Feb. 11, 1941. R. C. JEPERTINGER 2,231,501

AIR SEPARATOR FOR FLUID CIRCULATING SYSTEMS

Filed Jan. 29, 1938

Fig. 1.

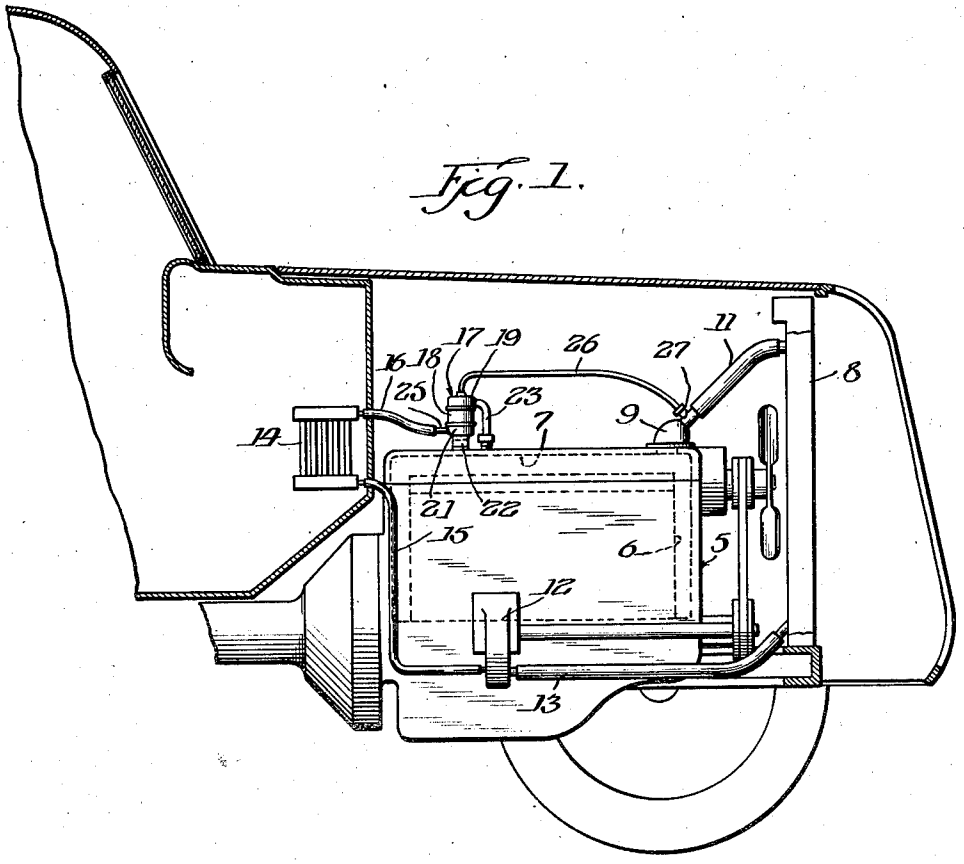


Fig. 2.

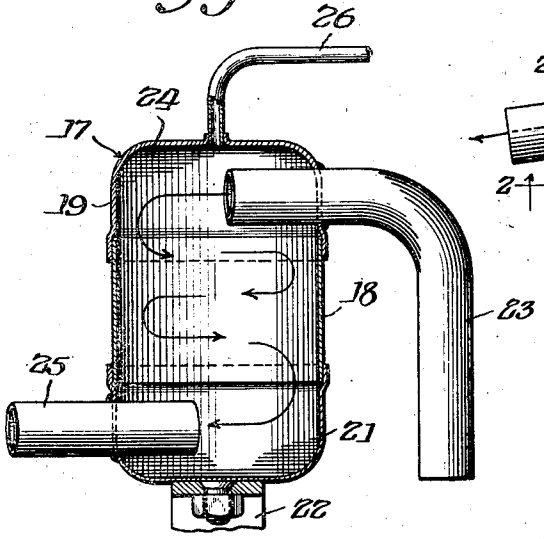
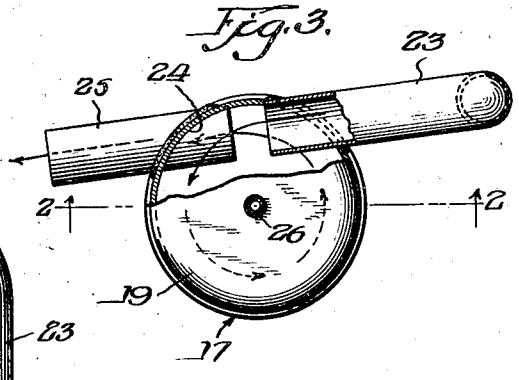


Fig. 3.



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AIR SEPARATOR FOR FLUID CIRCULATING SYSTEMS

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8 Claims. (Cl. 237—12.3)

This invention relates to air separators, and particularly to devices for separating air from fluid in a circulating system.

One object of the present invention is to provide a novel construction and arrangement for automatically removing air from fluid of a circulating system while the system is in operation.

Another object of the invention is to provide a novel construction and arrangement whereby the removal of the air from the fluid is facilitated by the operation of the system.

Another object of the invention is to provide novel means in a fluid circulating system having a heat exchange device operatively related thereto, whereby air is removed from the fluid of the system before entering the heat exchange device.

Another object of the invention is to provide a device of novel construction for producing a swirling movement of the fluid in a portion of a fluid circulating system and removing an accumulation of air from said device.

A further object of the invention is to provide an air separator of novel construction, which may be readily installed in a fluid circulating system for removing air from the fluid circulating therethrough.

A still further object of the invention is to improve devices of the character described in sundry details hereinafter referred to and particularly pointed out in the appended claims.

The present invention is particularly applicable for use in conjunction with the fluid circulating systems employed for cooling motor vehicle engines, wherein car heating units or heat exchange devices are employed, as it has been found that in modern automobiles, the engines are located lower in the chassis and the pumps of the cooling systems are of increased capacity. These features in modern automobile construction cause air to accumulate in the heads of engines, which, with the fluid, is then circulated by sheer force of the pump through the hot water heater, causing a very objectionable gurgling sound in and adjacent the heater.

To overcome this objectionable condition, a novel air separator was devised for separating the air from the fluid before the fluid was permitted to enter the heater, and in the present instance, this novel air separator will be described in its relation to the cooling system of an automobile engine, and in the arrangement shown in the accompanying drawing, in which,

Fig. 1 is a sectional elevational view of a portion of a motor vehicle showing the vehicle engine and associated parts mounted therein, and illustrating the application of my improved air separator thereto;

Fig. 2 is an enlarged sectional elevational view of the air separator illustrated in Fig. 1, and taken substantially as indicated by line 2—2 of Fig. 3; and

Fig. 3 is a plan view partly in section of the structure illustrated in Fig. 2.

As illustrated in Fig. 1 of the drawing, the present invention is shown in relation to the cooling system of an automobile engine indicated, as a whole, by the numeral 5, and having a water jacket 6 formed therein extending into the head of the engine, as indicated at 7, the water jacket 6—7 being connected to the upper portion of a radiator 8 by means of a connection comprising a thermostat housing 9 and hose connection 11 operatively related thereto, and with the lower end portion of the radiator by means of a pump 12 and hose connection 13.

The structure shown in Fig. 1 also illustrates a heat exchange device or hot water heater 14 positioned within the automobile body and connected to the pump 12 by means of a hose or other conduit 15, the said heater 14 being arranged to communicate with the portion 7 of the water jacket through a hose 16 and through my improved air separator comprising, preferably, a closed receptacle indicated, as a whole, by the numeral 17, and having a middle portion 18 and substantially cup-shaped upper and lower end portions 19 and 21 connected thereto, as illustrated in Fig. 2, the end portion 21 being adapted to be supported, preferably, on the head of the engine by means of a bracket 22 to provide a stable mounting for the separator.

As illustrated in Figs. 1 and 2, the separator or receptacle 17 is provided with an inlet pipe 23 communicating at one of its ends with the portion 7 of the water jacket formed in the head of the engine block, and at its opposite end with the receptacle 17 adjacent the upper portion thereof and, preferably, at one side thereof adjacent a wall portion of the receptacle, as illustrated in Fig. 3 or, in other words, on a line offset from the center of the receptacle or tangential to an arc struck from the center thereof, in a manner to produce a swirling movement of the fluid within the receptacle, the cylindrical inner wall portion 24 (Fig. 3) of the receptacle adjacent the discharge end of the inlet pipe 23 providing means for changing the direction of flow of the fluid as it enters the receptacle.

The receptacle 17 is also provided with an outlet pipe 25 communicating at one of its ends

with the heater 14 through the hose 16, and at its opposite end with the receptacle adjacent a portion thereof below the level of the inlet 23, and, preferably, adjacent a wall portion of the receptacle, as illustrated in Fig. 3 or, in other words, on a line offset from the center of the receptacle or tangential to an arc struck from the center thereof, and in a line substantially common to the direction of movement of the fluid in the receptacle adjacent the receiving end of the outlet pipe.

Operatively related to the receptacle 17 and communicating therewith at one of its ends and, preferably, adjacent the upper portion of the receptacle, is an air conduit 26, the opposite end of the conduit being adapted to communicate, preferably, with the connection between the portion 7 of the water jacket and radiator 8, as indicated at 27, preferably, adjacent the discharge side of the thermostat housing or casing 9 to remove air from the upper portion of the receptacle 17.

It will be observed from the foregoing description that by circulating the cooling fluid through the receptacle 17, particularly in a manner to produce a swirling movement of the fluid, the air contained within the fluid may be separated during such movement, and rising to the upper portion of the receptacle 17, the air may be removed therefrom through the conduit 26 and returned to the cooling system, preferably on the discharge side of the thermostat housing and thence through the hose connection 11 into the radiator 8 where it may escape to the atmosphere through the usual overflow pipe.

It will be observed also that the present invention provides a novel construction and arrangement for separating air from the fluid of the circulating system, as illustrated in the drawing, before the fluid enters the heater 14, thereby eliminating the objectionable gurgling sound within the heater due to the reasons already assigned.

Obviously, the present invention is not limited to the precise construction and arrangement shown and described as the same may be variously modified. Moreover all the features of the invention need not be used conjointly as the same may be used to advantage in variously different combinations and sub-combinations.

What I claim as new and desire to secure by Letters Patent is:

1. In the fluid circulating system of a motor vehicle engine having a water jacket, a radiator and car heater operatively connected thereto, and a pump for circulating fluid through said system, an air separator comprising a receptacle having inlet and outlet ports operatively connected, respectively, to said water jacket and heater, and an air conduit connected adjacent one of its ends to and communicating with said receptacle and at its opposite end to the connection between said radiator and water jacket.

2. In the fluid circulating system of a motor vehicle engine having a water jacket, a radiator and car heater operatively connected thereto, and a pump for circulating fluid through said system, an air separator comprising a closed receptacle forming a portion of the connection between said water jacket and heater and having inlet and outlet ports operatively connected, respectively, to said water jacket and heater, and an air conduit connected adjacent one of its ends to and communicating with the upper portion of said receptacle and at its opposite end to the connection between said radiator and water jacket.

3. In the fluid circulating system of a motor vehicle engine having a water jacket and a thermostat casing associated therewith, a radiator and car heater operatively connected to said water jacket, and a pump for circulating fluid through said system, a centrifugal air separator comprising a closed receptacle forming a part of the connection between said water jacket and heater, an inlet pipe communicating with the water jacket and said receptacle adjacent the upper portion thereof, an outlet pipe communicating with said heater and with the receptacle at a level below the level of said inlet, said outlet pipe extending outwardly from the receptacle on a line offset from the center thereof and adjacent the wall portion of the receptacle, and an air conduit connected adjacent one of its ends to and communicating with the upper portion of said receptacle and at its opposite end to the connection between said radiator and water jacket at the discharge side of said thermostat casing.

4. In the fluid circulating system of a motor vehicle engine having a water jacket and a thermostat casing associated therewith, a radiator and car heater operatively connected to said water jacket, and a pump for circulating fluid through said system, a centrifugal air separator comprising a closed cylindrical receptacle forming a part of the connection between said water jacket and heater, an inlet pipe communicating with the water jacket and said receptacle and extending into the receptacle on a line offset from the center and adjacent the wall portion thereof, an outlet pipe communicating with said heater and with the receptacle at a level below the level of said inlet, said outlet pipe extending outwardly from the receptacle on a line offset from the center thereof and adjacent the wall portion of the receptacle, and an air conduit connected adjacent one of its ends to and communicating with the upper portion of said receptacle and at its opposite end to the connection between said radiator and water jacket at the discharge side of said thermostat casing.

5. In a fluid cooling and circulating system of an internal combustion engine having a water jacket, a radiator and heater operatively connected to said water jacket, and a pump for circulating the fluid through said system, the combination of a centrifugal air separator comprising a closed receptacle forming a part of the connection between said water jacket and heater, an inlet pipe communicating with the water jacket and with said receptacle adjacent the upper portion thereof and extending on a line offset from the center of said receptacle, an outlet port communicating with said heater and with the receptacle at a level below the level of said inlet and on a line offset from the center of the receptacle, and an air conduit connected adjacent one of its ends to and communicating with the upper portion of said receptacle and at its opposite end to the connection between said radiator and water jacket.

6. In an automotive vehicle having an internal combustion engine and a water circulating system, and a passenger compartment heater connected in the engine circulating system the combination of a cylindrical tank joined in series to the supply side of said heater for separating air from water, said tank having an inlet and outlet pipe tangentially joined to the outer pe-

riphery adjacent the upper and lower portions thereof, respectively, and an air by-pass tube shunted from the uppermost portion of said tank to said circulating system beyond said heater.

7. In the fluid circulating system of a motor vehicle engine including a water jacket and having a car heater operatively connected to said system, and a pump having intake and discharge sides for circulating fluid through said system, an air separator comprising a receptacle having inlet and outlet ports operatively connected, respectively, to said water jacket and heater, and an air conduit connected adjacent one of its ends to and communicating with said receptacle and at its opposite end with a portion of said system between said jacket and the intake side of said pump.

8. In the fluid circulating system of a motor vehicle engine having a water jacket, radiator, car heater and pump forming parts of said system, an air separator comprising a receptacle having inlet and outlet ports operatively connected, respectively, to said water jacket and heater, and an air conduit communicating with said receptacle and with said system between said jacket and the intake side of said pump.

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