Oct. 22, 1940. I. E. COFFEY 2,218,699

CARBURETOR CHOKE DEVICE

Filed July 29, 1937 2 Sheets-Sheet 1

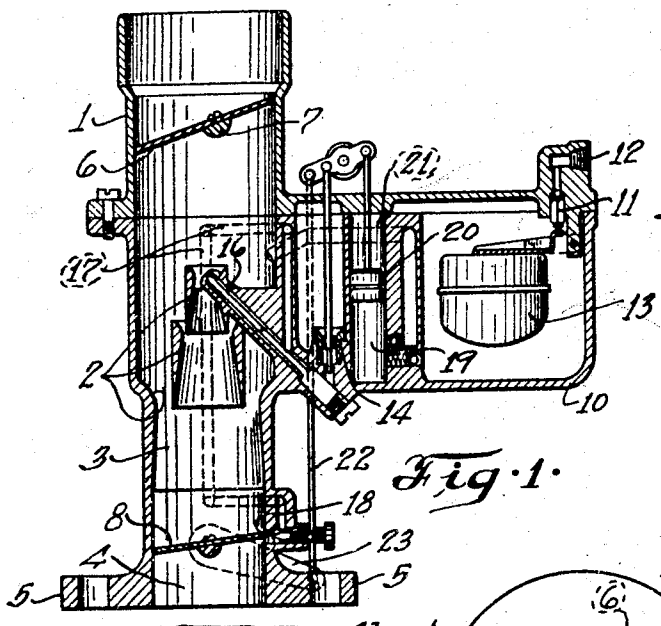


Fig. 1.

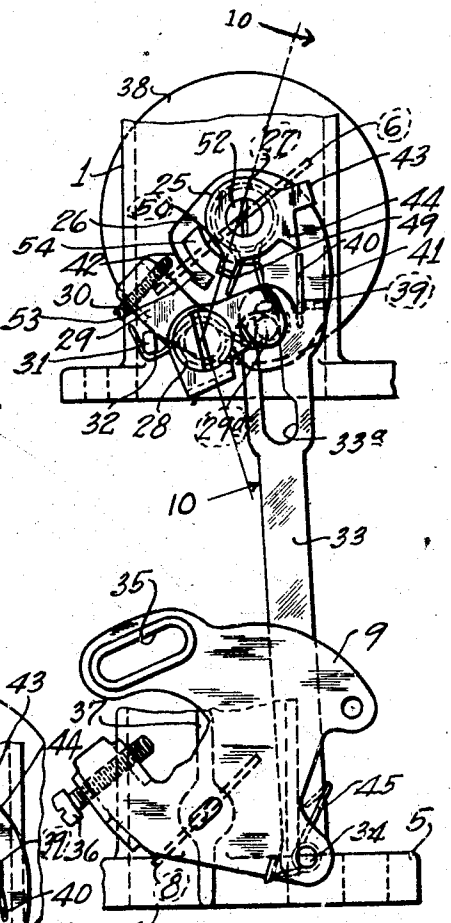


Fig. 2.

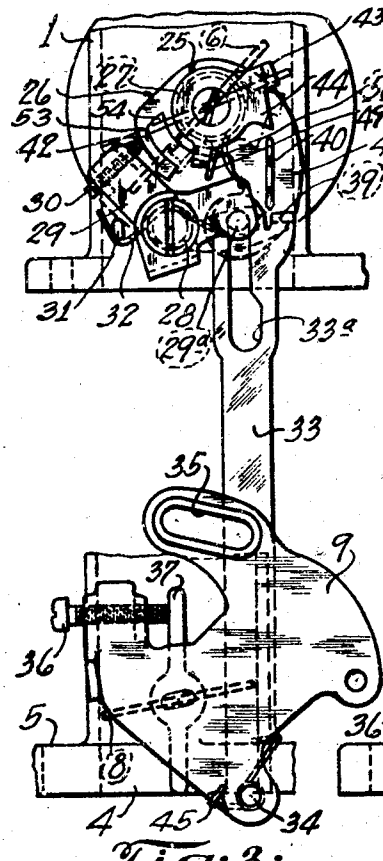


Fig. 3.

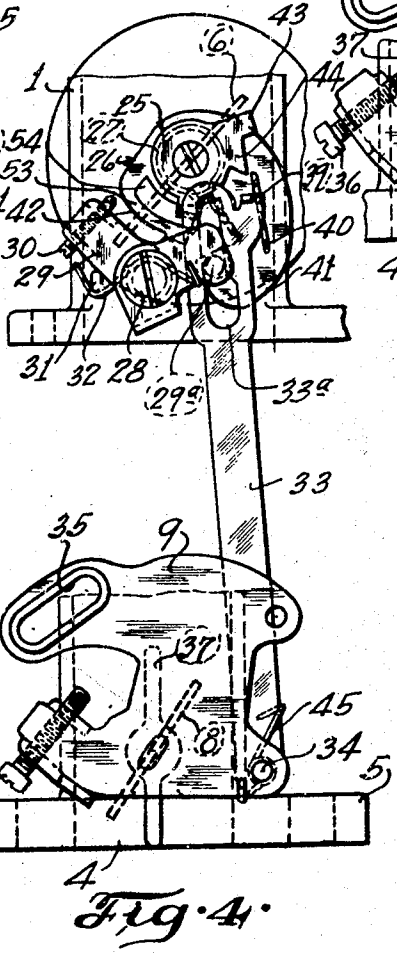


Fig. 4.

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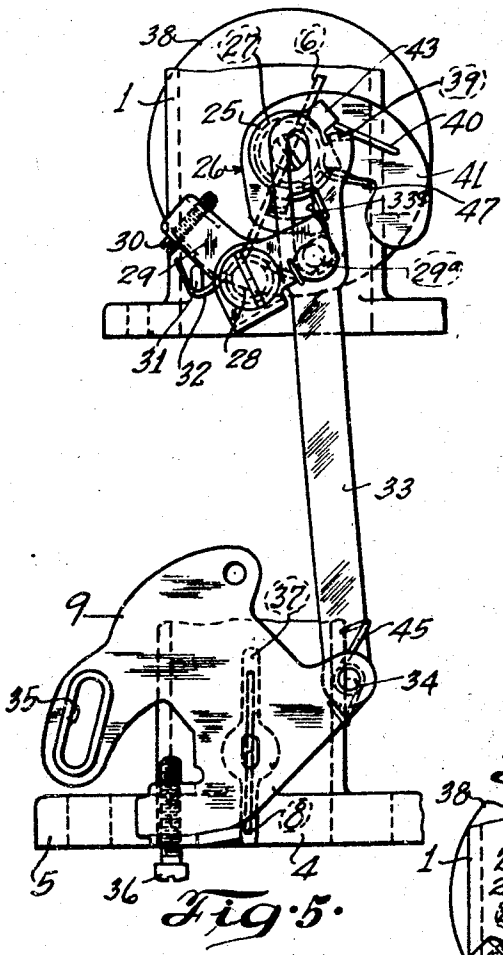


Fig. 5.

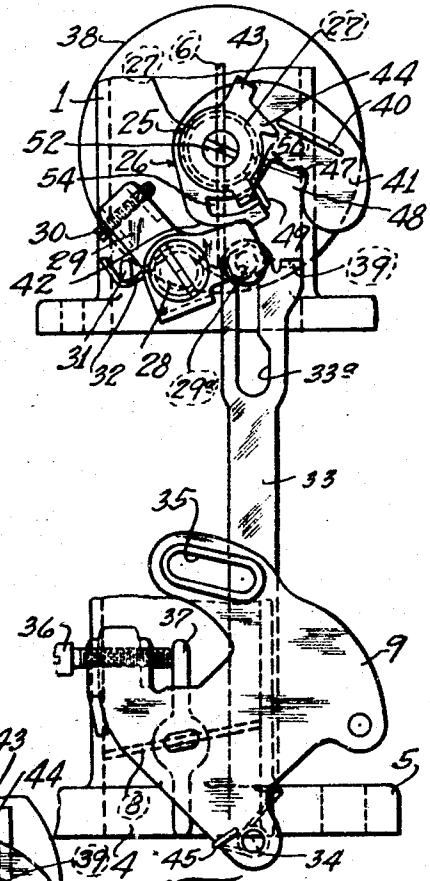


Fig. 6.

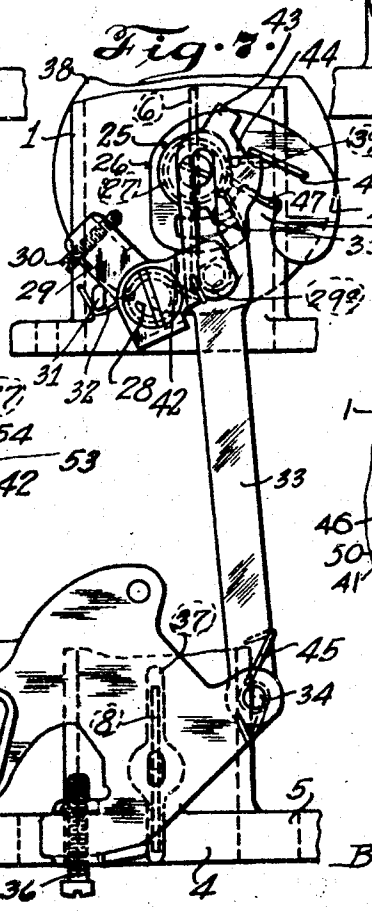


Fig. 7.

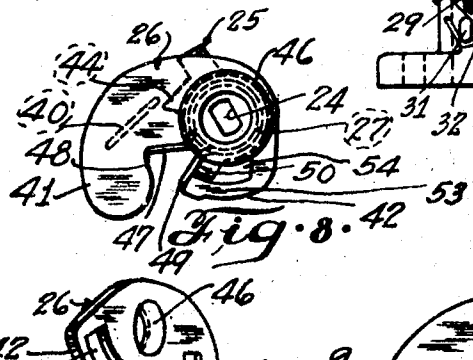


Fig. 8.



Fig. 9.

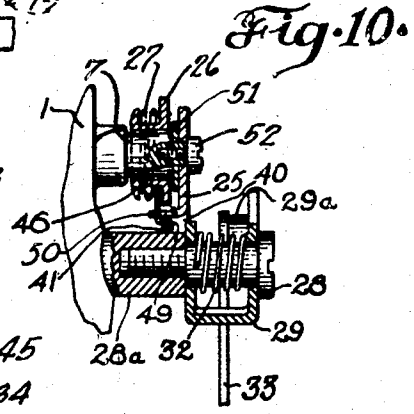


Fig. 10.

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UNITED STATES PATENT OFFICE

2,218,699

CARBURETOR CHOKE DEVICE

Irven E. Coffey, St. Louis, Mo.

Application July 29, 1937, Serial No. 156,339

7 Claims. (Cl. 261—39)

This invention relates to carburetors for internal combustion engines and consists, particularly, in novel engine starting and warm up mechanism associated with the carburetor.

Automatic choking devices usually embody a thermostatic control which yieldingly resists opening of the choke valve when the temperature is relatively low to provide a richer mixture of gasoline and air during the starting and warm up periods. The thermostat ordinarily becomes inoperative when the engine is fully heated, but prior to such time the choke constitutes a yielding restriction in the air intake and functions in the manner of an air valve, fluctuating according to the suction created by the engine. Ordinarily the choke valve must be held closed or nearly so during cranking so as to provide sufficient suction for starting the fuel flow from the main nozzle, but after the engine fires the choke valve should afford substantially less restriction to the inflowing air so as to prevent the engine from loading. Various devices have been provided for applying greater resistance to the choke valve during cranking than after the engine starts to run, one of these being illustrated in a co-pending application, Serial No. 610,865, filed May 12, 1932, in the name of Otto Henning, Patent No. 2,156,390, issued May 2, 1939.

One object of the present invention is to provide novel means operative only under engine starting conditions for applying additional tension to the choke valve.

A more detailed object is to provide means in an automatic choke carburetor for additionally tensioning the choke valve for starting and rendered operative only when the throttle valve is partially opened.

These objects and other more detailed objects hereafter appearing are attained substantially by the device illustrated in the accompanying drawings in which:

Fig. 1 is a sectional view of a carburetor to which the invention is applied.

Fig. 2 is an enlarged detail view showing certain parts of the carburetor in position for starting.

Fig. 3 is an enlarged detail view showing certain parts of the carburetor in the fast idle position.

Fig. 4 is an enlarged detail view showing certain parts of the carburetor during the warm up period.

Fig. 5 is an enlarged detail view showing certain parts of the carburetor during the warm up period, but with the choke valve forced open by the throttle valve for unloading.

Fig. 6 is an enlarged detail view showing certain parts of the carburetor, the choke valve being wide open and the throttle in the normal idle position.

Fig. 7 is an enlarged detail view showing certain parts of the carburetor, both the choke and throttle valves being wide open.

Fig. 8 is an inside view of a part of the mechanism disassembled from the carburetor.

Fig. 9 is a detail perspective showing part of the structure in Fig. 8 and

Fig. 10 is a detail section taken substantially on line 10—10 of Fig. 2.

The carburetor shown in Fig. 1 is, in general, of a well known automotive type and has a downdraft mixture conduit including air inlet horn 1, venturis 2, mixing chamber 3 and outlet portion 4, flanged as at 5 for attachment to the intake manifold (not shown) of an engine. An unbalanced butterfly type choke valve 6 is pivoted on shaft 7 in the air horn and the throttle valve 8 is rotatably mounted near the outlet portion and provided with the usual throttle control arm or crank 9 (Figs. 2–7). The choke is controlled, in part, by a thermostat in housing 38. Adjacent the mixture conduit is a bowl 10 within which fuel is maintained at a substantially constant level by needle valve 11 in threaded inlet 12 and controlled by float 13. Fuel is supplied to the mixture conduit through a main metering orifice member 14 and main nozzle 16, opening through the smallest venturi 2, and an idling system including passages 17 opening through port 18 near the edge of the throttle valve when closed. Additional fuel for acceleration is provided by a pump including cylinder 19 in the fuel bowl, piston 20, and discharge passage 21, the piston being connected to the throttle valve by link 22 and crank 23.

Choke shaft 7 at one end extends through and beyond the air inlet horn 1 and at its extremity has a non-circular portion rigidly secured in correspondingly shaped recess 24 in a disc-element 25 by a screw 52. A cam-like stop member 26 is loosely mounted on shaft 7 between element 25 and the air horn and has an inwardly projecting collared sleeve portion 46 receiving coiled spring 27 resiliently connecting a finger 50 on disk 25 and member 26. A washer 51 is interposed between members 26 and 25. Also pivoted to the air horn by means of a pivot screw 28 threaded in boss 28a adjacent the choke shaft is a bell crank 29 having a screw 30 in one portion

thereof, forming an adjustable abutment for engaging finger 53 on cam-like member 26, as will be explained hereafter. Crank 29 is constantly urged counterclockwise towards stop 31 by a spring 32. Projecting inwardly from another portion of bell crank 29 is a short pin 29a slidably received in a slot 33a formed in the upper portion of a link 33 connected at its lower end to the throttle control arm 9 by means of a pin 34. Link 33 has an inwardly projecting lip 39 at its upper end disposed adjacent an outward rib 40 on member 26 for cooperation with the latter as described hereafter. Radial projections or lugs 44 and 43 on disk 25 are disposed to be engaged by lip 39 for controlling the choke from the throttle valve. Member 26 has a weighted or unbalanced portion 41 which engages boss 28a when the member hangs freely from its pivotal support. Arm 9 has a slot 35 for adjustable connection to a link or other mechanism extending to the usual manual control pedal or button adjacent the driver's seat and carries an adjustable screw 36 for engaging a rib 37 on the outside of the mixture conduit.

The choke control mechanism functions as follows:

When the engine is cold, choke valve 6 will be yieldingly urged toward its fully closed position by the thermostat in housing 38. A suitable form of thermostatic control is disclosed in a co-pending application, Serial No. 679,201, filed July 6, 1933, now Patent No. 2,085,351, in the name of Irven E. Coffey. In cold starting, the throttle valve should be partially opened, as shown in Fig. 2, and this moves link 33 upwardly so as to position lip 39 on link 33 on the right side of the depending rib 40 on the depending cam-like member 26. This locks member 26 against counterclockwise movement so that opening of the choke valve is resisted by coiled spring 27 as well as the thermostat. Fig. 2 shows the choke valve and disc element 25 rotated slightly counterclockwise or in a choke opening direction relative to member 26, as under the influence of suction in the carburetor, while the choke valve is slightly opened against spring 27.

Whenever the engine is relatively cold and inoperative, cam-like member 26 will be urged by the unbalanced or weighted portion 41 thereof toward the position shown in Fig. 2 with high portion 42 on member 26 in the path of screw 30. Fig. 3 shows the throttle in the fast idle position with stop screw 30 engaging high point 42 on member 26. In case of starting with the throttle so positioned, opening of the choke valve will be resisted by spring 27, as in Fig. 2, due to the holding of the cam-like member by screw 30. In Fig. 4 the throttle valve has been partially opened releasing cam-like member 26 from screw 30 and the choke valve is thereafter controlled independently of spring 27. After the engine has started, the operator customarily and instinctively releases the throttle pedal so as to drop lip 39 to a position to permit cam 26 and rib 40 to rotate counterclockwise under the influence of suction on the unbalanced choke valve. During this movement, rib 40 passes above lip 39 to the right side thereof. In this position, lip 39 is ineffective to further resist counterclockwise or choke opening movement of member 26 and the choke valve. The throttle cannot be fully closed as long as the high portion 42 is abreast of screw 30. The engine will continue to run with the choke only partly open, as in Fig. 4, even though the warm-up is completed with member 26 held in the position shown by screw 30.

In case the engine becomes "loaded" during the starting or warm-up, the choke valve can be opened for unloading by substantially opening the throttle valve, as shown in Fig. 5, which raises link 33 causing lip 39 on the upper end thereof to engage abutment rib 40 which, in turn, strikes a projection 43 on plate element 25, thus positively rotating members 25 and 26 and the choke valve in a counterclockwise direction.

After the engine has started and the throttle valve has been closed and then re-opened so as to release the cam-like member from lip 39 and screw 30, members 25 and 26 move as a unit with the choke valve and when the engine has become thoroughly heated, the choke will be disposed vertically in the air horn as in Fig. 6, so as to constitute a minimum restriction. With the choke opened beyond the position in Fig. 4, high point 42 on member 26 is out of the path of screw 30 and closing movement of the throttle is limited to the normal idling position by engagement of screw 36 with rib abutment 37.

When both the choke and throttle valve are fully opened, lip 39 on interconnection link 33 catches beneath tooth or lug 44 on plate-like element 25 to prevent closing movement of the choke valve. This engagement of lip 39 and tooth 44, as shown in Fig. 7, is enforced by a spring 45 constantly urging link 33 in a counterclockwise direction relative to throttle control arm 9. The lower portion of slot 32 is enlarged to further facilitate this interlocking of parts.

Fig. 10 clearly shows the construction of the parts providing additional resistance against opening of the choke valve during starting. One end 47 of spring 27 is seated in a notch 48 in the unbalanced lower portion of member 26. The other end 49 of the spring normally abuts finger 50 on element 25 rigid with the choke shaft (Fig. 8).

Fig. 9 shows cam-like member 26 disassembled from the other parts with the end 49 of spring 27 engaging the extremity of finger portion 53 forming the high portion 42 of member 26. Slot or groove 54 between finger 53 and the main body portion of member 26 receives finger 50 on disk element 25 so as to permit closing of the choke under the influence of the thermostat when the cam-like member is secured by screw 30. This relationship is apparent from Fig. 3 which in broken lines indicates the end portion 49 of spring 27 engaging the extremity of finger 53 and disk element 25 rotated sufficiently counterclockwise relative to member 26 to permit closing of the choke valve.

Certain functions of the structure herein shown, particularly the throttle and choke interconnection, and the fast idle, unloading, and choke open lock features are attained by somewhat similar structure more fully disclosed and claimed in a co-pending application, Serial No. 88,566, filed July 2, 1936, in the name of Blattner and Kommer, Patent No. 2,160,411, issued May 30, 1939. The present invention is directed more particularly to the means in addition to the thermostat for resisting opening of the choke valve under certain conditions, as described. Obviously the features of the present invention may be practically embodied in various ways and these may be used with substantially any type of carburetor and choke control mechanism. The exclusive use of all such modifications as come

within the scope of the appended claims is contemplated.

I claim:

1. In an internal combustion engine carburetor, a mixture conduit having choke and throttle valves therein, a thermostat for yieldingly resisting opening of said choke valve when the temperature is low, a stop member having a yielding connection to said choke valve and movable therewith to a predetermined position when said choke valve is closed, said stop member having an abutment, and a part movable with said throttle valve and constructed and arranged to engage and hold said abutment when said throttle is opened for cold starting with said choke valve closed whereby said yielding connection additionally resists opening of said choke valve, said part being movable out of the path of said abutment when said throttle is substantially closed whereby said choke is released from the restraining influence of said yielding connection.

2. In an internal combustion engine carburetor, a mixture conduit having a throttle valve and an unbalanced choke valve normally resiliently closed for cold starting, a stop member having a resilient connection to said choke valve for movement therewith, and a part movable with said throttle valve and disposed to engage said stop member to hold the same against movement in the choke opening direction when said choke valve is closed and said throttle valve is partially opened for cold starting whereby said connection resists opening of said choke valve.

3. The combination of elements specified in claim 2 in which said stop member has a one-way connection to said choke valve whereby said stop member when held by said part, as described, yieldingly resists opening movement of said choke valve but is ineffective to prevent closing movement of said choke valve.

4. In a carburetor for an internal combustion engine, a throttle valve, an unbalanced choke valve normally resiliently closed for cold starting, a shaft pivotally mounting said choke valve and having an eccentric abutment, a stop member rotatably mounted about said shaft, a coiled spring encircling said shaft and normally connecting said stop member and said abutment, and an element movable with said throttle valve into engagement with said stop member to prevent the movement of the same in the choke opening direction when said throttle valve is substantially opened for cold starting with said choke valve closed whereby said spring resists movement of said choke valve in the opening direction.

5. In a carburetor for internal combustion engines, a mixing conduit having choke and throttle valves therein, a thermostat for yieldingly resisting opening of the choke valve when the temperature is low, a member resiliently connected to and movable with the choke valve, means connected to the throttle valve and movable therewith, said last named means being shifted during starting of the opening movement of the throttle for cold starting to a position to intercept the movement of said member movable with the choke valve when the latter is in closed position whereby the opening member of the choke is further resisted.

6. In a carburetor for internal combustion engines, a mixing conduit having an unbalanced choke valve and a throttle valve, a thermostatic device for applying yielding resistance to opening of said choke valve, a spring having one end operatively connected with said choke valve, means movable with said throttle valve, said last named means being positioned to restrain the opposite end of said spring when said throttle valve is opened for cold starting to cause the same to additionally resist opening of said choke valve.

7. In a carburetor for an internal combustion engine, a throttle valve, an unbalanced choke valve, a device for yieldingly closing said choke valve for starting, a stop member having a spring connection with said choke valve for movement therewith to a fast idle position when said choke valve is closed and away from said position when said choke valve is opened, and structure movable with said throttle valve and disposed to engage said stop member when the latter is in said fast idle position to prevent full closing of said throttle valve, opening movement of said choke valve being resisted by said spring connection when said structure is in engagement with said stop member as described, said structure movable with said throttle valve also engaging said stop member so as to resist movement thereof in the choke opening direction when said throttle valve is opened for cold starting with said stop member in said fast idle position.

IRVEN E. COFFEY.