A. H. CAVEN.

ELECTRIC SIGNAL DEVICE.

APPLICATION FILED MAY 7, 1914.

1,157,296.

Patented Oct. 19, 1915.

2 SHEETS—SHEET 1.

Fig. 4.

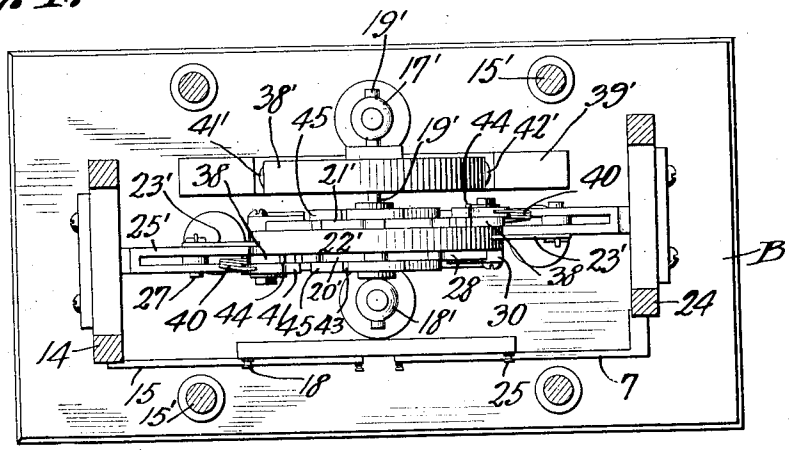
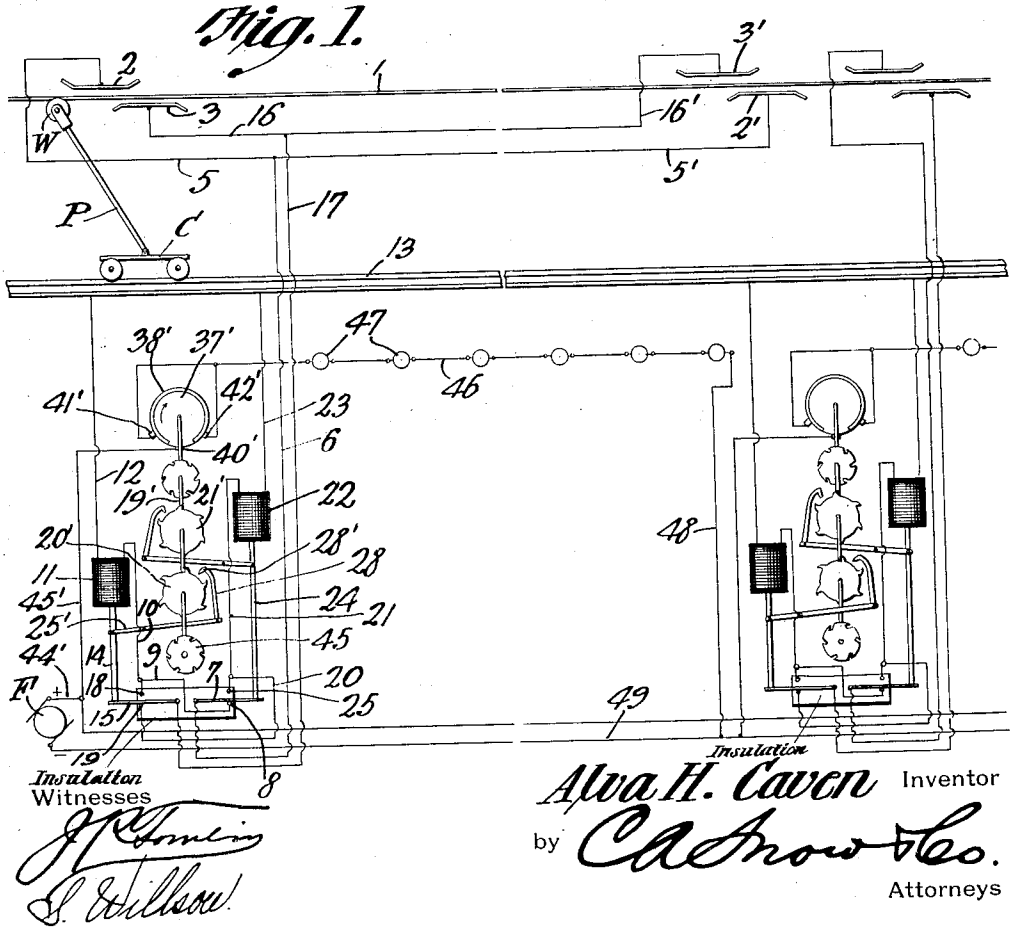


Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

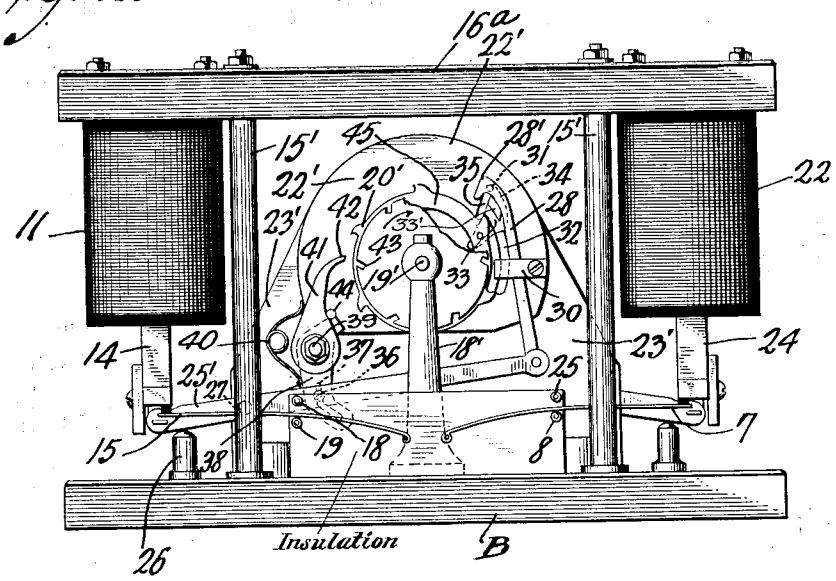


Fig. 3.

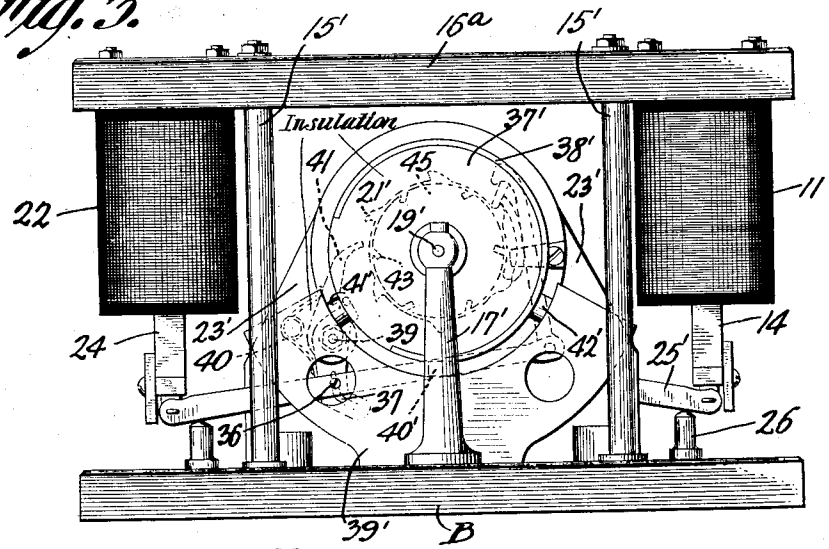
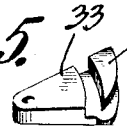


Fig. 5.



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ELECTRIC SIGNAL DEVICE.

1,157,296. Specification of Letters Patent. Patented Oct. 19, 1915.

Application filed May 7, 1914. Serial No. 837,043.

To all whom it may concern:

Be it known that I, ALVA H. CAVEN, a citizen of the United States, residing at Youngwood, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Electric Signal Device, of which the following is a specification.

The present invention relates to improvements in electric signal devices, the same having for its object a mechanism controlled by a passing car which indicates that the block is occupied, such signal being cut out as the car leaves the block, or as the car backs from such block into the one just left, the mechanism for controlling the signals being so disposed and constructed that any predetermined number of cars may enter the block, and whereby the last car leaving the block will cause the return to normal condition of the signal system.

A further object of the present invention is the provision of a simple mechanism controlled by two electromagnets, the energization of one of which actuates a circuit closing device, while the energization of the other will operate the same device in an opposite direction to open the circuit, the movable member of such circuit closing device being so constructed as to be maintained in circuit closing position as long as the car is within the block.

A further object of the invention, is the provision of means whereby the selected electromagnet due to the direction in which the car enters or leaves the block will be energized several times or continued by means of an arrangement of circuits and trolley contacts attached to the trolley wire, to thus insure the proper operation of the signal controlling device and at the same time permit the backing of the car out of the block to properly operate and insure the operation of the electromagnet and the return of the signal controlling device to its normal position.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is an electrical diagram illustrating the present invention, the signal circuit being closed due to the entrance of a car within the block. Fig. 2 is a side elevation of the circuit controlling mechanism stationed at the entrance end of the block. Fig. 3 is a view taken from the opposite side of the device as shown in Fig. 2. Fig. 4 is a top plan view of the switch mechanism and the pawls for operating the same, the cores of the two solenoids being shown in section and the top of the support of the device being removed. Fig. 5 is a perspective view of one of the pawls.

Referring to the drawings, and more particularly to Fig. 1 thereof, the numeral 1 designates the trolley wire, which has disposed adjacent to the entrance of the block, the two trolley wheel engaging contact plates 2 and 3, which are disposed in staggered relation with their inner ends overlapped, one upon each side of the trolley wire 1, while at the outlet or end of the block are similar trolley wheel contact plates 2′ and 3′, which are also similarly arranged whereby the trolley wheel W passing at such point will first engage one and before disengaging it will engage the other.

Assuming that the car C is about to enter the block, the trolley wheel W being carried by the pole P which is diagrammatically shown in Fig. 1, the wheel W will first engage the contact plate 2 and the following action will take place.

The wheel being disposed upon the trolley wire 1 and engaging the contact 2, will cause the current from the trolley wire to be shunted to the plate 2 and it will thus flow to the conductors 5 and 6, the switch 7, contact 8, conductors 9 and 10, the solenoid 11, the conductor 12 to the traffic rail 13. Thus the solenoid 11 will be energized and the rod 14 carried thereby will be elevated so that the switch 15 will be free to move from the contact 19 to engage the contact 18. Before the solenoid 11 has been deënergized, the wheel W will have engaged the contact plate 3, the contact plates 2 and 3 being disposed in overlapping relation one upon each side

of the trolley wire 1, so that the following circuit to continue the energization of the solenoid 11 will be closed. This circuit includes the contact 3, the conductors 16 and 17, the switch 15, the contact point 18, the conductor 10, the solenoid 11, the conductor 12 and the traffic rail 13. Thus the solenoid 11 will be energized for a sufficient period to insure the proper operation thereof to control the signaling circuit as will presently appear. As the car proceeds along within the block and is about to leave the same, the contact plate 3′ is first engaged by the trolley wheel W and the circuit energized thereby will be as follows:—The trolley 1, the wheel W, the contact plate 3′, the conductors 16′ and 17, the switch 15, the lower contact 19, the solenoid 11, having been deënergized so that the rod 14 has descended to move the plate 15 from the contact 18 to the contact 19, the conductors 20 and 21, the solenoid 22, the conductor 23, and the traffic rail 13. Thus the solenoid 22 is energized and operates the circuit signaling device as will presently appear for deënergizing the signal circuit to indicate that the car has left the block. As the contact plate 2′ is disposed in overlapping relation to the contact 3′, the wheel W will engage the same so as to insure the continuance of the energization of the solenoid 22, the elevation of the core of the solenoid 22 having elevated the rod 24 so as to permit the switch 7 to disengage the contact 8 and engage the contact 25. This circuit includes the trolley wire 1, the wheel W, the contact plate 2′, the conductors 5′ and 6, the switch 7, the contact 25, the conductor 21, the solenoid 22, the conductor 23 and the traffic rail 13. Thus the solenoid 22 is held energized until the trolley wheel has disengaged the contact plate 2′.

Now presupposing that the trolley wheel in passing the contacts 3′—2′, has entered a prohibited zone, and therefore must back into the block just left, the trolley wheel W will first engage the contact plate 2′ and as both solenoids 11 and 22 are deënergized, the switch members 15 and 7 will be in engagement with the lower contacts 19 and 8 respectively. The circuit thus energized will include the trolley 1, the wheel W, the contact plate 2′, the conductors 5′ and 6, the switch 7, the contact 8, the conductors 9 and 10, the solenoid 11, the conductor 12 and the traffic rail 13. Thus the solenoid 11 will be operated to actuate the signaling device and energize the signal to indicate that the block is again occupied, the rod 14 being elevated and the switch 15 moved from contact 19 to contact 18, and as the wheel continues to move, it engages the contact plate 3′ before disengaging the contact plate 2′, the following circuit being closed:—the trolley 1, the wheel W, the contact plate 3′, the conductors 16′ and 17, the switch 15, the contact 18, the conductor 10, the solenoid 11, the conductor 12 and the traffic rail 13, thus continuing the energization of the solenoid 11 and thus insuring the proper operation of the signal circuit throughout the block.

As clearly illustrated in Figs. 2, 3, 4 and 5, the signal switch controlling device the main construction of which is identical with that shown in my U. S. Letters Patent No. 1,111,215, granted September 22, 1914, and which is operated by the respective solenoids 11 and 22, each of which is a double solenoid with the cores 14 or 24 connected together at their free ends, comprises a base B of insulating material, preferably slate, having the supporting posts 15′, which support the upper plate 16ª. The upper plate 16ª constitutes a support for the two solenoids 11 and 22.

Mounted in the standards 17′ and 18′, is a shaft 19′ to which is keyed the two ratchet wheels 20′ and 21′, there being interposed between such ratchet wheels, a stationary shield or plate 22′ carried by the supporting plate 23′ attached to the base B. The ratchet wheels 20′ and 21′ are disposed to cause the shaft 19′, due to the energization of the respective solenoids 11 and 22, to have imparted thereto, a step-by-step movement in two directions, the disk 20′ being operated by the solenoid 11 as above set forth, while the disk 21 is operated by the solenoid 22 as above set forth.

Connected to the core 14 of the solenoid 11, is a lever 25′, which is limited in its downward movement by means of the pin or post 26, the core 24 being weighted so as to fall by gravity to assume the position, as shown in Fig. 2. The lever 25′ is pivoted at 27 and carries at its extreme free end, the pawl 28. The upper end of the pawl 28 is provided with a hooked terminal 28′ adapted when the solenoid 11 is energized to be pulled downwardly to engage one of the teeth of the ratchet wheel 20′ and consequently rotate the shaft 19′ in the direction of the arrow Fig. 2. The plate 30 is connected to the disk 22′ and forms a guide to maintain the pawl 28 in proper relation and against the plate 22′, so that the pin 31 carried by the pawl 28 and projecting from the inner face of the hooked end of the pawl 28, will properly ride within the slot 32 formed in said plate. This slot is so formed as to properly coact with the pivoted member 33 for guiding the pawl 28 into engagement with the ratchet 20′ as the solenoid 11 is energized, and to cause the hooked terminal 29 to recede and move away from the ratchet 20′ and thus be in non-interfering relation with the shaft 19′, should the solenoid 22 be energized during the falling of the core 24 of the solenoid 11, and consequently releas-

ing the pawl 28 from the ratchet wheel 20'. Disposed for movement within the slot as before stated, is a pivoted member 33 which is provided with a lug 33' which with the adjacent edges of the plate 22 forms passage ways for the pin 31 of the pawl 28, the pawl when lowered passing between the lug 33' and the inner wall of the slot, and when elevated causing the member to move so as to close the slot 35 and thus guide the pin 31 in the slot 34 to finally assume the position, as shown in Fig. 2.

As the operating mechanism for the ratchet wheel 21' is identical with that for the ratchet wheel 20', the various elements constituting the control of the solenoid 22 have not been designated.

Carried by each lever 25' is a pin 36, which is slidable within the slot 37 formed in the lever 38, said lever 38 being mounted for oscillation upon the supporting pin 39 and the spring 40 being so disposed and connected thereto and to the arm 41 as to form a flexible connecting means between the two. The arm 41 is a detent for preventing the too far movement of the shaft 19' and also constitutes a lock therefor. As the lever 25' starts in its elevation, the arm 41 is operated so that its free end 42 is moved toward the periphery of the ratchet wheel 20' and in engagement therewith between two of the recesses or slots 43, the continued movement of the lever 25' imparting movement to the ratchet wheel and finally presenting a recess or slot 43 to receive the free end 42.

The arm 41 normally, due to the spring 40, abuts against the pin 44 and as the lever 25' is elevated, due to the energization of its operating solenoid, the lever 38 will be moved and through the spring 40 moves the arm 41 so that its end 42 will engage the periphery of the disk 35 at a point intermediate of the slots, so that when the ratchet wheel carrying the disk is moved to full movement, the end 42 will drop within the recess 43 and thus lock the shaft 19' against retrograde movement.

When the instrument is at rest, the arm 41 is away from the wheel 20' as shown in Fig. 2, the elevation of the lever 25' causing the pawl 28 to engage the ratchet wheel 20 to impart a slight rotation thereto, the pin 36 operating the lever 38 so as to move the free end 42 of the arm 41 against the periphery of the disk 45 between two of the recesses 43, the continued movement of the lever 35 causing the wheel 20' to be moved farther until the end 42 snaps within the recess 43 to thus lock the disk 20' against too far movement either in a forward or in a retrograde direction.

When the armature falls, and consequently the lever 25' falls, the lever 38 through the pin 36 and the slot 37 has a slight upward movement imparted thereto so that the pin 44 will engage the under side of the arm 41 and thus elevate the point 42 thereof from the recess 43, thus permitting the shaft 19' to be positioned to be operated in either direction.

In order to provide a means for properly controlling the signal circuit, there is keyed upon the shaft 19', a disk 37' of insulation, the greater portion of the periphery of which is covered by the contact plate 38'. Disposed to a portion of the disk is a support 39' of insulation. Carried by the insulating support 39' is a central resiliently supported contact terminal 40' and two similar supported contact terminals 41' and 42', the metal plate 38' when bridging either of the terminals 40' or 41', or 40' and 42' causing an electrical circuit as will presently appear.

When the present switch controlling device is in normal condition, the insulated portion 43' is adjacent to the contact terminal 40', and therefore the circuit is opened and signals are at normal condition.

As viewed in Fig. 1, when the solenoid 11 is energized, the shaft 19' was moved in the direction of the arrow so as to place the contact 40' upon the strip 38' thus closing the following circuit: the generator F, which is indicative of any form of electrical energy, the conductor 44', the conductor 45', the contact terminal 40', the metal plate 38' of the switch disk 37', the contact terminal 42', the conductor 46, the signal light 47, which with the conductor 46 are disposed throughout the length of the block, and the conductors 48 and 49.

When the solenoid 22 was energized, the shaft 19' was operated in a reverse direction so as to place the contact 40' in the position as shown in Fig. 1, it deënergizing the signal circuit just described.

It will thus be seen that at the beginning and at the end of the signal block, will be disposed the respective plates 2 and 3, and 2' and 3', thus providing a means whereby the signal controlling devices will be operated as heretofore described both when the car is approaching or entering the block, when the car is leaving the block, and when the car has backed into the block, or out of such block into an adjacent block.

What is claimed is:

A circuit controlling device, including a base, a frame carried by the base, two solenoids carried by the frame and projecting toward said base, a step-by-step rotary switch controller operatively connected to the cores of the solenoids, whereby one core operates the switch in one direction while the other core operates it in the opposite direction, a block of insulation carried by the base between the solenoids, two pairs of

contacts carried by said block, and a pair of resilient switch members carried by the block and disposed between the contacts of the respective pairs, the switch members coöperating with the solenoid cores to be operated thereby for engaging the respective contacts.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ALVA HAYS CAVEN.

Witnesses:
C. E. SMITH,
G. P. FEHRMANN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."