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MASTER CONTROLLER

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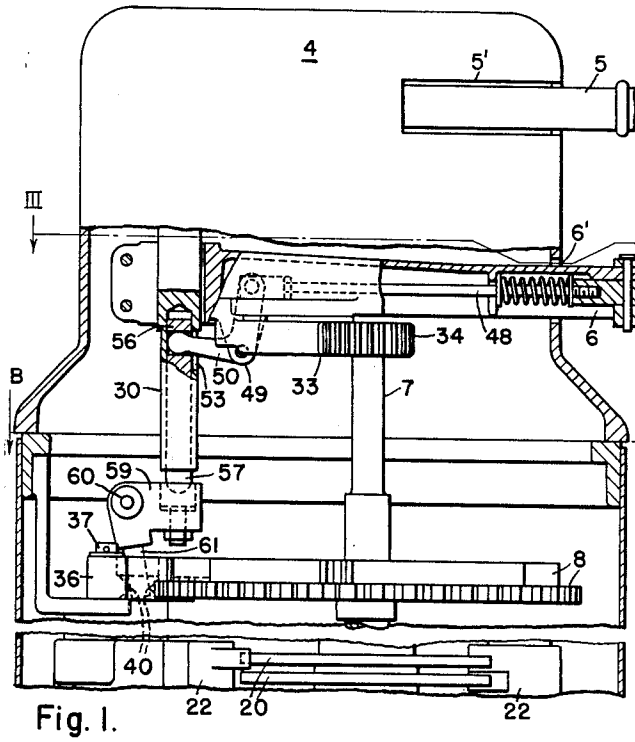


Fig. 1.

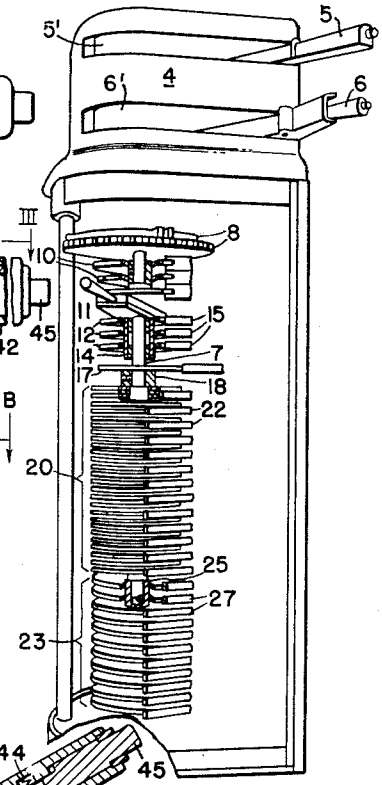


Fig. 2.

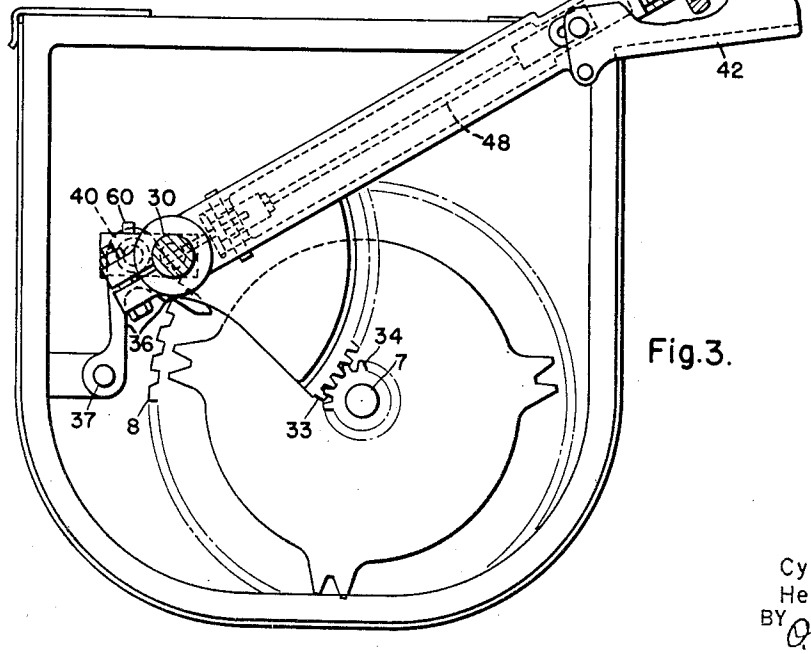


Fig. 3.

INVENTORS
Cyril E. Baston &
Henry M. Futral.
BY O. B. Buchanan
ATTORNEY

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MASTER CONTROLLER

Cyril E. Baston, Glenshaw, and Henry M. Futral, Wilkinsburg, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

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Our invention relates to the master controller with which the engineman controls the motions of an electric locomotive or other electrically propelled vehicle. In general, these master controllers consist of a series of drums or cam-shafts, arranged to be rotated by handles which project from the top or the top-side of the controller. These drums or cam-shafts have a plurality of different contact-controlling means, disposed in a plurality of positions extending around the periphery of the drum, for making the necessary contacts in the required sequences.

Heretofore, the main controller-drum, which is used for acceleration-control, and which carries the largest number of contact-controlling means, has been either operated directly by a controller-handle, or gear-connected to a controller-handle which is mounted on a short shaft parallel to the main drum. Heretofore, the main-drum handle or accelerator-handle has carried a latch-member, which was controlled from the grip of the handle, and which engaged notches which were provided in the periphery of a stationary notch-plate which was mounted in the top of the controller, these notches corresponding to the contact-controlling positions of the accelerating drum.

Our invention relates to a type of controller-drum in which the number of peripherally disposed contact-carrying means is so great that an unusually large percentage of the entire drum-periphery has to be taken up by the contact-controlling means, in order to space the contact-points a reasonable distance apart. This has necessitated the use of an unusually large speed-multiplication between the accelerator-handle and the accelerator-drum, so that the accelerator-drum could be rotated through an arc of anywhere from about 180° to close on to 360°, whereas the controller-handle should have an angular movement of not more than 60° or 70°, in order to provide an easily handled controller, although an angular movement of as much as 80° could be tolerated at the expense of some awkwardness from the engineman.

Heretofore, trouble has been experienced with this type of controller-drum, because of the small size of the notches (necessitated by their large number), in the previously used stationary notch-plate, resulting in a construction which is weak mechanically. Furthermore, the high speed-multiplication between the controller-handle and the controller-drum has necessitated extremely accurate initial machining of the parts to ensure the correct positioning of the drum

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with respect to the handle, and trouble has been experienced because of incorrect drum-positioning as a result of wear in the notch-plate, and wear and backlash in the gearing. All of these troubles have resulted from the fact that the controller-handle has been provided with a latch-member which was under the control of the thumb or grip of the engineman, for engaging and disengaging the peripheral notches in the stationary notch-plate, as the handle was notched around the periphery of said notch-plate.

It is an object of our present invention to avoid these difficulties by a new controller-construction in which our notch-plate is associated with the large-motion drum, rather than the short-motion handle. In our preferred construction, the notch-plate, instead of being stationary and having only a somewhat limited arcuate extent (corresponding to the arcuate movement of the controller-handle), is made as a notch-plate which is attached directly to the drum or drum-shaft, and which has a large arcuate extent equal to that of the drum. The latch is removed from the movable handle and is pivoted to a fixed point on the controller-housing, and a suitable mechanism is provided whereby this fixed latch can be released from the release-lever on the controller-handle. In this way, the notches can be considerably larger and more rugged, the drum-position is not at all affected by gear-wear or backlash, being affected only by the play between the latch and the notches, without being multiplied by the gear-ratio. Furthermore, it is no longer necessary to tolerate an awkwardly long travel of the controller-handle, in order to mitigate speed-multiplication drum-position difficulties, and the handle-movement can be reduced to, or kept at, the desired 60° or 70°, so as to provide a more easily handled controller.

With the foregoing and other objects in view, our invention consists in the combinations, structures, parts, and methods of design and operation, hereinafter described and claimed, and illustrated in the accompanying drawing, wherein:

Figure 1 is a fragmentary view of a master controller embodying our invention, partly in vertical elevation, and partly in section;

Fig 2 is a simplified perspective view of the controller, with the cover removed; and

Fig. 3 is a simplified horizontal sectional view of the controller, on the section-plane indicated by the line III—III in Fig. 1, with the controller-casing broken down to the line B—B in Fig. 1 (the top-part 4 being removed).

As seen in the perspective view of the Fig. 2, the controller has a top portion 4, of reduced size, which is provided with a braking-handle 5 and an accelerating-handle 6 which are movable within slots 5' and 6' in the side of said top-portion 4. The accelerator-handle 6 is geared to a vertical main-drum shaft 7, by means which will be subsequently described. Near the top of the main-drum shaft 7, there is a double notch-plate 8 which is fixed to the drum-shaft 7. As shown in all three figures, the illustrated notch-plate has two notched portions, the top portion having three deep peripheral notches, corresponding to the three main running-positions of the main drum, while the bottom portion has notches half as deep, as many as there are contact-controlling positions on the main drum, as will be subsequently described.

Seen next below the notch-plate 8 in Fig. 2, are three interlocking-cams 10, for providing suitable mechanical interlocks between the several drums of the master controller. Below the interlocking-cams 10 is the forward-and-reverse handle 11 of the forward-and-reverse drum 12, which consists of three cams, mounted on a hub 14 which is journaled on the main drum-shaft 7. The three cams of this forward-and-reverse drum 12 are engaged by three contact-fingers 15. Below the forward-and-reverse drum 12, Fig. 2 shows another interlocking cam 17, which is carried by a hub 18 which is secured to the main drum-shaft 7.

Below said interlocking cam 17, Fig. 2 shows the twentiy-six accelerating-cams 20, which are fixed to the main drum-shaft 7, and which are engaged by twenty-six contact-fingers 22 of the main drum.

The bottom portion of the main drum-shaft 7 is occupied by the eleven cams of the braking-drum 23, which are carried by a hollow shaft 25 which is journaled on the main drum-shaft 7, and turned by suitable gearing (not shown) from the brake-handle 5. The eleven cams of the braking-drum 23 are engaged by contact-fingers 27, as shown in Fig. 2.

Figs. 1 and 3 show some details of a selected few of the parts which have most to do with our present invention, starting with the accelerator-handle 6. The accelerator-handle 6 is clamped onto a short hollow vertical handle-shaft 30, the bearings for which have been omitted for simplicity in illustration. This handle-shaft 30 is substantially parallel to, and out of alignment with, the drum-shaft 7, as is readily seen in Figs. 1 and 3. The accelerator-handle 6, as shown, has an arcuate movement of about 64°, while the main-drum shaft 7 has a much larger arcuate movement, being something like 215° in the illustrated controller, although it can be anywhere from something of the order of 170° or 180°, and close on to nearly 360°. If the main drum has an arcuate movement of much less than 170° or 180°, our present invention is usually not needed. The movement of the accelerator-handle 6 is communicated to the drum-shaft 7 by a speed-multiplying drive-connection, which is shown in the form of a gear-segment 33, which is secured to the handle 6, meshing with a pinion 34 which is secured to the top of the main-drum shaft 7, as shown in Fig. 1.

As shown in Figs. 1 and 3, the notch-plate 8 is engaged by a latch-member 36 which is mounted on a fixed pivot 37, or otherwise so supported that it is prevented from peripheral movement around said notch-plate 8, but is free

to move its end into and out of engagement with one of the notches of said notch-plate 8. The particular latch-member 36, which is shown more in detail in Fig. 3, is an L-shaped latch-lever, one end of which is pivoted at 37, while the other end can be moved into and out of engagement with the notch-plate 8. The apex or bend 40 in this latch-lever 36 is engaged by suitable operating-mechanism, a preferred or exemplary form of which is illustrated, whereby the latch-lever 36 may be controlled from the accelerator-handle 6, as will now be described.

The accelerator-handle 6, in the form shown in Figs. 1 and 3, is provided with a pivoted grip-portion 42, which is adapted to be grasped by the hand of the engineman, and thus compressed toward the grip-end of the handle 6, against the bias of a suitable spring (not shown). Ordinarily, the inward movement of the pivoted grip portion 42 is restricted to about half of its full movement, by a stop 43 which is pressed outwardly by a spring 44. The inward movement of the stop 43 is ordinarily prevented by a button 45, which is disposed in the end of the handle 6, and which is adapted to be depressed by the thumb of the engineman, so as to release the stop 43, thus permitting the pivoted grip-motion 42 to be squeezed inwardly its full amount toward the end of the handle 6. This pivoted grip-portion 42, under the auxiliary control of the button 45, is used as a latch-operating member, for operating the notch-engaging latch-member 36 which is associated with the notch-plate 8.

When the grip 42 is squeezed inwardly halfway, without depressing the thumb-button 45, a suitable motion-communicating means, such as will soon be described, will pull back the latch 36 far enough to clear the smaller notches on the lower plate of the double latch-plate 8, thus permitting the drum 20 to be notched forward until its first running-position has been reached. To pass this first running-position of the main drum 20, it is necessary, in the illustrated controller, for the engineman to depress the thumb-button 45, and to simultaneously squeeze in the grip 42 all the way, which pulls back the latch 36 far enough to clear one of the three deep notches on the top plate of the double notch-plate 8.

In the broader aspects of our present invention, any suitable motion-communicating or motion-producing means may be used, whereby a complete inward-squeezing of the pivoted grip-portion 42 or other latch-operating member, on the handle 6, may be used to effect a withdrawal of the latch-member 36 from engagement with one of the notches of the notch plate 8; or the positions of the notch-plate 8 and latch 36 could be reversed, the latch being carried by the drum 20, or drum-shaft 7, and the notch-plate being in the form of a stationary notched ring. We have shown, however, a preferred mechanical means, for mechanically transmitting the movement of the pivoted grip-portion 42 to the apex or bend 40 in the pivoted latch-lever 36.

Thus, as shown more clearly in Fig. 1, the controller-handle 6 carries a substantially radially disposed handle-rod 48, which is secured to the pivoted grip-portion 42 so as to be moved substantially radially with respect to the handle-shaft 30, in response to a movement of said pivoted grip-portion 42. At the point where the handle 6 is secured to the hollow handle-shaft 30, there is a pivot-supporting part 49 (Fig. 1), in fixed relation to said handle and said handle-shaft. This pivot-supporting part acts as a piv-

otal mounting-point for a "lifter" bell crank **50**, having one arm in operative relation to said handle-rod **48**, and having a second arm extending through a slot **53** which is provided in the hollow handle-shaft **30**, so that this second arm of the "lifter" bell crank **50** extends inside of the hollow handle-shaft **30** into operative relation to a vertically movable shaft-pin **56**, which is slidably movable within the handle-shaft **30**. The bottom end of the vertically movable shaft-pin **56** extends below the bottom of the hollow handle-shaft **30**, and terminates in a rounded end **57** which rests in a concave socket at the end of a "pusher" bell crank **59**. This "pusher" bell crank **59** is stationarily pivoted at **60**, and has a short stub-end or arm **61** which extends downwardly into a beveled hole in the apex or bend **40** of the latch-lever **36**, to operate the same.

From the foregoing description, it will be seen that we have provided a short-movement operating-handle **6**, and a long-movement controller-drum or camshaft member. (We use these terms interchangeably in this description.) Notch-plate difficulties are avoided by fixing the notch-plate **8** on the main shaft **7** of the controller-drum **20**. Suitable means are provided for manipulating a stationarily supported latch-member **36** into and out of engagement with the notches of the notch-plate **8**, by means of a suitable latch-operating member **36** or **45** on the controller-handle **6**.

In the particular form of latch-manipulating mechanism which we have shown in the drawing, the movement of the latch-operating member **42** on the handle is thus communicated to a radially moving handle-rod **48**, which, in turn, lifts an axially movable shaft-pin **56**, by any suitable means, such as a "lifter" bell crank **50**. Although this shaft-pin **56** rotates with the hollow handle-shaft **30** (because it is engaged by the "lifter" bell crank **50** which rotates with the handle), said shaft-pin has a rounded end **57**, so that the rotation of this shaft-pin **56** makes no difference to the "pusher" bell crank **59** which is depressed or released according to the movement which is to be imparted to the latch-member **36**.

While we have illustrated our invention in a single preferred form of embodiment, in an illustration which has been much simplified in order to clarify the showing of parts which are hard to illustrate, we wish it to be understood that our invention is not limited to the details shown, as various changes of omission and addition, as well as substitution of equivalents, may be made, without departing from the essential spirit of our invention. We desire, therefore, that the appended claims shall be accorded the broadest construction consistent with their language.

We claim as our invention:

1. A controller-drum having a plurality of different contact-controlling means, disposed in a plurality of positions extending around at least about half of the periphery of the drum; a drum-shaft fixed to said drum; a notch-plate and a cooperating latch-member associated with said drum-shaft, one being carried by the drum-shaft and the other being stationarily supported without freedom of rotation about the drum-shaft, said notch-plate having the same arcuate extent as the drum, and having a plurality of notches corresponding to a plurality of different contact-controlling positions of said drum; an arcuately movable controller-handle having a smaller range of movement than said controller-drum; a speed-multiplying drive-connection between said controller-handle and said drum-shaft; a latch-operating member carried by the grip of said controller-handle; and means for effecting a movement of said latch-member in response to a movement of said latch-operating member.

2. A controller-drum having a plurality of different contact-controlling means, disposed in a plurality of positions extending around at least about half of the periphery of the drum; a drum-shaft fixed to said drum; a notch-plate fixed to said drum-shaft, said notch-plate having a plurality of peripheral notches corresponding to a plurality of different contact-controlling positions of said drum; a latch-member and means for so supporting the same that it is prevented from peripheral movement around said notch-plate, but free to move its end into and out of engagement with one of the notches of said notch-plate, an arcuately movable controller-handle having a smaller range of movement than said controller-drum; a speed-multiplying drive-connection between said controller-handle and said drum-shaft; a latch-operating member carried by the grip of said controller-handle; and means for effecting a movement of said latch-member in response to a movement of said latch-operating member.

3. A controller-drum having a plurality of different contact-controlling means disposed in a plurality of positions extending around at least about half of the periphery of the drum; a drum-shaft fixed to said drum; a notch-plate fixed to said drum-shaft, said notch-plate having a plurality of peripheral notches corresponding to a plurality of different contact-controlling positions of said drum; a latch-member and means for so supporting the same that it is prevented from peripheral movement around said notch-plate, but free to move its end into and out of engagement with one of the notches of said notch-plate; an arcuately movable controller-handle having a smaller range of movement than said controller-drum; a handle-shaft fixed to said controller handle, said handle-shaft being substantially parallel to, and out of alignment with, said drum-shaft; a speed-multiplying drive-connection between said controller-handle and said drum-shaft; a latch-operating member carried by the grip of said controller-handle; a substantially radially disposed handle-rod associated with said controller-handle; means for moving said handle-rod substantially radially in response to a movement of said latch-operating member; a substantially axially disposed shaft-pin associated with said handle-shaft; means for moving said shaft-pin substantially axially in response to a movement of said handle-rod; and means for moving said latch-member in response to a movement of said shaft-pin.

4. A controller-drum having a plurality of different contact-controlling means, disposed in a plurality of positions extending around at least about half of the periphery of the drum; a drum-shaft fixed to said drum; a notch-plate fixed to said drum-shaft, said notch-plate having a plurality of peripheral notches corresponding to a plurality of different contact-controlling positions of said drum; a latch-member and means for so supporting the same that it is prevented from peripheral movement around said notch-plate, but free to move its end into and out of engagement with one of the notches of said notch-plate; an arcuately movable controller-handle having a smaller range of movement than

said controller-drum; a slotted hollow handle-shaft fixed to said controller-handle, said handle-shaft being substantially parallel to, and out of alignment with, said drum-shaft; a speed-multiplying drive-connection between said controller-handle and said drum-shaft; a latch-operating member carried by the grip of said controller-handle; a substantially radially disposed handle-rod associated with said controller-handle; means for moving said handle-rod substantially radially in response to a movement of said latch-operating member; a slidable shaft-pin disposed partly within said hollow handle-shaft, and having an extending end extending beyond an end of said handle-shaft; a pivot-supporting part in fixed

relation to said handle and said handle-shaft; a bell crank pivoted in said part, and having one arm in operative relation to said handle-rod, and having a second arm extending through said slot in the handle-shaft and into opertaive relation to a portion of said shaft-pin within said handle-shaft; and a stationarily pivoted bell crank having one arm in operative relation to said extending end of said shaft-pin, and having a second arm in operative relation to said latch-member.

CYRIL E. BASTON.
HENRY M. FUTRAL.

No references cited.