Feb. 15, 1944. G. M. BICKNELL ET AL 2,341,685

CARBURETOR

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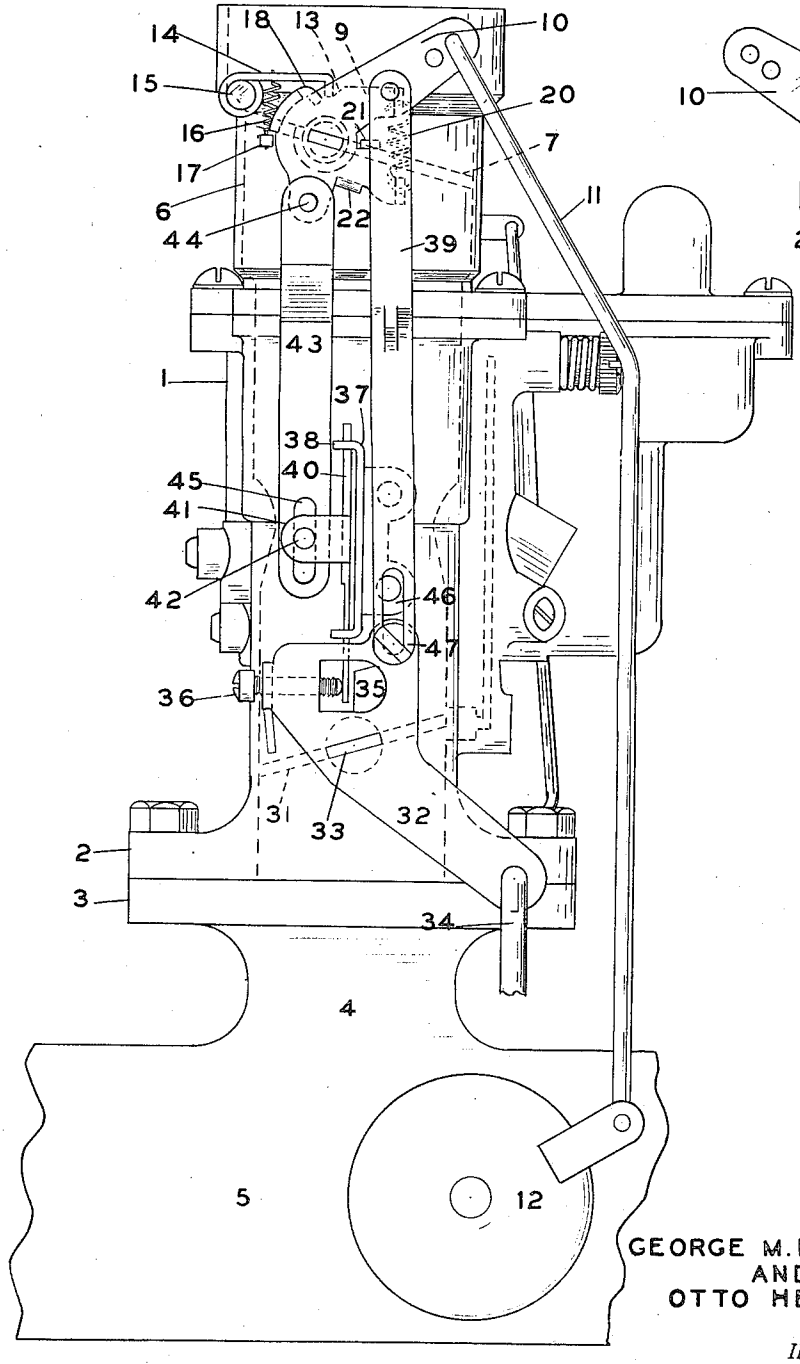



FIG. 1

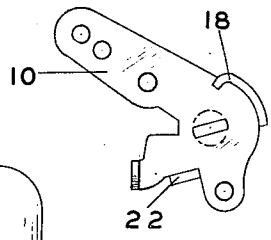



FIG. 4

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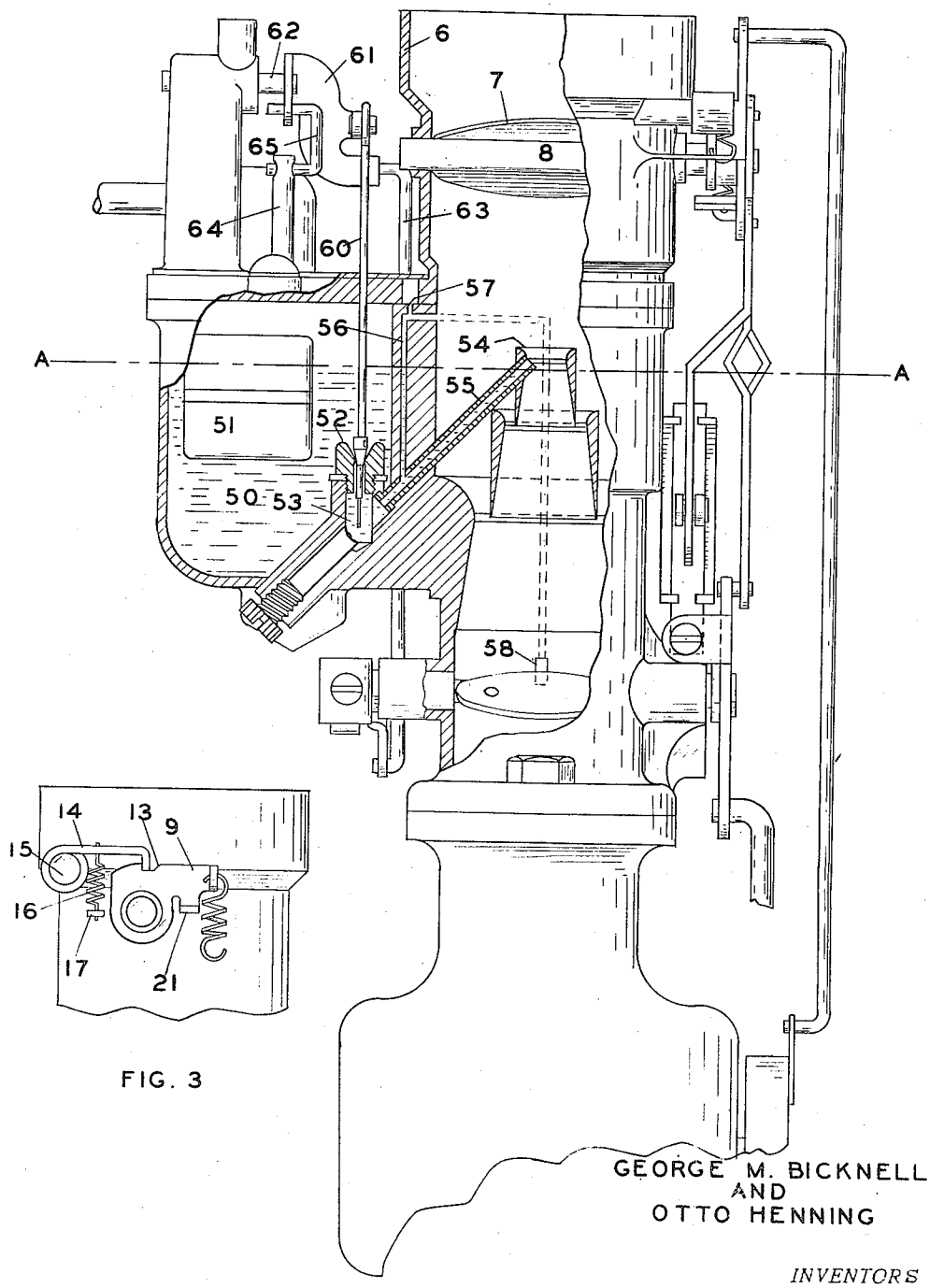



FIG. 2




FIG. 3

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# UNITED STATES PATENT OFFICE

2,341,685

## CARBURETOR

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Application April 14, 1933, Serial No. 666,118

4 Claims. (Cl. 261—39)

This invention relates to carburetors and more particularly to the provision of means for insuring a suitable throttle opening for warming up the motor just after it has been started under low temperature conditions. It will readily be understood by those familiar with the art that when an engine is started under low temperature conditions, the oil is likely to be highly viscous so that great power is required to overcome the resistance of the oil film in the various bearings of the motor, including the bearing of the pistons on the cylinder walls. With the throttle in completely closed or idle position, internal combustion engines of the automotive type will only develop a very few horsepower, usually less than that required to overcome the friction resistance above referred to and the motor will necessarily stop unless the throttle is opened.

In carburetors having hand choke controls, the throttle has frequently been connected to the choke valve in such a manner as to insure the opening of the throttle when the choke is fully closed, but in carburetors having automatic choke arrangements controlled by a heat responsive member, it is desirable to use a comparatively light thermostat chiefly on account of expense and the power required to open the throttle is so great that this thermostat cannot be depended on to operate a connected choke and throttle mechanism.

It is an object of this invention to provide a device for use in automatic choke carburetors for limiting closing movements of the throttle under low temperature conditions without, in any way, preventing the closing of the choke valve by the heat responsive device if the operator should happen to leave the throttle valve in closed position while trying to start the motor.

Other objects and advantages will appear from the following description and accompanying drawings, referring to which:

Figure 1 shows a side elevation of a carburetor constructed according to our invention and mounted on the combined intake and exhaust manifolds of an internal combustion engine.

Figure 2 is a side elevation of the device shown in Figure 1, taken from a different angle, with parts broken away and others shown in sections.

Figure 3 is a detail view showing the upper part of the carburetor with the member 10 removed.

Figure 4 is a detail view showing a rear elevation of the lever 10.

The reference numeral 1 indicates the main body member of a carburetor of the downdraft type having a flange 2 by means of which it may be attached to the corresponding flange 3 of the intake manifold 4 of an internal combustion engine. The intake manifold is built as a unit with the exhaust manifold 5. The carburetor is provided with an air inlet member 6, the admission of air to which is controlled by a choke valve 7. The choke valve is eccentrically mounted on the shaft 8 so that it may be moved toward open position by increases of suction. A bell crank lever 10 is firmly attached to the choke shaft and connected to a link 11 which is operated by the heat responsive member 12, mounted on the exhaust manifold.

It may be noted that the member 12 tends to rotate in a clockwise direction with respect to Figure 1 whenever the temperature increases and vice-versa. A latching member 9 is loosely carried by the choke shaft and provided with a notch 13 to receive the bent over end of the hook 14. This hook is pivotally mounted on a post 15 which is made integral with the air inlet member 6 and held in position by spring 16, the lower end of which is attached to the air inlet member as at 17.

The choke valve lever 10 carries a cam 18 adapted to encounter the hook 14 and disengage it from the notch 13 when the choke valve is operated a predetermined degree by suction. The loosely mounted latch member 9 is connected to the lever 10 by means of a spring 20. Partial clockwise rotation of the lever 10 with respect to the latch member 9 is permitted, but complete rotation of these members with respect to each other is prevented by means of the lug 21 carried by latch member 9, which lug encounters the lower side of the lever 10 to keep spring 20 in tension. The lever 10 carries a backwardly turned lug 22 which encounters the stop 17 when the choke valve has been moved to fully open position.

The carburetor is provided with the usual throttle valve 31, manually operated by means of lever 32 which is fixed to the throttle shaft 33 in a conventional manner. It will be understood that a suitable link 34 is provided for operating the throttle from the usual dash or foot control (not shown). The body of the carburetor is provided with an abutment member 35 against which the adjustable stop screw 36 is adapted to seat. Screw 36 is fitted to lever 32 in a conventional adjustable manner.

In order to enable the operator to at least partially open the choke valve by moving the throttle to full open position, a link 39 is provided for connecting throttle lever 32 and choke lever 10. In order to permit free operation of the throttle when the choke is open, a slot 46 is formed in the link 39, which slot loosely receives the retaining screw 47, carried by throttle lever 32.

A bracket 37 is mounted on the body of the carburetor and provided with upturned slotted lugs 38 adapted to guide the slidable stop member 40. The stop member 40 carries an upturned lug 41 fitted with a cross pin 42, and the lever

10 is connected to this lug by means of a link 43, the upper end of which is pivotally connected to the lever 10 as indicated at 44, and the lower end of which is connected to pin 42 by means of an elongated slot 45.

The general construction of the carburetor is of the plain tube type and comprises a constant level chamber 50 in which the fuel is maintained at a substantially constant level A—A by means of conventional float mechanism, a part of which is indicated at 51. The fuel is supplied from the constant level chamber to the mixing conduit thru a metering jet 52 and passageway 53. The fuel for normal speed operation is supplied to the throat of a venturi 54, by means of the main nozzle 55, and the fuel for low speed operation is supplied by means of the idling conduit 56 which is connected into the main nozzle or passageway 53 at any convenient point. The idle passage 56 is vented as indicated at 57 and discharged at a point adjacent the edge of the throttle as indicated at 58.

A metering rod 60 is provided to control the supply of fuel thru the main jet in accordance with the throttle position. This rod is carried on rocker arm 61, mounted on rock shaft 62 and operated from the throttle by means of link 63. Any suitable accelerating device may be employed and the operating member 64 for this device is connected to the rocker arm 61 by means of a link 65.

In operation, when the motor is to be started under low temperature conditions, the thermostat 12 will have closed the choke valve 7 to the position indicated in Figure 1, thereby permitting the hook 14 to drop into the notch 13 in the latch member 9. The latch member being held against clockwise rotation with respect to Figure 1 holds the upper end of the spring 20 in fixed position. When the motor is cranked suction will tend to open the choke valve 7 and some slight opening or breathing action of the choke valve may result during the cranking operation. This breathing action will stretch the spring 20 slightly and also flex the thermostat, but for ordinary cranking speeds up to about 100 R. P. M. the hook 14 will remain in position in the notch 13.

As soon as the suction of the motor is greatly increased, as for instance by the motor starting to run under its own power, the suction against the choke valve 7 will be sufficient to rotate the cam 18 far enough to contact with and dislodge the hook 14 from the notch 13. As soon as the latch member is released, the choke valve is left with nothing to urge it towards closed position except the thermostat 12 which is comparatively flexible and the choke valve will instantly move a substantial distance toward open position. This distance will, of course, vary with the temperature because the strength of the thermostat will vary with the temperature.

If the motor was started with the throttle in closed position, as may be done at temperatures not below 30 or 40 degrees Fahrenheit, the position of the lever 10 and pin 44 after the engine has begun to run under its own power may be such as to take up the lost motion between pin 42 and slot 45 and hold the stop member 40 up out of the way of the adjusting screw 36 so that the throttle may be opened and closed as usual without any interference from the stop member.

For low temperature starting however, it is desirable to open the throttle manually or by any other suitable means to approximately one-third or one-fourth open position. The opening of the throttle permits the stop member 40 to drop down between stop 35 and adjusting screw 36 so that when the operator attempts to close the throttle just after the motor has started the throttle does not move to fully closed position but to the predetermined fast idle position as determined by the thickness of the lower end of the stop 40.

It will be understood that the thermostat 12 is not powerful enough to fully open the choke with the screw 36 in position against the stop 40 as indicated in Figure 1, but in the normal operation of the carburetor the throttle valve will be frequently moved to open position, permitting the choke valve to adjust its position everytime the throttle is open until the choke valve reaches approximately full open position when the stop 40 will be withdrawn and the throttle valve will be permitted to fully close.

We claim:

1. In a carburetor, a choke valve and a throttle valve, heat responsive means for moving said choke valve to closed position when the temperature is low, said choke valve being openable in response to increases in temperature and also in response to suction, latch means for holding said choke valve in closed position, and mechanism between said choke and said throttle for preventing the complete closure of the throttle when the choke is in closed position.

2. In a carburetor, a choke valve and a throttle valve, heat responsive means for moving said choke valve to closed position when the temperature is low, said choke valve being openable in response to increases in temperature and also in response to suction, latch means for holding said choke valve in closed position, mechanism between said choke and said throttle for preventing the complete closure of the throttle when the choke is in closed position, said mechanism being constructed and arranged to permit free closing of the choke valve under the influence of decreasing temperature regardless of throttle position.

3. In a carburetor, a choke valve and a throttle valve, heat responsive means for moving said choke valve to closed position when the temperature is low, said choke valve being openable in response to increases in temperature and also in response to suction, latch means for holding said choke valve in closed position, mechanism between said choke and said throttle for preventing the complete closure of the throttle when the choke is in closed position, and means for preventing the complete closure of the throttle when the temperature is low.

4. In a carburetor, a choke valve and a throttle valve, heat responsive means for moving said choke valve to closed position when the temperature is low, said choke valve being openable in response to increases in temperature and also in response to suction, latch means for holding said choke valve in closed position, mechanism between said choke and said throttle for preventing the complete closure of the throttle when the choke is in closed position, mechanism between said throttle and choke valve to cause the release of said latching device when the throttle is moved to fully open position, and means for preventing the complete closure of the throttle when the temperature is low, said mechanism permitting free closing of the choke valve under the influence of decreases in temperature regardless of throttle position.

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