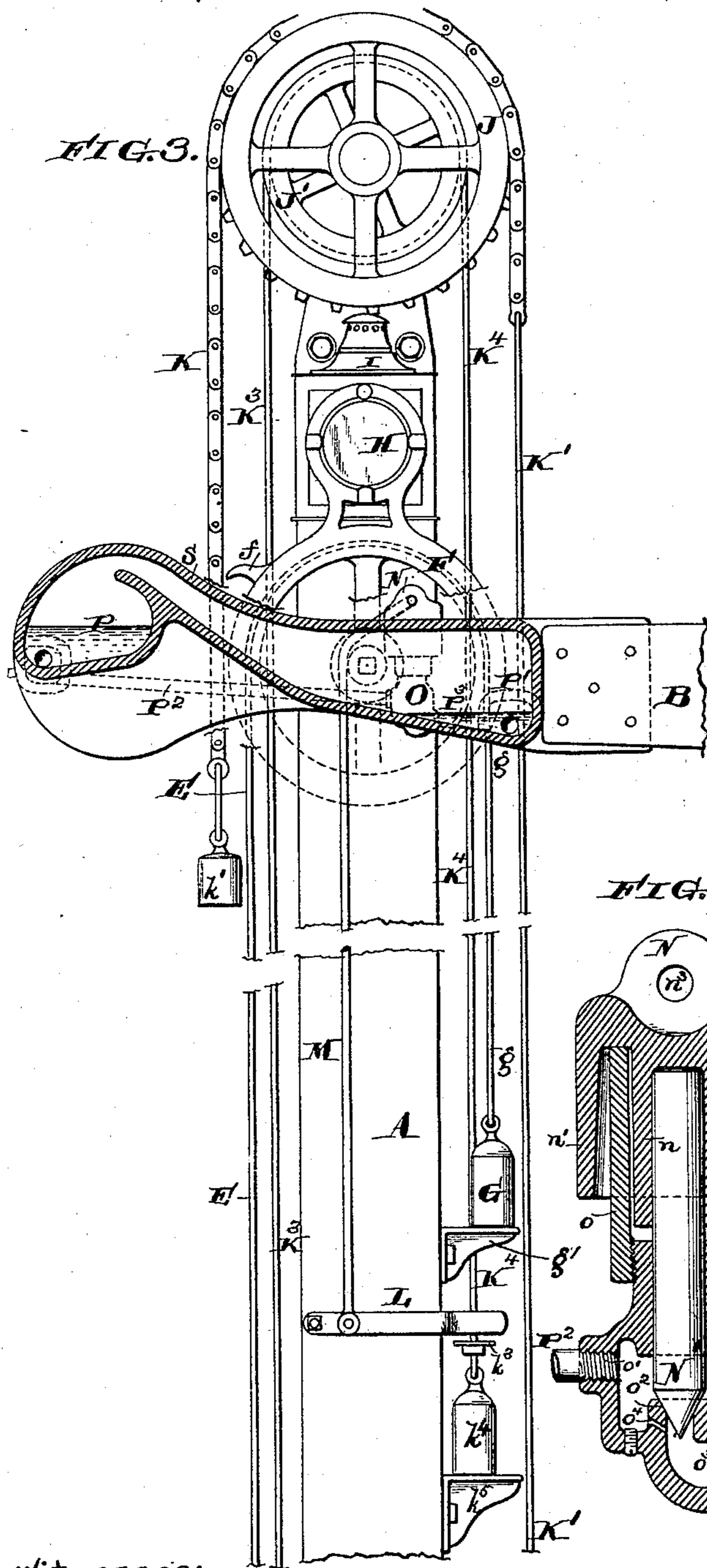
(No Model.)

3 Sheets—Sheet 2.

S. H. HARRINGTON.
RAILROAD SIGNAL.

No. 433,567.

Patented Aug. 5, 1890.



Witnesses:

Henry Duref
Walter Farnass

Inventor:

Samuel H. Hamington
by his attorney
Francis T. Chambers

(No Model.)

3 Sheets—Sheet 3.

S. H. HARRINGTON.
RAILROAD SIGNAL.

No. 433,567.

Patented Aug. 5, 1890.

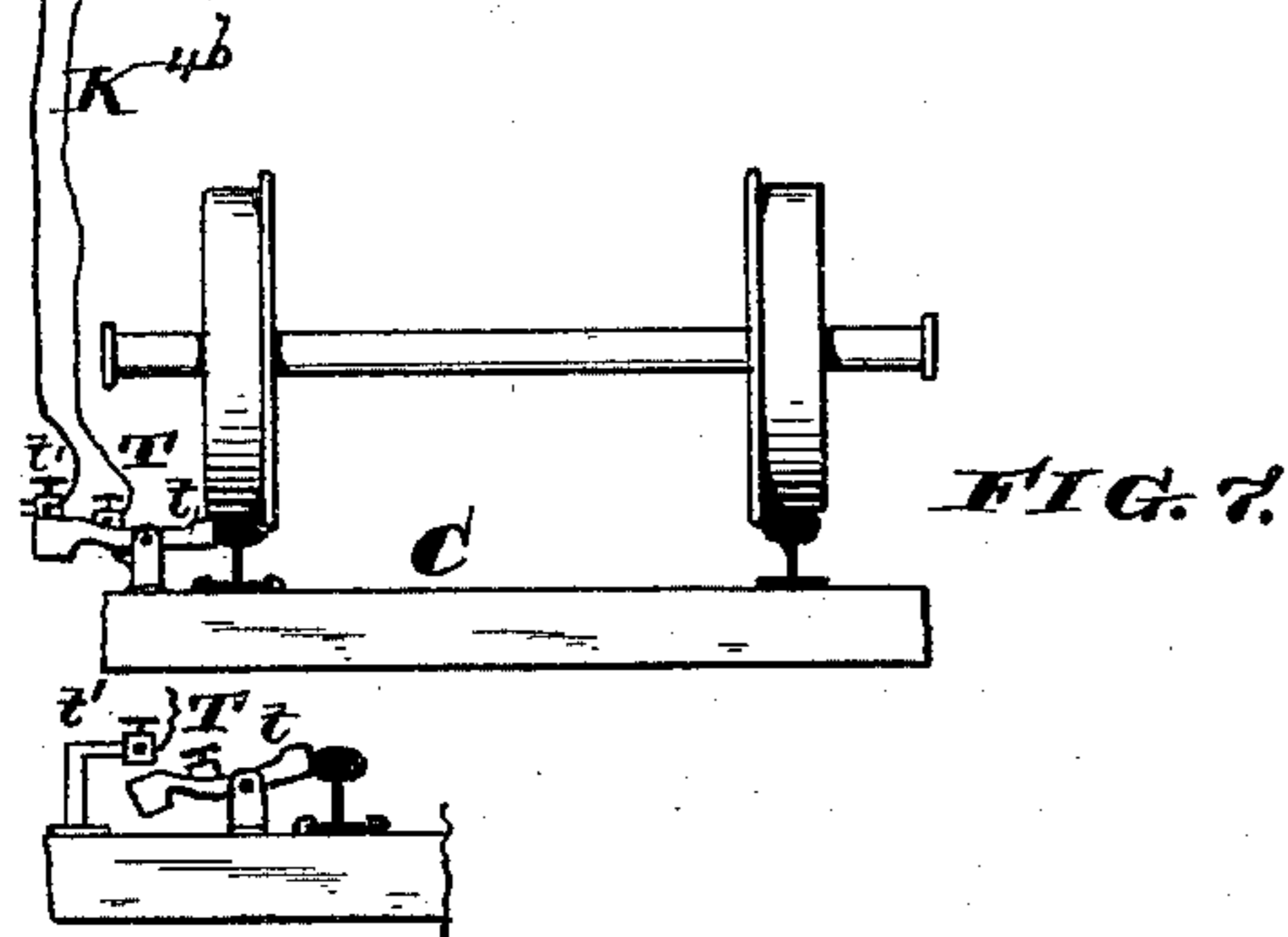
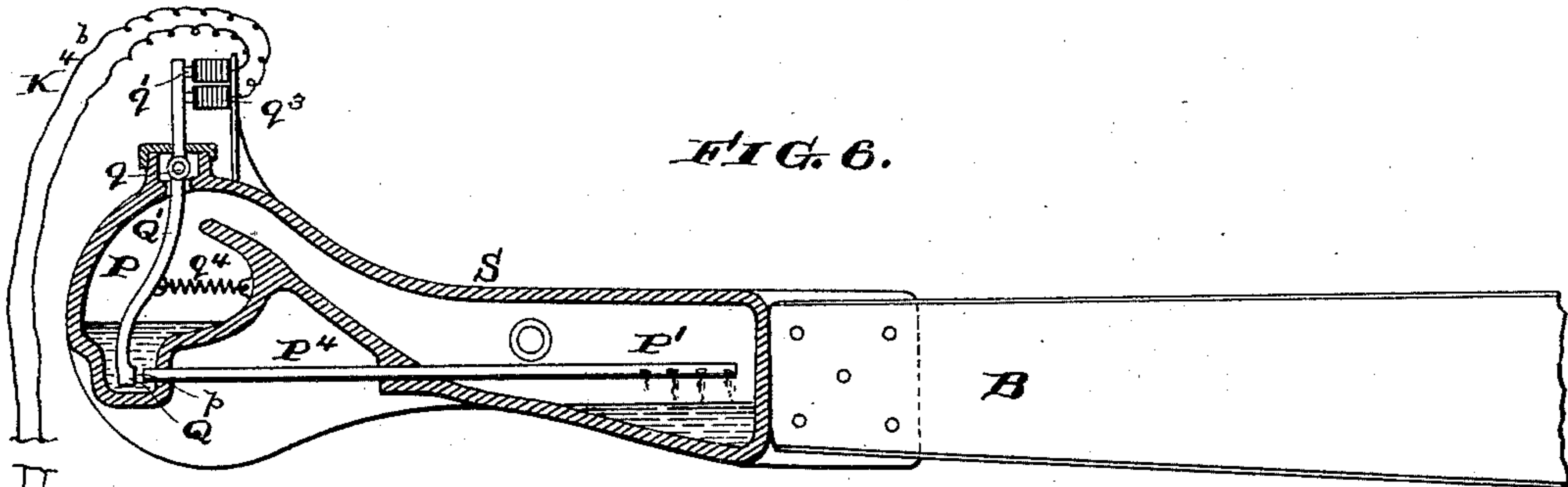
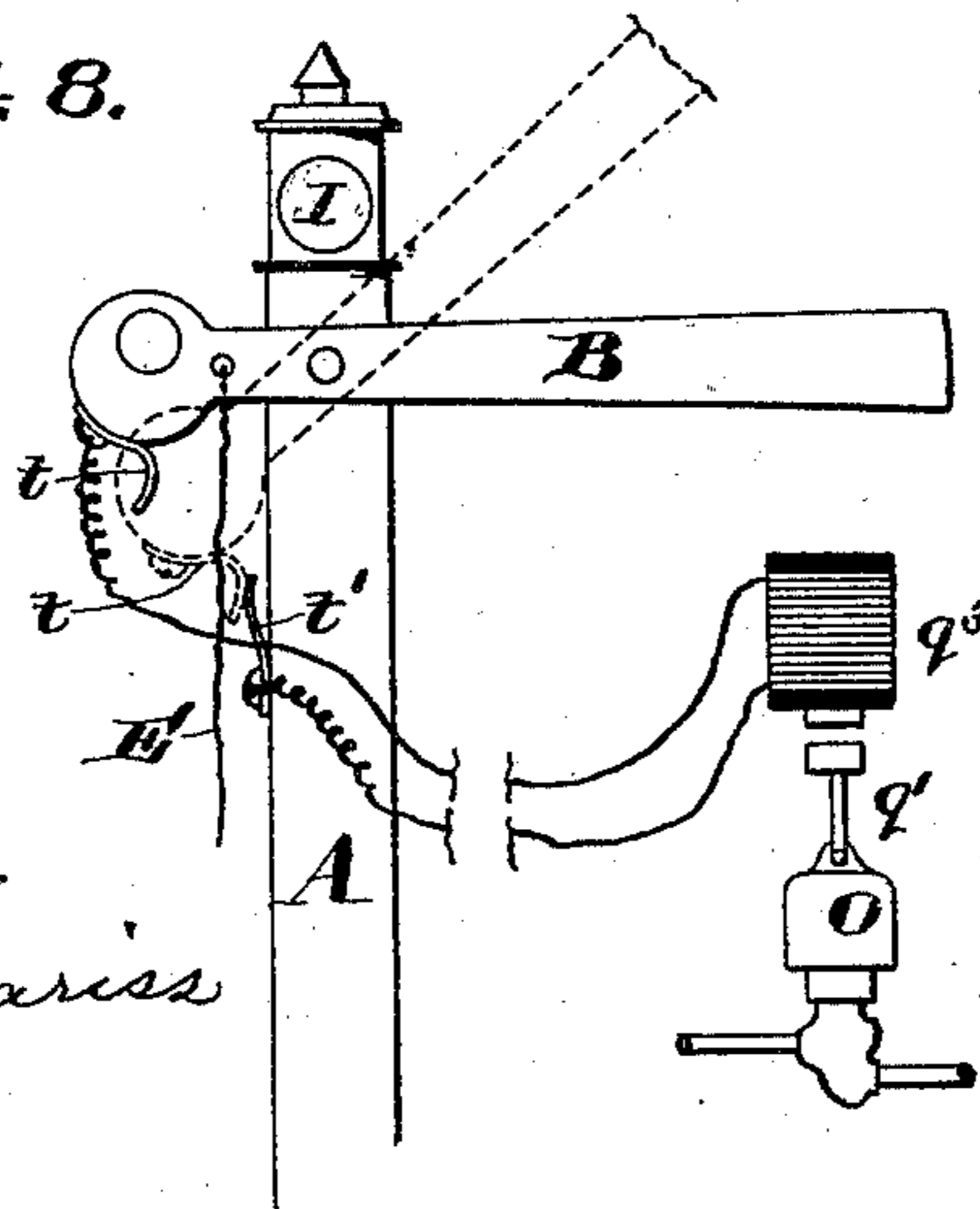


FIG. 8.



Witnesses:
Henry Drury
Walter Famariss

Inventor:
Samuel H. Harrington
by his attorney
Francis T. Chambers

UNITED STATES PATENT OFFICE.

SAMUEL H. HARRINGTON, OF BINGHAMTON, NEW YORK.

RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 433,567, dated August 5, 1890.

Application filed February 17, 1890. Serial No. 340,675. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. HARRINGTON, of Binghamton, county of Broome, State of New York, have invented a new and useful Improvement in Railroad-Signals, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the construction and combination of signals for indicating to locomotive-engineers the safety or danger of proceeding along the track in front of them.

My object is, primarily, to provide a system of signals which will be automatically set to "danger" as a train proceeds along the track upon which they are situated and which will remain in the "danger" position for a determined length of time or until the train has passed beyond a certain point in advance of them.

My preferred plan is to arrange the series of signals so that, for instance, the first of the series will remain to "danger" until the train has passed the second signal in advance—that is, the third of the series—and so on through the entire system.

The nature of my improvement will be best understood as described in connection with the drawings, in which they are illustrated, and the novel features which I desire to protect by Letters Patent are hereinafter clearly indicated in the claims.

In the said drawings, Figure 1 is a view taken along a railroad-track, showing a signal-post, with a semaphore-signal and other appliances connected with it, so that the signal will be set to "danger" as the train passes by it and so as to enable the set signal to be combined with others in accordance with my invention. Fig. 2 is a diagram illustrating my improved signal system. Fig. 3 is an enlarged view of the upper portion of a signal-post equipped with a signal and other appliances especially constructed and adapted for use in my system. Fig. 4 is a side view of the said signal-post and appliances. Fig. 5 is a sectional view of the valve-casing and valve used in connection with the signal shown in Fig. 3. Fig. 6 shows a signal and signal-balancing device of a somewhat modified construction from that shown in Fig. 3 and

provided with modified connections. Fig. 7 shows a device for releasing the signal; Fig. 8, another device for effecting the same purpose.

The manner of constructing and combining signals for use in my system which I prefer to use is shown in Figs. 1, 2, 3, 4, and 5, and I will describe this construction first.

A is a signal-post, and B a signal.

C indicates the railroad-track, along which the signals are situated, and D mechanism arranged to be actuated by a passing train and to actuate in turn a connection E, which draws the semaphore-signal B to the horizontal position indicating "danger." As shown, the mechanism D consists of a pivoted lever d' , pivoted at d^2 and a connection d , connected with lever d' and extending alongside of and close to the track, so as to be depressed by the flange or periphery of a passing wheel. The lever d' is of course depressed also, and, acting upon the cord E, which is fastened to it at d^3 and to the semaphore-wheel F as well, it rotates the wheel F and throws the signal-arm B up.

In the diagram Fig. 2 I have, for convenience in describing the relative action of the signals, designated the parts A, B, and D for the middle and end signal to the right as A' , B' , D' and A^2 , B^2 , D^2 , respectively. Besides the connection of wheel F to the actuating-cord E, it is also provided on its other side with a cord g , to the bottom of which is secured a weight G, and to the signal-post I connect a bracket g' , upon which the weight g rests when the signal B is in a horizontal position or below the horizontal position. The purpose of this will be seen on comparing the signals on posts A and A' of diagram Fig. 2. When the lever d' is depressed by a passing train, it throws the signal-arm to the position indicated at B on signal-post A and raises the weight G above its brackets g' . As soon as the train has passed the weight G, acting on the wheel F, draws the signal-arm down to the position indicated at B' on post A' , and having done this rests upon its bracket g' and ceases to affect the signal-arm.

f is a tooth connected to the rim of wheel F; H, a lens, also connected to said wheel, and I is the signal-lantern.

J is a pulley or sprocket-wheel secured to

the post above the signal B. Over this wheel passes a connection K K', the part K of which is preferably made like a drive-chain, as shown in Figs. 3 and 4, and to the end of this part K is attached a weight k' . The tooth f upon wheel F is situated so that when the signal-arm B is thrown up at or above a horizontal plane it will engage the chain K and pull it down.

Referring now particularly to the diagram Fig. 2, it will be seen that the connection which passes over the pulley J is continued beyond it to or below the surface of the ground, (see part marked K',) runs backward along the track (see part marked K²) to another signal, then rises along the signal-post, (see part marked K³,) passes over a pulley J, then passes downward along the post, (see part marked K⁴,) and has attached to its end a weight k^4 , which rests normally upon a bracket k^5 . Preferably the portion K of the connection between weights k' and k^4 passes by each intermediate signal-post, as A', and connects with the second signal-post behind it, as A². The weight k' is made considerably lighter than the weight k^4 , and has for its purpose simply to act to keep the connection K K' K² K³ K⁴ tight, while permitting it to contract or expand. L is a pivoted lever attached to the signal-post and extending over so as to be engaged by a bar or button k^3 , attached to the connection K⁴, as shown. When the tooth f on post A engages the chain K and pulls it down, it acts along the whole connection K K' K² K³ K⁴, lifting the weight k^4 from its bracket k^5 and raising the pivoted lever L upon its button or projection k^3 , as shown on post A². M is a rod attached to pivoted lever L, and the function of which is to raise or release the catch or other equivalent device which holds the signal in its horizontal position.

Referring now to Figs. 3, 4, and 5, S is a balancing-box, which, as shown, is connected with and forms part of the semaphore B, and which comprises two chambers P P', separated by a partition, which, however, permits the chambers to connect at the top and connected at the bottom by means of a pipe or pipes P² P³. Mercury or other fluid is placed in the chambers of the balancing-box, and when it is contained in the chamber P' it causes the signal-arm B to fall below a horizontal plane, while when contained in the chamber P it throws the center of gravity to the other side of the pivot of the arm, giving it a tendency to rise, a tendency which is checked by the weight G when the signal is in a horizontal position, so that, the mercury being contained in chamber P, the signal will remain in a horizontal position until the mercury or a sufficient quantity of it has passed through pipes P² P³ into chamber P', changing the center of gravity of the semaphore-arm and causing it to fall below the horizontal plane to the position indicating "safety." To the extent above described, this device

forms no part of my present invention, but is described and claimed in the pending applications filed by O'Brien and Harrington, August 24, 1888, Serial No. 283,620, and by myself on the 23d of September, 1889, Serial Nos. 324,823 and 324,824.

In the conduit connecting the two chambers P P', I place valve-casing O, in which is formed a valve-seat o^2 , opening o' to receive pipe P², and an opening o^3 to receive pipe P³. Preferably I form a smaller orifice o^4 , through which mercury can escape in small quantity and very slowly without passing through the valve-seat.

N' is a valve arranged in said casing O, so as to seat itself normally on valve-seat o^2 and close the connection between the two chambers, except through the orifice o^4 . As shown in Fig. 5, the stem of valve N' is connected with a bell-like casing N, having two concentric annular flanges $n n'$, between which a tubular extension o from the top of the valve-casing extends. By means of a hole n^3 , or in any convenient way, the rod M is attached to the bell-like casing N, and through it of course to valve N' in such a way that whenever the rod M is raised it will lift the valve N' from its seat and permit the mercury in chamber P to pass freely and rapidly through conduits P² P³ to chamber P'.

Referring now again to diagram Fig. 2, and supposing a train to be passing along the track C in the direction of the arrows, it will be seen that in passing post A² it will throw the signal B² to the position indicating "danger," and that said signal, if equipped in the manner shown in Figs. 3, 4, and 5, will remain in the "danger" position until the mercury in chamber P has escaped into chamber P' through the orifice o^4 , which will require, say, fifteen minutes, or until the valve N' is raised from its seat. The train next passes signal-post A', throwing its signal B' to the "danger" position in the same way. It next passes to signal-post A, throwing the signal B to "danger," and in doing so causes the tooth f on its wheel F to engage the chain K, drawing it down, and, acting along the connecting-line K K' K² K³ K⁴, it raises the weight k^4 and button k^3 on post A², raising also the lever L and rod M, and through the rod M lifting the valve N' from its seat and permitting the signal-arm B² to fall to the position indicating "safety." In passing the fourth signal of the system (not shown in the drawings) the same operation will take place, the connection in this case, however, being made to the signal-post A', and the result being to drop the signal-arm B' to the "safety" position, and so on for any desired number of signals.

The arrangement described by which the release of the signal set to "danger" is effected by the movement of a signal at an advance point in the line is desirable, because in this way the signals themselves are interlocked, and the dropping of one signal made

consequence of the elevation of another. In some cases, however, it may be desirable to effect the release of the signal set to "danger" by the passage of the train beyond a determined part of the track and without reference to the setting of another signal to "danger."

While the mechanism and system of connections shown in the drawings above described is preferred by me, I do not wish to be understood as limiting my invention upon it, except in those claims in which it is specifically referred to as a part of the combination. Any of the well-known means of conveying motion from one point to another may be used, or the motion of the valve, which controls the connection between the chambers of the balancing-box, may be effected by an electro-magnet and electrical connections. Thus in Fig. 6 I have illustrated a signal-arm, of which a balancing-box S forms a part, the lower portions of the chambers P P' being connected by a conduit P⁴, the end *p* of which is arranged to form the seat of a valve Q, attached to a lever Q', pivoted at *q* and having an armature *q'* at its upper end. Spring *q*⁴ is arranged to draw the lever Q' in, so that the valve Q will normally rest against the valve-seat *p* and close the conduit P⁴, and an electro-magnet *q*³ is arranged, as shown, so that the armature *q'* will be within its field and be attracted toward it when an electric current is passed through it, thus raising the valve Q from its seat *p* and permitting the mercury to pass from chamber P to chamber P'.

K^{4b} are electric connections extending from the electro-magnet *q*³ to a circuit-closer actuated, directly or indirectly, by a passing train at a point in advance of the signal and arranged so that when the circuit is closed the magnet will be operated and the valve lifted from its seat.

In Fig. 7 I have shown a circuit-closer T arranged so as to be closed by the action of a car-wheel passing over a pivoted lever *t*, connected with one of the circuit-wires K^{4b} and throwing it into connection with an arm *t'*, connected with the other wire of the circuit. In Fig. 8 I have shown a similar circuit-closing device arranged to be actuated by the movement of the signal itself.

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

1. The described automatic railway signaling system, consisting of signals arranged along the track, in combination with mechanism arranged, as described, to be actuated by a passing train, so as to set each signal to "danger" in turn, pivoted signal-balancing boxes S, each constructed as described and having a conduit arranged to connect its compartments P P', a valve arranged to close said conduit wholly or in part, and valve-raising

mechanism, actuating-lines connected with each valve-raising device and extending forward along the track, and actuating devices connected with said lines and arranged to be actuated directly or indirectly by a train in passing forward signals of the system or points in the track.

2. The described automatic railway signaling system, consisting of signals arranged along the track, in combination with mechanism arranged, as described, to be actuated by a passing train, so as to set each signal to "danger" in turn, pivoted signal-balancing boxes S, each constructed as described and having a conduit arranged to connect its compartments P P', a valve arranged to close said conduit wholly or in part, and valve-raising mechanism, actuating-lines connected with each valve-raising device and extending forward along the track, and actuating devices connected with said lines and arranged to be actuated by the upward movement of a forward signal in the system.

3. In combination with an oscillating semaphore-signal B, a balancing-box S, connected with the semaphore and having chambers P P' connected above and below the partition separating them, a valve arranged to close the lower connection, and valve-actuating mechanism, as described, all substantially as and for the purpose specified.

4. In combination with an oscillating semaphore-signal B, a balancing-box S, connected with the semaphore and having chambers P P' connected above and below the partition separating them, a valve-casing O, situated in the lower connection, a valve N', arranged in said valve-casing to close the conduit, and a contracted orifice *o*⁴, leading around the valve-seat, all substantially as and for the purpose specified.

5. In combination with a signal-support A, a semaphore-signal B, a balancing-box S, attached to and forming part of said semaphore, a valve-casing O, situated in the lower conduit of said box S, a valve N', situated in said casing, a semaphore wheel F, attached to semaphore B and having a tooth *f*, a pulley-wheel J, a connection K K', passing over pulley J and arranged, as described, so as to be engaged and actuated by tooth *f* when the semaphore is thrown above a horizontal plane, a pulley J', a connection K³ K⁴, passing over said pulley, and a valve-actuating rod M, connected with valve N' and with connection K³ K⁴, so as to open the valve when said connection is actuated, all substantially as described, and so as to be combined with similarly-equipped signal-posts, as and for the purpose specified.

SAMUEL H. HARRINGTON.

Witnesses:

A. W. CUMMING,
A. A. STRUBLE.