(No Model.)

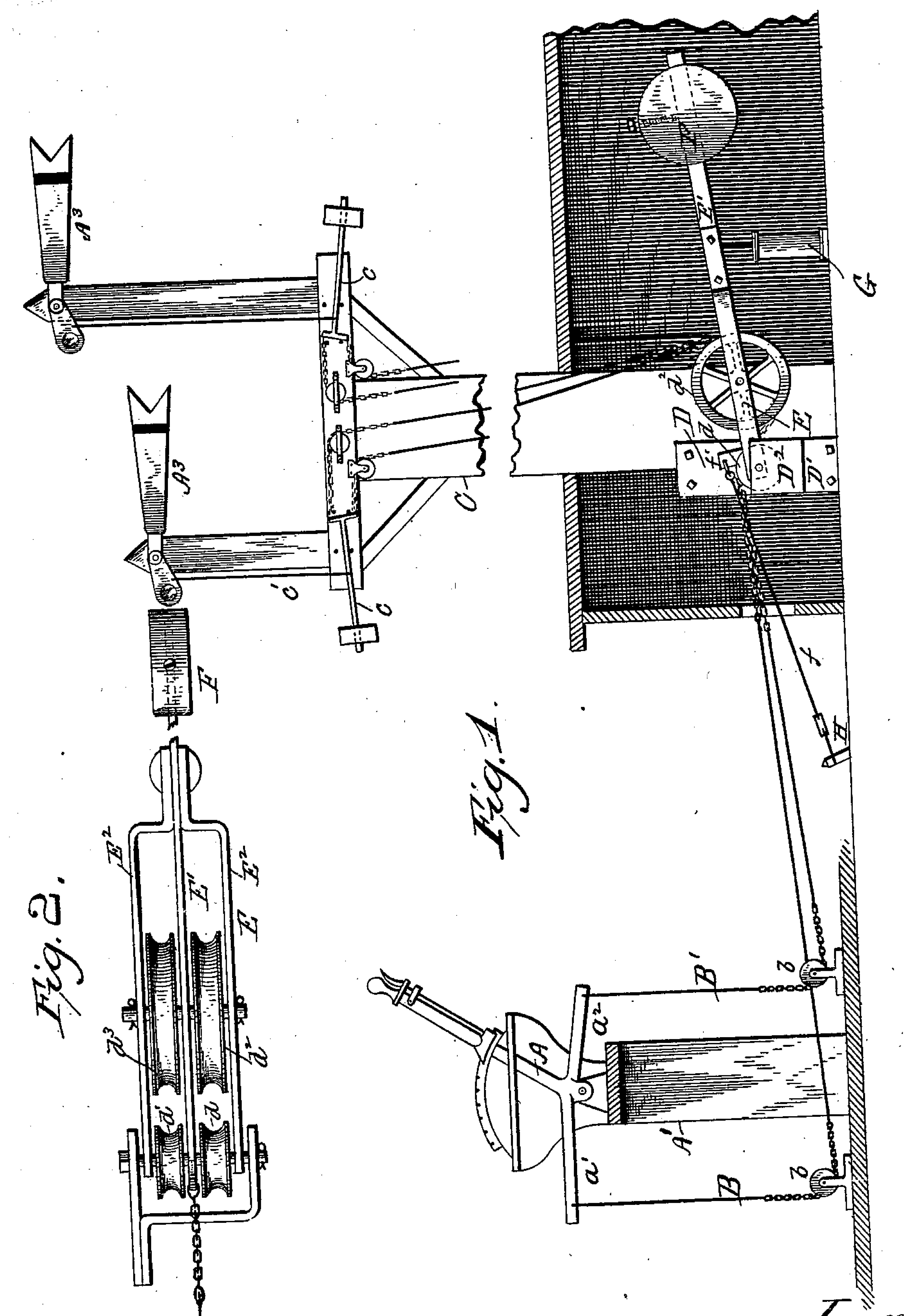
3 Sheets—Sheet 1.

# L. MURPHY.

## RAILROAD SIGNAL.

No. 592.661.

Patented Oct. 26, 1897.




Witnesses:
J. B. McGirr.
B. R. Kelly.

Inventor.
Leander Murphy
by Connolly Bros
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 2.

L. MURPHY.

RAILROAD SIGNAL.

No. 592,661. Patented Oct. 26, 1897.

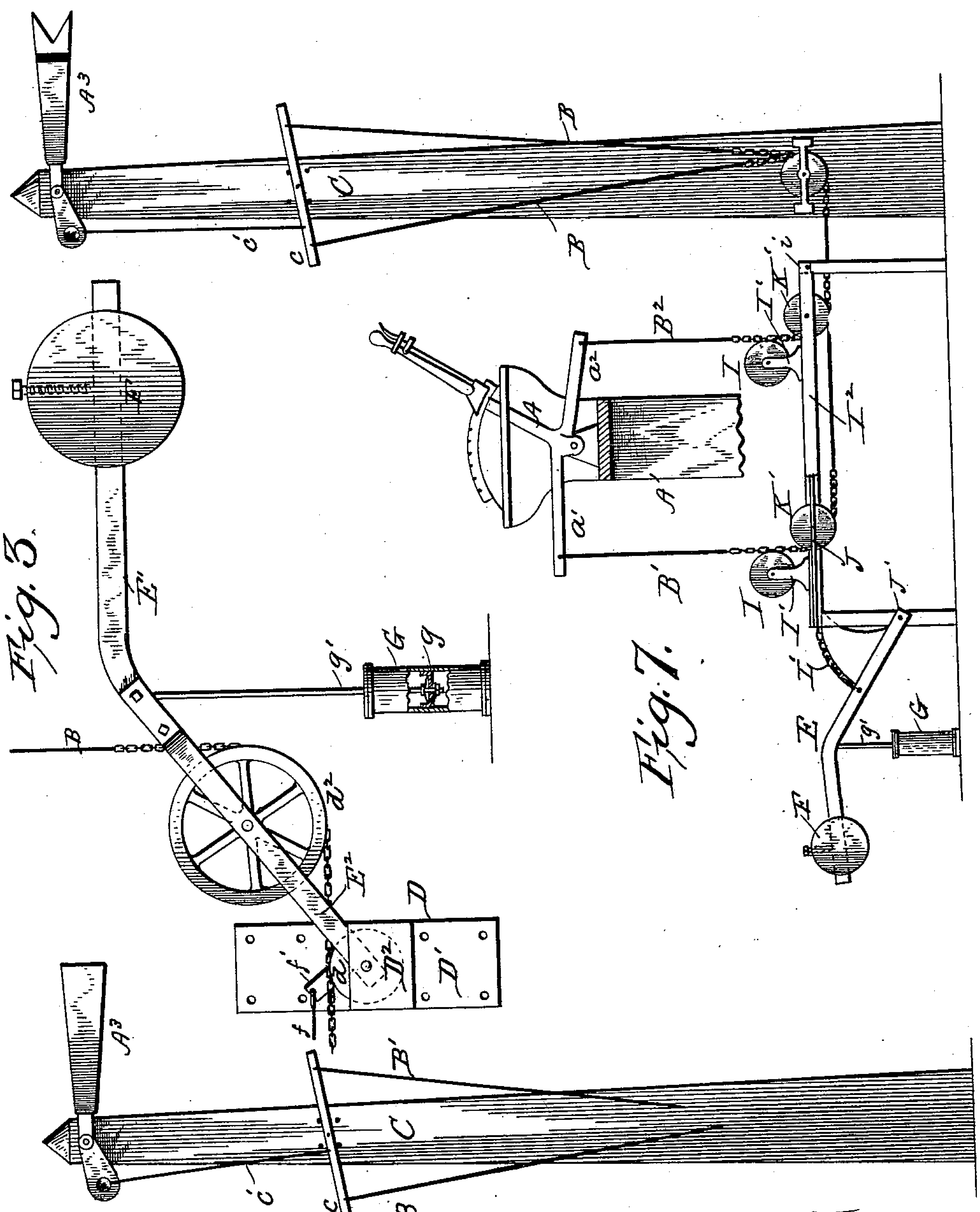



Fig. 4.

Witnesses:

J. B. McGirr.

B. R. Kelly.

Inventor.

Leander Murphy

by Connolly Bros

Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 3.

L. MURPHY.

RAILROAD SIGNAL.

No. 592,661. Patented Oct. 26, 1897.

Fig. 5.

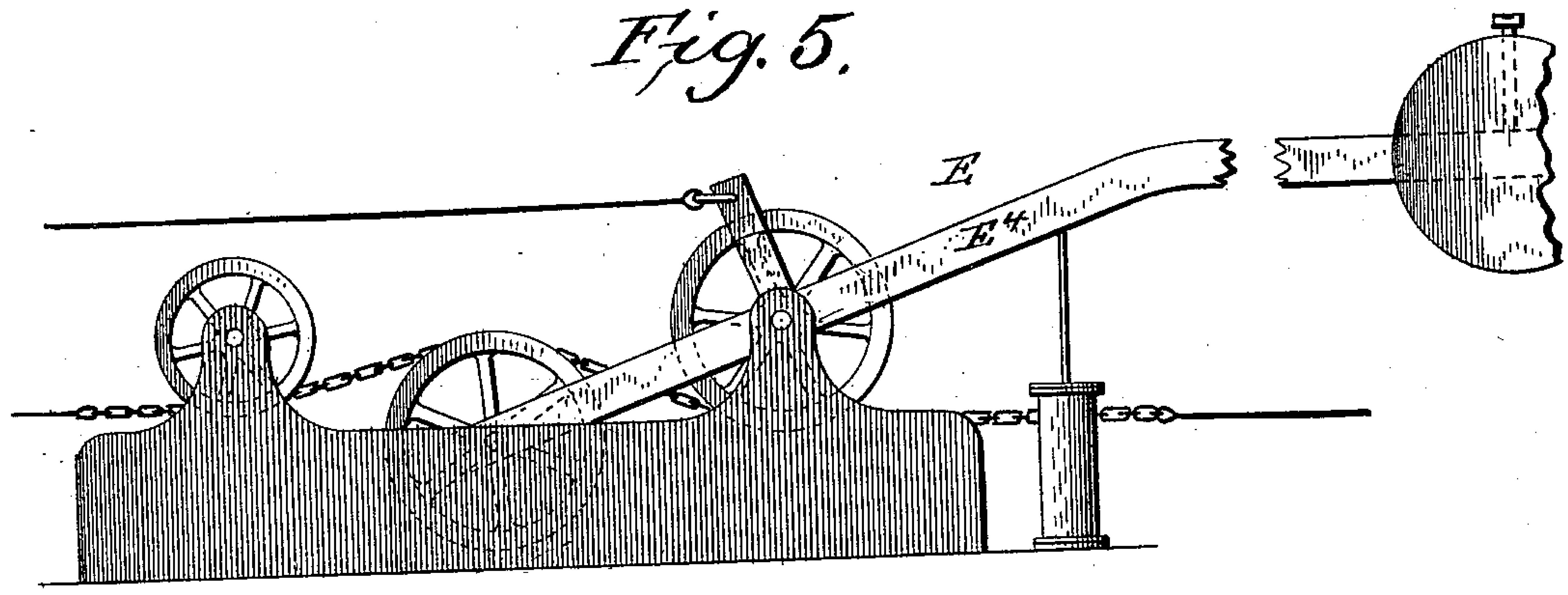
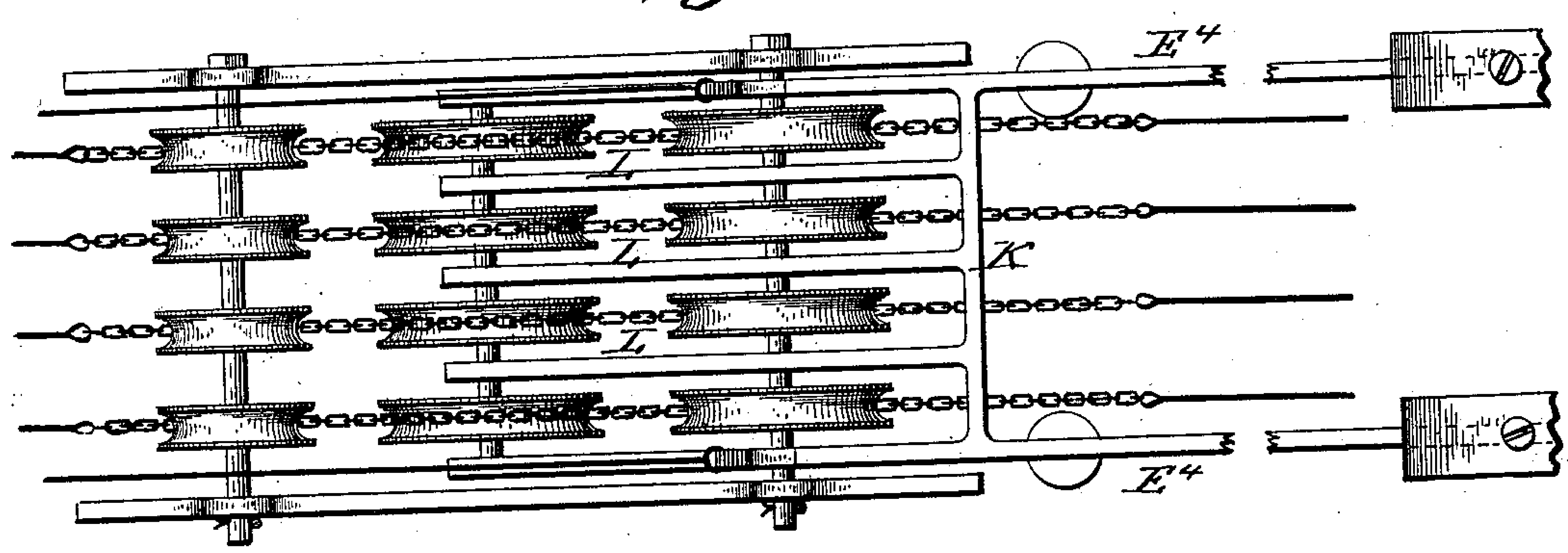



Fig. 6.




Witnesses:
J. H. McGirr.
B. R. Kelly.

Inventor.
Leander Murphy
by Connolly Bros
Attys

# UNITED STATES PATENT OFFICE.

LEANDER MURPHY, OF MANOR, PENNSYLVANIA.

## RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 592,661, dated October 26, 1897.

Application filed March 3, 1897. Serial No. 625,859. (No model.)

*To all whom it may concern:*

Be it known that I, LEANDER MURPHY, a citizen of the United States, residing at Manor, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Railroad-Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has relation to railroad-signals, and has for its object the provision of novel means whereby the contraction and expansion of the wires and other connections between the operating-lever and the signal, due to variations in temperature and other causes, is compensated for.

The invention consists in the novel construction, combination, and arrangement of parts, as hereinafter described and claimed, reference being had to the mechanical drawings, in which—

Figure 1 is a side elevation of the operating-lever stand and semaphore-signal post having mounted thereon and connected therewith the devices pertaining to my improved compensator. Fig. 2 is a plan view of the compensating devices. Fig. 3 is a side elevation of the compensating lever and its attachments on an enlarged scale. Fig. 4 is a side view of a home-signal post with a single semaphore-signal. Fig. 5 is a side view, and Fig. 6, a plan view, of a compensator for several signals. Fig. 7 is a side elevation of a modified form of compensator to be used in the signal-cabin instead of on the signal-post.

For the purpose of illustrating my invention to the best advantage I have shown in Fig. 1 of the drawings a bracket-pole, upon which are mounted two independent signal-blades supported on separate standards rising from the cross-bar or yoke, and it may be supposed that the signal-blades are green and that they give the usual indications when in horizontal and inclined positions. This style of signal-pole, with its groups of signal-blades, may be used either at a distance from the operator's cabin or signal-house or it may be used for home signals with as many blades as there are diverging routes.

A specific description of the compensator as constructed and adapted for use in connection with a single signal-pole will suffice to convey a very clear idea of the structural features, provisions, and purposes of the compensator constituting my invention.

The modification which may be made and which I have devised will be made the subject of special description, which will be hereinafter given. As will be understood, the purpose of the compensator is to take up slack in the wires and connections when the same are unduly expanded by heat or other causes and to yield at some point when undue contraction of the wires or other connections occurs under the influence of cold. The compensator is an apparatus set between the operating-lever and the signal-post in operative connection with the connecting-wires, and it comprises, chiefly, a weighted lever and a set of wheels or pulleys, in contact with which pulleys the chains are so arranged that as the wires contract the compensating lever will be raised proportionately to the contraction, and that when the wires expand the compensating lever will fall to an extent to take up the slack and keep the wires at a uniform degree of tension.

The operating-lever is shown at A in Fig. 1 and is mounted on a lever-stand A'. This lever is constructed and arranged in the usual manner, and to its laterally-projecting arms $a'$ $a^2$ are connected the wires B B', which lead under the pulleys $b$ to the signal-post C, where they are connected with the arms of a weighted lever $c$, to which is attached the wire or rod $c'$, the upper end of which is connected to the signal-blade $A^3$. At the base of the signal-pole C is set the compensator, which is mounted upon a suitable supporting-frame D and comprises the lever E, journaled at one end to the supporting-frame D between the brass plate D' and the bracket $D^2$, the pulley-wheels $d$ $d'$, mounted on the same shaft as the lever E, and the pulley-wheels $d^2$ $d^3$, journaled to and adapted to travel with the lever E and located at a sufficient distance from the pulleys $d$ $d'$ to enable the chains to pass from the pulleys $d$ $d'$ and under the pulleys $d^2$ $d^3$ before being carried upward to the lever $c$.

The lever E consists of a bar E', upon which is mounted the counterpoise-weight F near its outer end and having attached to its middle part the offset metallic pieces $E^2$ $E^3$, which embrace the outer faces of the pulleys, while the bar E′ passes between the pulleys, the shafts of the pulleys being supported on or passed through the three parts E′ $E^2$ $E^3$.

In Fig. 1 of the drawings, the compensating lever is shown at its most elevated position, as when the signal-wires have been contracted under the influence of cold and when the signal-arm is in a horizontal position or at "danger" and the operating-lever thrown forward. In first adjusting the compensator and signal-wires the latter are made of such length that when drawn tight around the pulley-wheels of the compensator the compensating lever will be in a medium position between the limits of its stroke, and so long as no expansion or contraction takes place the lever will remain in this its normal position, but when the wires contract their increased tension upon the pulleys $d^2$ $d^3$ will raise the lever upward to a distance corresponding to the amount of the contraction, so as to sufficiently relieve the tension and prevent the wires from breaking. When, on the other hand, the wires expand, the lever being relieved of the upward pull of the wires upon the pulleys $d^2$ $d^3$ will fall a distance corresponding to the elongation of the wires and so maintain such wires at their normal working tension.

The lever E is weighted sufficiently to keep the wires properly stretched to maintain a signal at a proper working position. To cause the compensating lever to operate steadily and to avoid any suddenness or jerkiness in its movements, I employ a cushioning apparatus consisting of an upright cylinder G, piston *g*, and piston-rod *g′*, and connect said rod *g′* to said lever, as shown. This cylinder is filled with any suitable liquid, and a small hole is bored through the piston *g* to allow the liquid to pass from one side to the other of the piston as the compensating lever rises or falls. The piston traveling in the cylinder and being retarded in its movements by the liquid will have a very slow and steady motion, which will prevent any jar to the lever while the signals are being operated. This cushioning and retarding device is an important feature of my invention, as the signal-blades are usually weighted to their normal positions, and there is hence always a dead-weight to be started by the signal connection, and unless this retarding device is employed the compensating lever would be moved and the signal-wires and connections would not operate promptly.

While the compensator, constructed and arranged as I have described it, will work effectively, I have provided a governing device which tends to make the operation of the compensator more certain under all conditions. This governor consists simply of a wire *f*, attached to one end of a lug *f′*, projecting upwardly from the inner end of the compensating lever, and thence running back and being rigidly attached to a signal-stake H. This wire is first brought to the same tension as the signal-wires when in their normal positions, but is much shorter than the signal-wires, its length, however, depending on the distance of the signal-pole from the operating-lever and other conditions to be determined in applying the compensator to practical use. This governor-wire, it will be understood, contracts and expands under the same conditions as the signal-wires, and as in practice I weight the compensator for the signal-wires and the governing-wire the compensating lever will move more steadily than it would if weighted simply to the requirements of the signal-wires.

Thus far I have described the compensator and its connections as a means for compensating for the expansion and contraction of the two wires leading from the operating-lever to the signal-arm lever *c*. The compensator is, however, applicable to use in connection with any number of different signals, it being only necessary to increase the number of pulley-wheels according to the number of signals to be operated, it being understood that each signal-arm requires two connecting wires with their chain-lengths embracing their respective pulley-wheels. As already described, the post C supports two different signal-arms and their connections; but, of course, a single signal-arm can be employed under proper conditions, as shown, for instance, in Fig. 4, which represents a home signal with permissive semaphore. The position represented indicates red by night or day, and when the signal-arm is dropped to an angle of thirty-seven degrees it is permissive or green by night or day, and when at an angle of eighty degrees is white or clear block. This style of signal-pole may also be used for distance-signals. When the single compensator is used in connection with several signals, the compensating lever will carry two wheels for each wire, while the lever-stand will support one pulley, as shown in Figs. 5 and 6, and the lever, instead of being made from a single bar E′, with the sides $E^2$ $E^2$, will consist of two bars $E^4$ $E^4$, supporting counterpoise-weights and connected together by the transverse piece K, from which pulley-supporting arms L L L will project between the pulleys.

In the modification shown in Fig. 7 of the drawings the compensator is so constructed and arranged as to be specially adapted for use in the signal-cabin, wherein it is located at the base of the operating-lever stand. In this modification I support the stationary pulley-wheels I by supporting standards I′ upon a rigid metallic frame $I^2$, which is composed of two side frames secured together by transverse connections at one end, as shown at *i*. This frame is grooved longitudinally on the inner surfaces of these two side pieces, and in this groove the frame J is mounted and arranged to slide forward and backward. The compensating wheels K′ K′ are journaled to the frame J, and the chains connected with the signal-operating wheels pass downward in contact with the peripheries of the wheels I I, and thence partially around and under compensating-wheels K′ K′. The compensating lever E is pivotally connected at its rear end J′ near the bottom of the latter and is coupled to the inner end of the sliding frame J by a chain L′, which passes from the cam L′, secured to the lever E.

Now when the signal-wires contract, their tension or pressure on the pulleys K being transmitted to the sliding frame cause the latter to move backward and the compensating lever to be raised, and when the connections and signal-wires expand, the compensating lever, falling by its own weight, draws the sliding frame in the opposite direction to weight the pulley-wheels K′, thus taking up the slack in the signal-wires. The principle of operation in this modification is the same as already described in connection with the compensator shown in the other figures, the compensating wheels being attached to a sliding frame connected with and operated by the compensating lever, instead of being carried by the compensating lever itself.

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

1. In railroad-signals, the combination with the signal-operating lever A, the semaphore signal-blade $A^3$, the double flexible connections B B, through which the signal-blade is operated, the lever *c* mounted on the signal-post, the rod or wire *c*′ leading therefrom to the signal-blade, of a compensator, consisting of a stationary support D having journaled thereto, pulley-wheels *d d*′, over which said connections pass, and a weighted lever E′ carrying pulley-wheels $d^2$ $d^3$, under which said connections are carried, said connections being attached at their upper ends to the lever *c*, and at their other ends to the operating-lever, substantially as described.

2. In railroad-signals, the combination with the signal-operating lever, the signal-blade and the flexible connections through which the latter is operated, of a compensator-lever located between the ends of said connections, and a cushioning device constructed and arranged to retard the motion of the lever, substantially as described.

3. In railroad-signals, the combination with the signal-operating lever, signal-blade, and flexible blade-operating connections, of a compensating lever having attached thereto a governing device, substantially as described.

4. In railroad-signals, the combination with the signal-operating lever, the signal-post, the signal-blades, a double-armed lever on the signal-post, and a connection between the same and the blade, of double flexible connections leading from the operating-lever to said double-armed signal-post lever, and a compensator comprising a weighted lever, pulley-wheels mounted on stationary bearings, and twin pulleys mounted on movable bearings connected with said lever, the said flexible connections being passed partially around said pulleys and the parts being so arranged that as the flexible connections contract, one set of pulleys will be brought correspondingly closer to the other, and as the connections expand, the reverse movement will take place, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

LEANDER MURPHY.

Witnesses:

A. F. LANDIS,

J. F. LANDIS.