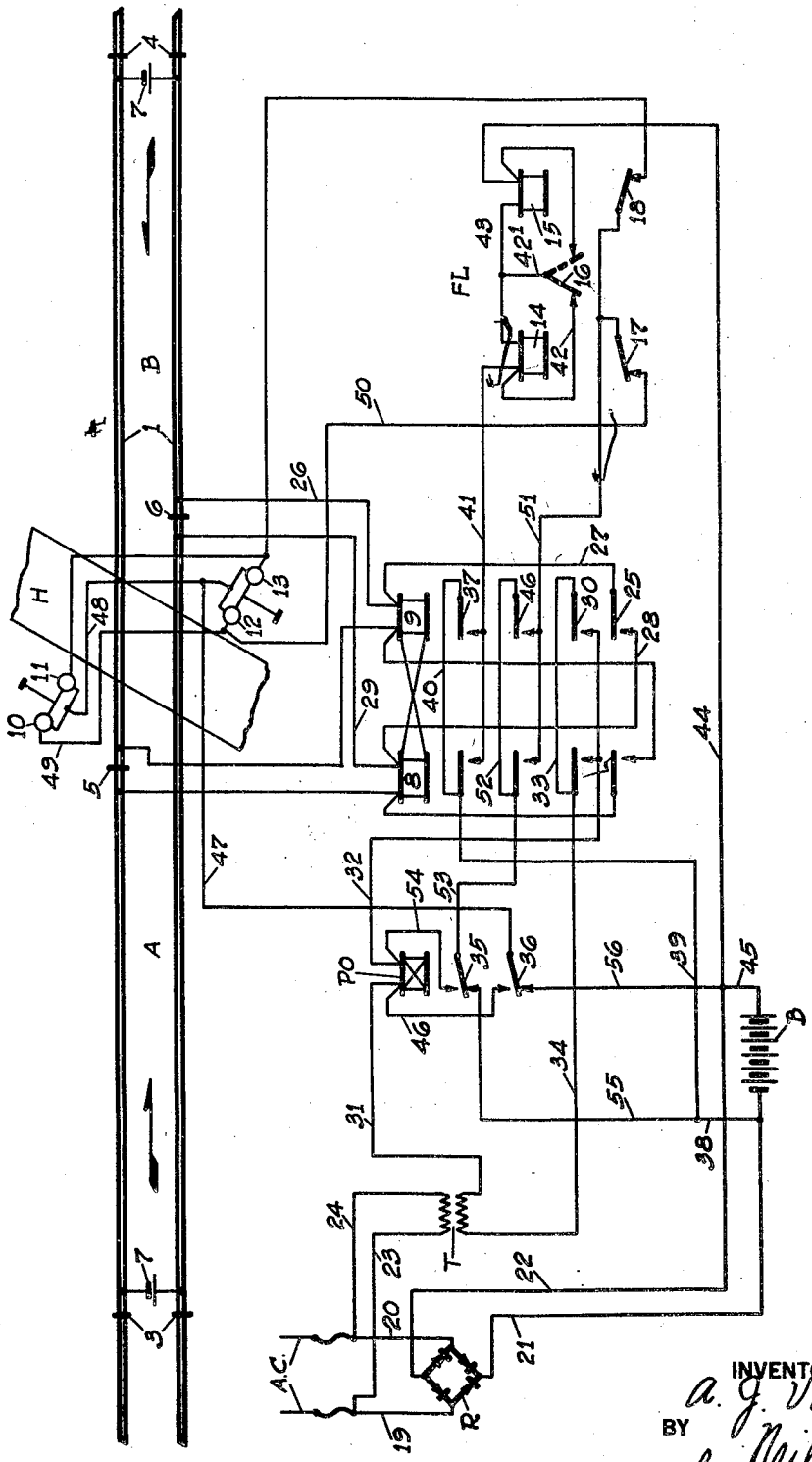
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HIGHWAY CROSSING SIGNAL SYSTEM

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HIGHWAY CROSSING SIGNAL SYSTEM

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This invention relates in general to signaling means for use where highways cross railway tracks, and has more particular reference to an improved and specially safeguarded system of this character.

In signaling systems of the character in question, it is always desirable to economize in power consumption as much as possible, and to continue any warning signaling so long as any danger exists.

With the above and other objects in view, it is proposed, in accordance with the present invention, to provide a signal system wherein a power-off relay is employed which automatically cuts into use a storage battery which is trickle charged from a source of alternating current, upon failure of the alternating current source, for energizing the light sources. Contrary to usual practice, however, this power-off relay is normally deenergized, thus saving energy, and more specifically, this is made possible by carrying the energizing circuit for the lights, not only through contacts of the power-off relay, but also through contacts of a usual interlocked relay.

A further object is to provide means whereby the highway crossing warning signal is continued until the rear end of a train has completely cleared the highway. More specifically, this is accomplished by providing the insulating joints separating the track into signaling blocks, in a staggered relation, on either side of the highway, and providing a shunt path around each insulating joint, with the shunt path controlled by a contact finger and back point of a respective interlocked relay.

Further objects, purposes and characteristic features will appear as the description progresses, reference being made to the accompanying drawing, showing, wholly by way of example, and in no manner whatsoever in a limiting sense, one form which the invention can assume. In the drawing:—

The single figure of drawing is a diagrammatic representation of a signalling system in accordance with the present invention.

Referring now to the drawing, there is shown a stretch of single track constituted by track rails 1, arranged for traffic in both directions. The track is separated into signaling blocks A and B, by means of insulating joints 3 and 4 and 5 and 6, with usual sources of energy, such as track batteries 7, each connected across one end of each of the signalling blocks. Across the other ends of the signalling blocks are connected interlocked relays 8 and 9, which are mechanically, or otherwise, interlocked, as desired, as for example, in application Ser. No. 474,958 filed August 13, 1930, of O. S. Field.

Crossing the track rails 1, at a point between the insulating joints 5 and 6, is a highway H, and at each side of the highway is a light signal of the usual wig-wag type, having light sources 10 and 11, and 12 and 13 respectively.

For causing the light sources to flash, a flashing relay FL is employed, having windings 14 and 15, a polar contact finger 16, and light controlling contact fingers 17 and 18. This flashing relay may be of any usual or desired type, but is preferably of the shunt-out type, as shown in the application to O. S. Field, Ser. No. 452,666 filed May 15, 1930.

The energy for operating this signal system comprises a source of alternating current A. C. connected up in multiple to a transformer T and a rectifier R which latter may be of any usual or desired type, either single or double wave. The input side of the rectifier R is connected to the alternating current source by wires 19 and 20, and the output side of the rectifier is connected by wires 21 and 22 to a storage battery B.

The primary winding of transformer T is connected by wires 23 and 24 to the source A. C.

The various parts are shown in the conditions and positions assumed under normal conditions with neither of the detector track circuits A, B occupied.

Assume now that a west bound train enters the detector track section B. Occupancy of section B shunts out interlocked relay 9, to cause it to release its various contact fingers.

The dropping of contact finger 25 of re-

lay 9 closes a shunt path about insulating joint 6, which path includes wires 26 and 27, contact finger 25 and back point, and wires 28 and 29, to thereby extend the detector track circuit B from the insulating joints 4 up to the insulating joint 5, so as to wholly include the highway. Before this shunt path was closed around joint 6, the detector track section B extended only up to the joint 6, but with 25 retracted, the section B extends up to 5, in as much as now, occupancy of the track between 6 and 5 shunts out relay 9. (When 25 is up, occupancy of the track between 6 and 5 does not shunt out relay 9.)

The release of contact finger 30 of relay 9 closes a pick-up circuit for the power-off relay PO, which includes the secondary of transformer T, wire 31, the winding of relay PO, wire 32, contact finger 30 and back point, and wires 33 and 34, whereupon relay PO picks up its contact fingers 35 and 36, and stays up so long as the source A. C., does not fail and detector track section B remains occupied.

The release of contact finger 37 of relay 9, closes a circuit for energizing the flashing relay FL which circuit includes the positive terminal of the battery B, wires 38, 39 and 40, contact finger 37 and back point, wires 41 and 42, contact finger 16 in its left hand position, wires 42^1 and 43, winding 15, and wires 44 and 45 to the other side of the battery. This results in a shifting of the polar contact finger 16 to its opposite, (dotted line), position, and causes the picking up of contact finger 18. The polar finger 16, alternately shunts out first one, and then the other, of the windings 14 and 15, to thereby cause contact fingers 18 and 17 to alternately make and break contact with their back points.

With contact finger 46 of relay 9 down, and contact finger 18 of the flashing relay FL picked up, energizing circuits are completed for the two left-hand light sources 12 and 10, of the respective crossing signals, which circuits include, one side of the secondary of transformer T, wires 31 and 46, contact finger 36 and front point, wires 47 and 48, light sources 12 and 10 in multiple, wires 49 and 50, contact finger 17 and back point of the flashing relay, wire 51, contact finger 46 and back point of relay 9, wires 52 and 53, contact finger 35 and front point of relay PO, wires 54 and 32, contact finger 30 and back point of relay 9, and wires 33 and 34 back to the other side of the secondary of transformer T.

After a short duration of time, lamps 10 and 12 become de-energized, and lamps 11 and 13 become energized, through circuits similar to those traced just above, but including contact finger 18 and back point of the flashing relay, in place of the contact finger 17 and back point thereof. Thus the highway signals are alternately flashed, to give a wig-wag effect, so long as the section B is occupied.

It should be noted particularly that section B, when unoccupied extends from the insulating joints 4 up to the insulating joint 6, but as soon as it is occupied, the shunt path around the insulating joint 6 is completed by the release of interlocked relay 9, to thereby extend this detector track section up to the insulating joint 5 as explained above. This section between joints 6 and 5, therefore is normally de-energized, or "dead," when sections A and B are unoccupied, and this is an advantage in that anything passing over the highway, such as a sleigh runner, is thereby interconnecting only rails of a dead section, and cannot result in dropping one of the interlocked relays, and thus tying up the system.

It thus appears from the above description, that after a highway signal has once become energized, due to occupancy of a detector track section, the signal continues to display its warning until the occupied train has completely cleared the highway.

Furthermore the power-off relay PO operates, on failure of alternating current, to release its contact fingers 35 and 36, to thereby substitute battery energy from battery B, through wires 55 and 56, for the alternating current energy.

The operation of the system, upon an east bound train entering section A, is similar to that described above, a shunt path being completed by relay 8, around insulating joint 5, to thereby extend section A up to insulating joint 6.

The above specific description of one form of system embodying the present invention, has been given solely by way of illustration, and is not intended, in any manner whatsoever, in a limiting sense. Obviously this invention can assume many different physical forms, and is susceptible of numerous modifications, and all such forms and modifications, are included by this application, as come within the scope of the appended claims.

Having described my invention, I now claim:—

1. In combination, a crossing signal, a traffic controlled relay, a source of alternating current and a source of direct current, a power-off relay, an energizing circuit for said signal including a back point of the traffic controlled relay and either a front or a back point of the power-off relay, and an energizing circuit for the power-off relay including a back point of the traffic controlled relay and one of the sources of energy.

2. In combination with a stretch of single track and a highway crossing the track, a detector track section at each side of the highway and each normally terminating at the near side of the highway respectively, and

means, including a traffic controlled device, for at times extending one or the other of the detector track sections to the opposite side of the highway.

3. In a crossing signal system, in combination a signal, a detector track circuit, a traffic relay controlled by said circuit, two separate sources of current, an energizing circuit for the signal controlled by said relay and having multiple branches connected respectively to said two sources, a power-off relay selectively controlling said multiple branches, and an energizing circuit for the power-off relay controlled by the traffic relay.

4. In a crossing signal system, in combination, a signal, a detector track circuit, a track relay controlled by said circuit to be energized when the track circuit is unoccupied, two separate sources of current, an energizing circuit for the signal controlled by said relay and having multiple branches connectable respectively to said two sources, a power-off relay selectively controlling said multiple branches, and an energizing circuit for the power-off relay controlled by a back point of the track relay.

5. In a crossing signal system for highway crossings, in combination, a signal, a detector track circuit, a traffic relay controlled by said circuit, two separate sources of current, an energizing circuit for the signal controlled by said relay and having multiple branches connectable respectively to said two sources, a power-off relay selectively controlling said multiple branches, an energizing circuit for the power-off relay controlled by the traffic relay, a track insulating joint at each side of a crossing highway for defining one end of the track circuit, and means controlled by said traffic relay for closing a shunt around the joint at the near side of the highway.

6. In a crossing signal system, in combination, a signal, a detector track circuit, a traffic relay controlled by said circuit to be energized when the track circuit is unoccupied, two separate sources of current, an energizing circuit for the signal controlled by said relay and having multiple branches connectable respectively to said two sources, a power-off relay selectively controlling said multiple branches, an energizing circuit for the power-off relay controlled by the traffic relay, a track insulating joint at each side of a crossing highway for defining one end of the track circuit, and means controlled by said traffic relay for closing a shunt around the joint at the near side of the highway.

7. In a crossing signal system, in combination, a signal, a detector track circuit, a track relay connected across said circuit, two separate sources of current, an energizing circuit for the signal controlled by the track relay and having multiple branches connectable respectively to said two sources, a power-off relay selectively controlling said multiple branches, an energizing circuit for the power-off relay controlled by the track relay, a track insulating joint at each side of a crossing highway defining one end of the track circuit, and means controlled by said track relay for closing a shunt around the joint at the near side of the highway, upon occupancy of the track circuit.

8. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway with their adjacent ends defined by insulating joints one at each side of the highway in staggered relation, an energizing circuit for each signal, and interlocked relays connected respectively across the track sections, and controlling the effective lengths of said sections and the signal energizing circuits.

9. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway with their adjacent ends defined by insulating joints one at each side of the highway, an energizing circuit for each signal, interlocked relays connected respectively across the track sections, and controlling the signal energizing circuits, and a shunt around each said joints controlled respectively by the interlocked relays.

10. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway with their adjacent ends defined by insulating joints one at each side of the highway, an energizing circuit for each signal, interlocked relays connected respectively across the track sections, and controlling the signal energizing circuits, and a shunt around each said joints controlled respectively by the interlocked relays, whereby occupancy of a track section operates to extend such section across the highway.

11. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway with their adjacent ends defined by insulating joints one at each side of the highway, an energizing circuit for each signal, interlocked relays connected respectively across the track sections, and controlling the signal energizing circuits, two separate sources of energy for the signal energizing circuits, and a power-off relay for placing one or the other of the sources in the signal energizing circuits, and having an energizing circuit including a point of an interlocking relay and one of said sources.

12. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway

with their adjacent ends defined by insulating joints one at each side of the highway, an energizing circuit for each signal, and interlocked relays connected respectively across the track sections, and controlling the signal energizing circuits, a shunt around each said joints controlled respectively by the interlocked relays, whereby occupancy of a track section operates to extend such section across the highway, two separate sources of energy for the signal energizing circuits, and a power-off relay for placing one or the other sources in the signal energizing circuits, and having an energizing circuit including a point of an interlocked relay and one of said sources.

13. In combination with a stretch of single track, and a highway crossing the track, a signal at each side of the crossing, a detector track section at each side of the highway with their adjacent ends defined by insulating joints one at each side of the highway, an energizing circuit for each signal, interlocked relays connected respectively across the track sections and controlling the signal energizing circuits, and a shunt around each said joints controlled respectively by the interlocked relays, whereby occupancy of a track section operates to extend such section across the highway, two separate sources of energy for the signal energizing circuits, and a power-off relay for placing one or the other sources in the signal energizing circuits, and having an energizing circuit including a back point of either of the interlocked relays and one of said sources.

In testimony whereof I affix my signature.

ARMAND J. VALLÉE.