March 8, 1938. P. H. CRAGO 2,110,591

TRACK RAIL CONTACTOR

Filed May 31, 1935

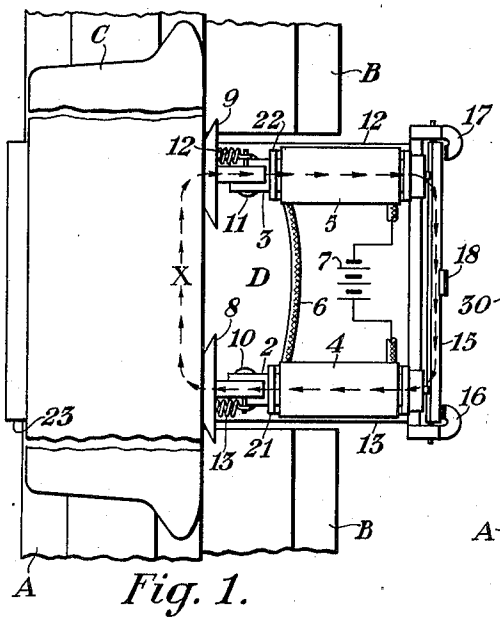


Fig. 1.

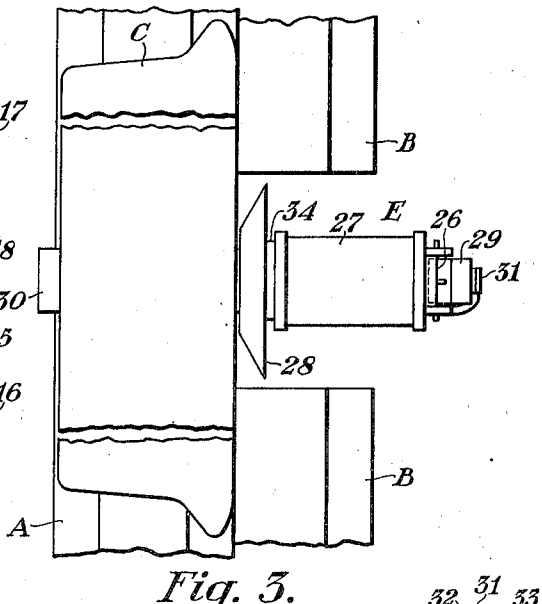


Fig. 3.

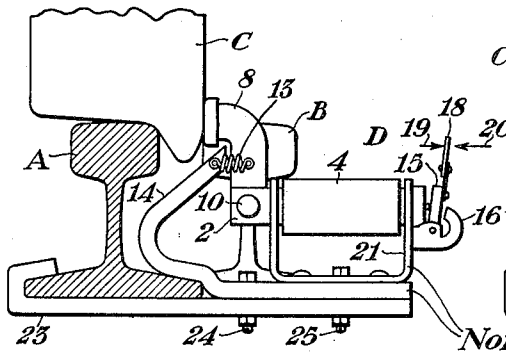


Fig. 2.

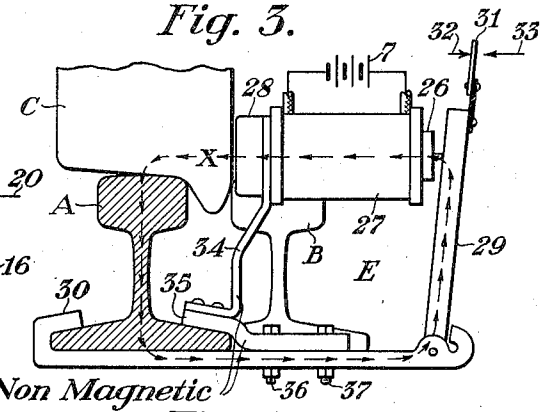


Fig. 4.

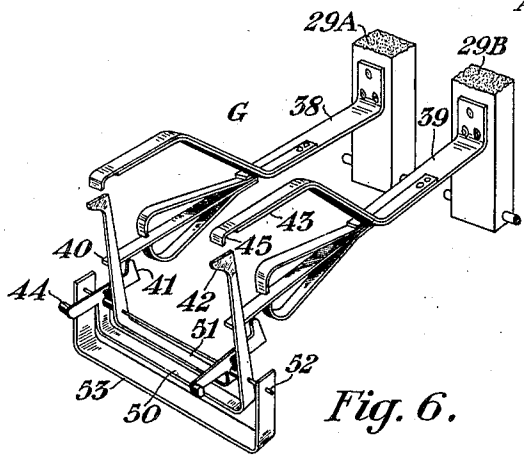


Fig. 6.

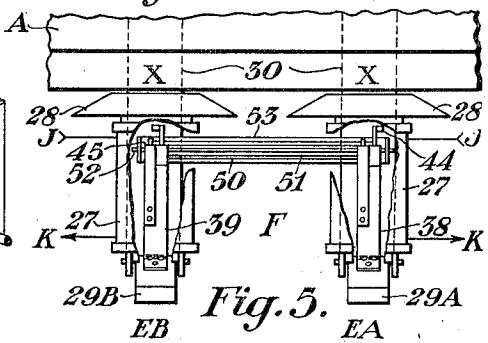


Fig. 5.

INVENTOR

Paul H. Crago.

BY A R Merrill

HIS ATTORNEY

Patented Mar. 8, 1938 2,110,591

UNITED STATES PATENT OFFICE

2,110,591

TRACK RAIL CONTACTOR

Paul H. Crago, Wilkinsburg, Pa., assignor to The Union Switch & Signal Company, Swissvale, Pa., a corporation of Pennsylvania

Application May 31, 1935, Serial No. 24,276

10 Claims. (Cl. 246—249)

My invention relates to track rail contactors of the magnetic type, and has for an object the provision of a novel and improved magnetic controlling device which may be mounted on a track rail for operation by the wheels of passing cars.

I will describe several forms of contactors embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawing, Figs. 1 and 2 are plan and front elevational views, respectively, of one form of contactor embodying my invention. Figs. 3 and 4 are plan and front elevational views, respectively, of another form of contactor embodying my invention. Fig. 5 is a reduced plan view, with parts broken away, showing still another form of contactor embodying my invention. Fig. 6 is an enlarged fragmentary isometric view illustrating a portion of the contactor shown in Fig. 5.

Similar reference characters refer to similar parts in each of the several views.

Referring first to Figs. 1 and 2, the reference character A designates one track rail of a railway track and the reference character B designates a guard rail located parallel to and a fixed distance from the track rail. The reference character C designates a car wheel movable over the track rail A. The reference character D designates in general a magnetic rail contactor which is mounted on the rail A and which is operated by a car wheel, such as C, moving over the rail A. As shown in the drawing, the space between the rail A and the rail B is such that the flange of the wheel C is held against the rail A. The wheel C, therefore, is prevented from moving horizontally and possibly damaging the contactor when passing over the rail A.

The magnetism generating unit of the contactor D comprises a pair of parallel cores 2 and 3 having their axes at right angles to the rail A. The cores 2 and 3 are provided with coils 4 and 5, respectively. The coils 4 and 5 are connected in series by a wire 6 and are constantly energized by a suitable source of current here shown as a battery 7. The cores 2 and 3 are provided, at their inner ends nearer to the rail A, with shoes 8 and 9, which shoes are pivotally connected to the cores by pins 10 and 11, respectively. The shoes 8 and 9 are biased towards the rail A by springs 13 and 12, respectively, so that the shoes will be in physical contact with a passing car wheel and thus provide a magnetic path of minimum reluctance when a wheel is present. The shoes 8 and 9 are prevented from moving into the path of the flange of the wheel by stops such as 14 (shown in Fig. 2 only). The stops 14 are made of non-magnetic material and as will be explained more in detail hereinafter are also utilized as clamps for fastening the magnetism generating units to the base of the rail A. At the outer ends farthest from the rail A of the cores 2 and 3 and extending from core 2 to core 3 is a pivotally mounted armature 15. The armature 15 is biased by gravity to fall away from the cores 2 and 3 when the reluctance of the magnetic circuit is reduced below a predetermined value. Excessive movement of the armature 15 away from the cores is prevented by stops or abutments 16 and 17. The armature 15 may be provided with suitable contacts here shown as a single movable contact 18 which engages with a fixed contact 19 or 20 (shown diagrammatically), depending upon whether armature 15 is attracted or retracted. The cores 2 and 3 are supported on non-magnetic yokes 21 and 22. The yokes 21 and 22 are riveted or otherwise suitably fastened to the non-magnetic stops or rail clamps 14 (shown in Fig. 2 only). A base plate 23 is provided which engages with the base of the rail and upon which the rail clamps 14 and the yokes 21 and 22 may be bolted or otherwise suitably fastened. As shown in the drawing, when the bolts 24 and 25 are drawn up, the assembled rail contactor D is fastened tightly to the rail A.

When the coils 4 and 5 are energized, a magnetic flux is generated in the cores 2 and 3 which flux follows the path indicated by the arrows. This path comprises a magnetic circuit which includes core 2, shoe 8, air gap X, shoe 9, core 3, and armature 15, in series. The parts are so proportioned that the magnetic flux is of sufficient magnitude to attract the armature 15 when and only when the air gap X is bridged by a car wheel. The armature 15, therefore, will become attracted when a car wheel is bridging the shoes 8 and 9 and will become retracted when the car wheel is absent. The cores 2 and 3 are supported by members of non-magnetic material in order to insure that all of the magnetic flux generated will follow the path indicated by the arrows. It will be noted that the contactor D as illustrated in Figs. 1 and 2 has a magnetic circuit which does not necessarily include the rail A.

Referring now to Figs. 3 and 4, the reference character E designates in general another form of magnetic contactor embodying my invention. The magnetism generating unit comprises a horizontal core 26 with its axis perpendicular to the rail A. The core 26 is provided with a coil 27 which is constantly energized by the battery 7. The core 26 is provided with a shoe 28 magnetical-

ly connected to the inner end of the core nearer to the rail A. The outer end of the core 26 farthest from rail A is provided with an armature 29 pivotally connected to a magnetizable base plate 30. The armature 29 may be provided with suitable contacts, here shown as a movable contact 31 which may engage with a fixed contact 32 or a fixed contact 33 according as the armature is in its attracted or its retracted position. The core 26 is supported by a suitable non-magnetic bracket 34 which may be riveted or otherwise suitably fastened to a non-magnetic rail clamp 35. The rail clamp 35 and the magnetizable base plate 30 when fitted to the base of the rail A and drawn together by the bolts 36 and 37, hold the contactor E firmly to the rail A.

When the coil 27 is energized, the magnetic flux generated in the core 26 follows the path indicated by the arrows. This path includes core 26, shoe 28, air gap X, rail A, base plate 30, and armature 29 in series. The parts are so proportioned that the magnetic flux will be of sufficient magnitude to attract the armature 29 when and only when a car wheel C is bridging the air gap X. Therefore, the armature 29, being biased to fall away from the core 26 when released, will become attracted or retracted depending upon the presence or absence of a car wheel adjacent the contactor E. The guard rail B is provided to insure that the flange of the wheel C may not strike the shoe 28.

Referring now to Figs. 5 and 6, the reference character F designates in general another form of rail contactor embodying my invention. The contactor F comprises two devices EA and EB, each, as here shown, being similar to the contactor E of Figs. 3 and 4, and each having a magnetic circuit including an air gap X similar to the magnetic circuit described for the contactor E. While the devices EA and EB are preferably similar to the contactor E, they may be similar to the contactor D if desired. The devices EA and EB are fixed at longitudinally spaced points along the rail A, the spacing to be such that a single car wheel may simultaneously bridge the air gaps X of both devices. The contactor F is provided with an interlocking device designated in general by the reference character G (Fig. 6). The interlocking device G in the form here shown includes arms 38 and 39 which are fastened to the parallel armatures 29A and 29B of the devices EA and EB, respectively. The arms 38 and 39 actuate movable members 50 and 51, respectively, which members are pivotally mounted on a shaft 52 supported by a fixed bracket 53. The bracket 53 may be fastened to base plates 30. The interlocking device G operates in such manner that if one armature is attracted, the other armature cannot be attracted. Thus, the contactor F will assume one condition if a car is moving in one direction and will assume another condition if the car is moving in the opposite direction. The contactor F, therefore, is what I will term a directional contactor as distinguished from the contactors D and E which operate the same for a car moving in either direction and are what I will term non-directional contactors.

With all the parts in their normal condition as shown in the drawing, that is, with both coils 27 constantly energized by a suitable source of current, the terminals of which are designated by the reference characters J and K, and with no car wheel present, the operation of contactor F will be as follows.

Assuming that a car wheel on the track A is bridging the air gap X for the device EA so that armature 29A is attracted, this will cause a downward movement of the arm 38. When the arm 38 moves downward, finger 40 of arm 38 engages with pawl 41 of movable member 50 forcing pawl 42 of movable member 50 into the path of finger 43 of arm 39. Thus, when the car wheel bridges the air gap X for the device EB so that the armature 29B is attracted, finger 43 of arm 39 rests on pawl 42 so that arm 39 is prevented from making its full downward movement. When the car wheel leaves the device EA, the armature 29A will assume its retracted position so that finger 40 will move upward. When finger 40 moves upward, the counterweight 44 will tend to cause movable member 50 to assume its initial position as shown in the drawing. It will be noted, however, that the hook projection 45 of arm 39 engages pawl 42 so that movable member 50 cannot return to its initial position as long as armature 29B is attracted and, therefore, arm 39 cannot complete its downward movement even though arm 38 has returned to its retracted position. When the car wheel departs from the device EB, armature 29B will assume its retracted position so that hook projection 45 of arm 39 will release pawl 42 of member 50. When pawl 42 is released, member 50 will assume its initial position and all parts of the contactor F will be in their normal condition ready for the next car wheel. I have described the operation of contactor F for a car moving in one direction only because it will be readily apparent how contactor F operates for a car moving in the opposite direction.

Since the contactor F assumes one condition when a car wheel passes in one direction and another condition when a car wheel passes in the opposite direction, it will be readily apparent how contactor F may be utilized as a directional contactor for governing railway traffic controlling devices or other apparatus. Likewise, the non-directional instruments D and E may be employed in any desired manner for the control of various railway devices.

Although I have herein shown and described only a few forms of contactors 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 track rail contactor comprising spaced magnetizable cores mounted in such relation to a track rail that between the inner ends of said cores there is provided an air gap capable of being bridged by a single car wheel passing along the rail, a constantly energized winding on at least one of said cores, and an armature cooperating with the outer ends of said cores and biased to a retracted position away from the cores, the parts being so proportioned and adjusted that said armature is attracted to said cores when and only when said air gap is bridged.

2. A track rail contactor comprising a magnetizable core mounted out of contact with but in such relation to a rail that between the inner end of said core and said rail there is provided an air gap capable of being bridged by a single car wheel passing along the rail, a constantly energized winding on said core, an armature cooperating with the outer end of said core and biased to a retracted position away from the core, and a magnetizable member connecting said armature with said rail, the parts being so pro-

portioned and adjusted that said armature is attracted to said core when and only when said air gap is bridged.

3. A track rail contactor comprising two spaced magnetizable cores mounted in such relation to a track rail that between the inner ends of said cores there is provided an air gap capable of being bridged by a single car wheel passing along the rail, a constantly energized winding on each of said cores, and an armature cooperating with the outer ends of both of said cores and biased to a retracted position away from the cores, the parts being so proportioned and adjusted that said armature is attracted to said cores when and only when said air gap is bridged.

4. A track rail contactor comprising two spaced magnetizable cores supported adjacent a track rail but magnetically insulated therefrom, said two cores being in such relation to the rail that their inner ends cooperate simultaneously with a car wheel passing along the rail, a constantly energized winding on each of said cores, and an armature cooperating with the outer ends of both of said cores and biased to a retracted position away from the cores, the parts being so proportioned and adjusted that said armature is attracted to said cores when and only when a car wheel bridges the air gap between the inner ends of said two cores.

5. A track rail contactor comprising a magnetizable core supported out of contact with but adjacent to a track rail by a non-magnetizable member in such manner that the inner end of said core confronts a car wheel passing along the rail, a constantly energized winding on said core, an armature cooperating with the outer end of said core and biased to a retracted position away from the core, and a magnetizable member supporting said non-magnetizable member and connecting said armature with said rail, the parts being so proportioned and adjusted that said armature is attracted to said core when and only when a car wheel bridges the gap between the inner end of said core and the track rail.

6. A track rail contactor comprising a magnetizable core, a constantly energized winding on said core, a movable armature cooperating with the outer end of said core and biased to a retracted position away from the core, a magnetizable member supporting said armature, and a non-magnetizable member for clamping said magnetizable member to a track rail and for supporting said core out of contact with the rail but in such relation to the rail that its inner end confronts a car wheel passing along the rail, the parts being so proportioned and adjusted that said armature is attracted to said core when and only when a car wheel bridges the gap between the inner end of said core and the track rail.

7. A directional track rail contactor comprising; two magnetic circuits each including an air gap and an armature which is moved from a retracted to an attracted position when and only when the associated air gap is bridged by a car wheel, said magnetic circuits being disposed adjacent a track rail and being so spaced that a car wheel passing said contactor on said track rail will successively bridge said circuits in such manner that both circuits will at one time be simultaneously bridged; means for supplying flux to each of said circuits; and means interconnecting said armatures in such manner that either armature is prevented from moving to its attracted position when the other armature occupies its attracted position.

8. A directional track rail contactor comprising; two magnetic circuits each including an air gap and an armature which is moved from a retracted to an attracted position when and only when the associated air gap is bridged by a car wheel, said magnetic circuits being disposed adjacent a track rail and being so spaced that a car wheel passing said contactor on said track rail will successively bridge said circuits in such manner that both circuits will at one time be simultaneously bridged; means for supplying flux to each of said circuits; and an interlocking device controlled by either of said armatures effective to prevent one armature from moving to its attracted position when the other armature occupies its attracted position.

9. A track rail contactor comprising two magnetizable cores, a constantly energized winding on each of said cores, a movable armature cooperating with the outer ends of both of said cores and biased to a retracted position away from the cores, a base plate supporting said armature, and two non-magnetizable members one for each core for clamping said plate to a track rail and for supporting the associated core in such relation to the rail that between the inner ends of said two cores there is provided an air gap capable of being bridged by a single car wheel passing along the rail, the parts being so proportioned and adjusted that said armature is attracted to the cores when and only when said air gap is bridged.

10. A track rail contactor comprising; a magnetic circuit including a magnetizable core having an enlarged pole face at one end, a movable armature at the other end of said core, and an air gap between one side of a track rail and said enlarged pole face, said magnetic circuit capable of being completed to attract said armature by the presence of a car wheel in said air gap and the air gap capable of receiving a relatively large portion of such wheel, thereby insuring completion of the magnetic circuit even though the wheel is moving at high speed; and means for supplying flux to said magnetic circuit.

PAUL H. CRAGO.