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STEAM CONDENSER, AIR CLEANER, AND HUMIDIFIER FOR INTERNAL COMBUSTION ENGINES.  
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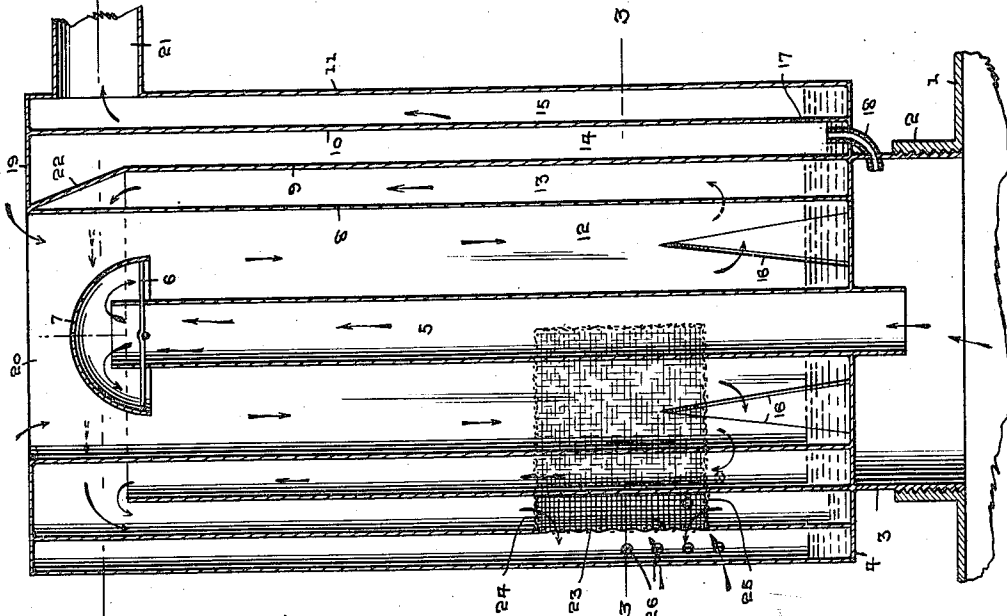
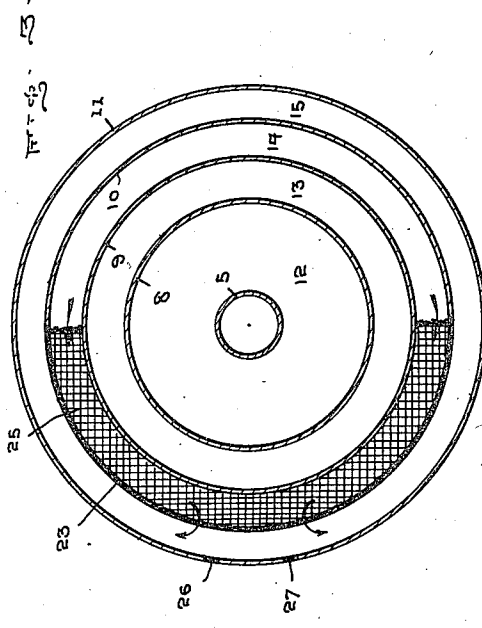
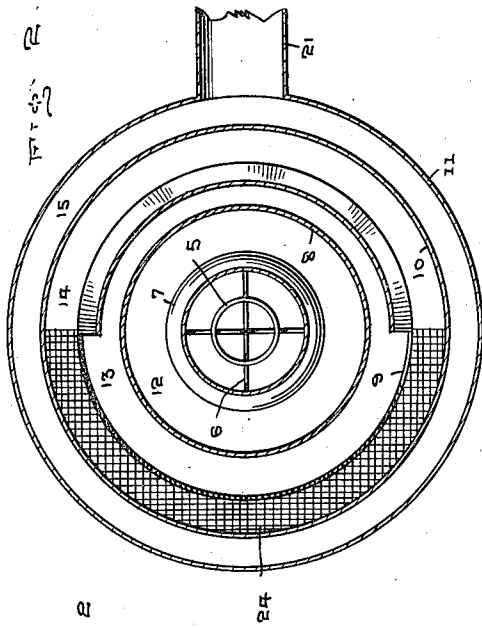


FIG. 1.

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# UNITED STATES PATENT OFFICE.

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STEAM-CONDENSER, AIR-CLEANER, AND HUMIDIFIER FOR INTERNAL-COMBUSTION ENGINES.

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*To all whom it may concern:*

Be it known that I, JESSE D. LANGDON, a citizen of the United States, residing at Waterville, in the county of Douglas and State of Washington, have invented certain new and useful Improvements in Steam-Condensers, Air-Cleaners, and Humidifiers for Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a steam condenser air cleaner and humidifier for internal combustion engines, and has among its several objects the production of a device designed to be connected with the water circulating system and also with the carbureter of an engine and constructed in a manner whereby steam that has been created in the water circulating system of the engine will be drawn into the device by the velocity of and into actual contact with the air which is drawn through the device by the suction of the engine thereby condensing the steam and clarifying the air of all foreign matter and precipitating the water of condensation and foreign matter to the bottom of the device and subsequently returning clear water to the circulating system from which it originally issued in the form of steam.

Other objects of this invention are attained by providing the device with means for causing the air to travel through the device in a multiplicity of varying directions and for humidifying and reducing the temperature of the clarified air so that the same will pass from the device to the carbureter in a condition to produce a more highly efficient explosive mixture for the engine.

Another object of this invention is to provide a device of this character which is simple in construction, efficient and durable, economical to manufacture, and which can be readily installed in any of the internal combustion engines now in use or which may be built in the engine structure during its course of manufacture.

These and other objects and advantages will more fully appear as the nature of the invention is more clearly understood from the following description taken in connection with the accompanying drawings wherein there is disclosed one embodiment of the invention, but which is susceptible to numer-

ous alterations and variations therein to meet the exigencies of the case without departing from the spirit of the invention or exceeding the scope of the claims.

In the drawings:

Figure 1 is a vertical sectional view drawn centrally through the device and showing the detail construction thereof.

Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view on line 3—3 of Fig. 1.

I desire to here state that I have adopted the form of my invention shown in the drawings and to be hereinafter described for the sake of clearness and convenience in illustrating my invention, and that the form which I have adopted is primarily designed for use in connection with high power tractors such as are used upon the plains for drawing heavy loads, gang plows and the like, but that the same is capable of being modified in construction and size to readily adapt the same to internal combustion engines of lesser power for drawing lighter loads.

Referring to the drawings, wherein similar reference characters denote corresponding parts throughout the several views, 1 denotes the top of the radiator provided with the internally threaded nipple 2 which surrounds the filler opening of the radiator 1, and screw threaded within the nipple 2 is the threaded end of the connecting tube 3 having its upper end suitably secured to or formed with the plate 4 which constitutes the bottom of the device or condenser.

Mounted centrally through the bottom 4 and projecting for a distance into the connecting tube 3 is the upwardly extending tube 5 having suitably secured in its upper portion the frame or spider 6 upon the outer ends of the arms of which is secured the edge of the substantially semi-spherical dome 7 which is supported by and maintained in spaced relation to the upper end of the tube 5 by the frame or spider 6 with the upper end of the tube 5 projecting for a distance within the dome 7. Also mounted upon the plate or bottom 4 and extending upwardly therefrom are the plurality of tubes or cylinders 8, 9, 10 and 11. The tubes or cylinders 8, 9, 10 and 11 are disposed in consecutive concentric relation to the tube 5 and to each other and

are also disposed in suitable spaced relation from the tube 5 and from each other so as to provide a plurality of consecutive compartments 12, 13, 14 and 15 therebetween and for establishing communication between the compartments 12 and 13 there is provided in the lower portion of the tube 8 the plurality of elongated substantial inverted V-shaped openings 16, and for establishing communication between the compartments 14 and 15 there is provided in the lower portion of the cylinder 10 somewhat remote from its lower edge one or more apertures 17, and for establishing communication between the lower portion of the compartment 14 and the upper interior of the connecting tube 3 and at a point above the plane of the lower and the inlet end of the tube 5 is provided the elbow pipe 18 which projects through a side of the connecting tube 3 and upwardly through the bottom 4 and extends for a distance upwardly within the lower portion of the compartment 14 and above the bottom 4 so as to provide for the return of clear water of condensation from the compartment 14 to the connecting tube 3 and thence into the radiator 1 and free from all sediment or foreign matter.

The cylinders 8, 10 and 11 are of the same length or height and are provided at their upper ends with the ring shaped top 19 for closing the compartments 13, 14, and 15 to the outside atmosphere while the edge of the central opening 20 in the top 19 establishes free communication between the compartment 12 and the outside atmosphere so as to freely admit atmospheric air through the opening 20 into the compartment 12 and after the air travels through the device, in a manner to be hereinafter described, the air is subsequently conveyed through the outlet pipe 21 secured in the upper portion of the cylinder 11 at one side of the device and to the air intake of the carbureter (not shown) of the engine. The tube 5 and its dome 7 and the upper end of the cylinder 9 terminate at a point and at a suitable distance below the plane of the top 19 and the upper ends of the cylinders 8, 10 and 11, and secured to or otherwise formed upon the upper edge or end of the cylinder 9 at the side adjacent the outlet pipe 21 and extending around the upper edge of the cylinder 9 for substantially half of its circumference and also extending upwardly and inwardly in an inclined direction with its upper edge suitably secured to the point of juncture of the upper end of the cylinder 8 and the edge of the opening 20 of the top 19 is the deflector plate 22, the remaining portion of the upper edge of the cylinder 8 establishing free communication between the compartments 13 and 14.

Formed in the cylinder 10 preferably in the lower portion thereof and at a suitable

distance from the bottom 4 is the screened opening 23, which may be of any suitable width and extending substantially halfway around the circumference of the cylinder 10 and may be provided with the upper screen member 24 and the lower screen member 25 which extend across the compartment 14 and from the cylinder 9 to the cylinder 10. The screened opening 23 establishes communication between the compartments 14 and 15 and is preferably positioned at a point in diagonal or oblique relation to the outlet pipe 21 and the deflector plate 22. Formed through the cylinder 11 preferably at points substantially opposite and slightly below the screened openings 23 of the cylinder 10 are preferably two sets of minute apertures 26 and 27, only one set being shown in Fig. 1 but both sets being shown in Fig. 3, and each of these sets of apertures 26 and 27 being formed of a plurality of parallel spaced vertical apertures and downwardly and obliquely disposed apertures extending outwardly from the respective vertical apertures and in opposite directions to each other. These apertures 26 and 27 establish communication between the compartment 15 and the outside atmosphere which is drawn through the apertures and into contact with the clarified and humidified air issuing through the screen 23 for refrigerating the air, and while I preferably form and position the same in the manner shown in the drawings I may, however, provide a greater or less number of these apertures 26 and 27 and position the same at any other suitable and desirable points upon the cylinder 11 to meet the exigencies of the case or I may dispense with these apertures if the use and employment of the device requires the omission of these apertures.

The application and operation of the device will be briefly described as follows:

Assuming the device to be secured in the upper end of a radiator with the air pipe 21 connected with the air intake of a carbureter, it will be seen that when the engine is started suction will be created in the pipe 21 and consequently through the device so that atmospheric air will be drawn through the air intake 20 into the compartment 12 and the air in its onrush through this compartment will create a vacuum in the suction cap or hood 7 for drawing the steam upwardly through the tube 5 from the radiator 1. The steam and air is then drawn through the openings 16 into the compartment 13 and upwardly against the deflector plate 22 so that the air and such uncondensed steam contained therein will be thrown across and into the compartment 14 at a point opposite to the suction pipe 21, the air and such moisture as it may contain is then drawn downwardly and through the screened opening 23 into the compartment

15 and at a point obliquely opposite to the air pipe 21. As the air and moisture issues through the screened opening 23 the same will be subjected to streams of atmospheric air issuing from the apertures 26 and 27 in a manner to refrigerate or materially reduce the temperature of the air and moisture, the air being then drawn through the compartment 15 and obliquely upwardly and through the suction pipe 21. During this operation the steam is thoroughly condensed and the water of condensation will descend to the bottom of the respective compartments as will also be carried downwardly to the bottom of the compartments any foreign matter such as dust, dirt, trash, etc., the foreign matter settling upon the bottom of the compartments the condensed water being conveyed from the lower portion of the compartment 14 into the radiator by the drain pipe 18 having its upper end projecting sufficiently upward into the compartment 14 so as to form a trap to prevent any foreign matter passing therethrough.

The compartments communicate in substantially alternating pairs, that is, the compartments 12 and 13 communicate at their lower ends by the provision of the inverted V-shaped slots 16, the compartments 13 and 14 by the cylinder 9 terminating at a point remote from the top of the device and the compartments 14 and 15 by the provision of the screened opening in one side of the cylinder 10 and there is also formed through the cylinder 10 remote from its bottom edge the aperture 17 which allows any water of condensation which has collected in the bottom of the compartment 15 above a certain quantity to pass into the lower portion of the compartment 14, the V-shaped slots being provided so that should the level of the water of condensation be above the height under ordinary conditions in the lower portions of the compartments 12 and 13, the passage of the air and steam through the slots 16 would be more restricted as the level of the water is raised so that the force of the air will be increased through these slots by the suction and will carry the surplus water upwardly through the compartment 13 and over into the compartment 14.

It will be seen that by the use of my device the steam will be efficiently condensed and the air thoroughly clarified, humidified and refrigerated, or reduced in temperature for the purposes sought in a very expeditious manner.

While I have shown and described the employment of four cylinders 8, 9, 10 and 11 I may either decrease or increase the number of these cylinders in accordance with the character of the engine to which the same is applied and in accordance with the amount of work required by the engine, and while the device is primarily designed

for the engines of motor vehicles and the like the same is equally applicable to stationary internal combustion engines and other devices employing air such as air motors, air compressors and the like. Again, the device is capable of trapping and retaining a large amount of foreign matter which has been filtered from the air, but when it is desirable or deemed necessary to clean the device of the accumulation of foreign matter it is only necessary to temporarily detach the device and remove the foreign matter therefrom by rinsing the device with water and thereafter replace the device in operative position.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character specified, the combination of a casing having means for connecting the same to a steam generating device and an air suction device, walls within said casing to provide compartments having communication with each other, a steam tube projecting into the central compartment, a vacuum producing member upon said steam tube, an air intake port for the admission of air into said central chamber for drawing the steam out of said steam tube, and a screen member at the opening between the two outer compartments within said casing.

2. In a device of the character specified, the combination of a casing having means for connecting the same to a steam generating device and an air suction device, walls within said casing to provide compartments having communication with each other, a steam tube projecting into the central compartment, a vacuum producing member upon said steam tube, an air intake port for the admission of air into said central chamber for drawing the steam from said steam tube, a screen member at the opening between the two outer compartments within said casing, and an air inlet in the outer wall of said casing for projecting air against said screen.

3. In a device of the character specified, the combination of a casing, means for connecting said casing with a steam generating device, means for connecting said casing with an air suction device, a plurality of walls within said casing arranged in spaced relation to each other to provide a plurality of chambers within said casing, said chambers communicating with each other at opposite ends, a steam tube communicating with a source of steam and projecting through the bottom of said casing and for a distance into the central chamber of said casing, a vacuum producing member upon the end of said steam tube within the central casing, an intake port in the top of said casing to provide for the drawing of atmospheric air into said central chamber

and the steam from said steam tube into said central casing, inverted V-shaped slots in the lower portion of the innermost wall to allow the air and steam to pass from the central chamber into the second chamber, a deflector plate upon a portion of the upper edge of the second wall for deflecting the air and steam over one side of the upper edge thereof and into the third chamber, and a screened opening in the lower portion of the third wall for establishing communication between the third and fourth chambers, said fourth chamber communicating with the air suction means at a point obliquely opposite to said screened opening.

4. In a device of the character specified, the combination of a casing, means for connecting said casing with a steam generating device, means for connecting said casing with an air suction device, a plurality of walls within said casing arranged in spaced relation to each other to provide a plurality of chambers within said casing, said chambers communicating with each other at opposite ends, a steam tube communicating with a source of steam and projecting through the bottom of said casing and for a distance into the central chamber of said casing, a vacuum producing member upon the end of said steam tube within the central casing, an intake port in the top of said casing to provide for the drawing of atmospheric air into said central chamber and the steam from said steam tube into said central casing, inverted V-shaped slots in the lower portion of the innermost wall to allow the air and steam to pass from the central chamber into the second chamber, a deflector plate upon a portion of the upper edge of the second wall for deflecting the air and steam over one side of the upper edge thereof and into the third chamber, a screened opening in the lower portion of the third wall for establishing communication between the third and fourth chambers, and air ports in the outer shell of said casing for the admission of additional atmospheric air into the outermost chamber for contacting with

the air and moisture within the outermost chamber.

5. The combination with the water circulating system and carbureter of an internal combustion engine, of a casing provided with means for connecting the same with the water circulating system and the air intake of the carbureter, a plurality of chambers within said casing, means to establish communication between said chambers, means for conducting steam into one of said chambers, means for the admission of air into the chamber surrounding the steam conducting means in a direction opposite to the direction of the flow of steam, a foraminous outlet between a certain two of said chambers, and means for admitting additional atmospheric air to commingle with the air and moisture issuing from said foraminous opening.

6. The combination with the water circulating system and carbureter of an internal combustion engine, of a casing provided with means for connecting the same with the water circulating system and the air intake of the carbureter, a plurality of chambers within said casing, means to establish communication between said chambers, means for conducting steam into one of said chambers, means for the admission of air into the chamber surrounding the steam conducting means in a direction opposite to the direction of the flow of steam, a foraminous outlet between a certain two of said chambers, means for admitting additional atmospheric air to commingle with the air and moisture issuing from said foraminous opening and means for automatically returning the water of condensation to said water circulating system.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JESSE D. LANGDON.

Witnesses:

ROBT. T. LANG,  
J. H. REID.