

[54] **MULTI-CAM TIMER WITH CLUTCH MEANS ALLOWING INDEPENDENT CAM ADJUSTMENT AND ROTATION OF CAM ASSEMBLY INDEPENDENT OF MOTOR**

[75] Inventor: **William Ray Brown**, Beech Grove, Ind.

[73] Assignee: **P. R. Mallory & Co. Inc.**, Indianapolis, Ind.

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[58] Field of Search ..... 200/36, 38 R, 38 B, 200/38 BA, 38 C, 38 CA, 38

[56] **References Cited**

**UNITED STATES PATENTS**

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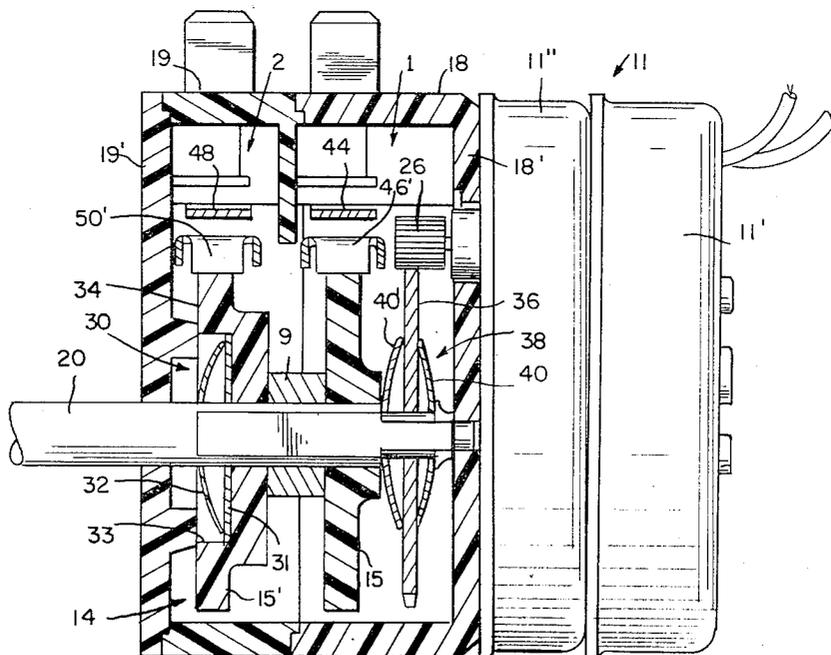
*Primary Examiner*—J. R. Scott

*Attorney*—Richard H. Childress and Robert F. Meyer

[57] **ABSTRACT**

At least two cams having different settings are carried by a single shaft one of the cams including a clutch so as to be independently operable from the other. A second clutch allows both the cams to be manually rotatable independent of a motor drive means.

**6 Claims, 2 Drawing Figures**



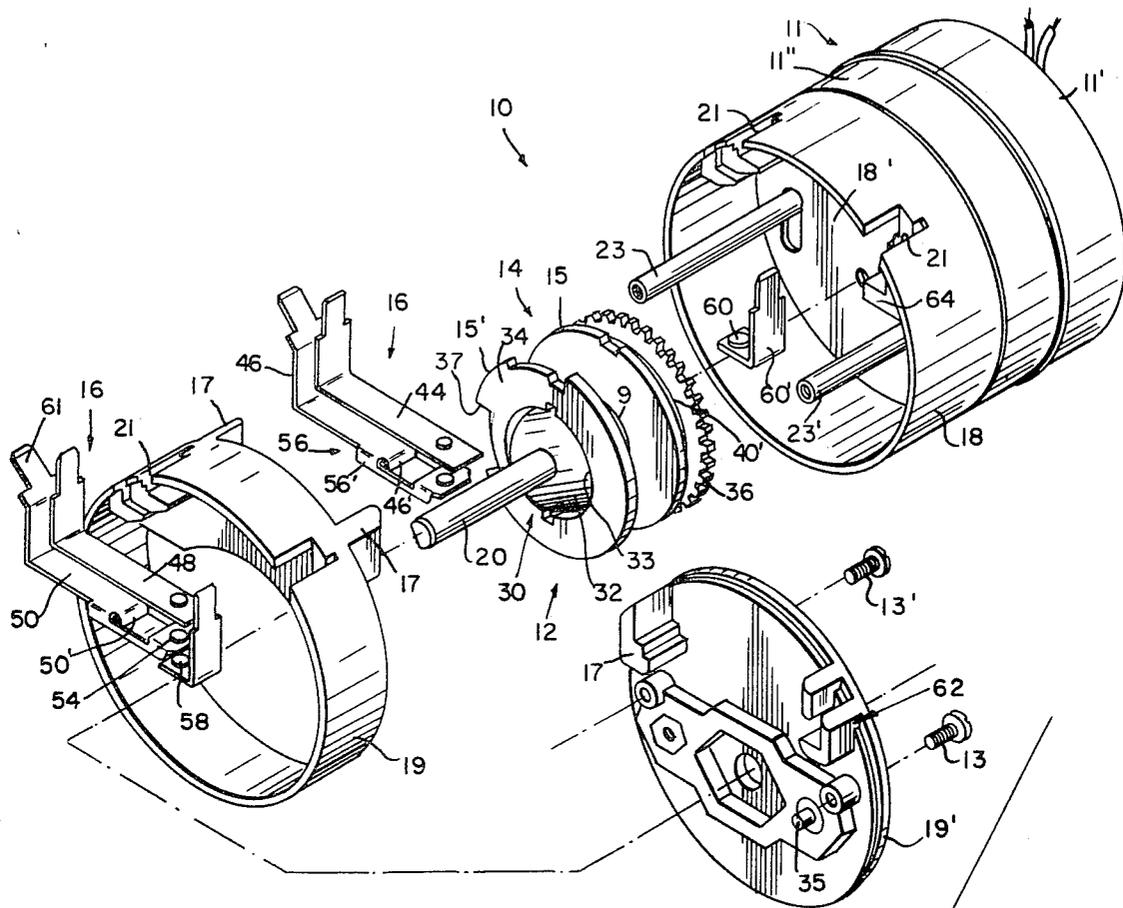


FIG. 1

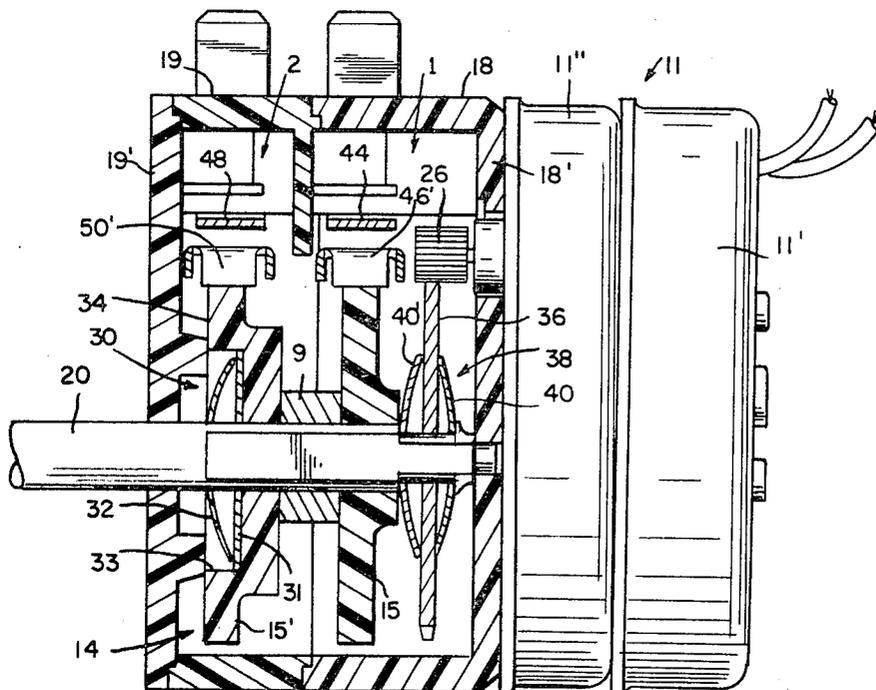


FIG. 2

**MULTI-CAM TIMER WITH CLUTCH MEANS  
ALLOWING INDEPENDENT CAM ADJUSTMENT  
AND ROTATION OF CAM ASSEMBLY  
INDEPENDENT OF MOTOR**

The present invention relates generally to electric switch actuating timing devices and concerns a timing device well suited for controlling various operating cycles in appliances such as dryers, sun lamps, etc.

In any particular appliance, various switch circuit arrangements are needed, depending upon the timing cycle desired. For example, in an automatic washer or dryer, a single pole double throw, or a double pole, double throw switching arrangement may be needed. Additionally, a particular application may require many more than one timing cycle with the different timing setting being able to be set with only one dial setting. For example in a sun lamp, it may be advantageous to set a time for a "fast warmup light" which could then be followed by "sun light" energized for a longer period of time, both times being set on a single dial.

The present invention is concerned with a timing device and has as one of its objects the provision of a timing device wherein different switching circuits are readily obtainable and which is also neat, compact and easily produced.

Still another object of the invention is the provision of a timing device providing at least two distinct timing cycles on only one dial setting.

Yet another object of the invention is the provision of a timing device having stages of cam program means and electrical switching means carried by individual housings which can be readily joined together or disengaged from each other.

Another object of the invention is the provision of a timing device having at least two cams carried by a single shaft, one of the cams including a clutch means so that the cams may be independently rotated.

Yet still another object of the invention is to provide a timing device having at least two cams carried by a single shaft, one of the cams including a clutch to be independently rotatable from the other, and a second clutch to permit both cams to be manually rotated independent of a motor drive means.

Another object of the invention is the provision of a timing device having stages of cam program means and electrical switching means carried in individual housings, the housings being axially aligned in juxtaposition through mating projections and notches and wherein the electrical switching means includes at least two movable contact blades having electrical contacts adapted to engage one another, cam follower means carried by one of the contact blades, and blade seating means disposed at the free end of the movable contact blade, the contact blades and the seating means being carried by the mated projections and notches.

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

FIG. 1 is an exploded view of the timing device; and  
FIG. 2 is a partial cross section of the timing device.

Generally speaking, the objects of the invention are accomplished by providing in a timing device having electrical switch means opening and closing in response to rotation of cam programming means with the cam programming means being responsive to manual and

motor drive means; a shaft, at least two cams providing two separate time settings, one of the cams including a first clutch means frictionally engaging the shaft, the other of the cams fixedly carried by the shaft, and a second clutch means carried by said shaft and frictionally engaging means coupling the motor drive means to the shaft, the first clutch means permitting power driven rotation of the two cams independent of each other, the second clutch means permitting manual rotation of the two cams independent of motor driven rotation.

Referring now to the drawings and particularly FIGS. 1 and 2, there is shown a timing device 10 incorporating the novel features of the present invention. The timing device is composed of sub-assemblies a constant speed drive assembly 11 and switch timing mechanism 12. Constant speed drive assembly 11 includes a suitable motor such as a synchronous motor 11' to which is coupled an appropriate gear train carried in housing 11''.

In general, switch timing mechanism 12 includes a cam program means 14 and electrical switching means 16 responsive to the rotation of the cam program means. Cam program means 14 includes at least two cams 15 and 15' separated to provide stages 1 and 2. Each of the stages are enclosed in a housing 18 and 19 generally of a ring configuration, each having a cover means 18' and 19' closing one end of the rings. As shown, cover means 19' is a separate piece while cover means 18', while not necessary, is unitarily constructed with ring member 18. It should be understood that more than two stages and thus more than two separate housings, could be used if more programs are desired. Thus if four programs are desired, there could be two more housings generally in the shape of rings similar to that of rings 18 and 19, the four rings then being closed off. There are cooperating projections 17 and notches 21 included as elements of the housings and cover means adapted to be mated together such that the housings with their cover means are axially aligned in juxtaposition. The stages are held together by screws 13 and 13' engaging internally threaded posts 23 and 23'.

Cams 15 and 15' are both carried by a common shaft 20 and are held in a predetermined spaced relation through spacer 9 surrounding and carried by shaft 20. Each of the cams have coded indicia on their outer periphery to actuate the electrical switching means 16 in accordance with a program cycle. Cam 15 is fixedly coupled to shaft 20 while cam 15' is frictionally coupled to the shaft through a first clutch means 30 included as part of the cam. Clutch means 30 includes a bow spring 32 surrounding the shaft which engages a drive plate 31 carried in recess 33 provided on face 34 of the cam. The bow spring frictionally engages the shaft such that the cam may be held from rotation as desired even though the shaft continues to turn. A means preventing rotation of cam 15' includes arcuate step 37 provided in cam 15' and stop pin 35 carried by housing 19' and which engages the arcuate step. Thus the rotation of cam 15' is limited by the arcuate length of the step.

Shaft 20 is coupled to output pinion 26 of the gear train of the motor through drive gear 36 which carries a second clutch means 38. Clutch means 38 includes a pair of spaced spring washers 40 and 40' fixed to shaft 20 and frictionally engaging opposed faces of the gear. The second clutch means permits manual rotation of

the shaft independent of the motor drive means by the gear train overcoming the frictional force between the springs and the gear.

Switching means 16 includes movable contact blades 44, 46, 48, and 50 each carrying electrical contacts 54. For each stage, or program means, one of the contact blades 46, 50 includes a cam follower means, which in the present invention includes tabs 46' and 50' lanced from the contact blades. A stiffening and guide means 56 aids in keeping blades 46 and 50 relatively rigid and maintains alignment between the blades and the cam means. Stiffening and guide means 56 includes thin strips 56' integrally or otherwise connected to the contact blade. Also included as part of the switching means are fixed contacts 58 and 60 carried by fixed contact blades 58' and 60' respectively, and blade seating means 62 and 64 which limit the movement of the movable contact blades and aids in the retention of the fixed contact blades. Seating means 62 and 64 are provided through the cooperation of the appropriate notches and projections. By using two or three movable contact blades in conjunction with the fixed contact as shown in FIGS. 1 and 2, and depending upon the cam's configuration, various switch sequencing can be achieved. As shown, the fixed and movable contact blades are carried by the cooperating notches and projections. Electrical terminals 61 are integral with each blade.

In operation, the motor will apply power driven rotation to the cam program means 14 through cam 15 being fixedly carried by the shaft 20. Cam 15' will also rotate until it is prevented from rotation by stop pin 35 engaging step 37 of the cam. Thereafter only cam 15 will rotate. Manual rotation may be effected by manual rotation of the shaft 20 with the clutch 38 allowing the shaft to rotate independent of the gear train.

What is claimed is:

1. In a timer having electrical switch means opening and closing in response to rotation of cam programming means with said cam programming means responsive to manual drive means and motor drive means; a shaft, at least two cams providing two separate time settings, one of said cams including a first clutch means frictionally engaging said shaft, the other of said cams fixedly carried by said shaft, and a second clutch means carried by said shaft and frictionally coupling said motor drive means to said shaft, said first clutch means permitting power driven rotation of said two cams independent of each other, said second clutch means permitting a manual rotation force sufficient to overcome said frictional coupling to permit rotation of said two cams independent of said motor driven rotation and means limiting the rotational travel of said first cam.

2. In a timer according to claim 1 wherein said first clutch means includes a bow spring surrounding said shaft and said cam is carried by said bow spring.

3. In a timer according to claim 2 wherein said cam includes a recess in a face of said cam receiving said bow spring.

4. In a timer according to claim 2 wherein said cam includes a recess in a face of said cam and a drive plate carried by said recess, said bow spring engaging said drive plate.

5. In a timer according to claim 5 wherein said means limiting the rotational travel of said first cam includes an arcuate step in said cam, and a stop pin engaging said step.

6. In a timer according to claim 1 wherein said second clutch means includes a pair of spaced clutch washers fixedly carried by said shaft and a gear disposed between said spaced clutch washers and connected thereto, said gear engaging said motor drive means.

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