

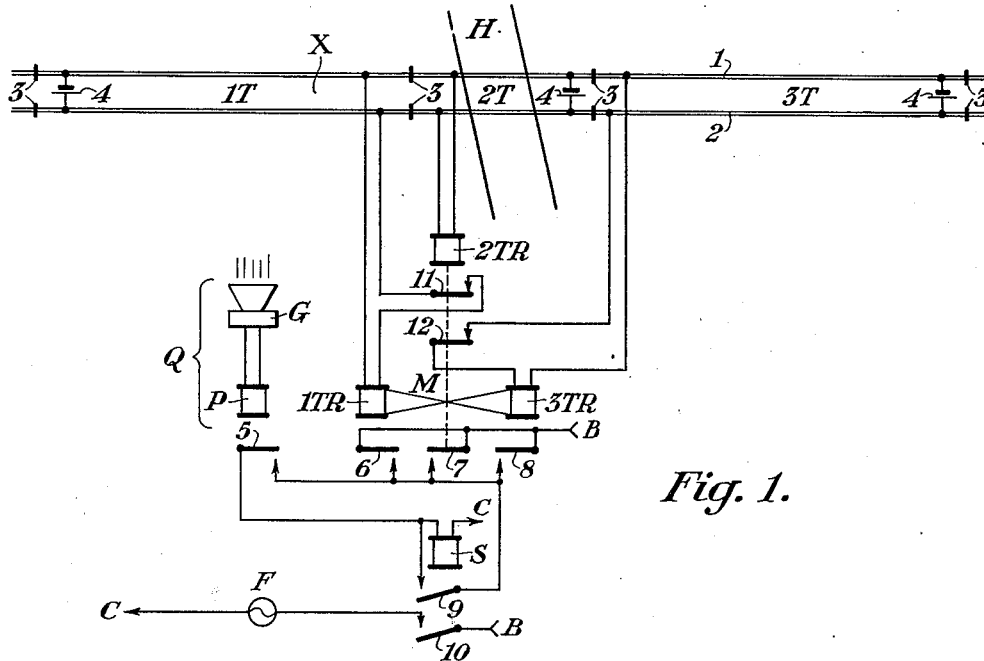
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W. B. WELLS

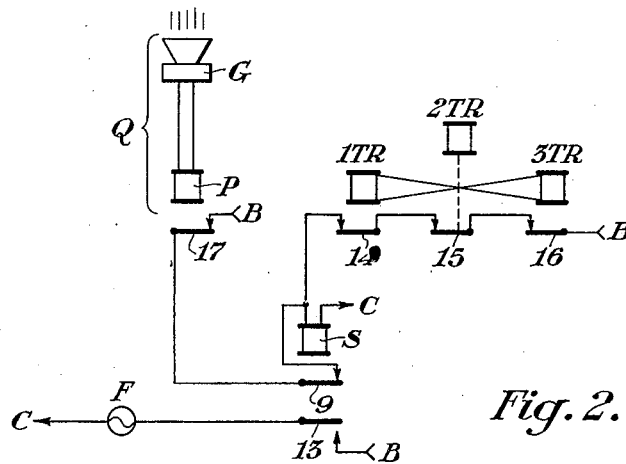
**2,124,807**

## LIGHT SENSITIVE APPARATUS

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*Fig. 1.*



*Fig. 2.*

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## UNITED STATES PATENT OFFICE

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## LIGHT SENSITIVE APPARATUS

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13 Claims. (Cl. 246—130)

My invention relates to light sensitive apparatus, and is particularly adapted for, though in no way limited to, the control of floodlights at intersections of railways and highways. More specifically, it relates to means for illuminating at night an intersection between a railway and a highway when a train is approaching or is occupying such intersection so that the train, while occupying the intersection, may be distinctly visible to users of the highway.

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 illustrating one form of apparatus embodying my invention. Fig. 2 is a diagrammatic view illustrating a modification of a portion of the apparatus shown in Fig. 1 and also embodying my invention.

Referring first to Fig. 1, the reference character X designates a stretch of railway track over which traffic moves in both directions. The rails 1 and 2 of track X are divided by insulated joints 3 into sections 1T, 2T and 3T. Each section is provided with a track battery 4 connected across the rails at one end of the section and with a track relay designated by the reference character R with a distinguishing prefix connected across the rails at the other end of the section.

The track relays 1TR and 3TR constitute the two relay elements of an interlocking relay designated by the reference character M.

The section 2T includes an intersection of the railway and a highway designated by the reference character H.

A light sensitive device designated in general by the reference character Q is located adjacent the intersection. The device Q, as here shown, comprises a photoelectric generator G exposed to the atmosphere and a relay P connected to the generator G. The generator G has the property of converting the energy of light rays into electrical energy. A number of such photoelectric generators are well-known, one such generator being described in Letters Patent of the United States No. 1,970,135, issued August 14, 1934, to Lars O. Grondahl and Paul H. Geiger. When the amount of daylight adjacent the intersection is above a predetermined value, the generator G will generate sufficient current to pick up the relay P whereas, when the amount of daylight decreases below this predetermined value, the generator G will not supply sufficient current to maintain relay P in its picked up condition.

Located adjacent the intersection is a lamp

designated by the reference character F and which may be a floodlight. The floodlight F is so located that, when lighted, the intersection will be illuminated so that any train or trains occupying the intersection will be distinctly visible to users of the highway H.

Associated with the floodlight F is a normally deenergized stick relay S. The relay S is effective, when energized, to light the floodlight by virtue of a circuit which passes from terminal B of a suitable source of energy through front contact 10 of relay S and lamp F to terminal C of the same source of energy.

The relay S will be energized upon the deenergization of any of the track relays provided that relay P is in its deenergized condition. That is, when the amount of daylight adjacent the intersection decreases to such value that back contact 5 of relay P becomes closed, the closing of any one or more of back contacts 6, 7 or 8 of relays 1TR, 2TR and 3TR, respectively, will close an easily traced pick-up circuit for relay S. When relay S becomes energized, it will be maintained in such condition as long as any one of back contacts 6, 7 or 8 is closed by virtue of one of three easily traced stick circuits each of which includes front contact 9 of relay S.

Under ordinary conditions, the relay P will release upon the approach of nightfall and will remain in such condition until the appearance of daylight again. The back contact 5 of relay P, therefore, under ordinary conditions is not required to make and break the circuit for the operating current for relay S but is only required to carry the operating current of the latter relay. The contact 5, therefore, may have an extremely long life even though it may be of delicate construction such as is usually found in light sensitive devices.

It will be noted that the magnets 1TR and 3TR of interlocking relay M are controlled over front contacts 11 and 12 of track relay 2TR. That is, both magnets 1TR and 3TR will be deenergized when the section 2T is occupied by a train. This insures that the interlocking feature of relay M will operate properly in the event a short car or engine passes over the intersection. That is, if a car or engine of a length such as to permit it to lie wholly within section 2T passes over the intersection, the interlocking feature of relay M will not be disabled since the initially deenergized magnet of the interlocking relay cannot pick up before the other magnet becomes deenergized.

It will be readily apparent that if a train

approaching the intersection enters section 1T, for example, when the relay P is in its deenergized condition, the relay S will become energized so that the floodlight F will be lighted.

5 It will also be apparent that when the train enters section 2T, the relay S will be maintained in its energized condition even though the rear of the train may vacate section 1T. That is, the floodlight F will be lighted as long as any portion of  
10 the train occupies section 2T. When the rear of the train leaves section 2T, the interlocking feature of relay M will prevent the closing of back contact 8 of magnet 3TR so that the relay S will become deenergized. When the relay S is  
15 deenergized, the floodlight F, of course, will be extinguished.

Referring now to Fig. 2, the stick relay S is here shown as a normally energized relay which, when deenergized, so that its back contact 13 be-  
20 comes closed, is effective for lighting the floodlight F.

The relay S is provided with three easily traced pick-up circuits which include contacts 14, 15 and 16, respectively, of relays 1TR, 2TR and 3TR,  
25 respectively, and is provided with an easily traced stick circuit which includes front contact 17 of relay P and front contact 9 of relay S.

It will be noted that front contact 17 of relay P is included in the stick circuit only for relay S  
30 and, therefore, as previously explained for the apparatus shown in Fig. 1, is not ordinarily required to make and break the circuit for the operating current for relay S but is only required to carry such current after the latter relay is in  
35 its picked up condition.

When relay P is in its deenergized condition so that the stick circuit for relay S is opened, it will be readily apparent that the relay S will become deenergized if any of the track relays  
40 1TR, 2TR or 3TR is released. In other words, the floodlight F will be lighted in a manner similar to that described for the apparatus shown in Fig. 1.

Contacts 14 and 16 of magnets 1TR and 3TR  
45 of interlocking relay are "flagman" contacts so that such contacts do not open for trains receding from the intersection. The relay S, therefore, will become energized so that floodlight F will be extinguished whenever a train receding  
50 from the intersection leaves section 2T.

From the foregoing, it will be seen that I have provided a simple and reliable means for illuminating at night an intersection of a railway and a highway so that a train occupying such  
55 intersection is distinctly visible to users of the highway. Furthermore, the apparatus embodying my invention utilizes a relay controlled by a photoelectric generator which relay may be of delicate construction so as to operate on the ex-  
60 tremely small current usually supplied by such generators, since the contacts of this relay are ordinarily not required to make and break energized circuits.

Although I have herein shown and described  
65 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.

70 Having thus described my invention, what I claim is:

1. In combination with a section of railway track having a track relay associated therewith, an electric lamp, a normally deenergized stick  
75 relay, means effective as long as said stick relay

is energized to light said lamp, a photoelectric generator located adjacent said lamp, another relay controlled by said photoelectric generator and deenergized when the amount of daylight is reduced to a predetermined value, a pick-up circuit for said stick relay including a back contact  
5 of said track relay and a back contact of said other relay, and a stick circuit for said stick relay including its own front contact and said back contact of said track relay.

2. In combination with a section of railway track having a track relay associated therewith, an electric lamp, a normally energized stick relay effective when deenergized to light said lamp, a photoelectric generator located adjacent said  
15 lamp, another relay controlled by said photoelectric generator and deenergized when the amount of daylight is reduced to a predetermined value, a stick circuit for said stick relay including its own front contact and a front contact of said  
20 other relay, and a pick-up circuit for said stick relay including a front contact of the said track relay.

3. In combination, a stretch of railway track divided into two end sections and an intermediate  
25 section, an interlocking relay controlled by traffic conditions in the three sections, a floodlight, a highway intersection in said intermediate section illuminated by said floodlight, a light sensitive device responsive to the amount of daylight  
30 adjacent said intersection, and means controlled by said interlocking relay and by said light sensitive device for governing said floodlight.

4. In combination, a stretch of railway track divided into two end sections and an intermediate  
35 section each having a track relay, the track relays for the end sections being the magnets of an interlocking relay and both controlled by the track relay for the intermediate section, a highway intersection in said intermediate section, a  
40 floodlight for illuminating said intersection, a photoelectric generator located adjacent said intersection, another relay controlled by said photoelectric generator, and means governed by said interlocking relay and by said track relay for the  
45 intermediate section as well as by said other relay for controlling said floodlight.

5. In combination, a device having an initial condition but operable to a different condition, a lamp, light sensitive apparatus responsive to the  
50 amount of daylight adjacent said device, means controlled by said light sensitive apparatus and by said device for lighting said lamp when said device is operated to its different condition provided the amount of daylight is then below a predetermined  
55 value, and means effective thereafter to light said lamp as long as said device remains in its different condition regardless of subsequent changes in the amount of daylight.

6. In combination, a device having an initial  
60 condition but operable to a different condition, light sensitive apparatus responsive to the amount of daylight adjacent said device, a relay normally in one condition, means controlled by said device and by said light sensitive apparatus for causing  
65 said relay to assume another condition when said device is operated to its different condition provided the amount of daylight is then below a predetermined value, means effective thereafter to maintain said relay in such other condition as  
70 long as said device remains in its different condition regardless of subsequent changes in the amount of daylight, a lamp, and means for lighting said lamp as long as said relay is in said other condition.

7. In combination, a device having an initial condition but operable to a different condition, a photo-electric generator exposed to daylight adjacent said device, a relay controlled by said photo-electric generator and arranged to assume one condition or another condition according as the amount of daylight is above or below respectively a given value, a lamp, means controlled by said device and by said relay for lighting said lamp when said device is operated to its different condition provided said relay is then in its other condition, and means effective thereafter to light said lamp as long as said device remains in its different condition regardless of whether said relay is in said one condition or said other condition.

8. In combination, a section of track including a track relay, a lamp, a light sensitive device responsive to the amount of daylight adjacent said section, means controlled by said light sensitive device and by said track relay for lighting said lamp when said relay is released provided the amount of daylight is then below a given value, and means effective thereafter to light said lamp as long as said track relay remains released regardless of subsequent changes in the amount of daylight.

9. In combination, a section of railway track including an intersection with a highway, a floodlamp for illuminating a portion of such intersection, a relay controlling the supply of current to said floodlamp, a circuit controlled by said relay through which current may be supplied to its winding, photoelectric means responsive to the amount of daylight at such intersection and also controlling said circuit, and a track relay associated with said track section and controlling a circuit through which current may be supplied to the winding of said relay.

10. In combination, a section of railway track including an intersection with a highway, a floodlamp for illuminating a portion of such intersection, a control relay controlling the supply of current to said floodlamp, a first circuit for supplying current to the winding of said relay, a second circuit for also supplying current to the winding of said relay, photoelectric means responsive to the amount of daylight at such intersection and controlling one of said circuits, and a track relay associated with said track section and controlling

the other of said circuits, one of said circuits being also controlled by said control relay.

11. In combination, a section of railway track including an intersection with a highway, a floodlamp for illuminating a portion of such intersection, a control relay controlling the supply of current to said floodlamp, a first circuit for supplying current to the winding of said relay, a second circuit for also supplying current to the winding of said relay, photoelectric means responsive to the amount of daylight at such intersection and controlling one of said circuits, the other of said circuits being controlled by said relay, and a track relay associated with said track section and controlling both of said circuits.

12. In combination, a section of railway track including an intersection with a highway, a floodlamp for illuminating a portion of such intersection, a relay having a winding and having a movable contact operated only when said winding is deenergized to establish a circuit to supply current to said floodlamp, a first circuit through which current may be supplied to said relay winding, means operative when and only when said relay winding is energized to establish said first circuit, photoelectric means responsive to the amount of daylight at such intersection for also controlling said first circuit, a second circuit through which current may be supplied to said relay winding, and a track relay associated with said track section and controlling said second circuit.

13. In combination, a section of railway track including an intersection with a highway, a floodlamp for illuminating a portion of such intersection, a relay having a winding and having a movable contact operated when and only when said winding is energized to establish a circuit to supply current to said floodlamp, a first circuit through which current may be supplied to said relay winding, means operative when and only when said relay winding is energized to establish said first circuit, a second circuit for supplying current to said relay winding, photoelectric means responsive to the amount of daylight at such intersection and controlling said second circuit, and a track relay associated with said track section and controlling the supply of current to said first and second circuits.

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