

[54] **AUTOMATIC ENGINE STARTER**

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FOREIGN PATENTS OR APPLICATIONS

[22] Filed: **June 10, 1970**

654,935 1/1963 Canada290/38 E

[21] Appl. No.: **45,055**

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[52] U.S. Cl.**340/52 R**, 180/114, 290/38 E, 290/DIG. 3, 340/54

[51] Int. Cl.**B60k 33/00**

[58] Field of Search290/DIG. 10, DIG. 8, DIG. 5, 290/38 E, DIG. 3, DIG. 6, DIG. 7; 180/114; 340/53, 54, 52

[57] **ABSTRACT**

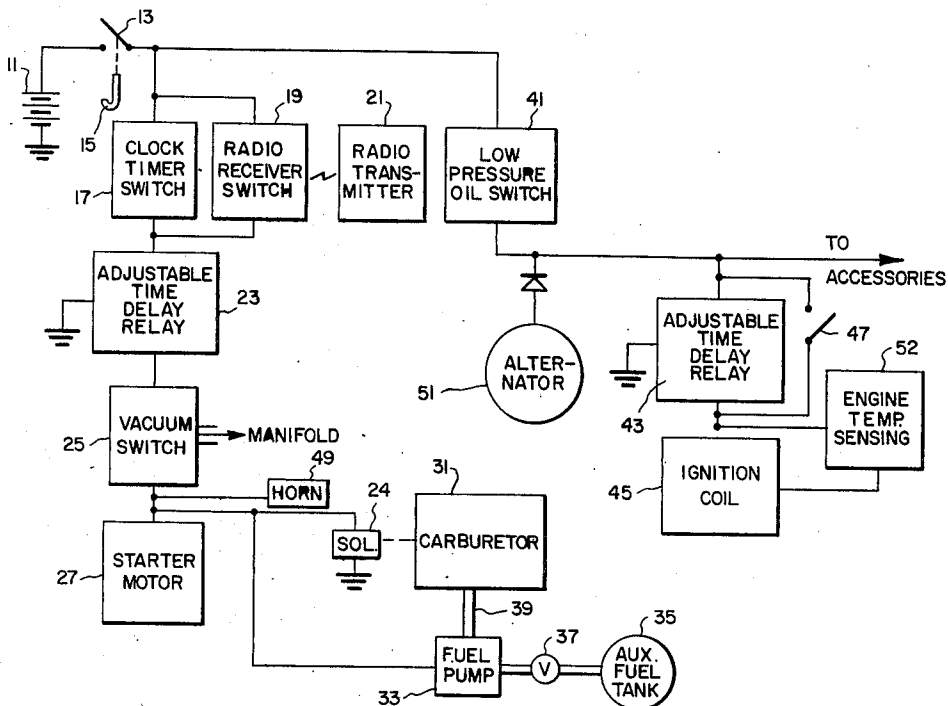
An automatic automobile engine starter using either clock-switching mechanism or a radio remote control system to supply current to a starter motor. Current is supplied to the ignition coil through an oil pressure switch to insure that the engine will not start unless there is sufficient oil pressure.

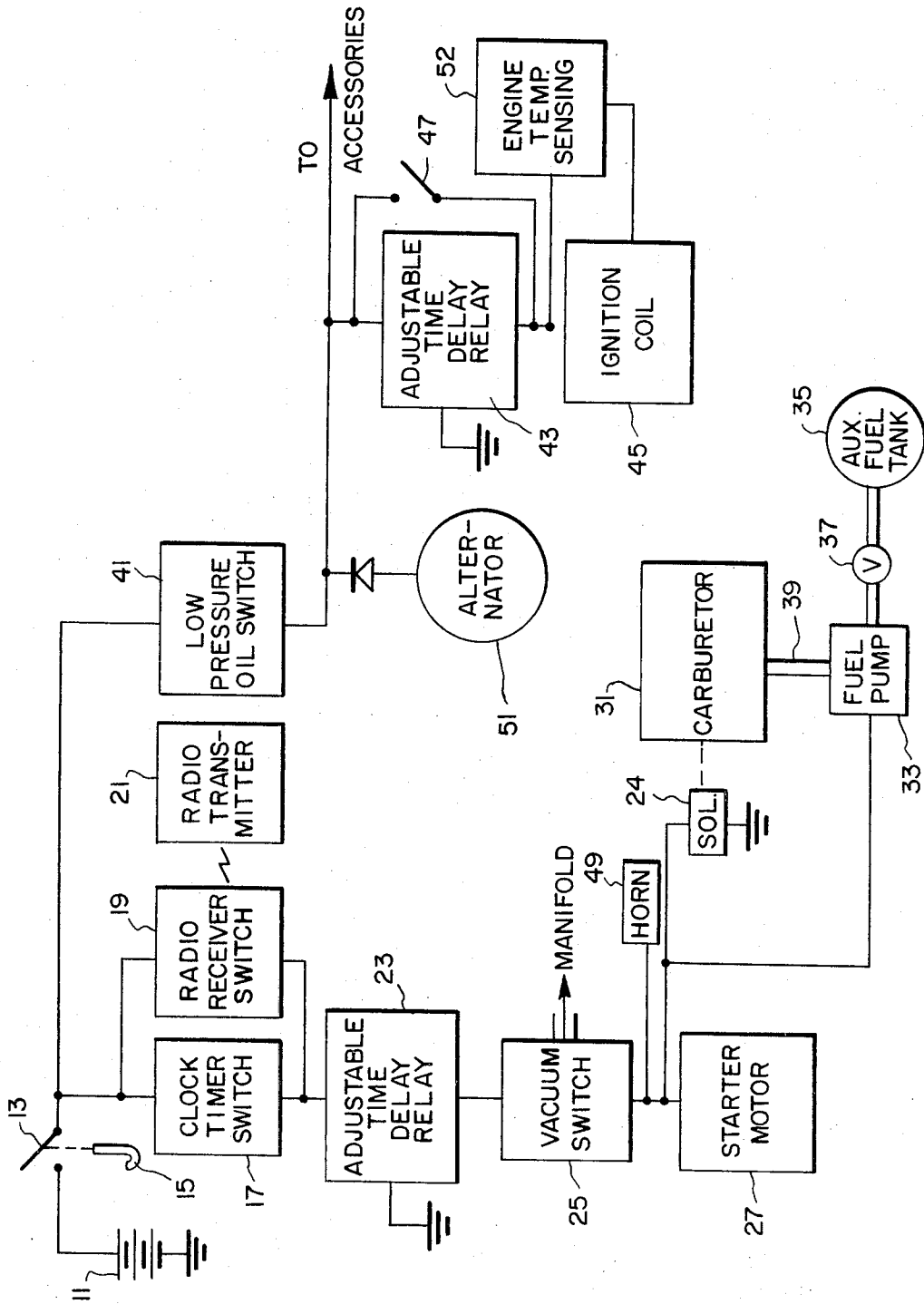
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8 Claims, 1 Drawing Figure





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AUTOMATIC ENGINE STARTER

BACKGROUND OF THE INVENTION

This invention relates broadly to timed starting devices and more particularly to apparatus for automatically starting an automobile engine or the like at a predetermined time, particularly in order that the automobile may either warm up or be cooled down before actual use thereof.

Many time and/or remote control systems for automatic engine starting have been proposed in the past. Most of these devices use various well-known time clock mechanisms to initiate the starting motor and to control the fuel supply as a carburetor. Other devices may use remote control radio systems for initiating the starting motor.

However, it is noted that very few of these devices are in use today. The apparent reason for such lack of use is the fact that most of the devices do not have the necessary safety feature or features required to prevent possible damage to the engine when the automobile is started without the operator being in full attendance.

There have been a number of proposals which are designed to prevent damage to the engine but they all have serious drawbacks in that they do not cover the vital aspects of engine protection.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an automatic starting system for an internal combustion engine which includes protective measures to prevent damage to the engine.

A further object of this invention is to provide an automatic starter for an automobile engine which is dependent upon a sufficient oil pressure within the engine before the automobile engine is allowed to start.

A further object of this invention is to provide means for automatically stopping the engine after a certain period of time if the operator has not arrived.

Yet another object of this invention is to provide a protective means whereby starting current can be supplied to the starting motor for a limited period of time only.

A still further object of this invention is to provide a protective system whereby the operation of the system depends upon the emergency brake being set before any of the automatic operation may go into effect.

Another object of this invention is to provide means whereby the engine may be started through a remote control radio signal.

BRIEF DESCRIPTION OF THE DRAWING

These and other objects of the invention will become apparent from the following description when taken in conjunction with the single FIGURE of the drawing wherein there is schematically illustrated the preferred embodiment of the system of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now more specifically to the drawing, there is shown a source of power such as a standard automobile battery 11 which is coupled by means of a switch 13 (controlled through emergency brake 15) to a clock timer switch 17. These clock timer switches are well

known and available through numerous commercial sources. The emergency brake may be connected to an emergency brake safety switch so as to close the switch only when the brake is set.

The output of the clock timer switch passes through an adjustable time delay relay 23 to a vacuum switch 25. The purpose of the time delay relay is to remove current to the starter motor 27 if the engine should fail to start after reasonable time. After the expiration of a predetermined time period, the relay 23 will automatically open a switch so that no further current can be delivered beyond that point. An example of such a predetermined time period would be approximately thirty seconds.

A vacuum switch 25, which is normally closed when no vacuum actuation is present, passes current to the starter motor 27. The vacuum switch is connected to the manifold of the automobile, and when sufficient vacuum is built up in the manifold, the switch will open and terminate the current to the starter motor 27. A solenoid 24 is also electrically connected to the output of the vacuum switch with the solenoid being connected to the carburetor. Actuation of the solenoid causes a mechanical linkage to open carburetor 31 which, in effect, opens the automatic choke (not shown) in the same manner as if an operator had depressed the throttle of the automobile.

As an auxiliary piece of equipment, there may be provided a fuel pump 33 which is connected between auxiliary fuel tank 35 and the carburetor 31 through a valve 37 and fuel line 39. If such an auxiliary fuel tank is used, high octane fuel may be contained therein and, during the starting period when the fuel pump is actuated, a small amount of such high octane fuel can be pumped directly into the carburetor so that starting will normally occur even if the automobile is in a very cool area and the temperature is quite low.

A low pressure oil switch 41 is also connected to switch 13 and is further coupled through an adjustable time delay relay 43 to the ignition coil of the car 45.

The use of the low pressure oil switch is very important since one of the major requirements for proper operation of the engine without damage is that there be sufficient oil pressure to circulate oil throughout the engine. The normal oil pressure switch which is present in an automobile and, in modern automobiles, causes actuation of the light when the oil pressure falls below a predetermined level, is set at approximately 2 pounds per square inch. This level is an extreme danger level of operation and, as is well known, the engine should not be operated when this light is actuated.

The low pressure switch 41 on the other hand is set at a slightly higher pressure such as 4 pounds per square inch which is sufficient in most automobiles to assure proper oil supply for cooling purposes. Additionally, this pressure is attained during the starting of the engine by the starting motor and, if it is not attained, the low pressure oil switch will remain open and will not allow current to be passed to the ignition coil 45.

However, when sufficient oil pressure is built up and low pressure oil switch 41 closes, current passes through adjustable time delay relay 43 to the ignition coil 45 and the engine is started.

The adjustable time delay relay may be used in order to provide a period of time wherein the operator may

normally reach the automobile after the automatic starter has actuated the engine. However, if for some reason the operator is unable to reach the automobile, then the automatic adjustable time delay relay 43 provides a means for shutting off the motor. One may adjust the time desired such as 5 or 10 minutes.

It will be obvious that if the current is cut from the ignition coil, then the motor will stop and none of the accessories will be operated since the oil pressure will then drop to zero.

The major purpose for providing a system as set forth in the present invention is to provide a warm up time for the motor in winter or in extreme cold conditions so that the automobile will be satisfactorily heated interiorly by the time the operator is ready to use the automobile.

Additionally, a great number of automobiles in use today are equipped with air conditioners and, in warm weather, the prestarting will allow for a period of time during which the interior of the car is cooled before use. These devices are shown generally as accessories in the drawing.

The only parts of the control system of the engine that are shown are those which are involved with the automatic starting of the engine. This is done for clarity since the normal electrical system of an automobile is well known. However, alternator 51 has been shown to indicate that once the engine is started the alternator will charge.

If the adjustable time delay relay is used, there may also be provided a manual switch 47 which may be hidden with the location known only to the operator of the automobile. Upon entering the automobile, he can bypass the adjustable time delay relay by closing switch 47. One of the additional advantages attained by use of the adjustable time delay relay is that if the automobile were stolen the set time on the relay would automatically shut down the engine and cause the automobile to stop.

Several additional auxiliary pieces of equipment may be also used with the present invention. One such device connects the electric horn 49 to the output of the vacuum switch. This could, in effect, act as an alarm clock of the car were parked in a garage which is located within the confines of a house.

Additionally, the automobile may be started by means of a standard radio receiver switch 19 which is also connected between the switch 13 and the adjustable time delay relay 23. This piece of equipment is well known and available from many commercial sources and is responsive to a small radio transmitter 21 which may be carried by the operator and actuated at whatever time he wishes to start the motor.

If a further safety feature is desired, a temperature sensing device and switch 52 may be attached to the motor itself and interposed in the electrical system so as to cut off power to the motor after a certain predetermined temperature is reached.

It can be seen that the present invention provides a relatively simple device with parts which may be easily replaceable and with the necessary safeguards to prevent damage to the automobile engine.

Primarily, one of the most essential parts of the invention is the fact that the oil pressure is a significant control factor. If the oil pressure is too low to lubricate

the motor or if water has been introduced to the oil and is frozen so as to prevent proper oil pressure, then the motor will not start. This feature is outstanding in the present invention because other known units depend on current from the generator to open or close switches and the use of alternators in modern day automobiles makes such devices impractical.

It is to be understood that the present invention is described above with respect to standard replaceable components and is not to be limited by any particular device. Accordingly, the invention is to be limited only by the scope of the following claims.

I claim:

1. In an internal combustion engine, an automatic starting system comprising
 - a clock timer switch,
 - switch means coupling said clock timer switch to a current source,
 - a vacuum switch coupled to said clock timer switch and connected to the manifold of said engine and opened by a vacuum in said manifold,
 - a starter motor coupled to the output of said vacuum switch,
 - a solenoid coupled to the output of said vacuum switch,
 - mechanical means coupling said solenoid to the carburetor of said engine for opening said carburetor,
 - a low pressure oil switch connected to said switch means and actuated to a closed position when a predetermined oil pressure occurs in said engine, and
 - means coupling the output of said low pressure switch to the ignition coil of said engine whereby said ignition is not connected to said current source unless said oil switch is closed.
2. The system of claim 1 further comprising an emergency brake, and means for coupling said switch means to said emergency brake whereby said switch means is closed when said brake is set.
3. The system of claim 1 further comprising an adjustable time delay relay between said clock timer switch and said vacuum switch, said relay opening after a predetermined time if the engine fails to start.
4. The system of claim 1 further comprising an adjustable time delay relay between said low pressure switch and said ignition coil, said relay opening after a predetermined time.
5. The system of claim 1 further comprising an auxiliary fuel tank, an electric fuel pump connected between said auxiliary fuel tank and said carburetor, and means for connecting said fuel pump to the output of said vacuum switch.
6. The system of claim 1 further comprising an electric horn coupled to the output of said vacuum switch.
7. The system of claim 1 further comprising a radio receiver switch coupled between said switch means and said vacuum switch so as to shunt said clock timer switch and responsive to signals from a remote radio transmitter.
8. The system of claim 4 further comprising

a manual switch connected between said low pressure switch and said ignition coil so as to shunt said adjustable time delay relay.

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