

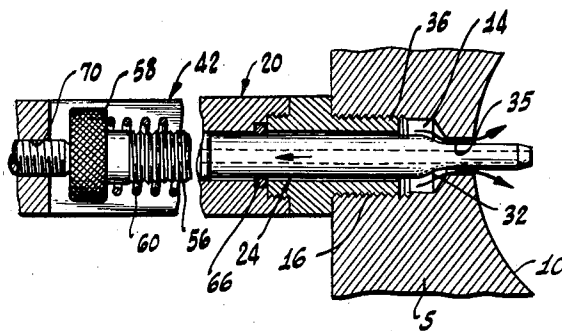
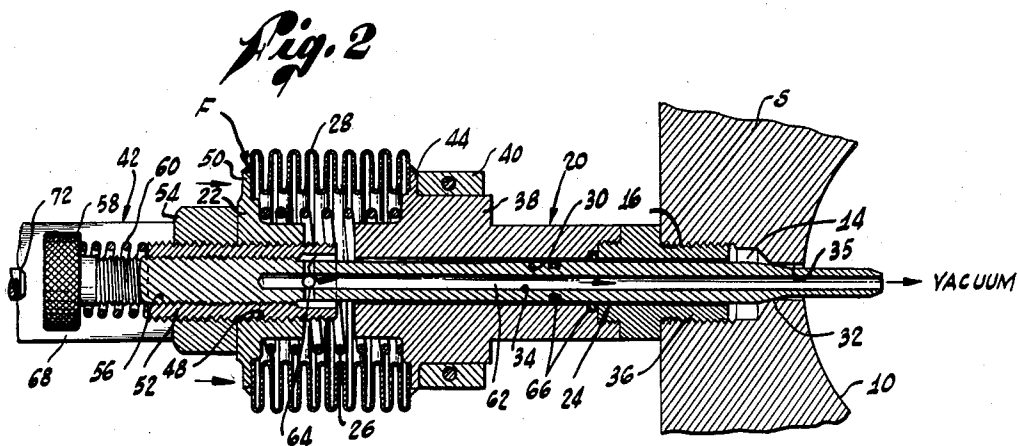
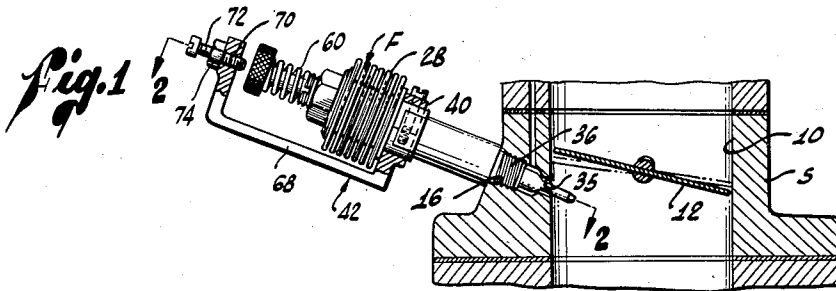
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SELF-CONTAINED FUEL SHUT-OFF DEVICE

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SELF-CONTAINED FUEL SHUT-OFF DEVICE

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The present invention relates generally to internal combustion engines and more particularly to a novel and improved fuel shut-off device for use therewith.

It has been heretofore determined that the largest percentage of unburned products of combustion are exhausted from the engine of an automotive vehicle during deceleration thereof. Such unburned products of combustion constitute a prime source of the so-called "smog" which exists in and around the principal population centers of the country. The harmful effect of this smog upon animate and inanimate objects are very well known. There presently exist several types of automatic shut-off devices for stopping the flow of fuel to an engine during deceleration. These devices generally utilize a member attached to the engine's carburetor for blocking the flow of idling fuel thereinto and operatively connected to auxiliary control devices, the latter in turn being connected to various elements of the engine.

It is a major object of the present invention to provide a fuel shut-off device which is entirely self-contained, requiring no external controls in order to effect its operation.

Another object is to provide a self-contained fuel shut-off device which is positive and fool-proof in operation.

A further object is to provide a self-contained fuel shut-off device which is simple in design and rugged of construction whereby it may afford a long and useful service life.

Yet another object is to provide a self-contained fuel shut-off device which is comparatively inexpensive to manufacture.

Another object is to provide a self-contained fuel shut-off device having a minimum amount of moving parts whereby it may provide maintenance free operation over a long period of time.

An additional object is to provide a self-contained fuel shut-off device which may be readily installed upon any conventional internal combustion engine without requiring modification of such engine.

Yet a further object is to provide a self-contained fuel shut-off device having an integral idling adjustment.

These and other objects and advantages of the present invention will become apparent from the following detailed description, when taken in conjunction with the appended drawings, wherein:

Figure 1 is a side elevational view of a preferred form of self-contained fuel shut-off device embodying the present invention;

Figure 2 is an enlarged central sectional view taken on line 2—2 of Figure 1 showing the parts of the device disposed in their normal position; and

Figure 3 is a fragmentary view similar to Figure 2 but showing the parts of the device disposed in a position to shut off the flow of fuel to the intake manifold.

Referring to the drawings and particularly Figure 1 thereof, the preferred form of self-contained fuel shut-off device F is shown mounted upon a carburetor support S disposed below the engine's carburetor (not shown). The support S is formed with a vertical bore

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10 wherein is pivotally mounted the engine's throttle valve 12. The walls of the support S are formed with an idling well 14 for conducting fuel from the carburetor to a point below the throttle valve 12 during idling of the engine. The lower portion of the idling well 14 intersects an internally threaded bore 16. This bore 16 threadedly receives the inner portion of the fuel shut-off device F.

Referring now to Figures 2 and 3, the fuel shut-off device F includes a body, generally designated 20, fixedly secured to the support S; a collar 22, aligned with and adjacent to the body 20; a metering pin, generally designated 24, secured to the collar 22; resilient means, such as a spring 26, biasing the collar 22 away from the body 20; and pressure-responsive means, such as a cylindrical metallic bellows 28, interconnecting the body 20 and the collar 22. The body 20 is formed with a longitudinal passage 30 which intersects the idling well 14. The metering pin 24 is slidably disposed within this passage 30 for longitudinal movement therein. Its inner end is formed with blocking means, such as a frusto-conical surface 32, which normally permits fuel to flow through the idling well 14 into the bore 10 of the carburetor support S, the spring 26 biasing the pin away from the body 20 during operation of the engine other than deceleration. During deceleration of the engine, the intake manifold vacuum will reach a sufficiently high value as to effect contraction of the bellows 28, such vacuum being communicated to the interior of the bellows by passage means 34 formed through the metering pin 24. Such contraction of the bellows 28 forces the collar 22 and hence the metering pin 24 inwardly, or to the right relative to the drawings, whereby the frusto-conical surface 32 of the metering pin will seat against the outer periphery of an inlet bore 35 of the idling well 14 so as to block the flow of fuel through the idling well 14 into the bore 10 of the carburetor support S.

More particularly, the body 20 is of annular cross-section and includes an externally threaded nipple 36 at its front end. The rear portion of the body is coaxially formed with a boss 38 for receiving the clamp 40 of a stop member, generally designated 42, to be described more fully hereinafter. A radially extending front bellows retainer 44 is formed at the rear of the boss 38. The collar 22 is also annular in cross-section and it is centrally formed with a threaded bore 48. The rear portion of the collar 22 is formed with a rear bellows retainer 50. The bore 48 threadedly carries an adjustment sleeve 52 which is threaded both internally and externally. A lock nut 54 is provided for this adjustment sleeve. The body 20 and collar 22 are coaxially interconnected by means of the metallic bellows 28, the front end of the bellows being rigidly secured to the front bellows retainer 44 and the rear thereof being rigidly secured to the rear bellows retainer 50.

The rear portion of the metering pin 24 is threadedly secured within the threaded bore 56 of the adjustment sleeve 52. The rear end of the metering pin 24 is formed with a knurled head 58 for use in effecting relative rotation between the metering pin and the adjustment sleeve 50. A helical compression spring 60 serves as a locking means between the adjustment sleeve and the metering pin. The passage means 34 includes a longitudinal bore 62 and a plurality of radially extending ports 64 which interconnect the bore 62 with the interior of the bellows 28. Preferably, one or more sealing rings 66 will be interposed between the metering pin and the passage 30 of the body 20.

The stop member 42 includes a generally U-shaped bracket 68 which extends rearwardly from the clamp 40 that is secured to the boss 38 of the body 20. The rear leg of the bracket 68 is formed with a threaded bore

70 wherein is disposed an adjustment bolt 72. A lock nut 74 is provided for this adjustment bolt.

In operation, the spring 26 will constantly bias the collar 22 and hence the metering pin 24 away from the body 20 during normal operation of the engine. During this time the idling fuel flowing through the idling well 14 will be free to enter the bore 10 of the carburetor support S. During deceleration of the engine, however, the intake manifold pressure vacuum will reach sufficient magnitude as to effect contraction of the bellows 28, such pressure being communicated to the interior of the bellows through the longitudinal bore 62 and the radially extending ports 64 of the metering pin. Such contraction of the bellows 28 will effect concurrent movement of the collar 22 and hence the metering pin 24 to the right relative to the drawings whereby the frusto-conical surface 32 of the metering pin will seat against the outer periphery of the inlet bore 35. The flow of fuel through the idling well 14 to the carburetor support bore 10 will thereby be effectively blocked. At the conclusion of the deceleration period, the resulting drop in intake manifold pressure will permit the spring 26 to return the collar 22 and metering pin 24 to their normal positions. The inner end of the metering pin 24 is seen to extend into the confines of the bore 10 of the carburetor support S a sufficient distance that its longitudinal bore 62 will always be exposed to the full magnitude of the intake manifold vacuum.

It should be observed that outward movement of the metering pin 24 will be positively limited by the abutment of its head 58 with the adjustment bolt 72 of the stop member 42. This becomes especially important when the automotive vehicle is operated at higher elevations since it prevents the occurrence of an excessively lean fuel mixture. It should additionally be observed that the idling speed of the engine may be adjusted by rotation of the head 58 so as to adjust the spacing between the frusto-conical surface 32 and the outer periphery of the inlet bore 35. From the foregoing description it will be apparent that the self-contained fuel shut-off device F of the present invention will provide excellent results with a minimum amount of maintenance. It should also be observed that these results are accomplished without requiring any auxiliary control means whatsoever.

It will also be apparent that various modifications and changes may be made with respect to the foregoing description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A self-contained fuel shut-off device for use with an internal combustion engine having an intake manifold, carburetor means formed with a bore wherein a throttle valve is mounted and an idling fuel conduit that intersects said bore below said throttle valve, comprising: a body fixedly securable to said carburetor means and formed with a passage intersecting said idling fuel conduit; a collar aligned with and adjacent to the outer end of said body; a metering pin longitudinally slidably disposed within said passage, the end of said metering pin remote from said collar being formed with blocking means for stopping the flow of fuel through said idling conduit into said bore, said metering pin also being formed with passage means open to said bore below said throttle valve; a coil spring coaxial with said body and interposed between said body and said collar so as to constantly bias said collar outwardly away from said body whereby said blocking means will normally permit fuel to flow through said idling conduit into said bore; thread means interposed between the outer portion of said pin and said collar so as to permit longitudinal adjustment of said pin relative to said passage; a stop member extending from said body outwardly to a point aligned with the path followed by the outer portion of said metering pin, said stop member limiting the outward movement undergone by said metering pin relative to said body; adjustment means

interposed between the outer portion of said stop member and the outer portion of said metering pin so as to limit the outward movement undergone by said pin relative to said body; and a cylindrical bellows coaxially interposed between said body and said collar, the space enclosed by said bellows communicating with said passage means of said metering pin whereby upon deceleration of said engine said bellows will contract so as to urge said collar and said metering pin towards said body in order that said blocking means may temporarily stop the flow of fuel through said idling fuel conduit.

2. A self-contained fuel shut-off device as set forth in claim 1 wherein said adjustment means includes an adjustment bolt coaxial with said metering pin.

3. A self-contained fuel shut-off device for use with an internal combustion engine having an intake manifold, carburetor means formed with a bore wherein a throttle valve is mounted and an idling fuel conduit that intersects said bore below said throttle valve, comprising: a body fixedly securable to said carburetor means and formed with a passage intersecting said idling fuel conduit; a collar aligned with and adjacent to the outer end of said body; an adjustment sleeve coaxial with said collar, said sleeve being internally threaded; a metering pin threadably disposed within said adjustment sleeve and having a portion longitudinally slidably disposed within said passage, the end of said metering pin proximate said body being formed with blocking means for stopping the flow of fuel through said idling conduit into the bore of said carburetor means, said metering pin also being formed with passage means open to the bore of said carburetor means below said throttle valve; coil spring means coaxial with said metering pin and interposed between said body and said collar so as to constantly bias said collar outwardly away from said body whereby said blocking means will normally permit fuel to flow through said idling conduit into said bore; a stop member extending from said body outwardly to a point aligned with the path followed by the outer portion of said metering pin, said stop member limiting the outward movement undergone by said metering pin relative to said body; adjustment means interposed between the outer portion of said stop member and the outer portion of said metering pin so as to limit the outward movement undergone by said pin relative to said body; and a cylindrical bellows coaxially interposed between said body and said collar, the space enclosed by said bellows communicating with said passage means of said metering pin whereby upon deceleration of said engine said bellows will contract so as to urge said collar and said metering pin towards said body in order that said blocking means may temporarily stop the flow of fuel through said idling fuel conduit.

4. A self-contained fuel shut-off device as set forth in claim 3 wherein said adjustment means includes an adjustment bolt coaxial with said metering pin.

5. A self-contained fuel shut-off device as set forth in claim 4 wherein the end of said metering pin remote from said body is formed with an adjusting head and a coaxial coil spring is interposed between said adjustment sleeve and said adjusting head to restrain said metering pin against unrestricted rotation relative to said adjustment sleeve.

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