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## [54] DRIVE MEANS WITH VARIABLE OUTPUTS


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[52] **U.S. Cl.**.....**74/3.54,** 74/1.5, 74/112, 200/35 R

[51] **Int. Cl.**.....**F16h 5/74**

[58] **Field of Search**.....74/1.5, 112, 3.54, 3.52, 3.5; 200/35 R



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[57] **ABSTRACT**

There is provided a combination constant speed output means and an intermittent drive means, both rotatably carried by a shaft and responsive to rotation of a gear reduction means, second output means responsive to movement of the intermittent drive means and dampening means cooperating with the second output means to retard the snap action characteristics generated by the intermittent drive means.


**15 Claims, 3 Drawing Figures**

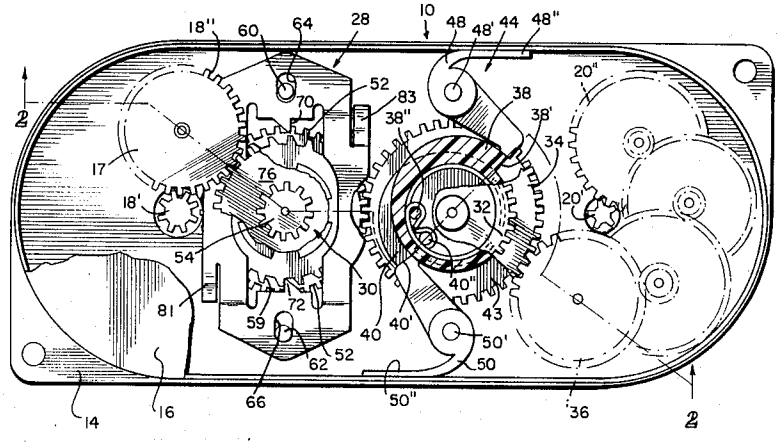
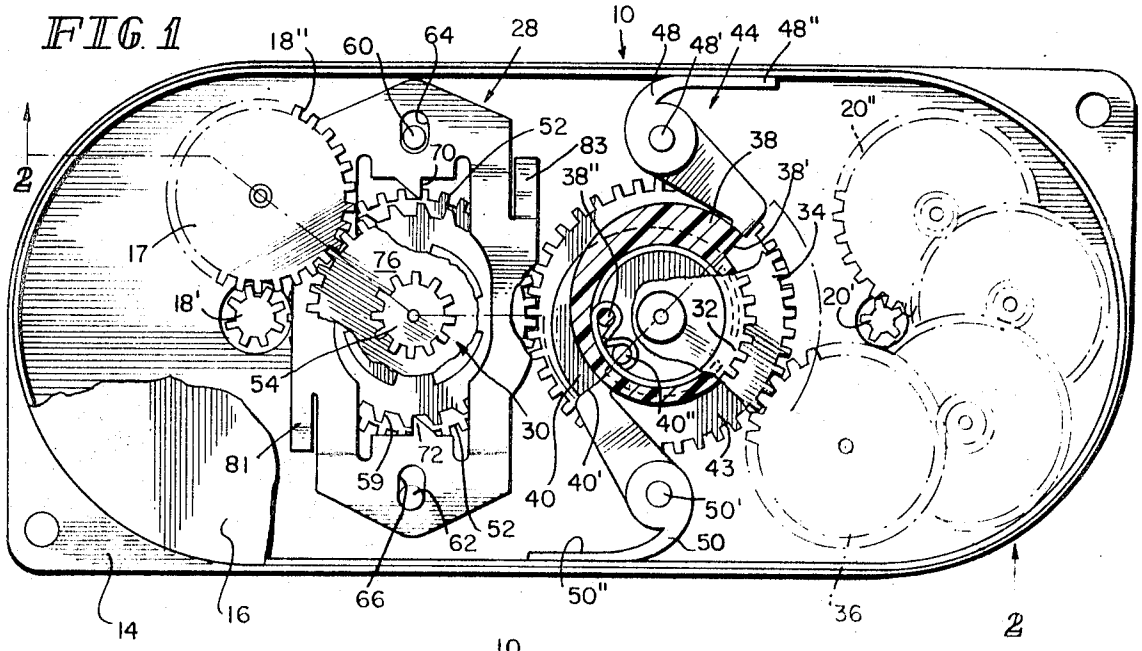


FIG. 1



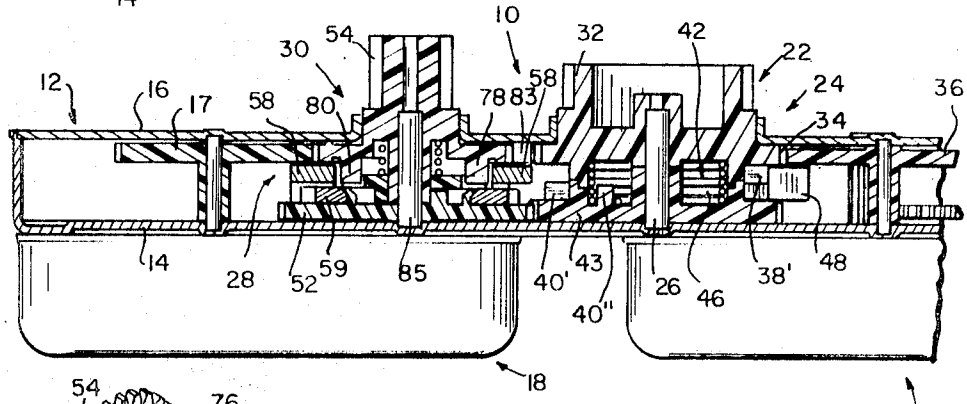




FIG. 2

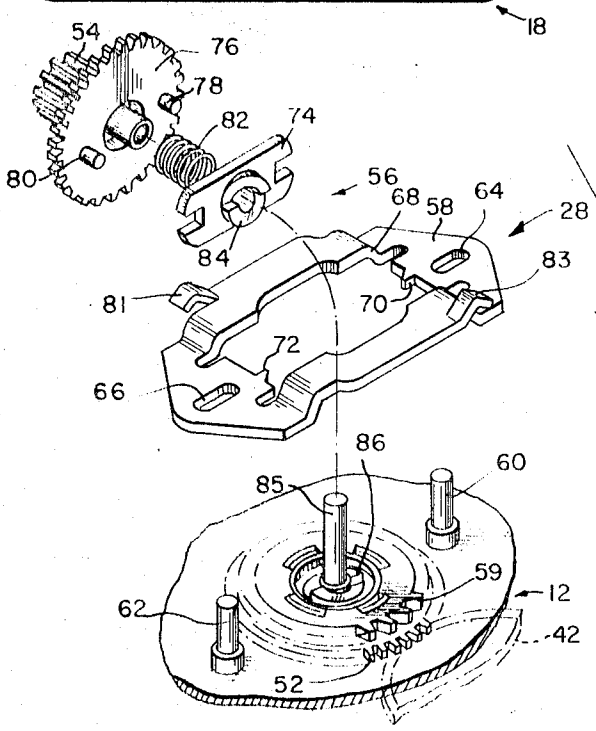



FIG. 3

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# DRIVE MEANS WITH VARIABLE OUTPUTS

The present invention relates to an intermittent drive means; and more particularly, to an intermittent drive means providing two separate outputs.

Timing mechanisms of the type having a plurality of control cams and a plurality of control switches responsive to the cams are widely used in appliance control applications. Generally, such timing mechanisms have an established program to which they are driven by a drive means which usually includes an intermittent drive mechanism. An intermittent drive mechanism, sometimes referred to as an escapement, is a means for coupling an output shaft on a constant speed motor to the control cams of the timer. The purpose of the intermittent drive mechanism is to provide a periodic, snap-action rotational motion to the control cams. The snap-action rotational motion is required for fast operation of the control switches.

As appliances become more complicated, the timing mechanism required to control the appliances become larger and larger. However, the space being allowed for the timing mechanisms by the appliance manufacturer is not increasing and, in some cases, it decreases. Naturally, as the appliances become more complicated, the escapement mechanism used to actuate the control cam becomes more complicated. This adds to the problem of keeping the timing mechanism neat, compact and simple so as to occupy a minimum amount of space.

Some appliances have become sufficiently complicated that in addition to the normal sequencing provided by the cam means, the timing mechanisms need to provide for subinterval timing means. Such means provide for a shorter time interval than normally provided for by the cam means in the timing mechanisms. Where such intervals are required, the drive means should also provide a means for driving a subinterval means.

Where the appliances for which the timing mechanism is being used are extremely complicated and have a multiplicity of sequential steps, it may be advantageous to selectively start a programming cycle at some point other than at the original starting point. For example, in a washing machine, it may be desirable to skip one of the rinse cycles and then continue the sequence at some other point. In such instances, it is highly desirable to include a rapid advance mechanism in the drive means whereby a programming sequence can be rapidly advanced to a desired starting point for a cycle.

The present invention is concerned with a drive means and has as one of its objects the provision of such a drive means which is neat, compact and occupies a minimum of space.

Another object of the present invention is to provide a drive means having two outputs.

Still another object of the present invention is to provide a drive means having two outputs wherein one of the outputs advances intermittently and includes means for providing a constant speed output.

A further object of the invention is to provide a drive means having a combination constant speed output means as an intermittent drive means rotatably carried by a single shaft.

Yet still another object of the present invention is to provide a drive means having a dampening means cooperating with an output means to retard the snap action characteristics generated by an intermittent drive means.

A further object of the invention is to provide a drive means which in cooperation with a clutch means permits an output means to be driven at either a constant speed or intermittently.

Another object of the invention is to provide an intermittent drive means which includes a cam drive means, pulse means, energy storage means coupling the cam drive means to the pulse means, and stop means intermittently engaging the pulse means.

These and other objects of the invention will become apparent from the following description taken in conjunction with the accompanying drawings wherein:



FIG. 1 is a bottom view of the drive means of the present invention with portions of the housing being removed;

FIG. 2 is a view taken along 2—2 of FIG. 1; and

FIG. 3 is an exploded view of the dampening means and the clutch means of one of the outputs of the drive means of the present invention.

Generally speaking, the objects of the invention are accomplished by providing in combination a gear reduction means responsive to rotation of a constant speed drive means, a combination constant speed output means and intermittent drive means rotatably carried by a shaft and responsive to rotation of the gear reduction means, a second output means responsive to movement of the intermittent drive means, and dampening means cooperating with the second output means to retard the snap-action characteristics generated by the intermittent drive means. There is also included a clutch means which cooperates with the second output means to permit it to be driven at either a constant speed or intermittently.

Referring now to the drawings, the drive means **10** of the present invention is substantially enclosed in a housing **12**, the housing including a cup-shaped member **14** enclosed by a cover plate **16**. Attached to and carried by the cup-shaped member **14** there is shown constant speed motor drive means **18** and **20**. Motor drive means **18** and **20** are preferably of the synchronous motor type. Motors **18** and **20** include motor output pinions **18'** and **20'** to which are coupled speed reducing means **18''** and **20''**. As is shown, the speed reducing means is in the form of a gear reduction means and in the case of speed reducing means **20''** includes a series of gears and pinions to obtain a substantial reduction in motor speeds. As will be apparent hereinafter, motor **18** serves as a drive means for a rapid advance means and consequently its speed reducing means **18''** includes only a single gear **17**.

Generally speaking, the drive means **10** includes gear reduction means **20''**, a combination constant speed output means **22** and intermittent drive means **24** both carried by a shaft **26** and responsive to rotation of the gear reduction means **20''**, dampening means **28**, and output means **30**, the gear reduction means **18''** being an optional feature of the present invention.

Output means **22** includes unitarily constructed gears **32** and **34**, gear **34** being meshed with gear **36** of gear reduction means **20''**. Output gear **32** could be used in a timing mechanism to drive a sub-interval means, for example. Intermittent drive means **24** includes cam drive means **38**, pulse means **40**, energy storage means **42**, and stop means **44**. Drive cam means **38** is unitarily constructed with gear **34** and includes a radial step **38'**. Pulse means **40** is unitarily constructed with gear **43** and includes a radial step **40'**. Energy storage means **42** includes a coil spring **46** sandwiched between the drive cam means **38** and the pulse means **40** with each end of the spring being connected to posts **38''** and **40''** of the respective drive cam means and pulse means. Stop means **44** includes a pair of pawls **48** and **50** pivotally mounted on posts **48'** and **50'**. The pawls are mounted about 180° apart thus allowing the pulse to be advanced 180° as will be hereinafter described. The pawls **48** and **50** are spring biased through leaf springs **48''** and **50''** which are biased against the sides of housing **12**.

The operation of the intermittent drive means **24** and output means **22** can now be described. Motor **20** will drive output pinion **20'** in a predetermined direction. The constant rotational drive from the motor **20** will then be transmitted through gear reduction means **20''** to gear **34**. It should be here noted that when the intermittent drive means **24** is assembled and the coil spring **46** is sandwiched between the drive cam and pulse means, the coil spring is preloaded such that its ends are disposed approximately adjacent each other as shown in FIG. **1**. This preloads the intermittent drive means. Rotation of gear **34** will cause rotation of drive cam **38** which in turn will, as shown in FIG. **1**, bias stop pawl **48** outward. Continued rotation of drive cam **38** will bias pawl **50** outward and allow pawl **48** to be deflected inwardly. As pawl

50 is biased outward, radial step 40' will become disengaged from the pawl 50, the energy in coil spring 46 will be released, and cam 40 will be permitted to advance 180° until it engages pawl 48. The 180° advancement of cam 40 will cause a 180° advancement of gear 43. Thus, an intermittent rotational advancement of 180° is achieved. As gear 34 is being driven at a constant speed through the drive motor 20, the output gear 32, which is unitarily constructed with gear 34, will also be driven at a continuous output. Such continuous rotational output could be used to drive a sub-interval means for the timing mechanism. Thus the present arrangement permits the combination of a continual rotational output and an intermittent rotational output operating off of a single shaft.

The intermittent rotation of gear 43 causes gear 52, with which it meshes, to intermittently rotate or advance 180° in accordance with the advancement of gear 43. The intermittent rotation of gear 52 causes intermittent rotation of output means 30. Output means 30 includes pinion 54. Pinion 54 is coupled to gear 52 through clutch means 56. Dampening means 28 retards the snap-action characteristics generated by the intermittent drive means 24. This is a desirable feature in the present arrangement since, if the snap-action characteristics were not somewhat slowed down, there would be an excessive wear on parts. As shown, the output means 30, clutch means 56 and dampening means 28 are rotatably and/or slidably mounted over post 85. Dampening means 28 includes slider 58 which, slides on housing 12 through tangs 81 and 83 and is guided by posts 60 and 62 and apertures 64 and 66, and ratchet wheel 59. Ratchet wheel 59 is staked to gear 52. As shown, the slider 58 includes an elongated centrally disposed aperture 68, and follower teeth 70 and 72 which are adapted to intermittently engage ratchet wheel 59. Thus, as gear 52 is intermittently advanced 180°, teeth 70 and 72 will alternately engage and disengage from the ratchet wheel 59 as slider 58 slides back and forth.

Output means 30 can be driven at a constant rate of speed via motor means 18 or intermittently through the action of the intermittent drive means 24. Such variation in output is accomplished through clutch means 56. Clutch 56 includes spring biased actuator member 74 which is coupled to gear 76 through posts 78 and 80, the actuator member 74 being spring biased through coil spring 82. Actuator member 74 includes a clutch face 84 in the form of a camming surface which is adapted to mate clutch face 86, also in the form of a cam surface. In the present drive means, the clutch means 56 permits the use of a rapid advance means. Thus motor 18 will provide a constant high speed output of pinion 54 through output pinion 18' and gear 17 meshing with gear 76, and by having clutch face 84 override clutch face 86. Output means 30 can also be driven at a slow rate of speed by adding more gears for greater gear reduction to give a drive cycle which could be slower than the normal program cycle. This may be advantageous in washing machines which need a longer soak time. Under such conditions, the drive means 20 would need to be de-energized.

Thus there is described a drive means which provides an intermittent output and at least one constant speed output, and if so desired has the means for providing a second constant speed output.

What is claimed is:

1. In combination:

a. gear reduction means responsive to rotation of constant speed drive means,

b. combination constant speed output means and intermittent drive means rotatably carried by a shaft and responsive to rotation of said gear reduction means,

c. a second output means responsive to movement of said intermittent drive means, and

d. dampening means cooperating with said second output means to retard the snap-action characteristics generated by said intermittent drive means.

2. The combination according to claim 1 further including clutch means cooperating with said second output means to permit said second output means to be driven at either a constant speed or intermittently.

3. The combination according to claim 2 wherein said clutch means includes a spring biased actuator coupled to said second output means, cam means extending from said spring biased actuator, and a cam means adapted to engage said first named cam means.

4. The combination according to claim 1 wherein said intermittent drive means includes cam drive means, pulse means, energy storage means coupling said cam drive means to said pulse means, and stop means intermittently engaging said pulse means.

5. The combination according to claim 4 wherein said cam drive means includes a gear means responsive to rotation of said gear reduction means, said cam means regulating the position of said stop means.

6. The combination according to claim 1 wherein said energy storage means includes a coil spring, the free ends of which are coupled to said cam drive means and to said pulse means.

7. The combination according to claim 1 wherein said stop means includes a pair of oppositely disposed pivotally mounted arms.

8. The combination according to claim 1 wherein said dampening means includes a rachet wheel connected to said pulse means, and a slider, said slider including follower means intermittently engaging said ratchet wheel.

9. The combination according to claim 8 wherein said slider includes a frame, an aperture in said frame receiving said ratchet wheel, and said follower means includes oppositely disposed teeth extending into said aperture.

10. An intermittent drive means comprising a constant speed drive means, a shaft, cam drive means and pulse means independently, rotatably carried by said shaft, energy storage means coupling said pulse means, a pair of oppositely disposed pivotaly mounted pawls responsive to rotation of said cam drive means to intermittently engage said pulse means, and output means responsive to movement of said pulse means.

11. An intermittent drive means according to claim 10 wherein said energy storage means includes a coil spring sandwiched between and having its free ends coupled to said cam drive means and said pulse means.

12. An intermittent drive means comprising a constant speed drive means, a shaft, cam drive means and pulse means independently, rotatably carried by said shaft, said cam drive means responsive to rotation of said constant speed drive means, energy storage means coupling said cam drive means to said pulse means, stop means responsive to rotation of said cam drive means to intermittently engage said pulse means, output means responsive to movement of said pulse means and dampening means cooperating with said output means to retard the snap-acting characteristics generated by said cam drive and pulse means.

13. An intermittent drive means according to claim 12 wherein said dampening means includes a ratchet wheel connected to said pulse means, and a slider, said slider including follower means intermittently engaging said ratchet wheel.

14. An intermittent drive means according to claim 12 wherein said energy storage means includes a coil spring sandwiched between and having its free ends coupled to said cam drive means and said pulse means.

15. An intermittent drive means according to claim 12 wherein said stop means includes a pair of oppositely disposed pivotally mounted pawls.

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