

[54] **ELECTRICAL TIMER WITH  
IMPROVED RESILIENT CONTACT  
MOUNTING AT GANGED HOUSING  
SECTION COMPLEMENTARY  
INTERFACES**

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[22] Filed: **Sept. 28, 1970**

[21] Appl. No.: **75,855**

[52] U.S. Cl. .... **200/38 R, 200/38 B, 200/166 J**

[51] Int. Cl. .... **H01h 7/08, H01h 43/10, H01h 1/28**

[58] Field of Search ..... **200/14, 38 R, 168 S, 166 J**

[56]

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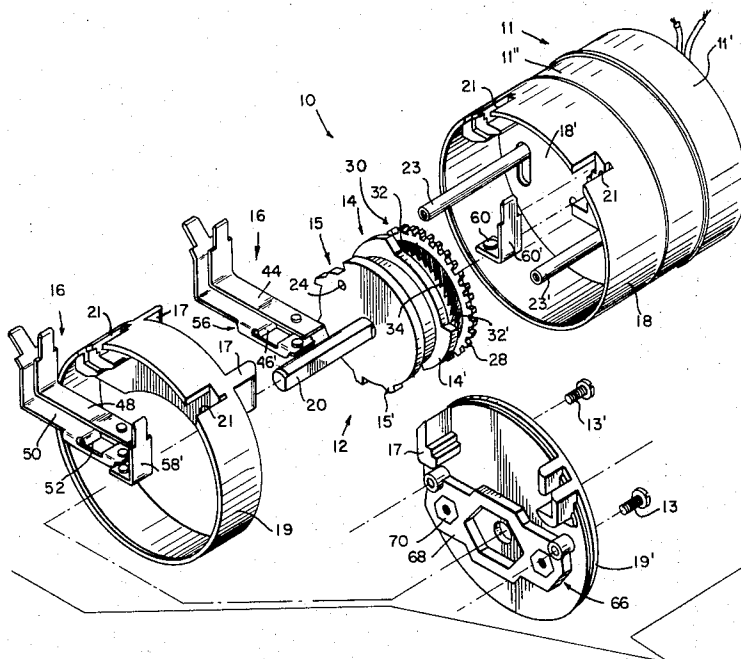
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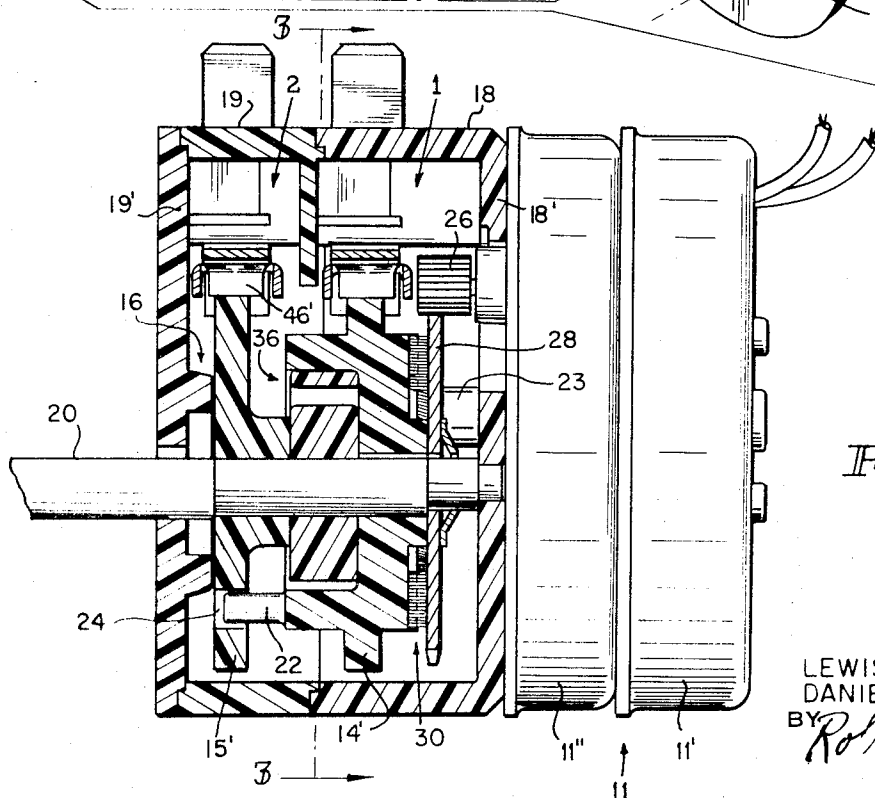
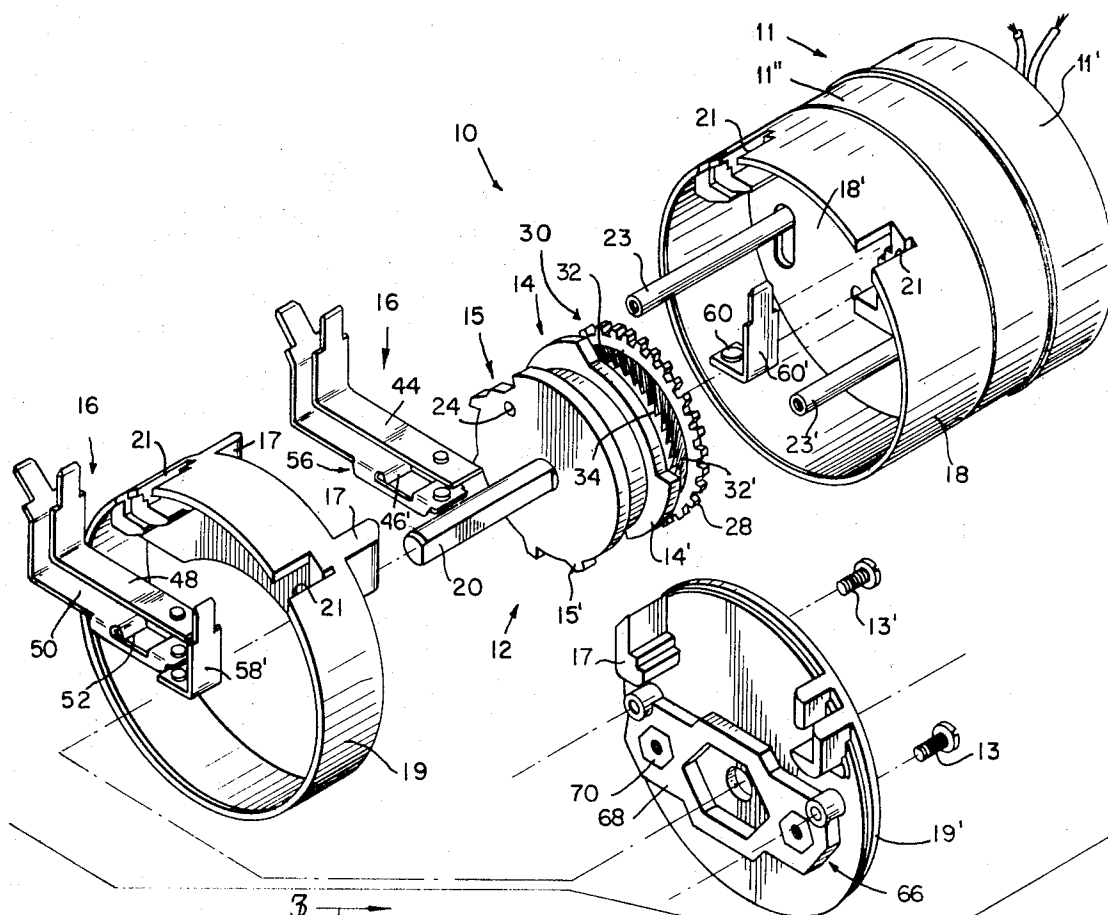
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**ABSTRACT**

Stages of cam program means and electrical switching means responsive to the cam program means are carried in open ended housings which are disposed in axially aligned juxtaposition with the mating of projections and notches formed as part of the housings.

**8 Claims, 4 Drawing Figures**





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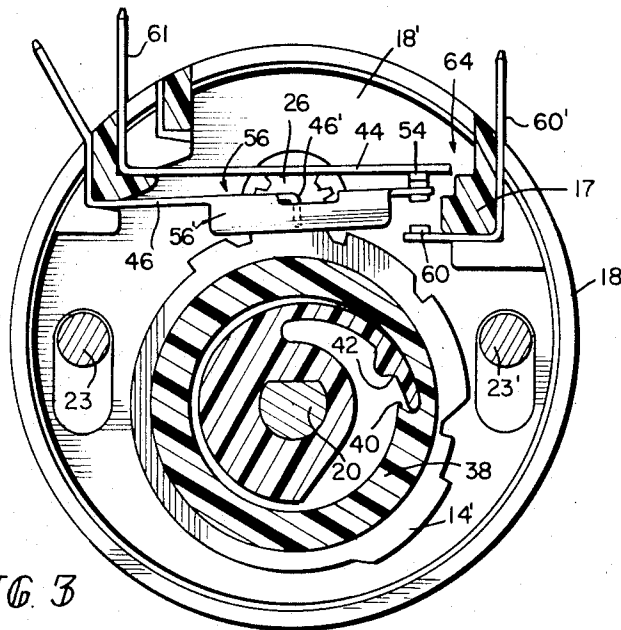


FIG. 3

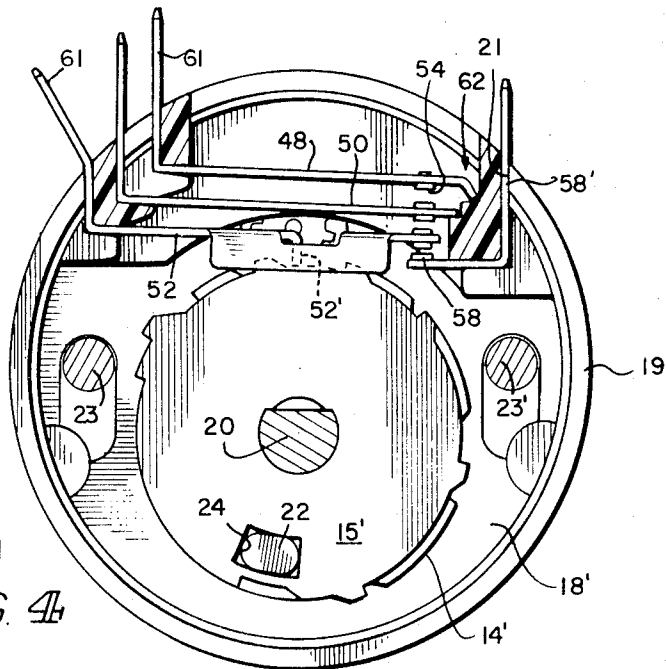


FIG. 4

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# **ELECTRICAL TIMER WITH IMPROVED RESILIENT CONTACT MOUNTING AT GANGED HOUSING SECTION COMPLEMENTARY INTERFACES**

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 washers, dryers, 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 washer or dryer may require many more timing cycles than would be required in another type washer. Under such situations, it would be advantageous if the number of programs could be easily increased or decreased as the need arose.

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 having stages of cam program means and electrical switching means.

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 stages of cam program means and electrical switching means disposed within individual housings and wherein the housings have projections and notches adapted to mate corresponding projections and notches of an adjacent housing.

Yet still another object of the invention is to provide a timing device having stages of cam program means and electrical switching means wherein the individual cam program means are carried by a common shaft.

Another object of the invention is to provide a timing device having stages of cam program means and electrical switching means wherein the individual cam program means are coupled together and wherein one of the cam program means is coupled to a constant speed drive means through a clutch means.

Still another object of the invention is to provide a timing device having stages of cam program means and electrical switching means wherein there is a unidirectional means insuring that the program means will be rotated in a predetermined direction.

Yet still 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 when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded view of the timing device;

FIG. 2 is a partial cross section of the timing device;

FIG. 3 is a view taken along the line 3—3 of FIG. 2; and

FIG. 4 is an end view of the timing device with an end cover being removed.

Generally speaking, the objects of the invention are accomplished by providing a timing device which has stages of cam program means and electrical switching means responsive to the cam program means, a housing substantially surrounding each of the stages, each of the housings being disposed in axially aligned juxtaposition through the mating of projections and notches included with each housing, with the electrical switching means being carried by the housings, shaft means extending through the axially aligned housings carrying the individual cam program means, cover means disposed at the opposite ends of the axially aligned juxtaposition housings, constant speed drive means carried by one of the cover means, and means coupling the cam programming means to the constant speed drive means.

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 two 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 stages 1 and 2, each stage including a cam program means 14 and 15 and electrical switching means 16 responsive to the rotation of the cam program means. 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'.

Cam program means 14 and 15 each include a cam means 14' and 15' both carried by a common shaft means 20. The cams 14' and 15' are rotationally coupled together through pin 22 which protrudes from cam means 14' and extends into an aperture 24 provided in cam means 15'. Each of the cam means 14' and 15' have coded indicia on their outer periphery to actuate the electrical switching means 16 in accordance with a program cycle. Cam means 14' is cou-

pled to constant speed drive means 11 through motor output pinion 26, gear 28 and unidirectional clutch means 30. Unidirectional clutch means 30 includes a clutch face 32 carried by gear 28 and clutch face 34 carried by cam means 14'. Clutch face 32 includes a multiplicity of oriented fibers 32' adapted to engage serrated teeth 34' of clutch face 34. Thus cam means 14' and 15' can be manually rotated in one direction by allowing teeth 34' to over-ride the oriented fibers 32 and can be driven by constant speed drive means 11 by having the oriented fibers engage the teeth 34' when being driven in the same direction. A wrong-way manual rotation is further prevented through a second unidirectional clutch means 36.

Referring to FIGS. 2 and 3, unidirectional clutch means 36 includes a cam means 38 having an arcuate step 40 adapted to engage a stop means 42 carried by shaft means 20 for manual rotation. When shaft means 20 is rotated in the wrong direction, stop means 42 disengages step 40. Cam means 38 is integrally or otherwise coupled to cam means 14'. Preferably the face of step 40 would be in axial alignment with an indicator means associated with a knob carried by the shaft means (not shown) used for manual rotation, such that orientation of the program means is readily achieved.

Switching means 16 includes movable contact blades 44, 46, 48, 50 and 52 each carrying electrical contacts 54. For each stage, or program means, one of the contact blades 46, 52 includes a cam follower means, which in the present invention includes tabs 46' and 52' lanced from the contact blades. A stiffening and guide means 56 aids in keeping blades 46 and 52 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. 3 and 4, and depending upon the cam's configuration, various switch sequencing can be achieved. As shown, the fixed and movable contact blades are cantilevered by the cooperating notches and projections. Electrical terminals 61 are integral with each blade.

Cover 19' also includes a mounting means 66 through which the whole timing unit may be mounted to a suitable base member. Mounting means 66 includes a frame member 68 having threaded apertures 70 into which mounting bolts can be threaded.

What is claimed is:

1. A timing device comprising:
  - a. a shaft means,

- b. a plurality of ring means surrounding said shaft means,
  - c. individual cam means disposed within each of said ring means and carried by said shaft means,
  - d. spaced projections extending from one end of said ring, notches in the opposed ends and substantially aligned with said projections, each of said rings disposed in axially aligned juxtaposition through the mating of said projections and notches,
  - e. first cover means disposed at one end of said axially aligned juxtaposition rings, constant speed drive means carried by said cover means,
  - f. means coupling said drive means to an individual cam means including clutch means, means coupling said individual cam means together,
  - g. second cover means disposed at the opposite end of said axially aligned juxtaposition rings, said cover means including notches and projections mating with notches and projections with the ring it closes,
  - h. at least two movable contact blades having electrical contacts at one end thereof adapted to engage one another, cam follower means carried by one of said contact blades responsive to said cam program means, the other end of said contact blades cantilevered by said mated notches and projections,
  - i. said shaft means journaled in said first and second cover means.
2. A timing device according to claim 1 further including at least one fixed contact means carried by said mating notches and projections and cooperating with at least one of said movable contacts.
  3. A timing device according to claim 1 further including blade seating disposed at said end of said blades carrying said electrical contacts and cantilevered by said mated notches and projections.
  4. A timing device according to claim 1 wherein said clutch means includes a gear carried by said shaft means and coupled to said drive means, said gear having a serrated face adapted to engage a face of said cam means having fibers oriented in a predetermined direction.
  5. A timing device according to claim 1 further including unidirectional means cooperatively connecting one of said cam means of said stages with said shaft means.
  6. A timing device according to claim 5 wherein said unidirectional means includes an arcuate step carried by one of said cam means and a stop means carried by said shaft means engaging said arcuate step.
  7. A timing device according to claim 6 wherein said arcuate step is axially aligned with an indicator means of a knob carried by said shaft means.
  8. A timing device according to claim 1 wherein said second cover means includes mounting means adapted to receive mounting pins.

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