

July 4, 1961

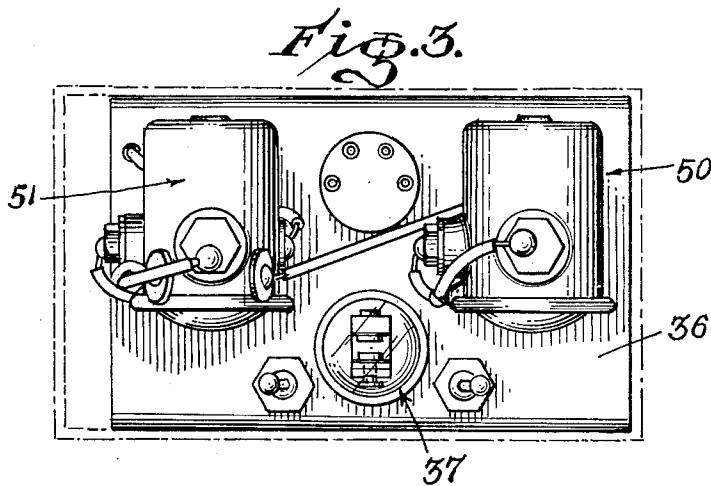
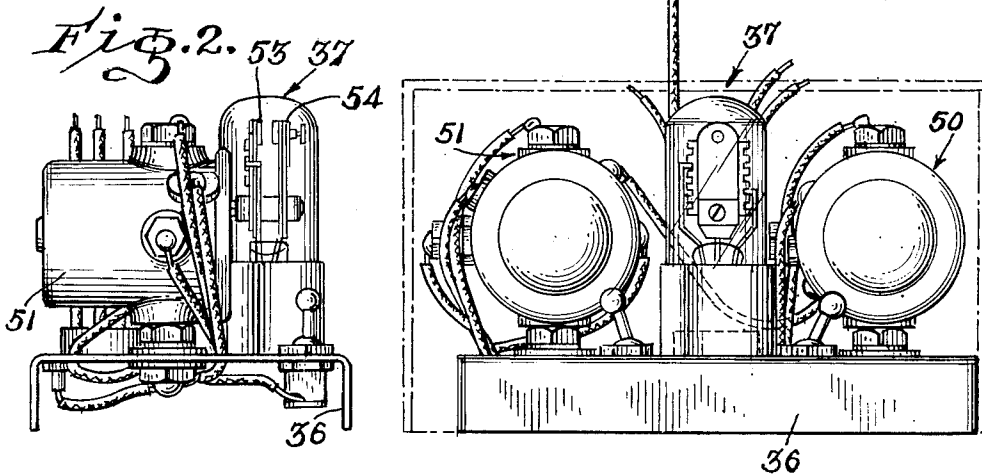
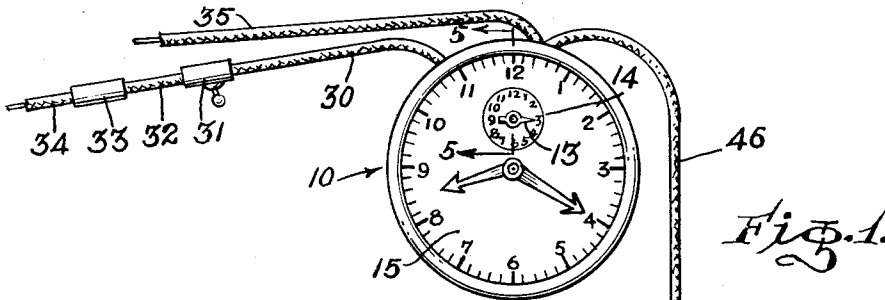
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2,991,370

TIME CONTROLLED AUTOMATIC ENGINE STARTER

Filed Oct. 13, 1955

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

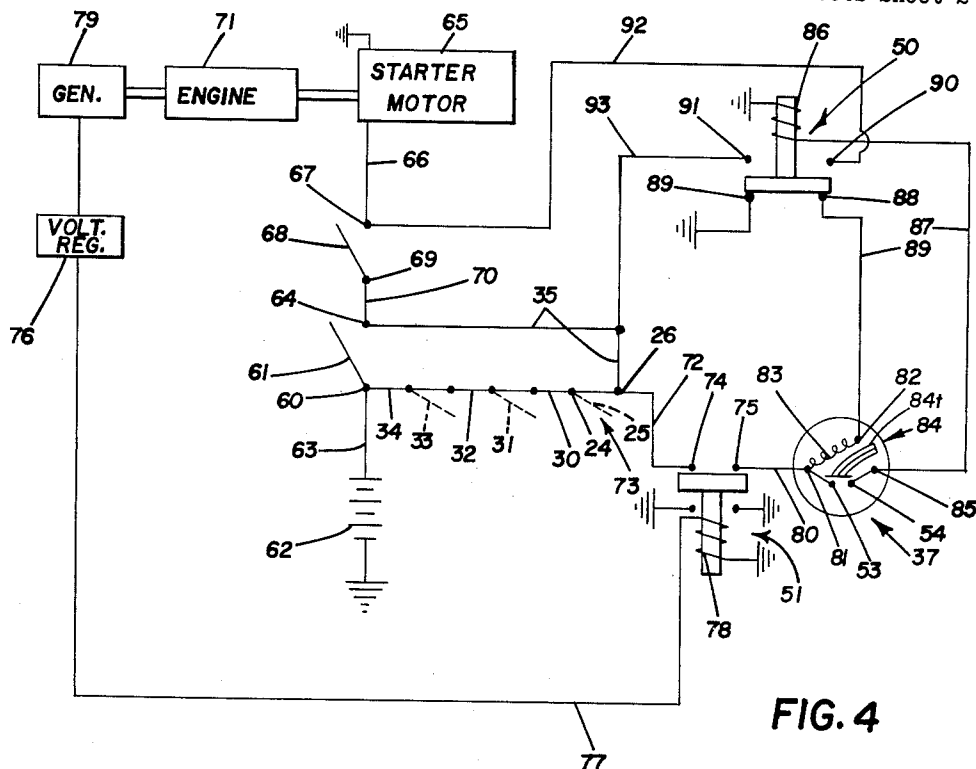


FIG. 4

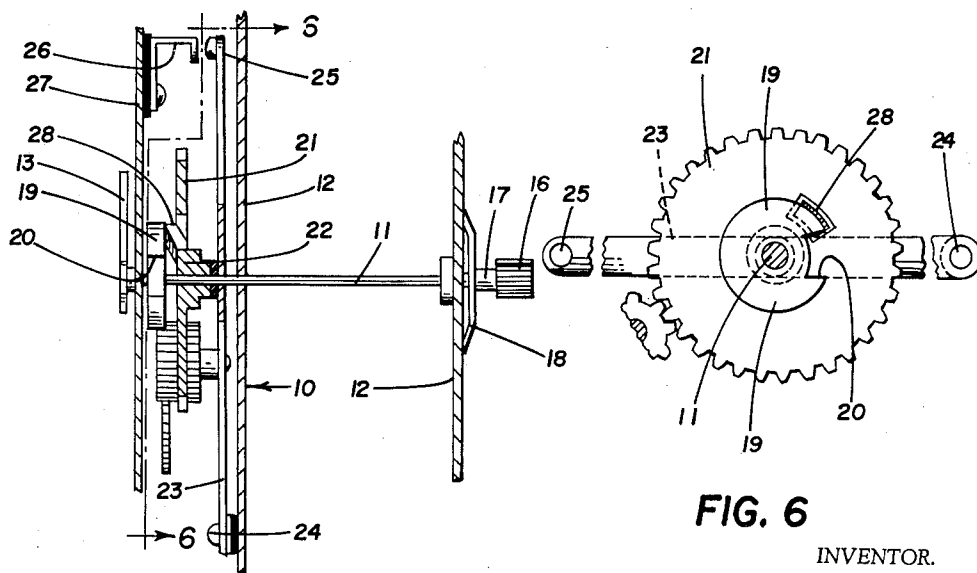


FIG. 5

FIG. 6

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2,991,370 TIME CONTROLLED AUTOMATIC ENGINE STARTER

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one-half to Louis Rado, Dayton, Ohio
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1 Claim. (Cl. 290—38)

The present invention relates to a time controlled automatic engine starter and it consists in the combinations, constructions and arrangements of parts herein described and claimed.

Generally the device consists of a clock, two solenoid switches and a delay relay in tube form. The clock is equipped with contact points and a setting hand whereby the device may be set to operate at a given time at which time certain contact points within the clock are closed. From these points run two wires to the car's ignition switch and thus, when the points are closed, the ignition is on. Another wire runs from the "cold" post inside the clock to the remainder of the unit so that when the ignition is turned on, the unit itself goes into operation. One solenoid switch and the delay relay tube are wired so that when the heater element in the tube is heating, the automobile's starter motor is not engaged. When the heater element becomes hot, contact points inside the tube close thus allowing current to flow into the solenoid which cuts off the power to the heater element in the tube and at the same time completes a circuit to the car's starter solenoid which is then grounded and a circuit thus closed to the starter motor. When the heater element in the tube cools, it causes the points therein to open thus cutting out the circuit to the starter motor and again completing the circuit to the heater element. This on and off procedure is repeated approximately every five seconds preventing the automobile's carburetor from flooding. Likewise in the event of the starter motor merely spinning (not engaging the fly wheel) the five second intermediate period gives the starter motor time to come to a complete stop before the next attempt to start the motor. When the car's engine starts, current from the car's voltage regulator is directed to the second solenoid switch and this breaks the flow of current to the first mentioned solenoid and the tube thus disengaging the starter motor. If an automobile is left unattended, the engine will run for about fifteen minutes at which time the contact points inside the clock itself will open thus shutting off all electrical current in the car. Another switch is placed in the car's gear shift linkage so that it will be connected only when the car's gear shift is in neutral position thus preventing starting of the car while in gear. Likewise, if theft should be attempted while the car is running, when the gear shift is moved from the neutral position, it will cause the engine to stop.

It is accordingly an object of the invention to provide a novel time controlled automatic engine starter.

Another object of the invention is to provide a device of the character set forth which is comparatively simple in construction, inexpensive to manufacture, capable of occupying a minimum of space and yet which is effective and efficient in use.

A further object of the invention is to provide a novel arrangement of switches which form a part of the invention.

Still another object of the invention is the provision, in a device of the character set forth, of a novel use for a relay delay tube.

Other and further objects of the invention will become apparent from a reading of the following specification taken in conjunction with the drawings, in which:

FIGURE 1 is an elevational view of an embodiment of the invention,

FIGURE 2 is a side elevational view thereof,

FIGURE 3 is a plan view of the device illustrated in FIGURES 1 and 2,

FIGURE 4 is a schematic view illustrating the electrical system utilized in the device,

FIGURE 5 is a fragmentary vertical sectional view of the clock illustrated in FIGURE 1 showing certain novel features of the invention, and

FIGURE 6 is a fragmentary sectional view taken substantially along line 6—6 of FIGURE 5.

Referring more particularly to the drawings, there is shown therein a clock generally indicated at 10 and including, in addition to the usual mechanism therein found, a shaft 11 geared in usual manner to control the setting of an alarm. The shaft 11 extends through a frame 12 and terminates at its front end in an indicating hand 13 which may be read in conjunction with a dial 14 upon the clock face 15. The rearward end of the shaft 11 is provided with an operating handle 16 provided with a reduced portion 17 which bears against the apex portion of an arcuate flat spring 18, it being understood that the shaft 11 extends centrally through the spring 18 and that the leg portions of the spring 18 bear against the rear portion of the frame 12. Adjacent the front wall of the frame 12 there is affixed to the shaft 11 a collar 19 having a slot 20 formed in the peripheral edge portion thereof.

In the operation of this portion of the invention, it will be apparent that when the shaft 11 is moved by means of the handle 16 until a particular time is indicated upon the dial 14, that thereafter when the clock has continued to run until the preselected time, the arm 23, being biased in a forward direction, will thereupon act to move the dog 28 into engagement with the slot 20, such dog being a part of the gear 21 whose hub 22 is slidable upon the shaft 11, the dog 28 and slot 20 being then in alignment as will be well understood. Thereupon, the movable thermostatic element 84 to bridge the contact 25 will come into physical contact with the fixed contact member 26. When additional time has passed, depending upon the size of the notch 20, the detent or dog 28 will then be moved out of engagement with the notch 20 and the gear 21 and its hub moved rearwardly or to the right as viewed in FIGURE 5 which action will cause the arm 23 to likewise move to the right thus opening the contacts 25 and 26.

As shown in FIGURE 4, a wire 30 interconnects the frame 12 preferably at the contact point 24 and extends to a main switch 31 which is, in turn, connected by a wire 32 to a switch 33 mounted upon the gear shift linkage (not shown). The switch 33 will be open unless the automobile's gearing is in "neutral" position. A wire 34 connects the switch 33 to the "hot" post 60 of the automobile's ignition switch 61, the hot post 60 being interconnected to the automobile's battery 62 by a wire 63. A wire 35 interconnects the fixed contact member 26 with the "cold" post 64 of the ignition switch 61.

A starter motor 65 is connected by a wire 66 to the "cold" post 67 of the starter switch 68. A so called "hot" post 69 of the starter switch 68 is connected to the "cold" post 64 by a wire 70 in the conventional manner whereby under normal operation the driver closes the ignition switch 61 and then closes the starter switch 68 until the engine 71 has started whereupon the starter switch 68 only is reopened.

A wire 72 connects the fixed contact 26 of the time controlled switch 73 previously described to a post 74 of a normally closed solenoid operated switch 51, the switch 51 normally effecting electrical connection between the

post 74 thereof and another post 75. The switch 51 is opened when electrical current flows from a voltage regulator 76 through a wire 77 to the coil 78 of the switch 51, the voltage regulator only receiving such current when a generator 79 is operated by the engine 71 in the conventional manner.

A wire 80 connects the post 75 of the switch 51 to a delay relay tube 37, the tube 37 being mounted on a chassis 36. The wire 80 is connected to a post 81 of the tube 37, the post 81 being interconnected to a post 82 of tube 37 by a heater element 83. The post 81 is also connected to a first contact 53 of a thermo switch 84 having another contact 54, the contacts 53 and 54 closing and making electrical contact therebetween when the heater element 83 supplies sufficient heat within the tube 37. The contact 54 of the thermo switch 84 is connected to a post 85 of the tube 37, the post 85 being connected to a coil 86 of another solenoid operated switch 50 by a wire 87.

The post 82 of the tube 37 is connected to a contact 88 of the switch 50 by a wire 89. The relay switch 50 is normally in the position illustrated in FIGURE 4 and thus electrically connects the post 88 thereof to a post 89 which leads to ground whereby current is normally permitted to pass through the heater element 83 to ground.

A second pair of contacts 90 and 91 are electrically connected by the solenoid switch 50 when the coil 86 thereof is energized, the electrical connection between the contacts 88 and 89 thus being broken whereby the flow of current through the heater element 83 is terminated. The contact or post 90 is connected to the "cold" post 67 of the starter switch 68 by a wire 92 and the contact or post 91 is connected to the wire 35 by a wire 93. In this manner when the posts 90 and 91 are connected by the switch 50, electrical current is permitted to flow from the wire 35 to the starter motor 65 to energize the same.

In operation, it will be apparent that when the switches 31 and 33 are closed and the contact members 25 and 26 are closed at a predetermined time as indicated in the explanation given above, a circuit will be completed from the battery 62 to the post 81 of the delay relay tube 37, the switch 51 being closed as no current is being supplied through the voltage regulator 76 by the generator 79. After approximately five seconds, the tube 37 will become sufficiently heated to cause the contact members 53 and 54 to close a circuit to the solenoid 50, the operation of which acts to start the automobile's starter motor 65 by connecting the wires 35 and 92 in the manner previously described. It will at the same time cause a break in the circuit through the heater element 83 allowing the tube 37 to cool whereby the contacts 53 and 54 open and thus de-energize the solenoid switch 50 and permit the solenoid switch 50 to again connect the heater element 83 to ground. Simultaneously, the current to the starter motor 65 is terminated until the heater element 83 supplies sufficient heat to again cause closing of the contacts 53 and 54. This on and off procedure is therefore repeated about every five seconds until the engine 71 of the automobile starts. As soon as the engine 71 so starts, current from the voltage regulator 76 which is connected to the coil 78 of the solenoid 51 by the wire 77, closes a circuit to the solenoid 51 thus opening the contacts 74 and 75 whereby the circuit to the delay relay tube 37 and the solenoid 50 is terminated, thus disengaging the starter motor 65. If the automobile in which the present device is installed is left unattended, the engine 71 will run for about fifteen minutes (such time interval being regulated by the size of the notch 20 as aforesaid). Thus

in cold weather, it is only necessary to set the indicating hand to 13 by means of the handle 16 to a time approximately fifteen minutes before it is desired to use the automobile. By running the motor with, of course, the customary heater in operative condition, it will be apparent that when the operator is ready to drive his car he will find the same in a completely warmed condition.

While but one form of the invention has been shown and described herein, it will be readily apparent to those skilled in the art that many minor modifications may be made without departing from the spirit of the invention or the scope of the appended claim.

What is claimed is:

A starter system for an internal combustion engine having electric starter means, gear-shifting means, a storage battery, a generator, and a voltage-regulator device including a conventional cut-out switch for said generator closed only when said motor is running, said starter system comprising: a manually operable selective on-off switch, a time-controlled switch settable to close at a preselected time and constructed and arranged to remain closed for a predetermined limited time period, a safety switch associated with said gear-shifting means and constructed and arranged to be closed thereby only in the neutral position thereof, said switches being connected in series with each other and with said battery and said starter means, a first solenoid-operated switch having a first pair of contacts connected in series with the aforesaid switches and said battery and starter means normally open but constructed and arranged to be closed when the solenoid thereof is energized and having a second pair of contacts closed when the solenoid is de-energized, a low-wattage heater, a lead connecting one terminal of said heater to one of said second pair of contacts, a second lead connecting the other contact of said second pair to ground, a second normally closed solenoid-operated switch constructed and arranged to open and stay open when and while the solenoid thereof is energized, the solenoid of said second solenoid-operated switch being connected to the said generator cut-out switch so as to be energized thereby when said engine is running, said second solenoid-operated switch and said second pair of contacts of said first solenoid-operated switch being connected in series with said heater, and a time-delay bimetallic thermostatic switch thermally closely associated with said heater and constructed and arranged to be opened when heated thereby, said thermostatic switch being connected to control the energization of the solenoid of said first solenoid-operated switch, whereby when said time-controlled switch closes said starter means will be energized until said engine starts or until said thermostatic switch opens, will again be energized when said thermostatic switch closes upon the time-delayed cooling thereof if said engine is still not running, and whereby the running of said engine will cease or the abortive starting cycles of said system will terminate at the end of said predetermined time period.

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