Feb. 25, 1930. L. E. SPRAY 1,748,804

RAILWAY TRAFFIC CONTROLLING APPARATUS

Filed April 30, 1928

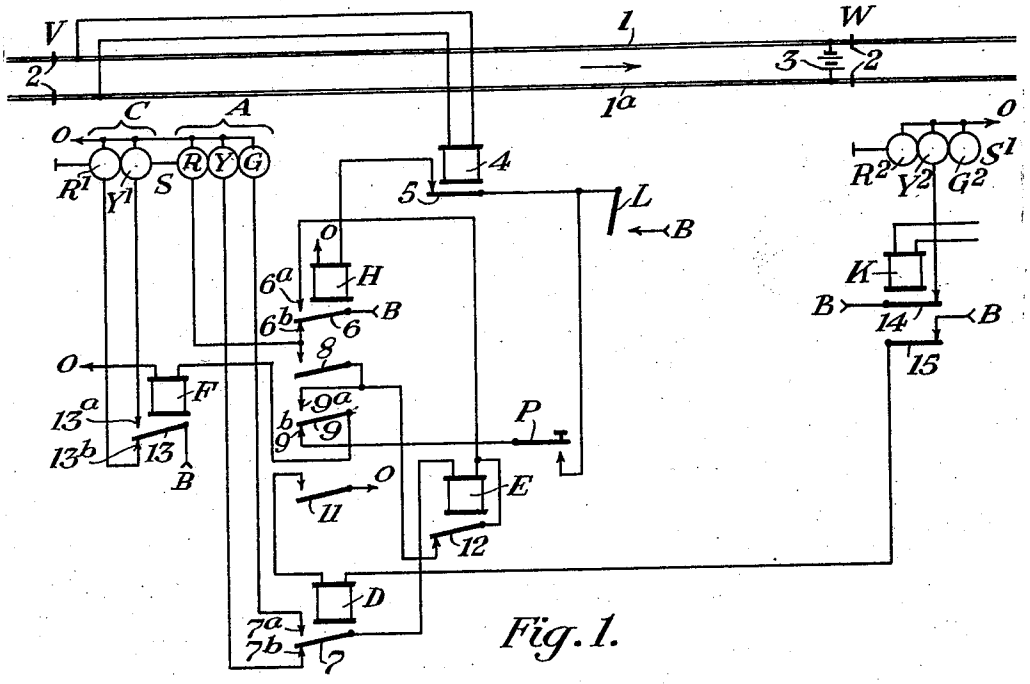


Fig. 1.

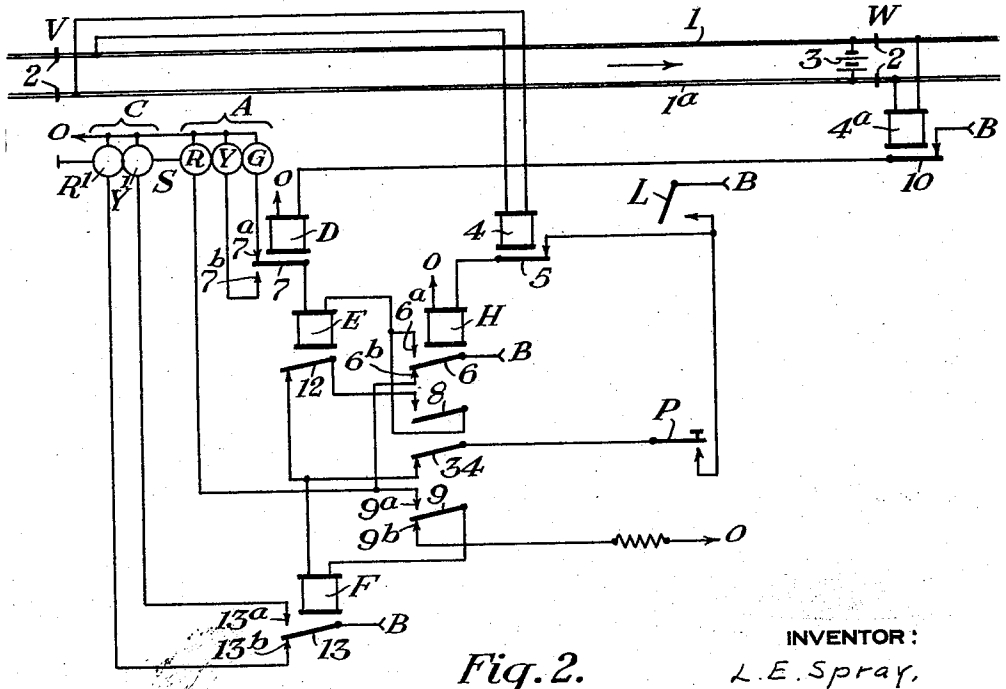


Fig. 2.

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UNITED STATES PATENT OFFICE

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RAILWAY-TRAFFIC-CONTROLLING APPARATUS

Application filed April 30, 1928. Serial No. 273,825.

My invention relates to railway traffic controlling aparatus, and particularly to apparatus of the type comprising interlocking systems having light signals. One feature of my invention is the provision of means for causing a proceed lamp of a "calling-on" group of lamps to become lighted in the event that a proceed lamp of the main group for the same signal becomes burned out when such latter proceed lamp should be lighted.

I will describe two forms of apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a diagrammatic view showing one form of apparatus embodying my invention. Fig. 2 is a similar view showing a modfied form of the apparatus illustrated in Fig. 1 and also embodying my invention.

Similar reference characters refer to similar parts in both views.

In so far as Fig. 1 is concerned, my present case is a continuation of my co-pending application, Serial No. 140,020, filed October 7, 1926, for railway traffic controlling apparatus; and in so far as Fig. 2 is concerned, my present case is a division of my co-pending application, Serial No. 193,794, filed May 24, 1927, for railway signalling apparatus.

Referring first to Fig. 1, the reference characters 1 and 1^a designate the track rails of a railway along which traffic normally moves in the direction indicated by the arrow, and which rails are divided by insulated joints 2 to form a track section V—W. Located at the entrance end of this section is an interlocking signal S, comprising a main group of lamps A and a calling-on group of lamps C. The main group A includes a clear lamp G, a caution lamp Y, and a stop lamp R. The calling-on group C includes a caution lamp Y^1 and a stop lamp R^1. Although certain of these lamps have been designated as clear and caution lamps, it is understood that each lamp G and Y of the main group A gives a proceed indication, and that the caution lamp Y^1 of the calling-on group C also gives a proceed indication, for the reason that none of these lamps when lighted requires a train to stop.

Located at the point W is an automatic signal S^1, having a clear lamp G^2, a caution lamp Y^2, and a stop lamp R^2. This automatic signal S^1 is controlled, in part at least, by a relay K in such manner that when this relay is energized the caution lamp Y^2 or the clear lamp G^2 is lighted, the circuit for lamp Y^2 being from terminal B of the source of current, through front contact 14 of relay K, and the lamp Y^2 to terminal O of the same source of current. The control of the relay K forms no part of my present invention, and has, consequently, been omitted from the drawing, and the same thing is true of the clear lamp G^2.

The track section V—W is provided with a track circuit comprising a battery 3 connected across the rails at the exit end of the section and a track relay 4 connected across the rails at the entrance end of the section.

The lamps of the main group A in the interlocking signal S are controlled by a main relay H and a distant relay D. The main relay H is controlled by track relay 4 and by a manually operable contact L of an interlocking machine. The distant relay D is controlled by the main relay H and also by relay K for signal S^1. The lamps of the "calling-on" group C of signal S are controlled by a "calling-on" relay F, which in turn is controlled by the main relay H, contact L, and a normally open calling-on contact P. The calling-on relay F is at times also controlled by a "light-out" relay E, which in turn is governed by the condition of the clear and caution lamps G and Y of the main group A in signal S.

As shown in the drawing, all relays H, D, E and F are de-energized. The stop lamp R in group A is lighted by virtue of a circuit which passes from terminal B of a source of current, through back contact 6—6^b of relay H, and the stop lamp R of group A, to terminal O of the same source of current. The stop lamp R^1 of group C is lighted by virtue of a circuit which passes from terminal B of a source of current, through back contact 13—13^b of the "calling-on" relay F, and lamp R^1 to terminal O of the same source of current.

I will now assume that the operator of the interlocking machine desires to admit a train to section V—W. To do this he will close the contact L, thereby energizing the main relay H, the circuit for this relay being from terminal B of a source of current, through contact L, front contact 5 of track relay 4, and the winding of relay H to terminal O of the same source of current. Distant relay D then becomes energized, its circuit being from terminal B of a source of current, through front contact 15 of relay K, winding of relay D and front contact 11 of main relay H to terminal O of the same source of current. The clear lamp G of group A will then become lighted, the circuit for this lamp being from terminal B of a source of current, through front contact 6—6^a of main relay H, winding of light-out relay E, front contact 7—7^a of distant relay D, and lamp G to terminal O of the same source of current. If relay K at signal S^1 is de-energized, the distant relay D will, likewise remain de-energized, and in that event the caution lamp Y of group A will be lighted, the circuit for this lamp being from terminal B, through front contact 6—6^a of relay H, winding of light-out relay E, back contact 7—7^b of distant relay D, and lamp Y to terminal O of the same source of current.

When the train enters section V—W it will de-energize track relay 4, thereby opening the circuit for main relay H at contact 5, whereupon the lamp G or Y of group A will be extinguished and the stop lamp R of this group will become lighted. If the operator desires to admit a second train to the section V—W while the first train is still in this section, he closes the "calling-on" contact P, whereupon the "calling-on" relay F becomes energized, the circuit for this relay being from terminal B, through contact L, contact P, back contact 9^b—9 of main relay H, and winding of relay F to terminal O. The stop lamp R^1 of the "calling-on" group C is then extinguished and the caution lamp Y^1 of this group is lighted, the circuit for lamp Y^1 being from terminal B, through front contact 13—13^a of relay F and lamp Y^1 to terminal O.

I will now assume that contact L is closed and that track relay 4 is energized, so that the main relay H is energized, and that distant relay D is energized, but that lamp G, which should be lighted, is burned out. Light-out relay E will then be de-energized, and an auxiliary circuit will therefore be closed for the "calling-on" relay F, which circuit is from terminal B, through front contact 6—6^a of relay H, back contact 12 of relay E, front contact 9^a—9 of relay H, and winding of relay F to terminal O. This will cause the "calling-on" relay F to become energized, so that stop lamp R^1 will be extinguished and the caution lamp Y^1 will become lighted. At the same time the stop lamp R of group A will become lighted by virtue of a circuit which passes from terminal B, through front contact 6—6^a of relay H, back contact 12 of relay E, front contact 8 of relay H, and lamp R to terminal O.

It will thus be seen that when lamp G of group A should be lighted but is burned out, the caution lamp Y^1 of group C will be lighted to permit a train to proceed. With the arrangement of circuits heretofore used, the indication given by signal S in the event of the burning out of lamp G when this lamp should be lighted, would be two lighted stop lamps R and R^1, which would require a train to stop; whereas with circuits embodying my invention, if the lamp G is burned out when it should be lighted, a train is permitted to keep moving by virtue of the restrictive proceed indication given by lamp Y^1 of the "calling-on" group C.

If the main relay H is energized and the distant relay D is de-energized, so that caution lamp Y should be lighted, and if this lamp is burned out, relay E will be de-energized as before, thereby causing "calling-on" relay F to be energized, with the result that lamp Y^1 is lighted.

Referring now to Figure 2, relays E and H are controlled as in Figure 1. The distant relay D is, however, controlled by a contact 10 of a track relay 4^a for the track section next in advance of point W. The "calling-on" relay F is at times responsive to the condition of lamp R of the main group A and is otherwise controlled as in Figure 1.

As shown in the drawing, relays H and F are de-energized, so that lamps R and R^1 are lighted. The circuit for lamp R is from terminal B of a source of current, through back contact 6—6^b of relay H, and lamp R to terminal O of the same source of current. The circuit for lamp R^1 is from terminal B, through back contact 13—13^b of relay F and lamp R^1 to terminal O.

I will now assume that relay D is energized and that contact L is closed. Current then flows from terminal B through contact L, front contact 5 of track relay 4 and the winding of relay H to terminal O. Relay H therefore becomes energized, so that the circuit for stop lamp R is opened at the back contact 6—6^b of this relay. The proceed lamp G then becomes lighted, the circuit being from terminal B, through front contact 6—6^a of relay H, winding of relay E, front contact 7—7^a of relay D and lamp G to terminal O. If relay D is de-energized, lamp Y will become lighted instead of lamp G, the circuit for lamp Y then including front contact 6—6^a of relay H, the winding of relay E and back contact 7—7^b of relay D.

I will now assume that track relay 4 is de-energized and that the operator closes both contacts L and P. Calling-on relay F will then become energized, the circuit being from

terminal B through contacts L and P, back contact 34 of relay H, winding of relay F and back contact 9—9[b] of relay H to terminal O. Relay F will therefore become energized, so that the circuit for lamp R^1 will be opened at the back contact of this relay and the circuit for lamp Y^1 will be closed at the front contact 13—13[a] of this relay.

I will next assume that while contact L is closed and relays H and D are energized, the proceed lamp G is burned out. Relay E will then be de-energized, and stop lamp R will then be lighted by virtue of a circuit which passes from terminal B through front contact 6—6[a] of relay H, front contact 8 of relay H, back contact 12 of relay E, winding of relay F, front contact 9—9[a] of relay H and stop lamp R to terminal O. Relay F will then be energized, so that lamp Y^1 of the "calling-on" group C will be lighted. Signal S will then give the "calling-on" indication. The same thing is true if relay H is energized and relay D is de-energized, and the caution lamp Y, which should then be lighted, is burned out. Furthermore, assuming that relay H is energized and that the lamp G or Y which should be lighted is burned out, and that the stop lamp R of group A is also burned out, it will be observed that relay F will be de-energized so that the stop lamp R^1 of group C will be lighted and the caution lamp Y^1 of this group will be extinguished. This prevents the possibility of lamp Y^1 being the only lamp in the signal which is lighted. It is, of course, understood that if lamp Y^1 were lighted when lamp R were extinguished, the signal would give a full caution indication instead of a "calling-on" indication.

Although I have herein shown and described only two forms of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, a signal comprising a main group of lamps having a proceed lamp, and a "calling-on" group having a proceed lamp; a main relay and a "calling-on" relay, a circuit for the proceed lamp of the main group including a front contact of said main relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, a normal circuit for said "calling-on" relay including a back contact of said main relay, a light-out relay in series with the proceed lamp of said main group, and an auxiliary circuit for said "calling-on" relay including a front contact of said main relay and a back contact of said light-out relay.

2. In combination, a signal comprising a main group of lamps having a proceed lamp, and a "calling-on" group having a proceed lamp; a main relay and a "calling-on" relay, a controlling circuit for said main relay including a contact of an interlocking machine and a track relay contact, a circuit for the proceed lamp of the main group including a front contact of said main relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, a normal circuit for said "calling-on" relay including a back contact of said main relay and a "calling-on" circuit controller and said interlocking machine contact, and an auxiliary circuit for said "calling-on" relay including a front contact of said main relay and a back contact of said light-out relay.

3. In combination, a signal comprising a main group of lamps having a proceed lamp, and a "calling-on" group having a proceed lamp; a main relay and a "calling-on" relay, a circuit for the proceed lamp of the main group including a front contact of said main relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, normal means for energizing said "calling-on" relay when said main relay is de-energized, and auxiliary means for energizing said "calling-on" relay when said main relay is energized and the proceed lamp of said main group is burned out.

4. In combination, a signal comprising a main group of lamps having a proceed lamp, and a "calling-on" group having a proceed lamp; a main relay and a "calling-on" relay, a circuit for the proceed lamp of the main group including a front contact of said main relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, normal means for energizing said "calling-on" relay when said main relay is de-energized, a light-out relay in series with the proceed lamp of said main group, and auxiliary means for energizing said "calling-on" relay when said main relay is energized and said light-out relay is de-energized.

5. In combination, a signal comprising a main group of lamps having a stop and a proceed lamp, and a "calling-on" group having a stop and a proceed lamp; a main relay and a "calling-on" relay for controlling said main group and said "calling-on" group respectively, and means for energizing said "calling-on" relay to cause the proceed lamp of said "calling-on" group to be energized when said main relay is energized and the proceed lamp of said main group is burned out.

6. In combination, a signal comprising a main group of lamps having a caution lamp and a clear lamp, and a "calling-on" group having a proceed lamp; a main relay, a distant relay, and a "calling-on" relay, a con-

trolling circuit for said main relay including an interlocking machine contact and a track relay contact, a circuit for said distant relay controlled by said main relay and by traffic conditions in advance, a normal circuit for said "calling-on" relay including a back contact of said main relay and a "calling-on" circuit controller and said interlocking machine contact, a circuit for the clear lamp of the main group including a front contact of said main relay and a front contact of said distant relay, a circuit for the caution lamp of said main group including a front contact of the main relay and a back contact of the distant relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, a light-out relay in series with both the clear and the caution lamps of said main group, and an auxiliary circuit for said "calling-on" relay including a front contact of said main relay and a back contact of said light-out relay.

7. In combination, a signal comprising a main group of lamps having a stop lamp, a caution lamp and a clear lamp, and a "calling-on" group having a proceed lamp; a main relay, a distant relay, and a "calling-on" relay, a controlling circuit for said main relay including an interlocking machine contact and a track relay contact, a circuit for said distant relay controlled by said main relay and by traffic conditions in advance, a normal circuit for said "calling-on" relay including a back contact of said main relay and a "calling-on" circuit controller and said interlocking machine contact, a circuit for the said clear lamp of the main group including a front contact of said main relay and a front contact of said distant relay, a circuit for the caution lamp of said main group including a front contact of the main relay and a back contact of the distant relay, a circuit for the proceed lamp of the "calling-on" group including a front contact of said "calling-on" relay, a light-out relay in series with a proceed lamp of said main group, an auxiliary circuit for said "calling-on" relay including a front contact of said main relay and a back contact of said light-out relay, a normal circuit for the stop lamp of said main group including a back contact of said main relay, and an auxiliary circuit for the stop lamp of said main group including a front contact of said main relay and a back contact of said light-out relay.

8. In combination, a railway signal having proceed, caution and stop lamps, controlling means for selectively lighting said lamps, and means for lighting said stop lamp when said controlling means is in condition to light either said proceed or said caution lamp and the lamp which should then be lighted is burned out.

In testimony whereof I affix my signature.

LESTER E. SPRAY.