Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 1

FIG. 1

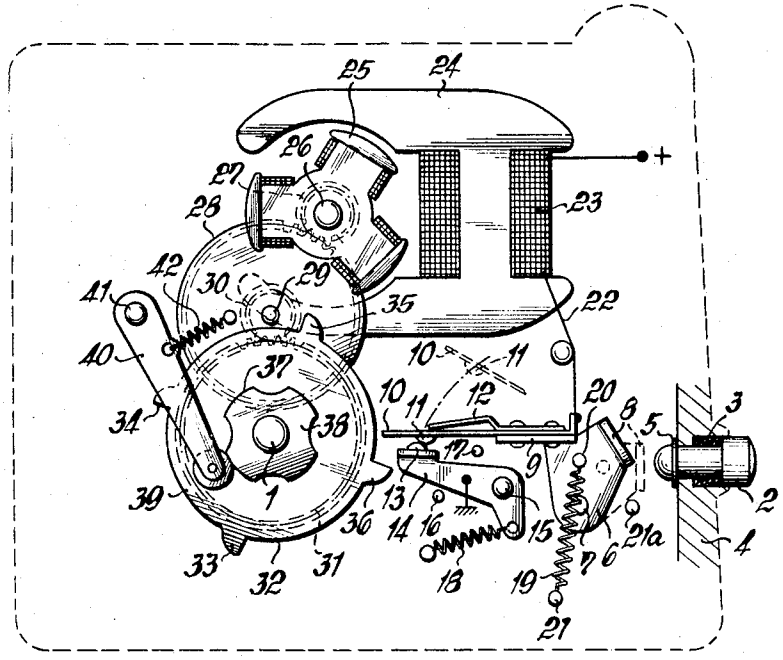
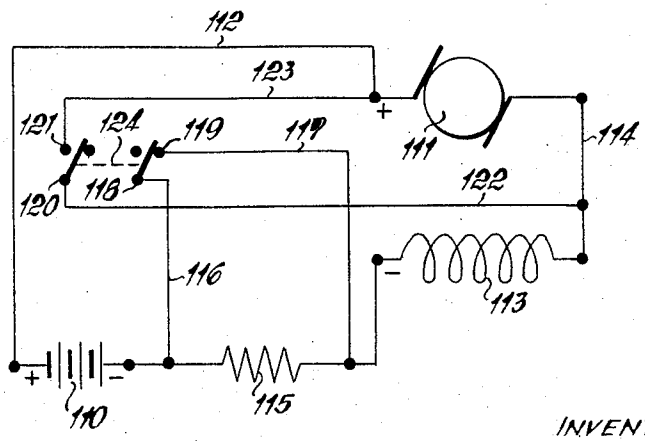


FIG. 3



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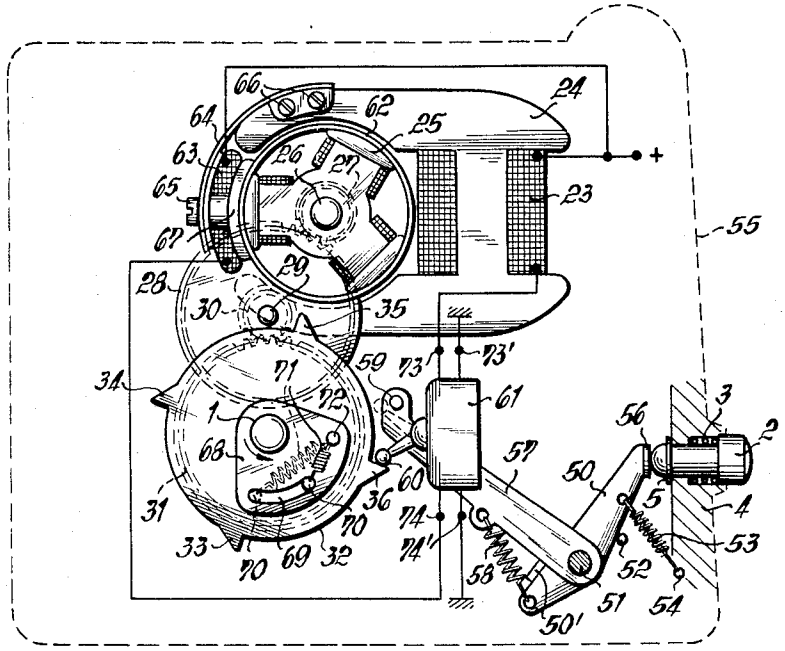
by Michael J. Striker
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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 2

FIG.2



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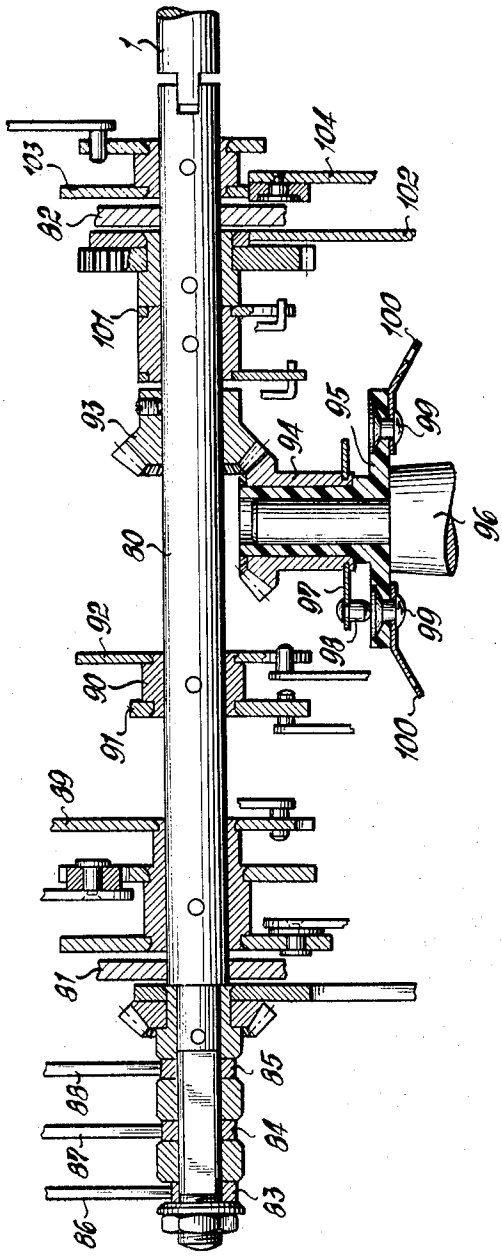
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OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 3

FIG. 4



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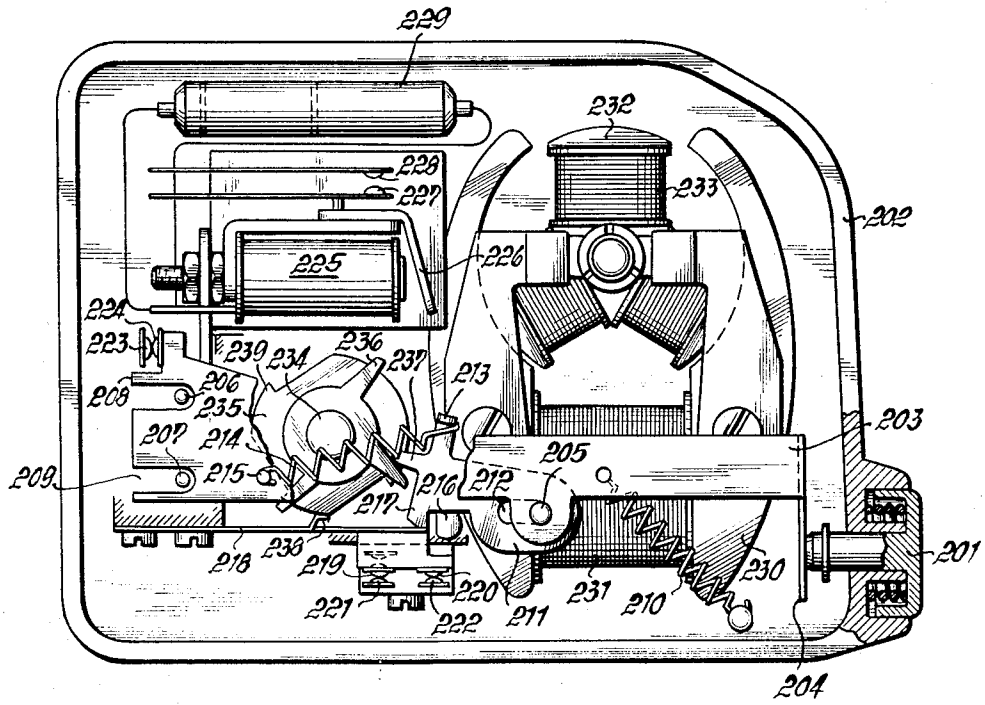
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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 4

FIG. 5



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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 5

FIG. 6

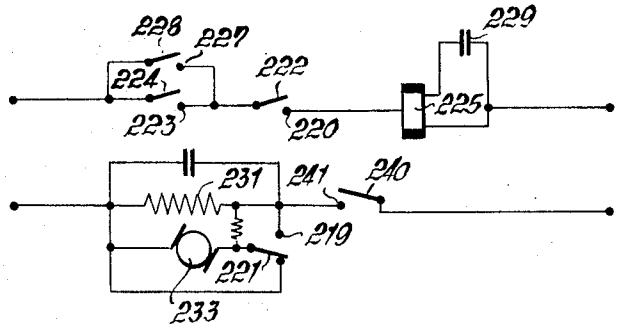
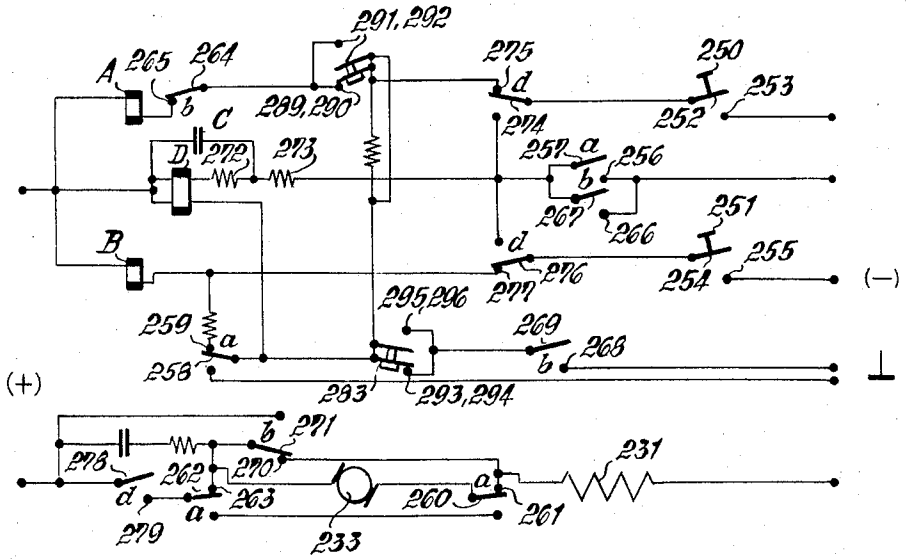


FIG. 8



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by Michael J. Striker

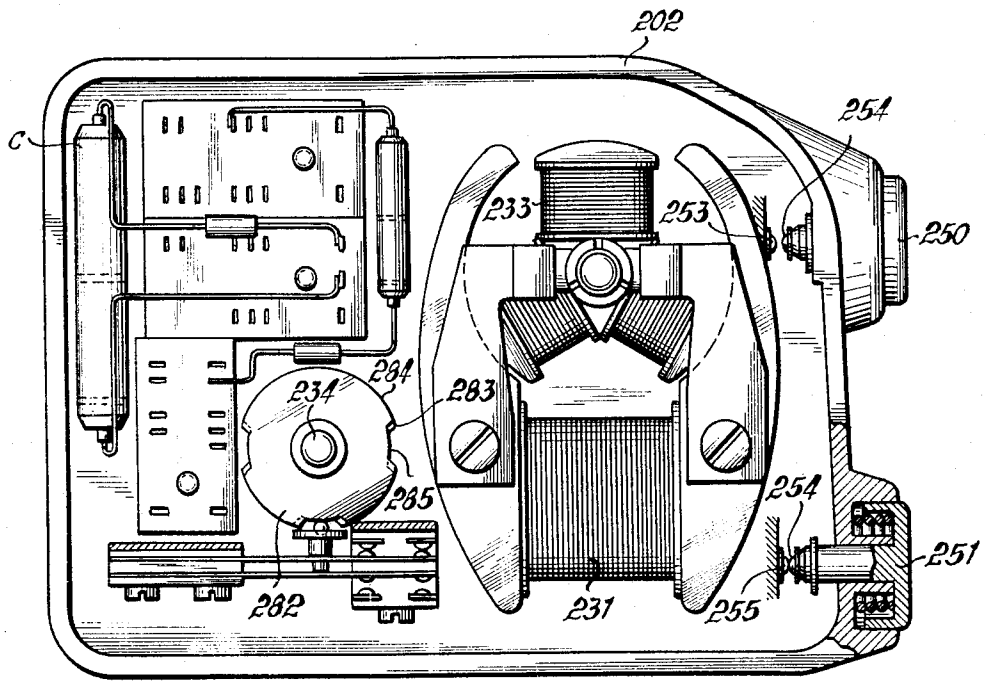
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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 6

FIG. 7



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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 7

FIG. 9a

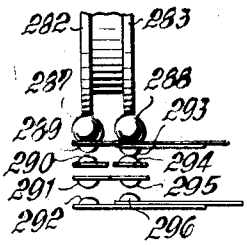


FIG. 9b

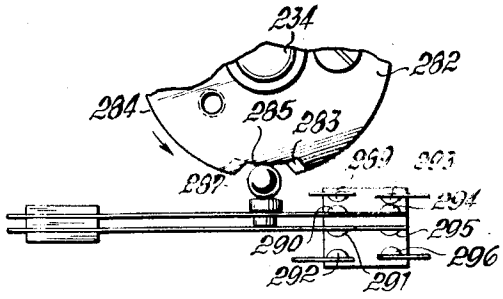


FIG. 10a

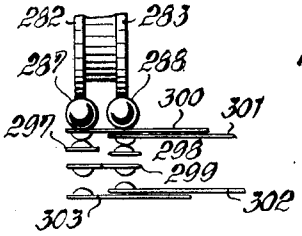


FIG. 10b

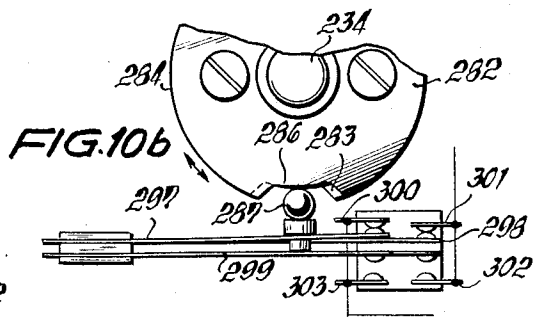


FIG. 11a

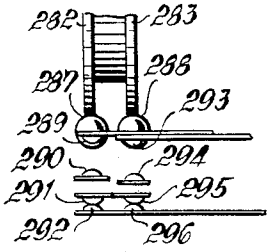


FIG. 11b

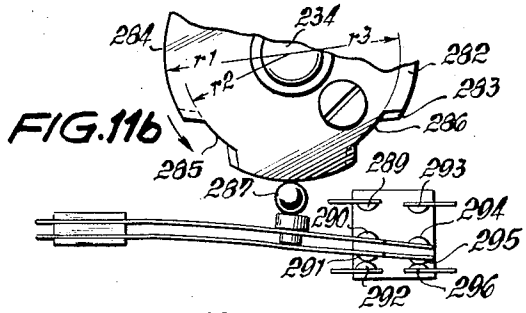


FIG. 12a

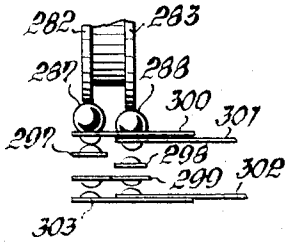
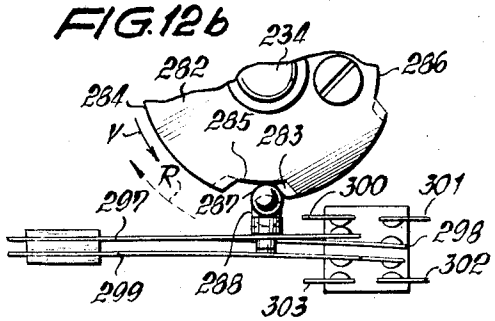


FIG. 12b



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Dec. 20, 1966 W. HAUPT 3,293,525

OPERATING APPARATUS FOR TAXIMETER

Original Filed Aug. 25, 1959 8 Sheets-Sheet 8

FIG. 13a

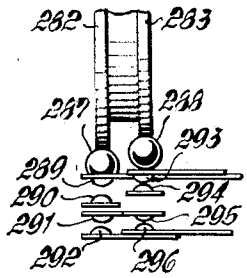


FIG. 13b

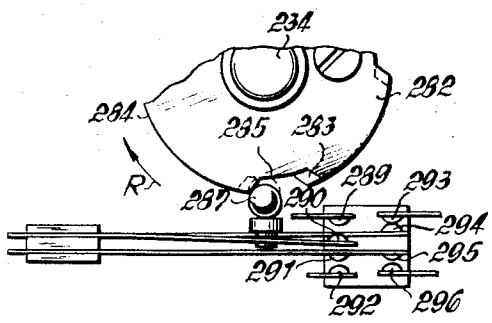
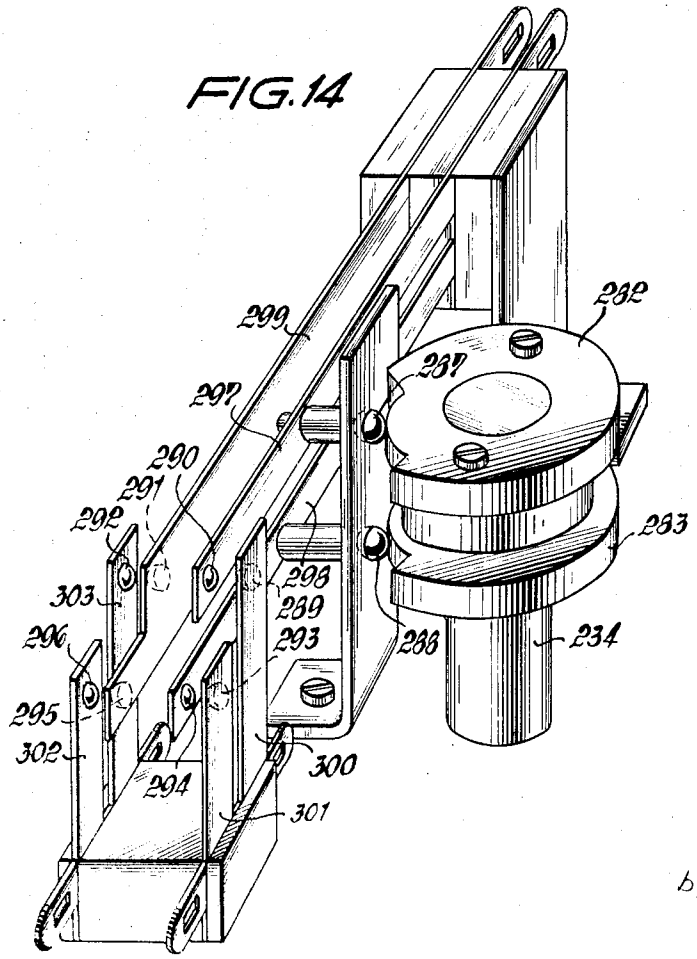


FIG. 14



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United States Patent Office 3,293,525
Patented Dec. 20, 1966

3,293,525

OPERATING APPARATUS FOR TAXIMETER

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Continuation of application Ser. No. 835,895, Aug. 25, 1959. This application Mar. 18, 1964, Ser. No. 353,321
Claims priority, application Great Britain, Apr. 15, 1959, 12,789/59
20 Claims. (Cl. 318—467)

The present invention relates to operating apparatus for taximeters and the like. The present application is a continuing application of my copending application Serial No. 835,895, filed August 25, 1959, now abandoned, which is a continuation-in-part application of the abandoned application Serial No. 629,364, filed December 19, 1956, and entitled Operating Apparatus for Taximeters or the Like.

Taximeters have a control shaft which must be stopped at a plurality of predetermined angular positions, in which positions the various functions of the taximeter mechanism will be released by means of control members connected to this control shaft. In known taximeters this shaft is operated by a so-called flag or a switching knob manually operated by the driver. The rotating movement applied to the flag or switching knob by the operator is transferred to the control shaft by purely mechanical means.

In order to guarantee a safe functioning of the taximeter, it is important with devices of this type that the control shaft be stopped precisely at predetermined angular positions. Furthermore, it is important that the shaft be prevented from stopping between its predetermined angular positions, and it is important that the operator of the device be prevented from tampering with it so as to injure it or to cause faulty operation.

It is accordingly an object of the present invention to provide an operating apparatus of the above type which ie capable of reliably stopping a shaft at precisely predetermined angular positions.

Another object of the present invention is to provide an operating apparatus of the above type which is electrically operated and which requires a small amount of current.

It is a further object of the present invention to provide an apparatus of the above type capable of being manually set into operation while at the same time eliminating any possibility of undesired tampering by the operator or faulty operation such as location of the shaft between two of its predetermined angular positions.

The objects of the present invention also include the provision of structure capable of accomplishing the above objects and at the same time composed of simple and ruggedly constructed elements which are inexpensive to manufacture and assemble and which are very reliable in operation.

It is still another object of the present invention to provide an apparatus of the above type wherein the control shaft can rotate in either one of two selected directions of rotation.

An additional object of the present invention is to provide an apparatus of the above type wherein the control shaft is stopped in a selected angular position solely by the electrical circuit of a motor which drives the control shaft.

A still further object of the present invention is to provide an apparatus of the above type wherein the control shaft is stopped precisely in predetermined angular positions solely by the electrical circuit of the motor and at the same time the motor does not have any components which are energized for a substantial period of time after the motor operation has stopped.

With the above objects in view the present invention includes in a taximeter or the like a unit which includes a rotary control shaft and an electric motor operatively connected to this shaft for rotating the latter during operation of the motor. A manually operable means cooperates with this motor for starting the operation thereof so as to start the rotation of the control shaft, and an automatic operating means is driven by the motor and cooperates therewith for turning the motor off when the shaft has turned through a predetermined angle. In accordance with the present invention a stop means or brake means cooperates with the above unit for stopping the rotation of the motor and of the control shaft precisely at a predetermined angular position of this control shaft. Actuating means are driven by the motor to return the manually operable means to a position of rest, while the motor is maintained energized by the operating means so that the motor cannot be stopped by operation of the manually operable means.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 shows in side elevation the one possible structure according to the present invention, the supporting apparatus for this structure being diagrammatically illustrated;

FIG. 2 shows another embodiment of a device according to the present invention;

FIG. 3 is a wiring diagram of a further embodiment of a structure according to the present invention, the electrical structure illustrated in FIG. 3 being capable of use with the mechanical structure illustrated in FIG. 2;

FIG. 4 is a fragmentary longitudinal sectional illustration of conventional components controlled by the control shaft according to the present invention, FIG. 4 illustrating the manner in which the angular positioning of the control shaft influences the taximeter structure;

FIG. 5 is a fragmentary side elevation, partly in section, of yet another embodiment of a structure according to the present invention;

FIG. 6 is a wiring diagram of the embodiment of FIG. 5;

FIG. 7 is a side elevation, partly diagrammatic and partly in section, of a further embodiment of a structure according to the present invention;

FIG. 8 is a wiring diagram of the embodiment of FIG. 7;

FIGS. 9*a* and 9*b* are fragmentary end and side views of part of the structure of FIGS. 7 and 8 shown in one possible position thereof;

FIGS. 10*a* and 10*b* are end and side views of the structure of FIGS. 9*a* and 9*b* in a different position;

FIGS. 11*a* and 11*b* illustrate the structure of FIGS. 9*a*–10*b* in a still further position, FIGS. 11*a* and 11*b* being respectively end and side views of the structure; and

FIGS. 12*a* and 12*b* are respectively end and side views of the structure of FIGS. 9*a*–11*b* in yet another position.

FIGS. 13*a* and 13*b* are respectively end and side views of the structure of FIGS. 9*a* to 11*b* in still another position; and

FIG. 14 is a perspective view of the parts of FIGS. 9*a* to 13*b*.

The structure shown in FIG. 1 of the drawings may be used for operating a taximeter. A control shaft **1** is supported for rotation about its axis, this shaft having different defined angular positions representative of different settings of the taximeter, various functions of the taximeter being released in each of these positions.

A manually operable switch means includes a push button 2 slidably carried for axial movement in a bore of a wall 4 of the housing and supporting structure. A spring 3 urges the push button 2 to the right, as viewed in the drawing, to its rest position, and the free end of the push button 2 which is within the housing 4 has an annular flange 5 fixed thereto for engaging the inner face of the housing 4 to limit the outer movement of the push button 2 by the spring 3.

The manually operable switch means further includes a snap-over switch made up in part of a lever 6 which is pivotally carried by a stationary pivot pin 7. This lever 6 has a laterally extending lug 8 and an additional laterally extending lug 9, the latter carrying an electrically conductive contact spring 10 which in turn carries an electrical contact 11. An insulated support spring 12 is also carried by the lug 9. The snap-over switch also includes a lever 14 pivotally supported by a stationary pivot pin 15 and having a laterally extending lug which carries a contact 13 engaged by the contact 11 in the position of the switch shown in the drawing, the switch being thus illustrated in its closed position. A pair of stationary stops 16 and 17 limit a turning movement of the lever 14, and a spring 18 urges the lever 14 to turn toward the stop 17 in a clockwise direction, as viewed in the drawing. The lever 6 fixedly carries a pin 20 to which one end of a spring 19 is connected, the other end of the spring 19 being connected to a stationary pin 21. When the spring 19 is on the left side of the center of the pivot pin 7, as viewed in the drawing, and as is shown in the drawing, the spring 19 urges the lever 6 in a counter-clockwise direction about the pivot pin 7, as viewed in the drawing. When the spring 19 is on the right side of the axis of the pivot pin 7, as viewed in the drawing, the spring 19 urges the lever 6 to turn in a clockwise direction, as viewed in the drawing, and the turning of the lever 6 in this direction is limited by the stationary stop 21*a*. The lever 6 is shown in dotted lines in the position it takes when the switch is open and when the lever 6 is pressed against the stop 21*a* by the spring 19. In this position, the lug 8 is located in the path of movement of the push button 2 so that when the latter is pressed the lever 6 is turned in a counterclockwise direction against the force of spring 19 until the latter moves to the left of the axis of the pivot pin 17 to cause the switch to snap over in counterclockwise direction, as viewed in the drawing.

The above-described manually operable snap-over switch means is connected electrically to an electric motor. Thus, a flexible conductor 22 electrically interconnects the contact spring 10 with the coil 23 of the electric motor, the other end of the coil 23 being electrically connected with the positive pole of a battery. The coil 23 is carried by the iron yoke 24 of the motor, and this yoke has two defined poles.

The shaft 26 of the armature 25 of the electric motor fixedly carries a relatively small gear 27 which meshes with a gear 28 carried by a shaft 29 which is fixed to a side wall of the housing 4 located in front of the plane of the drawing. The gear 28 is fixed coaxially with a gear 30 which thus rotates with the gear 28, and this gear 30 meshes with a gear 31 which is fixed to the shaft 1. Thus, elements 27–31 form a reduction gearing for driving the shaft 1 when the motor is energized at a speed of rotation considerable less than that of the motor.

A switch operating means is provided for automatically opening the above-described manually operable snap-over switch means after the shaft 1 turns through a predetermined angle, and this switch operating means is also driven by the electric motor. The switch operating means includes a disc 32 fixed to the shaft 1 for rotation therewith and having at its periphery a plurality of projections 33–36 which are equal in number to the number of predetermined angular rest positions of the shaft 1. It will be noted that the left free end of the contact spring 10 is located in the path of turning movement of the projections 33–36 so that the latter successively engage the contact spring 10 to cause the switch means to be moved to its open position. The shaft 29 terminates short of the plane in which the disc 32 is located and the yoke 24 is located behind this plane.

A stop means is provided for accurately stopping the shaft 1 in its predetermined angular positions, and this stop means includes a disc 37 fixed to the shaft 1 for rotation therewith and formed in its periphery with a plurality of angularly spaced notches 38. This stop means also includes a roller 39 which is adapted to successively enter the notches 38 and which is turnably carried by the free end of a lever 40 which is turnable on a stationary pivot pin 41 and which is urged in a counterclockwise direction by a spring 42 whose end distant from the lever 40 is connected to a stationary pin.

When the operator pushes the button 2 to the left, as viewed in the drawing, the snap-over means snaps over to its closed position, in the manner described above, so that this switch means assumes the solid line position shown in the drawing, and in this position contacts 11 and 13 engage each other so that the motor is energized. The armature 25 thus begins to rotate and drives the shaft 1 at a relatively low speed through the reduction gearing 27–31. The disc 32 rotates with the shaft 1 so that one of the projections 33–36 engages and raises the contact spring 10 through a distance sufficient to cause the spring 19 to become located to the right of the axis of the pivot pin 7 so that the switch means then snaps over to its open position. The upward movement of the lever 14 is limited by the stop pin 17, and while the levers 6 and 14 move simultaneously in a clockwise direction, as viewed in the drawing, the contacts 11 and 13 remain in engagement with each other while changing their relative positions. These contacts may rub against each other, or the contact 13 may be in the form of a ball which is located for free rotation in a suitable socket carried by the lug of the lever 14, so that with this construction a rolling engagement is provided between the contacts 11 and 13.

As soon as the contacts 11 and 13 are no longer in engagement with each other the motor begins to stop, and in order to prevent the contact spring 10 from moving into engagement with one of the projections 33–36 when the switch is closed the next time, the shaft 1 together with the disc 32 continue to turn through a relatively short distance after the switch is opened. The distance through which the shaft 1 turns after the switch is opened is determined by the stop means 37–42, the roller 39 entering into one of the notches 38 to precisely determine the stopped position of the shaft 1. The distance through which the shaft 1 is turned after the switch opens by cooperation of disc 37 with lever 40 is approximately equal to the sum of the play in the teeth of the reduction gearing which interconnects the shaft 1 with the armature 25.

The electrical circuit is from the positive pole of the battery of a vehicle, for example, to the coil 23, and from the latter through the flexible conductor 22 to the contact spring 10. Then the circuit continues from the contact spring 10 through the contacts 11 and 13 and the lever 14 to ground.

In FIG. 2 another embodiment of the invention is shown in which like parts will be designated with like reference numbers. The push button 2 acts on a lever 50 when being pushed in, this latter being pivotally mounted on a bolt 51 and drawn towards a stop pin 52 by means of a spring 53. The other end of this spring 53 is hooked on a pin 54 fastened to the plate 55. The lever 50 has a bentover lug 56 which lies against the free end of the push button 2 in its rest position. A lever 57 is mounted on the same bolt 51 as the lever 50 and is connected to the lever 50 by means of a spring 58 which is connected with its other end to the end of the lever 50 distant of the lug 56. In the rest position of the lever 50 the lever 57 is drawn towards a lug 50′ at the lever 50 by the spring 58. At the end opposite to the bolt 51 the lever 57 is provided with a pin 59. This pin 59 is

adapted to cooperate with the switching lever 60 of the snap-over switch 61 which has two defined positions.

The armature 25 of the motor in this case is surrounded with a ring 62 of magnetic material. Between the two arms of the yoke 24 an electromagnet consisting of the coil 63 and the armature 67 is mounted on a spring 64 of non-magnetic material fastened to the yoke 24 by means of screws 66. The screw 65 serves to fasten the electromagnet 63, 67 to the spring 64. The armature 67 of the electromagnetic coil 63 is in frictional engagement with the ring 62 of the armature 25.

Firmly mounted on the control shaft 1 is a section 68 having a slot 69 in which a bolt 70 fastened to the disc 32 can move. The disc 32 with its projections 33–36 is loosely mounted on the shaft 1 and connected to the sector 63 by means of a spring 71. One end of this latter spring is connected to the sector 68 by means of a pin 72, the other end being hooked to the pin 70 on the disc 32. The arrangement of the other parts corresponds to that in the embodiment shown in FIG. 1.

The switching of the arrangement is as follows:

The positive pole of the battery is for once connected to the coil 23 and to the coil 63. The other terminal of the coil 23 is connected to the contact 73 of the snap-over switch 61, the counter-contact 73' on this side of the snap-over switch being connected to ground. The other terminal of the coil 63 is connected to the contact 74 on the other side of the snap-over switch 61, the other counter-contact 74' also connected to ground. That means that in the position of the switching lever 60 shown in the drawings in full lines the voltage of the battery is applied to the coil 23 thereby starting the motor. In the snapped-over position of the switching lever 60 shown in dotted lines the voltage of the battery is applied to the coil 63 thereby energizing the armature 67 which will act on the ring 62 of the armature 25 as a brake.

The operation of the device is as follows: As soon as the operator pushes in the button 2, the end of this button makes the lever 50 swing around its pivot 51 against the action of the spring 53. By means of the spring 58, the lever 57 is forced to follow this movement of the lever 50, so that the pin 59 on the other end of the lever 57 swings around in anticlockwise direction. Thereby it puts the switching lever 60 into the position shown in the drawing in full lines, in which the coil 23 is energized so that the armature 25 begins to turn, thereby driving the control shaft 1 over the gearing 27, 28, 30, 31. As the sector 68 is fast on the shaft 1 it follows this movement thereby taking along the disc 32 by means of the bolt 70 projecting into the slot 69 of the sector 68. As soon as one of the projections 33–36 comes into engagement with the switching lever 60 the disc 32 will be stopped whereas the segment 68 is turned on. Thereby the spring 71 is drawn out until the pin 70 reaches a position in the slot 69 shown in dotted lines in the drawing. In this position the disc 32 actuates the switching lever 60 with one of its projections 33–36. By this movement of the switching lever 60 the current of the coil 23 is cut off and the voltage of the battery is put to the coil 63, which energizes its armature 67. This latter now operates as a brake for the armature of the motor, so that the motor is instantaneously stopped, thereby also stopping the shaft 1 in its next predetermined angular position.

As may be seen from FIG. 2 the elastic arrangement of the lever 50, 57 in relation to one another prevents any intended or unintentional faulty operation of the button 2 by the operator. When the button 2 is kept in its pushed-in position the snap-over switch will nevertheless be put back to its first position, in which the motor is switched off and the brake 63, 67 switched in. In this case the driving force of the shaft 1 and thereby that of the projection 33–36 on the disc 32 will overcome the force of the spring 58, so that the lever 57 is lifted off the lug 50' to let the switching lever 60 be put back to its first position.

It will be noted that with the above-described apparatus it is extremely convenient and easy for the operator to move the push button 2 in order to start the operation, and at the same time it is impossible for the operator to locate the shaft 1 at an intermediate position between two of its predetermined angular positions. As a result, it is impossible for the operator to tamper with the apparatus or to fraudulently operate it in any way, all of the structure being enclosed within a suitable housing except for the free end of the push button 2 which is accessible to the operator. The motor may be of an extremely small size so that a relatively small current is reqiured and it is unnecessary to use wires of large size for the supply leads.

Of course, instead of an electromagnetic brake as illustrated in FIG. 2, it is possible to provide a mechanical braking structure.

However, in accordance with the present invention, all braking structure may be eliminated and instead when the switch lever 60 of FIG. 2 is turned by one of the projections 33–36 to the position for turning off the motor, a circuit according to the present invention is provided for short circuiting the armature and in this way the rotation of the armature will also be braked. By short circuiting the armature the latter is instantaneously stopped because the remanent magnetic flux in the armature has the effect of generating current which opposes the current of the battery and therefore brakes the armature at once.

An electrical circuit according to the present invention for accomplishing this result is illustrated in FIG. 3. Thus, referring to FIG. 3 it will be seen that the battery 110 has its positive pole connected through the lead 112 to the armature 111 of the motor. The other end of the armature 111 is connected through the lead 114 to the stator 113. Thus, the lead 114 interconnects the armature and stator coils. The end of the stator coil 113 distant from the lead 114 is connected to an electrical resistor 115 which is in turn connected to the negative pole of the battery. The resistor 115 is bridged by a pair of leads 116 and 117 respectively connected to the contacts 118 and 119 which are connected to each other electrically when the switch 124 is in the position illustrated in FIG. 3, the switch 124 corresponding to the switch 61 illustrated in FIG. 2. There are also a pair of contacts 120 and 121 which are separated from each other when the switch 124 is in the position illustrated in FIG. 3, so that when the switching lever 60 of FIG. 2 is actuated by one of the projections 33–36, the switch 124 will be moved from the position illustrated in FIG. 3 to a position where the contacts 120 and 121 are placed in electrical communication with each other and the electrical communication between the contacts 118 and 119 is broken. The contact 121 is connected through a lead 123 to the same end of the armature coil 111 as the lead 112, and the lead 122 interconnects the contact 120 with the lead 114 in the manner illustrated in FIG. 3.

With the structure in the position illustrated in FIG. 3, the motor is switched on and drives the shaft 1. At this time the current flows from the positive pole of the battery 110 through the lead 112 to the armature coil 111 and from the latter through the lead 114 to the stator coil 113, bypassing the resistor 115, and flowing through the lead 117 and the switch 124 to the lead 116 and so back to the negative pole of the battery.

However, when the switch 124 is actuated so as to interconnect the contacts 120 and 121, the armature coil 111 is short-circuited through the lead 122 which now electrically interconnects the leads 114 and 123 through the contacts 120 and 121. The current at this time flows from the positive pole of the battery 110 to the lead 112 then through the lead 123 and the interconnected contacts 121 and 120 along the lead 122 to the coil 113 and from

the latter through the resistor 115 to the battery 110. Thus, in this position of the parts the armature coil 111 is short-circuited and the resistor 115 is connected in series with the stator coil 113. Therefore the armature is stopped instantaneously and does not continue to drive the shaft 1. Inasmuch as the coil 113 is always energized, the resistor 115 is placed in series with the coil 113 when the armature 111 is short-circuited in order to avoid unnecessary heating of the coil 113 and also in order to reduce the current consumption of the vehicle battery in the position where the armature 111 is short-circuited.

Although a series motor is shown in FIG. 3 and described above, it is also possible to use a shunt motor, and in this latter case a resistor would be connected in parallel with the coil of the stator when the armature coil is short-circuited.

FIG. 4 illustrates the manner in which the rotation of the shaft 1 is transmitted to the various parts of a taximeter. As may be seen from FIG. 4, the shaft 1 drives a shaft 80 which is mounted in the taximeter and supported for rotation by the plates 81 and 82 through which the shaft 80 passes. On the left outside plate 81 the shaft 80 carries a number of cams 83, 84, 85. These cams are part of the distance drive of the taximeter and have differently shaped notches which cooperate with levers 86, 87, 88 and serve to subsequently bring into engagement the various transmission ratios of the tariff gear corresponding to tariff I, II, III so that different charges may be made for the same travelled distance.

Also mounted on shaft 80 is a cam 89 which serves to block the shifting pawls of the counters in the "For Hire" position. A bushing 90 is also fastened to shaft 80 and carries two cams 91 and 92. Cam 91 serves to reset the driving shaft for the fare indicating wheels of the taximeter when shaft 80 is turned from the "Stopped" position to the "For Hire" position. Cam 92 serves to bring the zero stops of the fare indicating wheels into operation when the taximeter is reset.

A bevel gear 93 fastened to shaft 80 drives another bevel gear 94, which is mounted for rotation on the bushing 95 of non-metallic material fastened to a post 96 mounted in the casing of the taximeter. The bevel gear 94 is connected with a disc 97 carrying a contact pin 98. This contact pin 98 cooperates with three contact segments 99 in a horizontal flange of bushing 95. Each of the contact segments 99 is connected by leads 100 to the bulbs of an electrical indicator to be used with the taximeter to indicate the position to which the taximeter mechanism has been set, particularly the indications "For Hire," "Hired" and "Stopped."

A cam 101 mounted on the shaft 80 serves to start the time drive, when the taximeter is switched from the "For Hire" to the "Hired" position, and to stop the time drive, when the taximeter is switched from the "Hired" to the "Stopped" position. This is effected by starting and stopping the clock escapement of the time drive mechanism. The lever 102 serves to operate the blinds which cover the fare indicating wheels in the "For Hire" position. A cam 103 and a lever 104 effect the clearing of the fare indicating wheels.

Referring now to FIG. 5, the taximeter structure illustrated therein includes a spring-pressed button 201 carried by the housing 202 of the taximeter. The spring-pressed button 201 cooperates with a lug 204 of a slide bar 203 supported by the housing 202 for longitudinal movement on pins 206 and 207 which are fixedly carried by the housing 202 and are respectively located in elongated slots 208 and 209 formed in slide bar 203 to guide the latter for shifting movement to the right and left, as viewed in FIG. 5. A spring 210 is connected at one end to the slide bar 203 and at its opposite end to a pin which is fixedly carried by the housing 202, so that the spring 210 urges the bar 203 to the right, as viewed in FIG. 5, to a rest position in which the lug 204 is in engagement with the spring-loaded pin 201. The slide 203 carries a pin 205, on which a pawl 211 is mounted by means of a longitudinal slot 212. This pawl 211 has a lug 213, to which one end of a spring 214 is fastened, the other end of the latter spring fixed to a pin 215 on slide 203. This spring therefore always tends to turn pawl 211 in anticlockwise direction, as viewed in FIG. 5. A stop 216 is firmly mounted in casing 202 which serves as a stop for a projection 217 of pawl 211. Pawl 211 can either be in an elevated position in which projection 217 lies on top of stop 216 or it can take up the position shown in FIG. 5 in which nose 217 lies to the left of stop 216 and thereby prevents the slide 203 from being retracted towards the right by spring 210. Projection 217 not only cooperates with stop 216 but also with a leaf spring 218 which carries two contacts 219 and 220, which in the position shown in FIG. 5 cooperate with two counter-contacts 221, 222. Contact pair 219, 221 is part of a motor circuit whereas contact pair 220, 222 is part of a relay circuit described below.

In the position shown in FIG. 5, slide 203 also just closes another pair of contacts 223, 224. This pair of contacts is connected in series with a relay winding 225, which has a tilting armature 226 operating two pairs of contacts 227, 228 and 240, 241, see FIG. 6. Connected in parallel to the relay winding 225 is a capacitor 229.

The electric motor has a stator 230 with a stator coil 231 and an armature 232 having three coils 233. This motor drives the control shaft 234 of the taximeter over a suitable reduction gearing. Fastened to control shaft 234 for synchronous rotation therewith are two cams 235 and 236, cam 236 having three projections. During rotation of shaft 234 the projections of actuating cam 236 cooperate with a projection 237 on pawl 211, to lift pawl 211 from behind stop 216 so that spring 210 can retract slide 203 to a position of rest. Cam 235 is an operating means cooperating with a bent over projecting part 238 of spring 218. During rotation of shaft 234, pawl 211 is first lifted by one of the projections of cam 236, and leaf spring 218 remains in the position shown in FIG. 5, in which the two pairs of contacts 219, 221 and 220, 222 are closed, until cam 235 reaches a position in which the bent over part 238 of leaf spring 218 can snap behind one of the shoulders 239 of cam 235 to open the contacts 220, 222 while contact 219 is shifted to engage a contact 221'.

The operation of the device of FIG. 5 can best be explained with reference to the wiring diagram of this device as shown in FIG. 6.

When push button 201 is operated, slide 203 is moved to the left causing actuation of energizing means for the motor. Pawl 211 closes contacts 220, 222 and 219, 221, whereas slide 203 closes contacts 223, 224. Energizing relay 225 is switched in, and closes also contacts 228, 227 and 240, 241. The contacts, 228, 227 are only necessary as holding contacts for relay 225 so that contacts 223, 224 can open again without interrupting the current of relay 225. The capacitor 229 is charged. By the energizing switch means 219, 221 and 240, 241, the armature and stator coils 231, 233 are energized and the motor begins to rotate shaft 234. The brake means or stop means including switch 219, 221' are in a potentially active braking position. When shaft 234 has reached such a position the one lobe of cam 236 comes into engagement with pawl 211, pawl 211 is lifted up and slide 203 can be retracted by spring 210 while projecting cam portions 239 of the operating cam means 235 hold member 218, 238 and switch 219 in the previous position. After the motor turns shaft 234 a little further, the bent-over part 238 of leaf spring 218 snaps behind one of the shoulders into a recess of cam 235 so that contacts 220, 222 are opened and contact 219 shifted to contact 221' whereby the armature coil 233 is short circuited as shown in FIG. 6. Since relay 225 is connected in parallel with capacitor 229, this

capacitor will now be discharged through the disconnected relay winding 225, so that relay 225 is de-energized with a certain delay. Thus, the circuit of stator coil 231 is maintained closed for a short while over relay contacts 240, 241 after armature coil 233 has been short circuited due to the fact that switch 219 has assumed its braking position. This results in an immediate braking of the electric motor so that shaft 234 is stopped instantaneously. The small angle through which the brake rotor turns causes through the reduction transmission a turning of shaft 234 through an angle of 0.3° which is negligible. Another embodiment of the invention is shown in FIGS. 7 to 14. This embodiment distinguishes from the embodiment of FIGS. 5 and 6 in that the control shaft 234 of the taximeter can be driven in two directions, that is the control shaft can not only be switched from the "For Hire" position to the "Hired" position, from there to "Stopped" and back to "For Hire," but it can also be turned back from the "Stopped" position to the "Hired" position. For this purpose the embodiment according to FIGS. 7 and 8 is provided with a switch means including two manually operable press buttons 250, 251. Press button 250 serves to operate the taximeter for a reverse operation of the control shaft, whereas press button 251 serves to switch control shaft 234 in forward direction. Both press buttons cooperate with pairs of contacts 252, 253; 254, 255. There are provided two relays A, B, which are on one side controlled by the press button 250, 251 and on the other side by the motor circuit. Relay A when energized operates four pairs of contacts, namely, the contact pairs *a*256–257; *a*258–259; *a*260–261 and *a*262–263. The contacts 256, 257 constitute an open and closed switch only, whereas contact *a*258–259; *a*260–261; *a*262–263 also close a circuit, when the armature of relay A is in its released position. Contacts *a*256–257 serve to maintain the circuit of relay D, when the latter contacts are closed. Contacts *a*258–259 are the holding contact for relay A, and also serve to cut off relay B when relay A is working. Contacts *a*260–261 and *a*262–263 serve to reverse the circuit of the armature coils 233 of the motor.

Relay B cooperates with the following contacts:

Contacts *b*264–263, contacts *b*266–267; *b*268–269 and contacts *b*270–271; contacts *b*264–265 cut off relay A when relay B is working. Contacts *b*266–267 serve to maintain the circuit of relay D. Contacts *b*268–269 serve as holding contact for relay B and contacts *b*270–271 close or open the motor circuit. Relay D cooperates with the capacitor C and a pair of resistors 272, 273 and also with three pairs of contacts *d*274–275 and *d*276–277 and *d*278–279.

In addition there are also switching off means for the electric motor controlled by the control shaft. These are the four pairs of contacts as specifically shown in FIGS. 9*a*–14 and in FIG. 7. The first pair of double contacts 289/290 and 291/292 are the switching off means for reverse operations and serve to cut off relay A, while the other switching off means is the pair of double contacts 293/294, 295/296 serving to switch relay B. These switching off contacts will be explained in detail with reference to the FIGS. 9*a* to 14. The control shaft 234 of the taximeter is driven by the electric motor, comprising the stator coil 231 and the armature coil 233. Shaft 234 carries two switching off caps 282 and 283 fixed thereto and to each other. The control cam 282 controls the reverse action of the control shaft 284 whereas the control cam 283 controls the forward action of control shaft 234. The cam 282 has outer edge portions 284, intermediate edge portions 285 and inner edge portions 286, corresponding to radii r_1, r_2 and r_3, wherein $r_1 > r_2 > r_3$, as shown in FIG. 11*b*. The peripheral edge portions of control cam 282 are somewhat angularly displaced with respect to the corresponding peripheral edge portions of cam 283 as best seen from FIG. 14. In a forward action of control shaft 234 the recesses of cam 282, which controls reverse actions, are leading whereas in a reverse action of control shaft 234 the recesses of cam 283, which controls forward actions, are leading.

Each of the control cams cooperate over balls 287, 288 with the two pairs of switching off contacts, that is the control cam 282 cooperates with contact pairs 289, 290; 291, 292 and the control cam 283 over ball 288 with contact pairs 293, 294; 295, 296. Contacts 90, 91; 94, 95 and arranged on three leaf springs 297, 298 and 299, see FIGS. 10*a* and 10*b*. Leaf spring 297 carries contact 290, leaf spring 298 carries contact 294, whereas spring 299 carries contacts 291, 295. Each of contacts 289, 293, 292 and 296 are arranged on a leaf spring 300, 301, 302 and 303 which are arranged at right angles to the leaf springs 297, 298, 299. Leaf spring 300 is not arranged exactly in line with leaf springs 301, but a little higher up.

In the rest position of cams 282, 283 leaf springs 297, 298, 299 are in their upper positions so that contacts 289, 290; 293, 294 are closed. This position is shown in FIGS. 10*a* and 10*b*. It is a position from which the control shaft can be optionally operated in two directions, that is in forward or reverse direction, as cam 282 in this position cooperates at one of its inner edge portions 286 with springs 297 and 299.

When the control shaft takes up a position, out of which it is operable in forward direction only its parts take up a position as shown in FIGS. 9*a*, 9*b*. In this case the ball 287 does not engage an inner edge portion 286 of cam 282 but an intermediate edge portion 285 of cam 282, so that leaf spring 297 keeps contacts 290, 289 apart so that only contacts 293, 294 are closed.

From the position shown in FIGS. 9*a* to 10*b* the arrangement will be put into operation; while the motor runs the balls will take up a position as shown in FIGS. 11*a* and 11*b* in which the cams 282, 283 have lifted up the springs 297, 298 and 299 and thereby closed contacts 291, 292 and 295, 296.

It will be seen from the above that always that one of cams 282, 283 is leading which is non-operative. That is in the forward actions, cam 282, which controls the reverse switching, is leading and in reverse actions control cam 283 which controls the forward action is leading. Forward actions are carried out by an anticlockwise movement of control cams 282, 283 and reverse actions by a clockwise movement of control cams 282, 283, as viewed in the drawings. With this arrangement when switching over from edge portions 285, 286 of cams 282, 283 to outer edge portions 284 the circuit of contacts 289–296 will not be interrupted as the leading control cam, which is otherwise non-operative, will first move leaf spring 299 which is common to contacts 291 and 295, thereby closing contacts 291, 292 and 295, 296 before either of contacts 289, 290 or 293, 294 are opened, so that there is no interruption in the circuits when the balls 287, 288 engage the outer edge portions 284 of control cams 282, 283.

The switching off of relays A and B must be accomplished when contacts 291, 292 are opened before contacts 289, 290 are closed or when contacts 295, 296 are opened before contacts 293, 294 are closed. This short period of switching over from one pair of contacts to the other must be sufficient to release relays A and B. Therefore the steep portions between edge portions 284 and 285 or 286 of cams 282, 283 must slope correspondingly.

The switching over in a forward action from the lower contacts 295, 296 to the upper contacts 293, 294 is shown in FIGS. 12*a* and 12*b*. One can see that whereas contacts 291, 292 and 295, 296 have opened already and contacts 289, 290 have closed, contacts 293, 294 are not yet closed, because ball 288 cannot yet fully move to the inner edge portion 285 on cam 283. This is the moment when relay B is released and the motor stopped as described below. FIGS. 13*a* and 13*b* show the moment of

switching off relay A in reverse actions. Contacts 291/292 have already opened, while contacts 289/290 have not yet closed in the illustrated positions.

The operation of the device as a whole will now be described with special reference to FIG. 8. Let it be assumed that the parts take up a rest position, for instance that the taximeter is in a "For Hire" position which is a position out of which only a forward action of the control shaft is possible. Thus, the control shaft and its control cams 282, 283 take up a position as shown in FIGS. 9*a* and 9*b*. If now press button 251 is operated contacts 254, 255 are closed and relay B will be excited and will operate its contacts *b*264–265; *b*266–267; *b*268–269; *b*270–271. Opening of contacts *b*264–265 only serves to cut off relay A so that the initiation of a reverse action by depression of press button 250 is made impossible. Closing of contacts *b*268–269 serves to hold relay B excited, whereas operation of contacts *b*270–271 serves to switch on the motor circuit, so that coils 231–233 are supplied with current and the motor begins to turn. Control shaft 234 is turned whereby cams 282 and 283 open contacts 293/294 and close contacts 295/296 and 291/292 by means of their portions 284. By the excitation of relay D over contacts *b*266–267, contacts *d*274–275, *d*276–277; *d*278–279 are also closed. Contacts *d*274–275; *d*276–277 serve to separate relays A and B from press buttons 250, 251 so that once the motor has started, the operation of the press buttons 250, 251 remains ineffective during the whole switching procedure. Contact *d*278–279 serves also to maintain the motor circuit. While relay D is excited, the capacitor C is charged over resistor 272.

As soon as the control shaft 234 and thereby also control cams 282, 283 have reached a position in which the control shaft is to be stopped, and where cams 282, 283 are recessed, cam 282 first opens contacts 291/292. After that, cam 283 opens contacts 295/296 without at first closing contacts 293/294.

When these contacts have reached the position as shown in FIGS. 12*a*, 12*b* the current of relay B will be interrupted and contacts *b* will be put back to the initial position. This means that the armature coil 233 is short circuited over contacts *d*278–279 (closed), *a*262–263 (upper position), *b*271–270 (low position), and stator coil 231, which latter is therefore supplied a little longer with current due to the fact that the relay D does not release, while capacitor C dicharges, so that contacts *d*278–279 remain closed until capacitor C is completely discharged. When these last-mentioned contacts open, the motor is cut off completely.

Assuming now that a reverse action is to be initiated by depressing press button 250, this would immediately switch in relay A, if the control shaft 234 takes up a position, in which such reverse action is possible, as for instance if control shaft 234 takes up the "Stopped" position, in which the control cams 282, 283 take up the position shown in FIGS. 10*a* and 10*b* in which contacts 289/290 as well as 293/294 are closed. Relay A is excited and operates its contacts *a*256–257; *a*258–259; *a*260–261 and *a*262–263. The contacts *a*256–257 serve to supply the relay D with current, so that the latter is also excited.

Operation of contact *a*258–259 serves to hold relay A when it is put into its other position. Contacts *a*260–261 and *a*262–263 serve to reverse the direction of current in the armature coil 233, so that the motor turns in reverse direction and also turns the control shaft in reverse direction. The motor is now supplied with current as follows: Plus pole, contacts *d*278–279, *a*262–263 (low position), contacts *a*260–261 (low position), armature coil 233, contacts *b*271–270 (low position), and stator coil 231. The action of relay D is the same as described above for the forward action. When control shaft 234 has reached a position corresponding to that shown in FIGS. 13*a* and 13*b*, contacts 291/292, 295/296 will be opened but contacts 289/290 not yet closed, so that relay A is released and opens all its contacts. Therefore armature coil 233 is short-circuited over contacts *d*278–279 (closed), *a*262–263 (upper position), *b*271–270 (lower position), and stator coil 231 is still supplied with current for a short while from relay D and capacitor C so that the motor and thereby the control shaft 234 are instantaneously stopped.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of control arrangements differing from the types described above.

While the invention has been illustrated and described as embodied in an operating apparatus for the control shaft of a taximeter, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. For use in a taximeter or the like, in combination a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor having a stator and a rotor connected to said control means for rotating the same; brake means for braking rotation of said rotor of said electric motor, said brake means having an inactive condition, a potentially active condition and an active braking condition, which latter braking condition said braking means is adapted to assume only from said potentially active condition and from which braking condition it automatically returns to its inactive condition after a limited braking time period; energizing means for energizing and de-energizing said stator and rotor of said motor; actuating means for placing said brake means from said inactive into said potentially active condition thereof; manually operable means for simultaneously actuating said energizing means so that the same causes energization of said motor and cooperating with said actuating means for placing said brake means into said potentially active position thereof; and automatic operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means and actuating in each of said operating positions thereof said energizing means so as to de-energize said rotor so that said de-energized rotor continues to rotate due to inertia and placing simultaneously said brake means from said potentially active into said active braking condition thereof, whereby said brake means will automatically and instantaneously be placed into active braking condition instantaneously braking said rotor, and after braking of said rotor said brake means will then automatically return into its inactive condition thereof.

2. For use in a taximeter or the like, in combination, a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor having a stator and a rotor connected to said control means for rotating the same; brake means for braking rotation of said rotor of said electric motor, said brake means having an inactive condition, a potentially active condition and an active braking condition, which latter braking condition said braking means is adapted to assume only from said potentially active condition and from which braking condition it automatically returns to its inactive condition after a limited braking time period; energizing means including switch means for

energizing and deenergizing said stator and rotor of said motor; actuating means including first rotary cam means driven in synchronism with said rotor for placing said brake means from said inactive into said potentially active condition thereof; manually operable means for simultaneously actuating said energizing means so that the same causes energization of said motor and cooperating said actuating means for placing said brake means into said potentially active position thereof; and automatic operating means including second rotary cam means driven in synchronoism with said control means and having a plurality of operating positions corresponding to said control positions of said control means and actuating in each of said operating positions thereof said energizing means so as to de-energize said rotor so that said de-energized rotor continues to rotate due to inertia and placing simultaneously said brake means from said potentially active into said active braking condition thereof, whereby said brake means will automatically and instantaneously be placed into active braking condition, instantaneously braking said rotor and after braking of said rotor said brake means will then automatically return into its inactive condition thereof.

3. For use in a taximeter or the like, in combination, a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor having a stator and a rotor connected to said control means for rotating the same; brake means for braking rotation of said rotor of said electric motor, and including means for short-circuiting said rotor, and means for momentarily energizing said stator, said brake means having an inactive condition, a potentially active condition and an active braking condition in which said rotor is short-circuited and said stator is momentarily energized, which latter braking condition said braking means is adapted to assume only from said potentially active condition and from which braking condition it automatically returns to its inactive condition after a limited braking time period; energizing means for energizing and de-energizing said stator and rotor of said motor; actuating means for placing said brake means from said inactive into said potentially active condition thereof; manually operable means for simultaneously actuating said energizing means so that the same causes energization of said motor and cooperating said actuating means for placing said brake means into said potentially active position thereof; and automatic operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means and actuating in each of said operating positions thereof said energizing means so as to de-energize said rotor so that said de-energized rotor continues to rotate due to inertia and simultaneously permitting said brake means to move from said potentially active into said active braking condition thereof, whereby said brake means will automatically and instantaneously be placed into active braking condition, instantaneously braking said rotor, and after braking of said rotor said brake means will then automatically return into its inactive condition thereof.

4. For use in a taximeter or the like, in combination, a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor having a stator and a rotor connected to said control means for rotating the same; brake means for braking rotation of said rotor of said electric motor, said brake means having an inactive condition, a potentially active condition and an active braking condition, which latter braking condition said braking means is tending to assume only from said potentially active condition and from which braking condition it automatically returns to its inactive condition after a limited braking time period; energizing means for energizing and de-energizing said stator and rotor of said motor; actuating means for placing said brake means from said inactive into said potentially active condition thereof; manually operable means shiftable to an operative position for simultaneously actuating said energizing means so that the same causes energization of said motor and including a movable member for holding in said operative position said brake means in said inoperative condition, said movable member being displaced by said actuating means for placing said brake means into said potentially active position thereof; and automatic operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means and actuating in each of said operating positions thereof said energizing means so as to de-energize said rotor so that said de-energized rotor continues to rotate due to inertia and permitting simultaneously to move from said potentially active into said active braking condition thereof, whereby said brake means will automatically and instantaneously be placed into active braking condition, instantaneously braking said rotor and after braking of said rotor said brake means will then automatically return into its inactive condition thereof.

5. For use in a taximeter or the like, in combination, a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor having a stator and a rotor connected to said control means for rotating the same; brake means for braking rotation of said rotor of said electric motor and including means for short-circuiting said rotor, and means for momentarily energizing said stator including a relay, a relay switch, and a capacitor in parallel connection with said relay, said brake means having an inactive condition, a potentially active condition and an active braking condition in which said rotor is short-circuited and said stator is momentarily energized through said relay switch while said relay is energized by said capacitor, which latter braking condition said braking means is tending to assume only from said potentially active condition and from which braking condition it automatically returns to its inactive condition after a limited braking time period; energizing means including switch means for energizing and de-energizing said stator and rotor of said motor; actuating means including first rotary cam means driven in synchronism with said rotor for placing said brake means from said inactive into said potentially active condition thereof; manually operable means shiftable to an operative position for simultaneously actuating said energizing means so that the same causes energization of said motor and including a movable member for holding in said operative position said brake means in said inoperative condition, said movable member being displaced by said actuating means for placing said brake means into said potentially active position thereof; and automatic operating means including second rotary cam means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means and actuating in each of said operating positions thereof said energizing means so as to de-energize said rotor so that said de-energized rotor continues to rotate due to inertia and simultaneously permitting said brake means to move from said potentially active into said active braking condition thereof, whereby said brake means will automatically and instantaneously be placed into active braking condition, instantaneously braking said rotor, and after braking of said rotor said brake means will then automatically return into its inactive condition thereof.

6. For use in a taximeter, in combination, a taximeter control means turnable between a plurality of angularly spaced control positions for setting a taximeter to different operations; a motor for rotating said control means; energizing means for energizing said motor; stop means for stopping said motor; manually operable means having a position of rest and an operative position for actuating said energizing means and for inactivating said stop

means, said manually operable means including holding means for holding the same in said operative position while said motor starts rotation to turn said control means toward the next following control position whereby stopping of said motor by movement of said manually operable means to said inoperative position is prevented; operating means driven in synchronism with said control means and including means controlling said holding means to cause return of said manually operable means to said position of rest when said control means approaches the next following control position, and then holding said energizing means in actuated condition, said operating means having a plurality of operating positions corresponding to said control positions of said control means, said operating means including means for actuating said energizing means to de-energize said motor and for simultaneously actuating said stop means to stop said motor and thereby said control means when arriving at said next following operating position so that said control means is stopped in a control position.

7. For use in a taximeter, in combination, a taximeter control means turnable between a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; switching means having a first position for energizing said stator and rotor, and a second position for short circuiting said rotor and for energizing said stator for a selected short time; manually operable means having inoperative position of rest and an operative position for actuating said switching means to move to said first position whereby said motor starts and rotates said control means toward its next following control position; manually engageable means connected with said manually operable means for moving the same only from said inoperative position to said operative position but not from said operative position to said operative position; holding means for holding said manually operable means in said operative position; and operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means actuating in the region of said operating positions said switching means to move to said second position so that the rotor is rapidly braked while said stator remains temporarily energized and said stator is short circuited in such a manner that said control means is stopped in said next following control position, said operating means including means controlling said holding means to cause return of said manually operable means to said inoperative position when said control means approaches the next following control position.

8. For use in a taximeter, in combination, a taximeter control means turnable between a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; switching means having a first position for energizing said stator and rotor, and a second position for short circuiting said rotor and for energizing said stator for a selected short time; manually operable means having an inoperative position, and an operative position for actuating said switching means to move to said first position whereby said motor starts and rotates said control means toward its next following control position; manually engageable means connected with said manually operable means for moving the same only from said inoperative position to said operative position but not from said operative position to said inoperative position; holding means for holding said manually operable means in said operative position; actuating means connected to said control means and driven in synchronism with the same, said actuating means controlling said holding means and operating the same when said control means approaches the next following control position to cause return of said manually operable means independently of said manually engageable means to said inoperative position; and operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means holding said switching means in said first position upon return of said manually operable means to said inoperative position, and actuating, when arriving in the region of the following operating position, said switching means to move to said second position so that the rotor is rapidly braked while said stator remains temporarily energized and said stator is short circuited in such a manner that said control means is stopped in said next following control position while control of said manually operable means by the operator is prevented during setting of said control means by said motor.

9. For use in a taximeter, in combination, a taximeter control means turnable between a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; switching means having a first position for energizing said stator and rotor, and a second position for short circuiting said rotor and for energizing said stator for a selected short time; manually operable means having an inoperative position, and an operative position for actuating said switching means to move to said first position whereby said motor starts and rotates said control means toward its next following control position, said manually operable means including a shiftable member; arresting holding means for arresting and holding said shiftable member in said operative position; manually engageable means connected with said manually operable means for moving the same only from said inoperative position to said operative position but not from said operative position to said inoperative position; actuating means connected to said control means and driven in synchronism with the same, said actuating means engaging said arresting holding means of said manually operable means in said operative position and releasing the same to cause return of said manually operable means to said inoperative position; and operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means holding said switching means in said first position upon return of said manually operable means to said inoperative position, and actuating, when arriving in the region of the following operating position, said switching means to move to said second position so that the rotor is rapidly braked while said stator remains temporarily energized and said stator is short circuited in such a manner that said control means is stopped in said next following control position while control of said manually operable means by the operator is prevented during setting of said control means by said motor.

10. For use in a taximeter, in combination, a taximeter control means turnable between a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; switching means having a first position for energizing said stator and rotor, and a second position for short circuiting said rotor and for energizing said stator for a selected short time; manually operable means having an inoperative position and an operative position for actuating said switching means to move to said first position whereby said motor starts and rotates said control means towards its next following control position, said manually operable means including holding means for holding the same in said operative position; actuating means connected to said control means and driven in synchronism with the same, said actuating means including a plurality of cam projections whose number corresponds

to the number of said control positions, said cam projections controlling said manually operable means in said operative position and releasing the same to cause return of said manually operable means to said inoperative position; and operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means having a plurality of projecting cam portions followed by recesses bounded by shoulders, said projecting cam portions holding said switching means in said first position upon return of said manually operable means to said inoperative position, and said recesses and shoulders permitting when said operating means arrives in the region of the following operating position, said switching means to move to said second position so that the rotor is rapidly braked while said stator remains temporarily energized and said stator is short circuited in such a manner that said control means is stopped in said next following control position while control of said manually operable means by the operator is prevented during setting of said control means by said motor.

11. For use in a taximeter, in combination, a taximeter control shaft having a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; a voltage source; a relay having a relay switch connected to said stator; a capacitor connected in parallel to said relay; first switch means having a first position for connecting said relay, said capacitor, and said stator through said relay switch to said voltage source and a second position for disconnecting said relay from said voltage source so that said capacitor maintains said relay energized for a short time; second switch means having a first position for connecting said rotor to said voltage source and a second position for short circuiting said rotor, manually operable means for actuating said first and second switch means to move to said first positions whereby said motor starts and rotates said control shaft toward the next following control position; operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means actuating in said operating positions said first and second switch means to move to said second positions so that said capacitor maintains said relay temporarily energized and said relay switch maintains said stator temporarily energized, and so that said second switch means disconnects said rotor from said voltage source and short circuits said rotor whereby said rotor is braked and rapidly stopped in such a manner that said control shaft is stopped to the corresponding control position.

12. For use in a taximeter, in combination, a taximeter control shaft having a plurality of angularly spaced control positions for setting the taximeter to different operations; an electric motor having a stator and a rotor connected to said control means for rotating the same; a voltage source; a relay having a relay switch connected to said stator; a capacitor connecter in parallel to said relay; first switch means having a first position for connecting said relay, said capacitor, and said stator through said relay switch, to said voltage source and a second position for disconnecting said relay from said voltage source so that said capacitor maintains said relay energized for a short time; second switch means having a first position for connecting said rotor to said voltage source and a second position for short circuiting said rotor; manually operable means having an inoperative position of rest and an operative position for actuating said first and second switch means to move to said first positions whereby said motor starts and rotates said control shaft toward the next following control position; actuating means driven in synchronism with said control means and engaging said manually operable means in said operative position to cause return of the same to said inoperative position; operating means driven in synchronism with said control means and having a plurality of operating positions corresponding to said control positions of said control means, said operating means holding said first and second switch means in said first position after return of said manually operable means to said inoperative position, and actuating, when arriving at the following operating position, said first and second switch means to move to said second positions so that said capacitor maintains said relay temporarily energized and said relay switch maintains said stator temporarily energized, and so that said second switch means disconnects said rotor from said voltage source and short circuits said rotor whereby said rotor is braked and rapidly stopped in such a manner that said control shaft is stopped to the corresponding control position.

13. For use in a taximeter or the like, in combination, an electric motor having a stator coil and a rotary armature including an armature coil; electric circuit means including manually operable switch means; manually operable means controlling said switch means and including a longitudinal shiftable slide shiftable from a rest position to an operating position for closing said switch, a pawl carried by said slide for movement therewith, and a spring cooperating with said slide for returning the latter to a rest position where said manually operable switch is open; an arresting catch cooperating with said pawl for maintaining said slide in opposition to said spring in said operating position thereof until said pawl is moved away from said catch, said cam means cooperating with said pawl to actuate the latter for moving the same away from said catch to release said slide to said spring for return movement to said rest position, and another switch forming part of said circuit means and closed by said pawl when said slide is in said operating position thereof for closing said circuit means and starting the operation of said motor, said other switch opening upon movement of said cam means for short circuiting said armature coil and stopping the operation of said motor; relay means forming part of said circuit means and including a relay coil and a relay switch which is closed when said relay coil is energized, the latter coil being energized when said manually operable switch is closed and remaining energized during operation of the motor, said relay switch being located in said circuit means in series with said stator coil and maintaining the latter energized as long as said relay switch remains closed; and capacitor means connected electrically with said relay coil to be charged while said relay coil is energized and to discharge through said relay coil to maintain the latter energized after said cam means opens said circuit means and short circuits said armature coil for maintaining said relay switch closed after said circuit means is opened so that said stator coil remains energized for a period of time after said armature coil is short circuited whereby the rotation of the armature is braked.

14. The combination of claim **20** and wherein said pair of cams at its circumference has camming portions and said circuit means includes mechanically interrelated double contacts for controlling said pair of first relay means in accordance with the angular position of said pair of cams.

15. The combination of claim **14** and wherein one of said cams has inner circumferential camming portions and outer circumferential camming portions located from the center of said cam by a radial distance greater than said inner circumferential portions and said latter cam having intermediate circumferential portions located from the center of said one cam by a radial distance intermediate that of said inner and outer circumferential portions, a pair of contacts of said mechanically interrelated double contacts being closed when said one cam has its inner and outer circumferential camming portions cooperating with

the double contacts and both pairs of said contacts being open when said one cam operates at its intermediate circumferential camming portions with said contacts.

16. The combination of claim 14 and wherein the pair of cams are substantially identical and are angularly out of phase so that one of said cams will lead the other depending upon the direction of rotation of said cams, and irrespective of the direction of rotation that cam which leads being inoperative.

17. For use in a taximeter or the like, in combination, an electric motor having a stator coil and a rotary armature including an armature coil; electrical circuit means including a manually operable switch, said circuit means being connected with said motor for energizing and operating the latter when the latter switch is manually closed; manually operable means controlling said switch and including a longitudinally shiftable slide shiftable from a rest position to an operating position where said manually operable switch is closed, and a pawl carried by said slide for movement therewith, a spring cooperating with said slide for turning the latter to a rest position where said manually operable switch is open; an arresting catch cooperating with said pawl for maintaining said slide in opposition to said spring in said operating position thereof until said pawl is moved away from said catch; cam means operated by said motor and cooperating with said circuit means for short circuiting said armature coil when said armature has turned through a given angle and for simultaneously opening said circuit means to stop the motor, said cam means cooperating with said pawl to actuate the latter for moving the same away from said catch to release said slide to said spring for return movement to said rest position, and a switch means forming part of said circuit means and closed by said pawl when said slide is in said operating position thereof for closing said circuit means and starting the operation of said motor, said switch means opening upon movement of said pawl by said cam means for short circuiting said armature coil and stopping the operation of the motor, said cam means having one portion which cooperates with said pawl and having another portion which cooperates with said switch means; relay means forming part of said circuit means and including a relay coil and a relay switch which is closed when said relay coil is energized, the latter coil being energized when said manually operable switch is closed and remaining energized during operation of said motor, said relay switch being located in said circuit means in series with said stator coil and maintaining the latter energized as long as said relay switch remains closed; and capacitor means connected electrically with said relay coil to be charged while said relay coil is energized and to discharge through said relay coil to maintain the latter energized after said cam means opens said circuit means and short circuits said armature coil for maintaining said relay switch closed after said circuit means is opened so that said stator coil remains energized for a period of time after said armature coil is short circuited, whereby the rotation of the armature is braked.

18. For use in a taximeter or the like, in combination, a unit including a rotary control means having a plurality of angularly spaced control positions; an electric motor connected to said control means for rotating the same; switch means for energizing and de-energizing said motor; manually operable means controlling said switch means and including a slide shiftable from a rest position in which said switch means is open to an operative position in which said switch means is closed, a pawl carried by said slide for movement therewith, and a spring cooperating with said slide for urging the same to said rest position; an arresting catch cooperating with said pawl for maintaining said slide in opposition to said spring in said operating position thereof until said pawl has moved away from said catch; said manually operable means actuating said switch means so that the same causes energization of said motor whereby said motor starts and rotates said control means; switch operating means driven in synchronism with said control means and having a plurality of switch operating positions corresponding to said control positions of said switch means to deenergize said motor so that said de-energized motor continues to rotate due to inertia and permits said control means to turn toward a selected control position, said switch operating means including cam means operated by said motor and cooperating with said pawl to actuate the latter for moving the same away from said catch to release said slide for return movement to said rest position, said switch means being closed by said pawl when said slide is in said operating position thereof, said switch means opening upon movement of said pawl by said cam means for short circuiting the rotor of said motor to brake and stop said motor when said control means is in a selected control position; and means operatively connected with said motor for terminating rotation of the short circuited rotor whereby said rotor is turned to a position in which said control means is in a selected control position.

19. The combination of claim 18 wherein said cam means has one portion cooperating with said pawl and another portion cooperating with said switch means.

20. For use in a taximeter or the like, in combination, an electric motor having a stator coil and a rotary armature including an armature coil; electrical circuit means including manually operable switch means comprising a pair of independent switches selectively operable by the operator, said circuit means further including a pair of first relay means respectively connected electrically with said switches and with said motor for providing rotation of said armature in one direction when one of said manually operable switches and one of said first relay means are energized, and for providing rotation of said armature in an opposite direction when the other switch is closed and the other first relay means is energized; cam means operated by said motor and cooperating with said circuit means for short circuiting said armature coil when said armature has turned through a given angle and for simultaneously opening said circuit means to stop the motor, said cam means including a pair of cams coaxially connected to each other for rotation together and respectively cooperating with said pair of first relay means for switching off the circuit of one of said relay means when the armature rotates in one direction and for switching off the circuit of the other of said first relay means when the armature rotates in the opposite direction; second relay means forming part of said circuit means and including a relay coil and a relay switch which is closed when said relay coil is energized, the latter coil being energized when said manually operable switch means is closed and remaining energized during operation of said motor, said relay switch being located in said circuit means in series with said stator coil and maintaining the latter energized as long as said relay switch remains closed; and capacitor means connected electrically with said relay coil to be charged while said relay coil is energized and to discharge through said relay coil to maintain the latter energized after said cam means opens said circuit means and short circuits said armature coil for maintaining said relay switch closed after said circuit means is opened so that said stator coil remains energized for a period of time after said armature coil is short circuited, whereby the rotation of the armature is braked.

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