United States Patent

[11] **3,618,906**

[72] Inventor **William W. Charron**
Livonia, Mich.

[21] Appl. No. **661,570**
[22] Filed **Aug. 18, 1967**
[45] Patented **Nov. 9, 1971**
[73] Assignee **Ford Motor Company**
Dearborn, Mich.

---

[54] **DEVICE AND PROCESS FOR LIMITING IDLING FUEL IN CARBURETORS**
3 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **261/41,** 261/71, 251/92, 137/382.5, 137/385
[51] **Int. Cl.** **F02m 3/08,** F02m 19/04, F02m 7/18
[50] **Field of Search** ..... 261/23.1, 41.4, 66, 41, 71, DIG. 38; 29/447; 264/342; 137/385, 382, 382.5; 251/89, 92, 93, 112, 274, DIG. 4, 115, 214, 20, 266, 291, 289; 239/366

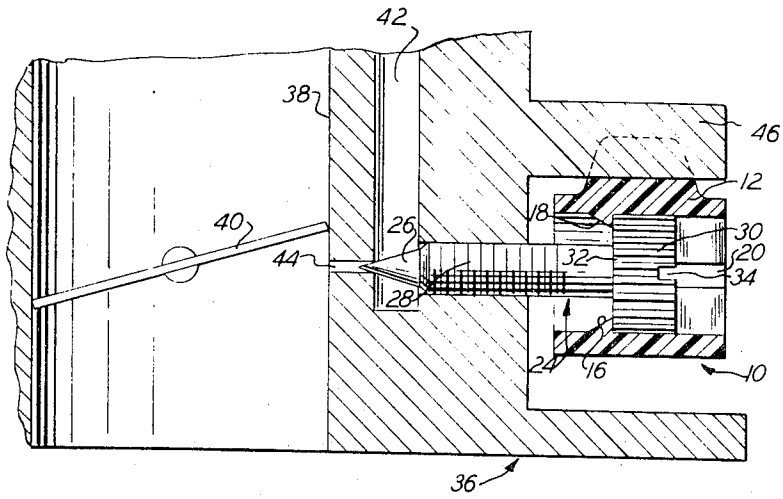
[56] **References Cited**

UNITED STATES PATENTS

1,801,396	4/1931	Thatchen	29/447 UX
1,872,786	8/1932	Mock et al.	261/41 (.4)
2,618,473	11/1952	Whitford	261/41 (.4)
2,858,570	11/1958	Richards	264/342 X
3,132,412	5/1964	Kneissig	264/342 X
3,166,292	1/1965	Forman	261/66 X
3,285,312	11/1966	Dison et al.	137/385 X
3,321,195	5/1967	Korte	261/41 (.4)
1,272,036	7/1908	Greuter	261/71
3,414,244	12/1968	Patterson, Jr.	261/41
2,551,117	5/1951	Gortner	287/53 H
2,544,111	3/1951	Schneebeli	261/71 X
2,590,217	3/1952	Snyder et al.	261/71 X
2,816,573	12/1957	Kaddis et al.	261/41 X
3,188,062	6/1965	Reid et al.	261/41
3,455,513	7/1969	Wyse	239/366

Primary Examiner—Ronald R. Weaver
Attorneys—John R. Faulkner and Glenn S. Arendsen

ABSTRACT: A polyamide cap fits tightly over the head of the idling needle and a vane on the cap abuts a boss on the carburetor body to prevent needle rotation in one direction. Internal teeth of the cap fit over the idling needle head to prevent separating the cap from the needle, while lands on the interior of the cap permit easy installation. The cap is installed during carburetor flow testing with the idling needle in the position producing the maximum allowable amount of fuel flow through the idling passages and with the vane contacting a boss on the side preventing further increases in the amount of idling fuel. A decrease in idling fuel can be effected by rotating the cap and needle in the direction moving the vane away from the boss for almost one full turn.



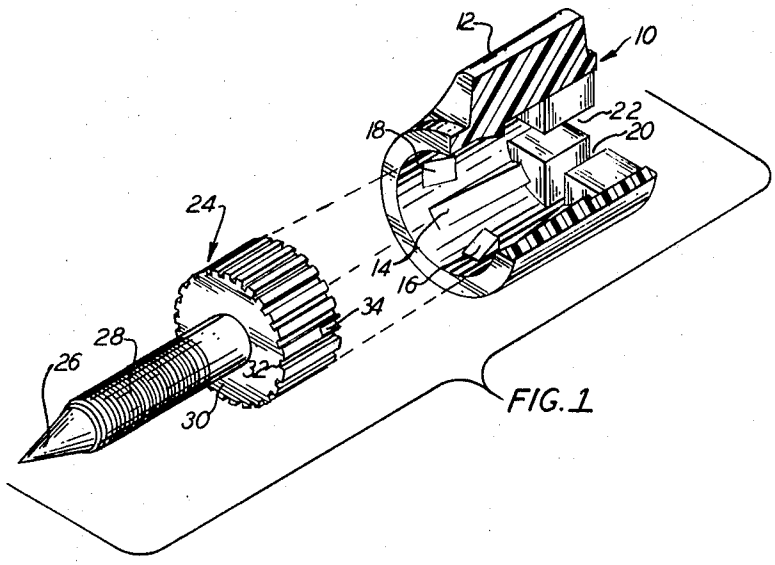


FIG. 1

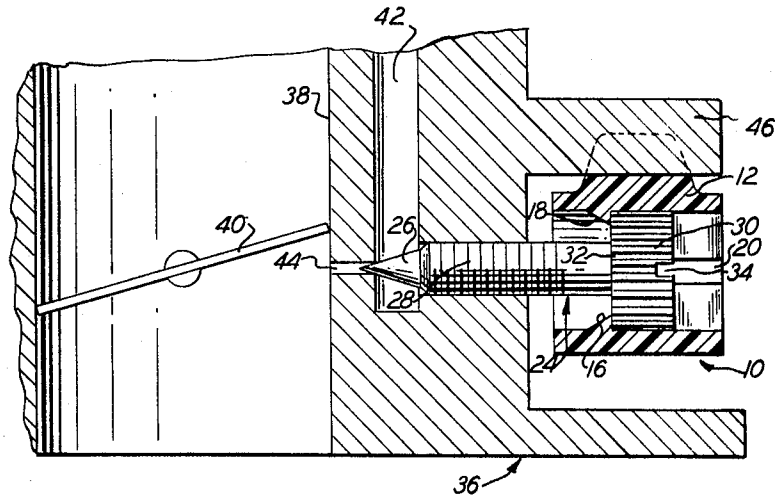


FIG. 2

WILLIAM W. CHARRON
INVENTOR
BY John R. Faulkner
Glenn S. Arendsen
ATTORNEYS

DEVICE AND PROCESS FOR LIMITING IDLING FUEL IN CARBURETORS

SUMMARY OF THE INVENTION

Recently adopted exhaust emission standards specify the maximum proportions of unburned hydrocarbons and certain other compounds in the exhaust gases of internal combustion engines. The amount of fuel supplied to an engine through the idling passages affects directly the amount of undesirable exhaust emissions during engine idling. With proper calibration of the idling system during carburetor assembly, most emission standards can be met; however, an increase in the amount of idling fuel during subsequent engine or vehicle assembly operations or by field service personnel could increase the undesirable emission beyond the standards.

In the past, setscrews have been used to lock the idling control needle in a certain position Of course, the setscrews can be loosened to permit a change and then retightened with the change being impossible to detect without another calibration or an exhaust gas sampling. Furthermore, the setscrews must be loosened and retightened whenever the amount of idling fuel is adjusted for changes in engine requirements necessitated by varying climate, weather, ground elevation, or engine conditions.

The idling fuel limiting device provided by this invention does not interfere with minor adjustments to the idling fuel system while providing positive evidence of unauthorized tampering with the idling needle to increase the amount of idling fuel beyond the calibrated amount. In a device for metering fuel to an internal combustion engine that has a rotatable member for increasing and decreasing the amount of idling fuel, the limiter comprises a cap made of a hard but deformable material fitting on the head of the rotatable member so the cap is nonrotatable relative thereto. A projecting vane is formed on the exterior of the cap where it contacts a rigid portion of the body when rotation of the member in the direction increasing the amount of idling fuel is attempted.

Preferably the cap contains internal teeth fitting over the head of the threaded member, the idling needle in most conventional carburetors, with a force sufficient to prevent integral removal of the cap. Lands are formed on the interior of the cap to guide the cap on the head during installation.

The cap is installed after carburetor assembly while the carburetor is being flow tested. Just prior to cap installation, the idling needle is backed out to the position where the amount of idling fuel is predetermined maximum providing engine compliance with the emission legislation. The cap then is pressed on the head of the idling needle with the vane on the cap abutting projection from the carburetor body on the side preventing further increases in the amount of idling fuel.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of a cap and needle with a portion of the cap sectioned to show the internal teeth and lands. FIG. 2 is a sectioned elevation of a portion of a carburetor showing the cap installed on an idling needle with the needle installed in the carburetor body.

DETAILED DESCRIPTION

Referring to FIG. 1, the cap represented by the numeral **10** has a vane **12** formed on the exterior surface. Cap **10** preferably is made of polymeric material capable of surviving in the underhood compartment of a vehicle. Polyamides are desirable cap materials because soaking the polyamide cap in water softens it to ease assembly. After assembly, the polyamide cap dries to become sufficiently tough to inhibit removal and sufficiently brittle to spit instead of yielding to a determined removal procedure. The interior of the cap contains four tapered lands, one of which is represented by numeral **14**, evenly spaced and alternating with four inwardly projecting teeth, two of which are represented by numerals **16** and **18**. The inner surfaces of the teeth define a substantially radial plane while the outer surfaces taper to the interior wall of the cap. Cross slots **20** and **22** for receiving a screwdriver blade are molded in the closed end of cap **10**.

Numeral **24** designates the carburetor idling needle. Needle **24** has a tapered point **26**, a threaded body **28**, and an enlarged head **30**. A plurality of closely spaced axial slots **32** are cut into the cylindrical surface of head **30**. The surface of head **30** facing body **28** is a substantially radial plane. A radial slot **34** for receiving a screwdriver blade is formed in the outer radial surface of head **30**.

Turning to FIG. **2**, a carburetor **36** contains an induction passage **38** with a throttle blade **40** mounted therein. An idling fuel passage **42** is connected to a fuel source (not shown) and communicates through a port **44** with the induction passage **38** posterior to throttle blade **40**. Idling needle **24** is threaded into a hole through the carburetor body coaxial with port **44**. Cap **10** is pressed onto head **30** so teeth **16**, **18**, etc. pass over the cylindrical surface thereof and snap into contact with the radial surface between the head and the body. Vane **12** abuts a projection **46** extending outward from the carburetor body.

During carburetor manufacturing, the carburetor is assembled completely except for installation of the cap on the idling needle. The carburetor is placed on a flow test stand and the idle needle is adjusted to provide the maximum amount of flow through the idling passage at which the engine ultimately using the carburetor will comply with exhaust emission standards. Then a polyamide cap, which has been soaked in water to soften it slightly, is pressed on the head of the idling needle with the vane abutting the boss on the side preventing further increases in the amount of fuel flow. For a needle having conventional right-hand threads, this abutment is on the right side of a boss located above the needle as shown in the drawing.

Lands **14** combine with the sloping outer surfaces of the teeth to guide the cap over the head of the idling screw until the teeth snap over the head into the position shown in FIG. **2**. Once this occurs, the lands coact with the axial slots in the cylindrical surface of the needle head to inhibit relative rotation between the cap and the needle.

Needle **24** now can be rotated inward to reduce the amount of idling fuel but cannot be rotated outward to increase the idling fuel flow beyond the predetermined maximum. Lands **14** grip the cylindrical surface of head **30** tightly so there is not need to line up the slots **20** or **22** with slot **34** since the cap-needle assembly can be rotated either by hand or by inserting a screwdriver in the slots in the cap. It is preferable for lands **14** to interfere with head **30** sufficiently to remove cap material during or produce plastic deformation after installation. Other useful polymeric cap materials include the phenolics, polyurethanes, polyacrylates, and the synthetic rubber materials.

During further carburetor processing the absorbed water in the polyamide cap material evaporates and the cap becomes relatively brittle. Any subsequent attempts to remove the cap generally result in splitting the cap along axial planes so the cap cannot be reinstalled. A visual inspection of the carburetor then readily reveals the tampering.

Thus, this invention provides an idle limiting device that is easily installed but cannot be removed without leaving clear evidence of tampering The device is useful carburetors of different types with the only requirement being an abutment for the vane. In many cases, an existing portion of the carburetor body can be used as the abutment; alternatively, a boss can be formed on the carburetor body specifically for this purpose as shown in the drawing. Installing the cap during flow testing insures adequate fuel flow despite tolerance variations in metering jets and other flow control components.

I claim:

1. In a device having a body for metering fuel to an internal combustion engine and having a rotatable member for increasing the amount of idling fuel, an idling fuel limiter comprising

a head formed on the rotatable member, said head being located just outside the body of said device, and

a cap made of a deformable material and movable onto said head, said cap fitting on the head so said cap is nonrotatable relative to the head, said cap containing internal teeth that deform to permit moving the cap over said head, said teeth fitting over said head to prevent integral removal of the cap from the head, said cap having an exterior projecting vane located to prevent rotation of the member in the direction increasing the amount of idling fuel but permitting rotation in the direction decreasing the amount of idling fuel.

2. The device of claim 1 comprising lands formed on the interior of the cap to guide the teeth over the head during installation of the cap on the head.

3. The device of claim 2 in which the cap is made of a polyamide.

* * * * *