Dec. 2, 1930. C. F. KETTERING 1,783,921

CONTAINER FOR REMOVING CARBON

Filed Jan. 31, 1927

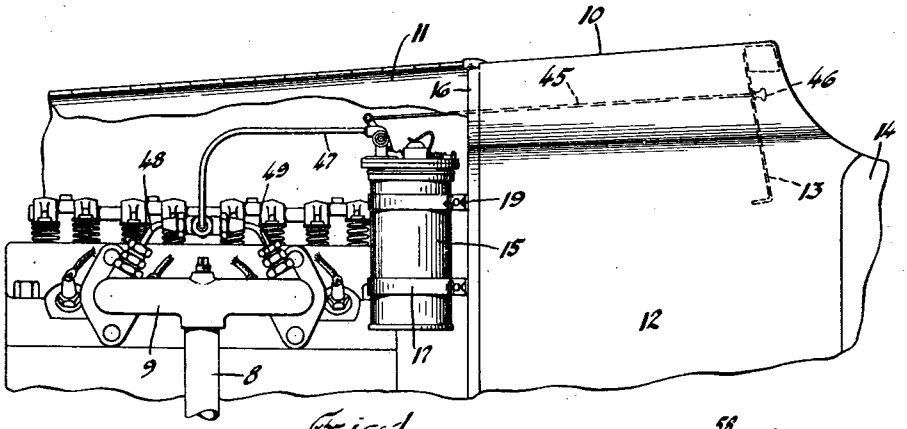

Fig. 1

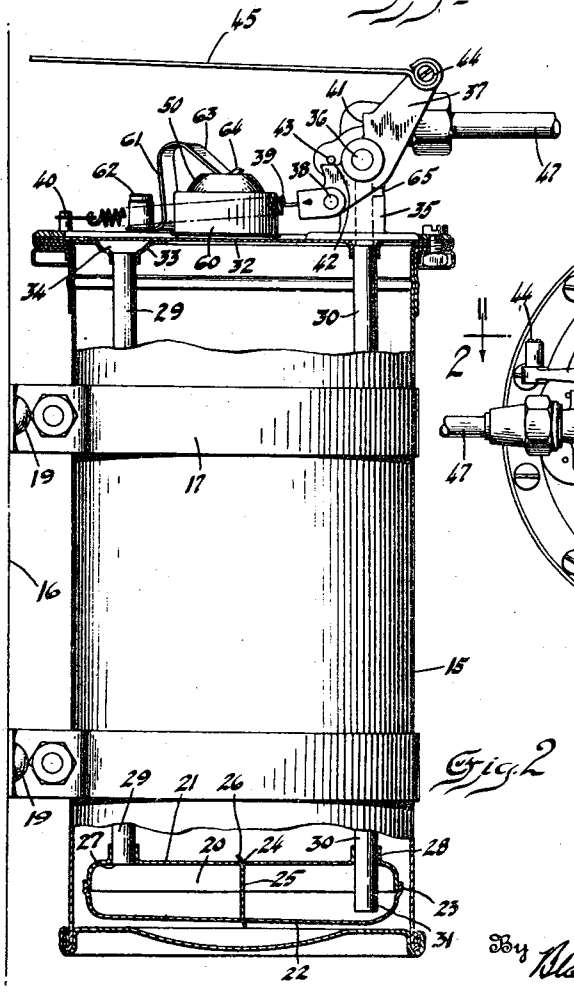

Fig. 2

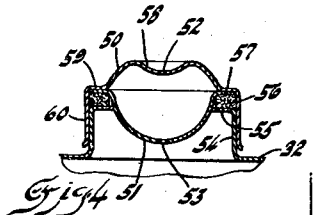

Fig. 4

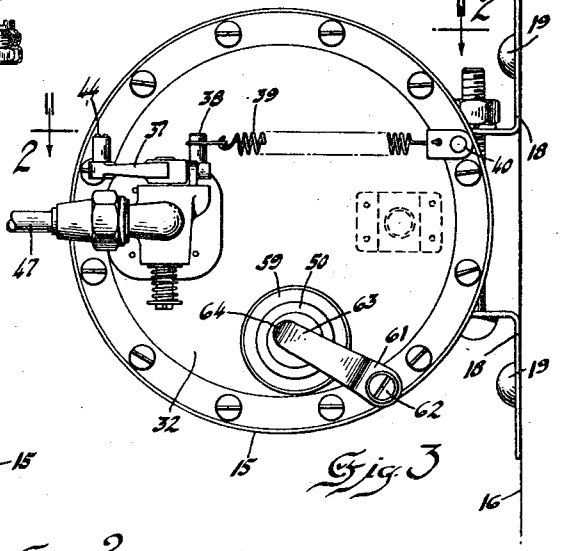

Fig. 3

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Patented Dec. 2, 1930 1,783,921

UNITED STATES PATENT OFFICE

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CONTAINER FOR REMOVING CARBON

Application filed January 31, 1927. Serial No. 164,838.

This invention relates to internal combustion engines, particularly to the injector tank or container and associated mechanism which form a means for the injection of a compound for the removing of carbon or carbonaceous deposits from the engine.

My invention is concerned principally with the method and manner of injecting a carbon remover into the engine cylinder and the mechanism for accomplishing this result. Carbon removing compounds are well known but the devices used in the past for applying these compounds have been none too satisfactory and do not give consistent results and it is therefore the purpose and object of my invention to produce a device which is superior to prior devices of its kind, one which is preeminently successful in operation, is reliable, and which will give very satisfactory results at all times.

My novel injector tank and operating mechanism is attached to the dashboard of a motor vehicle inside the engine compartment and consists of a closed cylindrical container held to the dash by means of two metal straps surrounding the container and having their ends bent at right angles for attachment to the dash. My tank has a secondary small container or receptacle at its bottom into which lead two pipes, one being a vent pipe and the other a feed pipe for the discharge of the liquid carbon remover from the secondary smaller container into the engine cylinder. The cubical capacity of this secondary container depends upon the size of the engine to which the invention is applied as it contains but one complete charge of liquid carbon remover.

The smaller receptacle has a thin wire passing through aligned openings therein, these openings being slightly larger than the wire to allow for liquid in the larger tank to seep through into the smaller container.

The top of the feed pipe leads into a valve which may be operated from the instrument board by any suitable mechanism. In the embodiment as shown the valve is operated by a lever which has a spring at one end tending to keep it in closed position and a wire at its opposite end which leads to a handle operated from the instrument board. At the opposite side of the valve a conduit leads to the arms of the intake manifold between the throttle valve and the engine so that upon closing the throttle valve and opening the valve at the tank, the vacuum produced in the cylinders will cause the liquid carbon remover to be drawn from the tank into the cylinders. The closing of the throttle valve will prevent the liquid from running into the carburetor. The valve has a safety opening to prevent the liquid from normally being pulled out of the container.

I provide a filling opening at the top of the container and this opening has a breather safety cap to prevent the escape of the liquid. The cap is provided with a pair of vent openings to allow the atmospheric pressure to be exerted upon the liquid within the container, and this cap is held in place by means of a spring pressing thereon and fastened to the top of the container.

The invention is disclosed in the accompanying drawings in which:

Figure 1 is a view of so much of an automotive vehicle as is necessary to illustrate my invention.

Figure 2 is an enlarged detailed view of my container and its related mechanism with parts shown in section, the upper sectioned part being taken on the line 2—2 of Figure 3.

Figure 3 is a plan view of the structure of Figure 2 except that the parts are reversed right and left.

Figure 4 is a section through the breather cap of my invention.

Referring to Figure 1, 10 designates an automotive vehicle as a whole, 11 the hood, 12 the cowl, 13 the instrument board and 14 the door. My improved injector tank or container is shown at 15 and is secured to the dashboard 16 by means of two metal straps 17 bent at right angles as shown at 18 and secured to the dash by means of the bolts 19. The construction of the tank per se forms no part of my invention and a detailed description thereof will therefore not be given.

Inside the tank 15, slightly spaced from its bottom, I provide a two-part receptacle 20 composed of upper and lower halves 21 and

22, respectively, secured together by means of a flange 23 formed on the lower half. Each half of the receptacle is provided with a centrally disposed opening 24 through which passes a wire 25 having bent ends 26. It is to be noted here that the size of the openings 24 is slightly larger than wire 26. The upper half of the receptacle 21 has two openings 27 and 28 in which are received a vent tube 29 and a feeder tube 30, respectively. The vent tube it will be noted does not extend within the smaller receptacle while the feeder tube 30 has its lower end 31 projecting well within and close to the bottom of the receptacle.

The upper end of the vent tube 29 extends almost to the top 32 of the tank 15 and is secured thereto by means of a U-shaped bracket 33 having air passages 34 at two of its sides.

The feeder tube 30 extends upwardly to the top of the tank 15 into a valve casing 35 having a valve 36 operated by a two-arm lever 37. The lower arm of the lever has a pin 38 to which is attached a spring 39 the opposite end of which is secured to a stud 40 fastened to the top 32 of the tank 15 and in the position of the parts shown in Figure 2 the valve is in closed position.

The lever 37 has two seats 41 and 42 which strike against a pin 43 on the casing 35 to limit the throw of the lever 37. The upper end of the lever 37 has a screw 44 to which is attached a rod 45 which terminates in a handle 46 at the instrument board 13.

At the opposite end of the valve from the feed pipe 30 a conduit 47, terminating in branches 48 and 49, leads into the arms of the intake manifold 9. The tube 8 as shown in Figure 1 leads from the carburetor to the intake manifold, and within this tube the throttle valve is located.

My breather cap is shown in section in Figure 4 and comprises upper and lower hemispherical halves 50 and 51 having centrally disposed openings 52 and 53, respectively. The tank top 32 has an upwardly directed housing 54 having an annular internal flange 55 upon which is seated a packing ring 56 upon which rests an outwardly turned annular flange 57 of the lower cap half 51. The upper half 50 is inwardly dented as shown at 58 and has an outwardly turned annular flange 59 which rests on the flange 57 of the lower cap half 51, and is further provided with a cylindrical portion 60, at right angles to the flange 59, and this cylindrical portion embraces and closely fits onto the housing 54. My breather cap is held in place by means of a spring 61 attached to the top 32 by means of a bolt 62 and this spring has a finger 63 having a bent end 64 which rests in the dented portion 58 but not so as to close the opening 52 thereof.

The valve casing 35 is provided with a safety opening 65 to prevent any liquid from being normally drawn past the valve seat such as might occur in the case of looseness between the valve and its seat.

The opening 65 also allows for the admission of an air stream along with the carbon remover when the valve 36 is thrown to permit communication between the container or tank 20 and the conduit or pipe 47. The air stream admitted through the opening 65 enters into and commingles with the carbon remover compound rising in the pipe 30 and causes a frothing of or intermixture of air bubbles in the compound before its arrival at or entry into the cylinders. This foaming or frothing, or commingling of air and carbon remover compound, enables the obtaining of a much easier and greater distribution of compound in the cylinders due to its decrease in density and its greater volume. The efficiency of the compound when mixed with air is also greater and accomplishes a more thorough removal of carbon owing to the greater ease with which the film of compound is spread over the carbon containing surfaces.

From the structure described it will be apparent that when the tank 15 is filled with a liquid carbon remover the space between the opening 24 and the wire 25 will gradually allow the liquid to seep into the lower container 20 and slowly fill the same. Atmospheric pressure is communicated to the liquid within the tank through the openings 52 and 53 and to the lower tank through the openings 34 and the vent tube 29.

The decarbonizing liquid should be injected into the cylinders only when the engine is hot. The best time is just after running into the garage from a drive of considerable length.

The operation of the device is as follows:— After the car has been driven into the garage and before stopping the engine, by moving the accelerator, or the hand throttle lever a sufficient distance, the engine can be given considerable initial speed, say 500 to 800 R. P. M. The throttle valve is then quickly closed and at once the valve at the tank opened by giving a strong pull to the wire attached to the valve crank of the injector. The closing of the throttle valve will stop the flow of gas from the carburetor and the opening of the tank or injector valve will open the passages between the lower container and the engine cylinders and due to the high vacuum created a decarbonizing liquid will be shot into the cylinders. The engine will cease firing at once and come to a complete stop within a few revolutions because the large amount of liquid rushing into its hot cylinders makes the mixture too rich to burn. The opening 65 in the valve casing 35 is not of such a size as will interfere with the discharge of liquid into the cylinders.

After the container 20 has been discharged

it will gradually be refilled by the seepage of liquid past the wire 25 through the openings 24.

I claim:

1. In a carbon removing device, a tank, a discharge outlet for said tank, a breather on said tank, and a vent associated with said tank, said breather and vent cooperating to allow atmospheric pressure within said tank.

2. In a carbon removing device, a tank, an outlet for said tank, a valve at said outlet, said valve having a safety opening.

3. A tank for a carbon removing device, a receptacle in said tank, a vent tube and an outlet tube leading from said receptacle to the top of said tank, a valve on said tank as a continuation of said outlet tube said valve having a safety opening, and a breather on said tank, said breather and vent tube cooperating to allow atmospheric pressure within said tank.

4. In a carbon removing device, a tank, a receptacle in said tank said receptacle having an opening, and a restricting member in said opening.

5. A tank for a carbon removing device, a receptacle in said tank, said receptacle having openings, a wire in said openings and passing through said receptacle.

6. A tank for a carbon removing device, a two part receptacle in said tank each part having an opening and a wire passing through said openings.

7. In a carbon removing device, a container for receiving a carbon remover, a receptacle within said container, a breather for permitting atmospheric pressure to maintain within said container and means connecting said receptacle and container to permit atmospheric pressure to maintain in said receptacle.

8. The invention of claim 7 said breather attached to the cover of the container, and a spring for holding said breather in place.

9. In a carbon removing device, a container for receiving a carbon remover, a substantially closed receptacle in said container, said receptacle having a plurality of openings, an outlet conduit connected to one of said openings, a vent conduit connected to another of said openings and terminating within said container, and means for maintaining atmospheric pressure within both container and receptacle.

10. In a carbon removing device as applied to internal combustion engines, a tank for containing a carbon remover, a conduit from the tank leading to the engine, an auxiliary receptacle in said tank for containing a single charge of carbon remover, means for delivering the charge to the conduit, and means for causing the charge of carbon remover to enter the engine.

11. In a carbon removing device, a tank for containing a carbon remover, a receptacle within said tank, an inlet affording communication between said tank and receptacle to allow the carbon remover to enter the receptacle from the tank, an outlet from the receptacle leading through the tank, a vent tube connected to said receptacle and terminating within said tank, and a breather on said tank to permit atmospheric pressure to maintain in said tank and receptacle.

12. The structure of claim 11, said vent tube secured to and terminating at the top of the tank.

13. The structure of claim 11, a valve at the tank at said outlet and means always tending to retain said valve in closed position.

14. In a carbon removing device for internal combustion engines comprising a container for a carbon remover, a conduit leading from the container to the engine for conducting carbon remover to the engine cylinders, and means for causing a frothing or foaming of the remover prior to its entry into the cylinders.

15. In a carbon removing device for internal combustion engines comprising a container for a carbon remover, means for conducting the carbon remover to the engine cylinders, and means for decreasing the density of the remover prior to its entry into the cylinders.

16. In a carbon removing device for internal combustion engines comprising a container for a carbon remover, means for conducting carbon remover from the container to the engine cylinders, a valve for controlling said means, and means between said valve and container for causing frothing of the carbon remover prior to its entry into the cylinders.

17. In a carbon removing device, a container for receiving a carbon remover, a substantially closed receptacle in said container, a restricted inlet to said receptacle, said receptacle having a plurality of openings, an outlet conduit connected to one of said openings, a vent conduit connected to another of said openings and terminating within said container, and means for maintaining atmospheric pressure within both container and receptacle.

18. In a carbon removing device as applied to internal combustion engines, a tank for containing a carbon remover, a conduit from the tank leading to the engine, a valve in said conduit, an auxiliary receptacle in said tank for containing a single charge of carbon remover, an air vent to said receptacle to maintain atmospheric pressure therein, means for delivering the charge to the conduit, and means for causing the charge of carbon remover to enter the engine.

19. In a carbon removing device as applied to internal combustion engines, a tank for containing a carbon remover, a conduit from the tank leading to the engine, an auxiliary receptacle in said tank for contain-

ing a single charge of carbon remover, an air vent in said receptacle leading to the top of the tank to maintain atmospheric pressure in the receptacle, means for delivering the charge to the conduit, and means for causing the charge of carbon remover to enter the engine.

20. In a carbon removing device adapted to be applied to the internal combustion engine of an automotive vehicle, a tank for containing a carbon remover, a closed receptacle in and constructed independently of said tank, an inlet to said receptacle from said tank, an air vent communicating between said tank and receptacle, and an outlet from said receptacle to the engine cylinders.

21. In a carbon removing device adapted to be applied to the internal combustion engine of an automotive vehicle, a tank for containing a carbon remover, a closed receptacle in said tank, an inlet to said receptacle from said tank, an air vent leading from said receptacle to the top of said tank, and an outlet from said receptacle leading to the engine cylinders.

22. In a carbon removing device adapted to be applied to the internal combustion engine of an automotive vehicle, a tank for containing a carbon remover, a receptacle in said tank, a carbon remover discharge tube leading from said receptacle through said tank, and means connecting the discharge tube to the engine cylinders.

23. In a carbon removing device for application to the internal combustion engines of automotive vehicles, a tank for holding a carbon remover, an outlet conduit from said tank leading to the engine, and a valve in said conduit operating in a valve casing, said valve casing having a safety opening to prevent the withdrawal of carbon remover from the tank when said valve is in closed position.

24. In a carbon removing device, a tank, a receptacle in said tank constructed separately therefrom and having an opening affording communication with said tank, and a wire in said opening serving as a flow restriction.

25. In a carbon removing device, a tank, a receptacle in said tank constructed separately therefrom and having an opening affording communication with said tank, and a restricting member in said opening.

26. In a carbon removing device, a tank for containing a carbon remover, a receptacle in said tank, said receptacle having a plurality of openings to permit carbon remover to flow between the tank and receptacle, and a restricting member passing through said openings.

27. The method of removing carbon deposits from internal combustion engines consisting of interrelating with the engine a carbon removing device adapted to handle a liquid carbon remover, causing a frothing or foaming of said liquid, and then injecting the liquid into the cylinders of the engine while in the frothy or foamy state.

28. The method of removing carbon from the cylinders of internal combustion engines consisting of interrelating with the engine a carbon removing device adapted to handle a liquid carbon remover, causing air to mix with the liquid to produce a frothing or foaming, and then injecting the liquid while in the frothy or foamy state into the cylinders to cause a film of carbon remover to spread over the carbon in the cylinders.

In testimony whereof I affix my signature.

CHARLES F. KETTERING.