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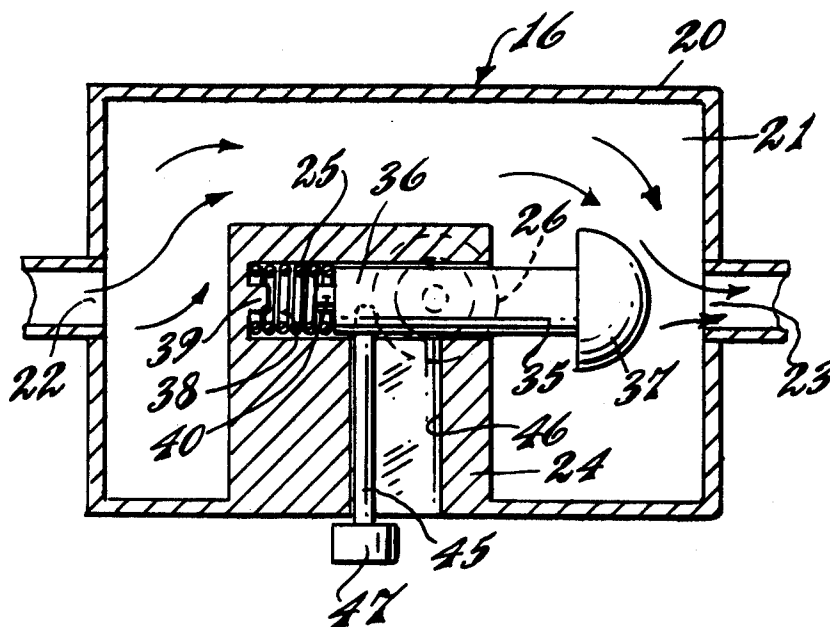
[54] SAFETY SHUTOFF FOR ENGINES 4 Claims, 4 Drawing Figs.

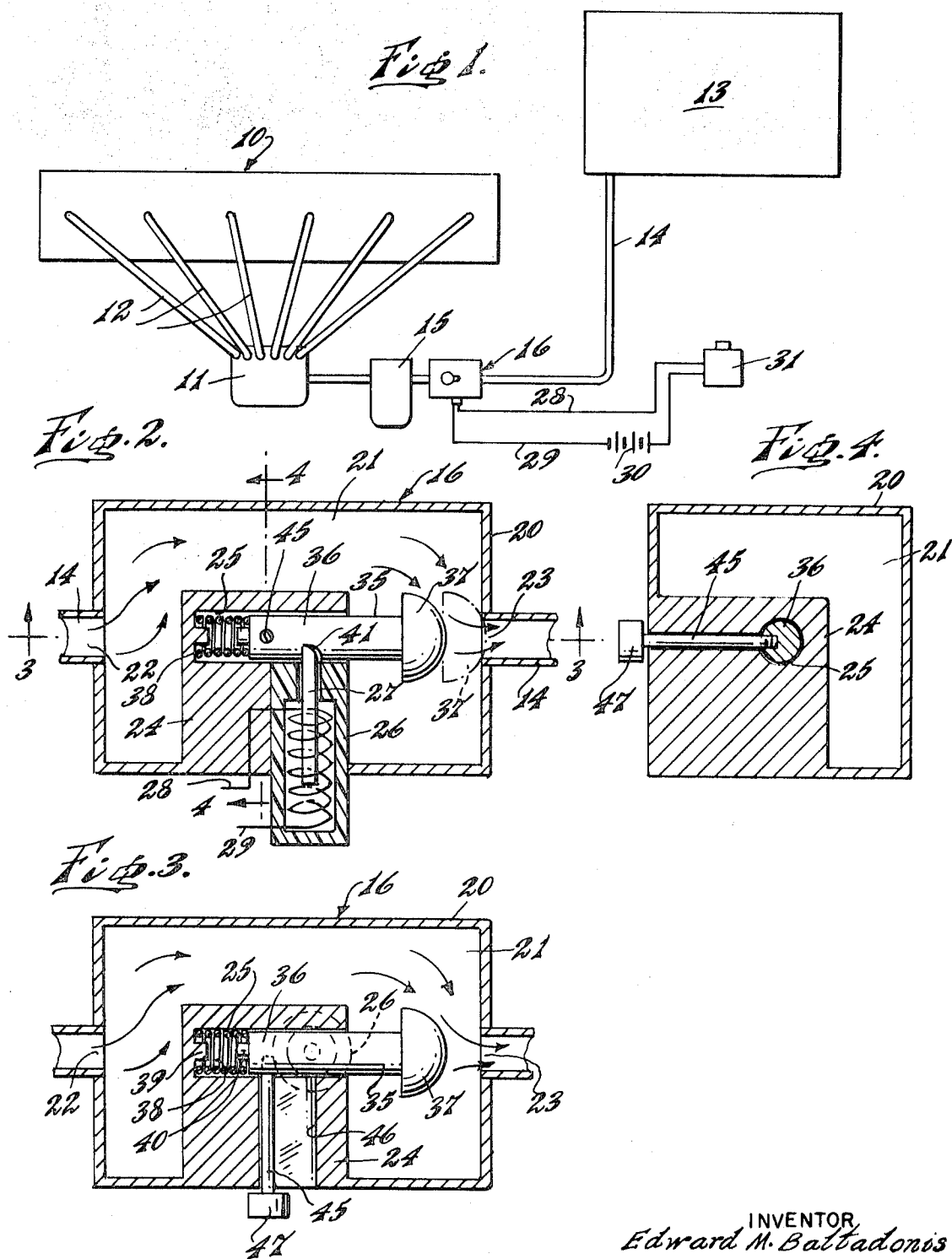
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ABSTRACT: An engine shutoff including a hollow chamber connected in the engine fuel line and quick-acting valve means in the chamber for effectively closing the fuel line at a location adjacent to the engine.





SAFETY SHUTOFF FOR ENGINES

BACKGROUND OF THE INVENTION

In the operation of internal combustion engines, and particularly in the operation of diesel engines controlled by governors, there has been found the problem of runaway engines, wherein their operation is incapable of being stopped by normal procedures. Of course, this presents serious safety hazards, as such engines are commonly employed in large trucks capable of doing much damage, as well as marine applications where accurate control is absolutely essential.

SUMMARY OF THE INVENTION

Accordingly, it is an important object of the present invention to provide a safety shutoff device for internal combustion engines, which is entirely reliable in operation, instantly responsive to actuation, and which can be quickly and easily incorporated into existing installations without modifications of the installation.

It is another object of the present invention to provide a safety shutoff for internal combustion engines having the advantageous characteristics mentioned in the preceding paragraph, which is extremely simple in construction, having a minimum of parts, so as to be durable throughout a long useful life, and capable of manufacture and incorporation in new and existing engine installations at a reasonable cost.

Other objects of the present invention will become more apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, which will be exemplified in the construction hereinafter described, and of which the scope will be indicated by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing an engine installation having incorporated therein a safety shutoff device of the present invention.

FIG. 2 is a generally horizontal, longitudinal sectional view taken through the shutoff device of the instant invention, enlarged for clarity of understanding, and illustrating an alternative position of the instant device in dot-and-dash outline.

FIG. 3 is a longitudinal sectional elevational view taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a transverse cross section taken generally along the line 4—4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, and specifically to FIG. 1 thereof, an internal combustion engine is diagrammatically represented at 10, and may include a fuel distributor or pump 11 having a plurality of cylinder fuel lines 12 extending from the pump to respective cylinders, or the cylinder fuel injectors, say of a diesel engine. A fuel tank is designated 13, and a fuel conduit or line 14 extends from the fuel tank to the pump 11. Interposed in series connection in the fuel conduit or line 14 may be a fuel filter 15. Also interposed in series fluid connection in the fuel line 14 is a safety shutoff device of the present invention, generally designated 16. The fuel shutoff device 16 is advantageously located proximate to the engine 10, say upstream or downstream of the fuel pump 15.

The fuel cutoff device is best seen in FIGS. 2-4, there illustrated as including a chamber or housing 20 having an interior hollow 21 and provided at its opposite ends with inlet and outlet openings 22 and 23, respectively. It is appreciated the chamber 20 may be of different sizes and shapes, as desired and in accordance with engine requirements. The inlet and outlet openings 22 and 23 may be in alignment with each other for convenient mounting of the shutoff device 16 in the fuel line 14.

Projecting from a sidewall of the chamber 20 interiorly of the chamber is a mounting body 24. The mounting body 24 may project in the chamber hollow 21 to a position in spaced relation between the fuel inlet and outlet openings 22 and 23.

That is, the mounting body is in spaced facing relation with respect to the chamber openings. Facing toward the outlet opening 23, the mounting body 24 may be formed with a blind bore or hole 25. The bore or hole 25 may be generally cylindrical, and in substantial alignment with the outlet opening 23. A solenoid is generally designated 26, and is mounted in the mounting body 24 with its axis transverse of the axis of bore 25. The solenoid 26 includes a plunger or pin 27 longitudinally shiftable between a retracted position entirely within the solenoid and an extended position projecting transversely into the bore 25, the extended position being shown in FIG. 2. The solenoid 26 may include conductors 28 and 29 extending exteriorly of the chamber 20 for connection to a suitable electric power source, as at 30, and to an actuating switch 31.

Slidably disposed longitudinally of and at least partially within the bore 25 is a valve 35 including an elongate shank or stem 36 slidably in the bore and having one end projecting from the bore in aligned relation with respect to the outlet opening 23. On the projecting end may be provided an enlargement or valve element 37 movable into and out of a closed position seated in closing relation with respect to the fuel outlet opening 23, as shown in dot-and-dash outline.

Suitable drive means is provided for displacing the valve means 35 towards its closed position, such as resilient compression means say a coil spring 38. As best seen in FIGS. 2 and 3, the coil spring drive means 38 may be located in the bore 25, interposed between and having its opposite ends engaging the bottom wall of the bore 25 and inner end of the stem, as at 39 and 40, respectively. Thus, the drive means or spring 38 serves to resiliently, yieldably bias or urge the valve 39 toward its outlet closing position.

The stem 36 of valve 35 is provided on one side with a receiving formation or notch 41 located with the valve stem into adjacent relation with the solenoid 26. More specifically, the stem formation 41 is movable with the stem upon retraction thereof to its open position so as to receive the pin 27, the condition is shown in FIG. 2. In this condition, the pin 37 defines a retainer and serves to retain the valve 35 in its open, withdrawn condition. It is, of course, understood that operation of the solenoid 26, as by actuation of the switch 31 effects withdrawal of the retainer pin 27 transversely with respect to the valve stem 36 out of the notch 41 to release the valve for driven movement to its outlet closing position. Thus, the solenoid 26, including its retainer pin 27 and circuitry 28-31, may be considered as actuating means in operative association with the valve means 35 and valve drive means 38 to effect operation of the latter.

It will now be understood, in normal operating conditions the safety shutoff device 16 assumes its solid line position of FIGS. 2-4, permitting full fuel flow to the engine for proper operation thereof. However, under emergency conditions the engine is quickly and easily stopped by mere operation of the switch 31. This operates the solenoid 26 to withdraw retainer pin 27 and thereby release valve means 35 for movement under the force of spring drive 38 to close fuel outlet opening 23. The engine then stops almost immediately, as fuel to the engine is nonexistent, except for the fuel remaining downstream of the shutoff device 16. Of course, the shutoff device 16 may be located at an optimum position in the fuel line 14 to leave a minimum of fuel downstream thereof.

When it is desired to restart the engine 10, say after investigation and/or repair, it is only necessary to retract the valve means 35 to its open position of FIG. 2, whereupon retainer pin 27 reengages in valve formation 41 to retain the latter open. Suitable means for retracting the valve 35 to its open position may be provided. One such means may comprise an arm 45 having one end fixed to the valve stem 36 and projecting radially therefrom through the mounting body 24 exteriorly of the chamber 20. That is, the mounting body 24 is provided with an open-ended passageway or slot 46 having its

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inner end opening into the bore 25 and its outer end opening exteriorly of the chamber for receiving the arm 45. A manually actuatable element or knob 47 may be provided on the outer end of the arm 45; and, by means of the knob 47 the arm may be shifted in the slot or passageway 46 to return the valve 35 to its open position. The safety shutoff device is then reset for engine operation, and may be actuated instantaneously should the need arise.

From the foregoing, it is seen that the present invention provides a safety shutoff for an internal combustion engine which fully accomplishes its intended objects and is well adapted to meet practical conditions of manufacture, installation and use.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention, for example the valve drive means may be of other than coil spring construction, while the actuating means may be other than a solenoid, and the valve retraction means may differ from the arm construction.

I claim:

1. The combination with an internal combustion engine having a fuel line, of a hollow chamber having generally aligned inlet and outlet openings at opposite ends and connected in series fluid communication in the fuel line adjacent to the engine, a mounting body extending into the hollow of

said chamber in spaced confronting relation with said outlet opening, a valve stem slidably mounted in said body for longitudinal reciprocatory movement in substantial alignment with said outlet opening, a valve element on one end of said valve stem and movable therewith into and out of closing relation with said outlet opening, resilient drive means connected to said valve element for moving the latter into said closing relation, a retainer pin mounted in said mounting body for longitudinal sliding movement transversely of said stem for releasable retaining engagement therewith to effect closure of said valve element, and return means connected to said valve element for returning the latter to its open relation.

2. The combination according to claim 1, said drive means comprising resilient compression means engageable with said valve means to urge the latter toward said closing relation.

3. The combination according to claim 1, in combination with a solenoid operatively associated with said retainer pin for effecting movement thereof from a remote location.

4. The combination according to claim 1, said return means comprising an arm extending generally rigidly with and transversely from said valve stem terminating externally of said chamber for manual access, said mounting body being formed with a slot receiving said arm and permitting movement thereof with said stem.

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