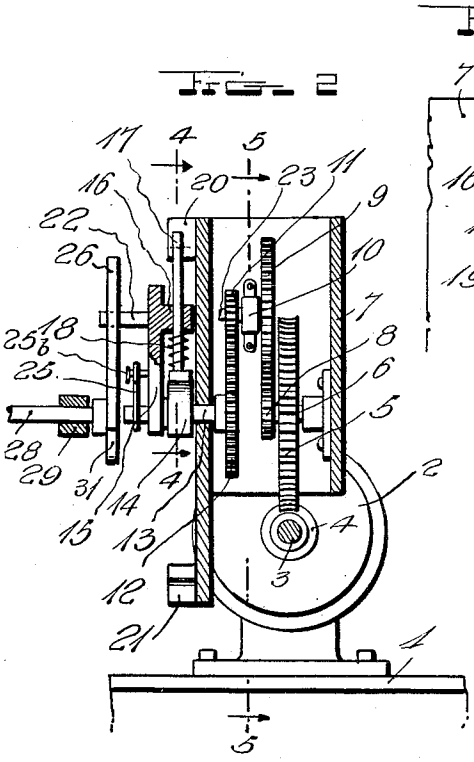
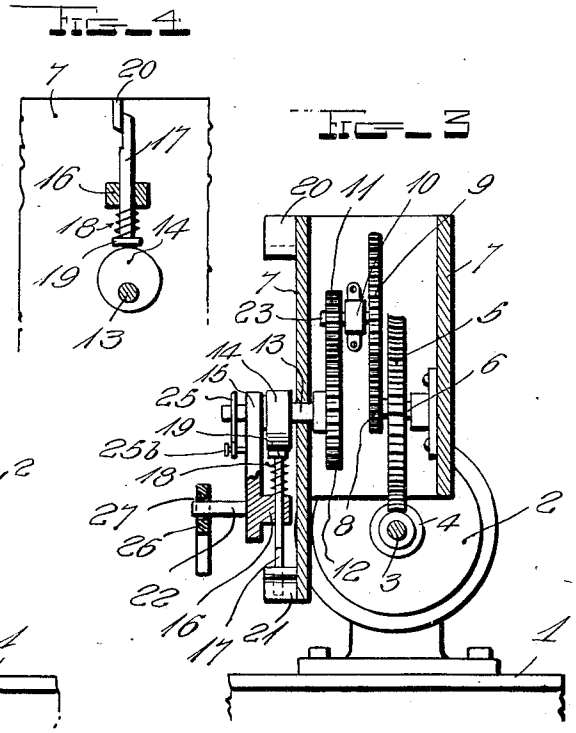
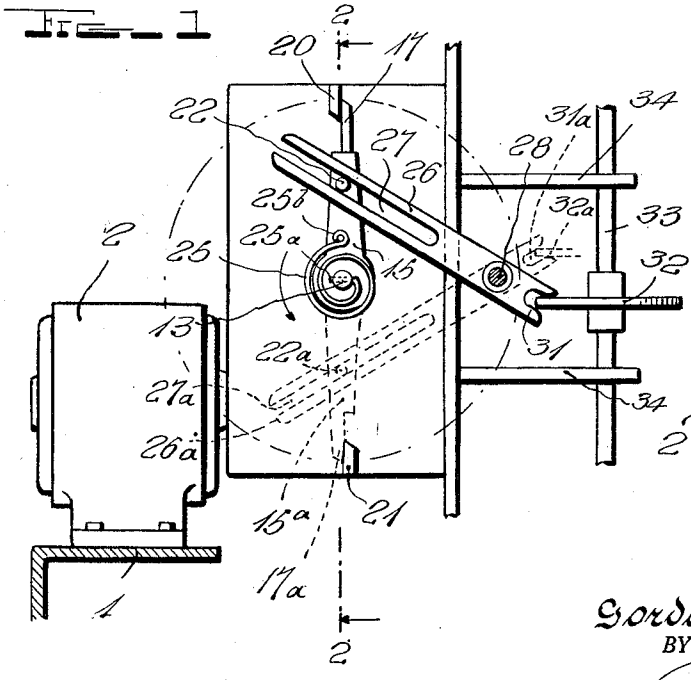
April 12, 1932. G. B. SCHEIBELL 1,853,381

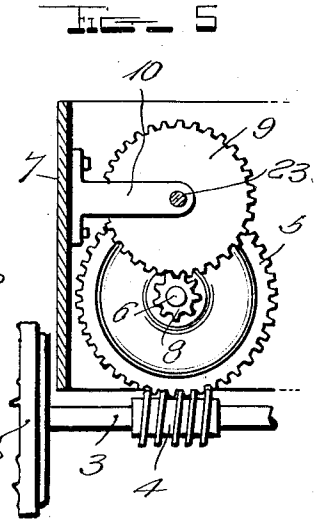
MECHANICAL CONTROL APPARATUS

Filed May 14, 1930









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UNITED STATES PATENT OFFICE

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MECHANICAL CONTROL APPARATUS

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My invention relates broadly to a mechanical movement and more particularly to a quick acting reversing mechanism.

One of the objects of my invention is to provide a construction of automatic time controlled reversing mechanism whereby the position of an actuating member may be changed quickly at the end of a predetermined time interval.

Another object of my invention is to provide a compact arrangement of gears and reversing mechanism by which the movement of a pin may be controlled over a predetermined time interval for bringing out a quick snap action for the reversing of an associated mechanical member.

Still another object of my invention is to provide a mechanism having means for automatically storing energy in a spring device for a periodic action for producing reciprocative movement from a continuous rotative movement.

Other and further objects of my invention reside in the construction of quick action reverse movement apparatus as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the mechanical movement of my invention; Fig. 2 is a longitudinal cross-sectional view through the actuating mechanism on line 2—2 of Fig. 1 showing the actuating mechanism in one position; Fig. 3 is a cross-sectional view of the actuating mechanism illustrated in Fig. 2 but removed to an extreme opposite position; Fig. 4 is a fragmentary view on line 4—4 of Fig. 2 illustrating one of the release pawls used in the construction of my invention; and Fig. 5 is a fragmentary cross-sectional view taken through the apparatus on line 5—5 of Fig. 2.

Referring to the drawings in detail, reference character 1 designates a supporting frame structure which carries driving motor 2 which operates drive shaft 3 having the worm 4 thereon. The worm 4 meshes with worm wheel 5 carried upon stub shaft 6 which is supported from one wall of the frame 7. The stub shaft 6 also carries spur gear 8 which meshes with gear 9 carried on shaft 23 which is journaled in the support 10. The opposite end of the shaft 23 carries gear 11 which meshes with gear 12 carried upon shaft 13 journaled in the opposite side of the frame 7. Shaft 13 carries a cam 14 which is rotatably driven at a greatly reduced rate of speed through the gear train from the driving motor 2. The pin 17 is caused to be actuated by the turning movement of cam 14. Spring 18 constantly urges the pin 17 to a projected position during the movement of the cam. The contacting shoe 19 is thus continuously urged against the surface of cam 14. A radially extending guide member 15 having a laterally projecting lug 16 thereon serves to slidably support pin 17 in position. The shaft 13 revolves within the inner end of the guide 15. A coil spring 25 has one end 25*a* thereof fixed to the shaft 13 and the other end 25*b* fixed to a pin in the radially projecting member 15. As the shaft 13 rotates in a couter-clockwise direction there is a tendency for spring 25 to be coiled thereby storing energy in the spring. The storing or winding operation continues for one-half of a complete revolution of shaft 13, serving to twist spring 25 counter-clockwise from the locked position illustrated in Fig. 2 in which position the pin 17 is stopped by the locking lug 20 (see Fig. 1). The pin 22 extends laterally from the member 15 and passes through the forked bar 26 having a slot 27 cut in the end thereof. The bar 26 is rigidly mounted on a stub shaft indicated at 28, which is rotatably mounted in the bracket 29. The opposite end of bar 26 shown at 31 is forked to engage the peripheral edge of a movable disk 32 which disk is carried by a shaft 33 which is reciprocative in the guides 34 in accordance with the movement of the bar 26.

Inasmuch as the pin 22 on the radially projecting member 15 engages the forked end of bar 26, the movement of the member 15 tends to impart angular movement to the bar 26 to shift bar 26 from the full line position shown in Fig. 1 to the dotted line position illustrated therein. As cam 14, driven by shaft 13, moves in a counterclockwise direction to a position opposite the position illustrated in Fig. 4, pin

17, the contacting shoe 19 of which rides on the cam 14, is pressed by spring 18, thus forcing pin 17 from behind lug or abutment 20. This leaves member 15 without obstruction to the angular movement thereof. The kinetic energy stored in spring 25 is now rendered effective for angularly shifting member 15. By providing the abutment 21 180° displaced from the abutment 20, the radially projecting member 15 is limited against further movement for the reason that pin 17 is ejected in the course of the 180° movement of arm 15 so that pin 17 abuts against the abutment 21 as represented at 17*a*. As heretofore pointed out, pin 17 was forced radially inward by spring 18 by reason of the angular shifting of cam 14 under control of shaft 13 to a position 180° removed from the position illustrated in Fig. 4. However, when arm 15 is snapped by the action of spring 25 to its lower limiting position 15*a*, spring 18 is compressed by reason of the fact that head 19 rides upon the surface of cam 14, which in the arrangement under discussion tends to eject pin 17 to the position 17*a* whereby member 15 is brought to a sudden stop in the position illustrated in dotted lines illustrated at 15*a* in Fig. 1, or in the position shown in cross-section in Fig. 3. This snap action angularly shifts bar 26, imparting rotary movement to the shaft 28, thus moving the bar 26 to dotted line position 26*a* under control of the path of movement of pin 22*a*. The yoke end of the bar 26 is moved to the position shown at 31*a* resulting in the shifting of disc 32 to the position 32*a*. That is to say, the shaft 33 is shifted vertically as represented in Fig. 1 when the disc 32 is moved to the position 32*a*.

The apparatus is now in condition for a repeat cycle for the series of operations which I have explained. Motor 2 is continuously operating so that the reduction gear operates continuously to rotate shaft 13. Shaft 13 tends to continuously wind spring 25, thereby restoring the required energy therein for producing the necessary turning torque. The continued driving of the reduction gear system results in the movement of cam 14 to the position illustrated in Fig. 4. When this occurs the pin 17 shifts inwardly under the action of spring 18 in a position clear of the abutment 21 and projecting arm 15*a* is again subjected to a quick impulse from spring 25. The pin shown at 22*a* travels along slot 27*a* imparting an impulse to the arm 26*a*, tending to restore the arm to full line position, as shown in Fig. 1. This action results in the movement of fork 31 to full line position, thereby actuating disc 32 and reciprocating shaft 33. In the course of this movement pin 17 has again been ejected by the action of spring 18 so that the arm 26 is brought to a state of rest by the abutment of the pin 17 against the stop 20.

The stops 20 and 21 intercept the path of movement of arm 26 every 180°. By properly designing the reduction gear and predetermining the rate of movement of driving motor 2 the time period at which shaft 33 will be shifted is adjusted.

The mechanism of my invention has numerous applications in devices in which it is desirable to quickly shift a member at a predetermined and regularly recurring time, among which I may mention a reversing device for reversing the movement of a film mechanism in a multiple channel sound projector, wherein the same film is operated first in one direction and then in the opposite direction, the rewinding process being directly utilized for the reproduction of sound recorded on the film.

While I have described a preferred embodiment of my invention, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A mechanical movement comprising driving means, a reduction gear actuated by said driving means, a cam angularly movable in accordance with the operation of said reduction gear, a latch mechanism operated by said cam, spring means maintained under tension by said driving means, a pair of oppositely positioned abutments for arresting the movement of said latch mechanism, the movement of said cam operating to release said latch mechanism from any one of the arrested positions thereof for movement of said latch mechanism under the action of said spring means, and an angularly moveable member operated by the movement of said latch mechanism for producing reciprocative motion.

2. A mechanical movement comprising rotary driving means, a reduction gear operated by said driving means, an angularly movable cam controlled by said reduction gear, a rotatable arm having a latch carried thereby and adapted to abut with either of two oppositely positioned limiting stops, an angularly shiftable lever having one end thereof adapted to produce reciprocative motion and the other end thereof adapted to be angularly shifted in accordance with the rotary movement of said arm, a spring device adapted to be wound by said driving means, and a pin aligned with said arm and radially projectible with respect thereto under control of the movement of said cam for latching said arm in either one of two limiting positions for a predetermined time period.

3. In a mechanical movement, rotary driving means for producing continuous rotary motion at a predetermined speed, recip-

rocative means, means rotatably driven by said rotary driving means at a substantially different speed for timing the operation of said reciprocative means, and resilient means for periodically reversing said reciprocative means at predetermined times with respect to the movement of said rotary driving means.

4. A mechanical movement comprising, a reciprocative member, a motor, gearing adapted to be continuously driven by said motor, a shaft driven by said gearing at a speed substantially different from the speed of said motor, a rotatable member for moving said reciprocative member in successively opposite directions, resilient means coupled to said shaft for driving said rotatable member, and means for periodically arresting the movement of said rotatable member for time intervals predetermined with respect to the continuous movement of said motor.

5. In a mechanical movement, rotary driving means, a rotatable member, resilient means driven by said driving means for imparting rotary motion to said rotatable member, means for intermittently arresting the rotary motion of said rotatable member, and a reciprocative member mounted non-axially with respect to said rotatable member, said rotatable member being adapted to move said reciprocative member in successively opposite directions.

6. A mechanical movement comprising, driving means, a cam driven by said driving means, a latch mechanism operated by said cam, resilient means maintained under tension by said driving means, abutments for arresting the movement of said latch mechanism, the movement of said cam operating to release said latch mechanism from any one of the arrested positions thereof for movement of said latch mechanism under the action of said resilient means, and an angularly movable member operated by said latch mechanism for producing reciprocative motion.

7. A mechanical movement comprising rotary driving means, reciprocative means, a reduction gear operated by said rotary driving means, a shaft driven by said reduction gear, a spring motor subjected to a continuous winding operation by said shaft, an angularly movable member operative by said spring motor for periodic movement through angles of substantially 180° at time intervals controlled by said rotary driving means, and a connection between said reciprocative means and said angularly movable member for imparting forces to said reciprocative means in successively opposite directions.

In testimony whereof I affix my signature.

GORDON BROWN SCHEIBELL.