Oct. 10, 1933. J. B. STRAUSS 1,929,859

PHOTO-ELECTRIC CELL CONTROLS FOR HIGHWAY BARRIERS

Filed May 17, 1932 3 Sheets-Sheet 1

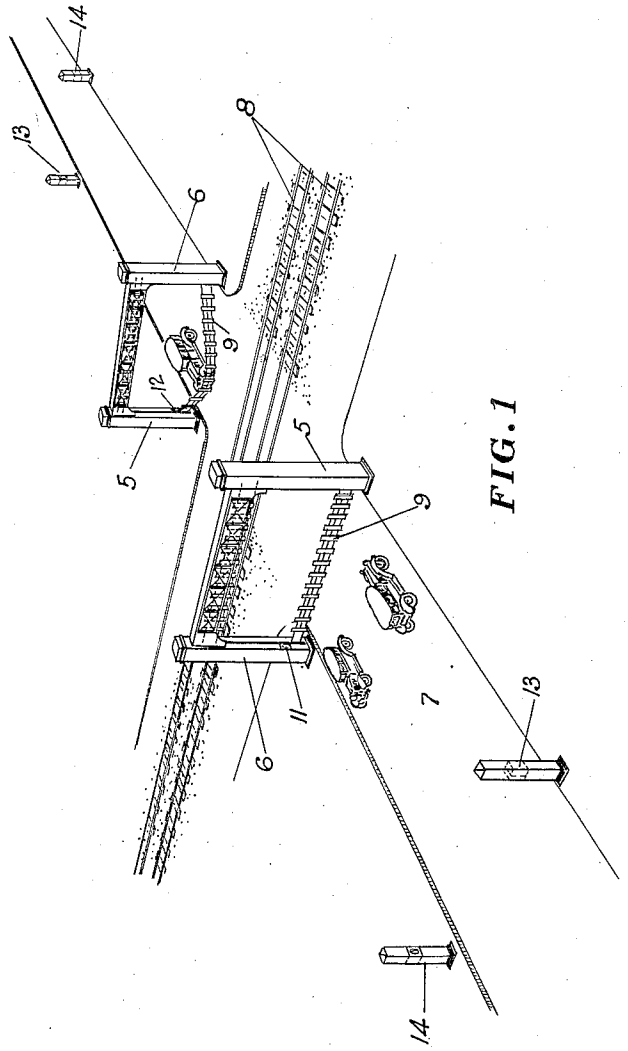


FIG. 1

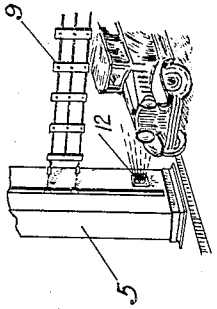


FIG. 2

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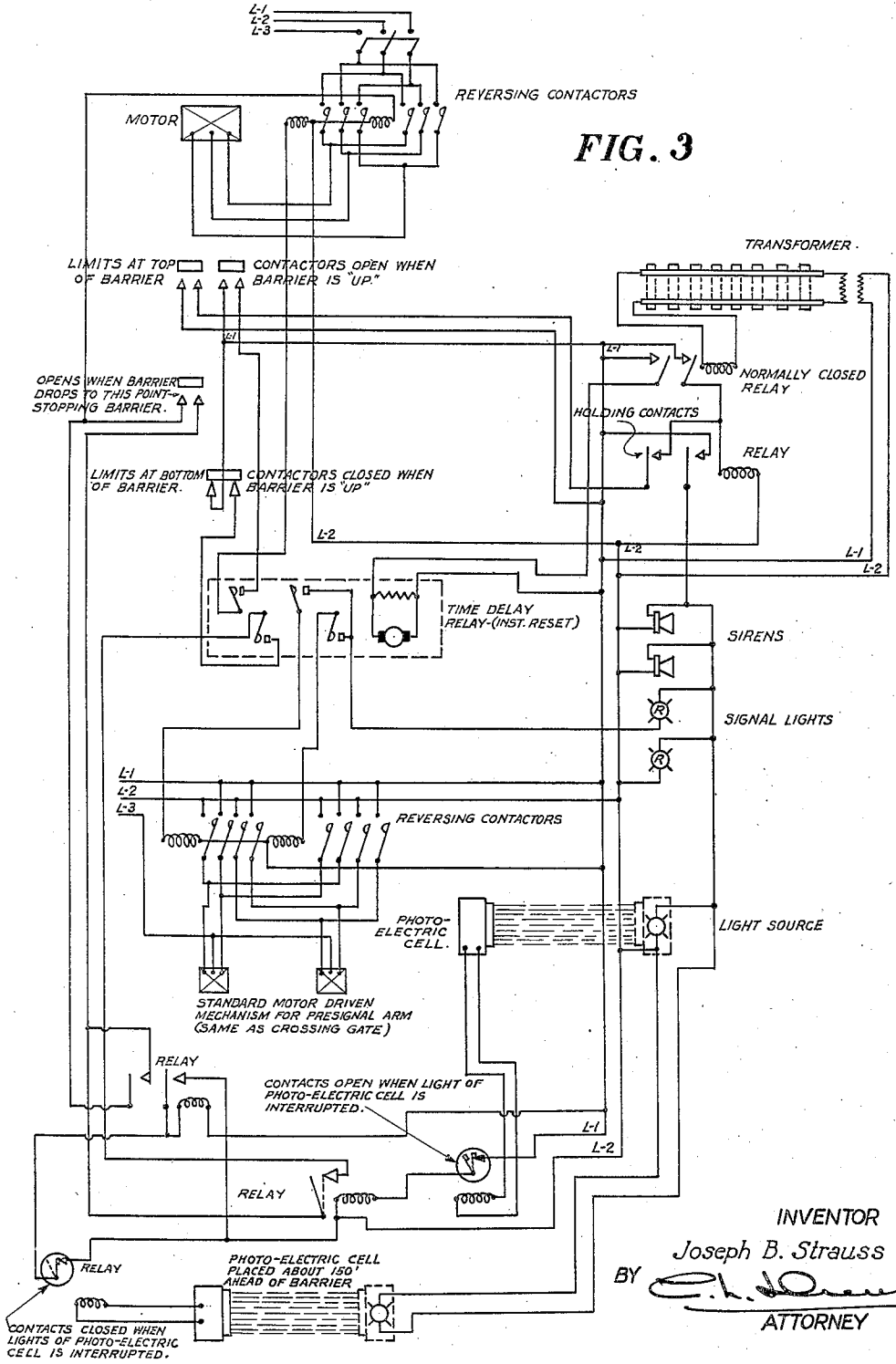


FIG. 3

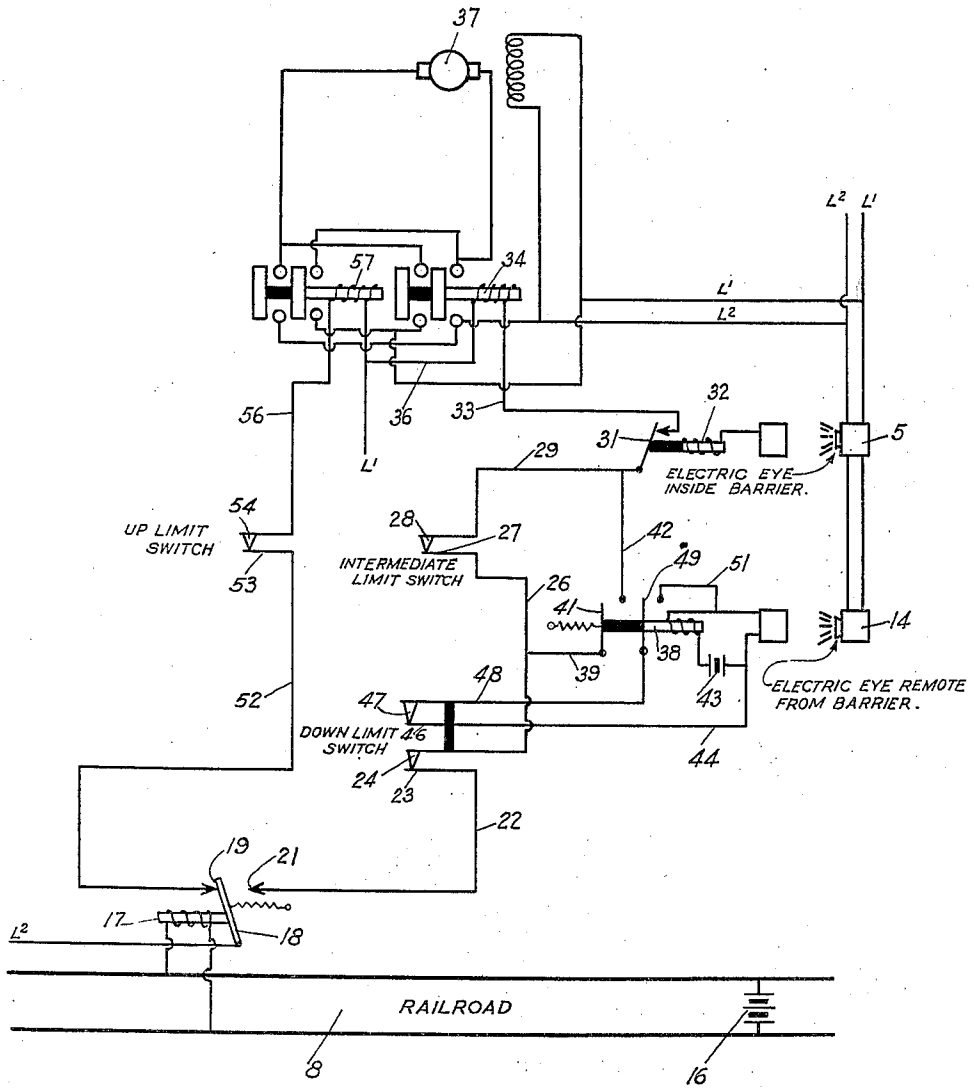
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FIG. 4



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PHOTO-ELECTRIC CELL CONTROLS FOR HIGHWAY BARRIERS

Joseph B. Strauss, San Francisco, Calif.

Application May 17, 1932. Serial No. 611,872

3 Claims. (Cl. 246—29)

Ths invention relates to improvements in photo-electric cell controls for highway barriers.

The principal object of this invention is to provide means whereby a mechanically actuated highway barrier may be either actuated or stopped through the employment of a photo-electric cell.

A further object is to provide means whereby a highway barrier which is actuated by a train entering a block adjacent the highway crossing will be actuated to an unlocked position and further dropped so as to act as a barrier should a vehicle approach the crossing.

A further object is to provide means whereby the barrier will be prevented from dropping on top of a vehicle directly there beneath.

A still further object is to provide means whereby the final dropping of the barrier is effected from a point remote from the barrier, thereby giving the barrier sufficient time for its final dropping so as to be in position when the vehicle actuating the same reaches the barrier.

A still further object is to provide a barrier control which is simple in construction and therefore reliable in actuation, as well as economical to install.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a perspective view showing my barrier as the same would be constructed adjacent a railroad crossing.

Figure 2 is a fragmentary detail view showing the manner in which one of the photo-electric cells is affected by a vehicle beneath the barrier.

Figure 3 is a diagrammatic view of one wiring arrangement whereby the barrier is raised, lowered and controlled as well as semaphores actuated, sirens blown and signal lights flashed, and

Figure 4 is a simplified wired diagram merely disclosing means for actuating the barrier upon the approach of a vehicle and railroad train.

Applicant is familiar with many forms of barriers, and is the inventor of several vertical lifting barriers of the yielding type employed herewith. Therefore, it is unnecessary to describe in detail any particular barrier construction other than to say that the barrier essentially consists of a pair of spaced posts located on each side of the highway and also upon each side of the track. Between each of these posts is stretched a flexible barrier, the ends being mounted in carriages so that the barrier may be raised or lowered. This barrier is secured by cables attached to suitable braking mechanism with a result that a vehicle may strike the barrier, which will retard and stop the vehicle without injury thereto or to the occupants thereof. It is to the regulation of the raising and lowering of a barrier of this kind automatically that this application refers, and has particular reference to means located at a remote point with relation to the barrier so that a train entering the block adjacent the crossing will first function to either unlock or drop the barrier a short distance, and will later drop the barrier providing a vehicle approaches the crossing during the time that the train is approaching or passing the crossing. I have further provided means whereby should a vehicle be beneath the barrier at the time that a train and a vehicle are both approaching the barrier, when the presence of the vehicle directly beneath the barrier will stop the downward movement thereof until the vehicle has cleared from beneath the barrier.

Referring now to the drawings particularly Figure 1, it will be noted that the posts 5 and 6 are located on each side of the highway 7, which highway crosses the railroad right-of-way 8. Similar posts are upon the opposite side of the railroad right-of-way, but as both barriers are identical, and both function in the same manner, but one will be described. A flexible barrier 9 is movably supported beneath the posts 5 and 6 so as to be raised to the dotted position, or lowered to the full line position. In the full line position upon the far side of the railroad right-of-way, I have shown the barrier as the same would function when struck by a vehicle. Located upon the posts 5 and 6 is a photo-electric system consisting of a light source 11 and a light receiving cell 12. Located a considerable distance in advance of the barrier are posts 13 and 14 which carry a light source and also a light receiving cell similar to those located upon the barrier posts. The electrical connections are best illustrated in Figs. 3 and 4, and as Fig. 4 shows a simplified wiring diagram, the same will be described in detail. The railroad trackage employs the usual closed circuit battery 16 and a relay 17. This relay is normally held so that the arm 18 engages the contact 19. As soon as a train comes into the block however, the battery 16 is short circuited, thus de-energizing the relay 17 and permitting the arm 18 to be pulled by the customary spring against the contact 21. This immediately completes a circuit from the line L—2 through the arm 18 to contact 21, wire 22, contact 23 of a down limit switch having a movable contact 24, thence through wire 26 to the contact 27 of an intermediate limit switch having a movable contact 28, thence by wire 29 through arm 31 of a relay 32, thence by wire 33 to relay switch 34, thence by wire 36 to wire L—1, which is the opposite side of the line. This completing of the circuit will cause the relay 34 to close the contacts which will deliver current from the wires L—1 and L—2 to the motor 37. The wiring of this motor connection is eliminated from the de-

scription as the same may be easily traced and is well known. The starting of the motor 37 will cause the barrier 9 to go down a short distance into unlocked position upon the posts 5 and 6 but not far enough to engage the top of the average vehicle. As soon as the barrier has moved down this pre-determined distance, it will engage the intermediate limit switch so as to open the contacts 27 and 28 which will break the circuit to relay 34 and thus stop the motor 37. The train may now pass the highway without further affecting the barrier 9. Should a vehicle however approach the railroad crossing, the act of the vehicle passing between the posts 13 and 14 will cut off the illumination from the source of electric light positioned upon the post 14, and immediately the relay 38 will function to bridge around the intermediate switch by passing the current from the wire 26 through the wire 39, arm 41 to wire 42 to wire 29. The result will be that current will be re-established to the motor 37 and the barrier will drop to its full line position of Fig. 1, and will reach the down position before a vehicle could proceed from the location between the posts 13 and 14 to the location of the barrier. At the same time as the vehicle actuates the relay 38, a holding circuit is also established so that the barrier will proceed to its lowermost position even after the vehicle passes the electric eye, which holding circuit includes a battery 43, one side of which is connected to the relay and the other side of which is connected to a wire 44, which in turn is connected to a contact 46, which engages a movable contact 47, of the down limit switch, which contact is in turn connected by a wire 48 to an arm 49, which engages a contact attached to a wire 51, which wire is in turn connected to the opposite side of the relay 38. Should a vehicle be directly beneath the barrier at the time that the barrier starts downwardly, a similar electric eye carried in the post 5 would be interrupted by the vehicle beneath the barrier, with a result that the relay 32 would be released, thus releasing the arm 31 and stopping the motor. As soon as the vehicle had cleared from beneath the barrier, the relay 38 would again function to re-establish the circuit and cause the barrier to complete its downward movement. As soon as the barrier reaches the limit of its downward movement, the down limit switch is actuated so as to operate the contacts 23—24 and the contacts 46—47, thus breaking the holding circuit and also the motor circuit. As soon as the train has passed out of the block, the battery 16 will again energize the relay 17, pulling the arm 18 into engagement with the contact 19. Current will then flow from the line L—2 through the arm 18 and contact 19 to wire 52 to contact 53 of an up limit switch having a movable contact 54, thence by wire 56 to a relay 57 of a motor switch, which is in turn connected to the wire L—1. As soon as this circuit is completed, the relay 57 will actuate contacts so as to reverse the direction of rotation of the motor 37 so as to raise the barrier from the full line position of Fig. 1, to the dotted line position thereof, and as soon as the barrier reaches the upper limit of its movement, the upper switch will be actuated so as to separate the contacts 53 and 54, thus de-energizing the relay 57 and stopping the motor 37. In the diagram shown in Fig. 3, the main line wires are also indicated by the same letters, namely L—1 and L—2, and the operation is identical with the exception that I have shown a system wherein audible signals, visible signals, as well as semaphore arms may be actuated in a certain sequence, and as all of the mechanism not previously described in Fig. 4 is well known, it is believed that further comment thereon is unnecessary.

It will thus be seen that I have produced a device wherein it is necessary for both a train and a vehicle to approach a highway crossing in order to operate the barrier to a protective position. This feature will save a great deal of wear and tear upon the mechanism, and further, I have provided means whereby when the barrier is actuated through the approach of both a train and a vehicle, the barrier has sufficient time to drop to protective position before the vehicle may reach the barrier, and I accomplish this entirely through the movement of the approaching highway vehicle. Further, I have provided means whereby should a vehicle be in the stretch of highway between the remotely positioned photoelectric cell and the barrier, and should a train enter the block and a vehicle pass the remotely positioned photo-electric cell, the first vehicle cannot be trapped beneath the barrier due to a second photo-electric cell positioned there-beneath.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:—

1. In combination with a highway barrier positioned at a railway and highway intersection, of means for moving the barrier into operative position by the combined movement of a vehicle and a train toward said intersection, said means including a track circuit adapted to move said barrier a predetermined distance when said track circuit is affected by a train approaching said intersection, and a photo-electric cell remotely positioned with respect to said intersection whereby a vehicle approaching said intersection actuates said cell to further move said barrier.

2. In combination with a highway barrier positioned at a railway and highway intersection, of means for moving the barrier into operative position by the combined movement of a vehicle and a train toward said intersection, said means including a track circuit adapted to move said barrier a pre-determined distance when said track circuit is affected by a train approaching said intersection, a photo-electric cell remotely positioned with respect to said intersection whereby a vehicle approaching said intersection actuates said cell to further move said barrier, said cell and said track circuit being independent upon joint actuation to cause said barrier to move into operative position.

3. In combination with a highway barrier positioned at a railway and highway intersection, of means for moving the barrier into operative position by the combined movement of a vehicle and a train toward said intersection, said means including a track circuit adapted to unlock said barrier when said track circuit is affected by a train approaching said intersection, a photo-electric cell remotely positioned with respect to said intersection whereby a vehicle approaching said intersection actuates said cell to further move said barrier, said cell and said track circuit being dependent upon joint actuation to cause said barrier to move into operative position.

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