A. DE CLAIRMONT.

DECARBONIZER.

APPLICATION FILED AUG. 5, 1918.

1,356,967. Patented Oct. 26, 1920.

FIG. 1.

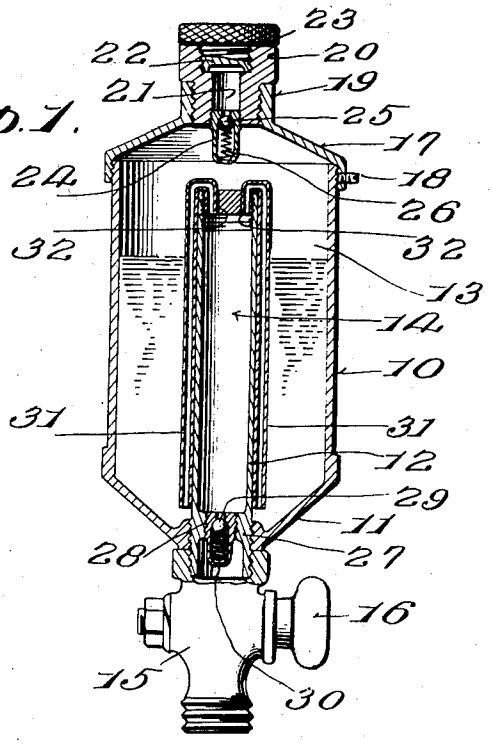
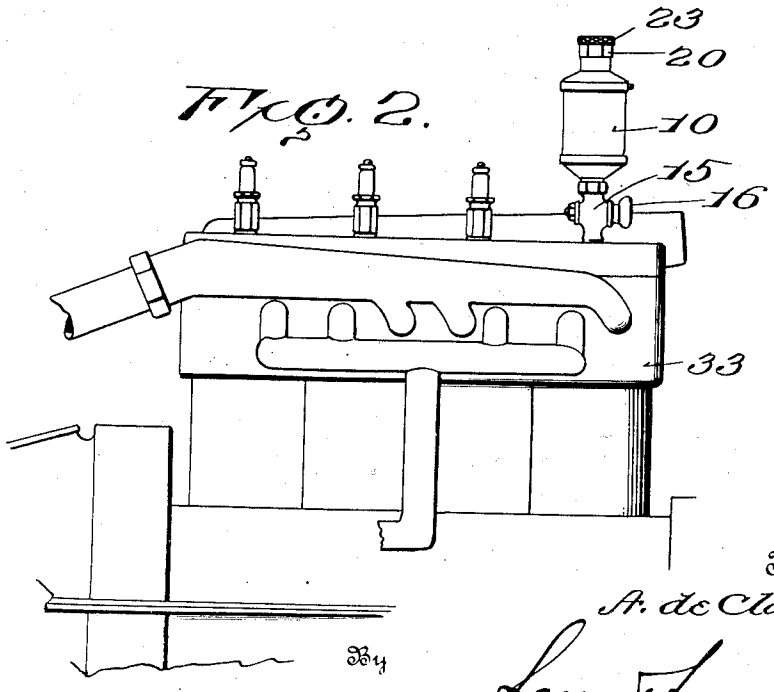


FIG. 2.



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DECARBONIZER.

1,356,967. Specification of Letters Patent. Patented Oct. 26, 1920.

Application filed August 5, 1918. Serial No. 248,369.

To all whom it may concern:

Be it known that I, ADOLFO DE CLAIRMONT, citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Decarbonizers, of which the following is a specification.

This invention relates to an improved decarbonizer for internal combustion engines and has as its primary object to provide a device of this character which may be connected with an engine cylinder at the spark plug opening therein and adapted to deliver a decarbonizing fluid into the cylinder while the engine is running and the cylinder thus heated to render the action of the decarbonizing fluid thoroughly effective.

The invention has as a further object to provide a device of this character wherein the decarbonizing fluid will be admitted into the engine cylinder a little at a time in order that the greatest cumulative effect tending to soften and disintegrate any carbon collected within the cylinder may be obtained from a given volume of liquid.

And a still further object of the invention is to provide a construction wherein a small quantity of decarbonizing fluid will be admitted to the engine cylinder at each downward stroke of the piston thereof to the end that the piston upon its alternate upward strokes will force the heated decarbonizing fluid to all exposed surfaces of the firing chamber of the cylinder and into the pores of the carbon collected thereon for softening and dissolving the carbon, so that when the cylinder is later fired, in the usual manner, the disintegrated carbon will be burned and discharged therefrom.

Other and incidental objects will appear as the description proceeds. In the drawings, wherein I have illustrated the preferred embodiment of the invention, and wherein similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a vertical sectional view of my improved decarbonizer, and

Fig. 2 is a side elevation showing the manner in which the device is attached to an engine cylinder, the engine shown being conventionally illustrated.

In carrying the invention into effect I employ a preferably cylindrical hollow body or container 10 which is formed with a conical lower end wall 11, the upper end of the container being open. Threaded through the bottom wall of the container axially thereof is a stand pipe 12 terminating at its upper end adjacent the upper end of the container. This stand pipe divides the container into a supply chamber 13 for decarbonizing liquid and a suction chamber 14. At its lower extremity the pipe 12 projects through the bottom wall of the container and threaded upon the lower terminal of the said pipe is a pet cock 15 which may be of any approved design but, at its lower end is preferably formed with a universal thread to enter a bushing or adapter whereby the device may be readily connected with differing spark plug openings of various types of engines. The valve of the pet cock is indicated at 16.

Threaded upon the upper end of the container 10 is a cap 17 therefor preferably held against accidental displacement by a set screw 18. This cap is formed axially with an upstanding reduced neck 19 into which is removably threaded a closure plug 20 overlying the neck and adapted to seat against the upper edge thereof. Formed axially through the plug is a passage 21 enlarged at its upper end to form a chamber for a plug valve 22 removably threaded into the said chamber. The valve 22 is provided at its upper end with an enlarged milled head 23 overhanging the upper end of the closure plug and adapted to seat thereagainst. This valve is adapted to normally close the passage 21 through the closure plug and, as will be understood, the milled head of the valve may be readily grasped for rotatably opening the valve.

Threaded into the passage 21 at the inner end of the closure plug 20 is a valve cage 24 opening into the passage and in which is mounted an inwardly opening air intake ball valve 25 normally held to its seat in closed position by a spring 26 within the cage. Formed in the stand pipe 12 adjacent its lower end is an internal annular shoulder 27 and threaded through this shoulder is a valve cage 28 similar to the cage 24 and communicating with the suction chamber 14. Mounted within the valve cage 28 is an outwardly opening discharge ball valve 29 normally held to its seat in closed position by a spring 30 within the cage. In this connection it is to be noted that the spring 26

of the valve 25 is relatively light while the spring 30 of the valve 29 is considerably heavier. The purpose of this arrangement will presently appear. Extending vertically along the outer side of the stand pipe 12 and secured to the said pipe in any approved manner, are relatively small feed pipes 31. One, two, or more of these pipes may be employed at spaced points around the stand pipe, as found most desirable. At their lower ends, the pipes 31 terminate adjacent the bottom of the supply chamber 13. At their upper ends these pipes are formed with crooked terminals 32 engaging over the upper end edge of the stand pipe and extending downwardly within the upper end portion thereof.

In Fig. 2 of the drawings, I have shown my improved device in connection with an internal combustion engine 33, of conventional type. In practical use the decarbonizer is designed for selective attachment to the cylinders of an engine at the spark plug openings therein and in this figure of the drawings I have illustrated the device so connected to the front cylinder of the engine 33, the spark plug of the said cylinder being, of course, first removed, when the lower end of the pet cock 15 is operatively connected with the spark plug opening of the cylinder. The engine is then started and is run until the cylinder and its associated parts become thoroughly heated, when the closure plug 20 of the container 10 is removed and a charge of suitable decarbonizing liquid, such as coal oil, introduced into the supply chamber 13 of the container. In this connection it will be observed that the closure plug together with the valve cage 24 and valve 25 as well as the plug valve 22, may be bodily displaced from the cap 17, thus permitting the decarbonizing fluid to be readily introduced into the container through the neck 19 at the top thereof. Having filled the supply chamber, the closure plug is then replaced, it being, of course, understood that during the operation of filling the supply chamber, the valve 16 of the pet cock is closed. This valve is then, while the engine is still running, opened. Thus communication will be established between the cylinder and the suction chamber 14 so that upon the first ensuing downward stroke of the piston of the cylinder, a partial vacuum will be created within said chamber acting upon the discharge ends of the feed pipes 31 at the upper end of the said chamber, to pump up from the supply chamber 13, a small quantity of the decarbonizing fluid to be discharged into the suction chamber. The suction created by the cylinder piston in its downward movement will also, as will be seen, act to unseat the discharge valve 29 so that the small quantity of decarbonizing fluid delivered into the suction chamber 14 will be drawn into the engine cylinder. Consequently, upon the following upward stroke of the cylinder piston, say for instance, its compression stroke, the small quantity of decarbonizing fluid introduced into the cylinder will be diffused to practically all of the exposed surfaces within the firing chamber of the cylinder and will be forced into the pores of any carbon collected thereon. Thus, since the cylinder is heated by the running of the engine, the decarbonizing fluid will be thoroughly heated upon its initial introduction into the cylinder and, in being subjected to the pressure created by the compression stroke of the piston, will permeate the carbon within the cylinder for effectually softening and disintegrating the carbon. After the first downward stroke of the cylinder piston, as just described, the air within the container 10 will have been exhausted to such extent that, in order to permit the pumping of a quantity of the decarbonizing fluid through the feed pipes upon the next downward stroke of the piston, or, in the instance taken, its firing stroke, air must be admitted into the container. Accordingly, the plug valve 22 is opened up a quarter turn more or less. Air will thus be permitted to flow in between the threads of the plug valve and the neck 19 of the cap and past the intake valve 25 to destroy the partial vacuum in the container. Then, upon the firing stroke of the cylinder piston, another small quantity of decarbonizing fluid will, as previously described, be introduced into the cylinder. This second charge of fluid will, of course, be immediately heated within the cylinder and will further act upon the carbon within the firing chamber for disintegrating the carbon. This action will continue as the engine continues to run, a small quantity of decarbonizing fluid being introduced into the cylinder at each down stroke of its piston. Thus, the maximum effect tending to soften, disintegrate and dissolve the carbon within the cylinder will be obtained from a given quantity of decarbonizing fluid due to the gradual application of the fluid within the cylinder and, in order to permit the pumping of the decarbonizing fluid from the supply chamber 13, during the continued operation of the device, the plug valve 22 is gradually opened to permit a free flow of air into the container. Having exhausted all of the decarbonizing fluid from the container, the decarbonizer is then removed and the spark plug of the cylinder replaced when, upon the firing of the cylinder, the softened and disintegrated carbon therein will be burned and discharged from the cylinder.

Owing to the extreme suction created by the cylinder piston in its downward stroke and acting to unseat the valve 29, the spring

30 is relatively heavy to resist such suction considerably in order that said valve may not be unduly opened to permit an undesired sudden discharge of all of the liquid pumped into the suction chamber 14. This spring is preferably of such tension that the discharge valve will be permitted to open sufficiently to allow only a gradual escape of a pumped charge of the liquid past the valve, so that said charge will be gradually fed into the cylinder. However, since it is important to prevent the formation of such a partial vacuum within the container that the pumping of the decarbonizing fluid will be prevented, the spring 26 normally holding the intake valve 25 closed, is, as previously stated, relatively light, so that the intake valve will readily open in response to suction within the suction chamber 14 for thus permitting a free flow of air into the container when the plug valve is opened. The purpose in employing the relatively light and heavy springs 26 and 30 in connection with the intake and discharge valves accordingly now becomes apparent. In this connection it is to be observed that while the discharge valve will serve as a primary check to the suction within the engine cylinder, the feed tubes will, owing to their relatively small diameter, also furnish a check to the cylinder suction tending to regulate the flow of liquid pumped from the supply chamber into the suction chamber. The feed tubes will, therefore, constitute a secondary suction checking means auxiliary to the primary checking means constituted in the discharge valve. As is well known the partial vacuum produced in different engine cylinders varies quite widely and it accordingly becomes imperative to provide some means for effectually checking the flow of liquid under the action of extreme cylinder suction. I accordingly employ the feed tubes 31 between the supply chamber and the suction chamber of the device. These feed tubes will prevent the entry of liquid into the suction chamber except in small quantities without regard to variance in cylinder suction so that the decarbonizing liquid will always be introduced into the cylinder in small quantities.

It will, therefore, be seen that I provide a highly effective construction for the purpose set forth. In this connection it will, of course, be understood that the decarbonizer is applied to each of the cylinders of the engine successively, and each cylinder treated in the manner previously described. Furthermore, it will be seen that while I have indicated that the device is connected directly with each cylinder of the engine at its spark plug opening, the device may, nevertheless, be mounted at some convenient point adjacent to the engine and a pipe led therefrom and successively connected with each of the cylinders of the engine at the spark plug openings therein. I, therefore, do not wish to be limited in this regard but reserve the right to employ all such minor changes as fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new is:

1. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, and means between the chambers whereby suction in the latter chamber will act to lift liquid from the first chamber for discharge from the casing.

2. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, and means between the chambers whereby suction in the latter chamber will act to lift liquid from the first chamber for discharge from the casing, said means acting as a check to the flow of liquid from the liquid chamber.

3. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, means between the chambers whereby suction in the latter chamber will act to lift liquid from the first chamber for discharge from the casing and primary means for checking suction in the suction chamber and consequently checking the flow of liquid pumped, said first mentioned means providing a means auxiliary to the latter means for checking such flow.

4. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, means between the chambers whereby suction in the latter chamber will act to lift liquid from the first chamber for discharge from the casing, and control means for admitting air to the liquid chamber to displace the liquid pumped therefrom.

5. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, means between the chambers whereby suction in the latter chamber will act to lift liquid from the first chamber for discharge from the casing, and means for admitting air to the liquid chamber to displace the liquid pumped therefrom, said last mentioned means being adjustable whereby to regulate the discharge flow of liquid from the liquid chamber.

6. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein

closed with respect to each other, means between the chambers whereby suction in the latter chamber will act to pump liquid from the first chamber for discharge from the casing, a spring pressed suction operated valve controlling communication with the suction chamber, and a spring pressed valve for admitting air to the liquid chamber to displace the liquid pumped therefrom, the spring tension of the first valve being greater than that of the second.

7. A decarbonizer for internal combustion engines including a casing, a standpipe within the casing defining a liquid chamber therein and providing a suction chamber closed with respect to the liquid chamber, and a feed pipe connecting the chambers whereby suction within the latter chamber will pump liquid from the first chamber for discharge from the casing.

8. A decarbonizer for internal combustion engines including a casing having a liquid chamber and a suction chamber therein closed with respect to each other, means between the chambers whereby suction in the latter chamber will act to pump liquid from the first chamber for discharge from the casing, a closure plug for the casing, and a plug valve adjustable upon the closure plug for admitting air to the liquid chamber to displace the liquid pumped therefrom.

9. A device of the character described including a casing having a liquid chamber and a suction chamber closed with respect to each other, and means forming open communication between the chambers whereby suction in the latter chamber will act to pump liquid from the first chamber for discharge from the casing but wherein liquid in the first chamber cannot gravitate into the second chamber.

10. A device of the character described including a casing having a liquid chamber and a suction chamber, and a feed pipe connecting the chambers and forming open communication therebetween whereby suction within the latter chamber will pump liquid from the first chamber for discharge from the casing, but wherein liquid cannot gravitate from the first chamber into the second chamber.

In testimony whereof I affix my signature.

ADOLFO DE CLAIRMONT, M. D. [L. S.]