July 23, 1940. R. E. BASSETT, JR 2,208,831

INTERMITTENT DRIVE MECHANISM

Filed Nov. 12, 1938

Fig. 1.

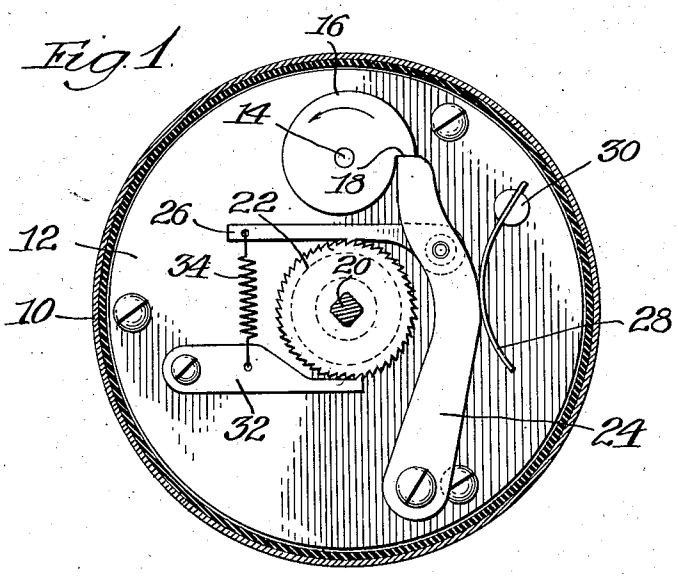


Fig. 2.

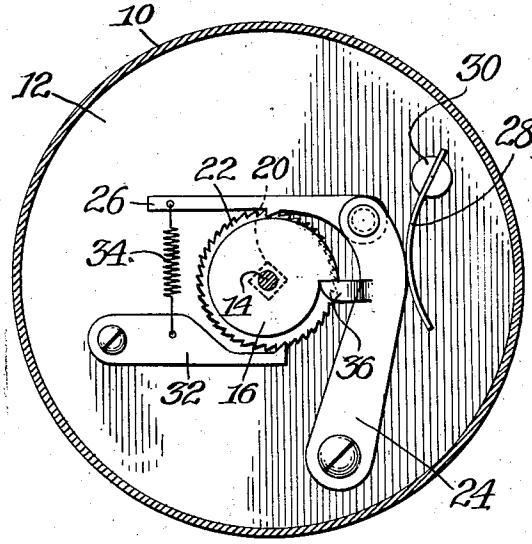
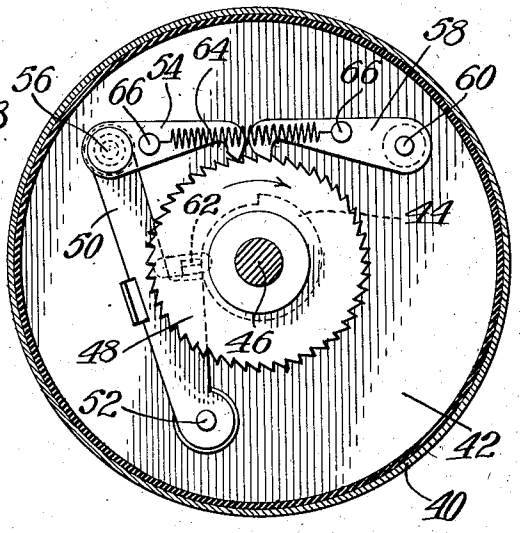


Fig. 3.



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INTERMITTENT DRIVE MECHANISM

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Application November 12, 1938, Serial No. 240,057

10 Claims. (Cl. 74—125)

This invention relates to intermittent drive mechanism and more particularly to mechanism for converting continuous rotary movement to step-by-step rotary movement.

One of the objects of the invention is to provide a simple compact mechanism which will efficiently convert continuous rotary motion into intermittent rotary motion.

Another object of the invention is to provide an intermittent drive mechanism in which the drive is resilient. Preferably a rotating cam or the like is provided to move a driving pawl in one direction and the pawl is returned by a spring and drives a ratchet wheel during its return motion.

Still another object of the invention is to provide an intermittent drive mechanism including a driving pawl and a dog to prevent reverse rotation in which a single resilient element holds both the pawl and dog in operative engagement with a driven ratchet wheel. According to one feature of the invention the resilient element may also serve as the driving spring.

Other objects, advantages and novel features of the invention will be apparent from the following description when read in connection with the accompanying drawing in which:

Figures 1, 2 and 3 are sectional views with parts in elevation of three forms of intermittent drive mechanism embodying the invention.

The invention is illustrated as embodied in a drive mechanism particularly adapted for use with sequential controllers of the type more particularly disclosed and claimed in my copending applications Serial Nos. 240,163 and 240,164, filed November 12, 1938. As shown in Figure 1 it is mounted in a casing 10 adapted to contain any other mechanism to be driven as well as a driving motor or the like if desired. A transverse plate 12 is mounted in the casing and serves as a support for the drive mechanism.

A driving shaft 14 driven by a motor or the like extends through the plate 12 and carries adjacent thereto a cam 16 formed with a gradual rise substantially throughout its circumference and an abrupt drop or shoulder at 18. The shaft to be driven is shown at 20 as provided with a squared portion on which a ratchet wheel 22 is mounted.

In order to drive the ratchet wheel an arm 24 is provided pivoted to the plate 12 at a point remote from the drive shaft 14 and having its free end engaging the ratchet 16. A pawl 26 is pivoted to the arm 24 and is provided with a tooth engageable with the teeth on the ratchet wheel 22. The arm 24 will be moved in one direction by the cam 16 and is urged in the other direction against the cam by leaf spring 28 mounted in a post 30.

The ratchet wheel is prevented from rotating backwards by a dog 32 pivoted to the plate 12 and extending substantially parallel to the pawl 26 and having a tooth engaging the ratchet wheel at a point diametrically opposite the point of engagement of the tooth on pawl 26. The dog 32 and pawl 26 are connected by a tension spring 34 which draws the pawl and dog into engagement with the ratchet wheel in such a manner that they will tend to be drawn into a line passing through the pivot points of the pawl and dog. It may be noted that the three pivot points are substantially equidistant from each other so that the pawl actuating arm forms one side of an equilateral triangle circumscribed about the ratchet wheel.

In operation, as the cam 16 is driven it moves the arm 24 and pawl 26 to the right, the construction being such that the pawl is moved slightly more than the length of a single ratchet tooth. When the arm 24 drops off the shoulder 18 the spring 28 moves it to the left and the pawl turns the ratchet wheel counterclockwise in an amount equal to the length of one tooth. Normally the spring action is very rapid to give the ratchet wheel a quick movement but in the event the driven mechanism should jam the spring will yield so that no damage will be done.

The mechanism of Figure 2 is substantially similar to that of Figure 1 and for purposes of brevity corresponding parts have been indicated by the same reference numerals. In this construction the driving and driven shafts are arranged coaxially end to end so that the cam 16 and ratchet wheel 22 are arranged side by side and rotate about a common axis. The arm 24 is formed with a projecting finger 36 engaging the cam 16, the arm being oscillated in the same manner as described above in connection with Figure 1.

In the form of Figure 3 there is shown a casing 40 having a transverse partition plate 42 through which there extends a driving shaft not shown. A cam 44 is mounted on the driving shaft adjacent the plate 42 and a driven shaft 46 coaxial with the driving shaft carries a ratchet wheel 48 lying close to the plate on the side opposite the cam.

An arm 50 is pivoted on the plate 52 and has a pawl 54 pivoted to its free end at 56. A dog 58 is pivoted to the plate at 60 and lies substantially in alinement with the pawl 54. The pawl and

dog are formed at their free ends with teeth engaging the teeth of ratchet wheel 48. It will be noted that the pivot points 52, 56 and 60 are spaced substantially equidistantly and are substantially equidistant from the axis of the driving and driven shafts.

The arm 50 is formed with a finger 62 extending through an opening in the plate 42 and engaging the periphery of the cam 44. This finger is held in engagement with the cam and the pawl and dog are urged against the ratchet wheel by a common tension spring 64 connected to pins 66 on the pawl and dog and lying in a line above the line between pivot points 56 and 60. Thus the tension of the spring tends to tilt the pawl and dog into engagement with the wheel, the spring attempting to aline itself with the pivots 56 and 60.

As the cam rotates it swings the arm 50 to the left, stretching the spring 64. When the finger 62 drops off the shoulder on the cam the spring will return arm 50 to the right, the pawl 54 engaging the ratchet wheel and turning it an amount equal to the length of one tooth.

While several embodiments of the invention have been shown and described it will be apparent that changes might be made therein and it is not intended to limit the scope of the invention to the exact forms shown nor otherwise than by the terms of the appended claims.

All of the subject matter described above is fully disclosed in my application Serial No. 141,078 filed May 6, 1937.

What is claimed is:

1. In apparatus of the type described, the combination including a ratchet wheel, a pawl having a wheel engaging portion for imparting movement thereto in a predetermined direction, a dog having a wheel engaging portion for preventing movement of the wheel in the opposite direction, said pawl and dog being mounted at points substantially diametrically opposite each other, resilient means tending to move said wheel engaging portions into coincidence with a line passing through said pivot points, and means including an arm pivotally mounting said pawl intermediate its ends and pivoted at one end, a rotatable cam adapted to bear against the other end of said arm, second resilient means adapted to maintain said arm and cam in operative relationship, and means for rotating said cam whereby said wheel is given a step-by-step movement through said pawl and ratchet mechanism.

2. A pawl and ratchet mechanism including a ratchet wheel, a pawl for imparting one way movement thereto, a dog for preventing movement thereof in a reverse direction, said pawl and dog being pivotally mounted at points substantially diametrically opposite each other and having wheel engaging portions located substantially opposite each other on lines substantially tangential to the wheel and passing through the pivot points, and resilient means tending to move said pawl and dog toward each other and maintain the wheel engaging portions thereof in contact with the wheel.

3. In apparatus of the type described, the combination including a ratchet wheel, a pawl having a wheel engaging portion for imparting movement thereto in a predetermined direction, a dog having a wheel engaging portion for preventing movement of the wheel in the opposite direction, said pawl and dog being pivotally mounted at points substantially diametrically opposite each other, resilient means tending to move said wheel engaging portions into coincidence with a line passing through said pivot points, and means adapted to impart a slight oscillatory movement to said pawl and its mounting for moving said wheel.

4. In apparatus of the type described, the combination including a ratchet wheel, a pawl having a wheel engaging portion for imparting movement thereto in a predetermined direction, a dog having a wheel engaging portion for preventing movement of the wheel in the opposite direction, said pawl and dog being pivotally mounted at points substantially diametrically opposite each other, resilient means tending to move said wheel engaging portions into coincidence with a line passing through said pivot points, and means including an arm pivotally mounting said pawl, a rotatable cam adapted to bear against said arm and second resilient means adapted to maintain said arm and cam in operative relationship for imparting oscillatory movement to said pawl whereby said ratchet wheel is rotated.

5. In apparatus of the type described, the combination including a ratchet wheel, a pawl having a wheel engaging portion for imparting movement to said wheel in a predetermined direction, a dog having a wheel engaging portion for preventing movement of the wheel in the opposite direction, said pawl and dog being mounted at points substantially diametrically opposite each other, resilient means tending to move said wheel engaging portions into coincidence with a line passing through said pivot points for maintaining them in engagement with said wheel, and means including an arm pivotally mounting said pawl at one end and pivotally mounted at the other, a rotatable cam mounted coaxially with said wheel and bearing against an intermediate portion of said arm, and second resilient means adapted to maintain said arm and cam in operative relationship, and means for rotating said cam whereby said wheel is given an intermittent step-by-step movement through said pawl and ratchet mechanism.

6. An actuating mechanism for a ratchet wheel rotatable about a fixed axis, including a pawl pivotally mounted upon a member mounted for pivotal movement about a fixed point for moving said wheel in a predetermined direction, a dog mounted for pivotal movement about a fixed point for preventing movement of said wheel in an opposite direction, the wheel engaging portions of said pawl and dog and the pivot point of said member being so located with respect to each other that a single resilient means under tension mounted on said pawl and dog imparts movement of all said members toward the axis of said wheel.

7. An actuating mechanism for a ratchet wheel rotatable about a fixed axis including, in combination, a pawl pivotally mounted upon an arm mounted for pivotal movement about a fixed point for moving said wheel in a predetermined direction, a dog mounted for pivotal movement about a fixed point for preventing movement of said wheel in an opposite direction, a cam rotatable about said axis, and single resilient means under tension mounted on said pawl and dog for maintaining said pawl and dog in engagement with the ratchet wheel and said arm in engagement with said cam.

8. An actuating mechanism for a ratchet wheel rotatable about a fixed axis including, in combination, an arm pivotally mounted at a fixed

point located at a distance greater than the radius of the wheel from said axis, said arm having a length equal to one side of an equilateral triangle circumscribed about the wheel and similarly located with respect to said wheel, a pawl pivotally secured to the free end of said arm and having a length approximately half that of the arm, a dog of substantially the same length as the pawl and extending toward the latter from a fixed pivot point located at the remaining apex of said triangle, resilient means connecting the pawl and dog for maintaining them in engagement with said wheel and means imparting an oscillatory movement to said arm for imparting movement to said wheel through the pawl said last named means comprising a cam positioned coaxially with the ratchet wheel and engaging said arm intermediate its length and means for rotating the cam.

9. In apparatus of the type described, the combination of a ratchet wheel, an arm pivotally mounted adjacent the ratchet wheel, a pawl pivotally mounted on said arm and engageable with the ratchet wheel to rotate it in one direction, a pivotally mounted dog engageable with the ratchet wheel to prevent movement thereof in the other direction, resilient means engaging the pawl and dog to urge them toward the ratchet wheel, a cam engaging said arm and means to rotate the cam to cause the arm to oscillate whereby said pawl will turn the ratchet wheel.

10. In apparatus of the type described, the combination of a ratchet wheel, an arm pivotally mounted adjacent the ratchet wheel, a pawl pivotally mounted on said arm and engageable with the ratchet wheel to rotate it in one direction, a pivotally mounted dog engageable with the ratchet wheel to prevent movement thereof in the other direction, resilient means engaging the pawl and dog to urge them toward the ratchet wheel, a cam coaxial with the ratchet wheel and engaging said arm and means to rotate the cam to cause the arm to oscillate.

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