

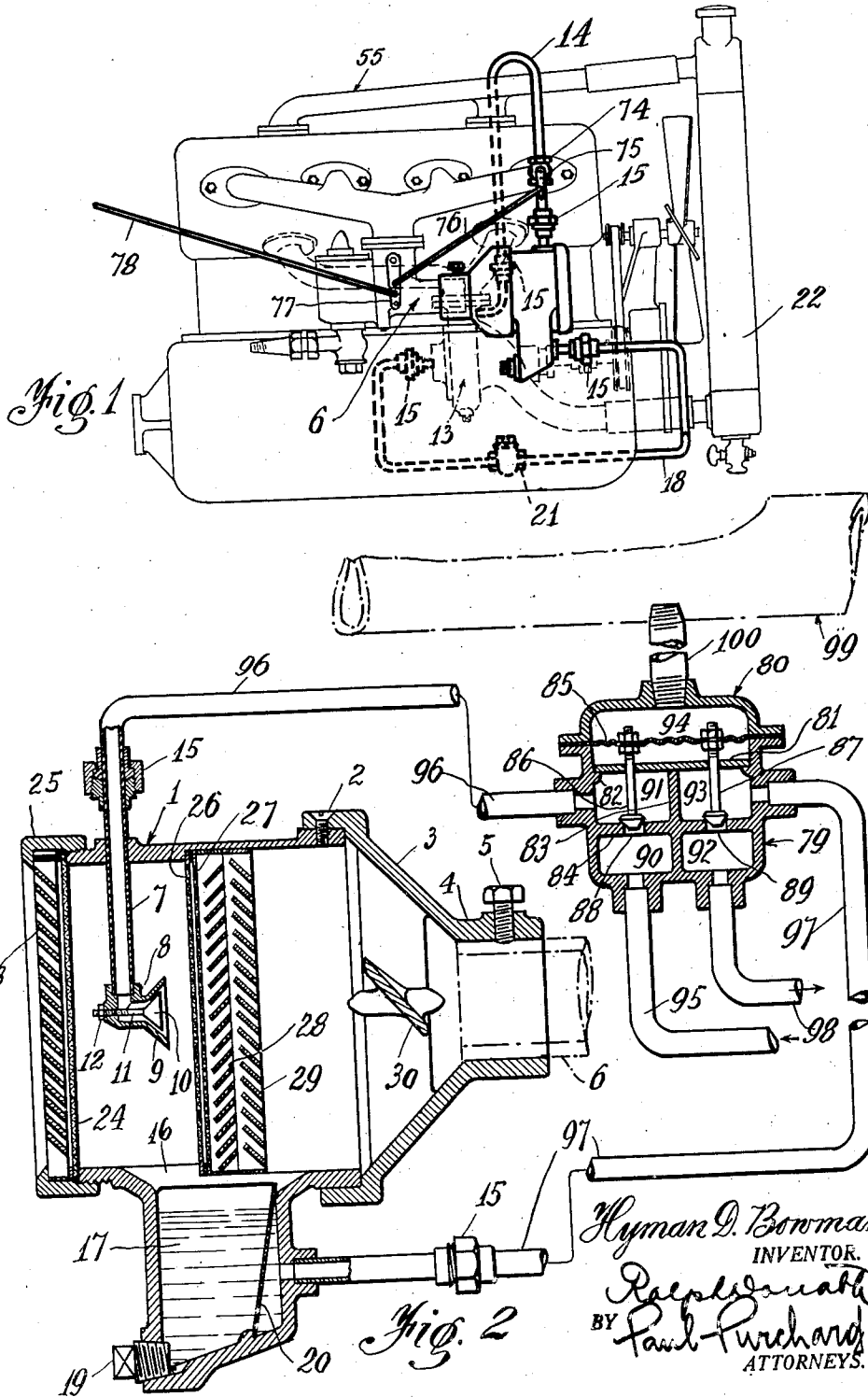
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AIR CONDITIONER FOR INTERNAL COMBUSTION ENGINES

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AIR-CONDITIONER FOR INTERNAL COMBUSTION ENGINES

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This invention relates to air conditioning devices for internal combustion engines, and in this application its use will be considered especially in connection with internal combustion engines for automobiles and the like.

One of the primary objects of this invention is to provide a device to be used in direct connection with the carburetor or the intake manifold of an internal combustion engine, whereby the air entering the engine at each suction stroke may be humidified to obtain the most favorable operating conditions. Another object of this device is to filter, or clean, the air before it enters the engine. Still another object of this invention resides in the provision of means whereby the air filters may be cleaned of all impurities accumulated thereon. Yet another object is to provide an air humidifying device which at the same time increases the temperature of the air entering the engine, thus improving the efficiency of the latter. A still further object of this invention relates to means for the manual, pedal, or automatic regulation of the air conditioning device.

Additional features and advantages of this invention will appear in the following description considered in connection with the accompanying drawing which forms a part of this application, and in which:

Fig. 1 is a general view showing the air-conditioning device applied to an internal combustion engine and provided with manual or pedal controlling means. The contour of the engine being drawn in light lines whereas the humidifying device and connected parts are shown in heavy lines, for the sake of clarity.

Fig. 2 is an enlarged view of the air-conditioner shown in Fig. 1, connected for full automatic control.

Referring to Figs. 1 and 2, the air-conditioner shown therein comprises a, preferably, cylindrical body 1 having secured at its rear end, by screws 2, a funnel shaped cap 3 provided with a bell 4 fastened by screws 5 to the air intake manifold of an internal combustion engine, or as shown, to the intake of its carburetor 6. Adjacent the front end

of the body is secured a water supply pipe 7 having at its inner end a spraying device disposed usually centrally of the body. This sprayer comprises an outer shell 8 fastened to the supply pipe and having a flaring nozzle 9 directed toward the rear. Cooperating with the nozzle is a conically shaped head 10 having a threaded shank 11 screwed into the shell 8 and lockable into adjusted position by a lock-nut 12. The supply pipe, in this embodiment, communicates with the pressure side of the water circulating pump 13 of the engine, Fig. 1, by means of the feed pipe 14 which is removably connected to the supply pipe 7 and to the pump by pipe unions 15.

At the bottom of the body there is a slot 16 which leads to a well 17 formed integrally with the body and which is intended to collect all the water delivered to the air-conditioner in excess of that sucked in by the engine. This well is connected by means of a return pipe 18 and unions 15 to the suction side of the pump 13, so that the surplus water delivered to the humidifier is returned into the water cooling system of the engine.

A clean out plug 19 is provided at the lowermost point of the well to remove therefrom all sediment of foreign matter which may have accumulated therein. A screen 20 is also used in the well to prevent the entrance of said sediment into the water circulating system of the engine. A check valve 21, of any desired and suitable commercial type is placed in the line 18 to keep water in the radiator 22 and in the pump from running into the well 17 and overflowing therefrom, when the engine is at standstill.

Before air is drawn into the engine, it must pass through the body portion of the air conditioner and, in order to properly direct said air and remove dust and other foreign matter entrained by it, the front end of the body is provided with louvers 23 and with a wire screen 24 of suitable fineness, removably secured to the body by means of the annular rim 25 screwed on the body 1, or otherwise secured thereto.

The spray of water emerging from the

sprayer is mixed with the inducted air and then passes through a series of screens and baffles to remove from the humidified air all of the globules of water too large to be readily vaporized by the engine. In Fig. 2 two sets of screens 26, 27 are shown in combination with two sets of oppositely directed baffles 28, 29, fitted within the body 1. The drops of water striking the baffles drain into the well 17 to be returned into the water circulating system.

Within the cap 3 is preferably produced a spider having spirally shaped blades 30, the purpose of which is to whirl the humidified and cleaned air before entering the carburetor or intake manifold and thus produce a more uniform mixture.

The supply of water to the air-conditioner may be regulated either by hand, foot or automatically.

In Fig. 1, the amount of water delivered to the air conditioner is regulated by means of a valve or cock 74, placed in the pipe 14; the handle 75 of this cock is hingedly connected by a link-bar 76 to the throttle-lever 77 of the carburetor 6. As is well known, the throttle lever is operated by the driver of an automobile either by a foot actuated mechanism or by hand, through the throttle-rod 78.

In this arrangement, the amount of water delivered is directly governed by the throttle valve, which also controls to a great extent the operation of the engine.

The control mechanism shown in Fig. 2 is fully automatic, being actuated by the fluid pressure prevailing in the intake manifold. The control valve consists of a housing 79 having a cover 80 and an internal separator 81 supported by a bead 82 and the vertical partition 83 formed integrally with the housing. In the latter is also provided a transverse web 84, and between the cover and the flange of the housing is inserted a valve diaphragm 85 in which are adjustably mounted the high and the low pressure valves 86, 87 respectively. These valves are suitably guided by the separator 81 and are adapted to engage valve openings 88, 89 provided in the web. The various above mentioned partitions divide the control device into the lower and upper high-pressure chambers 90, 91, the lower and upper low-pressure chambers 92, 93, and the diaphragm chamber 94.

The high-pressure side of the water circulating pump of the engine is connected by a pipe 95 to the lower chamber 90; and a pipe 96 connects the upper high-pressure chamber 91 with the supply pipe 7 of the air-conditioner. The surplus water in the well 17 of the air-conditioner flows through a pipe 97 to the upper low-pressure chamber 93 and is then returned, via the chamber 92, to the suction side of the circulating pump by

the pipe 98. The upper side of the diaphragm chamber 94 is connected to the intake manifold 99 of the engine by a pipe 100.

The tendency of the diaphragm 85 is to normally force both valves 86, 87 on their respective seats or apertures 88, 89. However, when the engine operates, the partial vacuum created in the intake manifold will cause the diaphragm to raise, thus opening the valve apertures and establishing the water circulation from the pump 13 to the air-conditioner and back to the pump. The amount of water going through the air-conditioner is, therefore, directly and automatically regulated by the suction in the intake manifold.

In an engine provided with an air-conditioner of the type shown in Figs. 1 and 2, the water issuing in spray form from the spray-nozzle 9 will further be atomized while passing through the screens and baffles of this device by the strong air current induced by the suction of the engine, before it enters the latter.

Although mention has only been made of the use of the air-conditioners in connection with engines already provided with a water cooling system, it is evident that air-conditioners could be applied to air cooled engines by providing the latter with suitable water storage tanks and, where required, with special water circulating pumps driven in any suitable manner by the engines. Also, if desired, suitable chemicals could be added to the water for the conditions to improve the performance of the engine, or increase the absorption of deleterious gases, as the case may be.

Moreover, by using the hot water of the engine's circulating system, the air conditioner, in addition to purifying and humidifying the air required by the engine, will also heat said air to a certain extent, thus improving the performance and efficiency of the engine.

As will be understood, as suggested herein, there may be slight changes made in the construction and arrangement of the details of this invention without departing from the field and scope of the same, and it is intended to include all such variations, as fall within the scope of the appended claims, in this application in which only a few of the embodiments of this invention have been disclosed.

I claim:

1. In combination with an internal combustion engine having a water circulating pump, an air intake device in communication with the intake manifold of said engine; a plurality of air screens positioned in spaced relation within the air intake device; a water sprayer positioned in said air intake device intermediate said screens; a well adapted to receive the surplus water delivered by the sprayer; a pipe line connecting said sprayer with the high pressure side of said pump;

another pipe line connecting said well with the suction side of the pump, and means actuated by the suction pressure of said engine to regulate the flow of water to the sprayer.

5 2. In combination with an internal combustion engine having a water circulating pump, an air intake device in communication with the intake manifold of said engine; a plurality of air screens positioned in spaced
10 relation within the air intake device; a water sprayer positioned in said air intake device intermediate said screens; a well adapted to receive the surplus water delivered by the sprayer; a pipe line connecting said sprayer
15 with the high pressure side of said pump; another pipe line connecting said well with the suction side of the pump, and unitary means to automatically regulate the flow of water to said spray and from said well.

20 3. In combination with an internal combustion engine having a water circulating pump, an air intake device in communication with the intake manifold of said engine; a plurality of air screens positioned in spaced
25 relation within the air intake device; a water sprayer positioned in said air intake device intermediate said screens; a well adapted to receive the surplus water delivered by the sprayer; a pipe line connecting said sprayer
30 with the high pressure side of said pump; another pipe line connecting said well with the suction side of the pump, and unitary means actuated by the suction pressure of said engine to simultaneously regulate the
35 flow of water to said sprayer and from said well.

4. In combination with an internal combustion engine having a water circulating pump, an air intake device in communication
40 with the intake manifold of said engine; a plurality of air screens positioned in spaced relation within the air intake device; a water sprayer positioned in said air intake device intermediate said screens; a well adapted to
45 receive the surplus water delivered by the sprayer; a pipe line connecting said sprayer with the high pressure side of said pump; another pipe line connecting said well with the suction side of the pump; and means ac-
50 tuated by the suction pressure of said engine to regulate the flow of water to the sprayer and from said well.

5. In combination with an internal combustion engine having a water circulating
55 pump, an air intake device in communication with the intake manifold of said engine; a plurality of air screens positioned in spaced relation within the air intake device; a water sprayer positioned in said air intake device
60 intermediate said screens; a well adapted to receive the surplus water delivered by the sprayer; a control mechanism adapted to regulate the flow of water to said sprayer and from said well; means to connect said mech-
65 anism to the intake manifold; a diaphragm

in said mechanism responsive to the pressure prevailing within the intake manifold; said control mechanism being divided into two sets of compartments; a pipe line connecting
70 said sprayer to one of said compartments and to the high pressure side of said pump; another pipe line connecting said well to the other compartment in the control mechanism and to the suction side of said pump, and in-
75 dividual valves severally mounted on said diaphragm and adapted to simultaneously regulate the flow of water to said sprayer and from said well.

In testimony whereof I affix my signature.

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