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INDEXING MECHANISM

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Fig. 1.

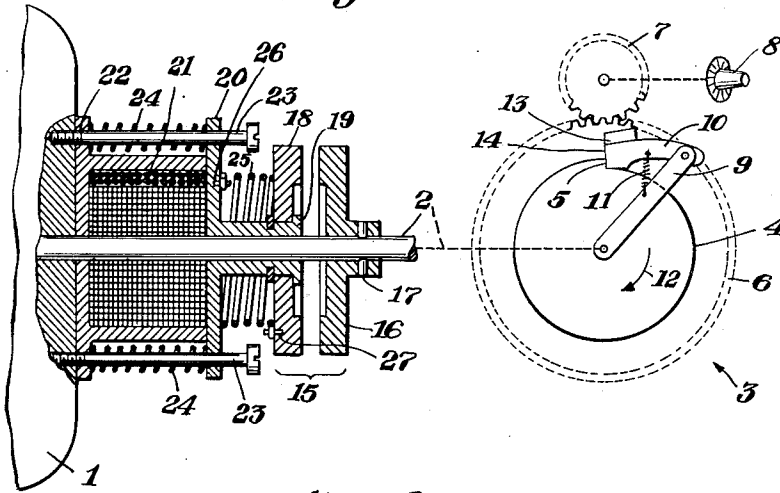


Fig. 2.

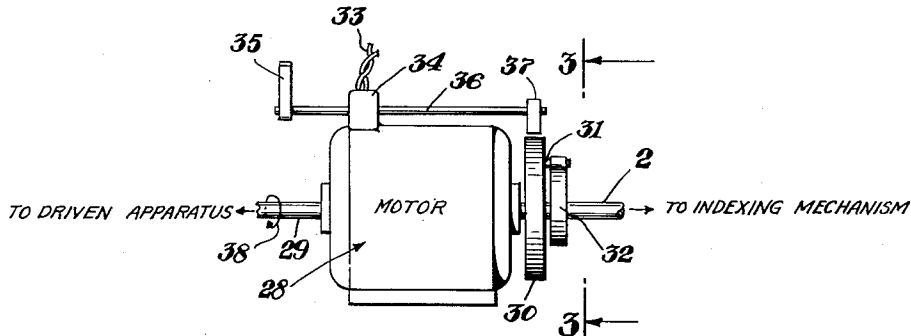
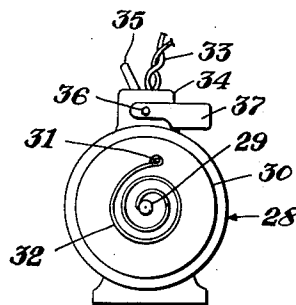


Fig. 3.



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INDEXING MECHANISM

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1

This invention relates to mechanism for effecting the stoppage of motor-driven devices and more particularly for effecting and maintaining the stoppage of such devices in a given rotary position by a reversal in rotation.

When attempting to effect a stoppage of a rotary apparatus in a given rotary position, mechanisms designed for this purpose, available heretofore, have been found inadequate due to the rotary inertia of the apparatus which caused it to override a given position at which it had been stopped, thereby also affecting the positiveness of the stoppage.

It is an object of the present invention to provide a means for stopping a rotatably driven apparatus in a given rotary position by application thereto of a reverse rotation at the time of stoppage.

It is another object to provide a mechanism of the type referred to which will impart a reversed rotation to a rotating apparatus upon stoppage thereof to return it to a predetermined rotary position from which it had departed due to inertia.

Still another object is to provide spring-actuated rotation-reversing means to return the rotary apparatus to a given rotary position after stoppage has been effected.

In accordance with our invention, we provide in combination with a motor-driven rotary apparatus, a stopping mechanism on the driving shaft, including a rotary detent element adapted to be engaged by a stopping element arranged for separate rotary motion with respect to the drive shaft. There is also provided on the shaft, rotation-braking and spring-motor means for effecting reverse rotation. The braking means comprises, according to one of the features, a clutch mechanism, one part of which is secured to the shaft, the other being freely movable thereon. The movable part of the clutch includes the spring-motor which, when the power to the motor has been removed and the freely movable spring-urged clutch portion has made contact with the clutch portion rotating with the shaft, causes, after the rotary inertia of the motor has wound it, to reverse the rotation of the shaft until the spring has substantially unwound. The reverse motion causes the detent and stopping means to firmly engage in a given rotary position as determined by the position given to the detent prior to the removal of power to the motor. In accordance with another feature of the invention, the clutch is replaced by a brake drum combination which becomes effective as the motor switch is opened.

2

These and other features and objects of the invention will be best understood from the following description of an embodiment thereof, reference being had to the drawings, in which:

Fig. 1 is an illustration, partly in section, of a rotary stopping mechanism and of the rotation-reversal means in accordance with the invention;

Fig. 2 is a view in elevation of a motor and prony-type brake therefor including a spring means for rotation reversal; and

Fig. 3 is a view in the direction of the arrows of a section III—III taken in the view of Fig. 2.

Referring to Fig. 1 of the attached drawings there is shown a portion of a motor 1 for driving an apparatus (which has not been shown) and which for instance, may be the tuning condenser of a radio communication apparatus as used in a scanning receiver. The motor 1 is provided with a drive shaft 2 for driving the rotary apparatus as well as an adjustable indexing or stopping mechanism 3. This stopping mechanism may be one of many convenient types, preferably such as the one illustrated, wherein a cam 4, provided with a detent or stopping face 5 is fixedly connected to a gear 6 which may be rotated through a gear 7 and an adjusting knob 8 to any selected rotary position. Directly mounted on the shaft 2 is a rotating arm 9 having a lever 10 pivoted thereon and urged against the cam 4 by means of a spring 11. When the shaft 2 is rotated in the direction of the arrow 12 at a normal operating speed, a weight 13 at the end of the lever 10 exerts a centrifugal force resulting in a position of the lever 10 effective in holding the stopping portion or face 14 out of engagement with the detent 5.

In addition, there is mounted on the shaft 2, a clutch mechanism 15 comprised of one clutch face 16 fixedly secured to the shaft 2 by means of a pin 17. Another clutch face 18 is mounted to rotate freely on a sleeve 19 on the shaft forming part of an armature 20 of an electromagnet 21 fastened to the motor 1 preferably by means such as threaded bolts 22—23. The armature 20 is ordinarily urged away from the electromagnet or coil 21 by means of expansion springs 24 mounted on the bolts 23. It will be seen that during rotation of the motor, the armature does not rotate but remains stationary due to its connection with the housing of the motor through the bolts 23. The freely rotatable clutch plate 18 is flexibly connected to the non-rotary armature 20 by means of a helical type spring 25, one end of which is anchored to the armature 26, the other end thereof being secured to the clutch plate 18 at 27.

The arrangement is such that when motor 1 is in operation, the coil 21 is energized to hold the armature 20 and therewith the clutch face 18 away from the rotating clutch 16 against the compression of the springs 24. When the power to the motor is removed, the electromagnet 21 becomes de-energized and the springs 24 force the armature 20 and with it the clutch plate 18 into engagement with the clutch plate 16. Due to rotary inertia, the rotation of the rotor of the motor 1 persists for a short period and causes the clutch plate 16 fixed to the shaft and the plate 18 to rotate and to wind the spring 25. As the shaft 2 finally comes to rest, the tension in the wound spring 25 reverses the rotation of the shaft 2 carrying the arm 9 and level 10 at a relatively low speed so that the stopping face or portion 14 of the stopping mechanism 3 tends to positively engage the detent 5 on the cam 4. The spring 25 is preferably of sufficient length to provide for several revolutions of the shaft after the motor has been stopped so that a continuous and positive urge is effective on the lever 10 with respect to the detent 5 regardless of the adjustment of the cam 4. It is apparent that the helical spring 25 may be replaced by a coil spring, such as ordinarily used in watches.

In the other form of the invention, shown in Figs. 2 and 3, a motor 28, which is provided with a drive shaft 29 for rotating suitable rotary apparatus, as well as an indexing mechanism, as described in connection with Fig. 3, has been provided with a freely rotatable brake drum or disk 30 to which is fixedly attached at 31 one end of a spiral or helical spring 32. The power supply circuit for the motor includes wire conductors 33 and a switch box 34, the switch of which is operated by a lever 35. Mounted on a shaft 36 provided for operating the switch 34 by means of the lever 30, is a brake shoe 37 for application to the brake drum 30.

Thus, when it is desired to stop the apparatus at a given selected position, the power supplied to the motor is interrupted by operation of the lever 35 opening the switch 34, simultaneously applying the brake shoe 37 to the drum 31, which tends to stop the rotation thereof. The inertia of the shaft 29 and of the motor rotor continues to rotate the shaft in the direction of the arrow 38 for a few revolutions to wind the spring 32 between the shaft 29 and the braked drum 30. After the rotation due to this inertia has stopped, the tension in the spring 32 will cause the shaft 29 slowly to reverse its rotation. This will effect a positive engagement of the detent and stopping portions of the indexing mechanism as described in connection with Fig. 1.

It will be apparent from the above description that the inherent advantage of this device lies in the fact that it is unnecessary to reverse the power of the motor in order to obtain a reversal of the driving shaft for positively operating the indexing or stopping mechanism.

While we have described above the principles of our invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of our invention as set forth in the objects hereof.

We claim:

1. For use with a rotatable device which it is desired to stop in a given rotary position, a stopping system, comprising a shaft, power means for driving said shaft; means for stopping said shaft arranged to become effective upon the removal of

power from said driving means including detent means and means for engaging said detent in a rotary sense opposite to the normal one for said shaft, said engaging means being arranged to be rotated by the shaft and said detent means being independently rotatable to selected rotary positions; means for braking the rotation of said shaft, and spring motor means arranged to be energized for reverse rotation of said shaft upon said braking means becoming effective, whereby a given period after said braking means has become effective said spring motor means causes said shaft to reverse its rotation to effect a positive operation of said stopping means in a predetermined rotary position.

2. A system according to claim 1, wherein said braking means comprises a clutch including means for maintaining it inoperative during operation of said shaft by said power means.

3. A system according to claim 1, wherein said braking means comprises a clutch including electromagnet means for maintaining it inoperative during operation of said shaft by said power means.

4. A system according to claim 1, wherein said braking means comprises a clutch having a portion rotating with said shaft and a freely rotatable second portion, and said spring motor comprises a helical spring operatively connected to said second portion to be wound by the rotation thereof.

5. A system according to claim 1, wherein said braking means comprises a friction brake, and means for actuating said brake.

6. A system according to claim 1, wherein said braking means comprises a friction brake including a freely rotatable brake drum and a brake shoe, and said spring motor means comprises a helical spring operatively connected between said drum and said shaft to be wound by the continued rotation of said shaft upon application of said shoe to said drum.

7. For use with a rotatable device which it is desired to stop in a given rotary position, a stopping system, comprising a shaft, power means for driving said shaft; means for stopping said shaft arranged to become effective upon the removal of power from said driving means including detent means and means for engaging said detent in a rotary sense opposite to the normal one for said shaft, said engaging means being arranged to be rotated by said shaft and said detent means being independently rotatable to selected rotary positions; friction clutch means for braking reverse rotation of said shaft, an electromagnet for maintaining said clutch inoperative during shaft rotation by said power means, spring means normally urging said clutch into operative position, spring motor means operatively connected between a fixed portion of said system and said clutch to be energized by said clutch for reverse rotation of said shaft upon the said clutch becoming effective, and means to render said clutch effective upon de-energization of said power means; whereby a given period after said clutch has become effective said spring motor means causes said shaft to reverse its rotation to effect a positive operation of said stopping means in a predetermined rotary position.

8. For use with a rotatable device which it is desired to stop in a given rotary position, a stopping system, comprising a shaft, an electric motor including power control means for rotating said shaft, means for stopping said shaft arranged to become effective upon the removal of power from

5

said motor including detent means and means for engaging said detent in a rotary sense opposite to the normal one for said shaft, said engaging means being arranged to be rotated by said shaft and said detent means being independently rotatable to selected rotary positions; friction brake means including a brake drum and a brake shoe for braking the rotation of said shaft, means for simultaneously operating said power control and said brake shoe, and spring motor means operatively connected between said drum and said shaft to be energized by said shaft for reverse rotation of the shaft upon said braking means becoming effective, whereby a given period after said

6

operating means has been actuated said spring motor means causes the shaft to reverse the rotation to effect a positive operation of said stopping means in a predetermined rotary position.

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The following references are of record in the file of this patent:

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