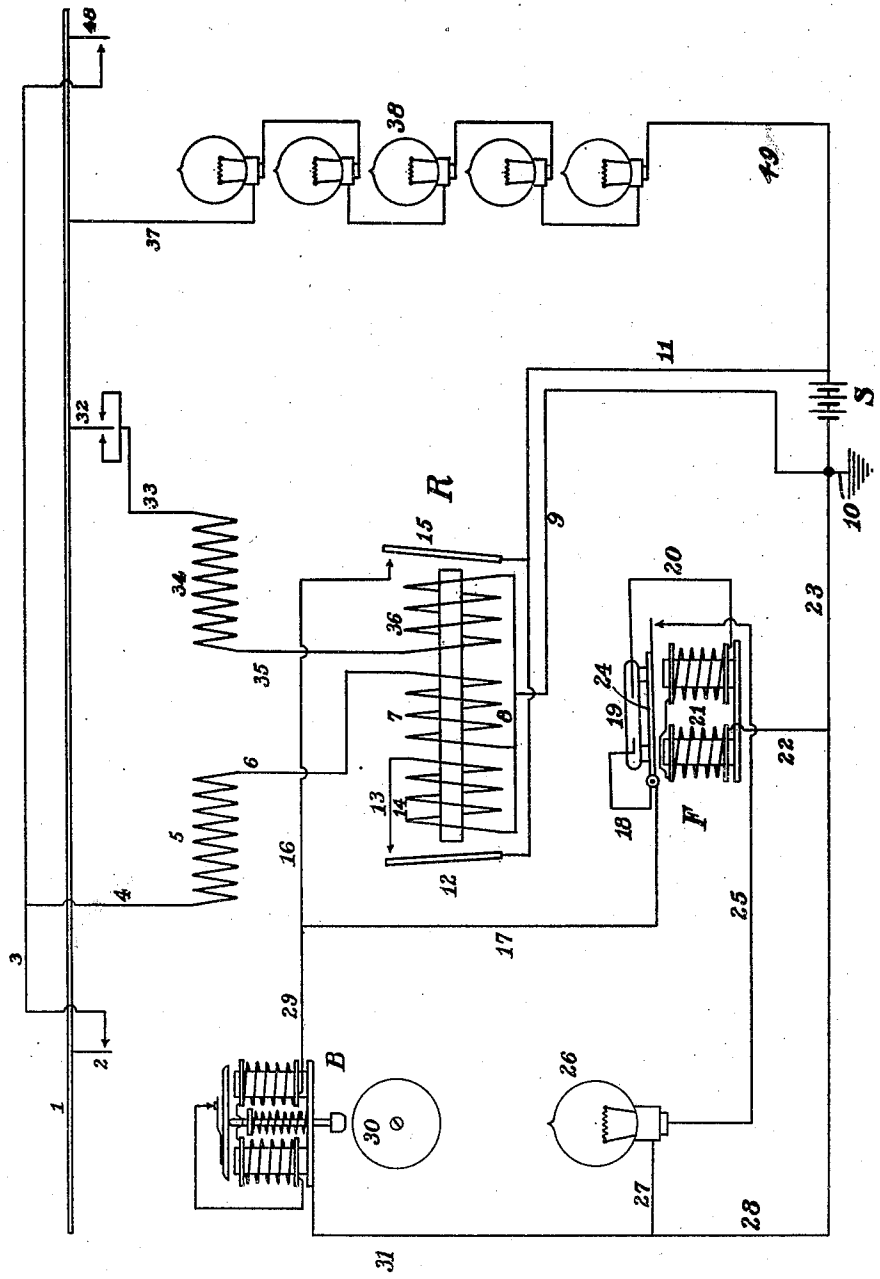
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ELECTRIC RAILWAY SIGNAL CROSSING SYSTEM.

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1,322,177. Patented Nov. 18, 1919.



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ELECTRIC RAILWAY-SIGNAL CROSSING SYSTEM.

1,322,177. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed March 30, 1918. Serial No. 225,614.

To all whom it may concern:

Be it known that I, CARL H. BUHL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Railway-Signal Crossing Systems, of which the following is a specification.

The present invention is designed to eliminate the troubles which have been experienced in operating crossing bells that are operated by the same power used in operating inter-urban cars. The voltage generally used for this purpose is 650 maximum and 400 minimum. This variation of the line voltage causes considerable trouble, as the bells that are now in operation receive their operating current from the trolley feed wire through a resistance wire which is gaged to allow only the required amount of current through to operate the bell. It will readily be seen that it is rather difficult to adjust the resistance to meet the varying conditions caused by the varying loads met with in such trolley systems.

Another source of trouble is due to the arcing of the contact points of both the control relays and the vibrating bell. This arcing is due to the high voltage used in their operation. The following describes some of the troubles the arcing causes: A repair man is sent out to repair a certain bell that is out of order, and he finds that the control relay does not respond or operate. He adjusts this relay by bringing the armature closer to the magnet cores, so that it will be more sensitive in its operation. After this has been done a test is made and likely the control relay will operate satisfactorily when he leaves. These adjustments are generally made during the day or during the heavy load, but on a light load or when the line voltage is at its maximum, this same relay may stick, causing the crossing bell to ring continuously, which may burn out the resistance unit as well as the bell. The sticking is caused by reducing the air-gap between the contact points, due to adjusting the armature closer to the operating cores, so that the relay will respond on low voltage. This heavy arcing may be reduced by the use of condensers, but they are liable to be ruined by lightning discharges.

The present invention eliminates the above troubles in the following way: A storage battery is used that is automatically charged from the trolley wire through a bank of lights in series, which are placed over the crossing to be protected. These lights illuminate the crossing at night, as well as charge the storage battery. This (assumed) six volt battery holds the control relay locked after said relay has been operated by an approaching car. It also operates a flashing device which in turn flashes a red light which is visible from all angles, which notifies both the motorman and the traffic from a distance that the crossing bell is operating. The same battery also operates the gong.

By using the storage battery in this way it will be seen that there is a uniform voltage of six volts at all times, for the operation of the crossing bell and signal. Instead of opening and closing a six hundred and fifty volt circuit with the control relay, a six volt circuit is opened and closed. A relay opening a 650 volt circuit, would require about a three-fourth inch air-gap, making a very sluggish operating relay, where a relay opening a 6 volt circuit, would only require one-eighth inch air-gap, making a very sensitive and quick acting relay. Another advantage of using the storage battery is, in case anything should go wrong with the charging circuit, say a lamp burn out or a wire break, the storage cells still have a reserve energy to operate bell and signal for several days before repairs are necessary.

The accompanying drawing is a diagram of the system and the various electrical devices may be such as are already known or are especially designed for the present system. The storage battery S is charged from the trolley wire 1, through wire 37 and lamps 38, wire 49, battery S—and wire 10 to the ground. The storage battery thus receives its charging current from the trolley wire through a sufficient number of lamps of the required wattage to charge the battery, and these lamps also illuminate the crossing at night.

The controlling circuit receives its current from the trolley wire 1, through either contactor 2 or 48, wires 3 and 4, resistance 5 and wire 6 to the coil 7 of the controlling relay R, wires 8, 9 and 10 to ground. The closing of this circuit energizes the relay core which attracts its armatures 12 and 15, thereby closing the local circuits controlled by this relay. As this relay is only closed for an

instant, it is necessary to have a holding circuit which will hold the relay locked until the car is past the crossing.

This holding circuit receives its current from the positive side of the storage battery S, through wire 11, armature 12, wire 13, holding coil 14, and wires 8, 9 and 23 to the negative side of the storage battery, and the control relay, when locked, closes two local circuits, the bell circuit and the flasher circuit.

The circuit of the bell B receives its current under such conditions from the positive side of the storage battery through wire 11, armature 15, wires 16 and 29, to the windings of the bell and back through the wires 31, 28 and 23 to the negative side of the storage battery, thereby sounding the gong.

The mercury flasher F receives its current from the positive side of the storage battery through the wire 11, armature 15, wires 16, 17 and 18, to the tilting mercury tube 19, and thence through the wire 20, coils 21, and wires 22 and 23 to the negative side of the storage battery. The flasher is of that type which causes the mercury tube, attached to the armature 24 of the magnet, to tilt back and forth, thereby flashing the red light 26, the circuit being from the wire 17, as above described, through the armature 24, wire 25, lamp 26, and wires 27, 28 and 23 to the negative side of the storage cell, causing the lamp 26 to flash. This flasher may be of special construction to produce the results indicated.

The release circuit receives its current from the trolley wire 1 through a double acting contactor 32, wire 33, resistance 34, wire 35 to the release coil 36 in the relay R, and thence by wires 8, 9 and 10 to the ground. The release coil 36 is wound opposite to the holding coil 14 and operating coil 7, which neutralizes the magnetism of the holding coil and releases the armatures 12 and 15, thereby opening all the local circuits controlled by the relay.

The trips 2 and 48 are in practice placed say a thousand feet each way from the crossing to be protected, and when operated the trolley voltage flows through the operating winding of the control relay R, which attracts its armatures and closes the local circuits of the storage battery, sounding the gong and operating the flasher as above described, the relay remaining locked until the car operates the trip 32 which controls the release winding of the relay, which opens the circuits of the bell and the flasher as above described.

The invention is not limited to the particular devices shown, but various modifications may be made within the scope of the following claims.

I claim:

1. In an electric railway signal system, the combination with a line circuit conductor, of a local storage battery charged therefrom, a signal device operated by said battery, a relay controlling the battery circuit, and actuated from the line circuit, and means to control the actuation of the relay.

2. In an electric railway crossing signal system, the combination with a line conductor, of a local storage battery connected to said conductor for charging therefrom, said connection including lamps to control the charging current and illuminate the crossing, and an electric signal device operated by said battery.

3. In an electric railway signal system, the combination with a line conductor, of a local signal circuit including a storage battery connected for charging from the line conductor, and trip-operated means to control the local circuit, said means including a relay in circuit with said conductor.

4. In an electric railway signal system, the combination with a line circuit, of a signal circuit including a storage battery, means actuated from the line circuit to control the local circuit, and means to charge the storage battery from the line circuit.

In testimony whereof, I do affix my signature in presence of two witnesses.

CARL H. BUHL.

Witnesses:
JOHN A. BOMMHARDT,
G. V. ROSENBERG.