

Jan. 13, 1942.

R. G. BERRY

2,269,704

ANTISTALL DEVICE

Filed May 17, 1940

2 Sheets-Sheet 1

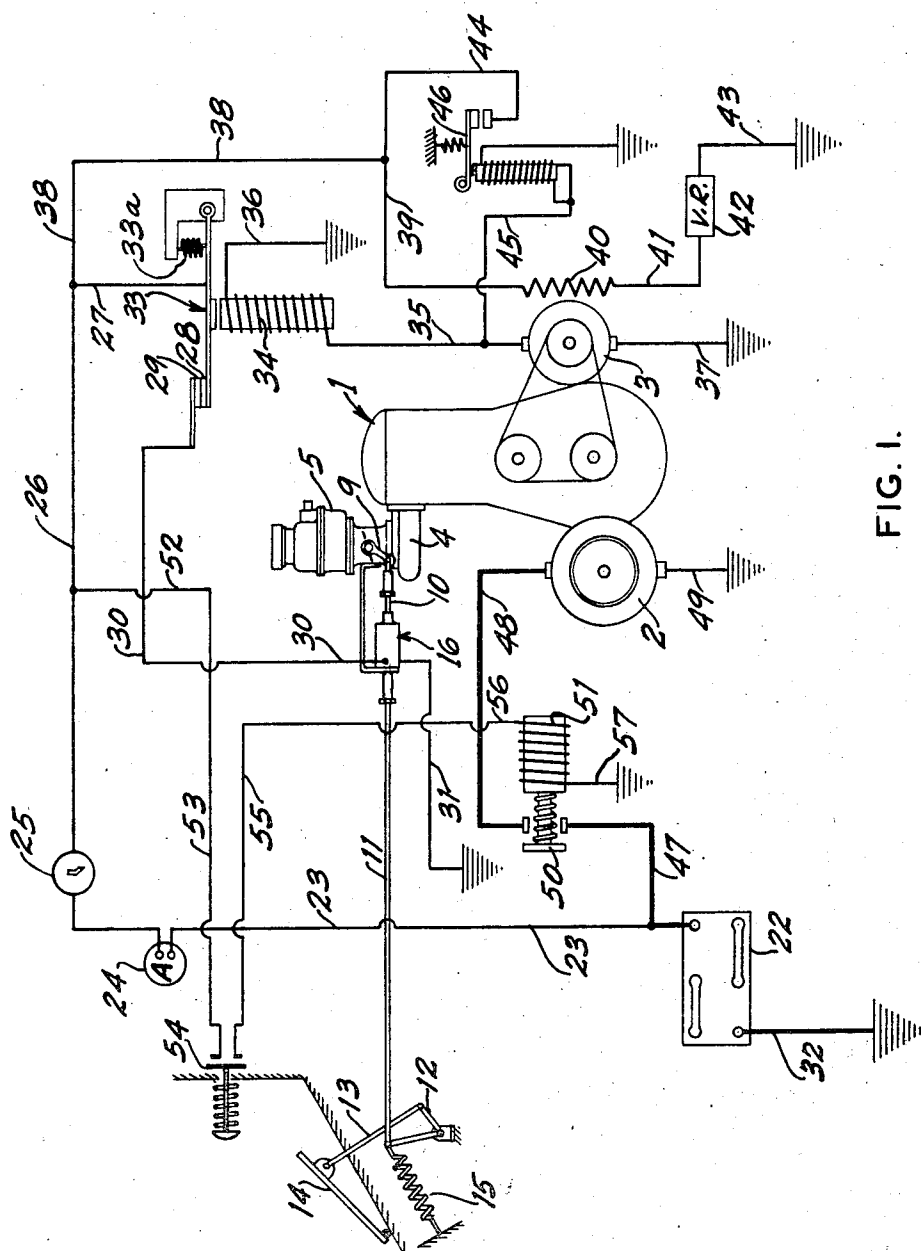


FIG. 1.

INVENTOR  
RUSSELL G. BERRY

*Donald U. Rice*  
ATTORNEY

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R. G. BERRY

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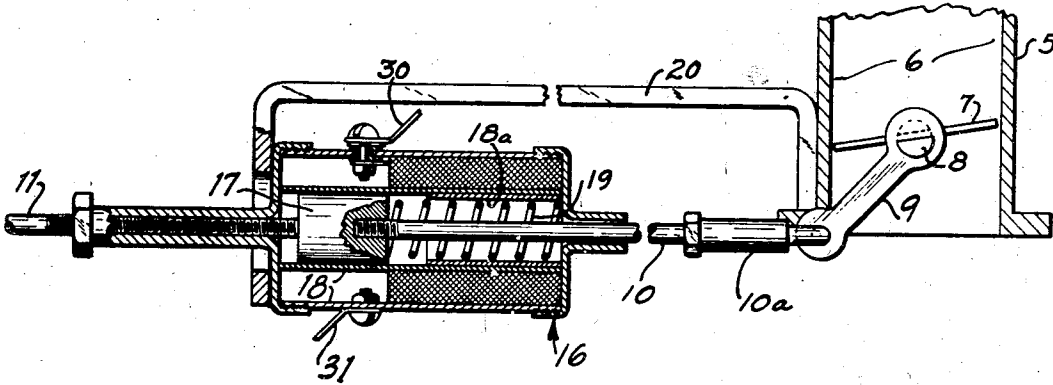


FIG. 2.

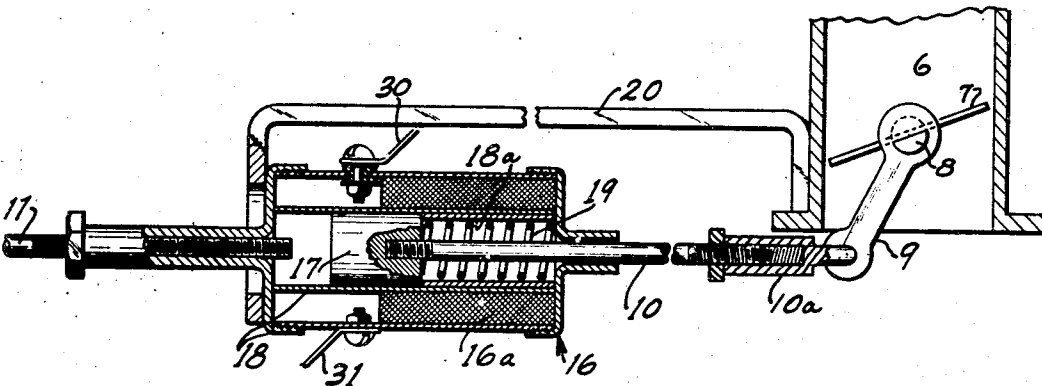


FIG. 3.

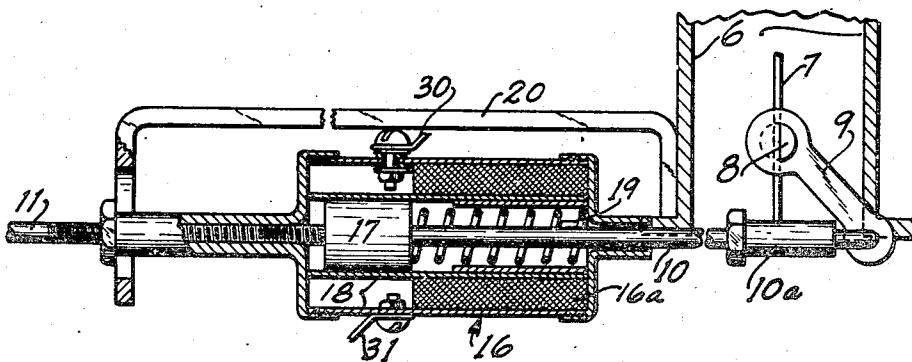


FIG. 4.

INVENTOR  
RUSSELL G. BERRY  
*Donald U. Reif*  
ATTORNEY

## UNITED STATES PATENT OFFICE

2,269,704

## ANTISTALL DEVICE

Russell G. Berry, Maplewood, Mo., assignor to  
Carter Carburetor Corporation, St. Louis, Mo.,  
a corporation of Delaware

Application May 17, 1940, Serial No. 335,681

4 Claims. (Cl. 123—102)

This invention relates to automotive internal combustion engines having throttle controlled induction systems and more particularly to automatic devices which function to impart an immediate partial opening movement to the throttle valve when the engine falters or slows down below the lowest speed at which it can continue to operate.

Devices of this character are aptly called "anti-stall" devices, as they function to forestall engine failure which is likely to occur when engine speeds are quite suddenly reduced from comparatively high speeds to dead idle speed, a flexibility of operation which is commonly required in automotive service. This tendency to stall when the speed is suddenly reduced to dead idle is inherent in current automotive engine constructions due to the remote position of the mixture control or throttle valve with respect to the cylinders, and the character of the fuel commonly used. During substantial throttle open operation, some of the heavier ends of the fuel, in liquid form, lag behind the mixture stream and adhere to the walls of the intake manifold. If the throttle is then suddenly closed the manifold pressure drops abruptly and the uncontrolled fuel deposited on the walls of the intake manifold quickly vaporizes and forms, in addition to the normally supplied idling fuel, a mixture too rich to fire. This condition, of course, exists only momentarily and if the engine is engaged to a moving vehicle, the momentum of the vehicle will carry the engine through this irregularity. If, however, the engine is declutched or disengaged from the vehicle at the moment the throttle valve is closed, or if the vehicle overruns the engine as in the overrunning arrangement of free-wheeling, the engine will often stall, as its own momentum is usually insufficient to carry it through this period.

It is the primary object of the present invention to provide a novel anti-stall device of the above character which is responsive to engine speed variations.

It is a further object of the present invention to provide an anti-stall device having a control system comprising an engine driven generator.

It is a further object of the present invention to provide a throttle pre-setting device to facilitate starting of the engine.

Further objects and advantages will become apparent upon reference to the following specification and accompanying drawings, referring to which:

Fig. 1 is a schematic view of an internal com-

bustion engine and the usual associated accessories, incorporating an anti-stall device which is constructed and arranged in accordance with the present invention.

Figs. 2, 3 and 4 are enlarged sectional views each illustrating the device in a different operative position.

The numeral 1 generally indicates an internal combustion engine having an electric cranking motor 2 and an electric engine driven generator 3 associated therewith. The engine is provided with the usual intake manifold 4 on which is mounted a conventional carburetor 5. The carburetor includes a mixture passageway 6, having a throttle valve 7 mounted therein for rotation with a transverse shaft 8. Rigidly attached to one end of shaft 8 is a throttle valve operating lever 9. Mechanism for the remote control of the throttle valve, as from the floor of a motor vehicle, is provided, and comprises a link section 10 attached to the throttle lever 9, a link section 11, a bell crank 12, a link 13 and a pedal 14. The mechanism is normally urged toward a throttle closing position by the usual throttle pull back spring 15.

Interposed in the throttle control mechanism is a solenoid generally indicated at 16 having a coil 16a, a plunger 17 attached by screw threaded means to one end of link section 10, and a coil casing 18 in which plunger 17 is arranged to reciprocate, attached by screw threaded means to one end of link section 11. Thus, a telescoping arrangement whereby the throttle valve may be adjusted independent of the position of pedal 14 is provided. The reciprocation of plunger 17 with relation to the casing 18 is limited to one end of its travel by the end of link section 11 and at the other end of its travel by a sleeve 18a. The solenoid further comprises a spring 18 which normally urges plunger 17 toward the left or toward a throttle closing position. The coil casing 18 is slidably mounted in a bracket 20 which may be attached in any suitable manner to any fixed portion of the engine or carburetor. The throttle linkage is limited in its travel toward the left by the abutting of casing 18 against bracket 20. Fine adjustment of the throttle valve position is provided for by the screw threaded adjustment device 10a. The length of stroke of plunger 17 may be varied by screwing link 11 inward or outward as desired.

Electrical current for energizing solenoid coil 16a is supplied by a storage battery 22 through a circuit comprising leads 23, ammeter 24, manual switch 25, leads 26, 27, contacts 28, 29, lead 30,

solenoid ground 31 and battery ground 32. The automatic control of this circuit in accordance with speed of the engine is accomplished by provision of an electro-magnetic switch 33 comprising a coil 34, which, when energized, parts the contacts 28 and 29 to break the solenoid circuit. A spring 33a normally holds points 28 and 29 in contact. The electro-magnetic coil 34 is interposed in a circuit comprising the armature of generator 3, lead 35, coil ground 36 and generator ground 37. It will be understood that the calibration of electro-magnetic switch 33 is so coordinated with the engine driven generator speed-output as to cause the contacts 28 and 29 to be parted and, therefore, the solenoid circuit broken at any speeds at which the engine will continue to run normally.

The manual switch 25 may be the usual engine ignition switch through which conventional engine ignition devices (not shown) are connected. The engine driven generator 3, although being of the usual automotive type in other respects, departs from the conventional in the manner of field excitation which, in this instance, is separately excited by battery energy through a circuit comprising battery 22, lead 23, ammeter 24, manual switch 25, leads 26, 38, 39, field winding 40, lead 41, a conventional voltage regulator 42, ground 43 and battery ground 32. The purpose of separately exciting the generator field winding is to augment the output of the generator at low speeds; that is at speeds below those at which a conventional self-excited automotive generator is capable of fully self-exciting its field. The generator armature-battery hook up 23, 24, 25, 26, 38, 44 and 45 includes the usual reverse current relay 46 which functions to break this hook up when the generator output voltage falls below the battery potential. A starting motor-battery circuit comprising leads 47, 48, motor ground 49 and battery ground 32 is indicated. This circuit is controlled by an electro-magnetic relay 50 having a coil winding 51. Relay coil winding 51 is energized by the battery through a circuit comprising lead 23, ammeter 24, ignition switch 25, lead 52, 53, starting switch 54, lead 55, 56, coil ground 57 and battery ground 32.

In operation: Referring to Fig. 2, this view shows the throttling valve in a normal idling position. The solenoid circuit being broken and the plunger 17 consequently being moved to its extreme left position by spring 10. Casing 18 is pulled against the bracket 20 by the throttle pull-back spring 15. If it is desirable to make any fine adjustments of throttle operation, this may be accomplished by means of the screw threaded adjusting device 10a.

If, for any reason, during idling operation, the engine falters, and as a result, the speed falls below that which has been determined as the minimum speed at which the engine will continue to operate independently, the resulting diminished generator output will permit the contacts 28 and 29 to be closed by the spring 33a and the solenoid 18 will be energized. As a result, the

plunger is drawn to the right, see Fig. 3, and the throttle valve moved toward an open position to catch the dying engine. As soon as the engine speed increases the generator output increases and the electro-magnet 33 is sufficiently energized to break the solenoid circuit.

Preparatory to starting an inoperative engine, the operator will close the manual ignition switch 25. This operation will cause solenoid 18 to be energized and, as a result, the throttle will be pre-set in a partially open position to facilitate starting.

Fig. 4 shows the throttle valve in a wide open position, coil casing 18 having been moved to the right until the lock nut 21 abuts the bracket 20. This arrangement provides a wide open stop.

The foregoing description and drawings are intended to be illustrative and not limiting and the use of all modifications within the scope of the following claims is contemplated.

I claim:

1. In combination, an internal combustion engine, a carburetor therefore having a throttle valve, spring means normally urging said throttle toward a closed position, an engine driven generator, a storage battery, an electro-magnetic device capable of imparting a partial opening movement to said throttle valve when energized, a circuit comprising said electro-magnet and said battery, and means responsive to a predetermined generator output for breaking said circuit.

2. In combination with an internal combustion engine, a carburetor having a throttle valve, adjustable stop means for limiting the closure of said valve to a predetermined, normal idling position, spring means for urging said valve toward a closed position, automatic means for advancing said throttle valve toward a predetermined partial open position for starting, and a source of power, independent of the operation of said engine for operating said last-mentioned means.

3. In combination with an internal combustion engine, a carburetor having a throttle valve, a throttle pull back spring for urging said valve toward a closed position, adjustable stop means for limiting the closure of said valve to a normal idling position, an electrical device for advancing said throttle toward a partially open position for starting, a storage battery for operating said electrical device, and a manual switch for controlling said electrical device.

4. In combination with an internal combustion engine, a carburetor having a throttle valve, a throttle pull back spring for urging said valve toward a closed position, stop means for limiting the closure of said valve to a normal idling position, an electromagnet for advancing said throttle toward an open position for starting, a source of electrical energy independent of the operation of the engine for energizing said electromagnet, a circuit connecting said electromagnet and said source of energy, and a manual switch in said circuit.

RUSSELL G. BERRY.