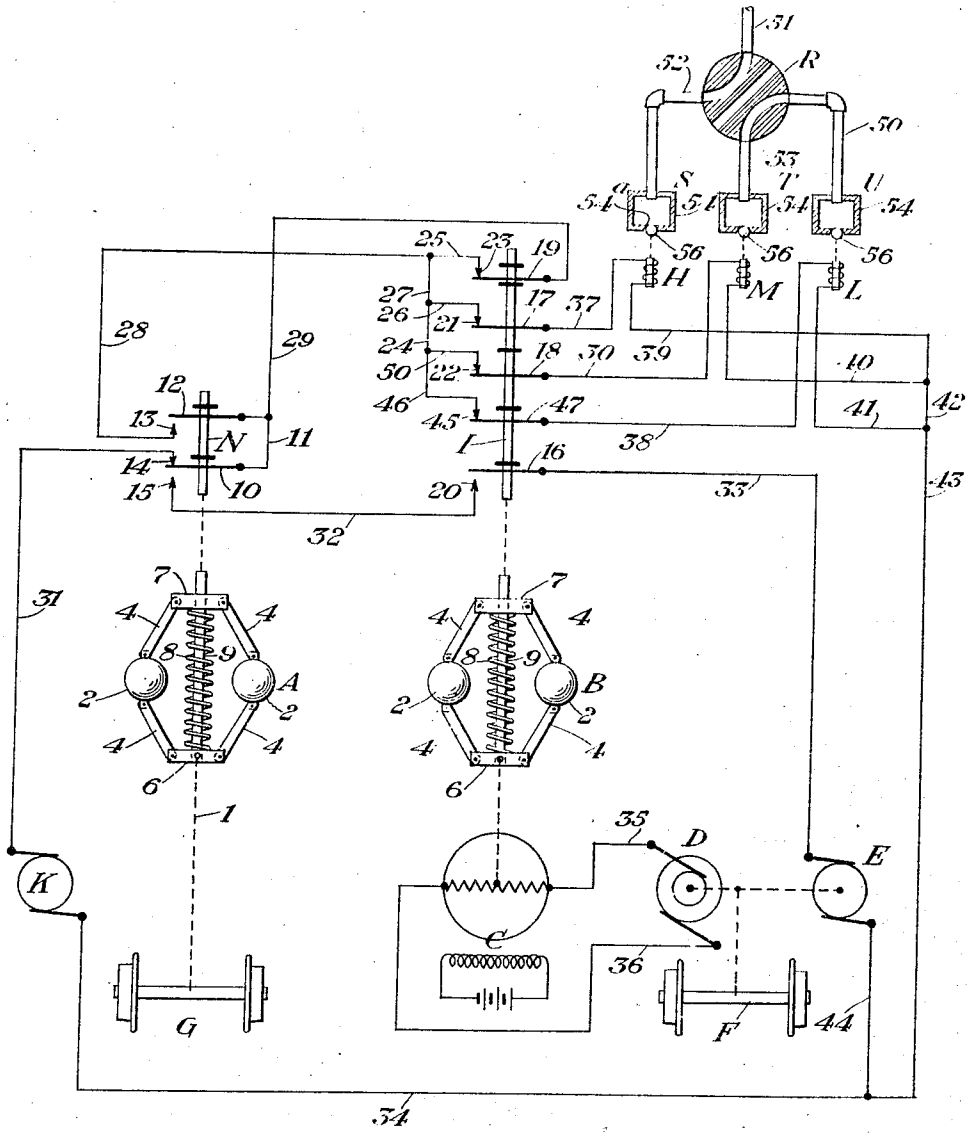
Nov. 4, 1924. 1,514,247

C. R. BEALL

RAILWAY TRAFFIC CONTROLLING APPARATUS

Filed Jan. 9, 1923



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Patented Nov. 4, 1924. 1,514,247

UNITED STATES PATENT OFFICE.

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RAILWAY-TRAFFIC-CONTROLLING APPARATUS.

Application filed January 9, 1923. Serial No. 611,590.

To all whom it may concern:

Be it known that I, CHARLES R. BEALL, a citizen of the United States, residing at Swissvale, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Railway-Traffic-Controlling Apparatus, of which the following is a specification.

My invention relates to railway traffic controlling apparatus, and particularly to apparatus of the type comprising governing means on a vehicle controlled in part by speed responsive means on the vehicle.

I will describe one form of railway traffic controlling apparatus embodying my invention, and will then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view showing one form of railway traffic controlling apparatus embodying my invention.

Referring to the drawing, the reference character A designates a centrifugal device mechanically driven from an axle G of the train. This device comprises two weights 2 which are caused to rotate about a shaft 9 by means of linkwork 4. The centrifugal force so generated causes the weigths to tend to move away from the shaft 9 and hence draw the collar 7 downwards against the pressure exerted by a spring 8. Thus for any given speed of the axle G there will be one, and only one, position of the collar 7. A movable contact finger 10, operated by this collar 7 is arranged to co-act with a fixed contact 14 or a second fixed contact 15. The adjustment of these parts is such that at any speed of the axle G below the speed corresponding to a suitable low speed of the train herein chosen as 12 miles per hour, the contact 10—14 is closed. When the train speed is 12 miles per hour or above, the contact 10—14 is open and contact 10—15 is closed. A second contact finger 12 operated by collar 7, and a fixed contact 13, are so arranged that the contact 12—13 is closed only for train speeds above 12 miles per hour. As shown in the drawing, this contact operation is accomplished by means of a rod N which is shifted longitudinally by collar 7, this rod having collars spaced theron which collars engage said movable contact fingers.

A double current generator having its alternating current end designated by the reference character D and its direct current end designated by the reference character E is operated by a second axle F on the train. A synchronous motor C is supplied with alternating current from the alternating current end D of the double current generator by means of wires 35 and 36. Driven by the synchronous motor is a second centrifugal device B similar in construction and operation to the first centrifugal device A. Since the frequency of the alternating current generated by the generator D is directly proportional to the speed of rotation of the axle F and hence the speed of the vehicle, and the speed of the synchronous motor is directly proportional to the frequency of its alternating current supply, it follows that for any given speed of the train there will be one and only one position of the collar 7 of the centrifugal device B. Five movable contact fingers 19, 17, 18, 47 and 16 co-act with fixed contact members 23, 21, 22, 45 and 20, and these contacts are operated by the centrifugal device B in such a way that contact 16—20 is closed only when the speed of the train is 8 miles per hour or above, contact 17—21 is open only when the speed of the train is 65 miles per hour or above, contact 18—22 is open only when the speed of the train is 35 miles per hour or above, and contacts 19—23 and 47—45 are open only when the train speed is 15 miles per hour or above. As shown in the drawing this contact operation is accomplished by means of a rod I which is shifted longitudinally by collars 7 and which rod is provided with collars spaced thereon and which collars engage the movable contact fingers.

I will term the device B the main centrifugal device, and the device A the auxiliary centrifugal device.

The reference character R designates a valve capable of assuming three positions. This valve is operated by any convenient means not shown in the drawing in such a manner that when traffic conditions in advance are safe the pipe 51, which controls the train brakes is connected with pipe 52 and disconnected from pipes 53 and 50; when traffice conditions in advance are such

as to require caution, the pipe 51 is connected to pipe 53 and disconnected from pipes 52 and 50; and when traffic conditions in advance are dangerous pipe 51 is connected to pipe 50 and disconnected from pipes 52 and 53. The pipe 51 which contains a fluid under pressure greater than atmosphere is thus selectively connected to one of the three pipes 50, 53 or 52. When the pipe 51 is opened to atmosphere the brakes are applied on the vehicle in the usual and well known manner. This pipe 52 is provided with a valve S comprising a chamber 54 having a seating member 56 which may be moved into and out of a position wherein it closes an aperture 54ª, thus closing or opening said valve to atmosphere. The seating member 56 is normally biased to its open position by means of the fluid pressure in the pipe 51. This member is controlled by a magnet winding H which serves when energized to close the valve S. Similar valves T and U having magnet windings M and L are provided for pipes 53 and 50, respectively. Thus it is clear that the brakes are applied when traffic conditions in advance permit full speed but magnet H is de-energized, or when traffic conditions in advance require caution but magnet M is de-energized, or when traffic conditions in advance are dangerous but magnet L is de-energized.

The reference character K designates a direct current turbo-generator which is used to supply energy to the apparatus when the vehicle is not moving. This turbo-generator K is provided with a circuit which passes from its upper terminal through wire 31, contact 10—14 of centrifugal device A, wires 11 and 29, contact 19—23 of centrifugal device B, wires 25, 27 and 26 contact 17—21 of centrifugal device B, wire 37, winding of magnet H, and wires 39, 42, 43 and 34 back to the lower terminal of generator K. This circuit is provided with a branch which passes from wire 27, through wires 24 and 50, contact 18—22 of centrifugal device B, wire 30, winding of magnet M, and wire 40 back to wire 42. A second branch passes from wire 27 through wires 24 and 46 contact 47—45 of centrifugal device B, wire 38, winding of magnet L and wire 41 back to wire 43. The circuit and the two branches thereto which I have just traced are closed only when the train speed is less than 12 miles per hour, because at all other times contact 10—14 is open.

The direct current end E of the double current generator is provided with a circuit which passes from its upper terminal through wire 33, contact 16—20 of centrifugal device B, wire 32, contact 10—15 of centrifugal device A, wire 11, contact 12—13 of centrifugal device A, wires 28, 27 and 26 contact 17—21 of centrifugal device B, wire 37, winding of magnet H, wires 39, 42, 43 and 44 back to the lower terminal of generator E. This circuit is closed only when the train speed is above 12 miles per hour and less than 65 miles per hour. This circuit is provided with a branch which passes from wire 27, through wires 24 and 50, contact 18—22 of centrifugal device B, wire 30, winding of magnet M, and wire 40 back to wire 42. The circuit is closed through this branch only when the train speed is greater than 12 miles per hour and less than 35 miles per hour. A second branch is provided for the circuit for generator E passing from wire 27 through wires 24 and 46, contact 47—45 of centrifugal device B, wire 38, winding of magnet L and wire 41 back to wire 43. The circuit is closed through this branch only when the train speed is greater than 12 miles per hour and less than 15 miles per hour. It is clear then that magnet L is energized for all train speeds below 15 miles per hour, magnet M is energized for all train speeds below 35 miles per hour and magnet H is energized for all train speeds below 65 miles per hour.

In operation the magnets are energized by the turbo-generator K at speeds below 12 miles per hour. At 8 miles per hour contact 16—20 on centrifuge device B closes to provide means whereby the magnets may receive current from generator E, but they do not receive this current until the speed reaches 12 miles per hour when contact 10—15 closes. At 15 miles per hour contact 23—19 opens thus supplying current from E to the magnets solely through contact 12—13. When the train slows down the same procedure takes place in the reverse order.

In normal operation, if traffic conditions in advance are safe the brakes will not be applied until the train speed exceeds 65 miles per hour; if traffic conditions in advance require caution, the brakes will be applied only when the train speed exceeds 35 miles per hour; but if the traffic conditions in advance are dangerous the brakes will be applied when the train speed exceeds 15 miles per hour.

One reason for operating the centrifugal device B through the medium of the synchronous motor C and the axle-driven generator D is that by so doing this device may be placed at any desired location on the train. Another reason is that the device may be made small and light and so particularly suitable for operation of the speed-controlling contacts 17—21, etc. It is obvious, however, that failure of the centrifugal device B is possible, and also that any element of the indirect connection between this device and the train axle F may fail. It is also obvious that in any one or more of these events, the speed-controlling con-

tacts will not be properly actuated in accordance with the actual speed of the train, and the speed controlling apparatus would then not function in the manner intended. To guard against this contingency, I have provided the auxiliary centrifugal device A which may be of rugged and reliable construction and is preferably connected as directly as possible to the axle G so that failure of this device to reflect actual train speed is highly improbable. Assume that the train is running at 12 miles or more per hour and that centrifugal device B is at rest for any reason whatever, contact 16—20 will be open so that the valve magnets H, M and L will receive no current from generator E, whereas contact 10—14 will be open so that the valve magnets will receive no current from generator K. Inasmuch as all the valve magnets are then open, it follows that the brakes will be applied and the train brought to a stop.

If the generator E should fail the valve magnets will of course receive no current from this generator, and if the train is running at 12 miles or more per hour, contact 10—14 will be open so that the valve magnets will likewise receive no current from generator K, with the result that the train will be brought to a stop.

In the extremely improbable event that centrifugal device A fails to operate its contacts in the manner intended then contact 10—15 will remain open so that generator E will furnish no current to the valve magnets, and when the train speed exceeds 15 miles per hour contact 19—23 will open so that the valve magnets will receive no current from generator K, with the result that the brakes will be applied and the train brought to a stop.

Although I have herein shown and described only one form and arrangement of railway traffic controlling apparatus 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. Railway traffic controlling apparatus comprising a vehicle, an alternating current generator driven by an axle of said vehicle, a synchronous motor supplied with current by said generator, a main centrifugal device operated by said motor, an auxiliary centrifugal device operatively connected with an axle of said vehicle, and governing means on the vehicle controlled jointly by said two centrifugal devices.

2. Railway traffic controlling apparatus comprising a vehicle, an alternating current generator driven by an axle of said vehicle, a synchronous motor supplied with current by said generator, a main centrifugal device operated by said motor, contacts controlled by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, and governing means on the vehicle controlled jointly by said contacts and by said auxiliary centrifugal device.

3. Railway traffic controlling apparatus comprising a vehicle, an alternating current generator driven by an axle of said vehicle, a synchronous motor supplied with current by said generator, a centrifugal device operated by said motor, a second generator driven by an axle of said vehicle, a third generator on said vehicle driven by means independent of the motion of the vehicle, and governing apparatus on the vehicle controlled by said centrifugal device and supplied with current from said second generator or said third generator according as the speed of the vehicle is above or below a given value.

4. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device, means interposed between said device and an axle of the vehicle for driving said device, speed governing mechanism controlled by said device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, means controlled by said two devices for nullifying the action of said speed governing mechanism when the speed of the vehicle is below a given value, and means also controlled by said devices for applying the vehicle brakes if said main centrifugal device fails while the speed of the vehicle is above a given value.

5. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing contacts operated by said centrifugal device, an auxiliary centrifugal device operative connected to an axle of said vehicle, speed governing mechanism on said vehicle; a circuit for said mechanism including a source of current, said speed governing contacts, a contact operated by said auxiliary centrifugal device and opened at speeds above a given low value, and a contact operated by said main centrifugal device and opened at speeds above a given higher value; a second circuit for said speed governing mechanism including a source of current, said speed governing contacts, a contact operated by said main centrifugal device and closed at speeds above a given lower value, and a contact operated by said auxiliary centrifugal device and closed at speeds above said first mentioned value.

6. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal de-

vice thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected to an axle of said vehicle, speed governing mechanism on said vehicle; a circuit controlled by said speed governing contacts for controlling said speed governing mechanism, means controlled by said main centrifugal device for opening said circuit at speeds below a given low value, and an auxiliary circuit also controlled by said speed governing contacts for supplying currents to said speed governing mechanism, and means controlled by said auxiliary centrifugal device for closing said auxiliary circuits at speeds below a given higher value.

7. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected to an axle of said vehicle, speed governing mechanism on said vehicle; and means controlled by said centrifugal devices for supplying current to said speed governing mechanism through said speed governing contacts from a first source when the speed of the vehicle is below a given value and from a second source when the speed of the vehicle is above said given value, and for discontinuing said supply of current if said main centrifugal device fails when the speed is above a given low value.

8. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, an auxiliary centrifugal device operatively connected to an axle of the vehicle, speed governing mechanism controlled by said main centrifugal device, and means including contacts controlled by said centrifugal devices for causing a brake application if said main centrifugal device fails at any speed above a given low value.

9. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, means for supplying current to said speed governing mechanism, and means controlled by said centrifugal devices for interrupting said supply of current when the speed of the vehicle is above a given value and said main centrifugal device is at rest.

10. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, means for supplying current to said speed governing mechanism, and means controlled by said centrifugal devices for interrupting said supply of current when the speed of the vehicle is above a given value and said auxiliary centrifugal device is at rest.

11. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, a source of energy responsive to the speed of said vehicle, a second source of energy unresponsive to the speed of said vehicle; and means controlled by said centrifugal devices for connecting said speed governing mechanism with said first source of energy when the speed of the vehicle is above a given value and for connecting said speed governing mechanism with said second source of energy when the speed of the vehicle is below such value.

12. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, a source of energy responsive to the speed of said vehicle, a second source of energy unresponsive to the speed of said vehicle; a circuit for said mechanism including said first source of energy, a contact operated by said auxiliary centrifugal device and opened at speeds above a given low value, and a contact operated by said main centrifugal device and opened at speeds above a given higher value; a second circuit for said speed governing mechanism including said second source of energy, a contact operated by said main centrifugal device and closed at speeds above a given lower value, and a contact

operated by said auxiliary centrifugal device and closed at speeds above said first-mentioned value.

13. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the vehicle for causing the device to rotate at speeds proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle, a source of energy responsive to the speed of said vehicle, a second source of energy unresponsive to the speed of said vehicle, means controlled by said centrifugal devices for at times connecting said speed governing mechanism with said second source of energy and means controlled by said centrifugal devices for disconnecting said second source and connecting said first source when the speed of the vehicle exceeds a given value.

14. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the said vehicle for causing the device to rotate at speed proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle; and a circuit for said mechanism including a contact operated by said auxiliary centrifugal device and closed at speeds above a given low value, and means for applying the brakes on the vehicle when the speed of the vehicle is above a given value and the main centrifugal device fails.

15. Railway traffic controlling apparatus comprising a vehicle, a main centrifugal device thereon, means interposed between said device and an axle of the said vehicle for causing the device to rotate at speed proportional to the speeds of the axle, speed governing mechanism on said vehicle including contacts operated by said centrifugal device, an auxiliary centrifugal device operatively connected with an axle of said vehicle; and a circuit for said mechanism including a contact operated by said main centrifugal device and closed at speeds above a given low value, and means for applying the brakes on the vehicle when the speed of the vehicle is above a given value and the auxiliary centrifugal device fails.

In testimony whereof I affix my signature.

CHARLES R. BEALL.