

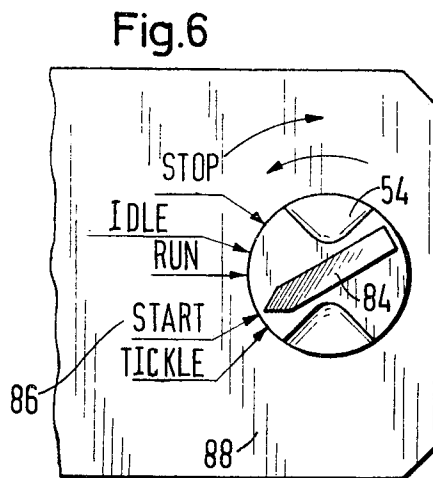
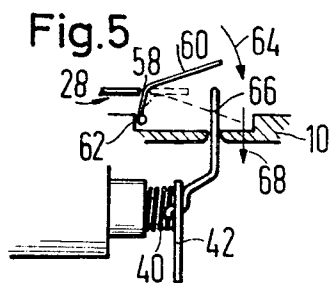
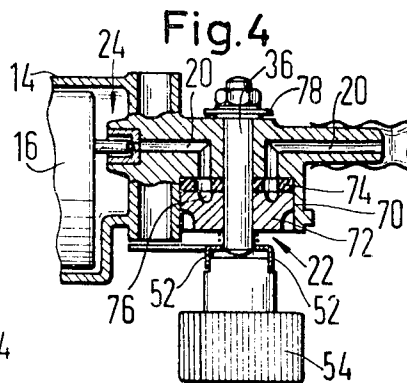
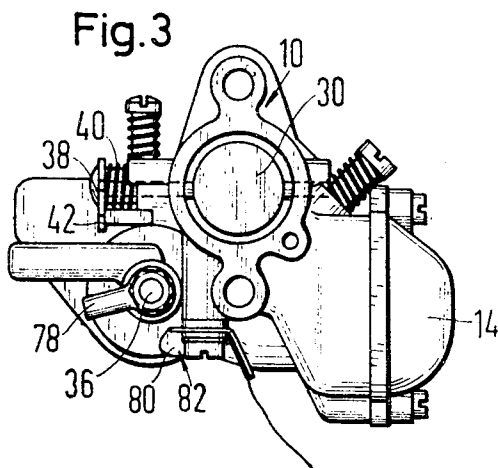
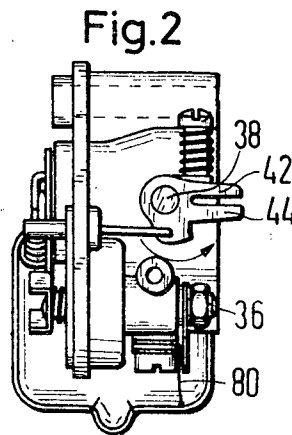
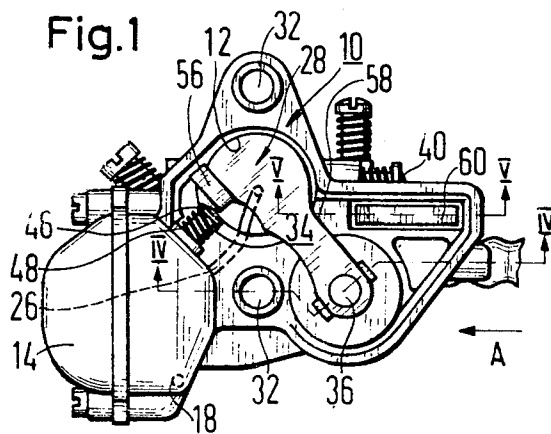
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3,511,220

CARBURETOR

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3,511,220
CARBURETOR

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U.S. Cl. 123—198 12 Claims

ABSTRACT OF THE DISCLOSURE

A carburetor for a gasoline engine in which a single control knob, when turned in one direction, sequentially causes tickling of the float, opening of the choke, closing of the throttle to idling speed, grounding of the ignition, and shut-off of the fuel supply conduit. The knob is mounted on a shaft carrying the choke plate, the grounding switch, and the shut-off valve. Abutments on the choke plate operate the throttle and the tickler rod.

BACKGROUND OF THE INVENTION

This invention relates to carburetors for internal combustion engines and particularly to a manual operating system for operating the choke, throttle, and other movable elements of a carburetor during starting and shut-down of the associated engine.

The invention will be described hereinafter with specific reference to a one-cylinder gasoline engine for a power tool or similar applications, but a carburetor operating system of the invention may be employed with carburetors of other internal combustion engines, as will be apparent to those skilled in the art.

It is known to interconnect operating elements in a carburetor of the type described so that one control member may sequentially operate more than one movable carburetor element. The object of the invention is the provision of a manually controlled carburetor which can be set for its several modes of operation during engine starting and shut-down by means of a single control member.

SUMMARY OF THE INVENTION

According to the invention, a single control member mounted on a support for movement relative to the same is connected with the choke, the throttle, an ignition shorting switch, and the fuel shut-off valve of the carburetor in such a manner that the several carburetor elements and the switch are sequentially operated in response to movement of the control member. The carburetor shell which defines the air intake conduit of the carburetor preferably carries the shut-off valve and serves as a support for the shaft of the control member.

As the control member sequentially passes through several positions during its movement in one direction, the choke is first moved away from its operative or starting position in which it largely obstructs the air intake conduit. In a subsequent position of the control member, the throttle is moved into the operative or idling position in which it largely obstructs the air intake conduit. When the control member moves further, the ignition is shorted and the fuel supply is shut off.

The choke may be mounted on the same shaft as the control member for angular displacement about the shaft axis which may be parallel to the axis of the air intake conduit.

Other features, additional objects and many of the attendant advantages of the invention will readily become apparent from the following detailed description of a

preferred embodiment when considered in connection with the attached drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 shows a carburetor of the invention in front elevation without its outer casing and control knob;

FIG. 2 shows the carburetor of FIG. 1 in side elevation in the direction of the arrow A;

FIG. 3 illustrates the same carburetor in rear elevation;

FIG. 4 is a fragmentary sectional view of the device in section on the line IV—IV;

FIG. 5 is a sectional view taken on the line V—V in FIG. 1; and

FIG. 6 shows the outer carburetor casing and the carburetor control knob in a view corresponding to that of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in detail, and initially to FIGS. 1 to 4, there is seen as much of an otherwise conventional carburetor as is needed for an understanding of this invention. A portion of the carburetor shell 10 encloses an air intake duct 12, and another portion forms a float chamber 14 in which a float 16 is pivotally mounted on a pin 18. The float chamber 14 receives fuel from a nonillustrated tank through a fuel supply conduit 20 equipped with a shut-off valve 22 and a float-operated needle valve 24.

A fuel line 26 communicates with the chamber 14 and terminates in an orifice in the air intake conduit 12. A choke 28 largely obstructs the duct 12 in the view of FIG. 1 ahead of the fuel line orifice, and a throttle 30 similarly obstructs the duct 12 in the view of FIG. 3 downstream from the fuel line orifice. The shell 12 is provided with apertures 32 for fasteners which normally attach the shell 10 to the inlet of the associated, non-illustrated engine cylinder.

The choke 28 mainly consists of a plate 34 mounted on a shaft 36 which is journaled in the shell 10. The axis of the shaft 36 is spacedly parallel to the longitudinal axis of the duct 12. The throttle 30 is mounted on a pin 38 which is also journaled in the shell 10 and is biased by a torsion spring 40 toward the angular position of the throttle 30 illustrated in FIG. 3. A sheet metal arm 42 radially projects from the shaft 38 outside the duct 12 and has a forked free end 44, the only illustrated element of a throttle linkage connecting the shaft 38 to an automatic speed governor (not shown) as is conventional in some power tool applications and not directly relevant to this invention.

A bore in the portion of the shell 10 enclosing the float chamber 14 slidably receives a tickler rod 46 whose inner end is directed from above toward the float 16 in the chamber 14, and which is biased outward of the chamber by a helical compression spring 48. Outward movement of the tickler rod 46 beyond the position illustrated in FIG. 1 is prevented by non-illustrated stops.

The apparatus described so far functions in a conventional manner. When the valve 22 is open, fuel flows through the conduit 20 into the chamber 14 until the rising float 16 closes the needle valve 24. Fuel is drawn from the chamber 14 into the duct 12 by the vacuum of the connected engine and is atomized in the duct. During engine start-up, the plate 34 of the choke 28 largely obstructs the flow of air into the throat of the duct 12 so that a fuel mixture rich in gasoline is fed to the engine through the opened throttle 30. In order further to enrich the initial fuel mixture, the tickler rod 46 may be

depressed prior to starting to fill the chamber 14 beyond the level automatically maintained by the float 16 during normal operation, the float being held away from the needle valve 24 by the rod 46.

After the engine has started and warmed up sufficiently, the choke 28 is opened and the throttle 30 is operated normally by the throttle linkage. It is biased toward the idling position seen in FIG. 3 by the spring 40. Ultimately, the engine is stopped by shutting the valve 22. This invention is concerned mainly with a control mechanism which operates the afore-described and other elements of the carburetor and associated other engine elements in a particularly convenient and simple manner.

The actuating shaft 36 on which the choke plate 34 is mounted carries a U-shaped prong 52 on one of its axial ends outside the shell 10. The prongs are somewhat resilient and can slidably engage conforming grooves of a control knob 54, as is shown in FIG. 4 only. The knob coaxially turns with the shaft 36 and with the choke plate 34 mounted on the shaft. An abutment 56 projects from the plate 34 in such a manner that it can engage and depress the tickler rod 46 when the shaft 36 is turned counter-clockwise from the position seen in FIG. 1.

As is best seen in FIG. 5, the plate 34 of the choke 28 has an edge 58 which abuts against a leaf spring 60 in the position shown in full lines in FIG. 5. The spring 60 is attached to the shell 10 at 62. When the choke 28 is moved toward the position shown in broken lines in FIG. 5 by turning the knob 54 and the shaft clockwise, as viewed in FIG. 1, the spring 60 is bent resiliently in the direction of the arrow 64 into abutting engagement with a wire link 66 attached to the arm 42, thereby moving the link 66 in the direction of the arrow 68, and returning the throttle 30 to the idling position of FIG. 3 regardless of the condition of the throttle linkage portion not seen in the drawing.

The fuel shut-off valve 22 includes a stationary valve housing 70 fixedly attached to the shell 10, a valve disc 72 mounted on the shaft 36, and a gasket 74 interposed between the housing 70 and the disc 72. Two longitudinal portions of the fuel supply conduit 20 have respective orifices in the flat wall of the housing 70 opposite the disc 72. The face of the latter opposite the housing 70 has a groove 76 which has the shape of an open ring of circular curvature about the axis of the shaft 36. The gasket 74 is perforated to permit the orifices of the conduit 20 in the housing 70 to be connected or separated by turning the disc 72 by means of the knob 54 and the shaft 36.

The axial end of the shaft 36 remote from the knob 54 carries the movable contact 78 of an ignition shorting switch 82 whose fixed contact 80 is mounted on the shell 10 and grounded to the shell. The movable contact 78 is electrically insulated from the shaft 36 and connected to the hot wire of the ignition system in a manner not shown in detail in the drawing, but known in itself.

The angular distribution of the several elements which transmit movement from the shaft 36 and the knob 54 to the operating elements described above will be evident from FIG. 6 which shows the outer casing 88 of the partly illustrated engine and carburetor. The main portion of the control knob 54 is located outside the casing 88, and only the narrow neck of the knob reaches through an opening in the casing for engagement by the prong 52. An arrow 84 molded into the knob cooperates with a scale 86 on the casing 88 to indicate the angular position of the knob 54 and of its shaft 36, and the resulting condition of the carburetor.

As seen in FIG. 6, the arrow 84 points at the index mark "start" of the scale 86 in which the choke 28 is in the position of FIG. 1. Prior to starting the engine, the knob is briefly turned counterclockwise into the position "tickle" to flood the chamber 14 with fuel if so desired. It is then returned to the "start" position, the non-illustrated ignition circuit is closed, and the engine is started

by means of a pull rope if so equipped. The closed choke 28 causes an enriched fuel mixture to be supplied to the engine.

When the latter has warmed up sufficiently, the knob 54 is turned to position "run," thereby removing the choke plate 34 from the air intake duct 12, and the engine runs thereafter at the speed set by its governor.

When the engine is to be shut down, the control knob 54 is turned further in a clockwise direction to "idle," thereby closing the throttle, as seen in FIG. 5, and slowing the engine. When the knob 54 is ultimately turned to position "stop," the ignition circuit is grounded by the switch 82, and the fuel supply conduit 20 is interrupted at the valve 22. The engine stops.

Prior to the next operating cycle, the knob is returned to the position "start," thereby opening the switch 82 and the valve 22. All functions of the carburetor which require intervention of the operator are thus set by the single knob 54 by an angular movement of the same in one direction for each operating cycle.

What is claimed is:

1. In a carburetor for an internal combustion engine having an air intake conduit (12), a float chamber (14), a float (16) in said chamber (14), a fuel supply conduit (20) communicating with said chamber (14), a fuel line (26) connecting said chamber (14) with a portion of said air intake conduit (12), a float valve (24) in said fuel supply conduit (20) adapted to be operated by said float (16), a choke (28) and a throttle (30) oppositely spaced in said air intake conduit (12) from said portion of the same, a grounding switch (82) for grounding the ignition circuit of said engine, a shut-off valve (22) in said fuel supply conduit (20), and operating means for operating said choke (28), said throttle (30), said switch (82), and said shut-off valve (22), the improvement in the operating means which comprises:

- (a) a support (10);
- (b) a single control member (54) mounted on said support (10) for movement relative to the same; and
- (c) motion transmitting means (52, 56) connecting said control member (54) with said choke (28), said throttle (30), said switch (82) and said shut-off valve (22) for sequentially operating the same in response to said movement of said control member (54).

2. In a carburetor as set forth in claim 1, said shut-off valve (22) being mounted on a shell (10) defining said air intake conduit (12) therein.

3. In a carburetor as set forth in claim 1, said control member (54) during said movement thereof sequentially passing through a plurality of positions when moving in one direction; said choke (28) being moved away from an operative position thereof in which the choke largely obstructs said air intake conduit (12) when said control member (54) moves through one of said positions thereof, said throttle (30) being moved into an operative position thereof in which the throttle largely obstructs said air intake conduit (12) when said control member (54) moves through another of said positions thereof, later than said one position during movement in said one direction; said switch (82) being closed and said shut-off valve (22) being closed when said control member (54) moves beyond said other position.

4. In a carburetor as set forth in claim 3, said support including a shell (1) defining said air intake conduit (12) therein, said motion transmitting means including a shaft (36) mounted on said shell (10) for angular displacement about the axis thereof, said control member (54) being mounted on said shaft (36) for angular displacement therewith, said displacement constituting said movement of said control member (54).

5. In a carburetor as set forth in claim 4, said choke (28) being mounted on said shaft (36).

6. In a carburetor as set forth in claim 5, said air intake conduit (12) having an axis parallel to the axis of said

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shaft (36), said choke including a plate member (34) moving into and out of said air intake conduit (12) during said angular displacement of said shaft (36).

7. In a carburetor as set forth in claim 4, tickler means (46) mounted on said shell (10) for moving said float (16) in a direction to open said float valve (24), said motion transmitting means including abutment means (56) mounted on said shaft (36) and engageable with said tickler means (46) for operating the same.

8. In a carburetor as set forth in claim 7, said abutment means (56) engaging said tickler means (46) during said movement of said control member (54) in said one direction prior to the control member (54) passing through said one position thereof.

9. In a carburetor as set forth in claim 8, said choke (28) being mounted on said shaft (36) and carrying said abutment means (56).

10. In a carburetor as set forth in claim 4, said motion transmitting means including cooperating abutments (58, 60) respectively mounted on said shaft (36) and operatively connected to said throttle (30).

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11. In a carburetor as set forth in claim 10, one of said abutments (60) being yieldably resilient.

12. In a carburetor as set forth in claim 4, said shut-off valve (22) including a valve chamber (70) and a valve member (72) mounted on said shaft (36) and rotatable relative to said valve chamber (70) between a valve-opening and a valve-closing position.

References Cited

UNITED STATES PATENTS

1,770,264	7/1930	Eslinger	-----	123—146.5
3,338,565	8/1967	Heid	-----	261—70
3,373,725	3/1968	Arpaia	-----	123—179 XR

FOREIGN PATENTS

956,890	4/1964	Great Britain.
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U.S. Cl. X.R.

123—119, 146.5, 152; 261—34, 70