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CONTROLLER MECHANISM FOR GENERAL PURPOSES

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Our invention relates to mechanism that may be employed for general purposes, that is, that may be used for controlling operations of mechanisms of various types and particularly in which it is desired to move an actuating member for controlling such mechanisms into a definite position or positions for effecting such control, and an object of the invention, among others, is the production of a mechanism of this type that shall be simple in construction and particularly efficient in securing the desired results.

One form of a mechanism embodying our invention and in the construction and use of which the objects herein set out, as well as others, may be attained is illustrated in the accompanying drawing, in which—

Figure 1 is a diagrammatic view illustrating the construction and operation of our improved controller mechanism.

Figure 2 is a view in lengthwise central section through the barrel and supported parts.

Figure 3 is a view in cross section on a plane denoted by the broken line 3—3 of Figure 2.

Figure 4 is a view of a fragment of the device on a plane denoted by the broken line 4—4 of Fig. 3, this being in the nature of a diagrammatic view, the lengths of the pins being somewhat exaggerated to enable a clear description and understanding of the device.

In the accompanying drawing the numeral 5 denotes a barrel that may be supported in a manner to be presently described by a bearing 6 at one end and by means of a spindle 7 in a bearing 8 at its opposite end. The spindle 7 is shown herein as connected by a worm wheel 9 and worm 10 with the arbor 11 of a reversible motor 12. The barrel 5 is hollow for a considerable portion of its length, a threaded actuating rod 13 being loosely mounted at one end in a hole in a solid part of the barrel at one end and extending along the hollow part of the barrel and through a solid part at the opposite end where its extremity is supported and secured in a bearing block 14 in such manner that the barrel may be rotated independently of the rod. An actuating nut 16 is threaded to fit the thread on the rod 13 and an actuating key 17 secured to the nut protrudes through a slot 18 extending lengthwise along the barrel 5. The key is entered into a hole in a cam 19 slidably mounted upon the barrel 5 whereby operation of the nut upon the threaded actuating rod 13 through the medium of the key will both move the cam lengthwise along the barrel, and rotate it.

The cam has an active portion 20 and an inactive part 21. A controller shaft 22 is rotatably mounted in cooperative relation with respect to said cam, said shaft 22 being mounted in a bearing 23 at one end and in a bearing in the block 14 near its opposite end, as shown in Fig. 1 of the drawing. A controller pin support 24 is mounted upon and secured to the shaft 22 and serves as a mount for controller pins 25 which extend into position for operation by the cam 19. These pins are spaced apart on the support 24 a distance having a definite or fixed relation to the threads of the actuating rod 13, the threads on the rod in the structure herein shown being of one-fourth of an inch pitch and the pins being spaced one-fourth of an inch apart. This provides that one full rotation of the barrel 5, and hence the cam 19, will move the cam along the shaft a distance of one-fourth of an inch and from one of the pins 25 to the next adjacent pin. The widths of the active and inactive parts 20 and 21 of the cam are substantially one-fourth of an inch although the width of the latter is somewhat immaterial. The pins are of gradually increased lengths so that the active part 20 of the cam will properly receive the next succeeding pin as the cam moves along the barrel 5. The inactive part 21 of the cam is concentrically formed to provide a "dwell" in the operation of the cam upon a pin and immediately after the pin disengages from the active portion of the cam for a purpose to be hereinafter described.

During the operation of the cam while rotating in the direction indicated by the arrow applied to the barrel 5 the pin 25 denoted by the letter *b* is engaged with the active part 20 of the cam and consequently lifts the support 24, and the pin 25 denoted by the letter *a* has therefore been moved from contact with the active part 20 of the cam and may pass to the right out of the sphere of action of the cam. The said pin *b* will continue to raise the support 24 as the cam rotates in the direction indicated until the end of said pin is positioned in the plane of the concentric portion of the cam 25, being then in position to pass on to the concentric inactive portion 21 of the cam. At this time the end of the pin 25 denoted by the letter *c* will be located opposite some part of the lower portion of the active part 20 of the cam in position to pass on to said active part, and continued rotation of the cam will cause the pin last mentioned to take up its duty in raising the support 24, this operation continuing until automatically stopped by mechanism to be hereinafter described. A control arm 26 is secured to

the shaft 22 to be moved thereby into different radial positions for such operation of a controller member as may be desired. The exact radial position to which the control arm will be moved within each step may be determined by screwing the pin 25, which corresponds to the particular step in question, in or out in the support. By so doing a greater or less portion of the cam surface is effective in imparting motion to the pin support 24. A bar is shown attached to the end of the arm 26 and serves as a connection to said controller member which may be employed for a wide variety of purposes, as for varying the speed control of an engine or for moving any controlling member from one position to another to change the operating effects obtained by its operation.

The mechanical structure just described is connected with an electrical apparatus for controlling the operation of the motor 12, this connection comprising a gear 27 having a hub on one side entered into a hole in the end of the barrel and secured therein by a set screw as shown in Fig. 1. A hub 13 on the opposite side of the gear has a bearing in the block 14 and the rod 13 extends through these hubs into the block 14 in which it is fast from turning as shown in Fig. 1. This gear 27 is engaged with a gear 28 secured to a shaft 29 at one end which shaft is supported as in a bearing 30, the opposite end of this shaft having a worm 31 in mesh with a worm gear 32 secured to the arbor 33 of a rotatably mounted contact supporting disk 34 upon which contacts 35—38 are secured. Brushes 37—38 are located with the free ends of the brushes against the contacts 35—38. The base of each of the brushes 37—38 is electrically connected into an electric circuit for flow of current for operation of the motor 12 in a manner now to be described.

The motor 12 is of the reversible type having one wire 39 extending from a main wire 40 and connected with the motor, and two wires 41—42 lead from the motor to the contacts 35—38, respectively. When the current traverses the wires 41 and 39 connected to the motor the latter will rotate in one direction in a manner that will be readily understood, and when the current traverses the wires 42 and 39 the motor will rotate in the opposite direction.

In the construction herein shown the brushes 37—38 are connected respectively with contacts 43—44, each brush being connected with a contact as by means of a wire 45 or 46. The contacts 43—44 are each in a position for engagement with one end of a pivotally mounted switch blade 47 the pivot of which is connected by wire 48 with the main line wire 49 located opposite the main line wire 40 hereinbefore mentioned.

The operation of the switch blade 47 in connection with the contacts 43—44 will cause the motor to turn in one direction or another as may be desired. The device is operated as follows:

It is explained that the pins 25 in the control support 24 have a definite relation to the contacts 43—44 and consequently to the brushes 37 and 38, the pins 37' at the right of the center in the set shown in Figure 1 having relation to and acting in connection with the set 37 of brushes and consequently with the set 43 of contacts, and the set 38' of pins at the left of the center in the set as shown in Fig. 1 having a relation to and acting in connection with the set 38 of brushes and consequently with

the set 44 of contacts. With this in mind the barrel 5 and the disk 34 rotating in the direction indicated by the arrow, the pin b is active in raising the support 24 to the limit to be reached by said pin just before it passes from the active part 20 of the cam on to the inactive part 21 of said cam, the pin a being in position just before leaving the cam and the pin c being in position just before it is located opposite the active part 20 of the cam, which is moving to the left. In this position of the parts the brush b' at the right of the set 37 of brushes and which cooperates with said pin b is just at the point of disengagement from the contact 35. Continuing movement for a short period to end the cycle the pin b passes on to the inactive part 21 of the cam, the pin c passes into position opposite the active part 20 of the cam, the pin a passes beyond the inactive part 21 of the cam and the brush b' disengages from the contact 35, thereby breaking the circuit and stopping the motor with the controller arm 26 in the proper position for which the mechanism was set.

The pin b is now located on the concentric part of the cam, thereby imparting no movement to the support 24 and arm 26 and this effects the dwell hereinbefore referred to for enabling the parts to overcome any slight momentum which they may have gained by their movement and this without further movement of the arm 26 from the position to which it has been moved. Should this momentum be sufficient to move the brush b' on to the contact 35 a circuit will be established but in a way to reverse direction of rotation of the motor in a manner that will be readily understood with the result that the brush b' will again be located in the space between the contacts 35—38, and the momentum having been reduced, the motor will come to rest.

If a different degree of movement of the arm 26 be desired, this may be effected by moving the switch blade 47 on to another of the contacts and the degree of movement of the arm 26 will be governed accordingly. If it be desired to move the arm 26 in the opposite direction, as to the left, the switch blade 47 will be moved into contact with one of the contacts 44, this reversing the direction of rotation of the motor and of the barrel 5 and the action of the cam 19 on the pins 25 will be reversed to that just described, the cam moving to the right instead of to the left.

The contacts 43—44, together with the switch blade 47, constitute a remote control connected with the controller mechanism by means of wires 45—46 and this enables a remote control to be obtained that may be located in any place relatively to the controller mechanism and at such distance therefrom as may be desired.

While as an illustrative example the threads on the rod 13 and the pins 25 are set out herein as having a one-fourth inch relationship, it will be understood that this may be varied as desired. The connection between the barrel 5 and the disk 34 is so timed, and the brushes 37—38 are so spaced relatively to each other that the degree of movement of the disk 34 and the movement of the contacts 35—38 together with the spaced arrangement of the pins 25 will act in unison to break the circuit coincident with the completion of an action by a pin 25.

In accordance with the provisions of the patent statutes we have described the principles of operation of our invention, together with the device which we now consider to represent the

best embodiment thereof; but we desire to have it understood that the device shown is only illustrative and that the invention may be carried out by other means and applied to uses other than those above set out.

We claim:

1. A controller mechanism including a movably mounted controller member, a separately movably mounted controller pin support, a set of pins rigidly carried by said support for successive operative movement with said controller member for operative movement of said support by either of said pins, and a control device operatively connected with said support for operation thereby.

2. A controller mechanism including a movably mounted controller member, a separately movably mounted controller pin support, a set of pins rigidly carried by said support but each of which is adjustably mounted therein for adjustment toward and from said controller member and for successive operative engagement with said controller member for operative movement of said support by either of said pins, and a control device operatively connected with said support for operation thereby.

3. A controller mechanism including a movably mounted controller member, a controller pin support mounted for rocking movement independently of said member, a set of pins rigidly carried by said support for successive operative engagement with said controller member for operative movement by either of said pins to rock said support on its axis, and a control device operatively connected with said support for operation thereby.

4. A controller mechanism including a movably mounted controller member, a rotatably mounted controller shaft, a controller pin support secured to said shaft, a set of pins rigidly carried by said support for successive operative engagement with said controller member for operative movement of said shaft by either of said pins, and a control device operatively connected with said support for operation thereby.

5. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins rigidly carried by said support for operative movement of said support by either of said pins, a controller member movably mounted to successively engage said pins to thereby move said pin support to various positions, and means for effecting movement of said controller member.

6. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins rigidly carried by said support for operative movement of said support by either of said pins, a controller member rotatably mounted to successively engage said pins to thereby move said pin support to various positions, and means for effecting rotation of said controller member.

7. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a controller member in the form of a rotatably mounted cam, means for rotating said cam, and means for imparting axial movement to the cam to successively engage said pins to effect different degrees of movement of said pin support.

8. In a controller mechanism of the character described and having a movably mounted pin support operatively connected with a control device and also having a set of controller pins mounted in said support, a controller member in the form of a rotatably mounted cam having an active and an inactive part, means for rotating said cam, and means for imparting axial movement to said cam to successively engage said pins to effect different degrees of movement of said pin support.

9. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a controller member in the form of a rotatably mounted cam having an active and an inactive surface, means for rotating said cam, and means for imparting axial movement to the cam to successively engage said pins first with said active surface and then with said inactive surface to impart different degrees of movement to said pin support.

10. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a rotatably mounted controller member in the form of a cam, means for rotating said controller member, a threaded actuating rod threaded through said cam, and means for rotating said cam to successively engage the cam with said controller pins.

11. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a rotatably mounted actuating barrel, means for rotating said barrel, a controller member mounted in said barrel for rotation thereby, and means for imparting movement of said controller member lengthwise along the barrel to successively engage with said pins for operation of said pin support.

12. In a controller mechanism of the character described and including a rotatably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a threaded supporting rod secured against rotation, an actuating barrel rotatably mounted on said rod, means for rotating said barrel, a slot extending lengthwise along the barrel through one wall thereof, a nut located within the barrel and engaged with said threaded rod and having a key extending through said slot, and a controller member mounted on said barrel and having a recess engaged by said key whereby said controller member is rotatably mounted and axially movable to successively engage said pins for operation of said pin support.

13. In a controller mechanism of the character described and including a rotatably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a threaded actuating rod secured against rotation, an actuating barrel rotatably mounted on said rod, means for rotating said barrel, and a controller member secured to said barrel for rotation therewith and having a threaded opening through which said rod extends, said controller member being operatively engaged with said pins for successive operation thereof to operate said pin support.

14. In a controller mechanism of the character described and including a movably mounted pin

support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support, an electric motor operatively connected with said controller support for the operation thereof, a controller mounted on said controller support and secured to rotate therewith, means for moving said controller lengthwise along said controller support to successively engage the controller pins on said pin support for operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, a contact on said contact support operatively connected into one side of the circuit for operating said motor, and a brush supported in position to engage said contact and operatively connected with the other side of said circuit.

15. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support, an electric motor operatively connected with said controller support for the operation thereof, a controller mounted on said support and secured to rotate therewith, means for moving said controller lengthwise along said controller support to successively engage the controller pins in said pin support for the operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, a contact on said contact support operatively connected into one side of the circuit for operating said motor, and a set of brushes supported in position to engage said contact and operatively connected into the other side of said circuit.

16. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support, an electric motor operatively connected with said controller support for the operation thereof, a controller mounted on said controller support and secured to rotate therewith, means for moving said controller lengthwise along said controller support to successively engage the controller pins on said pin support for operation thereof, a movably mounted contact support, a contact on said support operatively connected into one side of the circuit for operating said motor, a set of brushes supported in position to engage said contact and operatively connected into the other side of said circuit, and a timed connection between said controller support and said contact support for imparting relative timed action between said pins and said brushes.

17. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support, an electric motor operatively connected with said controller support for operation thereof, a controller mounted on said support and secured to operate therewith, means for moving said controller lengthwise along said controller support to successively engage the controller with the pins on said pin support for operation thereof, a movably mounted contact support operatively connected with the controller support for operation thereby, a contact on said

contact support operatively connected into one side of the circuit for operating said motor, a set of brushes supported in position to engage said contact, an electric switch, and a connection between said brushes and said switch and between said switch and the other side of said electric circuit.

18. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a rotatably mounted controller support, a reversible electric motor operatively connected with said controller support for the operation thereof, a controller mounted on said controller support and secured to rotate therewith, means for moving said controller lengthwise along said controller support to successively engage the controller pins in said pin support for operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, contacts mounted on said contact support and operatively connected into one side of the circuit for operating said motor, said contacts operating in connection with the motor in rotation of the latter in different directions, and a set of brushes supported in position to engage each of said contacts and operatively connected into the other side of said circuit.

19. In a controller mechanism of the character described and including a movably mounted pin supporting member operatively connected with a control device and having a set of controller pins mounted in said support, a controller member in the form of a rotatably mounted cam, means for rotating said cam, and means for imparting relative movement as between said pin supporting member and said cam to effect successive engagement of the cam with said pins to produce different degrees of movement of said pin support.

20. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support operatively connected with said pin support for successive engagement of the pins thereon, an electric motor operatively connected with said controller support for operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, a contact on said contact support operatively connected into one side of the circuit for operating said motor, and a brush supported in position to engage said contact and operatively connected into the other side of said circuit.

21. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support operatively connected with said pins for successive operation thereof, an electric motor operatively connected with said controller support for the operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, a contact on said contact support operatively connected into one side of the circuit for operating said motor, and a set of brushes supported in position to engage said contact and operatively connected into the other side of said circuit.

22. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support operatively connected with said pins for successive operation thereof to actuate said pin support, an electric motor operatively connected with said controller support for the operation thereof, a movably mounted contact support, a contact on said contact support operatively connected into one side of the circuit for operating said motor, a set of brushes supported in position to engage said contact and operatively connect it into the other side of said circuit, and a timed connection between said controller support and said contact support for imparting relative time action between said pins and said brushes.

23. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said pin support, a rotatably mounted controller support operatively connected with said pins for successive operation thereof to actuate said pin support, an electric motor operatively connected with said controller support for operation thereof, a movably mounted contact support operatively connected with the controller

support for operation thereby, a contact on said contact support operatively connected into one side of the circuit for operating said motor, a set of brushes supported in position to engage said contact, an electric switch, and a connection between said brushes and said switch and between said switch and the other side of said electric circuit.

24. In a controller mechanism of the character described and including a movably mounted pin support operatively connected with a control device and having a set of controller pins mounted in said support, a rotatably mounted controller support operatively connected with said pins for successive operation thereof to actuate said pin support, a reversible electric motor operatively connected with said controller support for the operation thereof, a movably mounted contact support operatively connected with said controller support for operation thereby, contacts mounted on said contact support and operatively connected into one side of the circuit for operating said motor, said contacts operating in connection with the motor in rotation of the latter in different directions, and a set of brushes supported in position to engage each of said contacts and operatively connected into the other side of said circuit.

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