March 10, 1959 H. N. NERWIN, JR 2,876,868

ROTARY STEPPING CAM

Filed April 9, 1957

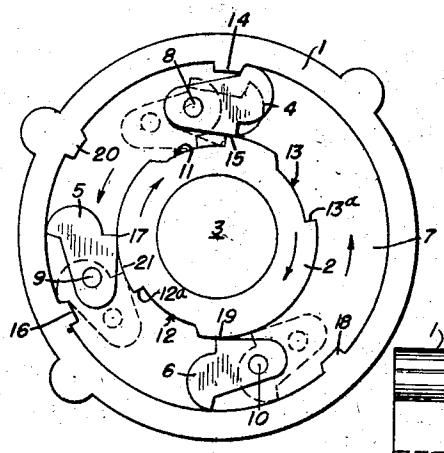


FIG. 1

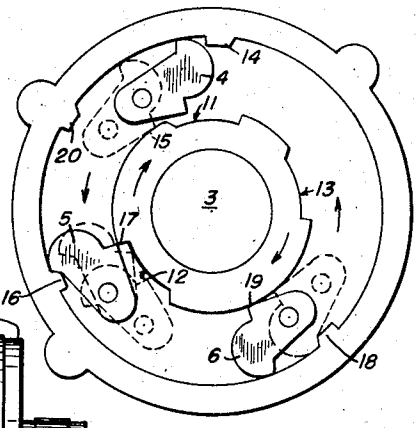


FIG. 2

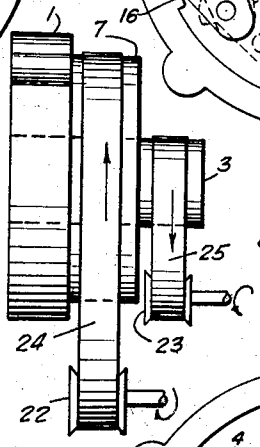


FIG. 5

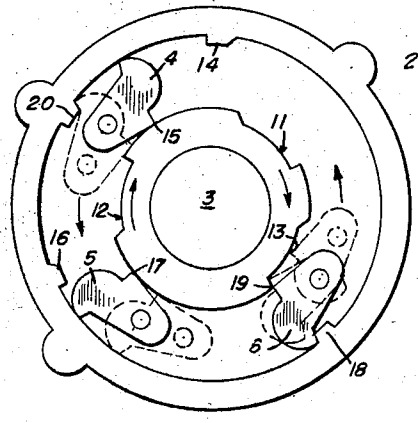


FIG. 3

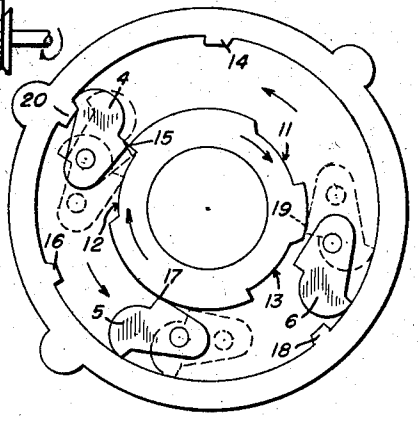


FIG. 4

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United States Patent Office 2,876,868
Patented Mar. 10, 1959

2,876,868

ROTARY STEPPING CAM

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Application April 9, 1957, Serial No. 651,770

1 Claim. (Cl. 188—85)

This invention relates to intermittent rotary devices, and more specifically to a device in which rotary motion is transferred to intermittent unidirectional rotary motion.

A principal object of the invention is to provide rugged, reliable, economical devices for producing intermittent rotary motions of predetermined amplitude at predetermined time intervals.

Preferred embodiments of my invention utilize unique arrangements of cam and pawl to provide an intermittent rotary motion not heretofore known.

The specific nature of the invention as well as other objects, uses and advantages thereof will clearly appear from the following description and from the accompanying drawing, in which:

Figure 1 is a plan view of an embodiment of my invention in the initial position.

Figures 2, 3 and 4 show subsequent positions after action commences.

Figure 5 is a side view of Figure 1, showing pulleys and belts which drive rotatable members of the rotary step cam.

In Figure 1, a pawl stop ring 1 is held in a fixed position. A timing trip cam 2 is attached to and is rotated clockwise by means of a drive shaft 3. Pawls 4, 5 and 6 are attached to a rotor plate 7 but are free to rotate about pins 8, 9 and 10. The rotor plate 7 is constructed so that when it is free, a spring, a pulley belt, or some other mechanism (not shown) will cause it to rotate in a counter-clockwise direction. The drive shaft 3 and timing trip cam 2 rotate in a clockwise direction at a fixed velocity. The above-mentioned mechanism for rotating the rotor plate 7, when rotor plate 7 is free, causes rotation at a velocity which greatly exceeds that of the timing trip cam 2. Intermittent stopping of rotor plate 7 can be varied to occur at predetermined intervals by the location of the latching pawls 4, 5, and 6 on rotor plate 7 and cam recesses 11, 12 and 13, on timing trip cam 2. Many combinations are obtainable; the one indicated here is for a timing sequence of 1-, 4-, and 1-second intervals in that order.

In Figure 1, counter-clockwise rotation of rotor plate 7 is restrained by contact of the latching pawl 4 with pawl stop 14 and at point 15 on timing trip cam 2. A moment arm tending to rotate latching pawl 4 about pin 8, resulting from the force of latching pawl 4 against pawl stop 14, causes contact at point 15. As timing trip cam 2 rotates clockwise, pawl 4 will move into cam recess 11, slip past pawl stop 14, and allow rotor plate 7 to rotate 20°. Latching pawl 5 then contacts pawl stop 16 and timing trip cam 2 at point 17, thereby stopping the rotation of plate 7. End 12*a* of cam recess 12 now lies 12° from point 17. With the timing trip cam 2 rotating at a constant velocity of 12° per second, rotor plate 7 is restrained for one second.

In Figure 2, after 1 second of clockwise rotation of timing trip cam 2, end 12*a* of cam recess 12 becomes aligned with latching pawl 5 so that latching pawl 5 will move into cam recess 12, thereby allowing pawl 5 to slip past pawl stop 16. Rotor plate 7 then continues to rotate for an additional 20°. Rotation ceases because of contact of latching pawl 6 with pawl stop 18 and point 19 on timing trip cam 2. Since end 13*a* of cam recess

13 lies 48° from point 19, the rotor plate 7 is restrained for 4 seconds.

In Figure 3, the timing trip cam 2 has traversed said 48° so that latching pawl 6 moves into recess 13, slips past pawl stop 18, and allows rotor plate 7 to rotate. After 20° of rotation by rotor plate 7, it is halted by contact of latching pawl 4 with pawl stop 20 and with point 21 on timing trip cam 2. Since end 12*a* of cam recess 12 lies 12° from point 21, the rotor plate 7 is restrained for one second.

In Figure 4, the timing trip cam 2 has traversed said 12°, so that the rotor plate 7 is free to rotate as previously explained.

As shown in Figure 5, continuous rotation of rotor plate 7 in one direction and continuous rotation of cam 2 in the opposite direction is effected by pulleys 22 and 23, respectively. Pulleys 22 and 23 drive belts 24 and 25, respectively, in the direction of the arrows so as to accomplish continuous cycling of rotor plate 7 and cam 2.

A further possibility is to make rotor plate 7 stationary and allow the pawl stop ring 1 to rotate in a clockwise direction.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of the invention as defined in the appended claim.

I claim:

A device for attaining instantaneous stopping of a driven rotor plate at predetermined time intervals, said device comprising: a drive shaft, a timing cam concentric with said shaft and adapted to be continuously rotated by said shaft in a first direction, a plurality of spaced recesses in the outer periphery of said timing cam, a stationary outer ring, said ring having a series of inwardly projecting stops radially spaced on the inner periphery of said ring, said stops providing surfaces which are inclined at an angle in a second direction, said second direction being opposite said first direction, a rotor plate coaxial within said outer ring and positioned intermediate said outer ring and said timing cam, said plate being driven in said second direction, a plurality of pins fixed to the surface of said plate, a plurality of pawls connected to said plate by said pins, each pin pivotally connecting each pawl at one end, the other end of each pawl having a protuberance which extends radially outward from the outer edge of said pawl so as to contact the inclined surfaces of said stops, the radial distance between the outermost portion of said protuberance and the inner edge of said pawl being substantially equal to the radial distance between the outer periphery of said timing cam and said inner periphery of said outer ring, said first-mentioned radial distance being not greater than the radial distance between the innermost portion of said stops and said recesses when said recesses are radially aligned adjacent said stops, rotation of said plate causing said inclined surface of a stop to contact a protuberance and thereby pivot said inner edge of said pawl against said outer periphery of said cam, said pawl thereby instantly stopping and locking said rotor against rotation in said second direction, continuous rotation of said cam in said first direction rotating a recess into adjacent radial alignment with said pawl permitting said pawl to pivot until said protuberance no longer contacts said stop, said rotor thus being released for further rotation in said second direction.

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