Feb. 21, 1967 F. HAUSER 3,305,649

TIMING DISC ASSEMBLY

Filed Jan. 12, 1965

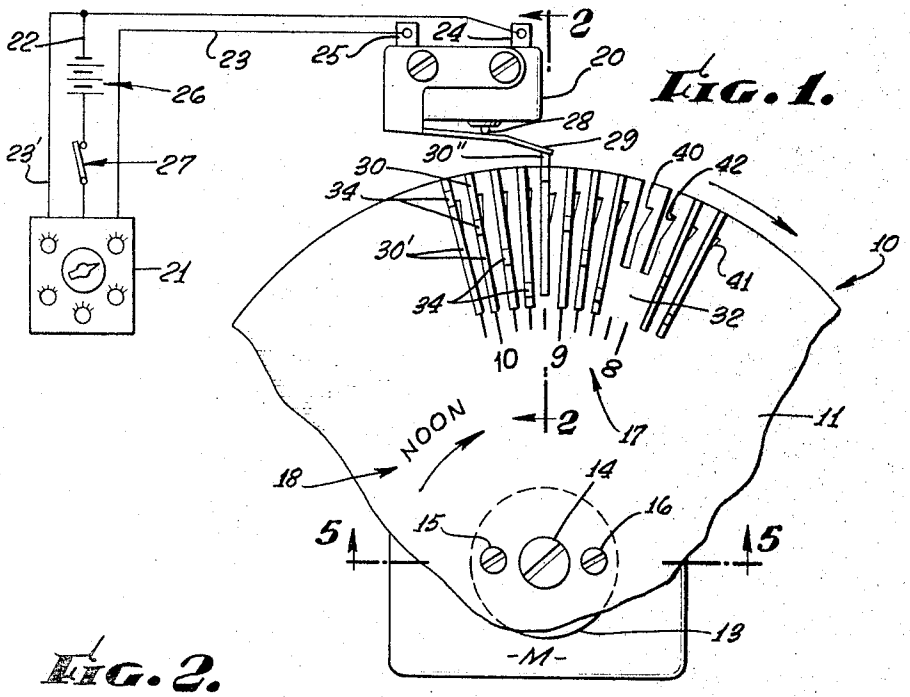
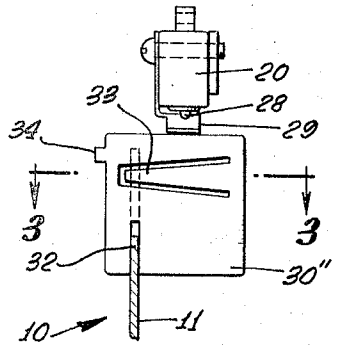


FIG. 1.

FIG. 2.



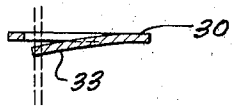


FIG. 3.

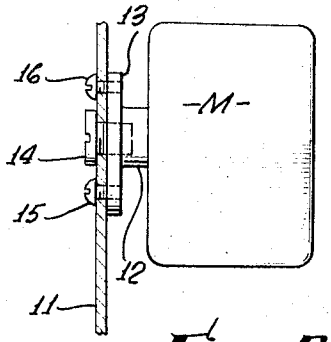


FIG. 5.

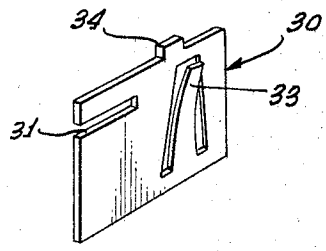


FIG. 4.

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TIMING DISC ASSEMBLY

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This invention relates in general to timing devices of the character in which a rotating timing part interferes mechanically during its rotation with portions of stationary switch means to actuate a mechanical or electrical means associated with the switch means. More particularly, the invention relates to a timing disc and timing part assembly adapted to be used in such timing devices.

The timing disc and timing part assembly, of the present invention, may be employed in association with timing devices normally used for programming or controlling automatic operations such as in operating lawn sprinkling controls, as disclosed in my co-pending applications, Serial No. 185,637, filed April 6, 1962, entitled "Timing Devices" and Serial No. 300,371, filed August 6, 1963, also entitled "Timing Devices." In these timing devices, a timing clock or similar means is employed to trip a switch associated with the programming controls. The present timing device assembly is particularly adapted to be employed in the timing clock device of such timing devices, but it is contemplated that the timing disc and timing part assembly of the present invention may be used in any device in which a rotating timing part is employed to selectably operate a stationary switch means, whether it is mechanical or electrical.

In prior timing clock devices, a plurality of pegs have been used with a rotating timing disc to actuate associated switch means through interference therewith by the pegs. In operating these devices, a peg is placed on the disc in whatever position a peg hole in the disc allows to determine when the switch means is to be operated. This type of device has been unsatisfactory because of the difficulties in completely removing and replacing pegs to adjust the operation thereof and because the number of pegs which physically fit, or the holes for mounting same, do not allow close spacing thereof for a fine graduation of timing units for which the device may be set.

It is therefore a principal object of the present invention to disclose and provide a timing disc and timing part assembly which is readily adapted for use in timing devices wherein a rotating timing part in the assembly interferes with associated stationary switch means and particularly wherein a plurality of rotating parts are all mounted upon a disc in close proximity to each other about the disc circumference to be selectable adjustable on the disc, the disc being associated with a motor means to be rotated at a predetermined speed.

It is also a principal object of the present invention to disclose and provide a timing disc and part assembly as in the foregoing object wherein each timing part may be very easily assembled to the disc and without being removed therefrom be selectably manually adjustable thereon between a retracted or inoperative position and a projected, operative or switch actuating position.

It is another object of the present invention to disclose and provide a timing part for use in a timing disc and part assembly wherein the part is of a generally flat wafer thin configuration which can be easily fabricated in one piece integral units out of strip material stock, or the like, and which can be assembled readily thereafter to the timing disc in operative relation therewith by merely sliding the individual parts onto the timing disc in a one-step operation.

It is a still further object of the present invention to disclose and provide a timing part as in the foregoing object wherein means are provided on the timing part and timing disc for cooperative operation therebetween to mount each timing part generally normal to the disc in slidable assembled relation thereto for ready sliding movement therebetween but with a limit or restricted extent of movement for the timing part outwardly of the timing disc so that it is not inadvertently pushed off of the disc and so that its disposition into a switch operating position is facilitated.

Further objects and various advantages of the present invention will become apparent to those skilled in the art from a careful consideration of the following detailed explanation of an exemplary embodiment of the timing disc and part assembly, in accordance with the present invention. Reference will be made to the appended sheet of drawings in which:

FIG. 1 is a partially schematic plan view of an exemplary embodiment of the timing disc and timing part assembly in accordance with the present invention shown in association with exemplary switch means and associated electrically operated means;

FIG. 2 is a partial section view of the assembly of FIG. 1 taken therein along the plane 2—2;

FIG. 3 is a section view of a portion of the assembly of FIG. 2 taken therein along the plane 3—3;

FIG. 4 is a perspective view of a timing part of the assembly of FIGS. 1 through 3; and

FIG. 5 is a section view of portion of the assembly taken along plane 5—5.

Referring now to the drawings, a detailed explanation of an exemplary timing disc and timing part assembly, in accordance with my present invention, will now be made. Referring to FIG. 1 initially, it may be seen that the timing disc and part assembly, indicated generally at **10**, is adapted to be used with a mechanically operated switch means, as the exemplary electrical normally open switch means **20**.

Switch means **20** may be employed in any electrical circuit, but for purposes of illustration, it is shown here used in conjunction with a timing device **21**. Timing device **21** may be constructed and operated as are the timing devices disclosed in my copending application, Serial No. 300,371, filed August 6, 1963, entitled "Timing Devices." As shown, the timing device **21** may be electrically connected to the switch means **20** by a pair of lead lines **22** and **23** which connect to the switch terminals **24** and **25** respectively to be actuated or set in operation on closing of switch means **20**. A source of potential, indicated generally at **26** and a manual on-off switch, indicated generally at **27**, may be electrically interconnected into one of the lead lines, as line **22**, between the timing device and the switch means **20**. As seen in FIG. 2, an actuating lever **29** mounted on the body of the switch means **20** serves to depress or release the switch actuating button **28** thereby opening or closing respectively the electric circuit. Therefore, upon a mechanical interference between a portion of the timing disc and timing part assembly with the switch arm **29**, the electrical circuit between the switch means and the timing device **21** to initiate its operation will be completed. Additional conventional circuitry may be employed to supply the timing device **21** with current to allow it to run its program, such as lead line **23'**.

The timing disc and timing part assembly, indicated generally at **10** in FIGS. 1 and 2, is adapted to be mounted to a motor means M which may rotate the assembly at any predetermined speed. When using the assembly with the timing device **21** of my copending application, Serial No. 300,371, filed August 6, 1963, for example, the assembly may be rotated once every 24 hours. In the exemplary embodiment, such timing disc and timing part assembly includes the generally flat timing disc **11** which may be mounted to the drive shaft **12** of the motor

means in any conventional manner. For example, a flange **13** may be provided on shaft **12** and the disc **11** may be secured thereto by a plurality of fasteners or screws **14**, **15** and **16**. Fastener **14** holds the disc to the flange while the additional smaller fasteners **15** and **16** relieve fastener **14** of any turning torque between the disc **11** and its mounting flange **13** which might tend to loosen the fastener **14**.

Disc **11**, as shown in the exemplary embodiment, preferably is provided with scale or indicator means, indicated generally at **17**, to indicate a time scale to which the disc is adapted to operate. As shown in FIG. 1, the scale means, indicated generally at **17**, is graduated in 15-minute segments for a 24-hour day, the numerals indicating the 24 hours in a day. Additional notations such as NOON and a directional arrow, indicated generally at **18**, may also be printed on the face of the timing disc to facilitate the understanding of its operation, the disc rotating clockwise in FIG. 1.

A plurality of timing parts are mounted upon or assembled to the timing disc **11** to be adjusted thereon for selectable mechanical interference with the arm **29** of switch means **20** during timing rotation of the timing disc **11**. In the exemplary embodiment, such timing parts comprise a plurality of relatively thin wafer-like plates or parts **30**, as shown in FIGS. 3 and 4, which are easily assembled in relatively close proximity to each other on the timing disc **11**. Each timing part **30** is assembled or mounted to the timing disc in a position thereon corresponding to each of the graduations of the scale means indicated generally at **17**. Thus, an individual timing part **30** is provided in the exemplary embodiment, as shown in FIG. 1, for each of the 15-minute divisions of a 24-hour day timing disc **11**.

Timing disc **11** is provided with a plurality of radially inwardly extending slots **40**, as best seen in FIG. 1, spaced about and originating at the circumference of disc **11**. Each slot **40** is provided in disc **11** aligned to one of the graduations in the scale means, indicated generally at **17** in FIG. 1, to correspond to a segment of the time scale for the day. Slots **40** form a portion of the mounting means for mounting the timing parts **30** normal to and spaced about the timing disc aligned to the individual graduations of the timing scale indicated generally at **17**.

Mounting means for allowing the easy assembly or mounting to the timing disc of each of the timing parts **30** comprises, in the exemplary embodiment, a pair of cooperating slot means **40** and **31**. The first such slot means comprises one of the slots **40** in the timing disc, as best seen in FIG. 1, and the second such cooperating slot means comprises slot means **31** provided in the wafer-like timing part **30**, as shown in FIG. 4. As best seen in FIG. 2, a timing part **30** may be received normal to the timing disc within each of the disc slots **40** with the part **30** in turn receiving a central portion **32** of the disc **11**. Portion **32** is inwardly on disc **11** of the slots **40**. The cooperation between slot means **31** and **40** allows a radial sliding mounting or assembly of each timing part **30** to the timing disc in very closely spaced relationship with fine timing scale graduations to be selectively slidable from a fully inserted inoperative position of the part **30'**, shown in FIG. 1, and an extended operative or switch actuating position of the radially timing part **30''**, as shown in FIGS. 1 and 2.

Means for limiting the outward sliding movement of each timing part within its associated slot in the timing disc are provided which, while allowing the ready-assembly of the timing parts to the discs, prevent inadvertent removal of a timing part and facilitate the positioning of the timing part in its outer switch actuating position. in the exemplary embodiment, such limiting means includes the provision of a recess **41** in one of the opposed inner surfaces of each of the slots **40** of the timing disc, as seen in FIG. 1. Each recess **41** forms a radially inwardly directed stop means or face **42** which cooperates with resilient means provided on each timing part **30** to limit the outward movement of the timing part **30** after it has been assembled to the timing disc.

Resilient means for slidably abutting the stop means included on the timing disc are provided on each timing part **30** to cooperate with one of the inner walls or surfaces of the associated slot **40** to abut the disc stop means and limit outward movement of the timing part in its switch actuator position, as shown by the timing part **30''** in FIGS. 1 and 2. As best seen in FIGS. 3 and 4, such resilient means may be formed integrally of the flat wafer-like part **30** by bending or offsetting a portion of the body itself, as the offset arm **33**.

Offset arm **33**, due to its bend or offsetting, normally assumes the position shown in FIGS. 3 and 4 with upper portions of the arm lying outside the plane of the relatively thin part **30**. Arm **33** is resilient and biased into the normal position of FIGS. 3 and 4 due to the permanent deformation, bend or offsetting of the arm as described. Each part **30** is, therefore, very easily assembled to the timing disc by merely being inserted or slid into a corresponding slot **40** in the timing disc until the slot **31** of timing part **30** overrides or receives an inner portion, as **32** in FIG. 1, of the timing disc.

When a timing part **30** is received within a corresponding slot **40** of the timing disc, inwardly thereon of the recess **41** in the slot, the resilient arm **33** yields into the plane of the wafer-like part **30** allowing free sliding movement of the part into its fully retracted or inoperative position.

Digitally sensed means are provided on an upper outer edge of each timing part **30** to facilitate manual movement of the timing part. In the exemplary embodiment, as best seen in FIG. 4, a projection **34** is provided on the upper edge of the timing part **30**. Such projections **34** are thereby presented outwardly of the front face of the timing disc when the parts are assembled to the disc, as shown in FIG. 1, to be easily manually sensed and employed in moving or sliding each of the timing parts radially between the retracted or inoperative position and the extended switch actuating position. For ease of operation the projections **34** are staggered as shown in FIG. 2.

Upon such manual outward movement of a timing part **30**, the biased leg or exemplary resilient means **33** abuts and slides along the inner surface of the corresponding slot **40** until it is received within the side wall recess **41** for the corresponding slot **40** and such leg **33** abuts the radially inwardly facing stop wall **42**. Each timing part can be readily removed from its assembled relationship with the timing disc **11** by merely biasing the resilient means into the plane of the wafer-like part **30** and sliding the part out of its corresponding slot **40**, if desired.

From the foregoing, it can be seen that the entire timing part and timing disc assembly may be readily constructed and assembled. The timing disc may be made of metal or other suitable material which can be stamped or otherwise machined to provide the plurality of slots **40**. The scale means or time indicia, indicated generally at **17**, may be printed upon the timing disc with whatever graduations desired, the assembly allowing a separate individual slot **40** and timing part for each graduation on the time scale. Each of the timing parts **30** may also be made of metal or other such suitable material which can be easily stamped out of flat material and which provides sufficient resiliency to a leg member **33** permanently deformed or offset from the plane of the part **30**. After the assembly has been mounted to a timing motor and associated with a timing switch, as the switch means **20**, any individual timing part or combinations thereof mounted on the disc **11** may be selectably slid to the outer switch actuating position, the timing part resilient means abutting the timing disc stop means, to easily adjust the assembly for selectable operation of the switch means **20**. No timing

part need be removed or unduly adjusted in order to be made inoperative and the adjustment of any one part **30** does not affect the adjustment of any other part **30**.

An additional important function of the bent arm **33** is to provide a friction fit necessary to prevent the part **30** from being pushed back when mechanically interfering with the switch arm **29**.

The assembly of timing disc and timing parts and the arrangement thereof as disclosed and explained in detail herein is intended to be exemplary in character only and it should be understood that further modifications, alterations and embodiments may be made within the scope of my invention, as defined by the following claims.

I claim:

1. A timing disc and adjustable timing part assembly for use in timing devices wherein a timing disc is mounted to a motor means and associated switch means are operable by intereference with the rotating adjustable timing parts, said assembly comprising:

a generally flat timing disc adapted to be mounted to a timing motor and including a plurality of radially inwardly extending slots spaced about the disc circumference, each of said slots including a pair of opposed inner surfaces and a radially inwardly directed stop means formed in one of said inner surfaces; and

a plurality of timing parts mounted on and generally normal to said disc in said slots, each said timing part being selectively movable within one of said slots radially of said disc between an outer switch actuating position and an inner inoperative position; and

wherein each of said adjustable timing parts includes a laterally resilient arm means for slidably abutting said one inner surface during selective radial movement of said part to restrain said part within said slot in said outer switch actuating position by abutting said stop means on radially outward movement of said part in said slot.

2. In a timing device for actuating a mechanically actuated switch by interference between a portion of a rotating timer disc and the switch, the provision of:

a generally flat timing disc to be operated by a timer motor and including a plurality of radially inwardly extending slots originating at and about the disc circumference, each said slot including a pair of opposed inner side surfaces and a radially inwardly facing stop shoulder formed in one of said surfaces; and

a plurality of timing members slidably received radially on and generally normal to said timing disc to be selectably positioned radially thereon between an outer operative position for interference with switch means associated with the disc and a radially inward inoperative position for non-interference with said switch means, each of said members being slidably received in one of said slots in said disc and having laterally resilient means thereon to frictionally engage one of the associated slot inner side surfaces to resist radial sliding movement within said slot between said operative and inoperative positions and to engage the slot inwardly facing stop shoulder upon outward movement of the member relative to said disc to place said member in said operative position.

3. The timing device of claim **2** wherein each said one of said surfaces includes a recess means therein providing said inwardly facing stop shoulder and each said timing member comprises:

a generally flat wafer-like body including a slot means therein to slidably receive a central portion of said disc which is inward of the disc slot on said disc in which the body is received; and

said resilient means is formed integrally of said body and biased laterally outwardly of the plane of said wafer-like body, said resilient means yielding against its bias into the plane of said body when said body is fully inserted into inoperative position in said disc slot between said slot side walls;

said resilient means normally abutting said one of said slot inner side surfaces under its bias to move out of the plane of said body, enter said recess means and abut said stop shoulder upon radially outward movement of said body within said slot into said operative position.

4. A generally flat wafer-like timing part to be employed with a timing device disc having a plurality of inwardly extending radial slots originating at the disc circumference characterized by its ease of assembly and selective operation without removal from the disc, said part comprising:

a generally flat wafer-like body including slot means to receive a portion of said disc when said body is fully inserted into a disc slot; and

resilient arm means on said body biased laterally outwardly of said body to abut the inner wall of an associated disc slot, said resilient means yielding again its bias to allow radial sliding movement of said body within said disc slot.

5. The generally flat wafer-like timing part of claim **4** wherein said timing part is provided with a digitally sensed means on an outer edge thereof and extending axially of said disc for use in manual radial adjustment of said body between operative and inoperative positions within the associated disc slot.

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BERNARD A. GILHEANY, *Primary Examiner.*

G. MAIER, *Examiner.*