(No Model.) 3 Sheets—Sheet 1.

W. NEWCOMB.

RAILWAY SIGNALING DEVICE.

No. 456,836. Patented July 28, 1891.

Fig. 1.

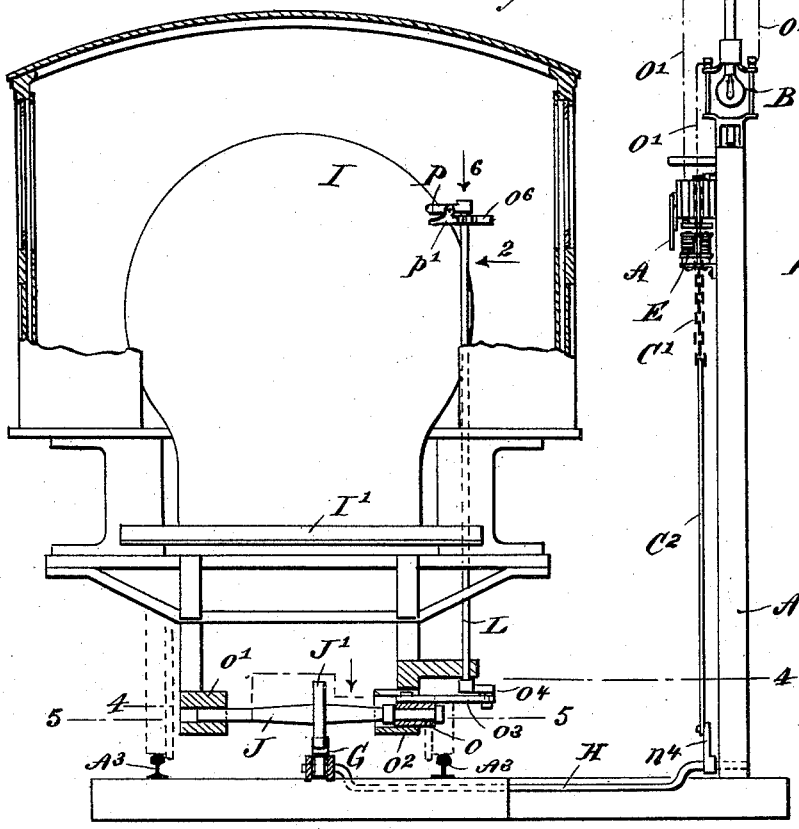


Fig. 2.

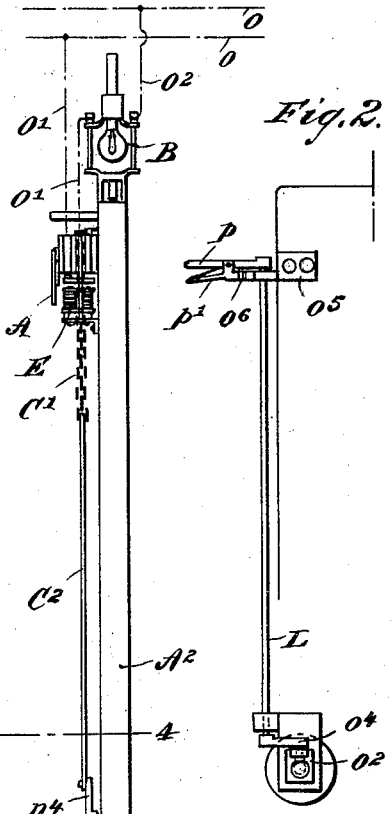


Fig. 3.

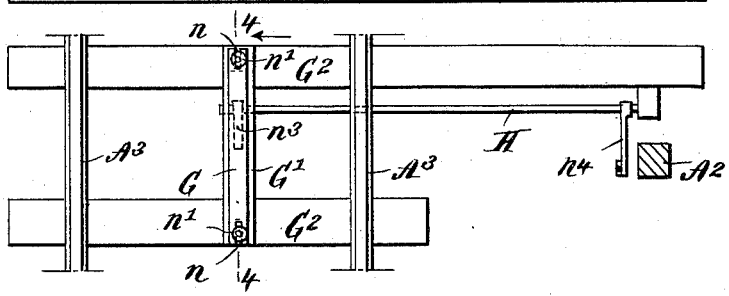


Fig. 5.

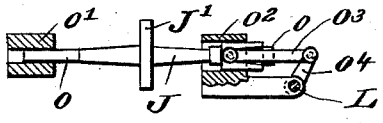


Fig. 6.

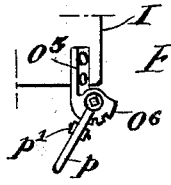
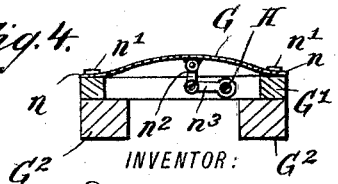


Fig. 4.



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RAILWAY SIGNALING DEVICE.

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Fig. 7.

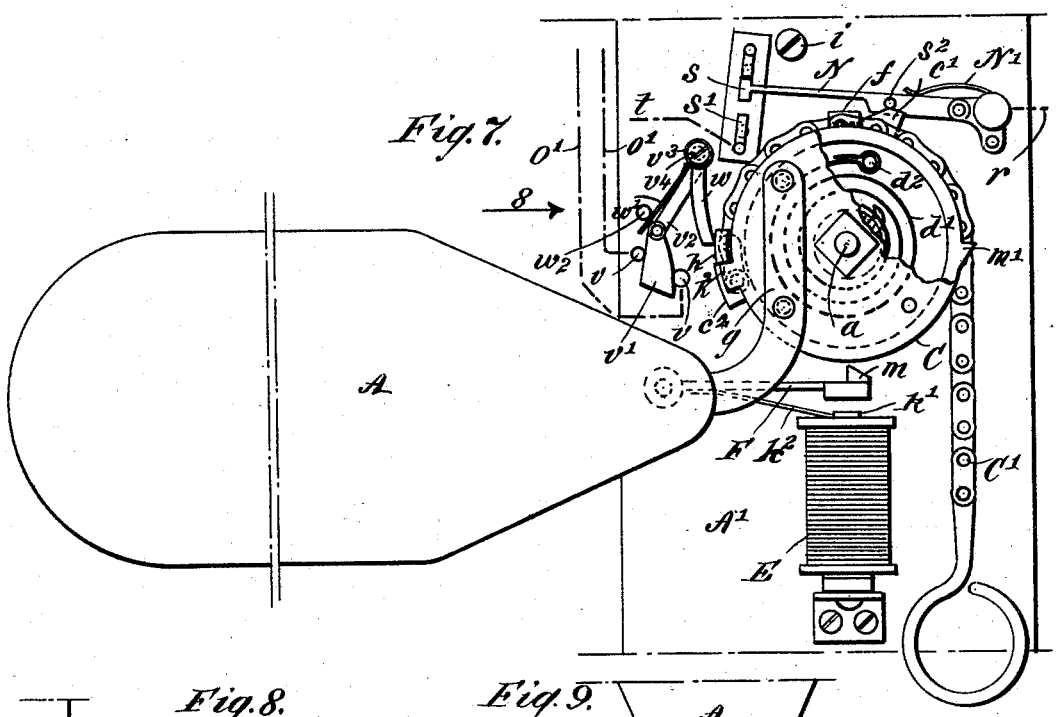

Fig. 8.

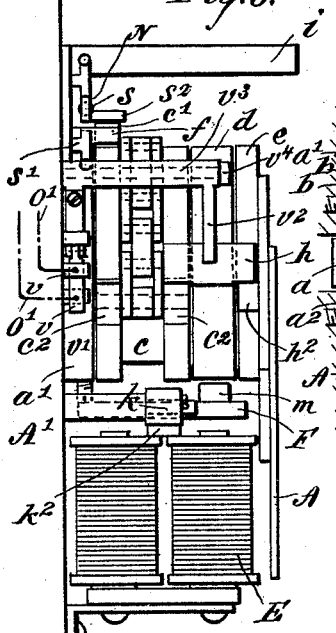

Fig. 9.

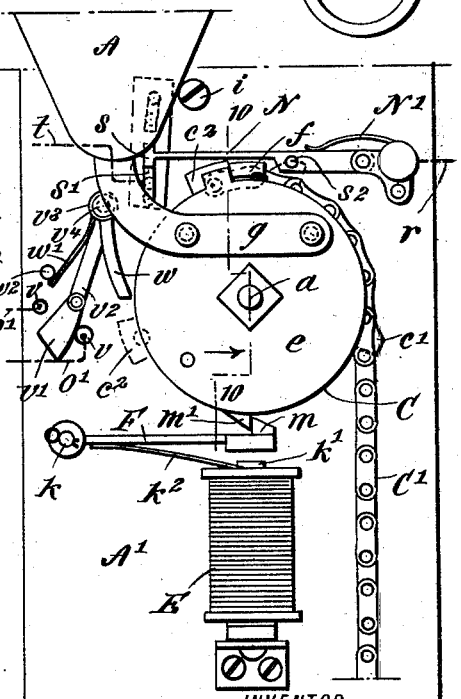

Fig. 10.

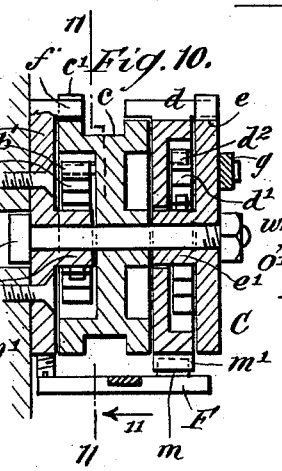

Fig. 11.

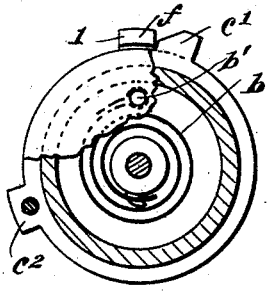

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Fig. 12.

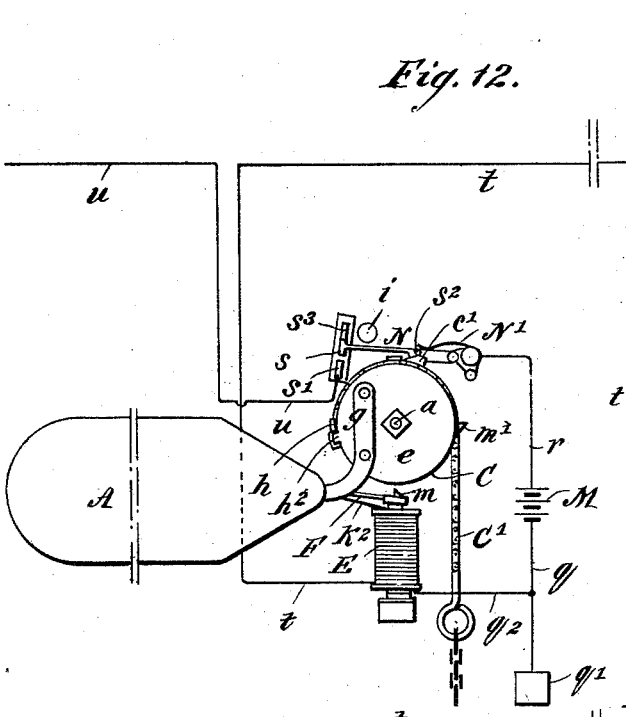


Fig. 13.

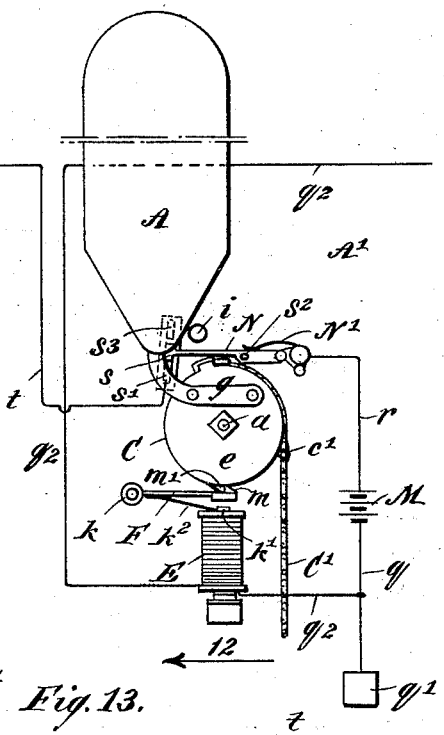
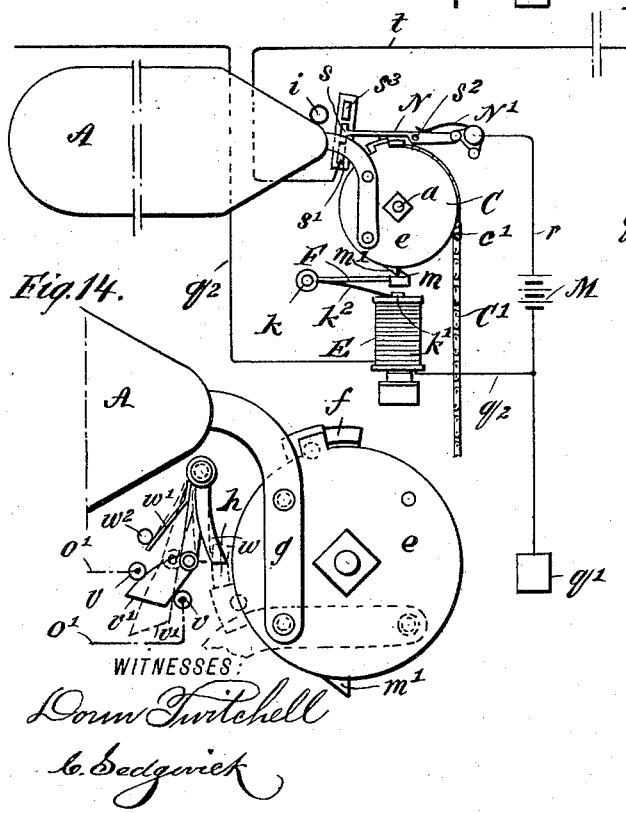
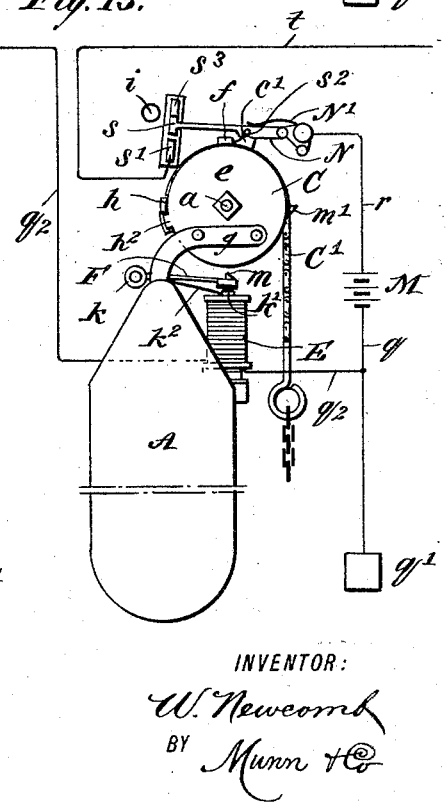


Fig. 14.





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UNITED STATES PATENT OFFICE.

WILLIAM NEWCOMB, OF JOHNSONVILLE, NEW YORK.

RAILWAY SIGNALING DEVICE.

SPECIFICATION forming part of Letters Patent No. 456,836, dated July 28, 1891.

Application filed December 20, 1890. Serial No. 375,332. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NEWCOMB, of Johnsonville, in the county of Rensselaer and State of New York, have invented a new and useful Railway Signaling Device, of which the following is a full, clear, and exact description.

This invention relates to visual signals for railway service, and has for its objects to provide automatic devices which are conjunctively operated by electricity and a moving locomotive or train of cars, whereby said rolling-stock will be protected from collision with other trains on either single or double track railroads.

A further object of the invention is to so construct the signaling mechanism that a visual signal will be exposed which may be seen in the dark as well as in daylight, and indicate "danger" by its exhibition.

To these ends my invention consists in the peculiar construction of a mechanism for signaling in advance of and behind moving trains on a railroad, its location at stations in sequence, and the provision of devices on a locomotive which will coact with the signaling devices at stations and set signals automatically by the interdependent action of electricity and gravity, so as to protect a moving train in front and also in the rear, at night or in daylight.

My invention further consists in the construction, combination, and arrangement of parts, as is hereinafter described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a rear elevation, partly in section, of a locomotive and the railroad-track on which it stands, showing the signaling device and the mechanism for operating the same. Fig. 2 is a side elevation of a portion of the mechanism carried by the locomotive viewed in the direction of the arrow 2 in Fig. 1. Fig. 3 is a horizontal plan view taken on the line 4 4 in Fig. 1, showing some of the parts below said line, others being removed. Fig. 4 is a cross-section of part of the device shown in Fig. 3, taken on the line 4 4 in said figure. Fig. 5 is a detached plan view, partly in section, of parts of the devices shown in Fig. 1, taken on the line 5 5 in said figure. Fig. 6 is a plan view of the upper portion of the adjusting mechanism shown in Fig. 1, viewed in the direction of the arrow 6 in said figure. Fig. 7 is an enlarged detail front view of the signaling device, partly broken away, with the semaphore-blade lowered. Fig. 8 is a side elevation of the device shown in Fig. 7, viewed in the direction of the arrow 8 in said figure. Fig. 9 is a front view of the signaling mechanism represented in Figs. 7 and 8, with the semaphore-blade elevated and partly broken away. Fig. 10 is a sectional view of the hub of the semaphore-blade, showing its component disk-sections and contained springs, taken on the line 10 10 in Fig. 9. Fig 11 is a cross-section of the hub, taken on the line 11 11 in Fig. 10, viewed in the direction of the arrow 11 in said figure. Fig. 12 is a diagrammatic view showing two signaling devices at separate stations on a single-track railroad, the direction of movement of a locomotive or train of cars being indicated by the arrow 12. Fig. 13 is a diagrammatic view of two signaling devices at separate stations on a double-track railroad, and Fig. 14 is a detached view of the switch or cut-out mechanism for the electric signal-light as it is arranged for use on a double-track railroad.

To enable a clear comprehension to be had of this improved system and device for protective signaling on single and double track railways, a brief preliminary statement of the general arrangement will be given.

A sufficient number of similar signaling devices are singly erected at stations separated a proper distance to form divisions known as "blocks" on the railroad, and a local battery is furnished for each signaling device, connecting the same in a normally-open circuit, which is closed at a proper instant by the pressure of a locomotive on mechanism that will set a signal to "danger" when the train passes a station. If on a single-track road, such a danger-signal is displayed at a station in advance of the moving train, while the impact of the locomotive sets the signal just passed at "safety," the simultaneous movement of the advance signal being effected by the closing of the battery-circuit and consequent release of the visual

blade, which falls by gravity from safety to danger.

When the signaling devices are in use on a double-track railroad, where there is only a necessity for guarding the rear end of the train, the signaling apparatus is similarly connected in sequence electrically; but the positions of the semaphore-blades are so changed that they will hang pendent to indicate "safety," and be elevated to a horizontal plane or at "danger" on the nearest signal when the locomotive enters a block, and simultaneously by the closing of the electric circuit release the visual blade at the opposite or further terminal of the block just vacated. In like manner the electric wires of the signal-lamps employed, which are connected in a normally-open circuit, will be adapted to light a red glazed signal-lantern at a station in advance of a moving train on a single-track railroad and extinguish a similar lamp at a station next behind the moving train, and on a double-track road light an electric lamp at the station just passed by a train and extinguish the one at the farther terminal of the block vacated, when mechanism is moved that closes the electric-light circuit between the stations mentioned. The specific construction and operation of the improved signal will now be given.

The signaling mechanism proper consists of a visual blade A for daylight signaling, and an electric lamp B for the illumination of a red-glazed globe or other similar glazed lantern, which may be of any preferred shape, and either an arc or an incandescent lamp may be utilized. The semaphore-blade A is secured on a bracket board or plate A′, attached to a vertical post A^2 along the side of a railroad-track A^3, and the lamp B is supported on top of said post, as shown in Fig. 1. The supporting-hub C of the semaphore-blade A is secured revolubly on the vertical face of the bracket-plate A′ by a horizontal journal-bolt *a*, said hub being constructed of three movable pieces *c d e*. A circular base-plate *a′* is secured to the outer face of the bracket-plate A′ by screws, and has a central boss formed on its free face of such dimensions and form as to produce a forwardly-projecting concentric collar a^2, whereon the inner terminal end of a volute coiled spring *b* is attached, which will be further mentioned.

The first section *c* of the hub of the semaphore-blade A is circular in contour and has its periphery grooved near the transverse center of a suitable depth to receive a metal chain C′ and guide it when the device is in use. In the face of the section *c* which is nearest to the base-plate *a′* a circularly-bounded cavity is formed, having a level bottom and side wall at a right angle thereto, the diameter of which cavity is such that a proper sized spring-box is afforded for the volute coil spring *b*, which is secured to the bottom wall of the box by an engagement of its outer end *b′* with a stud that projects from said wall into the box, as shown in Figs. 10 and 11. On the outer face of the second hub-section *d* an annular cavity is formed for the reception of a helical spring *d′*, which is secured to the hub-section at d^2 near the periphery of said hub-section, which section is centrally and circularly apertured to receive the laterally and inwardly projecting collar *e′*, that affords a revoluble bearing for the disk *e*, which is the outer section of the semaphore-hub C, the inner terminal of the helical spring *d′* being secured to the collar.

Upon the base-plate *a′* of the hub C a forwardly-overhanging lug *f* is formed, which lies in the same vertical plane with the journal-bolt *a* when the parts of the composite hub are assembled.

The semaphore-blade A is made of any suitable material, preferably in the form shown, and to one end is secured an arm *g*, which is bent to project its free-end portion at a right angle to the longitudinal plane of the blade.

When the signaling device is to be employed to protect trains on a single-track railroad, the stub end of the semaphore-blade arm is attached to the disk *e* on its outer face in such a relative position that the weight of the blade will cause it to fall into a horizontal position when free to do so, such a falling movement being cushioned by the coiling of the spring *d′* and of the volute spring *b*, these springs being wrapped to exert their tensional strength in a direction opposite to the descending movement of the blade A, so that they will aid the return of said blade to a perpendicular position. Upon the hub-section *c* an abutment *c′* is formed, which will impinge upon the lug *f* when the blade A hangs projected in a horizontal plane, as shown in Fig. 7, this contact of parts determining the downward movement of the blade, as will appear. On the hub-section *c* a radial lug c^2 is formed, which will abut upon the under side of the lug *f* when the semaphore-blade A is in a vertical plane, as shown in Fig. 9, and upon the same hub-section a similar lug is formed opposite the lug c^2 and separated from it by the peripheral groove in said hub-section, one end of the draft-chain C′ being attached between and to the lugs mentioned by a pintle, bolt, or other means, and said chain, extending over the upper portion of the hub C, hangs pendent for attachment to a connecting-rod C^2, as shown in Fig. 1. There is a cross-bar *h*, formed on or secured to the periphery of the hub-section *d*, which is so located that its laterally-projecting ends will engage the top edge of the lug c^2, and also receive the impinge of a radial ear h^2 on the disk *e*, which ear is formed at a proper point to adapt it to transmit the expansive action of the spring *d′* to the intermediate hub-section *d*, the resilient force of the spring *d′* being sufficient to counterbalance the weight of the semaphore-blade A, so that the dropping of said blade will be cushioned and the momentum absorbed by the co-

action of the springs *b d'*. When the chain C' is drawn upon so that the hub C is partly rotated and the blade A elevated, the edge of the latter named will strike against the check-bar *i* when said blade has been rocked into a vertical position, the lug c^3 impinging at the same instant upon the side of the overhanging lug *f*, as previously mentioned.

Below the hub C an electro-magnet E is secured in place upon the bracket-plate A', a sufficient space intervening between the magnet and hub for the proper vibration of the armature-bar F, which latter is pivoted at *k* on the bracket-plate and is held off of the pole-piece *k'* of the magnet by a weak spring k^2, that is depressed by the force of an electric current when the magnet is energized, as will be further explained. The upward projection of the armature-bar F carries a latch-hook *m* on the upper surface of its free end to interlock with a similar hook-shaped projection *m'*, that is formed on the hub-section *d*, diametrically opposite to the cross-bar *h*, thus retaining the composite hub C and the attached blade A in locked adjustment with the armature-bar and the blade in an upright position. The bar F being within the field of force exerted by the magnet E will release the signal-blade A as soon as an electric current is sent through the magnet, allowing the blade to drop by its gravity to the position shown in Fig. 7. Between the track-rails A^3 a longitudinally-located spring-plate G is retained upon a scantling bar G', that extends between and is secured upon two cross-ties G^2, that are adjacent, the plate G having a sliding connection with the bar it rests upon by reason of the engagement of its longitudinally-slotted ends *n* with bolts *n'*, that are inserted in the bar and pass upwardly through said slots. On the lower surface of the spring-plate G an ear is formed, to which the upper end of a link n^2 is pivoted, (see Fig. 4,) the lower end of said link having a similar connection with the end of a rock-arm n^3, that is secured upon one end of a rock-shaft H. The latter, being loosely inserted in a transverse perforation of the bar G', is projected below one track-rail and has its other end pivoted on the post A^2. A crank-arm n^4, which is secured upon this end portion of the rock-shaft, has a pivotal connection with the lower end of the upright rod C^2, thereby completing a connection between the spring-plate G and the semaphore-blade A of such a character that the depression of the plate G will rock the blade A from a horizontal to a vertical position.

Upon the lower part of the frame-work of a locomotive I below the foot-board I' a transverse shaft J, having a longitudinally-central roller J' on it, is supported to revolve at its ends in a fixed box *o'* and a sliding box *o*. The latter, having its outer surface square in cross-section, is loosely secured in a box o^2 of similar formation, the box *o* being held on the shaft J by the loose engagement of its ends with two spaced collars on said shaft. The box o^2 is pivotally connected on its upper surface with a pitman-bar o^3, that extends outwardly, and is secured in a like manner at its outer end to the end of a crank-arm o^4, which is mounted on and secured to the lower end of a vertical shaft L. Said shaft L is supported to revolve, and extends upwardly within the locomotive-cab a proper height to be secured loosely in position near the fire-box of the locomotive-boiler by a bracket-arm o^5, which is enlarged to afford a semicircular rack-plate o^6 on its projecting portion, which rack-plate is notched properly on its circular edge for the interlocking engagement therewith of a pawl *p'*, that is pivoted by its ear upon the sides of the handle-bar *p*. The roller J' is of such dimensions and has such a relative position given it above the track-rails A^3 that when the locomotive I is moved on the track above the spring-plate G the roller will engage said spring-plate and depress it a correct distance for the vibration of the semaphore-blade A when said roller is longitudinally aligned with the plate, which an adjustment of the handle-bar *p* will effect or prevent, according to the position it is made to occupy with regard to the rack-plate o^6, as a movement of the handle-bar in one direction will slide the shaft J and roller J' so as to move the latter away from the spring-plate, while an opposite vibrating and locking engagement of the handle-bar and its pawl *p'* with regard to the notches of the rack-plate will locate the roller in alignment with the spring-plate and adapt the progressive or retrograde movement of the locomotive to actuate the described mechanism and set the signal-blade to indicate "safety" when the device is in use to protect a single-track railroad.

Referring to the diagram Fig. 12 it will be seen that two signaling devices are shown, the one at the right representing the entering end of a block. The direction of progressive movement of a locomotive, detached or connected with a train of cars, is indicated by the arrow 12.

The manner of establishing an electric circuit is as follows: A local battery M is placed at any convenient point near the station, and a ground-wire *q* runs from one pole to a ground-connection indicated by the square block *q'* at the right side of the diagram, a loop q^2 from the wire *q* extending to the electro-magnet E and thence to a station in the rear. The other pole of the battery M is connected to a conductor-wire *r*, that extends toward and is electrically joined to a switch-bar N, that is pivoted at the end where said connection is formed upon the bracket-plate A'. The switch-bar N is extended across the bracket-plate A' and given sufficient length to permit it to engage with its free end *s* the contact-post *s'*, said bar being so relatively located with regard to the forwardly-inclined top face of the radial abutment *c'* on the hub-section *c* that a laterally-projecting pin s^2 on the switch-bar will be thrown in the path of this

abutment when the hub C is rotated and the end s of the bar be raised off of the contact-post s', when the latched engagement of the hooks m m' is broken by the depression of the armature-bar F, when the magnet E is energized, the depression of the switch-bar being effected by a spring N′ and its upward movement limited by a check-block s^3. At the left side of diagram 12 there is a signaling device of similar form to that at the right side, which represents a station sufficiently in advance of the station on the right side to insure safety by the arrest of a train approaching on the single track, which, when signaled, must take a siding if the train moving from right to left has the precedence.

The advance signaling device in Fig. 12 is connected to the rear one by extending a line-wire t from the contact-post s' on the rear signaling device forwardly and connecting it to the electro-magnet E on the advance signal, which is also furnished with a local battery M, ground-wire q, loop q^2, and connecting-wire r between the battery and the switch-bar N, the line-wire u on the advance signal extending forwardly to the next station in sequence. As shown, the locomotive is just passing the station at the right side of the diagram Fig. 12, and by a draft on the chain C′ has elevated the semaphore-blade A, the partial revolution of the hub C toward the right hand carrying the abutment c' away from the switch-bar N and permitting it to be depressed by the spring N′, so as to complete the circuit between the battery M at the station the locomotive is passing and the electro-magnet E of the signaling device in advance, which will cause the release of the blade A at said advance station, so that it will fall by gravity to a horizontal position. While the locomotive is on the spring-plate G the imposed weight will prevent the blade A from falling, although the circuit is completed, as shown; but the instant the plate G is released the action of the volute spring b will return the abutment c' to its normal position and break the circuit, as shown in Fig. 7, thus demagnetizing the electro-magnet at the station the locomotive is passing, so that the semaphore-blade will stand in an elevated position by reason of the engagement of the hooks m and m'.

The diagram in Fig. 13 represents the improved signaling device in position at two separate stations on a double-track railroad, so arranged as to guard the rear of a train, as there can be no trains moving toward each other on the same track in this case, the position of parts representing their adjustment just as a locomotive is passing the signal, at the left side of the diagram. To effect the result mentioned the semaphore-blades are attached to the hubs C below the pivots of the latter, so that "safety" will be indicated by the blade falling to a vertical position, as shown at the right hand in Fig. 13, "danger" being indicated by a mechanical depression of the chain C′ and consequent elevation of the blade to a horizontal position, as shown at the left side of said figure, the locomotive having just set the blade A at danger point and simultaneously released the signal-blade at the station immediately at the rear of the moving train, or rather distant one signal block from it, the signal remaining at danger until the train has left the block so guarded.

To more fully explain the operation, in the diagram under consideration it will be seen that the local battery at each station has one pole connected by the wire q^2 to the magnet E of the signaling device at said station, this wire being extended forwardly to be attached by its other terminal to the post s', on which the switch-bar N impinges, the other pole of each local battery M having an electrical connection established with the switch-bar N of its own station. Furthermore, it will be noticed that the arm g of the semaphore-blade A is so attached upon the outer plate e of the hub C that the blade will be disposed in a vertical plane pendent when the magnet E of a rear station is demagnetized, and the blade A elevated to a horizontal position over the track showing "danger" when the impact of the locomotive passing a station moves the mechanism, as has been previously explained, which contact establishes a circuit electrically with the magnet at the rear station, so as to energize it and release the blade A to drop by gravity to "safety."

In the matter of the night signaling by the improved mechanism herein described electric lamps are preferably employed, there being a single lamp B of proper candle-power provided for each signaling-station.

The electric lamps B may be of the arc or incandescent type, the latter named being preferred. Each electrolier is placed in an appropriate frame provided with red glass to display a danger-signal when the lamp is lighted, the lantern at each station being mounted upon the post A^2 above the semaphore mechanism, as represented in Fig. 1. The line-wires O, which are the conductors of electricity for the lamps B, extend aside of the railroad from station to station, and at suitable intervals are connected to sources of electricity, which may be dynamos, primary batteries, or storage-batteries, as may be preferred. Each lamp has its loop-wires O′ O^2 extended from the main line-wires O O to connect it therewith, and one wire O′ is severed, and has its ends attached to the contact-posts v v, which are insulated metallic projections from the bracket-plate A′. The posts v are separated a proper distance to allow a circuit closing and opening block v' to slide between them, always resting on one post. The block v' is flat on its sides and wedge-shaped on its edges, is made of a suitable metal, such as copper, and is insulated from the plate A′, if the latter-named portion of the device is metallic.

There is a slight change in the adjustment of the parts of the switch to adapt it for use on a single or a double track, which will be explained. The switch for lamps on a single track first considered is shown in Figs. 7 and 9, and consists in part of the posts v and block v', previously mentioned, the latter having its smaller end pivoted to the outer end of a lifting-arm v^2, which projects from a sleeve v^3, that is supported to rock on a journal-stud v^4, which projects horizontally from the bracket-plate A′. There is a finger-bar w projected from the sleeve v^3 at such a point as will permit its free end to engage with the hub-section d, said contact being enforced by the spring w', which is attached by one end to the lifting-arm v^2, its body engaging the stud w^2. When the cross-bar h on the hub-section d is in the position shown in Fig. 7, the blade A has been dropped to indicate "danger" at an advance station on a single-track railroad, and, as therein indicated, the circuit-closing block v' is drawn by the outward projection of the end of the finger-bar, so as to produce a contact of its opposite edges with the two posts v, thereby completing the electrical connection of the lamp B at the station in advance of the moving locomotive or train. The elevation of the semaphore-blade A at the station an engine is passing on a single track will remove the cross-bar h from contact with the finger-bar w, and by the inward rocking movement of the arm v^2 thus produced break the contact of the block v' with one of the posts v, thereby opening the circuit of the lamp at the station just passed and extinguishing the red light or danger-signal.

Fig. 14 shows in full lines the position of the block v' when the circuit of a signal-lamp on a double-track railroad is closed, and in dotted lines the position of the block when the circuit is open. As it is necessary in order to protect the rear of the train that the circuit should be closed and the lamp lighted at the station which the train is passing, on entering a block the circuit opening and closing block v' is so connected to the lifting-arm v^2 that its side edges are in a relation to the parts v the reverse of that shown in Figs. 7 and 9, so that the contact of the cross-bar h with the finger-bar w will open the circuit, and the removal of said cross-bar from the finger-bar will close the circuit. In operation, therefore, if the station at the left of Fig. 13 is being passed by a locomotive with an attached train to enter a new block on a double-track railroad, the impact of the engine will elevate the semaphore-blade A to a horizontal plane or "danger," and at the same time close the circuit of the lamp B, owing to a release of the finger-bar w and attached parts, which will permit the resilience of the spring w' to rock the finger-bar against the periphery of hub-section d, the consequent movement of the arm v^2 drawing the block v' into close contact with both of the posts v, as represented in Fig. 14. The elevation of the semaphore-blade to indicate "danger," and the simultaneous closing of the lamp-circuit will display a red light at the station just passed, and at the same time the lamp one station removed at the rear of the train is extinguished by the dropping of the signal-blade to indicate "safety," which will cause the cross-bar h to impinge upon the finger-bar w, so as to throw the lifting-arm v^2 outward and allow the block v' to drop away from one of the contact-posts v, thus opening the lamp-circuit and extinguishing the red light.

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

1. A railway signaling device having a signal-blade adapted to rock from a "safety" to a "danger" indication and the reverse and supported by a hub having a weight-compensating spring therein, substantially as set forth.

2. A railway signaling device having a signal-blade adapted to indicate "danger" or "safety" by its position, supported by a hub pivoted on a vertical support, and counterbalanced by springs in the hub and adapted to be rocked by the impact of a locomotive on mechanism connected with the hub, substantially as set forth.

3. In a railway signaling device, a semaphore-blade attachable at different points on a pivotally-supported sectional hub having interior springs adapted to counterbalance the weight of the blade when it is elevated and cushion its fall when released, substantially as set forth.

4. In a railway-signaling device, a cylindrical sectional hub for the semaphore-blade, consisting of a base-plate, two intermediate hub-sections, each having a spring-box formed laterally therein, two coiled springs in these boxes, and an outer disk whereon a semaphore is secured, all held together by a central bolt, substantially as set forth.

5. In a railway-signaling device, a semaphore-blade, a sectional hub for said blade having spring-boxes in two of its sections, and springs coiled similarly in said boxes and secured by their ends to the sections, substantially as set forth.

6. In a railway signaling device, the combination, with a semaphore-blade having an arm bent at a right angle, of a cylindrical hub for the blade formed in four sections, consisting of a base-plate screwed to a bracket-plate fixed on a vertical support, two hub-sections, each having a laterally-formed spring-box therein, and an outer disk, all centrally perforated, a pivot-bolt holding the parts assembled, and two similarly-coiled springs, each secured by its ends to different hub-sections, substantially as set forth.

7. In a railway signaling device, the combination, with a semaphore-blade secured on a sectional hub pivotally supported on a fixed vertical support and two helical springs simi-

larly coiled within the hub and attached to sections of the hub and counterbalancing the semaphore-blade, of a mechanism on the railroad-bed adapted to set the semaphore-blade when depressed by the weight of a locomotive, and a longitudinally-adjustable device on the locomotive adapted to be set to contact with and depress the road-bed mechanism by the impact of the moving locomotive, substantially as set forth.

8. In a railway signaling device, the combination, with a semaphore-blade secured on a sectional revoluble hub containing springs adapted to sustain the weight of the semaphore-blade, a bracket-plate on which the hub is secured, a post supporting the bracket-plate, a battery, circuit-wires normally in open circuit, an electro-magnet on the bracket-plate below the hub, and an armature-bar supported by a weak spring and pivoted at one end to vibrate between the magnet and hub and adapted to detachably hold the hub when the magnet is dormant, of a similar signaling device at another station having its battery in open circuit with the magnet of the first-mentioned signaling device, and a mechanism on the road-bed adapted to be impinged upon by a locomotive and close the circuit of the first-mentioned signal device and permit its blade to fall and simultaneously set the blade of the second signaling device to give an opposite signal, substantially as set forth.

9. The combination, with a series of similar signaling devices at stations in sequence, a semaphore-blade on each device adapted to rock with a hub containing counterbalancing-springs, and a mechanism adapted to be actuated by a device on the locomotive to elevate the signal-blade from "safety" to "danger," of an electro-magnet and a local battery for each signaling device, and conductor-wires having ground connections and normally in open circuit, which circuit is closed by the elevation of the semaphore-blade to a horizontal plane to indicate "danger" at a near station, simultaneously causing a semaphore-blade at a rear station to fall to a perpendicular plane and indicate "safety," substantially as set forth.

WILLIAM NEWCOMB.

Witnesses:
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C. SEDGWICK.