Oct. 2, 1928.

1,686,033

L. G. RILEY

CONTROL APPARATUS

Filed May 11, 1925

3 Sheets-Sheet 1

Fig. 2.

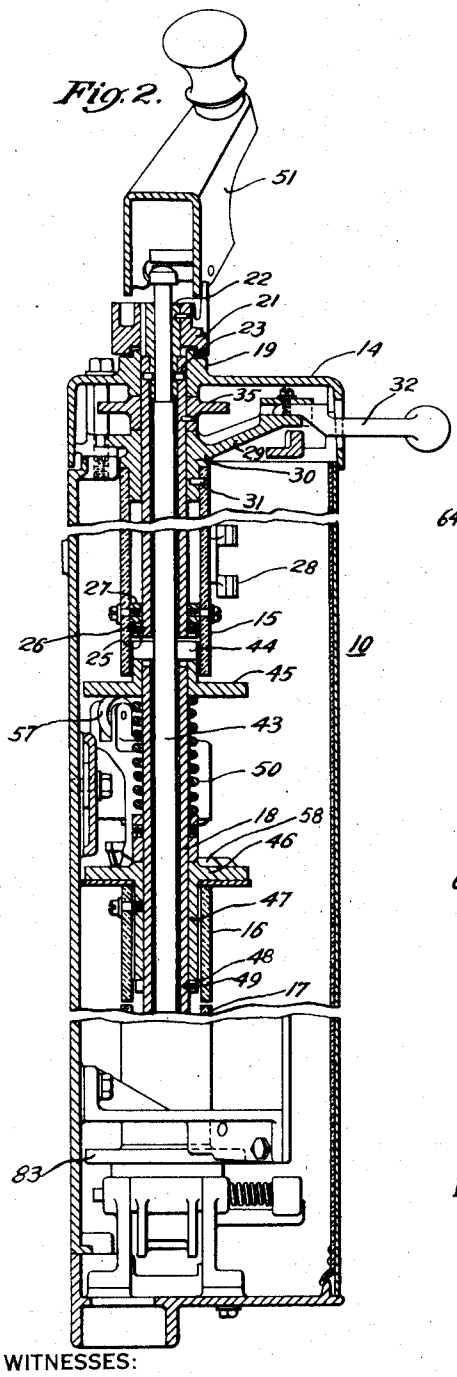
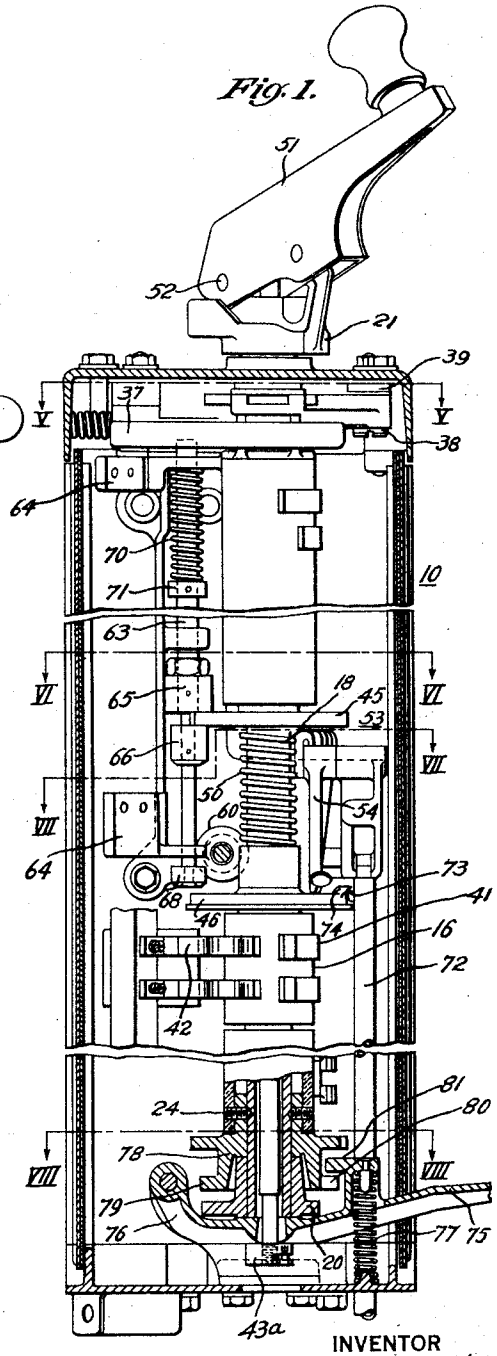


Fig. 1.



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3 Sheets-Sheet 2

Fig. 3.

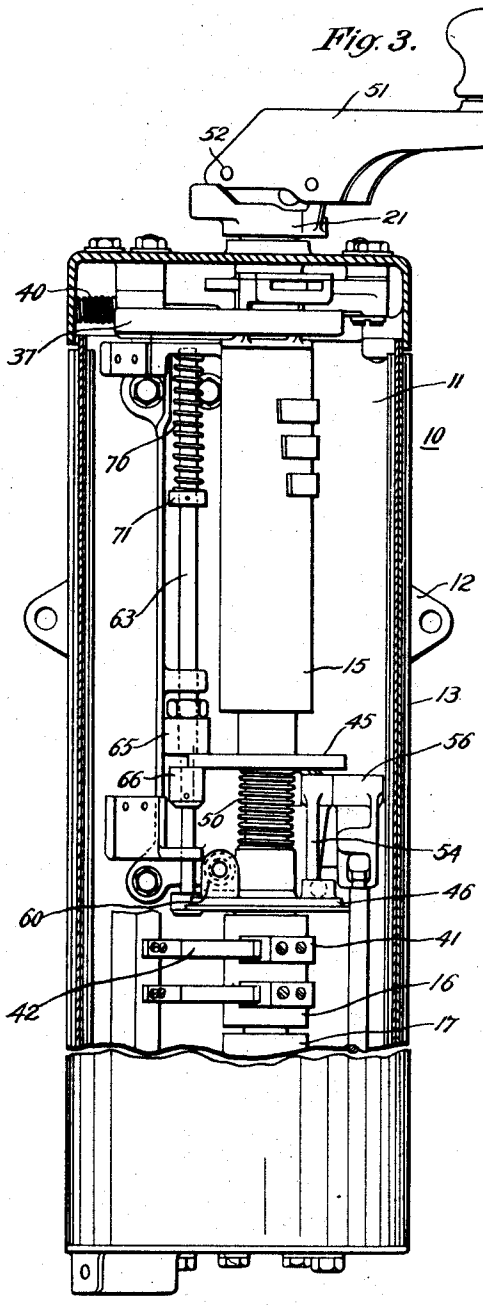
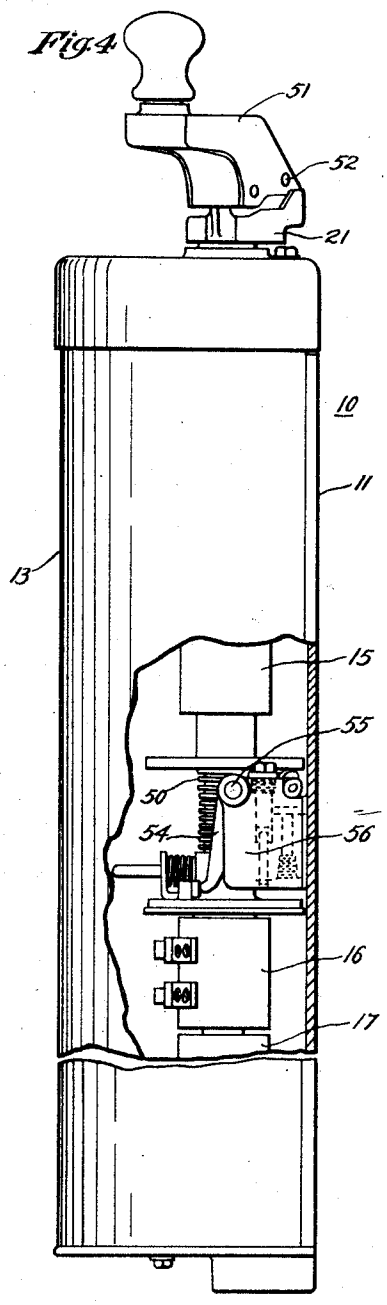


Fig. 4



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3 Sheets-Sheet 3

Fig. 5.

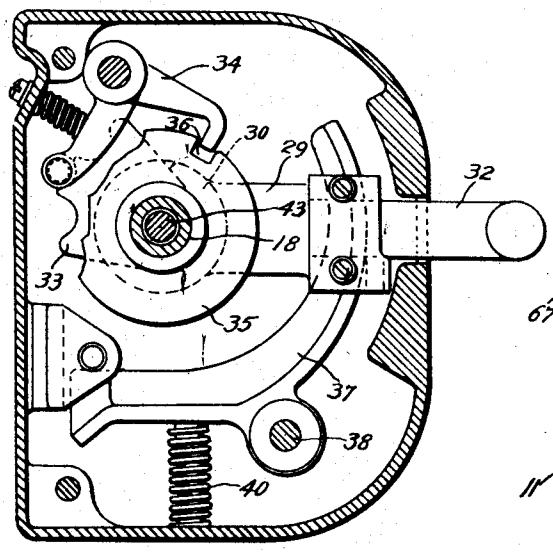


Fig. 6.

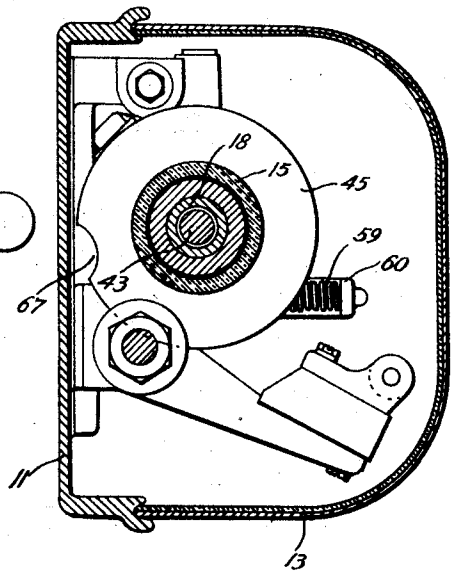


Fig. 7.

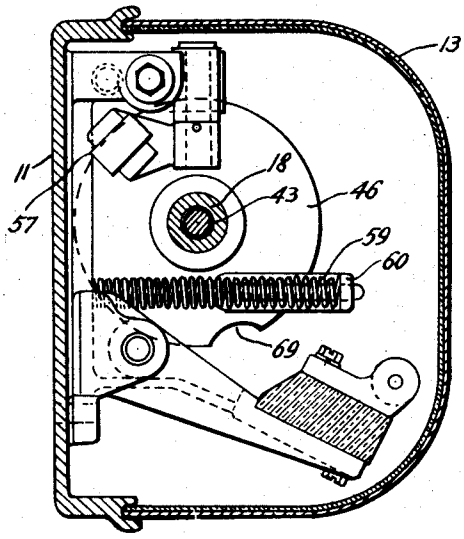
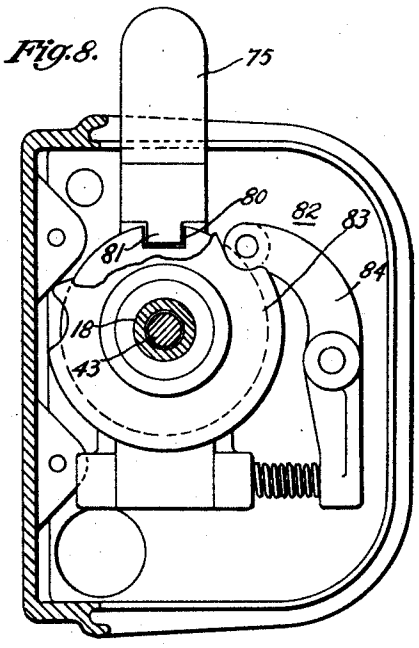


Fig. 8.



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Patented Oct. 2, 1928. 1,686,033

UNITED STATES PATENT OFFICE.

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CONTROL APPARATUS.

Application filed May 11, 1925. Serial No. 29,285.

This invention relates to improvements in control apparatus and more particularly to controllers adapted for controlling the supply circuits of motor vehicles.

The object of the invention, generally stated, is the provision of a controller that shall be simple and efficient in operation and economically manufactured.

A more specific object of my invention is to provide for the operation of a plurality of controller drums independently through the oscillation of an actuating handle.

Another object of my invention is to provide for the locking of one of the drums to prevent its operation unless the drums are operated in a predetermined sequence from an initial "off" position.

A further object of the invention is to provide for the ejection of the reversing lever from the controller, when it is moved to the neutral position.

It is also an object of the invention to provide for the retention of the actuating handle in a predetermined position through the operation of a foot treadle.

Other objects of the invention will, in part, be obvious and will, in part, appear hereinafter.

The invention accordingly is disclosed in the embodiment thereof, shown in the accompanying drawing and comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and scope of the application of which will be indicated in the claims.

For a full understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in conjunction with the accompanying drawing, in which

Figure 1 is a view, partially in elevation and partially in section, of a controller constructed in accordance with this invention.

Fig. 2 is a view, partially in section and partially in elevation, of the controller showing details of the construction,

Fig. 3 is a view in side elevation of the controller with a portion of the casing cut away to show the relative positions of the controller members after the handle has been actuated.

Fig. 4 is a view, in elevation, of the controller with a portion of the cover cut away to show the actuating members,

Fig. 5 is a horizontal sectional view of the controller taken along the line V—V of Fig. 1, showing the reversing mechanism,

Fig. 6 is a horizontal sectional view along lines VI—VI of Fig. 1,

Fig. 7 is a horizontal sectional view along lines VII—VII of Fig. 1, showing the details of construction,

Fig. 8 is a horizontal sectional view along the line VIII—VIII of Fig. 1, showing the foot operated mechanism.

Referring to the drawings, the controller shown comprises a casing 10 for containing the contact making drums and the actuating members therefor to be set forth hereinafter. In this particular construction, the casing includes a base section 11, provided with any suitable means such as the lugs 12 for attaching it to any support, a cover section 13 adapted to be removably mounted on the base section and a cap 14, which seats over the other sections and retains the cover section in position.

In constructing controllers for motor vehicles, economy of floor area is an important feature and the contact making drums are generally disposed above one another to oscillate about a common axis thereby occupying space of minimum cross-sectional area. As will be observed in this particular construction, a reversing drum 15, an emergency drum 16 and a main drum 17 are all disposed to oscillate about the axis of the hollow shaft 18.

In this particular embodiment of the invention, a thrust bearing 19 is provided in the cap 14 of the casing and the shaft 18 is suspended therefrom. In order to suspend the shaft 18, the upper face of the bearing 19 is adapted to receive a bearing 21 which carries a sleeve 22 to the lower end of which the shaft 18 is connected by a plurality of pins 23. A bearing 20 provided for holding the lower end of the shaft is supported in the bottom of the casing in any suitable manner, such for example as by attaching it to the base portion 11.

Since controllers of this type are exposed to the weather, the bearing 21 is formed with a groove in its lower face for the reception of an annular ridge provided on the bearing 19 to provide a water-tight seal.

As will be observed in Fig. 1, the main drum 17 is attached to the shaft 18 by means of set screws 24. It will be readily under-

stood that this drum may be provided with any number of contact members disposed to engage contact fingers supported in the casing in a manner common in the construction of controllers.

The reversing drum 15 is disposed for oscillatory movement about the shaft 18. As will be noted, in mounting the shaft 15, a ring 25 attached to the shaft in any suitable manner, such as by means of the screws 26, is provided to serve as a bearing for a ring 27 mounted in the drum 15.

The drum 15 may be provided with a plurality of contact members 28 positioned to engage predetermined contact fingers disposed in the casing 10, when the drum is actuated to establish the desired circuits. Since reversing drums of this type are well known in controllers, further description of the arrangement of the contact members and contact fingers is deemed unnecessary.

As will be observed in Fig. 2, a hub 30 rotatably mounted on the shaft 18 is provided with a depending portion which extends into the drum 15, and is attached thereto by a pin 31. An arm 29 carried by the hub 30 is adapted for the reception of a reversing lever or a key 32.

In order to restrict the operation of the reversing drum 15, a cam 33 having three notches therein, one for each of the usual positions of a reversing lever provided in this type of controller, is disposed to actuate a spring controlled dog 34. An annular member 35 is pinned to the shaft 18 and disposed to aline with the dog 34. As will be observed, the member 35 is provided with a notch 36 for the reception of the inturned end of the dog 34. The notch 36 is so positioned in the member 35 that it alines with the inturned end of the dog when the main drum 17 is set in its initial or "off" position, and the contact members carried thereby are disengaged from the contact fingers.

As shown in Fig. 5, and as well known in controllers of this type, the notch provided for receiving the spring controlled dog 34, when the reverse lever is in this neutral position, is not as deep as the other notches. Consequently, when one end of the dog 34 seats in the notch of the cam 33 corresponding to neutral position, the inturned end of the dog is projected into the notch 36. In this manner, the main drum 17 is locked against actuation when the reversing lever is in its neutral position. Further, the reversing lever cannot be operated to set the cam 33 in the position corresponding to neutral, when the main drum has been rotated forward from this off position.

In the operation of vehicles equipped with controllers of this type, the operator sometimes becomes careless and leaves the vehicle without having removed the reversing key or lever. In such cases, it is possible for an unauthorized person to operate the controller.

In order to remind the operator that he should carry the reversing lever or key with him, a spring actuated arm 37 is provided. In this construction, the arm 37 is rotatably suspended from the cap 14, by means of a set screw 38, which engages in a threaded opening provided in a projection 39, formed integral with the cap. As will be noted in Fig. 5, a spring 40 is interposed between the casing 10 and the lever 37 and normally tends to rotate the latter clockwise. Consequently, when the reversing lever is set in the neutral position, the spring 40 actuates the arm 37 to eject the key 32 from the controller. Accordingly, when the key is ejected and thrown on the floor of the car, the operator is reminded that it should be taken away so that unauthorized persons cannot operate the vehicle.

The emergency drum 16 provided for controlling the main supply circuit has mounted thereon a plurality of contact members 41 disposed to engage contact fingers 42 mounted on the casing. In the operation of the drum 16 it is desirable to provide for the quick breaking of the main supply circuit in case of emergency and to prevent the closing of the main circuit until the main drum has been set in its "off" position. Accordingly, the actuating means of the emergency drum are adapted to effect the speedy oscillation of the drum and the restriction of its operation until the main drum is set in the proper position.

The actuating mechanism of the emergency drum comprises a rod 43 slidably mounted in the hollow shaft 18. As shown in Fig. 2, a key 44 is provided which extends through the rod 43 and the shaft 18 and projects over a collar 45 mounted on the shaft. Slots are provided in the shaft 18 for the reception of the key 44 and to permit longitudinal movement of the latter. A second collar 46, having a depending sleeve 47 rotatably mounted on the shaft 18 is supported by a ring 48 which is fixed in position on the shaft by means of set screws 49.

In order to normally retain the rod 43 in its raised position, a spring 50 is interposed between the collars 45 and 46. As will be pointed out hereinafter, the spring 50 has an additional function.

As shown in Figs. 1 to 4, inclusive, the actuating handle 51 is pivotally mounted on the bearing 21 by means of the pin 52, which extends in a horizontal plane. Thus, the handle may be oscillated in a vertical plane about a horizontal axis. Further, since the shaft 18 is rotatably mounted, the handle 51 may be oscillated in a horizontal plane about a vertical axis.

As will be noted, the pin 52 is located at a distance from the axis of the rod 43 and the actuating handle 51 is disposed in alinement

with the rod 43. Consequently, the rod 43 may be actuated downwardly by depressing the handle 51.

In order to utilize the downward movement of the rod 43 to oscillate the emergency drum 16 to close the main supply circuits, a translating mechanism for converting a reciprocatory motion into a rotary motion, shown generally at 53, is provided.

Referring now to Figs. 1 to 4, inclusive, it will be observed that the controlling mechanism 53 comprises a bell-crank 54 which is pivotally mounted at 55 on a bracket 56 carried by the casing 10. One arm of the bell crank is provided with a roller 57 disposed to engage an outwardly extending flange provided on the collar 45. The other arm of the bell crank is adapted to engage an upwardly extending projection 58, provided on the collar 46. Consequently, when the rod 43 is depressed, projecting the collar 45 downwardly against the action of the spring 50, the bell crank is rotated about this pivot point 55, giving the collar 46 and the drum 16 an angular motion. In this manner, the drum 16 may be oscillated in one direction about the axis of the shaft 18.

In order to oscillate the drum 16 in the opposite direction, a spring 59 is interposed between the casing 10 and a bracket 60 provided on the outwardly extending flange of the collar 46. As will be readily understood, this spring continually opposes the forward motion of the collar 46, and when the actuating handle is released, operates to rotate the drum 16 to its initial off position, breaking the main supply circuits.

The actuating handle 51 is pinned to the bearing 21 which, in turn, is directly connected to the shaft 18, carrying the main drum 17. Thus, the actuating handle and main drum 17 may be oscillated together about the axis of the shaft 18.

In controllers of this type, as is the usual practice, the main drum is provided for cutting resistance out of supply circuits, such as the supply circuit of a motor to reduce the resistance in the circuits. It will, therefore, be readily understood that some means is necessary to lock the emergency drum against operation to prevent the closing of the main supply circuit after the main drum has been operated to reduce the resistance of a circuit.

In this particular embodiment of the invention, the latching or locking means provided comprises a vertical rod 63 which is slidably disposed in brackets 64 carried by the casing 10. As shown, two collars 65 and 66 are mounted on the rod 63 and spaced apart a distance slightly greater than the thickness of the outwardly extending flange of the collar 45. When the sleeves 65 and 66 are so spaced, the flange of the collar 45 may be rotated between them when the rod 63 is properly positioned.

As will be observed, the sleeve 65 is greater in diameter than the sleeve 66 and cannot pass through a notch 67 cut in the periphery of the flange to permit the passage of the sleeve 65.

A head 68 is formed on the lower end of the rod 63 and is disposed to engage in a notch 69 cut in the flange of the collar 46, when the rod is projected to the limit of its downward movement. In this manner, the collar 46 may be locked against rotation with the shaft 18.

Referring now to Fig. 1, it will be seen that a spring 70 is mounted on the rod 63 and disposed between the collar 71 attached to the rod and the upper bracket 64. This spring normally tends to project the rod 63 downwardly.

Since motor vehicles are usually equipped with air brakes, it is necessary to provide for the releasing of the brakes, preferably upon the depression of the actuating handle 51. In order to effect the release of the brakes, a slidably mounted rod 72 carrying a cam 73 disposed for engagement by a cam 74 mounted on the collar 46 is provided. This rod operates in a well known manner to close the air valve and thereby build up pressure to disconnect the main reservoir from the brakes through the actuation of the three-way valve.

It is sometimes found a convenience in the operating of motor vehicles to retain the main supply circuit closed when the vehicle is standing at a station or coasting. Normally, the circuits are retained closed by the retention of the actuating handle 51 in its depressed position. When the supply circuit is retained closed by means of the actuating handle 51, the operator does not have free use of his hands for performing other operations.

In order to provide for the maintaining of the main supply circuit, a treadle 75 is pivotally mounted on a bracket 76 attached to the bottom of the casing 10. As shown the treadle is adapted to engage the nut 43*a* which is mounted on the rod 43. Consequently the treadle may be used to retain the rod 43 in its lowermost position or to draw it downwardly. In this construction, a spring 77 is provided for normally retaining the treadle in its raised position. Further, the rod 43 may slide freely through the treadle so as to permit its operation independently.

It will be readily understood that it would be undesirable to provide any means independent of the actuating handle 51 for maintaining the supply circuit closed when the main drum 17 stands in any position other than its off position. Consequently, a collar 78 provided with an outwardly extending flange 19 is attached to the shaft 18. A notch 80 is cut on the flange of the collar 78 and is located to aline with a hook member 81 carried by the treadle 75 when the drum 17 is in its off position. As will be observed, the hook member 81 is normally retained above the flange 79. Consequently, the treadle cannot

be operated until the notch 80 is alined therewith. The movement of the treadle is limited so that the member 81 cannot be projected below the flange 79, thereby avoiding all possibility of the rod 43 being held down and the drum 17 operated.

A notching attachment, shown generally at 82, is provided to assure the rotation of the drum 17 through predetermined angles when it is actuated step by step. This notching attachment is of well known construction and includes a notching wheel 83 and a spring controlled dog 84.

Assume that the reversing lever is thrown to its forward position, then the dog 34 is actuated to release the main drum 17. The actuating handle 51 may be oscillated about the pin 52 to project the rod 43 downwardly. As the rod 43 moves downwardly, the collar 45 is carried with it, depressing the spring 50.

The spring 70 now projects the rod 63 downwardly until the head 68 seats upon the flange of the collar 46. Further movement of the rod 63 downward cannot be effected until the notch 69 is alined with the head 68. However, as the collar 45 moves downward, the bell crank 54 is actuated to rotate the collar 46 and set the notch 69 in alinement with the head 68 provided on the rod 63.

When the drum 17 is in its off position, the notch 67 provided in the flange of the collar 45 alines with the collar 66, thereby permitting the movement of the rod 63 downwardly when the notch 69 cut in the collar 46 is alined with the head 68.

When the collar 46 reaches the forward limit of its angular movement, the head 68 is projected into the notch 69. The collar 65 now seats on the collar 45 and serves to retain the head 68 in position to lock the collar 46 against further angular movement.

As will be readily understood, the forward rotation of the collar 46 through a predetermined angle effects the forward oscillation of the drum 16 to close the supply circuits.

After the supply circuit has been closed, the main drum 17 may be actuated through the oscillation of the handle 51 about the axis of the shaft 18. It is common practice to use the drum 17 to cut resistance units out of the supply circuit step by step to permit the gradual increase of the current. Since controllers of this type are well known in the art, it was not deemed necessary to illustrate how the resistance units might be connected in the supply circuit.

In order to prevent the closing of the supply circuit, when the drum 17 is set in any position other than its initial off position, when all the resistance units are included in the circuit, the notch 67 is so disposed in the collar 45 that it will not aline with the member 66 until the drum 17 has been returned to its off position. Consequently, if an attempt is made to operate the drum 16 prior to the setting of the drum 17 in its off position the collar 45 engages the member 66 and projects the head 68 carried by the rod 63 into engagement with the collar 46. Consequently, when the drum 17 is not in its "off" position it will be seen that the collar 46 cannot be oscillated about the axis of the shaft 18 to effect the closure of the supply circuit through the actuation of the drum 16.

When the collar 46 is given a forward angular movement, the cam 74 engages the projection 73, and forces it downward, closing an air valve which functions to build up sufficient pressure to effect the disconnection of the main reservoir from the air line to the brakes, thereby permitting the release of the brakes in a well known manner.

In operating motor vehicles, it is sometimes found desirable to maintain the supply circuit closed when the main drum 17 is set in its off position. The provision of means for maintaining the supply circuit closed permits the operator to release the handle 51 so that he may have both hands free for performing other operations, such, for example, as making change for passengers when vehicles are standing at stations.

In order to maintain the drum 16 in its forward position, the treadle 75 is operated to retain the rod 43 in its lowermost position and to project the hook member 81 into the notch 80, provided in the collar 78. Since the notch 80 does not aline with the hook member 81, unless the drum 17 is set in its off position, it is impossible to maintain the supply circuit closed by means of the treadle except when the resistance units are cut into the circuit. Further, when the member 81 is projected into the notch 80, it is impossible to operate the main drum 17.

Assume that the operator has operated the handle 51 to actuate the drum 16 to close the supply circuit, and that he has rotated the drum 17 forward to any position and then released the handle 51. The spring 50 immediately projects the collar 45, the rod 43 and 63 upward, releasing the collar 46. The spring 59 which was energized upon the forward oscillation of the collar 46 serves to oscillate the collar 46 and drum 16 in the opposite direction, breaking the supply circuit.

As explained in a preceding paragraph, the rod 43 cannot be projected downwardly again until the drum 17 is returned to its "off" position and so the handle 51 has to be returned to its "off" position before the emergency drum 16 can be operated to close the supply circuit. Thus, when it is desired to effect the operation of the emergency drum and the main drum through the continuous progressive operation of the handle 51, the drums must be operated in a predetermined sequence.

Further, when the collar 46 is returned to its initial "off" position by the spring 59 the rod 72 is projected upward by the spring 77

opening the air valve. A connection of the main reservoir with the air lines leading to the brakes is then established. In this manner, the brakes are immediately applied when the handle 51 is released.

After the car has been brought to rest and the reversing lever 32 is thrown to its neutral position, the spring 40 rotates the lever 37, as viewed in Fig. 5, clockwise about its pivot point and ejects the lever 32 from the controller. Since the ejection of the reversing lever occurs immediately after it is returned to its neutral position, the operator is reminded that he should take it with him to prevent the operation of the vehicle by unauthorized persons.

Since various changes may be made in the above described construction and arrangement of parts, and different embodiments may be made without departing from the scope and spirit thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In a controller, in combination, a plurality of contact-making drums, an actuating handle disposed for oscillation about a plurality of axes, means cooperative to rotate the drums independently as the handle is oscillated about different axes, and means adapted to control the sequence of operation of the drums when all the drums are actuated.

2. In a controller, in combination, a plurality of contact-making drums, an actuating handle disposed for oscillation about a plurality of axes, means cooperating to rotate the drums independently as the handle is oscillated about different axes, means adapted to control the sequence of operation of the drums when all the drums are actuated, and means for automatically returning one set of drums to their initial positions when the handle is released.

3. In a controller, in combination, a plurality of contact-making drums, an actuating handle disposed for oscillation about different axes to effect the independent rotation of the drums and means cooperating to effect the rotation of both drums when the handle is oscillated about its axes in a predetermined sequence.

4. In a controller, in combination, a plurality of contact-making drums mounted to oscillate about a common axis, an actuating handle disposed for oscillatory movement in different planes and means cooperative to effect the rotation of the drums independently upon the oscillation of the handle in different planes and the operation of the drums in sequence when the actuating handle is given a continuous progressive movement in a plurality of planes.

5. In a controller, in combination, a plurality of contact-making drums mounted to oscillate about a common axis, an actuating handle disposed for oscillatory movement in different planes, and means cooperative to effect the rotation of the drums independently upon the oscillation of the handle in different planes and the operation of the drums in sequence when the actuating handle is given a continuous progressive movement in a plurality of planes and means automatically operable to return one of said drums to its initial position when the handle is released.

6. In a controller, in combination, a rotatably mounted emergency contact-making drum, an actuating handle disposed for oscillatory movement and translating means adapted to utilize the oscillatory movement of the handle in any plane to operate said emergency drum.

7. In a controller, in combination, a rotatably mounted drum, an actuating handle disposed to oscillate about an axis at right angles to the axis of the drum, a bell crank disposed for operation by the handle adapted to oscillate the drum in one direction about its axis when the handle is actuated.

8. In a controller, in combination a rotatably mounted drum, an actuating handle disposed to oscillate about an axis at right angles to the axes of the drum, a bell crank disposed for operation by the handle adapted to oscillate the drum in one direction about its axis when the handle is actuated, a resilient means for oscillating the drum in the opposite direction when the handle is released.

9. In a controller, in combination, a plurality of drums disposed to oscillate about a common axis, an actuating handle disposed to oscillate about a plurality of axes connected to one of the drums, thereby to effect the oscillation of said drum as the handle is oscillated about one axis, a bell crank disposed for operation by the handle adapted to oscillate the other drum when the handle is oscillated about its other axis.

10. In a controller, in combination, a plurality of drums disposed to oscillate about a common axis, an actuating handle disposed to oscillate about a plurality of axes connected to one of the drums to provide for the oscillation of said drums, as the handle is oscillated about one axis, a bell crank disposed for operation by the handle adapted to oscillate the drum in one direction when the handle is oscillated about its other axis, and resilient means for opposing the return of the drum by said bell crank, said resilient means being adapted to return the drum to its initial position when the handle is released.

11. In a controller, in combination a casing, a reversing drum rotatably mounted in the casing, a key adapted to engage the drum, said casing having an opening therein for the reception of the key and to permit it to be oscillated about the axis of the drum to rotate

said drum, the walls defining said opening being adapted to retain the key in engagement with the drum when the drum is in a position other than neutral, and means cooperative to eject the key from the casing when the drum is in its neutral position.

12. In a controller in combination, a casing, a reversing drum rotatably mounted in the casing, a key adapted to engage the drum, thereby to provide means for the manipulation of the drum, said casing having an opening therein to permit the key to be projected into engagement with the drum and slots extending laterally from said opening to permit the oscillatory movement of said key about the drum axis to effect the operation of the drum, and means cooperative to eject the key from the casing when the drum is set in its neutral position.

13. In a controller, in combination, a casing a reversing drum rotatably mounted in the casing, a key adapted to engage the drum, thereby to provide means for the manual operation of the drum, said casing having an opening therein to permit the key to be projected into engagement with the drum, and slots extending laterally from said opening to permit the oscillatory movement of said key about the drum axis to effect the operation of the drum, and means cooperative to eject the key from the casing when the drum is set in its neutral position, the walls defining said slots being adapted for use as guides and to retain the key in engagement with the drum during the operation of the latter.

14. In a controller in combination, a main drum and an emergency drum disposed for oscillatory movement about a common axis, a rod disposed for reciprocatory movement longitudinally of said drums, means actuated by said rod to effect an oscillatory movement of the reversing drum, forward from its "off" position, and foot operated means cooperative with said rod to retain the emergency drum in its forward position.

15. In a controller, in combination, a main drum and an emergency drum disposed for oscillatory movement about a common axis, a rod disposed for reciprocatory movement longitudinally of said drums, means actuated by said rod to effect an oscillatory movement of the emergency drum, forward from its "off" position, a foot operated member cooperative with said rod to retain the emergency drum in its "forward" position, and means carried by the main drum adapted to restrict the actuation of said foot operated member.

16. In a controller, in combination, a casing, a main drum and an emergency drum rotatably disposed in said casing to oscillate about a common axis, means tending to retain the emergency drum in its off position, a rod disposed for reciprocatory movement longitudinally of the drums, controlling mechanism actuated by said rod for converting the reciprocatory movement of the rod to rotary motion to oscillate the emergency drum forward from its "off" position, and a treadle cooperative with the rod to retain the emergency drum in its forward position.

17. In a controller, in combination, a casing, a main drum and an emergency drum rotatably disposed in said casing to oscillate about a common axis, means tending to retain the emergency drum in its off position, a rod disposed for reciprocatory movement longitudinally of the drums; translating mechanism actuated by said rod for converting the reciprocatory movement of the rod to rotary motion to oscillate the emergency drum forward from its "off" position, a treadle cooperative with the rod to retain the emergency drum in its forward position, and means carried by said main drum to restrict the operation of the treadle.

18. In a controller, in combination, a casing, a reversing drum and an emergency drum rotatably mounted in the casing, a key adapted to engage the reversing drum to provide for its manual operation, means for actuating the emergency drum, means for locking the emergency drum against operation, means for ejecting said key from the casing when the reversing drum is in its "neutral" position, said ejecting means being adapted to cooperate with said locking means to retain the emergency drum in its "forward" position.

In testimony whereof, I have hereunto subscribed my name this 8th day of May, 1925.

LYNN G. RILEY.