Aug. 15, 1950 C. H. MacINTYRE 2,518,628

SNAP-ACTION ROTARY TIMER

Filed Nov. 24, 1947

Fig. 1

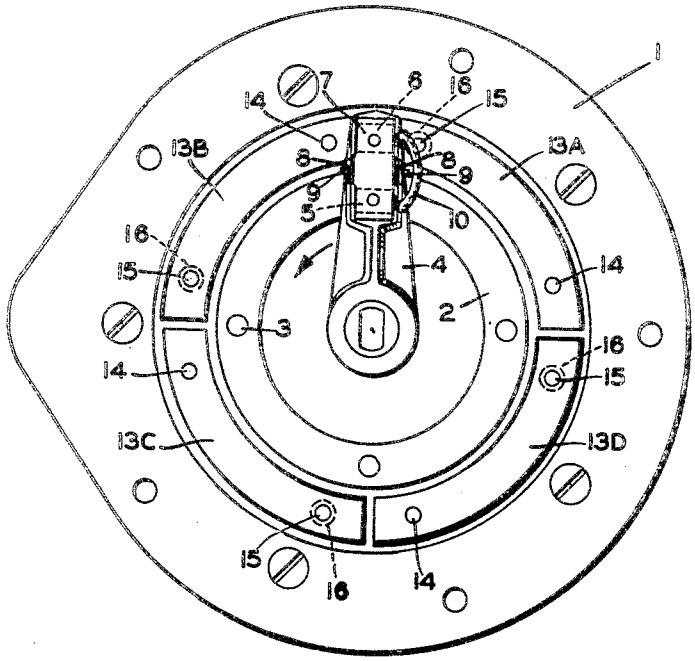


Fig. 2

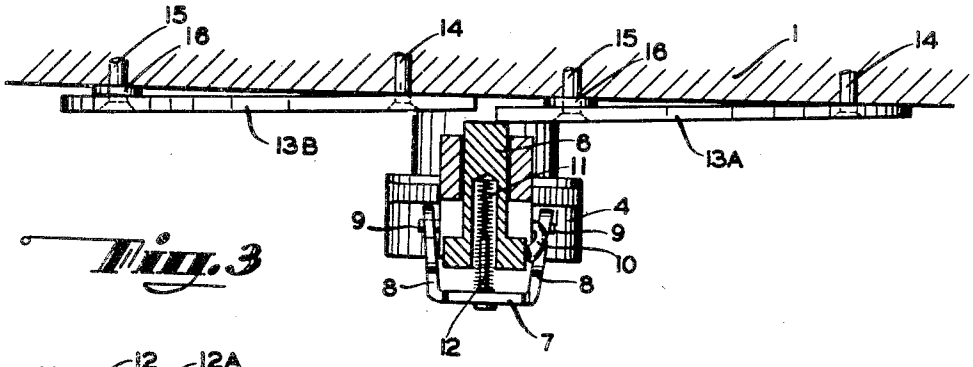
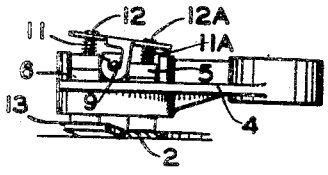


Fig. 3



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Patented Aug. 15, 1950

2,518,628

UNITED STATES PATENT OFFICE

2,518,628

SNAP-ACTION ROTARY TIMER

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Application November 24, 1947, Serial No. 787,756

2 Claims. (Cl. 200—28)

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This invention relates to electrical timing apparatus and more particularly to that type of timing apparatus wherein a series of load devices are sequentially operated for a predetermined time interval; and improvements in a rotary timer of the type disclosed in the copending application Serial No. 498,248, filed August 11, 1943, now Patent No. 2,515,519, granted July 18, 1950 by Donald M. Lawrence, David Gregg and Myron L. Taylor and assigned to Bendix Aviation Corporation.

An object of the invention is to provide a novel rotary timer in which there may be effected an arc-eliminating snap-action between a rotating arm and suitable switch segments of the timer.

Another object of the invention is to so incline the switch segments of the rotating timer that a spring biased contact brush carried by a rotating switch arm may successively slide up each of the contact segments and at its inclined end drop onto the declined end of the next succeeding switch segment so as to provide a snap-action contact break between the contact brush of the rotating arm and the switch segments.

Another object of the invention is to provide an improved rotary timer for operating electrically controlled elements of an ice eliminating system for aircraft.

The above and other objects and features of the invention will appear more fully hereinafter from a consideration of the following description taken in connection with the accompanying drawings wherein one embodiment of the invention is illustrated by way of example.

In the drawings:

Figure 1 shows a plan view of the rotary timer embodying the features of this invention.

Figure 2 is an enlarged top end view of Figure 1 with the rotary switch arm and a portion of the base plate in section so as to better illustrate the invention.

Figure 3 is a side view of the rotary switch arm of Figure 1.

Referring now to Figure 1, there is indicated by the numeral 1 a base plate formed of a suitable electrical insulating material on which there is mounted a ring 2 fastened to the base plate 1 by rivets 3. The ring 2 is formed of a suitable electrical conducting material and may be connected at one of the rivets 3 to a suitable source of electrical energy, not shown.

Rotatably mounted in the base plate 1 is a switch arm 4 made of a suitable electrical insulating material and which may be driven by an electric motor, not shown, at either a constant

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or a variable speed, as indicated in the copending application Serial No. 498,248 referred to above. The arm 4 carries a pair of suitable electrical conducting contact brushes 5 and 6 slidably mounted therein. To secure the brushes 5 and 6 in operative position there is provided a rocking beam 7, which, as shown in Figures 2 and 3, is pivotally fastened to the rotary arm 4 by fingers 8 pivotally engaged by pins 9 projecting from the rotary arm 4. The brushes 5 and 6 are electrically connected by an electrical conductor 10.

In Figure 2, the brush 6 is shown as held in operative relation by a spring 11 mounted on a pin 12. The pin 12 projects from the rocking beam 7 at one side of the pivotal connection 9 and into a cavity formed in brush 6. The brush 5 is similarly mounted, as shown in Figure 3, by a like spring 11A and pin 12A at the other side of the pivotal connection 9. Thus brush 5 is biased by spring 11A into continuous contacting relation with the ring 2 and is electrically connected to the source of electrical energy through the ring 2.

The brush 6, electrically connected by conductor 10 to brush 5, is likewise biased into contacting relation with switch segments 13 so as to successively make and break an electrical contact with the switch segments 13A, 13B, 13C and 13D upon rotation of arm 4 to control suitable load devices connected thereto. These switch segments are formed of an electrical conducting material suitably fastened to the base plate 1 by rivets 14 and 15. Each of the switch segments 13 may be electrically connected through rivet 14 to a load device.

As shown in Figure 2, there is inserted about the rivet 15 and between the base plate 1 and each of the switch segments 13 a washer 16 made of a suitable plastic or metal, and which inclines one end of the switch segment 13 relative to the other end.

The inclined switch segments 13, as shown in Figure 2, are arranged so that the arm 4 may be rotated in a counter-clockwise direction relative thereto. As shown in Figure 1, the brush 6 will then successively slide up each of the contact segments 13 until the end of the switch segment is reached, whereupon the brush 6, biased by spring 11, will then drop with a snap-action on to the declined end of the next succeeding switch segment as the distances between the switch segments is less than the width of the brush. The rocking arm 7 is arranged so as to freely pivot at 9 to effect the latter snap-action of the brush

6 under the combined biasing force of spring 11 and 11A.

Thus the breaking of the connection of the first switch segment 13 by the brush 6 will be made with a snap action so as to effect a rapid opening and closing of the switch segments 13 and eliminate arcing between the brush 6 and the switch segments 13.

The several segments 13A, 13B, 13C and 13D are individually connected to suitable load devices controlled thereby, which load devices, as shown in the copending application Serial No. 498,248, may be arranged for controlling the operation of suitable inflatable ice eliminating elements. The rotary timer may also be used to control through the switch segments the energization of suitable electrical heating units mounted on the propeller or other portions of the aircraft and which heating units are well known in the art.

Although only one embodiment of the invention has been illustrated and described, various changes in the form and relative arrangements of the parts may be made to suit requirements.

What is claimed is:

1. A rotary timer, comprising, in combination, a base plate formed of an electrical insulating material, a ring formed of an electrical conducting material and mounted on said base plate, a plurality of arcuate switch segments formed of an electrical conducting material and mounted on said base plate, each of said switch segments positioned in spaced relation to each other and the ring, a member inserted between one end of each of said switch segments and said base plate so as to incline the one end of each of said switch segments above a declined end of its succeeding switch segment, a rotary switch arm formed of an electrical insulating material, a first brush slidably mounted in said switch arm for continuously contacting said ring, a second brush slidably mounted in said switch arm and arranged to successively contact each of said inclined switch segments, said first brush electrically connected to said second brush, a rocking arm pivotally connected to said switch arm, spring elements mounted at opposite sides of said pivotal connection for biasing said first and second brushes into contacting relation with said ring and inclined switch segments respectively so that upon rotation of the switch arm said second brush may successively slide up each of said inclined switch segments in contacting relation and successively break the contact with each switch segment at its inclined end under the combined biasing force of said spring elements so as to make a contact with the declined end of the next succeeding switch segment with a snap-action to eliminate arcing between the second brush and switch segments.

2. A rotary timer, comprising, in combination, a base plate formed of an electrical insulating material, a ring formed of an electrical conducting material and mounted on said base plate, a plurality of arcuate switch segments formed of an electrical conducting material and mounted on said base plate, each of said switch segments positioned in spaced relation to each other and the ring, each of said switch segments having one end thereof inclined above a declined end of its succeeding switch segment, a switch arm, a first brush mounted in said switch arm for continuously contacting said ring, a second brush slidably mounted in said switch arm and arranged to successively contact each of said inclined switch segments, said first brush electrically connected to said second brush, a first spring to bias said first brush in a direction to contact said ring, a second spring to bias said second brush in a direction to contact said inclined switch segments, a rocking arm to support said first and second springs, a member to pivotally connect said rocking arm to said switch arm at a point intermediate said first and second springs, said switch arm rotatable relative to said switch segments so that said second brush may successively slide up each of said inclined switch segments in contacting relation and successively break the contact with each switch segment at its inclined end under the combined biasing forces of said first and second springs so as to make a contact with the declined end of the next succeeding switch segment with a snap-action.

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