

Nov. 17, 1942.

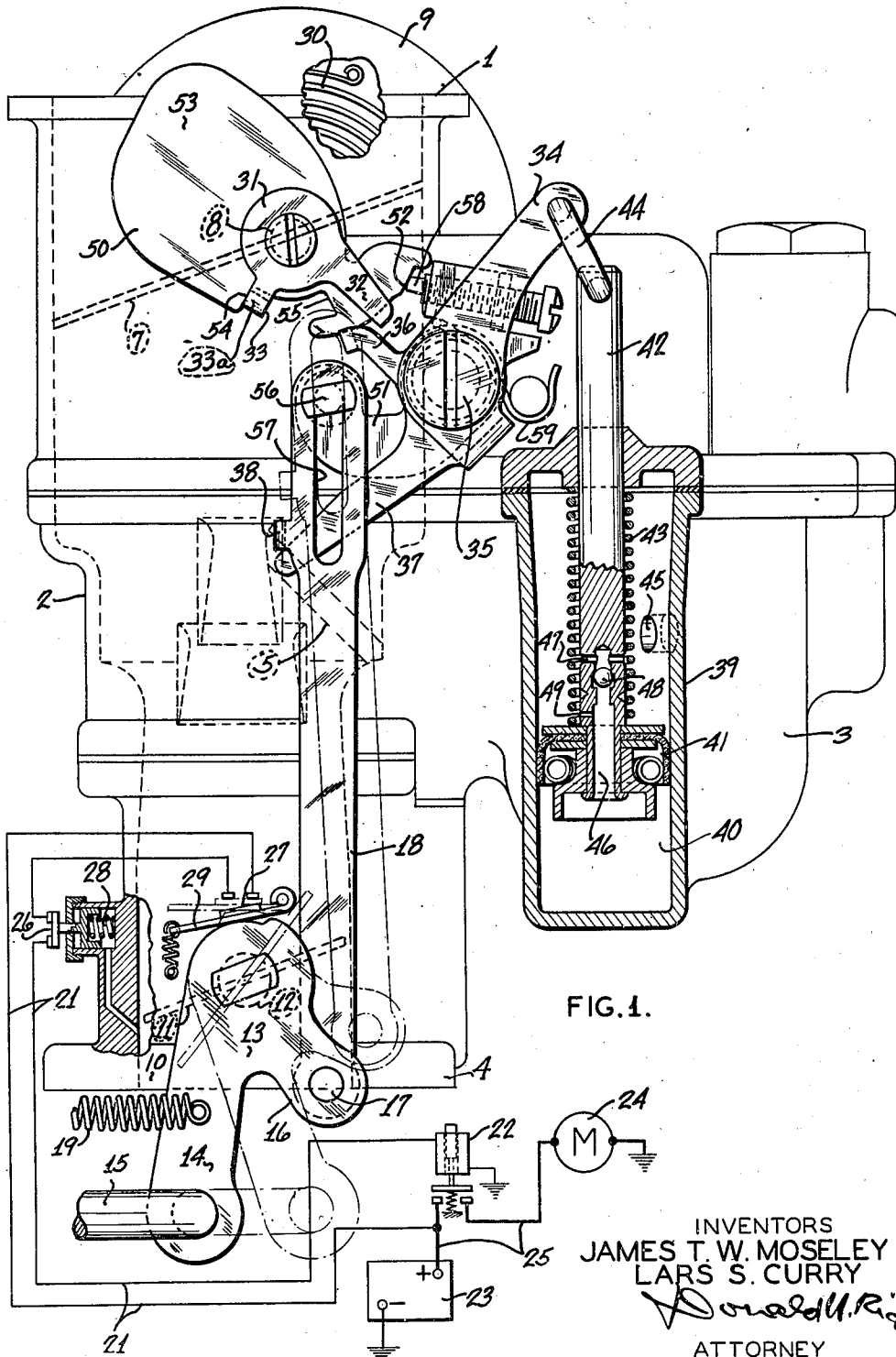
J. T. W. MOSELEY ET AL

2,302,245

CARBURETOR UNLOADER

Original Filed Sept. 1, 1939

2 Sheets-Sheet 1



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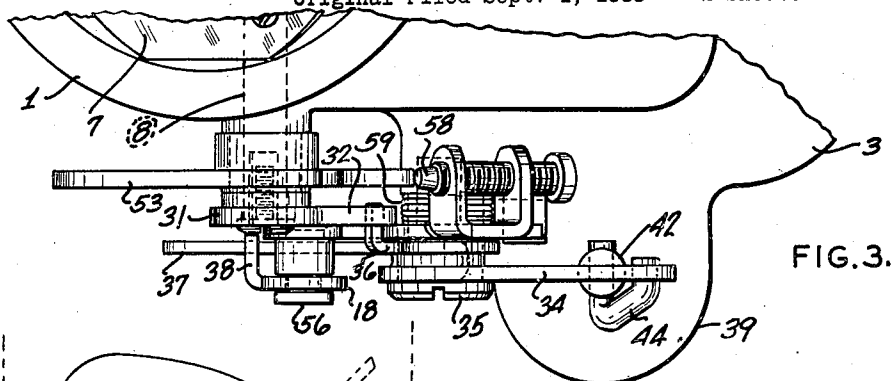


FIG. 3.

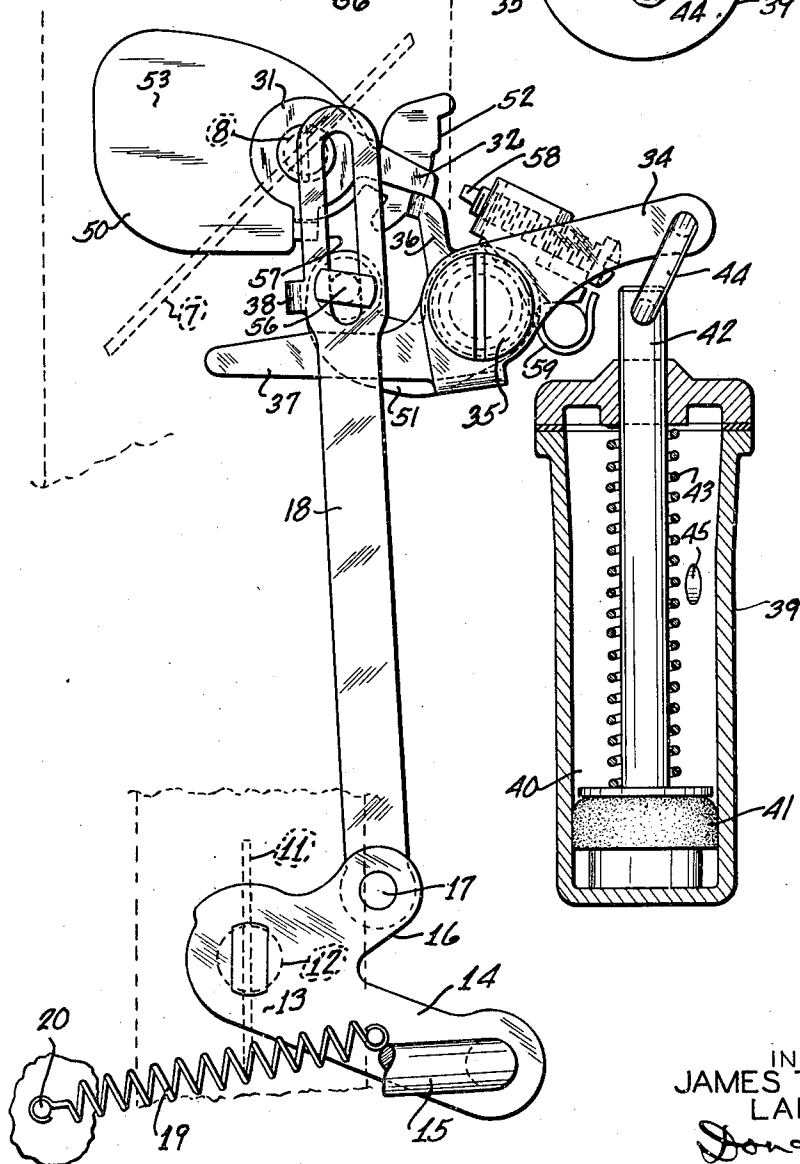


FIG. 2.

INVENTORS
JAMES T. W. MOSELEY
LARS S. CURRY
Donald H. Rich

ATTORNEY

UNITED STATES PATENT OFFICE

2,302,245

CARBURETOR UNLOADER

James T. W. Moseley, Clayton, and Lars S. Curry,
Ferguson, Mo., assignors to Carter Carburetor
Corporation, St. Louis, Mo., a corporation of
Delaware

Original application September 1, 1939, Serial No.
293,006. Divided and this application May 21,
1940, Serial No. 336,344

6 Claims. (Cl. 261—39)

This invention relates to automatic choke equipped carburetors for internal combustion engines and more particularly to a device with which the automatic choking means may be, at the will of the operator, conveniently rendered substantially ineffective.

This application is a division of our co-pending application, Serial No. 293,006, filed September 1, 1939.

In automatic choke equipped carburetors, so-called "unloading" mechanism are usually included to enable the operator to forcibly open the choke valve against the resistance of the thermo responsive element, a feature which is desirable and necessary to permit cranking of the engine when cold with the choke valve substantially open, for the purpose of clearing out or leaning out a loaded induction system. The term "loaded" is commonly used to describe a condition resulting from excessive choking or cranking for an unusually long period with a closed choke valve without successfully starting the engine, causing an excessive amount of fuel to be drawn into the induction system.

For convenience and structural economy the unloading mechanism is usually arranged to coact with the throttle valve operating mechanism in such manner as to forcibly open the choke valve as the throttle valve approaches a wide open position. Recent developments in starting motor circuits have included so-called throttle pedal starting switches which are also arranged to coact with the throttle valve operating mechanism to close the starting motor circuit as the throttle valve is moved to a partial open position. It will be seen that as the performance of these diverse functions is dependent upon throttle position, a degree of skill is required by the operator in manipulating the throttle control mechanism.

For example, he must not open the throttle too far beyond the position necessary to close the starting circuit lest he inadvertently force the choke valve open, which in the case of a cold engine will usually result in failure to start. This requirement for discretion on the part of the operator has, as a matter of fact, caused considerable inconvenience, possibly due to the habit formed through extensive usage of the older types of starting motor switches in which full extension of the operating lever or button is required for contact.

This invention has for its primary object the provision of a fool-proof, dependable, "unloading" device which can be used to the best ad-

vantage in connection with a throttle pedal starting switch.

It is a further object of this invention to provide a generally new and improved device of the above character in which means is included to provide a predetermined delay of the unloading function. Other objects and advantages will appear upon reference to the following description and accompanying drawings referring to

which:

Fig. 1 is a side view of a carburetor embodying the invention. Somewhat diagrammatically shown therewith is a starting motor and circuit.

Fig. 2 is a side elevation of the device shown in another operative position.

Fig. 3 is a plan view of the device in the position shown in Fig. 2, a fragment of the carburetor being shown therewith.

The carburetor shown in Fig. 1 is of the conventional downdraft type, comprising an air inlet casting 1, a main body casting 2 having a constant level fuel chamber 3 formed integral therewith and an outlet or flange casting 4 adapted for attachment to the intake manifold of an internal combustion engine. Fuel is supplied to the constant level fuel chamber 3 from a remote source and is aspirated therefrom through a nozzle 5. For control of the air inlet 6 an unbalanced plate-type choke valve 7 rigidly attached to choke shaft 8 is provided. The choke shaft 8 is journaled in the walls of inlet casting 1 and projects therefrom on both sides. On the far side in Fig. 1 shaft 8 projects into an automatic choke mechanism housing generally indicated at 9. The automatic choke mechanism includes the usual thermo-responsive element 10 which functions to yieldably position the choke valve in accordance with the temperature. This form of automatic choking device is shown and described in a patent to I. E. Coffey, 2,085,351. To control the discharge outlet 10, a plate-type throttle valve 11 rigidly attached to rotatable throttle shaft 12 is provided. Rigidly attached to the near end of shaft 12 is a bifurcated throttle lever 13. The branch 14 of lever 13 is perforated to receive rod 15 provided for the manual control of the throttle valve and the other branch 16 of lever 13 carries a pivot pin 17 on which is pivotally mounted the connector link 18.

A throttle pull back spring indicated at 19 is attached at one end to lever 13 and to a fixed post 20 at its other end and constantly urges the throttle valve toward a closed position. The starting motor and circuit diagrammatically indicated comprise the usual starting relay circuit

indicated at 21, relay or solenoid operated switch 22, storage battery 23, starting motor 24 and starting motor circuit 25. Two switches in circuit 21 are indicated at 26 and 27. At 26 the circuit is broken by the suction actuated switch 28 and at 27 by the throttle lever actuated switch 29. A good form of starting device for use in the present invention and which includes an additional switch in the relay circuit controllable by generator output is shown and described in a patent to I. E. Coffey, #2,174,313.

On the near side in Fig. 1 and Fig. 2 the projecting choke shaft 8 carries a rigidly attached disc-like element 31 having radial projections 32 and 33. Projection 33 is formed at 90° to provide an axially extending abutment 33'. A lever 34 pivotally mounted on screw 35 having a lateral abutment 36 arranged to engage projection 32 on element 31 is provided. Lever 34 is also provided with a longitudinal projection 37 arranged to engage abutment 38 formed as a part of connector link 18.

Means for opening the choke valve against the resistance of the thermo responsive element 30 and means for timing this performance are embodied in the spring-loaded dash pot generally indicated at 39 and which comprises a cylinder 40 preferably an integral part of the carburetor body casting. A closely fitting plunger 41, a plunger rod 42, and a spring 43. Rod 42 is connected to lever 34 by a link 44. Liquid is supplied to the cylinder 40 from the constant level fuel chamber 3 at a point above the upper limit of travel of plunger 41 through passage 45. By-passing of plunger 41 is provided on the upward stroke by longitudinal passage 46 and calibrated cross passages 47 and 49. By-passing is checked on the downward stroke by valve 48 permitting by-passing only through 49.

It will be understood that spring 43 is sufficiently stronger than any resistance to choke opening which the thermo-responsive element directly or indirectly is capable of, and further that the throttle pull-back spring 19 is capable of raising the dash pot plunger 41 against the spring 43. A fast idling cam member 50 mounted for rotation on choke shaft 8 and a fast idling lever 51 mounted for rotation on screw 35 are provided. Cam member 50 is provided with a cam surface 52 and a diametrically opposite weighted portion 53 which tends to rotate the member in a counterclockwise direction. Member 50 is further provided with abutments 54 and 55 adapted to engage projection 33 on member 31 thereby limiting its rotation with respect to member 31. Fast idling lever 51 is provided at one end with a pin 56 which provides a sliding pivotal engagement with connector link 18 by reason of the slot 57 in link 18. At its other end lever 51 carries an adjusting screw 58 adapted to contact cam surface 52 thereby limiting the counterclockwise rotation of lever 51, the downward travel of link 18 and, consequently, the closing movement of the throttle valve. A coiled spring 59 having one end attached to the carburetor and its other end attached to lever 51 and constantly urging the lever in a clockwise direction is provided to relieve drag upon the member 50 as the throttle is opened.

The operation of the device is as follows:

Upon starting a cold engine the throttle valve is moved to a position as shown by the dot-dash line in Fig. 1 thereby closing the switch 29. Link 18 has been moved upward to the position also indicated by dot-dash lines thus removing stop

38 carried thereby from arm 37 of lever 34. This permits spring 43 to depress plunger 41 and consequently rotate arm 34 clockwise to some extent, not sufficient, however, to move abutment 36 thereon into operative engagement with projection 32 on member 31. Cranking may, therefore, be continued indefinitely with a closed choke in this position. If, however, the throttle lever is inadvertently moved substantially further open than necessary to close switch 29, the lever 34 will be rotated sufficiently to bring abutment 36 and projection 32 into contact and the choke valve will then be moved toward an open position, but this function is delayed as desired by sizing the by-pass 49 of closely fitting plunger 41.

It is the intention of the inventor to provide a delay of this function sufficient to permit starting under average conditions and to limit the delay to a reasonable cranking period with a closed choke, whereafter it is desirable to partially open the choke. As the engine temperature rises and the choke valve is moved toward an open position by means of the automatic choke mechanism, the member 50 will be rotated counterclockwise due to the contact of projection 33 with abutment 55 and the high part of cam surface 52 removed so as to permit the throttle to close. It will be seen that a delay or slow closing of the throttle valve is also accomplished by this arrangement, the degree being dependent upon the relative strength of springs 43 and 19 and the accumulated effective area of passages 47 and 49.

The detail description and structure shown is intended to be illustrative, not limiting, and various modifications within the scope of the following claims are possible.

We claim:

1. In a carburetor having in combination, a choke valve, a throttle valve, a resilient thermo-responsive element for moving said choke valve in a closing direction with decreasing temperature, a constant level fuel chamber, delayed action unloading mechanism comprising a vertical cylinder, a plunger in said cylinder, a shaft for said plunger, a fuel passage communicating with said constant level chamber at a point below the level of fuel and with said cylinder at a point above the upward limit of travel of said plunger, a spring surrounding said plunger shaft and normally urging said plunger downward, said spring being sufficiently strong to overcome said resilient thermo-responsive element, a by-pass around said plunger, means for reducing said by-pass on the downward stroke of said plunger, mechanism connected to said plunger for opening said choke valve as said plunger descends, and lost motion connections between said throttle valve and said plunger whereby said plunger is raised during the latter portion of the throttle valve closing movement.

2. In a carburetor having in combination a choke valve, a resilient temperature responsive element for moving said choke valve in a closing direction with decreasing temperatures, a spring actuated mechanism having a single acting connection with the choke valve whereby when released said choke valve is moved towards open position against said temperature responsive element, a throttle valve, and a single acting means operated by said throttle valve for compressing said spring actuated mechanism to render the same inoperative to open the choke valve when

said throttle valve is in closed and starting positions, and releasing said spring actuated mechanism to permit it to move said choke valve toward open position when said throttle valve is moved beyond starting position, and means for retarding the movement of said spring actuated mechanism, whereby choke opening movement may be delayed substantially beyond the throttle opening.

3. A carburetor having in combination a choke valve, a resilient temperature responsive element for moving said choke valve in a closing direction with decreasing temperatures, a throttle valve, a spring actuated means which when released moves said choke valve toward open position against said temperature responsive element, means operated by said throttle valve for rendering said spring means ineffective to open the choke valve when the throttle valve is in starting position, means for releasing said spring actuated means to permit it to move said choke valve toward open position, said releasing means being operated by movement of said throttle valve beyond starting position, and a retarding means for delaying the movement of said spring actuated means, whereby choke opening movement may be delayed substantially beyond the throttle opening.

4. In a carburetor having in combination a choke valve, a resilient temperature responsive element for moving said choke valve in a closing direction with decreasing temperatures, spring actuated mechanism having a single acting connection with the choke valve whereby when released said choke valve is moved towards an open position against said temperature responsive element, a throttle valve, and a single acting means operated by said throttle valve for compressing said spring actuated mechanism to render the same inoperative to open the choke valve when said throttle valve is in closed and starting position, and releasing said spring actuated mechanism to move said choke valve toward open position when said throttle valve is moved beyond

starting position, and a dash pot for retarding the movement of said choke valve by said spring responsive mechanism.

5. In a carburetor having in combination a choke valve, a resilient temperature responsive element for moving said choke valve in a closing direction with decreasing temperatures, spring actuated mechanism having a single acting connection with the choke valve whereby when released said choke valve is moved towards its open position against said temperature responsive means, a throttle valve, a single acting means movable with said throttle valve for compressing said spring actuated mechanism and rendering same inoperative when said throttle valve is moved to starting position, said spring compressing means being released upon movement of said throttle valve beyond starting position, means for retarding the movement of said choke valve by said spring actuated mechanism, and resilient means for moving said throttle valve towards closed position upon movement of said choke valve to fully open position by said heat responsive means.

6. In a carburetor having in combination, a choke valve, a throttle valve, a resilient temperature responsive element for moving said choke valve in a closing direction with decreasing temperature, spring motor mechanism so arranged that when released it will operate said choke valve and move same toward an open position against the resistance of said thermoresponsive element, and a single action connection between said throttle valve and motor mechanism for energizing said spring motor mechanism as the throttle is moved toward a closed position and releasing said spring motor mechanism as said throttle is moved forward, said spring actuated mechanism including dashpot means for delaying the opening of said choke by said motor.

JAMES T. W. MOSELEY.
LARS S. CURRY.