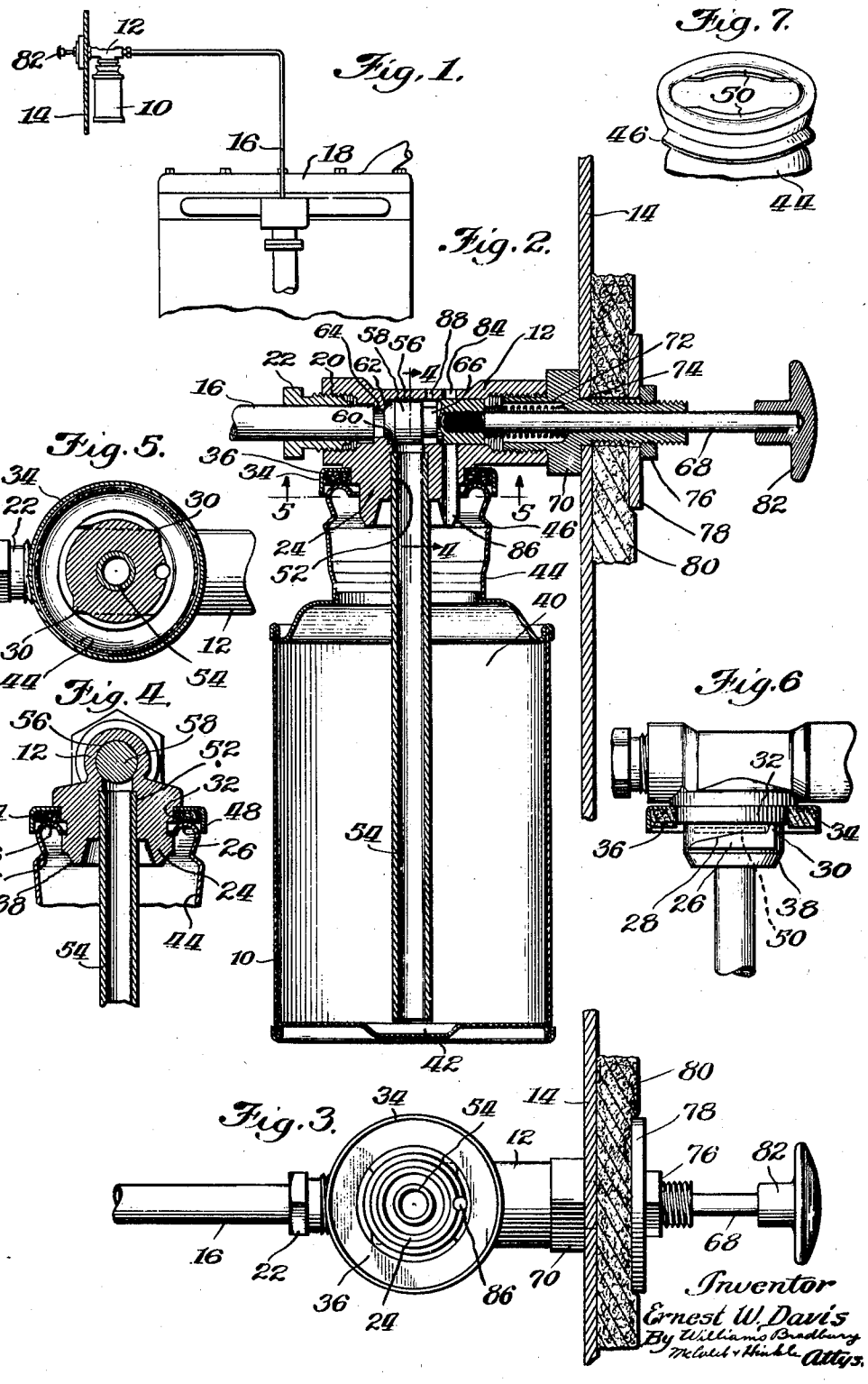
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DECARBONIZING APPARATUS

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DECARBONIZING APPARATUS

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My invention relates, generally, to apparatus for use in supplying decarbonizing solvents to the cylinders of internal combustion engines. It has been found effective in removing carbon from the cylinders of internal combustion engines to inject a certain quantity of suitable solvent into the cylinders while the engine is hot and it is the primary object of my invention to provide an apparatus suitable for use in expeditiously and conveniently supplying such decarbonizing agents to cylinders of internal combustion engines.

A further object is to provide an improved valve mechanism of simple construction in which the valve need not necessarily seat tightly.

A further object is to provide an improved mounting for the carbon solvent container.

Other objects will appear from the following description, reference being had to the accompanying drawings, in which

Figure 1 is a fragmentary side elevation of parts of an automobile showing the way in which the apparatus of my invention is used;

Figure 2 is a central vertical sectional view of my improved apparatus;

Figure 3 is a bottom plan view thereof with the container removed;

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 2;

Figure 5 is a horizontal sectional view taken on the line 5—5 of Figure 2;

Figure 6 is a side elevation of a portion of my improved device, the gasket and gasket retainer being shown in central vertical section; and

Figure 7 is a perspective view of the neck of the container.

In a method of supplying carbon solvent to the cylinders of internal combustion engines which has been proposed, the carbon solvent is introduced in the following manner: The engine is raced, the carbon solvent drawn into the intake manifold by suction and the engine permitted to run until the carbon solvent chokes and stops it. The ignition is turned off as soon as the engine stops and the engine is then permitted to stand for a sufficient time to permit the solvent to penetrate and loosen the carbon. By following this method the carbon solvent is sprayed upon the hot carbon deposits on the valves, cylinder head and piston and it has been found that the solvent is much more effective when thus used while the engine is hot.

In following this method with the apparatus of my invention, a container 10 is supported by a valve body 12 which is preferably secured to the dashboard 14 of the automotive vehicle for convenience of operation. A conduit 16 connects the valve body 12 with the central portion of the intake manifold 18. The forward end of the body 12 is threaded at 20 to receive a bushing 22 by which the conduit 16 is attached to the body.

The body has a depending projection 24 upon which are a pair of outwardly projecting lugs 26, the upper surfaces 28 of which are inclined and which have a vertical stop portion 30. The projection 24 has a smooth, cylindrical portion 32 over which an annular downwardly flanged gasket retainer 34 is secured, preferably by a press fit. A suitable gasket 36, made of cork or similar material, is forced in the groove between the portion 32 and the retainer 34. The lower end of the projection is beveled at 38 to aid in guiding the container in position.

The container 10 comprises a cylindrical portion 40 of conventional construction except for the fact that its bottom has a central depression 42. The container, however, has a specially formed neck 44 which is ribbed at 46 to provide additional strength and the upper end 48 of which is rolled inwardly to form a semi-toroidal surface for contact with the gasket 36. As best shown in Figure 7, this end portion has a pair of oppositely disposed inwardly projecting ledges 50 which, as the container is being fastened to the body, slide over the surfaces 28 of the lugs 26 and abut against the vertical stop portions 30 of these lugs. The rolled end portion 48 of the container is so positioned with reference to these ledges 50 that upon initial engagement of the ledges with the surfaces 28 of the lugs it will commence pressing against the gasket 36 and as the ledges slide upwardly upon the lugs

26 the gasket will be tightly compressed so that if the container is turned until the ledges 50 abut against the vertical stop portions 30 of the lugs 26, the gasket will, due to its inherent resiliency, press the ledges 50 downwardly upon the surfaces 28 of the lugs with sufficient force so that the container will be frictionally clamped to the body and vibration of the vehicle will not loosen the connection. To aid in obtaining this tight clamping effect the upper portion of the surface 28 on the lugs is substantially horizontal for an appreciable distance and thus decreases the tendency of the container to loosen.

The projection 24 has a central bore 52 into which a tube 54 is pressed, the tube abutting against a suitable annular shoulder formed in the bore 52. The tube extends downwardly into the container, its lower end being substantially at the level of the bottom surface of the container and lying directly above the depression 42.

The bore 52 communicates with a longitudinal bore 56 formed in the body member. A multiple valve 58 is slidable in the bore 56 and has a beveled end portion 60 seating against a shoulder 62 formed around an outlet port 64 which communicates directly with the end of the conduit 16. The valve 58 has an annular groove 66 formed in its middle portion and its rearward end is threaded to receive a stem 68 which is guided in a bushing 70. The bushing is threaded in the end of the body 12 and has a recess 72 to receive a compression coil spring 74, one end of which abuts against the bushing at the end of the recess 72 and the other end of which engages the valve 58. The bushing 70 extends through the dashboard or other suitable mounting panel having an externally threaded shank portion over which a nut 76 is screwed, pressing a washer 78 against a suitable felt cushion 80. A button 82 is preferably pressed over the end of the stem 68 or may be die cast about the end of the stem. The body 12 has an aperture 84 drilled vertically into the bore 56 in prolongation of a passageway 86 drilled in the projection 24. A smaller aperture 88 is drilled in the body adjacent the aperture 84 and communicates with the annular groove 66 when the valve 58 is in normal closed position.

In normal use of the apparatus of my invention, the container 10, substantially filled with the carbon solvent or carbon loosening liquid, is secured over the projection 24, its ledges 50 fitting upon the lugs 26 in the manner previously described, and the container thus detachably secured to the body 12 and the opening in its top tightly sealed by the gasket 36. When it is desired to remove carbon the button 82 is grasped and pulled to the right (Figure 2), thus withdrawing the beveled end of the valve from the outlet aperture 64 and permitting the manifold suction to act upon the liquid in the tube 54. When the valve is drawn outwardly, the annular groove 66 thereof will be in registry with the aperture 84 and passageway 86, since the right hand end of the valve (Figure 2) abuts against the inner end of the bushing 70. The inside of the container is thus in free communication with the atmosphere to permit entrance of air to replace the liquid which is thus forced by atmospheric pressure into the intake manifold and thence distributed to the various cylinders. With the valve in open position the aperture 88 is covered by the cylindrical end portion of the valve.

It is difficult to obtain a tight seal at the seating surface 60 of the valve without the use of undesirable gaskets or packings and even if such seal is initially obtained when the device is manufactured, a small piece of foreign matter may become caught between the valve and its seat and thus prevent proper seating of the valve. The aperture 88 is therefore provided to permit the passage of air when the valve is in closed position, the air passing through the aperture around the groove 66 and around the cylindrical end portion of the valve 68 by way of the end of the bore 52. Thus, if the valve does not seat tightly the intake manifold suction will draw only air and will not draw the carbon solvent from the container. If this aperture 88 were not provided there would always be the possibility that when the valve was supposedly closed there would be a slight leakage of the solvent past the end into the engine. Such leakage might not only slightly interfere with the smooth operation of the engine but also would in time deplete the supply of solvent in the container so that when it was desired to remove the carbon the container would be found to be empty.

The apparatus of my invention, it will be noted from the above description, is very simple in construction, comprises a relatively small number of parts, practically all of which, with the exception of the body, may be made upon automatic screw machines and which may thus be economically manufactured. Its operation is extremely simple and due to the provision of the safety air vent feature the tolerances required in the manufacture of the valve parts may be comparatively great.

The detachable connecting means by which the container is secured to the valve body is not claimed herein but forms the subject matter of my copending divisional application, Serial No. 510,405, filed January 29, 1931.

While the apparatus herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the embodiment herein disclosed, for the invention is susceptible of embodi-

ment in various forms all coming within the scope of the claims which follow.

I claim:

1. In apparatus of the class described, the combination of a valve body, a carbon solvent container detachably secured thereto, a conduit leading from said container to the intake manifold of an internal combustion engine, a valve adapted to close said conduit, and an aperture in said body to permit entrance of air when said valve is in closed position, said aperture admitting the air to said conduit on the side of said valve nearest said container.

2. In a device for supplying a liquid to an internal combustion engine, the combination of a container for said liquid, a valve body detachably secured to said container and having an open end tube depending into the bottom thereof, a conduit connecting said body with the intake manifold of the engine to be supplied with liquid, a passageway connecting said tube with said conduit, an air duct connecting the inside of said container with the atmosphere, a unitary valve normally closing said passageway and said duct, and means for admitting air to said passageway when said valve is in closed position.

3. In a device for supplying a carbon loosening liquid to an internal combustion engine, the combination of a valve body, a manually operable valve therein, resilient means for holding said valve closed, a liquid container, means for detachably securing said container to said body, a conduit leading from the bottom of said container to said body on one side of said valve, a tube connecting said body at the other side of said valve to the intake manifold of the internal combustion engine, and means operable in conjunction with said valve to admit air to said container only when said valve is open.

4. In a device for supplying a carbon loosening liquid to an internal combustion engine, the combination of a valve body, a manually operable valve therein, resilient means for holding said valve closed, a liquid container, means for detachably securing said container to said body, a conduit leading from the bottom of said container into said body on one side of said valve, a tube connecting said body at the other side of said valve to the intake manifold of the internal combustion engine, and means operable in conjunction with said valve to admit air to said conduit only when said valve is closed.

5. In a device for quickly charging the cylinders of an internal combustion engine with a carbon loosening liquid, the combination of a valve body having a liquid passageway therethrough, means for connecting one end of said passageway to the intake manifold of an engine, a liquid container communicating with the other end of said passageway, means on said container and on said body for making a quick detachable connection therebetween, means for admitting air to said container only when said valve is open, and means for admitting air to said liquid passageway at the side of said valve remote from the intake manifold only when said valve is closed.

6. In a device for quickly charging the cylinder of an internal combustion engine with a carbon loosening liquid, the combination of a valve body having a liquid passageway therethrough, means for connecting one end of said passageway to the intake manifold of an engine, a liquid container communicating with the other end of said passageway, means on said container and on said body for making a quick detachable connection therebetween, a pair of openings in said body, one communicating with said passageway on the side of said valve adjacent said container and the other communicating with said container, and means on said valve to obstruct the first opening when the valve is open and to obstruct the second opening when the valve is closed.

In witness whereof, I hereunto subscribe my name this 19th day of August, 1929.

ERNEST W. DAVIS.