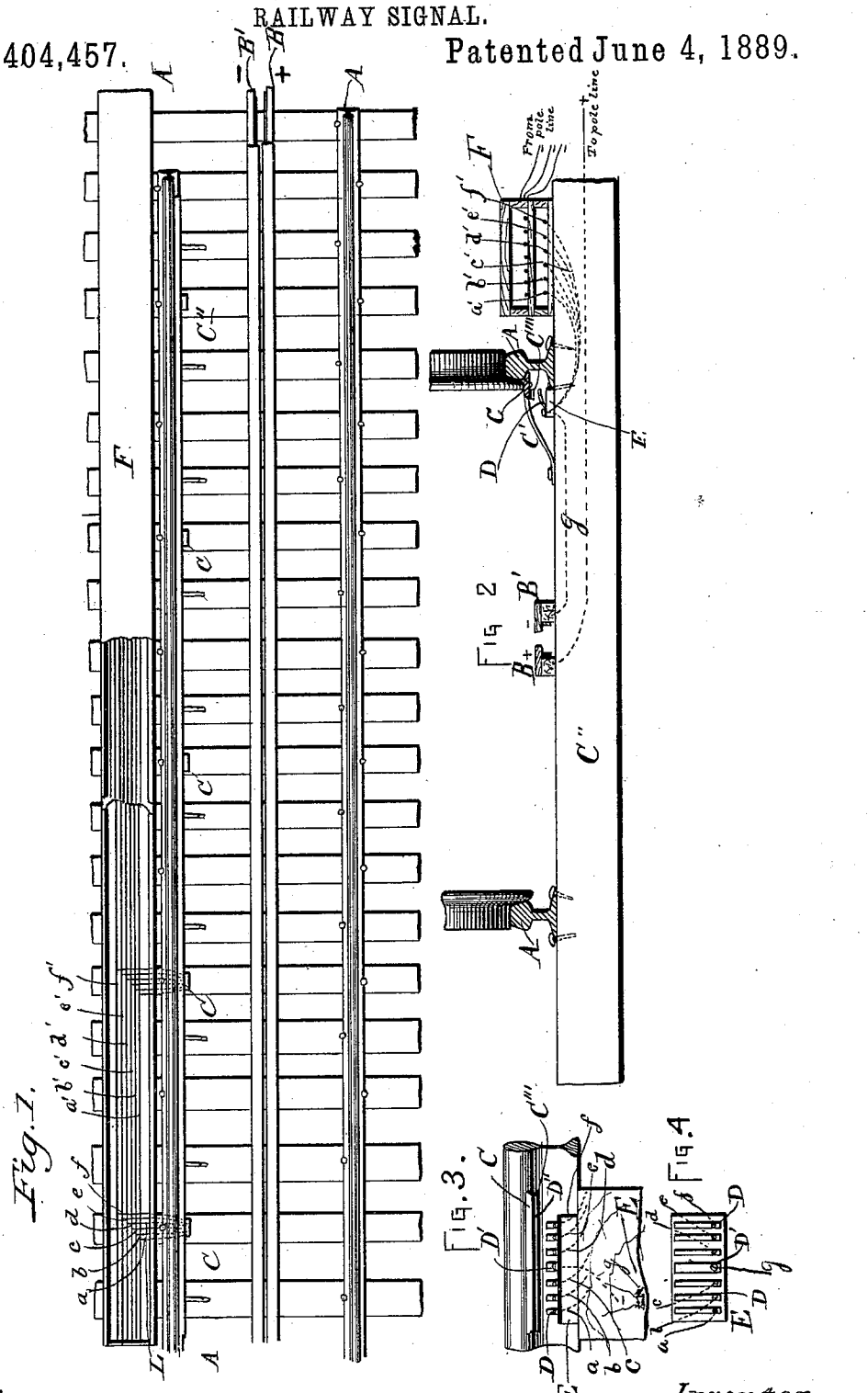
(No Model.) 4 Sheets—Sheet 1.

A. J. WISNER.

RAILWAY SIGNAL.

No. 404,457. Patented June 4, 1889.



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(No Model.) 4 Sheets—Sheet 2.

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RAILWAY SIGNAL.

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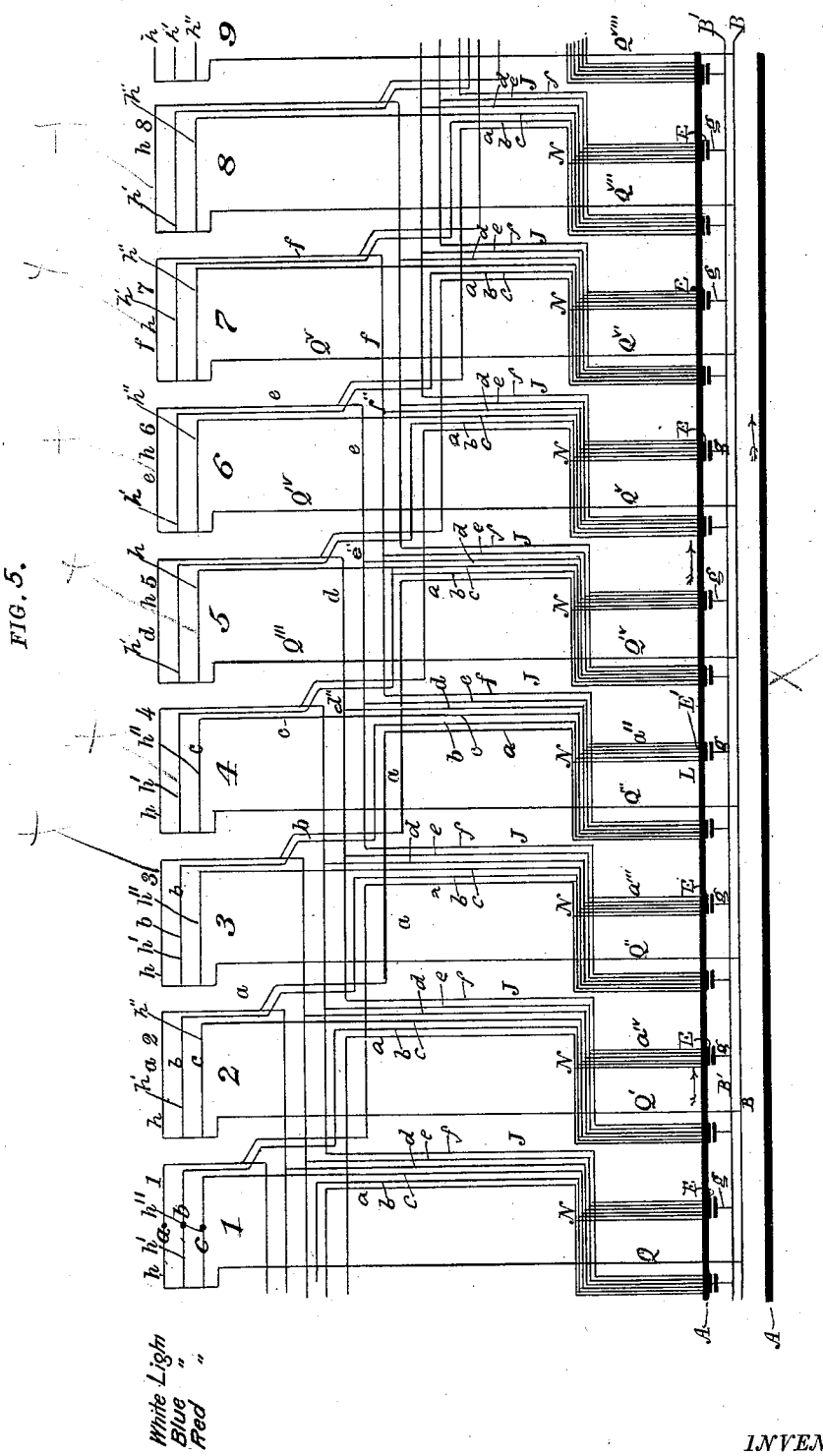

FIG. 5.

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Fig. 6.

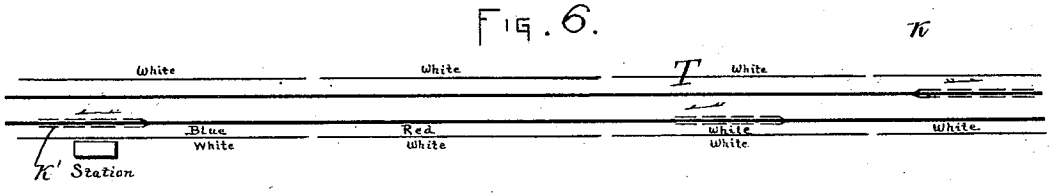


Fig. 7.

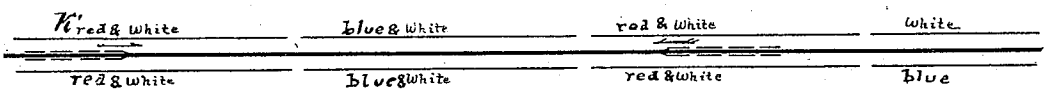
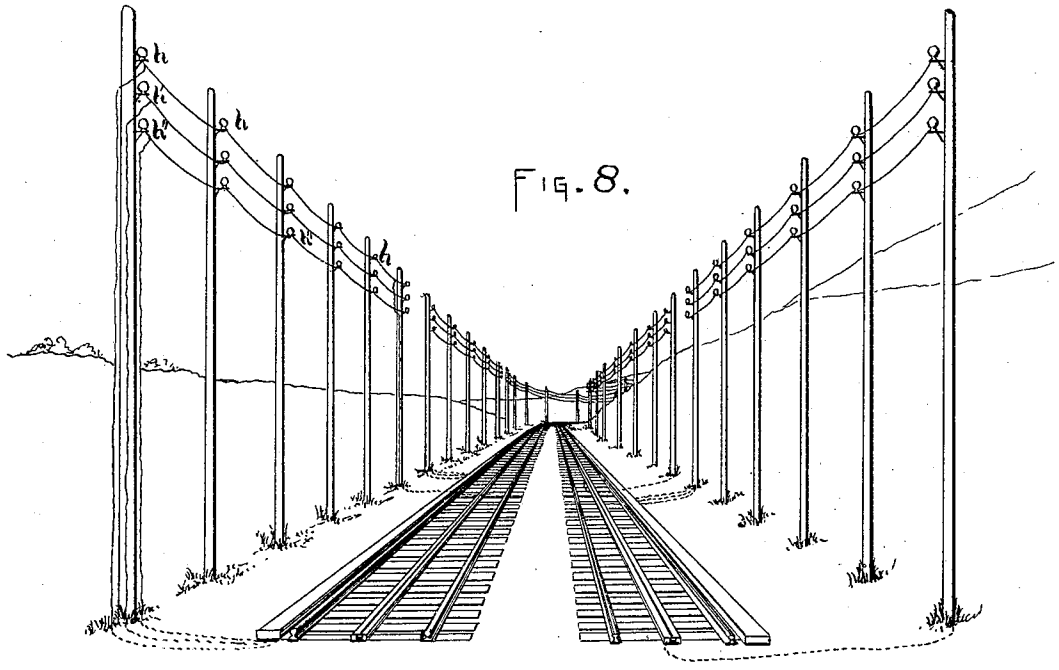


Fig. 8.



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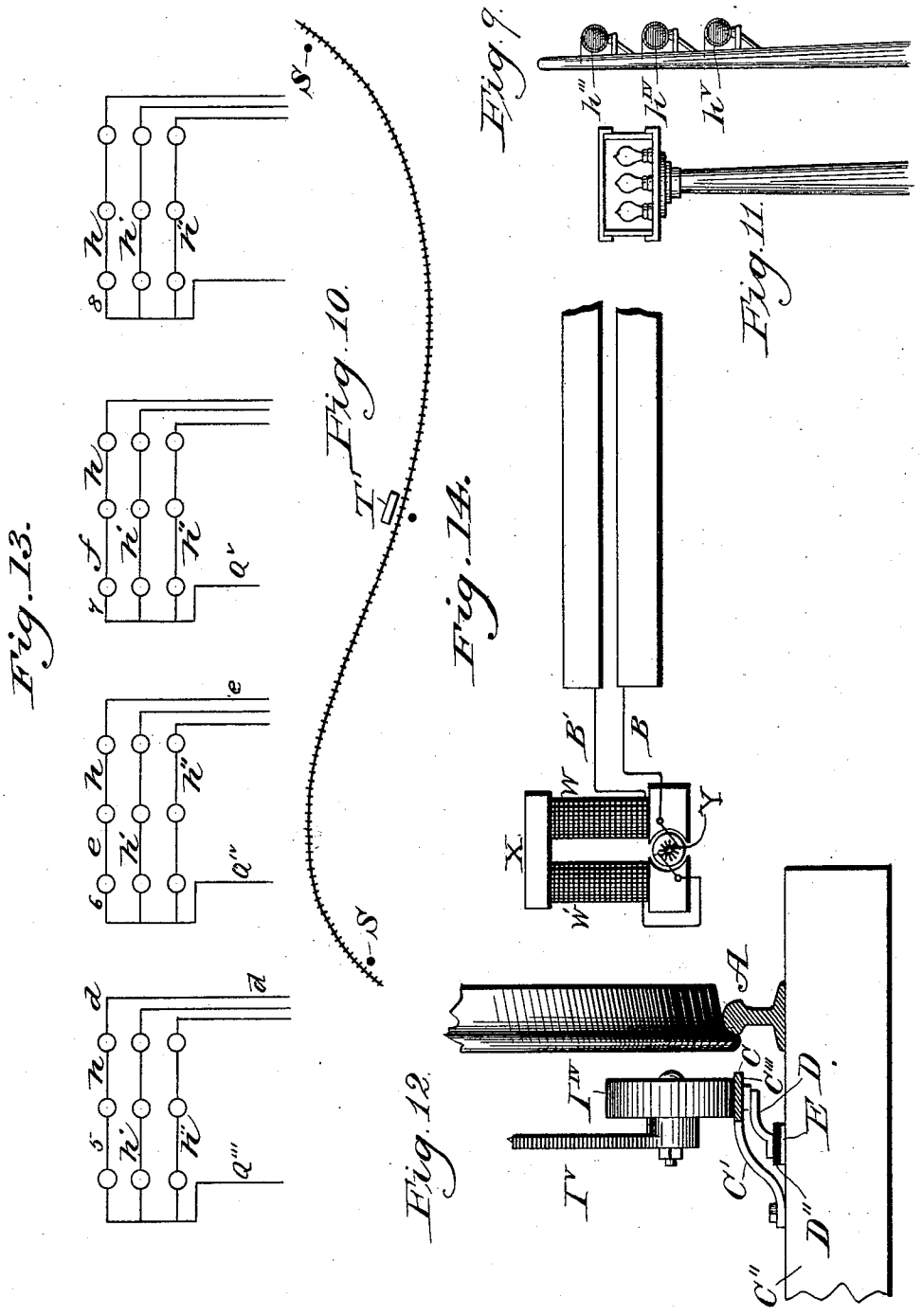

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UNITED STATES PATENT OFFICE.

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RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 404,457, dated June 4, 1889.

Application filed January 24, 1888. Serial No. 261,709. (No model.)

To all whom it may concern:

Be it known that I, A. JACKSON WISNER, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented a new and Improved System of Automatic Electric Railroad-Signals, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part hereof.

The nature of my invention will fully appear from the following specification and claims. Its object is to prevent collision and other accidents to moving trains on railroads.

In the drawings, Figure 1 represents a portion of a track supplied with my electric signals; Fig. 2, a cross-sectional view of the same, showing the springs for carrying the circuit-making rod; Fig. 3, an elevation of a broken section of track, showing an electric switch-block; Fig. 4, a detached plan view of an electric switch-block. Fig. 5 is a plan view of a double-track road with my invention applied thereto, showing particularly my system of electric wires connecting with the signals on one side of the track; Fig. 6, a plan view of a double-track road; Fig. 7, a similar view of a single-track road; Fig. 8, a perspective view of a double-track road provided with my signal. Fig. 9 represents a section of a lamp post or pole; Fig. 10, a view of road with station, but no siding; Fig. 11, a lamp with supporting-post. Fig. 12 is a detached view, showing in elevation my roller-depressor arranged inside the wheel to operate the negative contact mechanism by rolling over the inside rod without pushing it longitudinally. Fig. 13 is a detached partial or broken view of sections 5, 6, 7, and 8 of the wires carrying electric lights *h h' h''*, the arrangement of the wires being shown more in detail in Fig. 5. Fig. 14 is a detached broken view designed to illustrate the connection of main wires B and B' with a Brush electric-light machine.

A A are the two rails.

B is the positive, and B' the negative, electric mains set between the rails; C, a flat rod set within one of the rails A and parallel therewith slightly below the level of the upper surface of the rail. It is sustained by springs C' C' set at intervals upon the ties C'', and is adapted to be depressed by the flanges of the wheels of a passing train.

D D' D D are seven small contact-springs set on an insulating material D'' (see Fig. 3) on the upper face of switch-block E. A copper plate C''' on the under face of rod C, separated therefrom by the insulating material, is so set that when the said rod is depressed contact between springs D D D' is made by plate C''' touching all the springs D D' simultaneously. The circuit is broken by the rebound of springs C', which raise the rod when the pressure of the wheels is removed.

a, *b*, *c*, *d*, *e*, *f*, and *g* (see Fig. 4) are seven electric wires attached to contact-springs D D', one *g* of which wires passes to the negative main B', (see Fig. 2,) and all of the other six connect with six corresponding wires *a' b' c' d' e' f'* in long box or conduit F. The box F is parallel with and outside of the rails A A, and the wires *a b c d e f* are carried to it under that rail A intervening between blocks E and the box F. All these wires are covered with insulating material. The wires in box F are connected with signal-lamps, each wire passing from the positive electric main B to a lamp and thence back to negative main B'. When the rod A is depressed, it touches all of the contact-springs D D' D of each series beneath it simultaneously. A train or engine with its tender is never less than forty-one feet in length, and the switch-blocks E are placed about forty feet apart. The flanges of the wheels or (in case they are used) rollers I^{IV} (see Fig. 12) will thus bear down upon rod C over one or more of switch-blocks E at all times. As mentioned above, on the bottom of the rod C, over each switch-block E, is a short metallic (say copper) strip C''', (see Figs. 2 and 3,) with an insulating material between it and the rod. When the rod is pressed down, this strip C''' touches each contact-spring D D' D of the switch-block beneath it and brings them into electrical contact each with the others. A circuit is thus completed between the wires *a b c d e f*, through wire *g*, with the negative main B'. The circuit is made and broken at each switch-block E by throwing plate or strip C''' into and out of contact with the contact-springs. Each wire

Q Q′ Q″ Q‴ Q^{IV}, &c., (see Fig. 5,) leads from the positive main B to the half-mile of light-wires in its own half-mile section and in the two half-mile sections ahead of it. Thus the wire Q′ connects with light-wires *a b c* in section 2, and wire *a* passes forward and down into section 4 through the cluster of wires lettered *a″*. Wire *b* similarly passes forward into section 3 to connect with the contact-springs of cluster of wires *a‴*, and wire *c* passes directly down into the same half-mile section in which Q′ is located to connect with the contact-springs of cluster *a*^{IV}. Positive wire Q‴ similarly connects with its own and two forward half-mile sections of light-wires. In this way the wires lettered Q (with its powers) keep the light-wires charged ready to ignite the carbons when circuit is made with wire *g*, which connects with the negative wire B′.

If a train of cars is located at L, the pressure of the rod C on the block E′ connects the wires *a″* with the negative wire *g*, and therefore with the negative main B′, completing the circuit for the electric current and igniting the carbons in the light-wires. As these wires *a″* are thus connected with the negative main, the current passing upward and backward through wire *a* to the upper line of white lights *h* in half-mile section 2, and through wire *b* to the line *h′* of blue lights in section 3, and through wire *c* to the lower line of red lights *h″* in its own half-mile section 4, wire *d* passes forward into the upper line *h* of white lights in section 5, wire *e* to the upper line of white lights *h* in section 6, and *f* into the white lights *h* of section 7. It will be seen that the wires *d e f*, as at points *d″ e″ f‴*, would, by connections at those points, seem likely to exert an influence to the rear of point L; but if these lines are carefully traced to the rear of that point, it will be seen that they terminate at blocks E, where there is no agency at work to connect them with the negative wires *g* at such blocks, and the current for the time terminates at such blocks. The only lights affected are those connected with the cluster of wires *a″*, which are, by the contact-springs of blocks E′, joined to negative wire *g*. The contact-springs and the details of construction of these blocks E E′ E are not shown in Fig. 5, because the parts are so small therein, and the box or conduit containing wires N N N is not shown, because it is desirous to have the lines exposed in order to trace the wires and their connections. This description of the operation of the current when the train is in half-mile section 4 will suffice for the operation resulting from its location in any other half-mile section. It will in each case result in the ignition of red lights in its own section and blue and white in the respective sections behind it, and white in three half-mile sections in front. In each block E or E′ the wires *a*, *b*, *c*, *d*, *e*, and *f* from the lights, while separated from each other, are respectively connected with contact-springs D D D D D D, and the wire *g* from the negative main B′ is connected with contact-spring D′. These contact-springs are all in line in juxtaposition, and when the metallic plate C‴ is pressed down upon them all simultaneously, connection is made between the wires *g* and the others through these contact-springs and the plate C‴. The carbons on the wires *h h′ h″* are thus ignited by the force of the current. Whether the train is moving or standing the operation is the same, signals being thrown into two half-mile sections behind and three half-mile sections ahead of its own section, as well as being shown in the latter. The arrows indicate the direction of movement of the train.

In a single-track road the system already described is set on each side of the track, the device being arranged to throw signals for trains moving to the right in the same manner as is already described, but for trains moving to the left a separate system is arranged for the lower side of the track, (as shown in the drawings,) and the arrangement or operation is to throw white lights ahead of the train moving to the left, the red in its own half-section and the blue and white in the respective half-sections behind, so that trains running in opposite directions will operate them, as above described. In such case the flanges of the wheels will operate both systems of wires and lights or signals (those on each side) at the same time. Thus while the wheel-flanges on one side or line of track will operate the white lights ahead and the red, blue, and white behind, as described, the flanges of the wheels on the other side will operate the white lights behind and the red, blue, and white ahead for a mile and a half each way. In this manner all danger of collision is avoided.

In Fig. 11 I show one of my lights composed of three lamps inclosed in a glass casing. The latter may be of any colored glass desired. The casing around the lamps may be made transparent in both sides forward and backward in the line of track and opaque on the two sides toward and opposite to the track, whereby the illumination of the interior may be perceptible through the glass in the day-time as well as at night. The diameter is greater between the opposite edges of each flange than between those of the "tread" portion of the wheel. The wheel runs upon the tread, and the circumference of the flange being free travels faster than that of the tread. The flange will therefore tend to thrust the rod O backward as the train moves and to grind upon it. Therefore the springs C′ should be simply strong enough to sustain the rod without giving it very strong pressure against the flanges; otherwise the rod would be torn from its fastenings. To avoid this difficulty a series of wheels or friction-rollers similar to I^{IV}, Fig. 12, may be rigged beneath

the engine and each car so as to be in constant contact with a rod C and roll freely and easily over it, their action being simply to depress rod C without friction, as the roller or wheel I^{IV} turns loosely on its pin or axis, and only then when in contact with rod C. The flanges, wheels, or rollers are intended to act as depressors to bear upon rod C. This roller I^{IV} is rigged beneath the cars between the rails immediately inside the line of wheels, (see Fig. 12,) by means of frame I^{V}. When it is used, the rod C is set so as to come in contact with it and far enough from the rail to avoid contact with the flanges of the wheels. This is done when it is desired to avoid the back-thrust of the flanges. It is desired that the action upon rod C be merely a depressing action, or as nearly exclusively so as possible. The positive and negative mains B and B′ are simply two main lines connected with a dynamo or system of dynamos, which supply them with the electric current. As circuit is broken from one to the other through the separation of one of them into two parts at the points where the contact-springs are located, it cannot be established until the plate C‴ is depressed and bridges this break by connecting the contact-springs. By the depression of this plate circuit is made complete and the carbons in the lamps are ignited.

Fig. 13 simply shows signal-lamps on sections of wires 5, 6, 7, and 8, the parts in Fig. 5 being too small for this purpose. Fig. 6 indicates that the signals may be set on each side of a double-track road, and Fig. 8 is a perspective view showing that they may be set on each side of a single track. These figures, together with Figs. 9, 10, and 11, are of no special importance in illustrating the invention, but are mere details to show where it may be applied and of some of the devices employed. Fig. 14 is designed to illustrate the connection of the positive and negative main wires B and B′ with a Brush electric-light machine, only a part of the latter being shown, as I make no claim to it. The wire B′ joins coil W and the current connects with wire B through this coil W, armature X, coil W, through the commutator Y to positive main wire B.

What I claim as new is—

1. In a system of electric signals for railroads, the combination, with rail A, of rod C, set parallel with and closely to the inner side of the rail, positive and negative contact-springs D D′, connected with wires leading, respectively, to positive and negative mains B B′, the wires from the positive main, with signals connected therewith in the line of their traverse, and negative connecting-wires *g*, so arranged that the pressure of the wheel-flanges of the train will depress rod C and effect electrical circuit, substantially as described.

2. In a system of electric signals for railroads, the combination, with rail A, of rod C, set parallel with and closely to the side of the rail, positive and negative contact-springs D D′, connected with wires leading, respectively, to positive and negative mains B B′, the wires from the positive main, with signals connected therewith in the line of their traverse, and negative connecting-wires *g*, so arranged that the pressure of the wheels of the train will depress rod C and effect electrical circuit, substantially as described.

3. In a system of electric signals for railroads, the combination, with the rail A, of spring-rod C, set parallel with and closely to the side of the rail, positive and negative contact-springs D D′, connected with wires leading, respectively, to positive and negative mains B B′, or wires from the positive main traversing back along the road, with a signal or signals in its or their traverse, one or more of said wires traversing back along the line of road and one or more of them traversing forward along the line, with signals set upon said wires in the lines of their traverse, and negative wires from contact-springs D′, all operating, substantially as described, to throw signals simultaneously ahead of and behind the train.

4. In a system of electric signals, the combination, with rail A, of rod C, set parallel with and closely to the side of the rail, and positive and negative contact-springs D D′, set at intervals along the line of the rail and connected with wires leading, respectively, to the positive and negative mains B B′, the wires from the positive main being provided with signals in the line of their traverse and arranged in blocks, substantially as shown, whereby, as the train progresses and circuit is broken with one block behind, circuit is made or closed with an additional block farther ahead, continuous successive blocks of signals being thus operated as the rear signals cease to operate, substantially as described.

5. In a system of electric signals for railroads, the combination, with rail A, of rod C, set parallel with and closely to the rail, plate C‴ with insulator D″, springs C′, to sustain rod C, contact-spring D D′, connected with wires leading, respectively, to positive and negative mains B B′, signal-lamps set on the line of and operated by the positive wires when circuit is closed by the depression of rod C, and negative wire *g*, rod C being adapted to be depressed by the wheels of the train, substantially as described.

6. In a system of electric signals for railroads, the combination, with rail A, of rod C, set parallel with the rail, positive and negative contact-springs D D′, connected with wires leading, respectively, to positive and negative mains B B′, the wires from one of the mains having signals connected therewith in the line of their traverse, negative connecting-wires *g*, and a wheel or roller attached to one or more of the vehicles of the train to depress said rod and close circuit, substantially as described.

7. In a system of electric signals for railroads, the combination, with rail A, of rod C,

set parallel with the rail, positive and negative contact-springs D D′, connected with wires leading, respectively, to positive and negative mains B B′, the wires from the positive main having signals connected therewith in the line of their traverse, negative connecting-wires *g*, and a depressor attached to the train and adapted to bear upon rod C to close circuit, substantially as described.

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