June 2, 1953 H. F. AULER ET AL 2,640,295

TIMER FOR MODEL AIRPLANES

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Fig. 1.

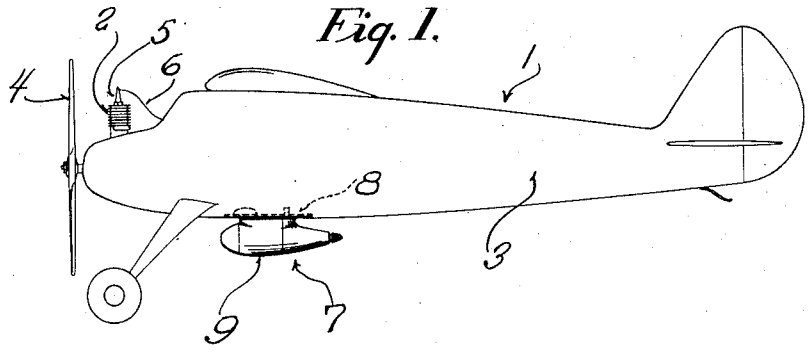


Fig. 2.

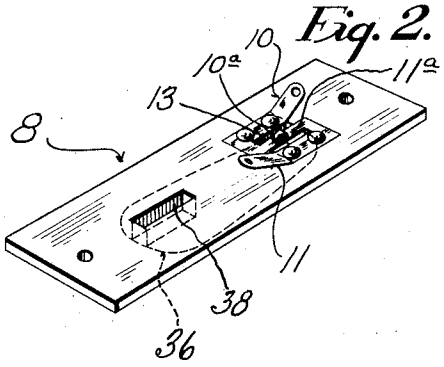
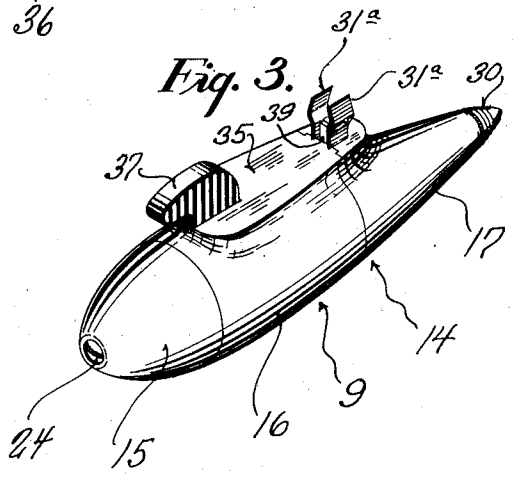


Fig. 3.



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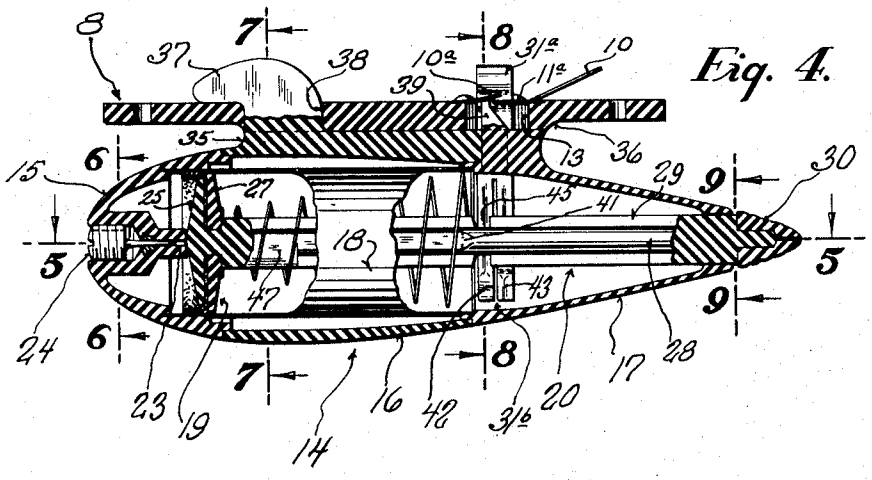


Fig. 4.

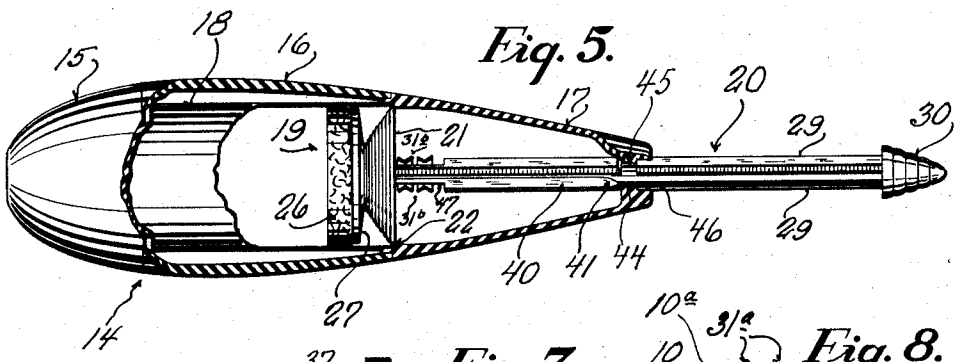


Fig. 5.

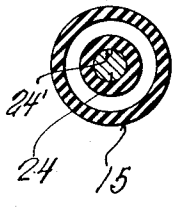


Fig. 6.

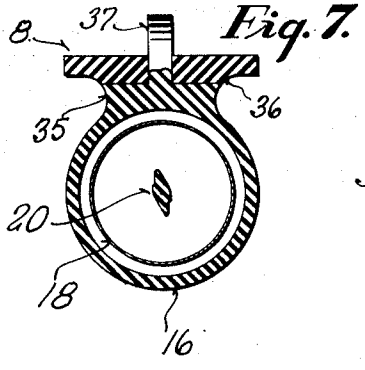


Fig. 7.

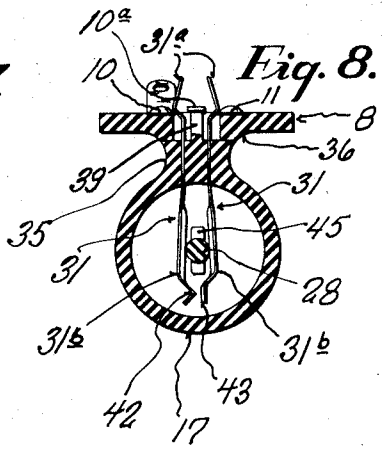


Fig. 8.

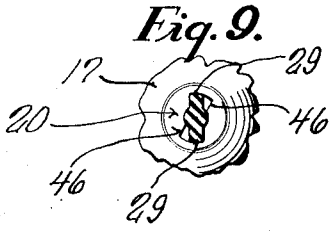


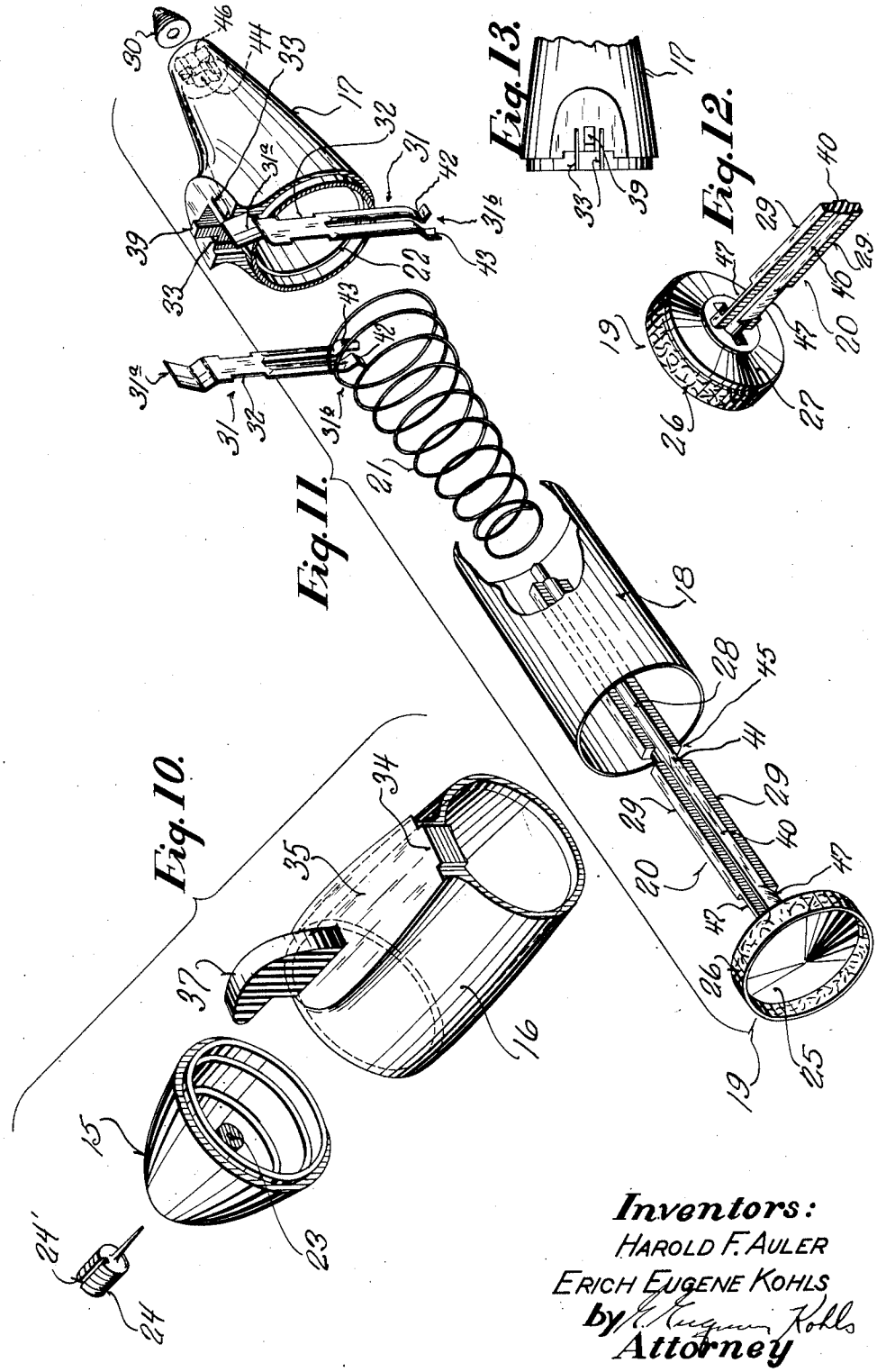
Fig. 9.

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TIMER FOR MODEL AIRPLANES

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TIMER FOR MODEL AIRPLANES

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Application June 30, 1947, Serial No. 758,004

8 Claims. (Cl. 46—78)

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This invention relates to timing devices and refers particularly to a timing device especially adapted for use with model airplanes to time the duration of the motor run.

Although the capacity of the fuel tanks of the small internal combustion engines used in model airplanes is limited, it is nevertheless, sufficient for a motor run much longer than is desirable or, in the case of contests, permissible. Hence, it is necessary to equip gas engine powered model airplanes with timers which open the ignition circuit and stop the motor after a predetermined time, generally a matter of seconds. A timer for this purpose is illustrated in Patent No. 2,207,189, issued July 9, 1940 to W. C. Austin et al.

Obviously, to control the ignition circuit the timer must be attached to the model airplane. In the past, the entire timer had to be permanently wired into the ignition circuit. Thus, it became a part of the model airplane. This required a complete timer for every model. Moreover, the timers heretofore available were so lacking in appearance that model builders generally concealed the timer within the model rather than have it exposed to view. This made access to the timer difficult, but access must be had to the timer to enable the same to be adjusted.

The model builder, therefore, was faced with the choice of providing a removable panel to close the compartment in which the timer was mounted, or of locating the timer in some out-of-the-way place on the model where it would be more or less hidden from view. In either case the space available was limited, making it extremely difficult to adjust the timer, especially inasmuch as the adjustment should be made while the motor is running, since the vibration imparted to the timer by the motor has a bearing upon its action.

In addition to providing for the adjustment of the timer, the matter of pulling out its stem to cock the timer presented a problem. Invariably a string was tied to the stem with the end thereof trailing from the fuselage. While this enabled the stem of the timer to be pulled out to cock the timer, there was no way of holding the timer in its initial cocked condition while final adjustments were made to the motor and possibly the model airplane itself, other than to maintain a pull on the string. The disadvantages of this procedure are obvious.

With the above and other objections to past and existing timers for model airplanes in mind, this invention has as one of its objects to provide a timing device especially suited for use with

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model airplanes, which is so constructed and designed as to invite mounting the same on the outside of the model in plain view where it is readily accessible.

Another object of this invention is to provide a timer or timing device of the character described which is made in two separable parts, one comprising a combined mounting and terminal plate adapted to be permanently fixed to the model, and the other, which is the timer proper, being readily removably attached to the plate so that one timer may be used on any one of several model airplanes, provided they are all equipped with combined mounting and terminal plates.

Another object of this invention is to provide means whereby the attachment of the timer unit to be combined mounting and terminal plate automatically connects the switch controlled by the timer in the ignition circuit, and whereby removal of the timer unit automatically bridges the break in the ignition circuit which accommodated the timer controlled switch.

Another object of this invention is to provide means whereby the timer can be easily locked in its cocked condition thereby leaving the model flyer free to make last minute adjustments without danger of losing part of his permissible or desired motor run.

A further object of this invention resides in the provision of a novel gas engine powered model airplane wherein the timer for controlling its motor run is readily removably attached to an exposed portion of the model airplane to be readily accessible for adjustment and cocking, and wherein detachment of the timer automatically effects closure of the break in the ignition circuit occupied by the timer controlled switch when the timer is in position on the model airplane.

A still further object of this invention is to provide a readily removable timer for model airplanes which is of streamlined or tear-drop shape or design so that its presence on the exterior of a model airplane is not incompatible with adherence to strict design requirements.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of a model airplane equipped with the timing device of this invention;

Figure 2 is a perspective view of that part of the timing device which is permanently attached to the model airplane;

Figure 3 is a perspective view of the removable part of the timing device, and which may be considered the timer proper;

Figure 4 is a longitudinal sectional view through the complete timing device with its switch open;

Figure 5 is a longitudinal sectional view through Figure 4 substantially on the plane of the line 5—5, but showing the piston latched in its cocked position at which the switch is closed to remain so until the piston returns to its position shown in Figure 4;

Figure 6 is a cross sectional view on the plane of the line 6—6 in Figure 4;

Figure 7 is a cross sectional view through Figure 4 on the plane of the line 7—7;

Figure 8 is a cross sectional view through Figure 4 on the plane of the line 8—8;

Figure 9 is a detail cross sectional view through Figure 4 on the plane of the line 9—9;

Figure 10 is a perspective view of some of the component parts of the timer unit illustrated in Figure 3, said parts being shown separated but in their proper order of assembly;

Figure 11 is an exploded perspective view of the remaining parts of the timer unit;

Figure 12 is a perspective view of the piston and part of its stem; and

Figure 13 is a fragmentary detail view looking down on the tail portion of the timer body.

Referring now more particularly to the accompanying drawings, in which like numerals indicate like parts throughout the several views, the numeral 1 designates a model airplane having a gas engine 2 mounted in the forepart of its fuselage 3 to drive a propeller 4. The engine has a spark plug 5 to which a lead 6 is attached. This lead is part of the ignition circuit of the engine. The ignition circuit is of conventional design and includes the usual components (not shown).

As pointed out hereinbefore, gas engine powered model airplanes should be equipped with means for stopping the engine or motor after a short time, and for contest work this is a necessity since the regulations prescribe the maximum motor run. Opening the ignition circuit is the best way to stop the engine, and for this purpose a timer indicated generally by the numeral 7 is provided. While the use of timers to interrupt the ignition circuit is not broadly new, the timers heretofore employed for this purpose were not adapted to be mounted on the exterior of the model as shown in Figure 1. Hence, they lacked a very important feature of this invention for by mounting the timer on the exterior of the model, it is unrestrictedly accessible, making its adjustment and cocking a simple matter.

The specific shape and design of the timer 7 as well as its structural features (to be described) not only makes possible such external mounting but actually invites it and in addition enables the model builder to introduce desirable effects in the appearance of his model.

Structurally the timer 7 comprises two separable units 8 and 9. The unit 8 is essentially a plate

of insulating material adapted to be permanently secured to the underside of the fuselage, as shown in Figure 1, or to some other part of the model. Mounted on this plate are two electric terminals 10 and 11 normally bridged by the engagement of spring contacts 10^a and 11^a on the terminals. The terminals are secured to the top of the plate 8 at opposite sides of a rectangular hole 13, with their spring contacts 10^a and 11^a extending towards each other from opposite ends of the hole to overlie and contact each other, and with the inner side edges of the terminals overhanging the sides of the hole, as best shown in Figure 8. Preferably, though not necessarily, the terminals 10 and 11 are recessed into the top of the plate.

Wire leads may be soldered to the terminals to permanently connect them in the ignition circuit; and as long as their spring contacts 10^a and 11^a are engaged, the ignition circuit is closed, providing of course it is otherwise complete. The spring contacts thus provide a switch which, as will appear hereinafter, is closed when the two timer units 8 and 9 are detached from each other.

The unit 9 may be considered the timer per se. It comprises a streamlined or tear-drop shaped body 14 consisting of a nose 15, a mid section 16 and a tail section 17, all molded from an electrically insulating plastic. These three sections are cemented together in end-to-end relation during assembly.

Inside the body 14 is a cylinder 18, preferably a length of metal tubing, held in place by having its ends cemented into counterbores in the nose and tail sections. Within the cylinder is a piston 19 secured to the front end of a stem 20, and a spring 21 confined between the piston and a shoulder 22 on the tail section 17 to yieldingly urge the piston towards the nose 15. A vent port 23 in the nose, adjusted by a needle valve 24, provides means for regulating the rate of spring propelled forward movement of the piston 19. It is to be noted that the screw portion of the needle valve has an air escape slot 24′ cut into the side thereof; and that the screw is readily accessible for adjustment even when the timer is in position on the model airplane.

The stem 20, like the body sections, is molded from plastic so as to be electrically non-conductive, and has a head 25 integral therewith. This head is of slightly smaller diameter than the bore of the cylinder and provides support for a leather cup 26 the bottom of which is clamped between the head 25 and a washer 27 slipped over the stem 20 and rotated to secure the same in position. For most of its length the stem has a non-circular cross section consisting of a round core 28 and diametrically opposite longitudinally extending ribs 29. Omission of the ribs 29 for a short distance directly adjacent to the head 25 provides shoulders by which the washer 27 is held against the leather cup upon rotation of the washer to disalign the opposite recesses of its non-circular hole from the ribs 29. The head 25, cup 26 and washer 27, of course, comprise the piston.

The rear end of the stem 20 slidably projects through an appropriately shaped hole in the end of the tail section 17 to have a knob 30 cemented or otherwise secured thereto. By means of this knob, the piston is easily retracted to cock the timer. Such retraction of the piston effects closure of the timer controlled switch which comprises a pair of combined contact and terminal members 31. These contact-terminal members are stamped from suitable metal and are held in

place by having narrow necks 32 received in slots 33 formed in the tail section 17 and closed by a key 34 projecting from the rear end of the mid section 16. This key 34 serves the further purpose of holding the mid and tail sections in proper rotational relationship, necessitated by the need for keeping bosses on these sections in line to conjointly form a pad 35. The pad 35 is complementary to and merges with a pad 36 on the bottom of the plate 8 when the units 8 and 9 are connected.

The upper end portions of the members 31 project from the pad 35 and are shaped to provide spring clips or connector terminals 31ª adapted to enter the hole 13 in the plate 8 and snap over the overhanging inner edges of the terminals 10 and 11 when the units 8 and 9 are connected. The detent action of these spring clips or connector terminals 31ª snapping over the edges of the terminals 10 and 11 assures a good electrical connection and coacts with the engagement of a hook 37 over the edge of a hole 38 in the plate 8 to removably hold the timer unit 9 attached to the plate unit 8. In attaching the timer unit, the hook 37 is first engaged over the edge of the hole 38 and then the rear end of the timer unit is swung up into place.

As the spring connector terminals 31ª snap over the side edges of the terminals 10 and 11 the spring contact 10ª is lifted out of engagement with the contact 11ª by a lug 39 projecting up from the pad 35 between the connector terminals 31ª. Thus, the timer switch is connected into the ignition circuit; and, as will be readily apparent, when the timer unit 9 is removed, the contacts 10ª and 11ª re-engage to close the ignition switch.

The timer switch actually comprises the inner end portions of the member 31 which straddle the stem 20 and are spring biased toward each other. The thickness of the portion of the stem 20 between the members 31 at any given time determines whether the timer switch is open or closed.

For a distance slightly less than the full stroke of the piston, the round core 28 of the stem is slabbed off at opposite sides, as at 40, and the distance between the flat sides 40 is less than that required to hold the contact portions 31ᵇ of the members 31 separated. Thus, as long as the piston is in a position at which the slabbed-off portion of the stem lies between the members 31, their contact portions 31ᵇ engage and the switch is closed. However, as the piston reaches the end of its forward spring propelled stroke, the inclined ends 41 of the slabbed-off stem portions move between the members 31 and spread them apart to disengage their contact portions.

The contact portions 31ᵇ are preferably bifurcated with the extremity of one leg shaped to form a horizontal "knife edge" 42 and the extremity of the other leg shaped to form a vertical "knife edge" 43. Inasmuch as the two members 31 are identical and oppose each other, the "knife edges" 42 and 43 of opposite legs cross to provide single point contact therebetween. Hence, these switch contacts are less apt to be fouled by dirt or corrosion. The duplication of the contacts resulting from the bifurcation of the members 31 gives further assurance against failure of the switch to close.

In the interest of smooth operation, the legs of the contact portions 31ᵇ are preferably arcuate in cross section (see Figure 5) to present a

rounded edge to the stem 20 and thus minimize the frictional drag on the stem.

During reciprocation of the stem and piston, the stem is held against turning by its sliding engagement in the hole at the rear end of the tail section 17, the inner portion 44 of which is of the same shape as the stem. However, when the piston is fully retracted, as in Figure 5, an interruption 45 in the ribs 29 aligns with the inner portion 44 of the hole in the tail section to allow rotation of the stem. The extent of this rotation is defined by the shape of the outer portion 46 of the hole in the tail piece, which (as best shown in Figure 9) is angularly enlarged. Thus, when the stem is pulled out to cock the timer, it may be turned a few degrees to engage the outer edges of the interruption 45 in the ribs 29 over the sides of the recesses in the hole portion 44. This latches the timer in its cocked condition.

Opening of the contacts 31ᵇ by the turning of the stem to latch the timer in its cocked condition is precluded by having the ribs 29 relieved at 47, the relieved portions 47 being between the contacts 31ᵇ when the stem is fully pulled out.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides a timer for model airplanes which has many advantages over timers heretofore available for this purpose.

What we claim as our invention is:

1. A timer of the character described comprising: a body having complementary sections joined together during assembly; a cylinder within the body secured therein upon juncture of the complementary sections of the body; a controllable air bleed leading from the cylinder; a piston operating in the cylinder and biased in one direction; a stem on the piston projecting to the exterior of the body to provide means for moving the piston against its biasing force; switch terminals mounted in the body at the juncture of two of its complementary sections, said switch terminals having contact portions at opposite sides of the piston stem and relatively biased toward engagement with one another; and means on the piston stem operable upon said contact portions to control contacting engagement thereof during movement of said means with the piston.

2. In a time delay switch of the type comprising a dash pot and switch actuating means movable by the dash pot: a body composed of complementary sections molded from insulating material and adapted to accommodate a dash pot mechanism; a switch actuating stem movable by the dash pot across the plane of juncture between two complementary sections of the body; a pair of elongated sheet metal members of non-uniform cross section secured in correspondingly shaped recesses in the body at the juncture of said two complementary sections thereof, the non-uniform cross section of said members fitting in the correspondingly shaped recesses to secure the members against displacement, at least one of said members having a part in juxtaposition to the switch actuating stem and adapted to be actuated thereby; and complementary switch contacts on said members adapted to be opened and closed in consequence to actuation of said one member by the stem.

3. A timing device for model airplanes, comprising: an elongated hollow body having a side wall; a time delay actuator in the body including

an elongated stem constrained to endwise back and forth motion lengthwise of the body and spring propelled toward one limit of motion; control means carried by the body in its interior alongside of said stem to be operated thereby as the stem reaches its limit of spring propelled motion; connecting means on the side of the body at the exterior thereof for operatively connecting the timing device with a part of the model airplane to be controlled, said connecting means having operative connection with the stem operated control means and providing for manifestation of the effect of operation thereof by the stem upon the part of the model airplane to be controlled; and means at said side of the body for attaching the body to the exterior of a model airplane to be controlled.

4. A timing device for model airplanes, comprising: an elongated hollow body having a side wall; a time delay actuator in the body including an elongated stem constrained to endwise back and forth motion lengthwise of the body and spring propelled toward one limit of motion; a switch carried by the side wall of the body and including a contactor inside the body movable crosswise of the stem between switch closed and switch open positions and biased against the side of the stem and toward one of its two positions; means on the side of the stem engageable with said contactor as the stem reaches its limit of spring propelled motion to move said contactor to its other position; a pair of terminals connected with said switch and projecting through the side wall of the body to the exterior thereof; and means at one side of the body for attaching the body to the exterior of a model airplane.

5. The combination of: a model airplane powered by an internal combustion engine having an ignition circuit; a combined mounting and terminal plate permanently fixed to the model airplane with one side of the plate accessible at the exterior of the airplane; spaced terminals on the plate permanently connected in the ignition circuit with the ignition circuit interrupted across the terminals so that closure of the ignition circuit requires the terminals to be electrically bridged; a switch on the plate for bridging said terminals; an enclosed timer unit having in its interior a switch actuator and time delay means for operating the same; means readily removably attaching the timer unit to said accessible side of the combined mounting and terminal plate; means on the timer unit independent of said attaching means for opening said switch in consequence to attachment of the timer unit to the plate; and another switch carried by the timer unit having terminal portions exposed at the exterior of the timer unit for bridging the terminals on said plate when the timer unit is attached thereto, said other switch having movable contacts inside the timer unit and controlled by the switch actuator.

6. An electrical timing device for gas engine powered model airplanes and the like, comprising: a combined terminal and mounting plate adapted to be permanently secured to a model with one side of the plate exposed at the exterior of the model; terminals on said plate connectable in the ignition circuit of the engine of the model; switch means on said plate for electrically connecting said terminals with one another; an enclosed time delay switch unit including a movable actuator; cooperating means on said time delay switch unit and the plate for readily removably securing the time delay switch unit against said exposed side of the plate; and means on said time delay switch unit independent of said securing means but cooperable with said switch means for opening the same in consequence to attachment of said time delay switch unit to the plate; another switch inside the time delay switch unit controlled by the actuator thereof; and cooperating means on said plate and the time delay switch unit interengaged by attachment of the unit to the plate to electrically connect said last named switch with said terminals.

7. A motor run timer for model airplanes, comprising: a combined terminal and mounting plate adapted to be permanently attached to a model airplane with one side of the plate exposed at the exterior of the plane; terminals on said plate connectable in the ignition circuit of the motor in the model airplane; a hollow timer body; an adjustable dash pot type time delay switch actuating means within the body; switch means within the body controlled by said actuating means; and means detachably securing the timer body to said plate against the exposed side thereof, including spring clips on the body electrically connected with said switch means and extending through the side of the body for interengagement with portions on said terminals to hold the body to the terminal plate and to electrically connect said time delay actuated switch means across said terminals.

8. In a timer for model airplanes: a terminal plate adapted to be mounted on a part of the model airplane with one side of the plate exposed at the exterior of the plane; terminals on said plate; an elongated timer housing having a side wall; dash pot type time delay switch actuating means within the housing; and means for detachably securing the housing to the terminal plate with a portion of the side wall of the housing against said exposed side of the terminal plate, including a pair of elongated flexible conductive strips extending through said portion of the side wall of the housing substantially parallel to one another, said strips having switch contacts at their inner ends controlled by said dash pot type actuating means and having means at their outer ends cooperable with portions on said terminals on the terminal plate to hold the housing to the terminal plate and to electrically connect said contacts with the terminals.

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