3 Sheets—Sheet 1.

C. E. HANSCOM.

Railway-Signal.

No. 209,042. **Patented Oct. 15, 1878.**

Fig 1.

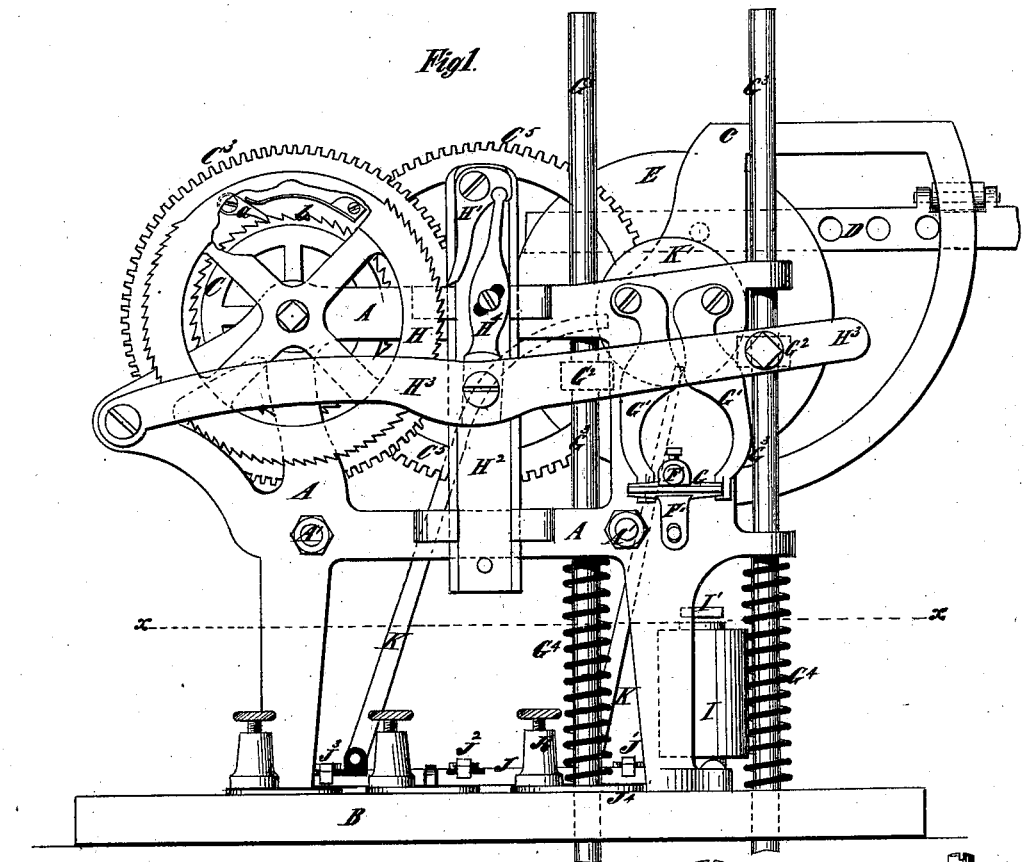
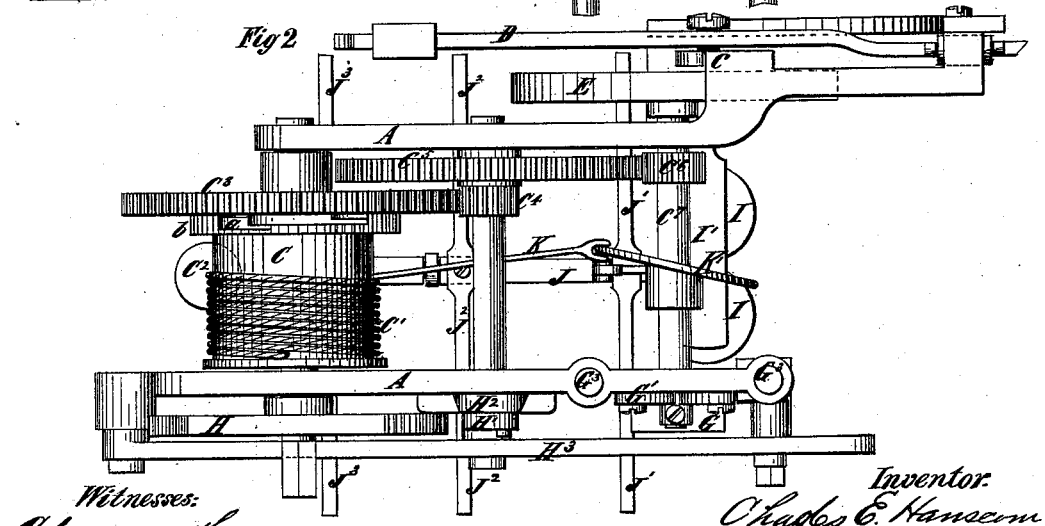


Fig 2



Witnesses:

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Inventor:

Charles E. Hanscom

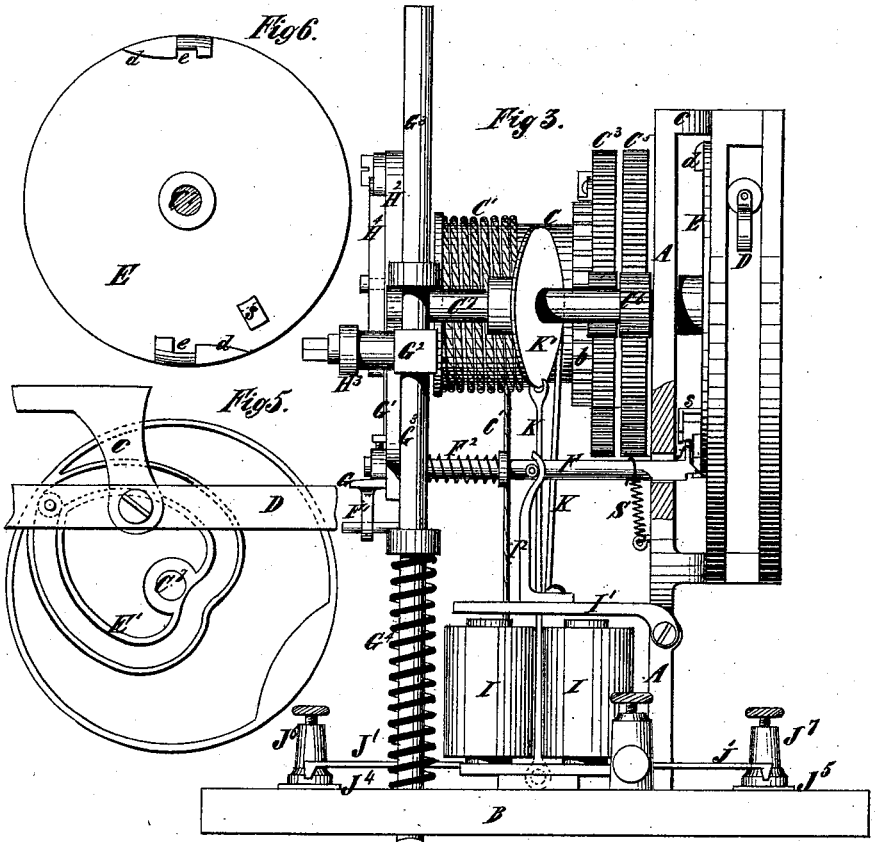
by his attorney.

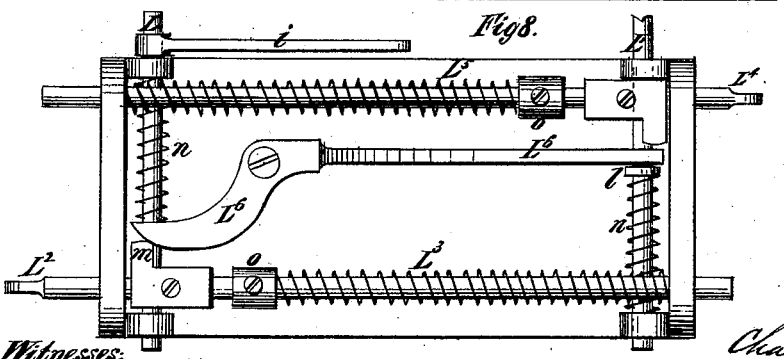
Edwin H. Brown.

3 Sheets—Sheet 2.

C. E. HANSCOM.
Railway-Signal.

No. 209,042. **Patented Oct. 15, 1878.**





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3 Sheets—Sheet 3.

C. E. HANSCOM.

Railway-Signal.

No. 209,042. Patented Oct. 15, 1878.

Fig 1.

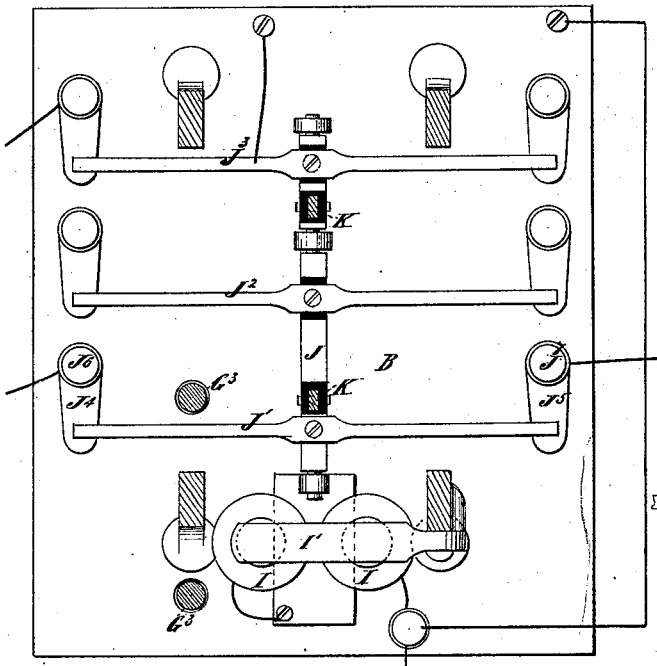

Fig 10.

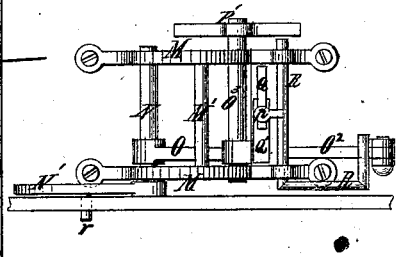

Fig 7.

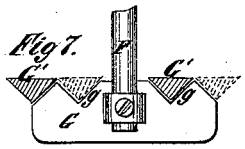

Fig 9.

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UNITED STATES PATENT OFFICE.

CHARLES E. HANSCOM, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENT, TO JENNIE H. HANSCOM, OF SAME PLACE.

IMPROVEMENT IN RAILWAY-SIGNALS.

Specification forming part of Letters Patent No. **209,042**, dated October 15, 1878; application filed April 4, 1878.

To all whom it may concern:

Be it known that I, CHARLES E. HANSCOM, of the city, county, and State of New York, have invented certain new and useful Improvements in Signaling and other Apparatus, of which the following is a specification:

These improvements relate particularly to signaling apparatus for use in connection with railways.

One important object of them is to provide for operating such signals either mechanically or electrically, in order to increase the reliability of signaling under all circumstances, to reduce the labor thereby involved, and economize electricity.

I employ a signal-operating instrument in which are comprised a motor for shifting the signal, devices for controlling the operation of the motor either through mechanical force or the agency of electricity, and devices for effecting the winding of the motor by means of passing trains.

I employ what I term a "relay" or "relief" mechanism, through which the mechanical force for controlling the motor of the signaling-instrument is transmitted, and by which, in case of any accidental tendency to operate the signal in opposite directions at the same time, relief will be afforded, the breakage of parts obviated, and the signal made to indicate "danger" until the cause of such accident is removed.

I employ what I term a "combined track-instrument and circuit-closer," serving to utilize mechanical force from the passing trains for the purpose of controlling the motor of the signal-instrument or to close an electric circuit, so as to control such motor by electricity.

Various other features of importance are included in my invention, and will be hereinafter explained.

In the accompanying drawings, Figure 1 is a side view of what I term the "signal-instrument" of my improved apparatus. Fig. 2 is a plan thereof. Fig. 3 is a front view of the same, including a side view of what I term "relay" or "relief" mechanism. Fig. 4 is a longitudinal section of the signal-instrument on the line *x x*, Fig. 1. Fig. 5 is a face view of a cam employed to operate the signal. Fig. 6 is a rear view thereof. Fig. 7 is a horizontal section illustrative of means for operating a latch or stop bar comprised in said instrument. Fig. 8 is a plan of the relay or relief mechanism. Fig. 9 is a side view of what I term the "track-instrument" or "circuit-closer;" and Fig. 10 is a plan thereof on a smaller scale.

Similar letters of reference designate corresponding parts in all the figures.

I will first describe the motor of the signaling-instrument, after which I will consider the mechanical devices for controlling it, and subsequently I will explain the electrical devices used for that purpose.

A designates two side frames, erected on a platform, B, made of material which is a non-conductor of electricity, and united by cross-bars or stretchers A′.

C designates a drum, around which is wound a cord, C^1, suspending a weight, C^2, on the descent of which motion is imparted to it. Motion is transmitted from this drum through a train of gear-wheels, C^3 C^4 C^5 C^6, to the signal-actuating shaft C^7, a pawl, *a*, and ratchet *b* being employed to connect the drum with said gear-wheels to provide for winding the drum without disturbing the wheels. In lieu of the weight and cord, I of course could use a convolute spring for operating the motor.

D designates the rod whereby the signal is supported. It is pivoted to a bracket, *c*, extending from one of the side frames A, and is shown as fitting in quadrant-shaped guides, permitting its movement into either a vertical or horizontal position. On the adjacent portion of the signal-actuating shaft C^7 there is a wheel, E, carrying on the outer side a cam, E′, which engages with a stud on the signal-rod D, and when rotated actuates the latter. The rotation of this cam is controlled through devices which are operated from the track of the railway; hence it only actuates the signal when caused to do so by a passing train, and at other times the motor is stationary.

The device which I have represented for controlling the operation of the cam consists of a latch or stop bar, F, which is supported loosely in the side frame A which is farthest from the cam, and passes through a vertical slot in the other side frame, an arm, F^1, fitting

on a stud or pin, being employed to keep it from turning. The bar F is capable of longitudinal movement, and also of a vertical movement at the end nearest the wheel E.

On the inner side of the wheel E are latches, composed of inclined portions *d* and notches *e*. A spring, F^2, forces the latch or stop bar F out toward the wheel E, and when, during the rotation of the latter, one of the latches *d e* arrives opposite the end of the latch or stop bar, its inclined portion *d* catches up the adjacent end of said bar, and allows it to drop into the notch *e*, whereupon the bar latches or stops the wheel E from rotating, and holds the signal-rod stationary. One of these latches *d e* is for holding the signal in position to indicate "danger"—for instance, in a horizontal position; and the other is for holding it in position to indicate "safety"—for instance, depressed in a vertical position. The signal is released by moving the latch-bar longitudinally, so as to draw its end out of the notch *e* of the latch *d e* and allow it to drop or plunge downward, if preferable, with the aid of a spring, S, in position to engage with the next latch.

In order to effectually avoid any possible accident from a failure of the latch or stop bar to engage with either of the latches, I may arrange on the wheel E, in advance of either or both of them, a tappet or stop, *s*, consisting of an elbow-shaped projection, having its outer limb chamfered or beveled transversely, so that in the event of its contact with an upwardly-projecting part, *f*, of the latch or stop bar, it will tend to wedge or force the bar toward the wheel E, in order to engage with the latches, and, failing to accomplish this, will stop the said wheel and lock the signal until the cause of the obstruction is removed.

I provide for operating the latch or stop bar and controlling the signal by mechanical means or electricity. I will first describe the former.

On the end of the latch or stop bar farthest from the wheel E is a yoke or cross-head, G, having on the inner side and near the ends V-shaped projections *g*, as shown clearly in Fig. 7. G^1 designates two levers (see Fig. 1) suspended from the adjacent side frame A, so that they have a tendency to hang apart, so that when either is adjusted into a vertical position it abuts against the other and forces it aside. The lower end portions of these levers are V-shaped on the outer side, and when either is swung or adjusted into a vertical position it wedges past the adjacent V-shaped portion *g* of the cross-head G, and thereby forces the latter and the latch or stop bar F outward, the other lever, G^1, aside, and, on passing the said portion *g*, allows the cross-head, with the latch or stop bar, to return inward, and is itself retained in a vertical position. I have shown the levers G^1 as operated by tappets or carriers G^2, projecting from rods G^3, capable of a vertical movement, so that on the operation of the latter, one at a time, they will severally be swung or shifted into vertical positions. If the tappets or carriers are made to embrace the edges of the adjacent side frame A, they may be guided properly in their movements. The rods G^3 are caused to rise by springs G^4, or their equivalents, after being forced downward, and as the levers G^1, after their adjustment, are held stationary, they offer no resistance to the return of the rods. It will be seen that these rods control the signal. They are drawn downward by devices which are actuated through the passage of passing trains, and which will presently be described.

In order to obviate the labor of winding the motor of the signal-instrument, I provide for winding it by passing trains. The means employed to accomplish this I will now describe.

H designates a mutilated ratchet-wheel, mounted on the shaft of the drum C—that is, a ratchet-wheel a portion of whose periphery is destitute of teeth.

H^1 designates a pawl adapted to engage with the mutilated ratchet, and pivoted to a slide, H^2, capable of vertical movement, and preferably balanced by a spring arranged behind it, and exerting friction upon its guides or bearings. H^3 designates a lever, pivoted at one end to one of the side frames A, and connected to one of the rods G^3, so as to be vibrated or oscillated on the depression and rising of the same.

H^4 designates a link connected to an arm extending from the pawl H^1 beyond its pivot, and to the lever H^3. This link, preferably, is guided so as to have a lateral as well as a longitudinal movement. This may be accomplished by providing it with an inclined slot fitting on a pin projecting from the slide H^2, and such pin may also serve as a stop for limiting the throw of the pawl. On the descent of the lever H^3 the pawl is caused to engage with the mutilated ratchet-wheel H, and turn or rotate the latter, causing the drum C to wind up the cord and elevate the weight, or effect the winding of the spring employed in lieu thereof. In rising the lever causes the pawl to move away from the ratchet-wheel; hence the pawl is positive in its action.

By mutilating the ratchet H, I obviate any breakage or straining of the motor by undue winding, for when the plain portion of its periphery arrives in juxtaposition to the pawl the latter is powerless to continue winding up the cord or spring.

It is obvious that a series of pawls could be operated by a single link of the kind just described for the purpose of imparting intermittent motion to a series of wheels and continuous motion to a shaft driven by such wheels, and that this feature of my invention is susceptible of various applications.

I will now proceed to describe the means for controlling the signal through electricity.

I designates an electro-magnet mounted on the non-conducting platform B, and I^1 designates an armature actuated by the same, and furnished with an arm, I^2, having a bifurcated

upper end, which engages with a pin or projection on the latch or stop bar F, so that on the descent of the armature the latch or stop bar is forced away from the wheel E, disengaged from either latch *d e*, and caused to release the signal-actuating cam, so that the motor may revolve it.

J designates a rock-shaft, supported in suitable bearings above the platform B, and connected electrically by metal or otherwise with the magnet I. J^1 J^2 J^3 designate metallic cross-bars mounted upon the rock-shaft J, one or more being insulated from the remainder. Opposite the extreme ends of these cross-bars there are arranged upon the platform B metal plates or tables J^4 J^5, connected with binding-posts J^6 J^7, wherein wires for conducting electricity are to be fastened.

The cross-bars J^1 J^2 J^3 are intended to operate so as to successively come in contact with the plates or tables J^4 J^5, one having a lead over the others. They may be made flexible, and one or more set nearer to the center of the rock-shaft to accomplish this; or the rock-shaft may be made in sections, as shown in the drawing, and operated independently of each other for this purpose.

K designates flexible levers extending from the sections of the rock-shaft J, and fastened thereto by insulated connections. They engage with a disk or cam, K′, arranged obliquely on the signal-actuating shaft C^7, whereby they are vibrated to and fro and the rock-shaft operated.

When the rock-shaft is not made in sections, one lever may be sufficient for operating it.

An electric circuit from the battery is established through the electro-magnet, thence to the rock-shaft J, and, by the motion of the latter, is communicated through the bar J^1, which is in electric communication therewith, to one of the plates or tables J^4 J^5 and binding-posts J^6 J^7, and to the circuit-closer attachment of a combined track-instrument and circuit-closer, which is operated by passing trains.

In the present instance, when the rock-shaft J is vibrated so as to bring the bar J^1 into contact with its table or platform J^5, an electric circuit is established to the circuit-closer attachment of a combined track-instrument and circuit-closer, which is operated by passing trains, completes the circuit, and effects the operation of the signal to indicate "danger;" and when the motor, in its operation, vibrates the rock-shaft J so as to bring the cross-bar J^1 in contact with its table or platform J^4, an electrical current is established to the circuit-closer attachment of a combined track-instrument and circuit-closer, which is arranged in advance or beyond the signal-instrument, to effect, on the passage of trains, the adjustment of the signal to indicate "safety." The cross-bar J^2 operates similarly on another circuit to effect the ringing of a bell, and the cross-bar J^3 to control another instrument. The said bars have the lead described, so as to obviate any confusion which might occur from their operating together.

It will be seen that this rock-shaft, with its cross-bars, forms an electrical-circuit regulator actuated by the motor of the signal-instrument, and that it enables one current of electricity to be diverted or tapped for several purposes, and hence economizes electricity.

I will now proceed to describe what I have termed the "relay" or "relief" mechanism. It is preferably arranged beneath the signal-instrument, as shown in Fig. 3; and consists, essentially, of two rock-shafts, L L^1, provided with arms *i i′*. The rock-shaft L is connected to the rod G^3 of the signal-instrument, which effects the setting of the signal at "danger;" and such rock-shaft is provided with a toe, *j*, which is operated upon by a tappet, *k*, carried by a rod, L^2, which is moved in one direction by the combined track-instrument and circuit-closer, arranged in proximity to it, and in the other by a weight or a spring, L^3. A train, in passing, will set the signal at "danger" and leave it there.

The tappet *k* is rounded on one side, and as the rod L^2 is moved back into position to re-engage with the toe *j* it moves the rock-shaft L longitudinally, so that it can pass the toe, and hence it does not, during its return movement, interfere with the shaft G^3, to which it is connected.

The rock-shaft L^1 is connected to the rod G^3 of the signal-instrument, which effects the setting of the signal at "safety." It is provided with a toe, *j′*, which is operated upon by a tappet, *k′*, carried by a rod, L^4, which is moved in one direction by a combined instrument and circuit-closer arranged in advance or forward of the signal-instrument, and in the other direction by a spring, L^5. The tappet *k′* is rounded on one side, and as the rod L^4 is moved back into position to re-engage with the toe *j′* it moves the rock-shaft L^1 longitudinally, so that it can pass the said toe in its return movement without interfering with the shaft G^3 of the signal-instrument, with which it is connected. This rock-shaft L^1 is intended to be operated by a combined track-instrument and circuit-closer arranged some distance in advance or forward of the signal mechanism and relay or relief instrument, so that the signal will not be set at "safety" by the passage of a train until it shall have passed far enough to render it safe to permit another to follow it.

L^6 designates a lever supported on a fulcrum-post between the rods L^2 L^4, so that it can be vibrated or shifted horizontally. One end of the lever engages with a stud or cross-pin, *l*, on the shaft L^1, and the other projects up into the plane of a tappet, *m*, carried by the rod L^2; hence if the latter should be moved forward at the same time as the rod L^2 it would move the rock-shaft L^1 longitudinally and throw its toe *j′* out of the way of the tappet *k′*, whereupon the signal will not be oper-

ated, and will continue to indicate "danger," besides which the parts of the apparatus are relieved, so as to obviate breakage. Both the rock-shafts L L^1 are returned to their normal positions by weights or springs *n*, and preferably the rods L^2 L^4 are provided with steady-bars *o*, engaging with the guides on the base-piece of the relay or relief mechanism to preclude said rods from turning.

I will now proceed to describe one of the combined track-instruments and circuit-closers which I have hereinabove referred to. It consists of two side frames, M, connected by a cross-bar or stretcher, M′. N designates a shaft, supported in the side frames, and provided with a track tappet, lever, or arm, N′, projecting up into proximity with one track of the railway, and preferably having an inclined upper face and a pin or stud, *r*, extending under the track, so that on the passage of a train over the track the vibration thereof, acting on the stud, will depress the lever or arm N′, and subsequently the wheels passing over its inclined face depress it still farther and rock the shaft N, on which it is arranged. O designates an arm or lever mounted on the rock-shaft N, and extending in the direction opposite to the lever N′. It is connected at the outer end by a link, O^1, to an arm or lever, O^2, mounted on a rock-shaft, O^3, provided at the outer end with arms P P′ for operating relay or relief mechanism and signal-instruments. If desirable, additional arms may be fastened to the arms P P′ to increase the length thereof. The arm P is intended to be connected, by a wire or otherwise, with the rod L^4 of a relay or relief instrument, effecting the setting of the signal at "safety;" and the arm P′ is connected with the rod L^2 of another relay or relief instrument, effecting the setting of an advance or forward signal at "danger;" but, of course, my combined track-instrument and circuit-closer may be used for only one signal-instrument. Arranged upon the combined track-instrument and circuit-closer—for instance, on the upper portion—are contact-points Q Q′, one of which is connected by a wire with the binding-post J^6 or J^7 of the rock-shaft cross-bar J^1, according to which of the circuits the track-instrument is to work on, and the other of which is connected to a return wire or loop. When free these contact-points spread apart by their elasticity, so as to be out of electrical communication with each other. R designates a lever, pivoted in the side frames M, bearing at one end against the arm O^2, and provided at the other with an insulated push-piece, *p*, which, upon the rising of the arm O^2, descends and forces the contact-points together, so as to close the circuit.

It will be seen that by my invention I have produced a signaling apparatus which may be operated either by mechanical force or through the agency of electricity, and provides for setting a signal at "danger" mechanically or by electricity, at pleasure, as well as for setting it at "danger" mechanically and at "safety" by electricity, or vice versa.

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

1. A signaling-instrument comprising an adjustable signal, a motor for adjusting such signal, rotary latches driven by said motor, a latch or stop bar for engaging with said latches, pendent levers with V-shaped wedge-like portions, and an electro-magnet adapted to operate said latch or stop bar, whereby the operation of the signal may be controlled by mechanical or electrical force, substantially as specified.

2. The combination, with a pivoted signal-rod, of a rotary grooved cam and a stud on said rod engaging therewith, substantially as specified, whereby the signal is always controlled in its movements and is not liable to displacement.

3. A signaling-instrument comprising the combination, with a motor having a wheel provided with latches, of a latch or stop bar adapted to engage with said latches to retain the signal in its different positions, substantially as and for the purpose specified.

4. A signaling-instrument comprising the combination, with a motor having a wheel provided with latches consisting of inclines and notches, of a latch or stop bar impelled longitudinally toward said wheel, and capable of a vertical or tilting movement as well as a longitudinal movement to effect its engagement with and disengagement from said wheel, substantially as and for the purpose specified.

5. In a signaling-instrument, the combination, with a wheel provided with latches and a latch or stop bar susceptible of a longitudinal movement to engage with such notches, of a safety-piece adapted, on contact with a portion of said bar, to assist its forward movement, or, failing to do this, to lock the instrument, substantially as and for the purpose specified.

6. In a signaling-instrument, the combination, with a wheel provided with latches and a latch or stop bar for engaging therewith, of a yoke or cross-head provided with V-shaped portions, and pendent levers provided with V-shaped portions capable, upon being vibrated, of displacing the yoke or cross-head and imparting longitudinal movement to the latch or stop bar, substantially as and for the purpose specified.

7. In a signaling-instrument comprising a wheel provided with latches and a latch or stop-bar provided with a yoke or cross-head, the combination, with such yoke or cross-head, of pendent levers adapted to move said latch or stop bar longitudinally as well as to dis place each other, and means for operating said levers, substantially as and for the purpose specified.

8. In a signaling-instrument, the combination of the wheel E, latches *d e*, latch or stop bar F, yoke or cross-head G, levers G^1, tap-

pets or carriers G^2, rods G^3, and springs G^4, substantially as and for the purpose specified.

9. The combination, with a ratchet-wheel, of a pawl, a slide to which said pawl is pivoted, a link connecting said pawl with the means for operating it, an oblique guide, and a stop, substantially as and for the purpose specified.

10. The combination, with the mechanism of a motor in a signaling-instrument, whereby winding up of the motive agent or weight is effected, of a mutilated ratchet-wheel—*i. e.*, a ratchet-wheel having a long space destitute of teeth—connected to said winding mechanism, and a pawl engaging therewith and operated by passing trains, whereby excessive winding of said winding mechanism is obviated, substantially as specified.

11. The combination, with a ratchet-wheel, H, pawl H^1, slide H^2, and link H^4, of the lever H^3 and rod G^3, substantially as specified.

12. In a signaling-instrument comprising a motor for operating the signal, the combination, with a vertically-arranged wheel provided with latches and a latch or stop bar capable of a longitudinal movement and of a vertical movement by gravity at one end, and adapted to interlock with the said latches, of an electro-magnet having an armature provided with an arm engaging with said latch or stop bar, substantially as and for the purpose specified.

13. The combination of a signaling-instrument comprising a motor for imparting motion to a signal, an electro-magnet controlling the operation of such motor, an electrical circuit, and a vibratory circuit-changer consisting of a rock-shaft and arms capable of being adjusted into contact with different binding-posts, and a lever connected with the rock-shaft and vibrated by the motor, substantially as and for the purpose specified.

14. The combination, in a signaling-instrument, of relay or relief mechanism comprising rock-shafts for actuating the signal-operating devices, means for operating said rock-shafts, and means for throwing one of said rock-shafts out of operation on the simultaneous operation of the other, substantially as and for the purpose specified.

15. In a signaling-instrument, the combination, with a motor for operating the signal and means for controlling said motor by either mechanical or electrical force, of a track tappet, lever, or arm, a lever connected therewith for operating on the aforesaid motor by mechanical force, and an electrical circuit-closing lever actuated by said track tappet, lever, or arm for operating on the aforesaid motor through electrical force, substantially as specified.

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Witnesses:
EDWIN H. BROWN,
CHANDLER HALL.