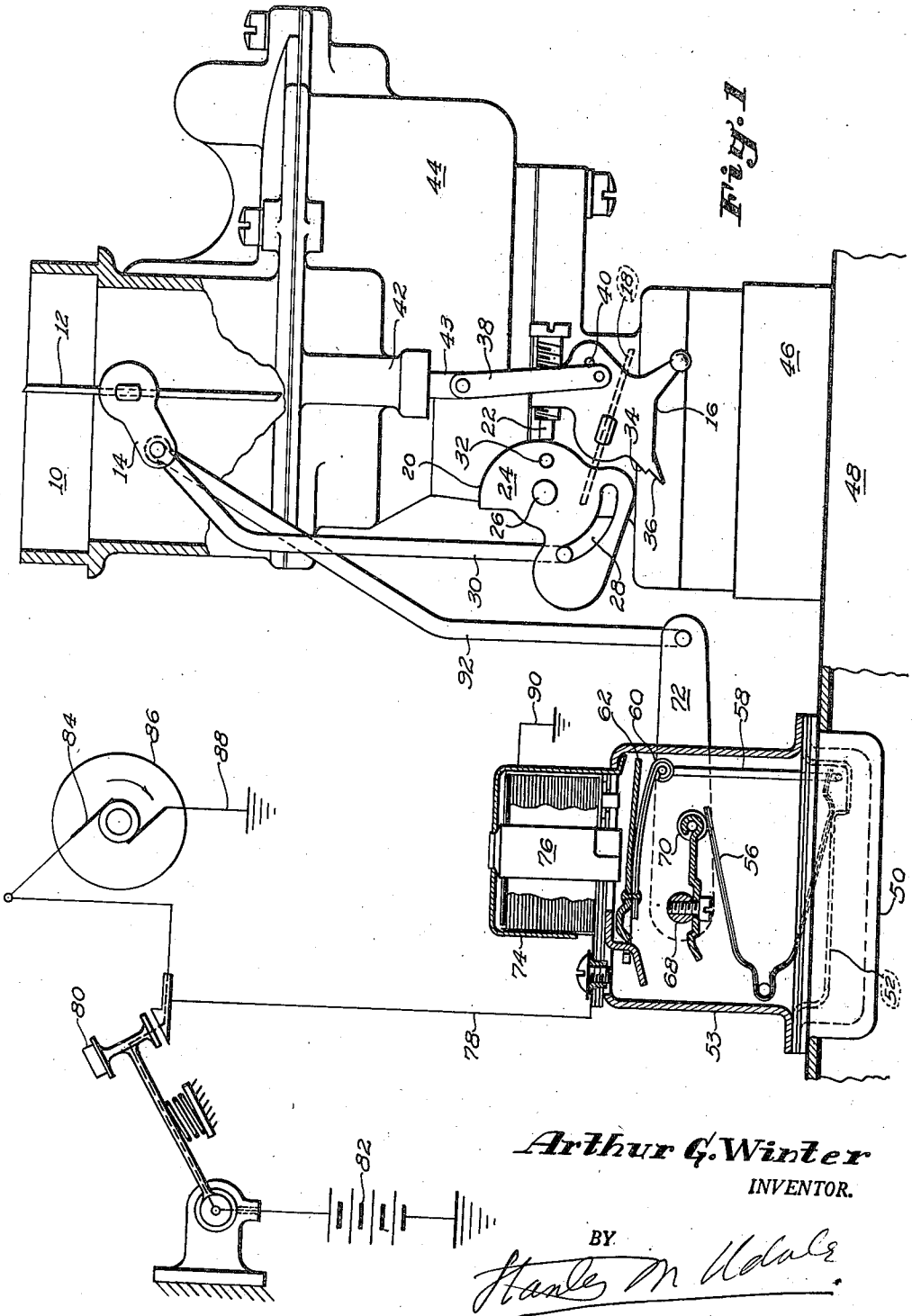
Aug. 3, 1948. A. G. WINTER 2,446,352

AUTOMATIC CHOKE

Filed June 8, 1946

2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

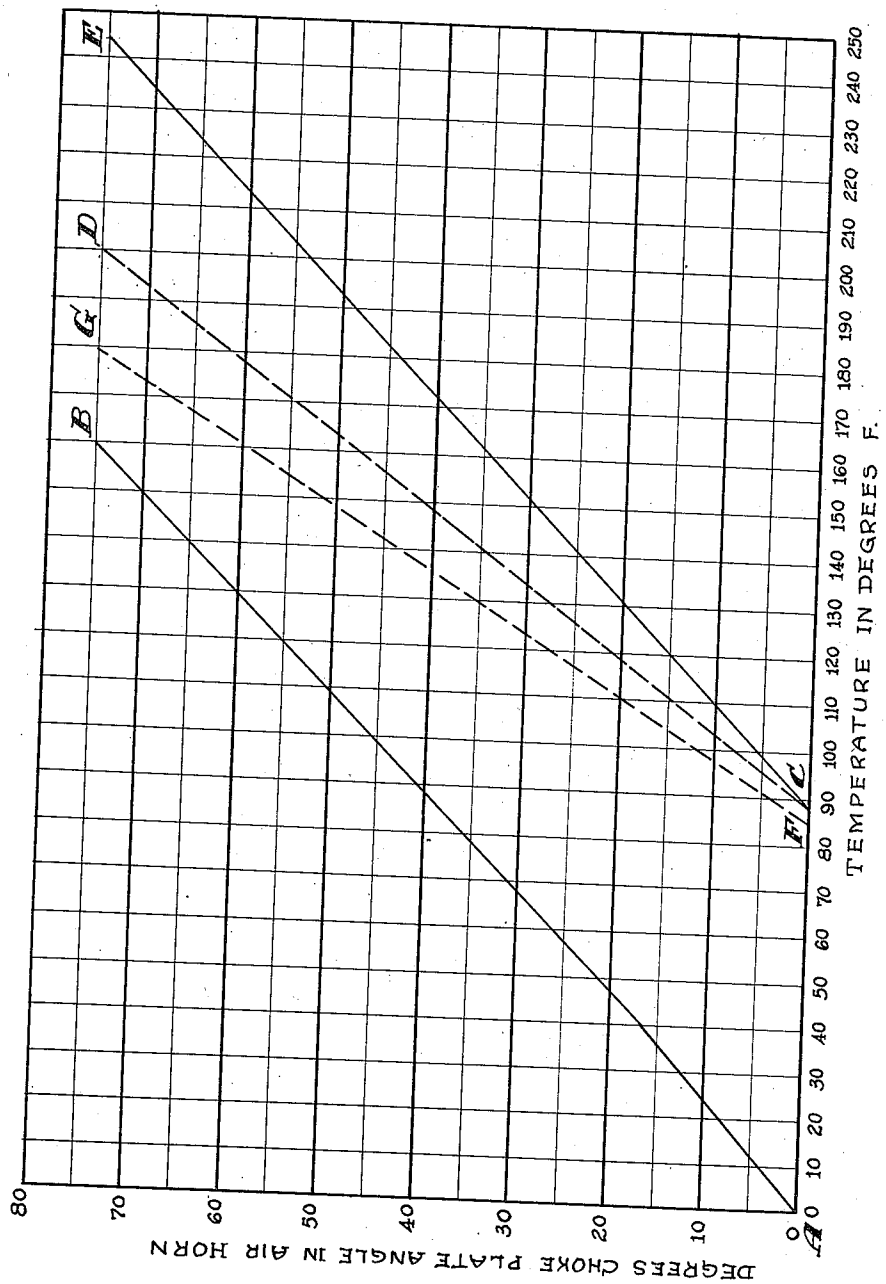


Fig. 2

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AUTOMATIC CHOKE

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Application June 8, 1946, Serial No. 675,509

4 Claims. (Cl. 123—179)

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The object of this invention is to improve the action of an ordinary thermostatically controlled choke modified by an electro-magnet now in general use.

These chokes respond to the flow of the electric current through a starting motor to energize an electro-magnet. This energized electro-magnet then closes the choke so that the moment the current ceases to flow the thermostat acts alone and imposes only a weak force tending to close the choke and a much stronger force tending to close the choke when the electro-magnet is energized.

When adjusted for low temperatures the action of these devices at the higher temperatures tends to overchoke. To overcome this defect is the object of this invention.

Fig. 1 is a cross-sectional elevation of the preferred form of my invention.

Fig. 2 shows the effect of the addition of an ancillary thermostat to the main thermostat of the prior art.

In Fig. 1, 10 is the air entrance, 12 is the choke valve therein, 14 is the choke valve lever. Two independent links 30 and 92 are pivotally connected to the lever 14. The lower end of the link 30 engages with a curved slot 26 in an element 24 which slot is approximately concentric with the pin 26 upon which the element 24 rotates. A pin 32 projects from the surface of the element 24. This pin 32 engages with a stop 34 mounted on the throttle lever 16, which throttle lever 16 is mounted on the end of the throttle shaft of the throttle 18. The throttle lever 16 carries an adjustable idling stop 22 which engages with a cam shaped surface 20.

The line 38 is connected to the throttle lever 16 and an alternative opening 40 is provided so that the motion of the link 38 can be increased. A guide 42 is provided so that a rod 43 is reciprocated downwardly whenever the throttle 18 is open. The rod 43 is connected to an accelerating fuel pump not shown. Float chamber 44 is provided but again the details of this are not shown as they are no part of this invention. The carburetor is connected to an exhaust jacket fuel entrance 46 which is mounted on an exhaust manifold 48, a cup shaped device 50 is located in the exhaust passage. Another cup shaped device 52 is provided so that between the cup 50 and the inner cup 52 there is a dead air space which may be partially filled with metal particles. By this means there is a definite time lag and the temperature rises in the exhaust manifold 48 before it rises in the cup 52. An inverted

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cup-shaped chamber 53 is provided so as to enclose the space in the cup 52 and provide a substantial air chamber which again is heated more slowly than the exhaust 48. The thermostatic element 56 (shaped like a hairpin) is connected at its lower end to a one way link 58 with another thermostatic element 60. The upper end of the hairpin 56 engages with a roller 70 which is mounted on a lever pivoted in the pin 68. The pin 68 is connected to the lever 72. The lever 72 is connected to the bottom end of the link 92.

An iron armature 62 is provided which is attracted by the electromagnet 74, 76 whenever the current flows through the electro-magnet. The current flows through the electro-magnet 74, 76 whenever the starting motor 86 operates. A foot operated switch 80 allows current to flow in the storage battery 82 through the electric conductor 78 through the electro-magnet 74, 76 to the ground 90. The major portion of the current meanwhile flows through the brush 84 through the starting motor 86 to the ground 88.

In Fig. 2 the ordinate is the degrees of opening of the choke. The choke is fully open at 75°. The horizontal line of Fig. 2 is the temperature of the operative thermostat 56 and the range is from 0° F. to 245° F.

AB shows the effect of thermostat 56 acting alone without thermostat 60 and without the solenoid 74 so that at 0° F. the choke valve is fully closed and at point B, which is approximately 160° F., the thermostat 56 is out of operation and the choke valve is held open by gravity. That is, it is held open by the weight of element 24, arm 72, links 32 and 92 and also by suction due to the offset of the choke valve 12.

When the solenoid 74—76 comes into effect we have the curve CE. The point C is at approximately 88° F. and the choke is still fully closed at this temperature when the solenoid and the starting motor 86 are operative. The choke valve will not be wide open under these conditions until point E which is approximately 245° F. This is the prior art.

The result of the addition of the ancillary thermostat 60 is to change the characteristic of the curve CE to FG or to CD. The difference between CD and FG is determined by the characteristic of the thermostat 60. When the solenoid is operative and both thermostats 56 and 60 are operating then the choke valve will be fully closed at a temperature of approximately 85° to 88° F. which are points F and C, as the case may be, and they will be fully open at approximately 180° F. (point G) or at 200° F. (point D).

This result is obtained because at the temperature 80–88° F. the ancillary thermostat **60** first comes to life: below 80–88° F., thermostat **60** is inactive.

The link **58** when the thermostat **60** gets very hot can disengage from thermostat **56** and descend into the depression found in the cup **52**.

Operation

In the ordinary operation of the carburetor in starting a cold engine the switch **80** is closed and immediately the electric motor **86** starts to crank the engine. At the same time the armature **62** is attracted upwardly by the electro-magnet **74—76**. This means that the lever **72** is also raised which closes the choke **12**. The moment the engine fires the switch **80** is allowed to open. The electro-magnetic solenoid **74—76** ceases to act. The armature **62** is released and the link **58** descends. The thermostat **60** permits the link **58** to descend so that the hairpin thermostat **56** assumes the position shown permitting the choke valve **12** to open wide. In cold weather the hairpin thermostat **56** expands and the lever **72** is rotated anti-clockwise and the choke valve **12** is partially closed. At the same time the hairpin thermostat **56**, under the influence of heat, closes and this tends to open the choke valve **12**, so that both the thermostat **60** and the hairpin thermostat **56**, when cold, are deflected so that whenever the engine is started by depressing the foot operated switch **80** the solenoid **74—76** is energized and the starting of the engine is facilitated by holding the choke valve **12** in a partially closed position. The degree of closure of the choke being increased by the upward deflection of the thermostat **60** when cold. The thermostat **60**, however, is so arranged that it acts only in conjunction with the solenoid **74—76**. The length of the link **58** is adjusted to give the desired result. The link **58** makes a one way connection with the hairpin thermostat **56**.

What I claim is:

1. A mixture enrichening device for starting an internal combustion engine having an electric starting switch in said circuit, a source of electricity connected to said circuit, a second circuit also connected to said source and also controlled by said starting switch, an electromagnet in said second circuit, an armature adapted to be attracted by said electromagnet whenever the starting switch is closed, a first thermostat connected to said armature, a second thermostat, said thermostat having a U-shape and being pivotedly mounted on the engine having one free end, the other end of the U resting on the engine, a link connecting this other end of the second thermostat with the free end of the first thermostat so that the free end of the U-shape of the second thermostat receives additional motion from the motion of the said armature and the extent of said motion is reduced as the temperature of the first thermostat is increased, a carburetor, an air entrance therein, a choke valve therein, a choke valve lever therefor, linkage connecting this choke valve lever to the free end of the U-shaped second thermostat.

2. A mixture enrichening device for starting an internal combustion engine having an electric starting motor, an electric circuit therefor, a starting switch in said circuit, a source of electricity connected to said circuit, a second circuit also connected to said source and also controlled by said starting switch, an electromagnet in said second circuit, an armature for said electromagnet, a thermostat, said thermostat being U-shaped and pivotedly mounted on the engine, having one free end, the other end of the U resting on said engine, a carburetor, an air entrance thereto, a choke valve therein, a choke valve lever, linkage connecting this choke valve lever with the free end of the U of said thermostat, a second thermostat connected to said armature, a link connecting the end of said first thermostat which rests against the engine with the free end of said second thermostat so that the free end of the U of the first thermostat receives additional motion from the motion of said armature and the extent of said motion is reduced as the temperature of the said second thermostat is increased.

3. A device as set forth in claim 1 in which there are heating means responsive to the heat of the engine adapted to apply engine heat to the second mentioned thermostat immediately the engine begins to fire, indirect heating means also responsive to the heat of the engine and adapted to apply engine heat to the first mentioned thermostat after the second mentioned thermostat has been heated.

4. A device as set forth in claim 2 in which there are heating means responsive to the heat of the engine adapted to apply engine heat to the first mentioned thermostat immediately the engine begins to fire, indirect heating means also responsive to the heat of the engine adapted to apply engine heat to the second mentioned thermostat after the first mentioned thermostat has become heated.

ARTHUR G. WINTER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,377,248	Langhaar	May 29, 1945