Feb. 13, 1940. E. G. LITTLE 2,190,520

CIRCUIT CONTROLLER

Filed Dec. 30, 1937 2 Sheets-Sheet 1

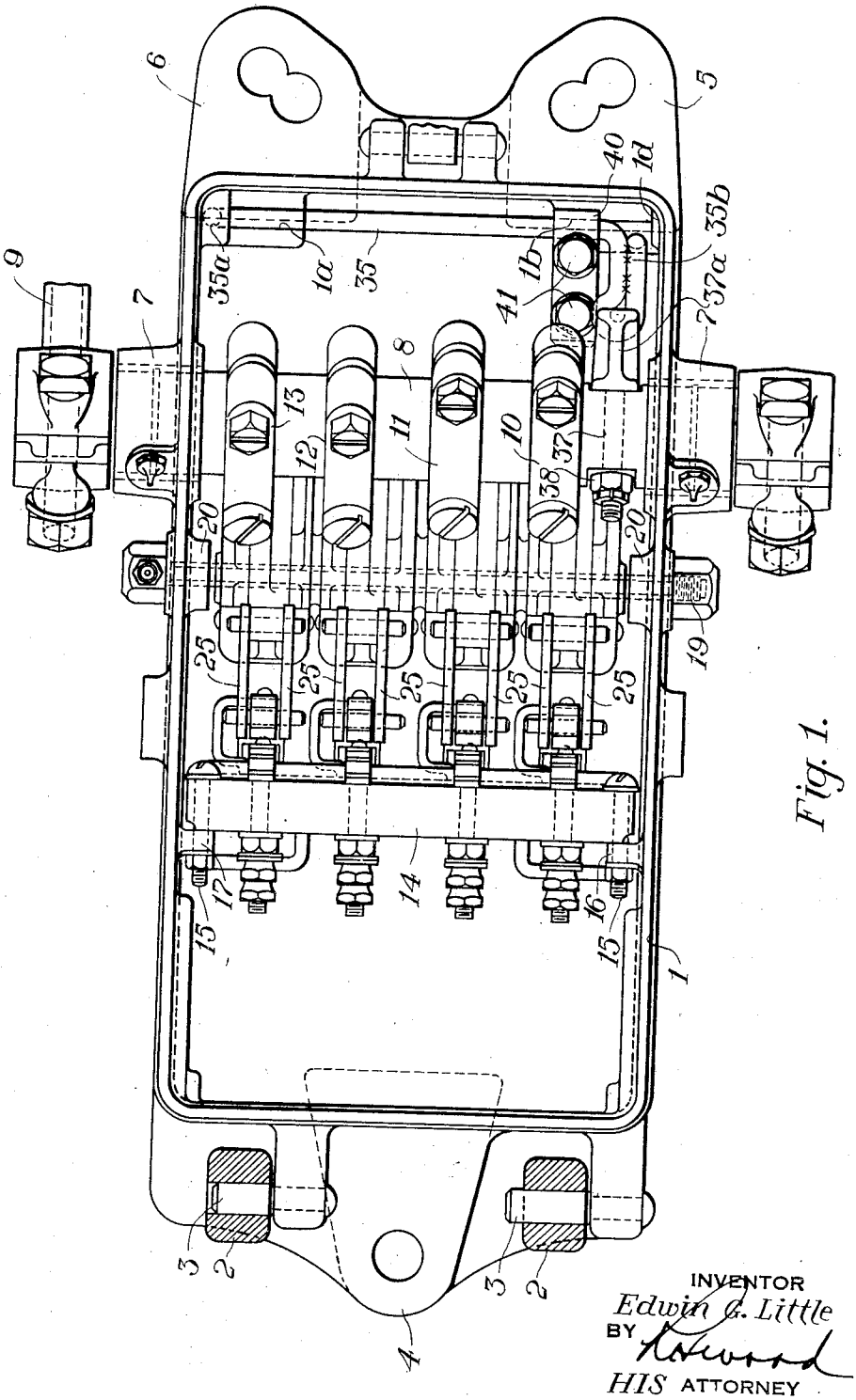


Fig. 1.

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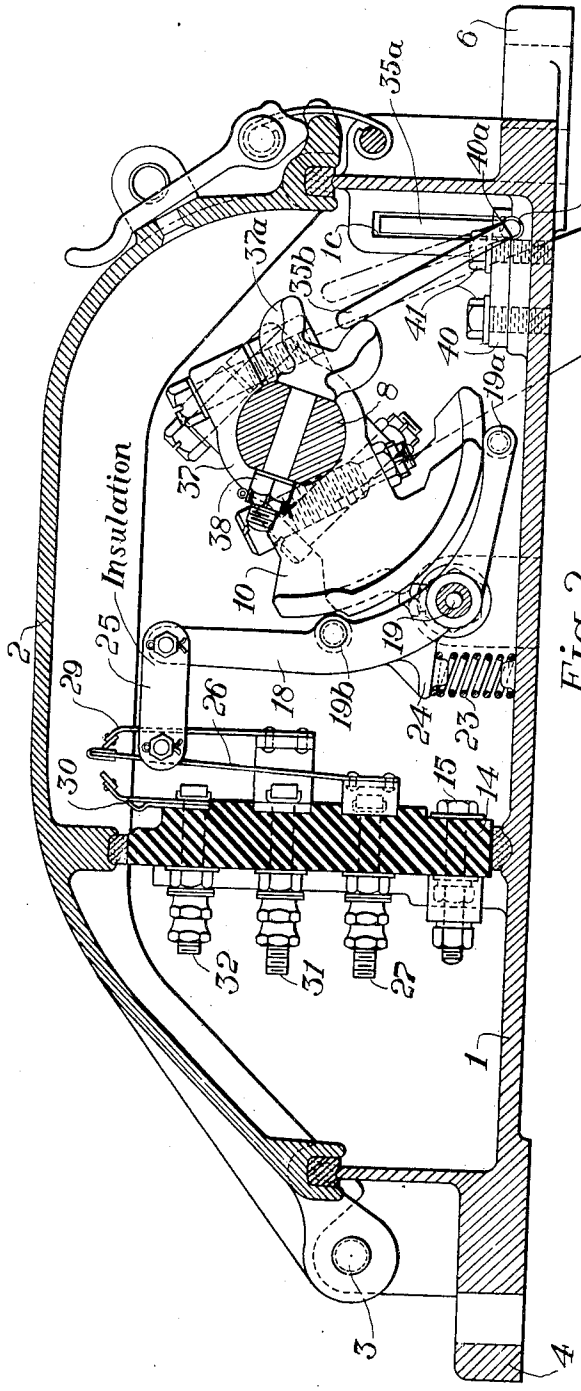


Fig. 2.

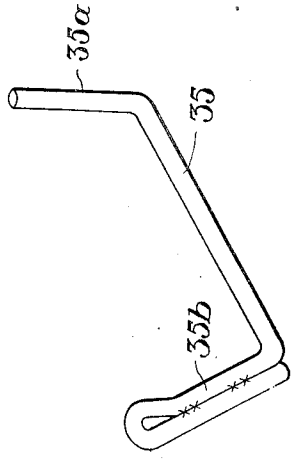


Fig. 3.

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2,190,520

UNITED STATES PATENT OFFICE

2,190,520

CIRCUIT CONTROLLER

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Application December 30, 1937, Serial No. 182,490

4 Claims. (Cl. 200—17)

My invention relates to circuit controllers, and particularly to circuit controllers which are designed for operation by railway switches.

I shall describe one form of circuit controllers embodying my invention, and shall then point out the novel features thereof in claims.

In the accompanying drawings, Fig. 1 is a top plan view, showing one form of circuit controllers embodying my invention with the cover for the casing removed to illustrate the construction. Fig. 2 is a vertical sectional view of the circuit controller shown in Fig. 1. Fig. 3 is a detail view showing in isometric projection the spring 35 forming part of the circuit controller illustrated in Figs. 1 and 2.

Similar reference characters refer to similar parts in all three views.

Referring to the drawings, the reference character 1 designates a casing which houses the operating mechanism of the circuit controller. The casing 1 is provided with a cover 2 which is hinged to the casing at 3, and with apertured lugs 4, 5 and 6 by means of which the casing may be fastened to any suitable support or standard.

Journaled in bushed bearings 7, 7 located in the opposite side walls of the casing 1 is an operating shaft 8 which may be oscillated by means of a crank 9 attached to one of its ends. The crank 9 may be operated by any desired means, such for example, as by the movable rails of a railway switch.

The shaft 8 carries a plurality of cams, here shown as four in number, and designated by the reference characters 10, 11, 12 and 13, respectively. Each of these cams operates an associated set of contacts, which contacts are all mounted on an insulating panel 14 secured by means of bolts 15 to two ribs 16 and 17 provided in the sides of the casing 1. The contacts of each set are similar, and a description of one set will therefore suffice for all.

Referring particularly to the set of contacts operated by the cam 10, this set comprises a rocker arm 18 pivoted on a transverse shaft 19 mounted in bosses 20 provided in the opposite side walls of the casing 1. The rocker arm 18 carries two rollers 19a and 19b disposed on opposite sides of its pivotal axis, and is biased to a clockwise extreme position, as viewed in Fig. 2, by means of a compressed coil spring 23 which is interposed between the bottom of the casing and a laterally projecting lug 24 formed on the arm. At its upper end, the rocker arm is connected by means of a pair of insulating links 25 with a movable contact finger 26. This contact finger is secured to the panel 14 by means of a terminal post 27 mounted in the panel, and cooperates with two fixed contact fingers 29 and 30 to form contacts 26—29 and 26—30, respectively. The fingers 29 and 30 are secured to the panel 14 by means of terminal posts 31 and 32, respectively, mounted in the panel. The function of the spring 23 is to eliminate wear by preventing vibration of the rocker arm in response to vibration transmitted to the circuit controller due to passing trains.

The cams 10, 11, 12 and 13 may have any desired shape and may be secured to the shaft 8 in any desired angular positions to provide the desired contact combinations. As here shown, these cams are so shaped and are secured to the shaft in such positions that when the shaft occupies the extreme position shown the contacts 26—29 will all be closed, and that when the shaft occupies its opposite extreme position the contacts 26—30 will all be closed, but that when the shaft occupies any position intermediate its two extreme positions the contacts 26—30 controlled by the cams 10 and 11 will be closed and the contacts 26—29 controlled by the cams 12 and 13 will be closed.

The circuit controller also comprises means embodying my present invention for moving the shaft 8 away from either of its two extreme positions far enough to operate one set or the other of the contacts, as the case may be, in the event the circuit controller becomes disconnected from the associated switch for any reason when the circuit controller occupies either extreme position, due for example to the rod which connects the crank 9 with the switch becoming broken or unfastened. As here shown, these means comprise a spring 35 consisting of a spring steel rod provided at one end with a portion 35a which is bent at right angles to the main part of the rod, and at the other end with a loop 35b which is also bent at right angles to the main part of the rod, but which is offset angularly with respect to the portion 35a. The adjacent parts of the rod which comprise the loop are welded together to increase the stiffness of the loop for a purpose which will appear presently. The spring rests adjacent its ends in aligned grooves 1a and 1b formed in the bottom of the casing, and has the portion 35a disposed in a cored slot 1c formed in the side wall of the casing. The loop portion 35b of the spring extends between and cooperates with bifurcation 37a formed on an arm 37 which is

secured to the shaft 8. The arm may be secured to the shaft in any suitable manner, but, as here shown, it is formed with a shank portion which extends through a clearance hole in the shaft and is provided at its outer end with a threaded portion which receives a nut 38. Adjacent its looped end the spring is guided by a bearing cap 40 which is bolted to the bottom wall of the casing by means of stud bolts 41, and which cap is provided with a groove 40*a* which mates with the groove 1*b* in the casing 1. A boss 1*d* is formed on the side wall of the casing opposite the cored slot 1*c*, and this boss restricts the longitudinal movement of the spring and serves as a means for retaining the spring in the position in which the portion 35*a* is within the slot 1*c*.

The parts are so proportioned that when the shaft 8 is midway between its two extreme operating positions, the loop portion 35*b* of the spring 35 will be disposed midway between the two bifurcations 37*a*, but that when the shaft 8 is rotated to the extreme operating position in which it is shown in the drawings, the lower bifurcation will engage the loop and rotate it from its normal position in a clockwise direction, as viewed in Fig. 2, through a limited distance, and that when the shaft is rotated to its other extreme position, the upper bifurcation will engage the loop and rotate it from its normal position in a counterclockwise direction, as viewed in Fig. 2, through a limited distance. It will be apparent that since the portion 35*a* of the spring is held in the cored slot, the rotation of the loop will exert a torque on the straight portion of the rod which will store up energy in this portion of the rod, and the size and material of the rod are so chosen that this energy will be sufficient, in the event the circuit controller becomes disconnected from the switch when the operating shaft occupies either extreme operating position, to rotate the shaft away from such operating position far enough to operate the contacts of the circuit controller.

The parts are further so proportioned that if the shaft 8 is rotated in a counterclockwise direction as viewed in Fig. 2 beyond the extreme operating position shown, the spring 35 will deflect to a maximum position as shown in dot and dash lines, and will then snap clear of the arm 37 as the rotation of the shaft continues, and that a similar action will take place if the shaft is rotated beyond its opposite extreme operating position. The reason for this latter construction is that the circuit controller is frequently handled with the crank in place by workmen who are unfamiliar with its construction, and who, in order to set the circuit controller down on its base, will rotate the crank beyond one or the other of its normal operating extreme positions to other extreme positions in which if the spring were not allowed to snap clear of the arm 37, it would become stressed beyond its elastic limits, thus impairing its efficiency. After the spring has snapped clear of the arm, it may be restored to its normal position with respect to the arm by rotating the shaft in the opposite direction from that which caused the spring to snap clear of the arm to a position a little beyond the mid position of the shaft, whereupon the spring will automatically snap into place between the bifurcations of the arm.

One advantage of a spring arrangement embodying my invention is that it utilizes the spring effect of a straight rod in torsion, which type of spring arrangement is better adapted to the available space than other types of spring arrangements would be, and which arrangement permits operation of the spring at a minimum fiber stress.

Another advantage of a spring arrangement embodying my invention is that it is economical to manufacture and install.

A further advantage of a spring arrangement embodying my invention is that, as was pointed out hereinbefore, the spring will not become damaged due to improper handling of the circuit controller.

Although I have herein shown and described only one form of circuit controllers 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. A circuit controller comprising a contact controlling shaft rotatable between two contact operating positions, a bifurcated arm secured to said shaft, a spring comprising a rod extending parallel to said shaft and having one end fixed and the other end provided with a loop which extends between said bifurcations, the parts being so proportioned that when said shaft is midway between its two extreme positions said loop will be located midway between said bifurcations but that rotation of said shaft to either extreme position will cause one bifurcation or the other of said arm to engage said loop and twist said rod.

2. A circuit controller comprising a casing, a shaft journaled in said casing for rotation between two operating positions, contact mechanism operated by said shaft, a bifurcated arm secured to said shaft, a recess formed in one side wall of said casing, a spring comprising a spring steel rod extending transversely of said casing and provided at one end with a portion bent at right angles to the main portion of the rod and fitting in said recess and provided at the other end with a portion bent into a loop which extends at right angles to the main portion of the rod and extends between and cooperates with the bifurcations of said arm, and means for guiding said rod adjacent its looped end, the parts being so proportioned that when said shaft is midway between its two extreme positions said loop will be located midway between the bifurcations of said arm but that rotation of said shaft to either extreme position will cause one bifurcation or the other of said arm to engage said loop and twist said rod.

3. A circuit controller comprising a contact controlling shaft rotatable between two contact operating positions, a bifurcated arm secured to said shaft, a spring comprising a rod extending parallel to said shaft and having one end fixed and the other end provided with a loop which extends between said bifurcations, the parts being so proportioned that when said shaft is midway between its two operating positions said loop will be located midway between the bifurcations of said arm but that rotation of said shaft to either operating position will cause one bifurcation or the other of said arm to engage said loop and twist said rod and that rotation of said shaft beyond either operating position will cause said one bifurcation or said other bifurcation to move completely past said loop.

4. A circuit controller comprising a casing, a

shaft journaled in said casing for rotation between two operating positions, contact mechanism operatively connected with said shaft, a bifurcated arm secured to said shaft, a recess formed in one side wall of said casing, a spring comprising a spring steel rod extending transversely of said casing and provided at one end with a portion bent at right angles to the main portion of the rod and fitting in said recess and provided at the other end with a portion bent into a loop which extends at right angles to the main portion of the rod and extends between and cooperates with the bifurcations of said arm, and means for guiding said rod adjacent its looped end, the parts being so proportioned that when said shaft is midway between its two operating positions said loop will be located midway between the bifuractions of said arm but that rotation of said shaft to either operating position will cause one bifurcation or the other of said arm to engage said loop and twist said rod and that rotation of said shaft beyond either operating position will cause said one bifurcation or said other bifurcation to move completely past said loop.

EDWIN G. LITTLE.