Feb. 23, 1965 L. J. SVOREN ET AL 3,170,447

SPRING

Filed June 14, 1963

FIG. 1.

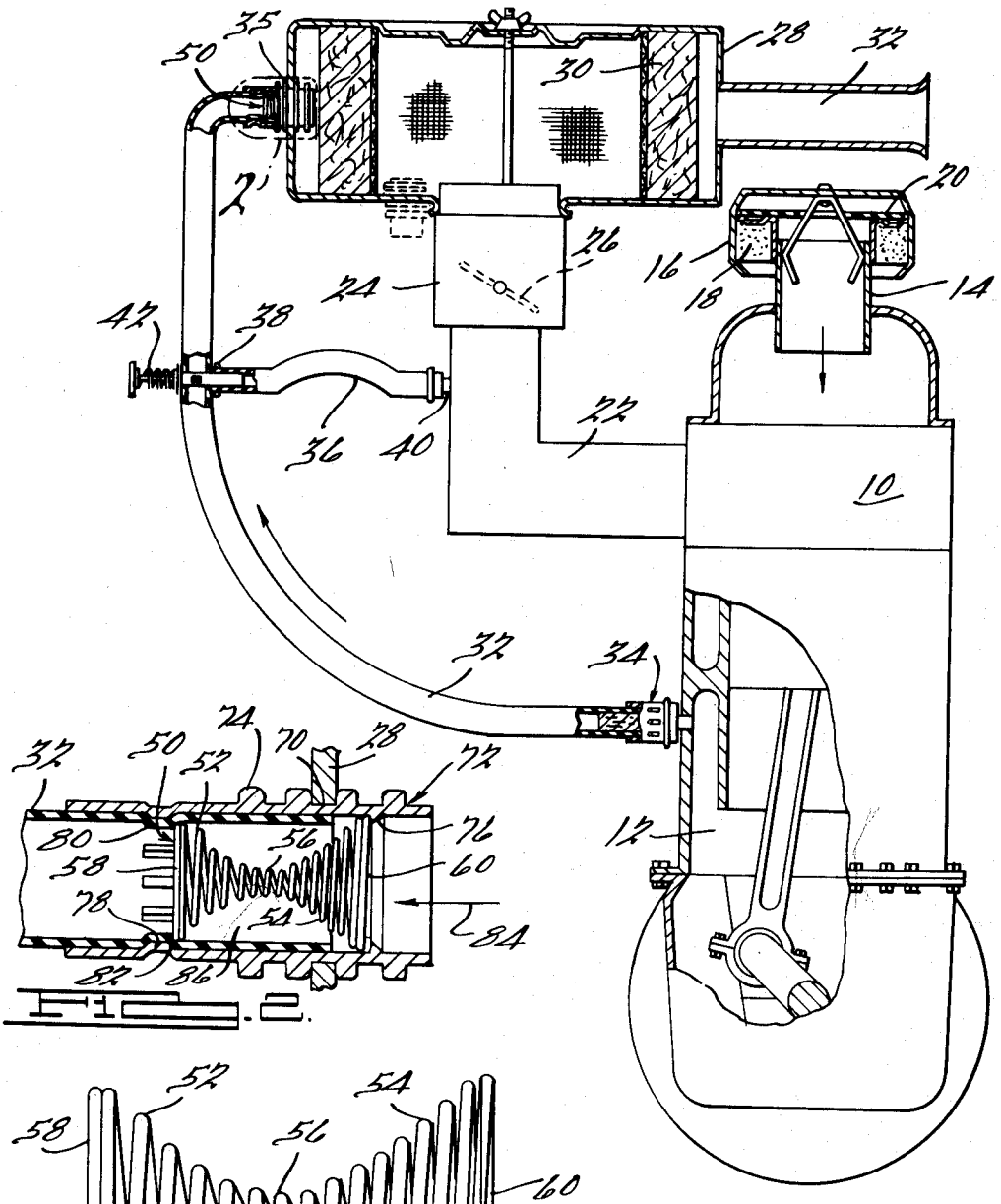


FIG. 2.

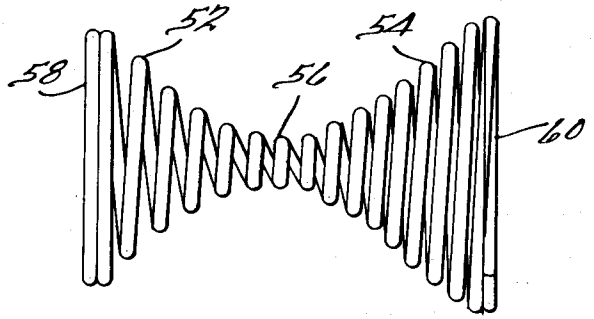


FIG. 3.

INVENTORS.
Louis J. Svoren
Eugene C. Van Eimeren, Jr.
BY
J. Carmen, Dickey & Pierce.
ATTORNEYS.

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SPRING

Louis J. Svoren and Eugene C. Van Eimeren, Jr., Racine, Wis., assignors to Walker Manufacturing Company, a corporation of Delaware

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This invention relates to crankcase ventilation systems and more particularly to a flame stop therefor.

In crankcase ventilating systems, it is customary to provide flame stop means in the blowby passage connecting the crankcase with the combustion air intake system. Some of the disadvantages of prior art flame stops have been high cost, difficulty of assembly within a blowby passage, inability to stop flame propagation through a blowby passage while at the same time permitting adequate flow of blowby from the crankcase to the air intake system, and clogging and deterioration in use.

Accordingly, an object of the present invention is to provide a low cost flame stop which is capable of dispersing a flame pattern and quenching the flame while at the same time allowing necessary blowby flow through the passage in which it is mounted.

Another object of the present invention is to provide a new and improved flame stop for a crankcase ventilating system which is far less susceptible to clogging and deterioration in use than previous flame stops.

Other objects and advantages of the present invention will be apparent to those skilled in the art to which this invention relates by reference to the following detailed description and the accompanying drawing wherein:

FIGURE 1 is a side elevational view partly in section of a crankcase ventilating system apparatus incorporating the inventive principles;

FIGURE 2 is an enlarged sectional view of the flame stop portion of the apparatus shown in FIGURE 1; and

FIGURE 3 is an enlarged side elevational view of the flame stop.

Referring now to FIG. 1, the crankcase ventilating system in which the present invention is illustratively incorporated includes an engine **10** having a crankcase **12**, an oil filler tube **14** and an oil filler tube cap **16**. A filter **18** and a valve **20** are provided in the filler tube cap to enable air to be drawn into the crankcase. The engine is further provided with an intake manifold **22**, a carburetion unit **24** having a throttle valve **26**, and an air cleaner unit **28** having a suitable filter element **30** and a combustion air intake **32**. A length of hose **32**, or the like, is connected at one end **34** to the crankcase **12** and at the other end **35** to the air cleaner **28** to establish a flow of blowby gases from the crankcase to the air cleaner. A branch hose **36** may be provided and is connected to the hose **32** at one end **38** and is connected to the intake passage **22** below the throttle valve **26** at the other end **40**. A combination control orifice and cleaner **42** is mounted at the juncture of the branch passage provided by hose **36** and the main passage provided by hose **32**. In order to stop flame travel through the passage **32**, a flame stop means **50** is, in the preferred embodiment, mounted in the upper end of the passage **32**.

Referring now to FIG. 2, the flame stop means **50** is shown to comprise a coiled wire spring element having two substantially conically shaped portions **52**, **54** which extend toward one another and terminate in a central portion **56** defining a small aperture therebetween. Opposite ends of the elements are substantially flat and provide enlarged base portions **58**, **60**. It may be noted that the flame stop has substantially an hour glass configuration. Each of the coils of the wire are preferably spaced from one another a distance approximately $\frac{1}{32}$ to $\frac{1}{16}$ of an inch.

The inside diameter of the aperture at the portion **56** should, preferably, not exceed .090 inch. A suitable embodiment of the flame stop may be made from .035 diameter wire having a total axial length of approximately $1\frac{1}{16}$ inches, and a maximum diameter of approximately .760 inch. Each section of conical coils may include eight full coils. Furthermore, the diameter of the base portion **58** may be made slightly smaller than the diameter of the base portion **60** with the difference in diameters in the preferred embodiment being approximately .100 inch. The wire itself may be characterized as hard drawn spring wire.

The hose **32** is connected to the combustion air intake system through a suitable aperture **70** provided in a side wall of the air cleaner casing **28** and is secured therein by a fitting **72** which comprises a sleeve having a plurality of radially outwardly extending ribs **74** formed about its outer periphery and adapted to seat the adjacent edge of the air cleaner casing, as indicated. A shoulder **76** is formed in the sleeve at one end and a radially inwardly extending annular rib **78** may be formed in the other end of the sleeve. The end of the hose **32** is secured in place within the sleeve by inward distortion of a portion **80** of the hose in alignment with the rib **78**. Other suitable clamping means may be utilized.

The flame stop is adapted to be mounted between the shoulder **76** and a shoulder **82** formed by the edge of the rib **78** and the deflected portion **80** of the hose end. As shown in FIG. 2, the spring is seated between the two shoulders in a slight state of compression with adjacent coils spaced from one another to permit flow of blowby while preventing propagation of a flame.

In operation, with a flame wave traveling in the direction of the arrow **84** toward the crankcase **12**, the first portion **54** of the flame stop tends to break up and disburse the flame pattern radially outwardly. The cavity **86** defined between the surrounding sleeve, the end of the hose **32**, and the outer peripheral surfaces of the flame stop serves to quench the flame as it passes through and among the coils of the spring. The second conical portion **58** completes the flame quenching process and prevents any flame from traveling through into the tube **32**. The diameter of the passage in the central portion **56** is sufficiently small to prevent passage of flame therethrough. It will be readily appreciated that a maximum amount of aeration is provided in the spring consistent with the requirements of flame stoppage. In other words, at all times blowby is able to travel relatively freely through the flame stop because of the central passage in the area **56** and because of the relatively wide spacing between adjacent coils of the flame stop. The relative wide spacing of the flame stop and the relatively large diameter of the central hole prevents clogging and greatly reduces the tendency for the flame stop to eventually close due to contamination by the blowby gases carried through the tube passage.

Since the inventive principles may be otherwise variously embodied in alternative ventilating systems by various modifications, it is intended that the scope of the appended claims be construed to include alternative embodiments which incorporate the inventive principles.

What is claimed is:

1. In a flame stop for a crankcase ventilating system having a blowby flow passage connected to the crankcase, the improvement comprising a flame stop formed from a continuous section of coiled wire having a plurality of spaced coils and being mounted within said passage, the coils of said wire having a spacing forming a restriction in said passage sufficient to prevent the propagation of flame through the passage to the crankcase while also

having a spacing permitting flow of blowby through the passage from the crankcase.

2. In a flame stop for a crankcase ventilating system, the improvement comprising a plurality of coils of wire, said coils having varying diameters and tapering from a maximum diameter approximately equal to the crankcase ventilating passage in which the flame stop is to be inserted to a minimum diameter approximately equal to the largest passage through which flame propagation will be prevented.

3. The invention as defined in claim 2 and wherein said coils of wire are spaced from one another a substantial distance to permit substantially unimpeded flow of blowby therethrough.

4. The invention as defined in claim 2 and wherein said central passage has a diameter of approximately .090 inch.

5. The invention as defined in claim 2 and wherein the spacing of said coils from one another is approximately .032 inch.

6. In a flame stop for a crankcase ventilating system, or the like, the improvement comprising a first portion of coiled wire, a second portion of coiled wire, said portions of coiled wire tapering toward one another and defining a flame quenching space therebetween.

7. In a crankcase ventilating system, a blowby passage extending from the engine crankcase to the air intake system, a pair of spaced shoulders formed in said passage, a flame stop in the form a continuous helical coil of wire extending axially in said passage between said shoulders, and inner and outer concentric passage means provided in said passage by said wire.

8. The invention as defined in claim 7 and wherein said continuous helical coil of wire comprises a plurality of coiled turns spaced from one another and having varying diameters.

9. The invention as defined in claim 7 and wherein said continuous helical coil of wire comprises a first portion of coiled turns, said first portion of coiled turns tapering progressively from a maximum diameter to a minimum diameter, and a second portion of coiled turns, said second portion of coiled turns tapering progressively from a maximum diameter to a minimum diameter, and said first portion and said second portion of coiled turns being connected centrally to one another to define an hour glass flame stop configuration.

10. In a flame stop for a crankcase ventilating system, the improvement comprising a wire formed into a plurality of coils, said coils being spaced from one another and progressively changing dimensions from opposite end portions of substantially equal diameter to a central portion therebetween of reduced diameter.

11. In a crankcase ventilating system for an engine having a blowby passage extending from the engine crankcase to the air intake system of the engine, the invention comprising; a flame stop mounted in said passage, said flame stop being elongated and extending a substantial axial length, said flame stop defining a plurality of co-axially extending fluid passageways within said passage, at least one of said co-axially extending fluid passageways being defined solely by contiguous portions of said flame stop, and at least one other of said co-axially extending fluid passageways being defined by the inner wall of said passage and the outer periphery of said contiguous portions of said flame stop.

12. In a crankcase ventilating system for an engine having a blowby passage extending from the engine crankcase to the air intake system of the engine, the invention comprising a flexible tube of resilient material defining a part of said passage, an elongated coil of wire mounted in said passage to form a flame stop, a central passage formed by said wire and defined by the inner peripheral surfaces thereof, and portions of said elongated coil of wire having an outer peripheral dimension larger than an inside dimension of said passage and being held within said passage in intimate surface to surface engagement therewith.

13. In a crankcase ventilating system for an engine having a passage extending between the engine crankcase and the engine air intake system, said passageway having axially spaced inlet and outlet openings, a portion of the passage being peripherally continuous along a substantial axial distance, the invention comprising a length of wire wound into axially extending helical coils to form a flame stop, said flame stop being mounted in said portion of the passage, an outer peripheral portion of the flame stop being in surface to surface engagement with an inner peripheral portion of the passage, another outer peripheral portion of said flame stop being located in radially inwardly spaced relationship to the inner peripheral portion of the passage and defining flow passage means of reduced size relative to said passage, and restricted flow passage means provided between adjacent coils of said flame stop sufficient to prevent the propagation of flame through said passage.

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RICHARD B. WILKINSON, *Primary Examiner.*

KARL J. ALBRECHT, *Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,170,447 February 23, 1965

Louis J. Svoren et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 46, for "954,944" read -- 958,944 --.

Signed and sealed this 17th day of August 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents

UNITED STATES PATENT OFFICE
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