

No. 807,939.

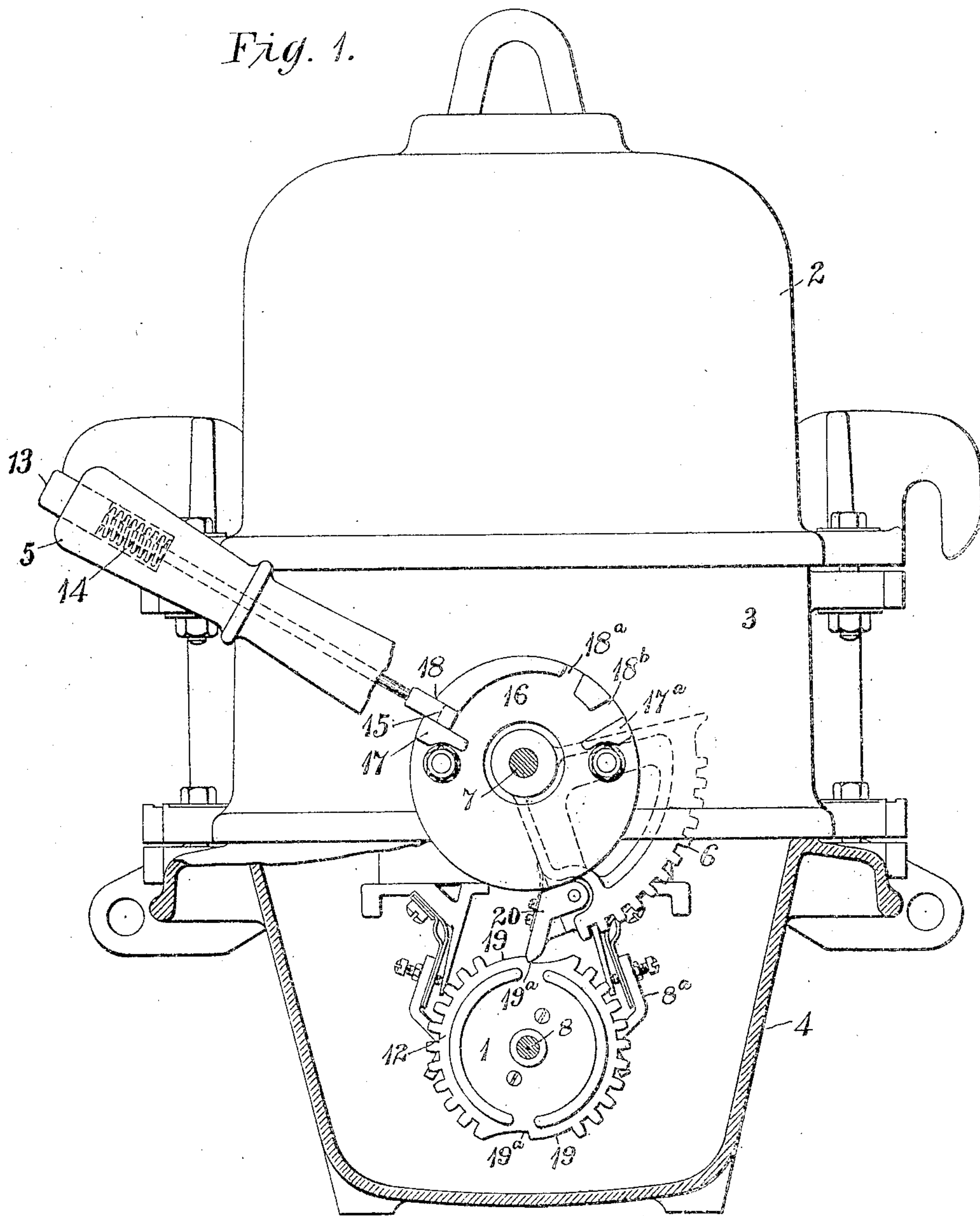
PATENTED DEC. 19, 1905.

H. D. JAMES.
CONTROLLER FOR ELECTRIC MOTORS.

APPLICATION FILED APR. 3, 1905

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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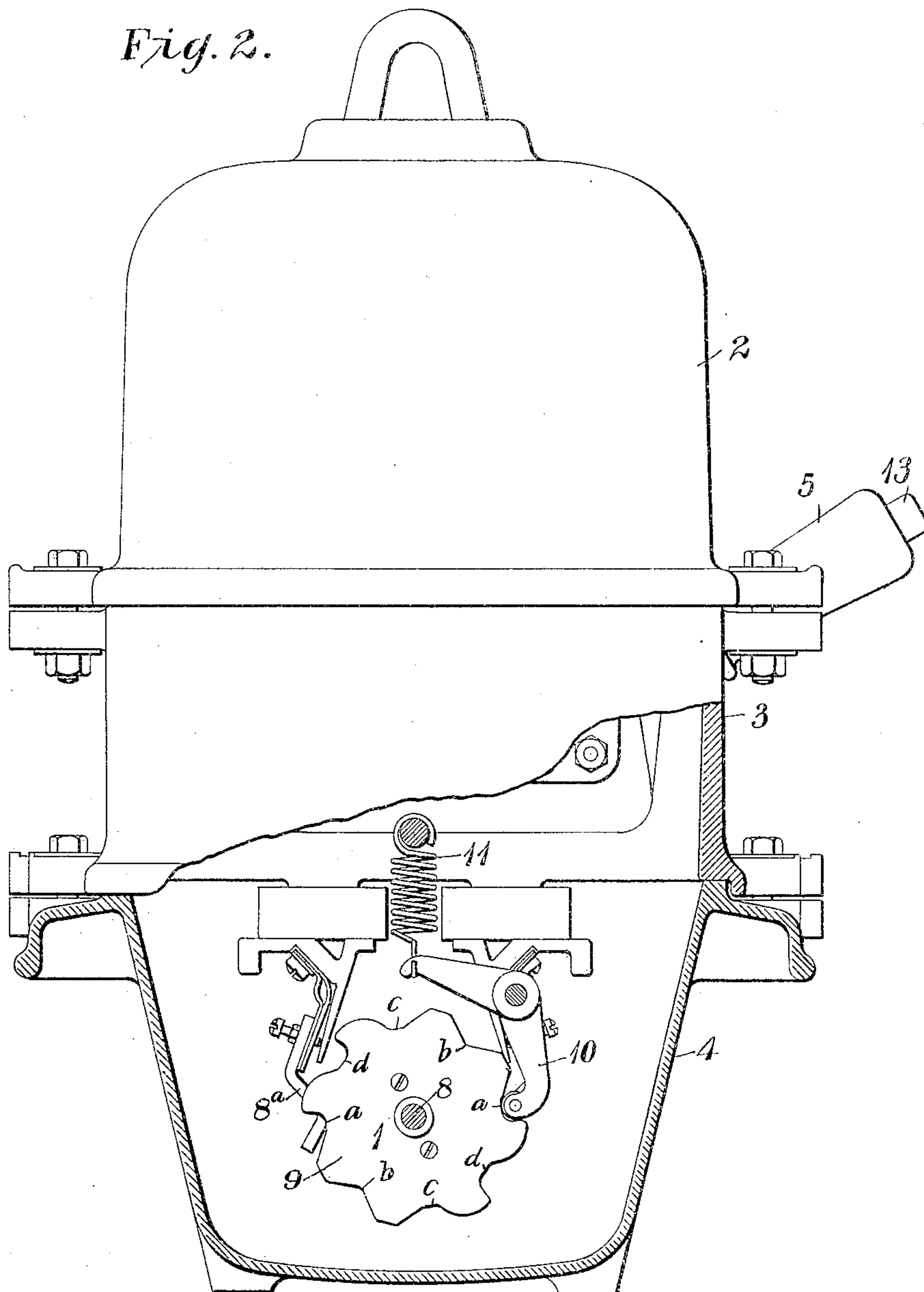
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2 SHEETS—SHEET 2.

Fig. 2.



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HENRY D. JAMES, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO WEST-
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CONTROLLER FOR ELECTRIC MOTORS.

No. 807,939.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed April 3, 1905. Serial No. 253,637.

To all whom it may concern:

Be it known that I, HENRY D. JAMES, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Controllers for Electric Motors, of which the following is a specification.

My invention relates to controllers for electric motors, and particularly to controllers which are adapted for use with motors that employ relatively heavy starting-currents.

The object of my invention is to provide means for operating a contact-carrying drum continuously and forwardly in one direction by an actuating device that shall be limited to a predetermined arc of rotation.

In controllers of relatively small size it is convenient and desirable to limit the movement of the operating-handle to less than a full circumference in order to insure a better actuating leverage without providing special clearance-space. This has been done in the prior art, where the contact-carrying drums were returned from the "running" to the "off" positions over the intermediate positions; but so far as I am aware an oscillating controller-handle has never before been arranged to actuate a contact-carrying drum continuously and forwardly in one direction.

My invention is illustrated by the accompanying drawings, in which—

Figure 1 is a front elevation with the case partially removed to disclose the drum-actuating mechanism, and Fig. 2 is a similar rear elevation disclosing a drum-interlocking device of a controller constructed in accordance therewith.

Referring to the drawings, a controller contact-carrying drum 1 and actuating mechanism therefor are supported from an intermediate section 3 of a case comprising a plurality of sections 2, 3, and 4, of which section 4 may serve as a base and as a tank for oil in which the drum 1 is immersed. The drum-actuating mechanism comprises an operating-handle 5 and a gear-wheel segment 6, both of which are rigidly fixed to a rotatable shaft 7, that is parallel to the shaft 8 of the drum 1.

The drum 1 is engaged by a plurality of contact-fingers 8^a in the usual manner and is provided with a cam 9, having two identical halves, which are notched to correspond to the various controller positions *a*, *b*, *c*, and *d*,

so that in passing from the off to the full running position once only half of the drum is used, and then a forward movement of one notch takes the drum directly to the off position of the other half. The notches *a*, *b*, *c*, and *d* are engaged successively by a pawl 10, which is held against the cam 9 by a tension-spring 11 and serves to accentuate the several positions. The notches *a* and *d*, which correspond to the off and the running positions of the controller, are so formed as to limit the motion of the drum 1 to a single direction when they are engaged by the pawl 10, while the notches *b* and *c* permit motion of the drum in either direction. This arrangement prohibits the backward turning of the drum from the off position to the running position, allows the free motion either to the running or to the off positions from the starting-notches, and limits the motion to a forward movement from the full running notch to the off position.

The drum 1 is operated by the segment 6, which is actuated by the handle 5 and meshes with a gear-wheel 12, that is attached to the drum-shaft 8. The handle 5 is provided with a push-pin 13, which may be pressed inwardly against the action of a spring 14 to disengage a catch 15, with which the handle is provided, from a dial-plate 16, which is fixed to the case-segment 3 and is provided with projections 17 and 17^a to limit the motion of the handle and with a plurality of notches 18, 18^a, and 18^b to further accentuate the running and the off positions of the controller. The gear-wheel 12 has two relatively small opposite blank portions 19, which are provided with notches 19^a to engage a pawl 20, that is attached to the segment 6, the arrangement of parts being such that when the pawl 10 engages the notch *a*, the drum then being in the off position, the handle 5 rests against the stop 17, the catch 15 engages the notch 18, and the pawl 20 engages one of the notches 19^a. If the catch 15 is then withdrawn from the notch 18 and the handle is moved in a clockwise direction, the segment 6 engages the gear-wheel 12, the drum 1 is moved in a counter-clockwise direction, and the pawl 10 is moved from notch *a* into engagement with notches *b* and *c* successively, which are "starting" positions, and then into engagement with notch *d*, which is a running position, at which

point the handle-catch 15 engages the notch 18^a. The drum is then prevented from motion in a backward direction by the cam-notch *d* and from motion in a forward direction by the dial-plate notch 18^a. The operator may again release the catch 15 and move the handle one notch farther to notch 18^b on the dial-plate 16, when the pawl 10 will engage notch *a* on the cam 9, which is an off position. The gear-segment 6 will then have moved out of engagement with the gear-wheel 12, which has been sufficiently rotated to bring the corresponding blank position 19 opposite the segment, so that if the handle-catch 15 is released from the notch 18^b the handle may be rotated back to notch 18 against the projection 17, when pawl 20 engages with the notch 19^a, and the process may be repeated as before, except that the other similar half of the drum 1, the cam 9, and the gear-wheel 12 are employed. In this way one portion of the drum 1 is in service only half the length of time it otherwise would be, which correspondingly increases its life. Furthermore, with the dial-plate arrangement as hereinbefore explained an operator may start up a motor in the dark without fear of passing over the running position to the off position by mistake, since the catch 15 will be engaged by the notch 18^a and must be released before the controller may be thrown to the off position.

I claim as my invention—

1. In a controller, the combination with a rotatable, contact-carrying member, and an operating-handle therefor, of an interlocking device that permits movement of said rotatable member progressively in only one direction from the "off" position and from the "running" position and limits the motion of said operating-handle to a certain predetermined arc of rotation.

2. In a controller, the combination with a rotatable, contact-carrying member, and an operating-handle therefor, of an interlocking device that permits progressive rotation of said contact-carrying member in one direction, prevents rotation in the opposite direction when said member occupies one or more predetermined positions and limits the motion of said operating-handle to a predetermined portion of a revolution.

3. In a controller, the combination with a contact-carrying drum, and an operating-handle therefor, of an interlocking cam mounted on the shaft with said drum that permits progressive rotation of said drum in one direction and prevents rotation in the opposite direction when said drum occupies one or more predetermined positions, said operating-handle being limited to a predetermined arc of rotation.

4. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of a plurality of interlocking devices that limit the motion of

said operating-handle to a predetermined arc of rotation, accentuate the position of said contact-carrying member and limit the motion of said member to a single direction of rotation from certain of said accentuated positions.

5. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of means for actuating said member in either direction except when it attains certain predetermined positions and then only in one direction and means for limiting the motion of said handle to a predetermined arc of rotation.

6. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of means for accentuating a plurality of predetermined positions of said member and for limiting the motion of said member to a single direction of rotation from predetermined "off" and "running" positions and means for limiting the motion of said operating-handle to a predetermined arc of rotation.

7. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of means for rotating said member in either direction between certain positions but only in one direction from such positions, said operating-handle being limited to a predetermined arc of rotation.

8. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of means for accentuating a plurality of positions of said rotatable member, and for limiting the motion of said member to one direction of rotation from certain of said positions and means for accentuating certain corresponding positions of said operating-handle and for limiting the motion of said handle to a predetermined arc of rotation.

9. In a controller, the combination with a rotatable, contact-carrying member and an operating-handle therefor, of means that permits the progressive rotation of said member in one direction and prevents motion in the opposite direction when said member occupies one or more predetermined positions, and means that limit the motion of said operating-handle to a predetermined arc of rotation.

10. In a controller, the combination with a rotatable, contact-carrying drum, a driving gear-wheel attached thereto and an operating-handle therefor, of means for actuating said drum progressively in one direction by said attached gear-wheel, that comprises a segmental gear-wheel attached to said handle, and means for limiting the motion of said handle to a predetermined arc of rotation.

11. In a controller, the combination with a rotatable, contact-carrying drum, a driving gear-wheel and a cam attached thereto that is engaged by a pawl to accentuate a plurality of predetermined positions occupied by said drum, and an operating-handle therefor, of

means for actuating said drum progressively in one direction, that comprises a segmental gear-wheel which meshes with said driving gear-wheel and is attached to said handle, 5 means for interlocking said actuating-cam to prevent rotation of said drum in an opposite direction when it occupies certain predetermined positions, and means for limiting the motion of said operating-handle to a predetermined arc of rotation. 10

12. In a controller, the combination with a rotatable, contact-carrying drum, a driving gear-wheel attached thereto, an operating-handle therefor and a cam which is engaged 15 by a pawl to accentuate a plurality of predetermined positions of said drum and to limit the motion of said drum to a single direction of rotation from certain of said positions, of means for actuating said drum progressively 20 in one direction and for limiting the said operating-handle to a predetermined arc of rotation.

13. In a controller, the combination with a rotatable, contact-carrying drum, a driving gear-wheel attached thereto, an operating-handle therefor, and a cam which is engaged 25 by a pawl to accentuate a plurality of predetermined positions of said drum and to limit the motion of said drum to a single direction of rotation from certain of said positions, of means for actuating said drum progressively in one direction, that comprises a gear-wheel 30 segment which is attached to or is a part of said operating-handle and which meshes with

said driving gear-wheel, and means for limiting said operating-handle to a predetermined arc of rotation. 35

14. In a controller, the combination with a rotatable, contact-carrying drum having a gear-wheel, and an operating-handle therefor 40 that is limited to a predetermined arc of rotation, of means for operating said drum progressively in one direction that comprises a gear-segment which meshes with said gear-wheel to drive the drum through an arc of 45 substantially one hundred and eighty degrees as the handle moves through said predetermined limited arc of rotation, and is disengaged from said gear-wheel while said handle is returned through said limited arc to reën- 50 gage another portion of said gear-wheel and drive the drum through an additional arc of substantially one hundred and eighty degrees.

15. In a controller, the combination with a contact-carrying drum having a gear-wheel 55 comprising two toothed rim-sections and intervening blank spaces, each of which has a notch, of an actuating gear-segment having an operating-handle and a pawl that engages 60 one of said notches when the operating-handle is moved from its "off" position.

In testimony whereof I have hereunto subscribed my name this 22d day of March, 1905.

HENRY D. JAMES.

Witnesses:

OTTO S. SCHAIRER,
BIRNEY HINES.