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[54] AUTOMATIC ENGINE STARTER SYSTEM INCLUDING MEANS FOR RELEASING THE FAST IDLE CAM

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[58] **Field of Search** ..... 290/38, 37, 36 A, DIG. 3; 125/179

[56] **References Cited**

UNITED STATES PATENTS

3,521,076	7/1970	Hayon	290/38
3,357,417	12/1967	Baumann	290/38
3,275,836	9/1966	Vancha	290/38
3,220,397	11/1965	Fenner	290/38
3,009,067	11/1961	Janeczko	290/38
2,975,296	3/1961	Dominguez-Rego	290/38
2,791,699	5/1957	Taylor	290/38
2,748,759	6/1956	Schiffer	290/38

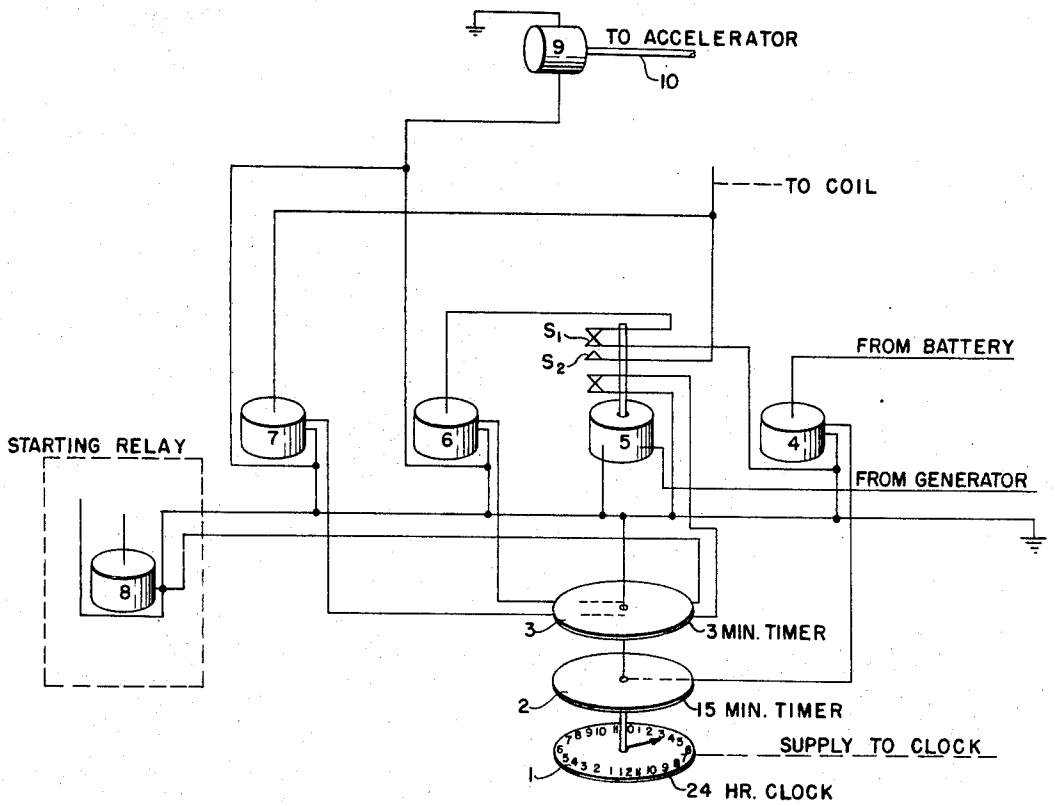
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[57] **ABSTRACT**

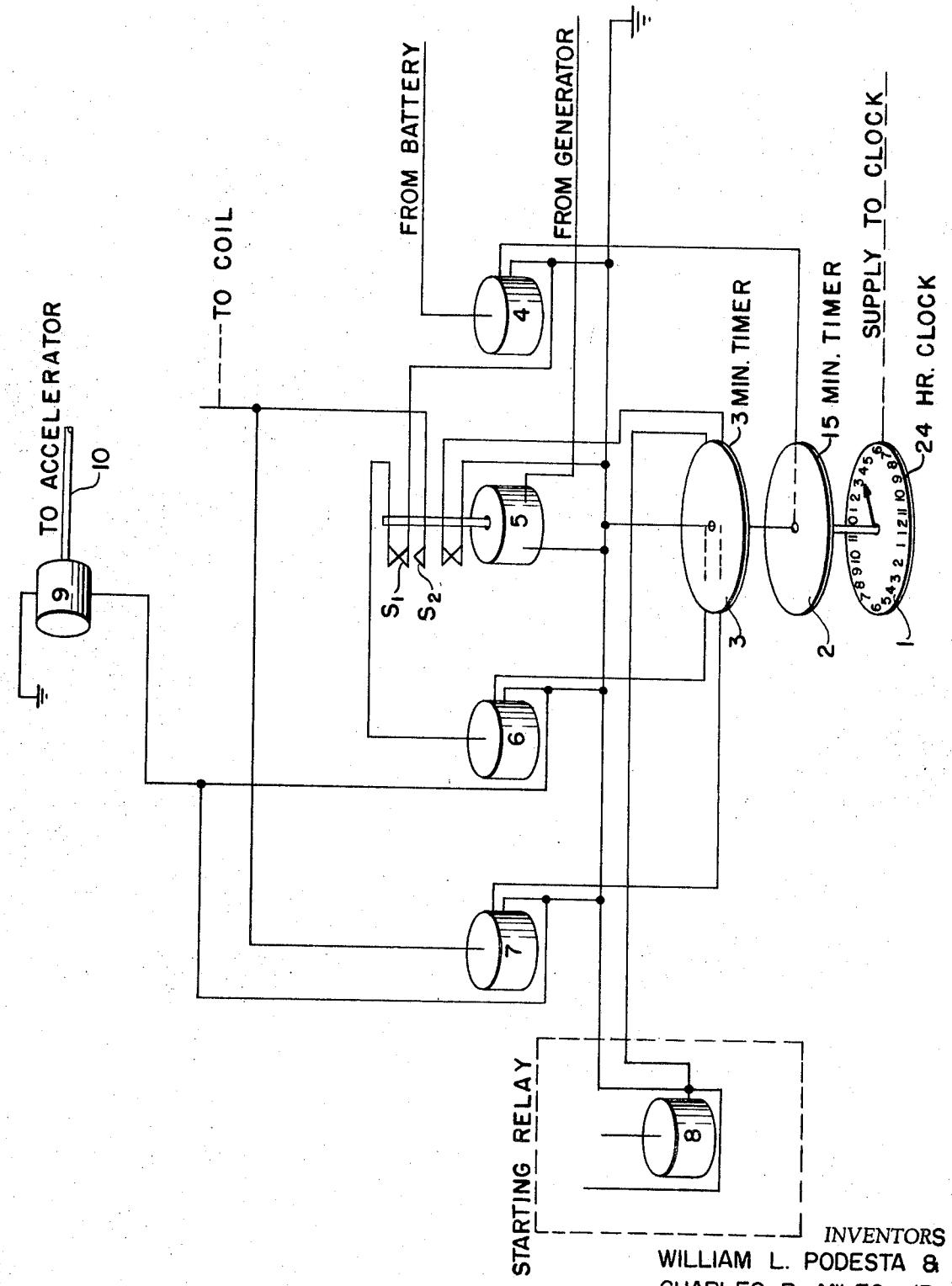
An automatic engine starter including a plurality of timer means operable to selectively energize electrical relays in a predetermined sequence to affect sequential operation of the engine accelerator and starting relay to start the engine at a predetermined time. The timer means includes means for repeating a cranking cycle of the engine a predetermined number of times if the engine fails to start on the first attempt.

14 Claims, 1 Drawing Figure



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AUTOMATIC ENGINE STARTER SYSTEM INCLUDING MEANS FOR RELEASING THE FAST IDLE CAM

BACKGROUND OF THE INVENTION

This invention relates to automatic engine starters and is particularly adapted for use on automotive vehicles.

In very cold climates it is often difficult to start an internal combustion engine, and once the engine is started it must be permitted to warm up before the engine is operated. Further, the oil in the crank case often will become thick or frozen when the vehicle is exposed to very cold temperatures for long periods of time. In such cold climates there is also danger of the cooling water in the engine block freezing, and causing damage to the engine. Moreover, in warm climates, and in instances where the vehicle is equipped with air conditioning, it often takes several minutes for the air conditioner to cool the interior of the vehicle to a comfortable temperature, after the engine of the vehicle is started.

The present invention provides an automatic engine starter which is operable to start an internal combustion engine of a vehicle at a predetermined time, so that the engine will be protected from damage due to very cold temperatures and the like, or in order to permit the engine to be warmed up prior to use of the vehicle without requiring the attendance of a vehicle operator and the like.

OBJECTS OF THE INVENTION

It is an object of this invention to provide an automatic engine starter, wherein means is provided for starting an internal combustion engine at a predetermined time.

A further object of this invention to provide an automatic engine starter, wherein means is included for effecting a series of cranking cycles of the engine should the engine fail to start at the first attempt.

It is another object of this invention to provide an automatic engine starter, wherein means is provided for priming the carburetor prior to cranking of the engine.

It is a further object of this invention to provide an automatic engine starter, wherein a plurality of independent timers are provided for energizing various portions of an electrical circuit for priming the carburetor and cranking of the engine in a predetermined number of sequential operations should the engine fail to start on the first attempt.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE is a schematic view of the timer means and electrical circuit means for effecting automatic starting of an internal combustion engine.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawing the automatic engine starter comprises a suitable clock means, such as a 24 hour clock **1** operatively connected to a 15 minute timer **2** and a 3 minute timer **3**. The 15 minute timer **2** acts in the nature of a master switch and when a predetermined time is reached as set on the 24 hour clock, a grounding contact is closed on timer **2** completing a circuit to a master relay **4**, causing current to flow through a double pole, double throw switch S_1, S_2 to a holding position in a first accelerator control relay **6**. The timer **2** causes current to flow through master relay **4** for a 15 minute period, and immediately after the ground contact on timer **2** is closed to energize relay **4**, the 3 minute timer **3** operates to send **3** pulses of current to relay **6** which results in **3** pulses of current being sent to an accelerator control solenoid **9**, which causes reciprocation of accelerator rod **10** to effect pumping of gasoline into the carburetor on the engine and setting of the fast idle cam on the carburetor. Immediately after the **3** pulses of current are caused to flow through relay **6** to solenoid **9**, the three minute timer **3** closes a second grounding contact causing a six second flow of current to a starting relay **8** on the engine, cranking the engine for a 6 second period of time. When the engine starts, current will

flow from the generator on the engine to a switching relay **5**, opening switch S_1, and closing switch S_2, and establishing a flow of current to the coil and to a second accelerator control relay **7**. Current from the generator also breaks the grounding contact on relay **8** causing the starter to disengage. At this point, the engine is operating at a fast idle, as determined by the setting of the choke and fast idle cam, and the engine will, therefore, be less likely to stall or cease running. Just prior to the end of 3 minutes, the 3 minute timer **3** sends a pulse of current through delay **7**, establishing a flow of current to solenoid **9** to pump the accelerator a single time, and release the fast idle cam to cause the engine to operate at a normal idle speed.

Should the engine fail to start on the first cranking attempt, the three minute timer **3** causes the cranking cycle to repeat every 30 seconds for 3 minutes. At the end of the 3 minute period of time, if the engine is not started, the timers will be ineffective to cause operation of the circuit until a predetermined time is again reached by the 24 hour clock **1**.

The clock may be any suitable clock mechanism operated either mechanically or electrically, and capable of having predetermined times set thereon. Alternatively, the starter could be made responsive to temperature, or the like, by utilizing thermally responsive means, or the like, to actuate the circuit. The timers **2** and **3** may be any suitable timing means capable of establishing and interrupting electrical circuits through the use of grounding contact and the like, in order to establish a flow of current to the various relays in the starting system. A preferred form of timer would be a timing disc, having an electrical contact thereon which cooperates with a contact on the various wires in the circuit going to the relays in order to establish a circuit between the source of energy and the relays.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents, are therefore intended to be embraced by those claims.

We claim:

1. An automatic engine starter for effecting automatic cranking and starting of an internal combustion engine having a starter and a carburetor, comprising an electrical circuit including a source of energy, electrical relay means in said circuit for opening and closing certain portions of said circuit in a predetermined sequence to effect cranking and starting of said engine, and timing means in said circuit connected with said relay means for controlling energization of said relay means in said predetermined sequence, said circuit including an accelerator control solenoid having means for operating an accelerator on said engine to prime the carburetor prior to cranking of the engine, said relay means including a first accelerator control relay connected between said source of energy and said accelerator control solenoid, said timing means being operatively associated with said first accelerator control relay and having means for causing at least one pulse of current to be sent through said first accelerator control relay to said accelerator control solenoid for effecting pumping of said accelerator and priming of said carburetor and setting of a fast idle cam on said carburetor, a second accelerator control relay operatively connected in said circuit between said source of energy and said accelerator control solenoid, and said timing means including means for causing a single pulse of current to be sent through said second accelerator control relay to said accelerator control solenoid a predetermined time after said at least one pulse of current is sent to said accelerator control solenoid to effect pumping of said carburetor accelerator and release of said fast idle cam.

2. An automatic engine starter as in claim **1**, wherein said relay means includes a plurality of separately controlled relays.

3. An automatic engine starter as in claim 2, wherein said timing means includes a plurality of independent timers operatively interconnected with certain ones of said relays to effect operation of said relays in said predetermined sequence.

4. An automatic engine starter as in claim 3, wherein a clock mechanism is operatively connected with said timers to operate said timers at a predetermined time.

5. An automatic engine starter as in claim 4, wherein said plurality of relays includes a master relay in said circuit between said source of energy and the remaining relays for controlling the flow of current from said source through said relays to effect cranking and starting of said engine.

6. An automatic engine starter as in claim 5, wherein one of said timers includes means for establishing a circuit with said master relay to energize said master relay for a predetermined period of time.

7. An automatic engine starter as in claim 6, wherein the other of said timers includes means for establishing circuits with preselected ones of said other relays in a predetermined sequence and for predetermined periods of time to sequentially effect priming of said carburetor and cranking of said engine.

8. An automatic engine starter as in claim 7, wherein said one timer has an effective duration of a first predetermined time and said other timer has an effective duration of a second predetermined time less than said first predetermined time.

9. An automatic engine starter as in claim 8, wherein said first predetermined time is 15 minutes and said second predetermined time is 3 minutes.

10. An automatic engine starter as in claim 9, wherein said accelerator control relay is connected between said master relay and said accelerator control solenoid, said timing means including means for causing three pulses of current to be sent to said accelerator control solenoid to effect priming of said carburetor and setting of said fast idle cam.

11. An automatic engine starter as in claim 10, wherein a switching relay is operatively connected in said circuit and includes means operative in response to current flowing therethrough from a generator on said engine when said engine is running to effect disengagement of said starter.

12. An automatic engine starter as in claim 11, wherein said other timer includes means for effecting repetition of a cranking cycle every 30 seconds for 3 minutes in the event said engine does not start on the first cranking cycle.

13. An automatic engine starter for automatically starting an internal combustion engine at a predetermined time, said engine having a starter and a carburetor with an accelerator and fast idle cam, comprising an electrical circuit having a source of energy, timer means operatively connected in said circuit, said timer means including a 24 hour clock, a first timer operated by said clock and having a 15 minute duration, a second timer operated by said clock and having a 3 minute duration, a master relay connected between said source of energy and said first timer and including means for establishing and interrupting flow of current to the rest of said circuit, said first timer operatively associated with said master relay and effective to energize said master relay for a 15 minute period of time when a predetermined time is reached as set on said clock, an accelerator control solenoid operatively associated with said carburetor accelerator, first and second accelerator control relays operatively connected with said accelerator control solenoid and with said second timer, said second timer having means for causing three pulses of current to flow through said first relay to said solenoid immediately after energization of said master relay by said first timer so that said carburetor is primed and said fast idle cam is set, a switching relay operatively connected in said circuit and including a double pole, double throw switch controlling flow of current to said first and second relays, said switching relay having means operative in response to flow of current from a generator on said engine when said engine is running to operate said double pole, double throw switch to interrupt flow of current to said first relay and to cause disengagement of said starter, said second timer including means operative a predetermined time after said engine is started to cause a single pulse of current to flow through said second relay to said accelerator control solenoid to pump said accelerator and release said fast idle cam, said second timer also including means for repeating a cranking cycle if the engine does not start on the first cranking cycle.

14. An automatic engine starter as in claim 13, wherein said second timer effects said cranking cycle once every 30 seconds for 3 minutes if the engine does not start.

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