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S. H. SMITH ET AL

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RADIATOR AND CYLINDER BLOCK CLEANER

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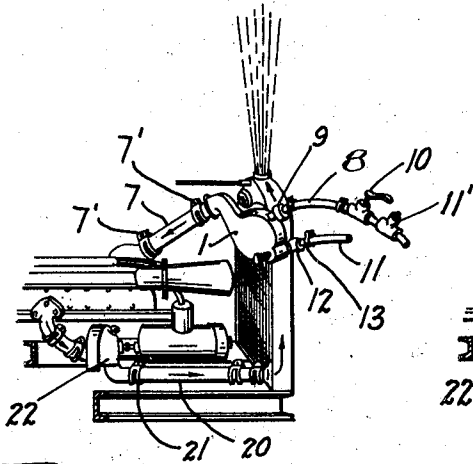


FIG. 3.

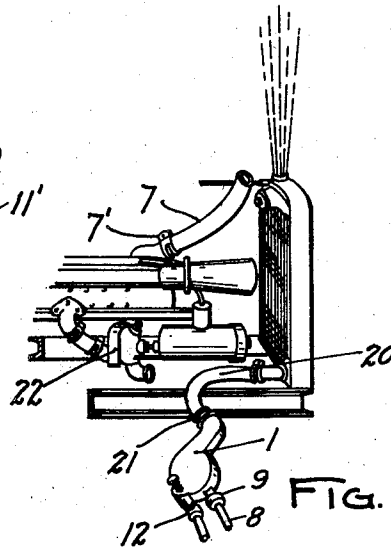


FIG. 4.

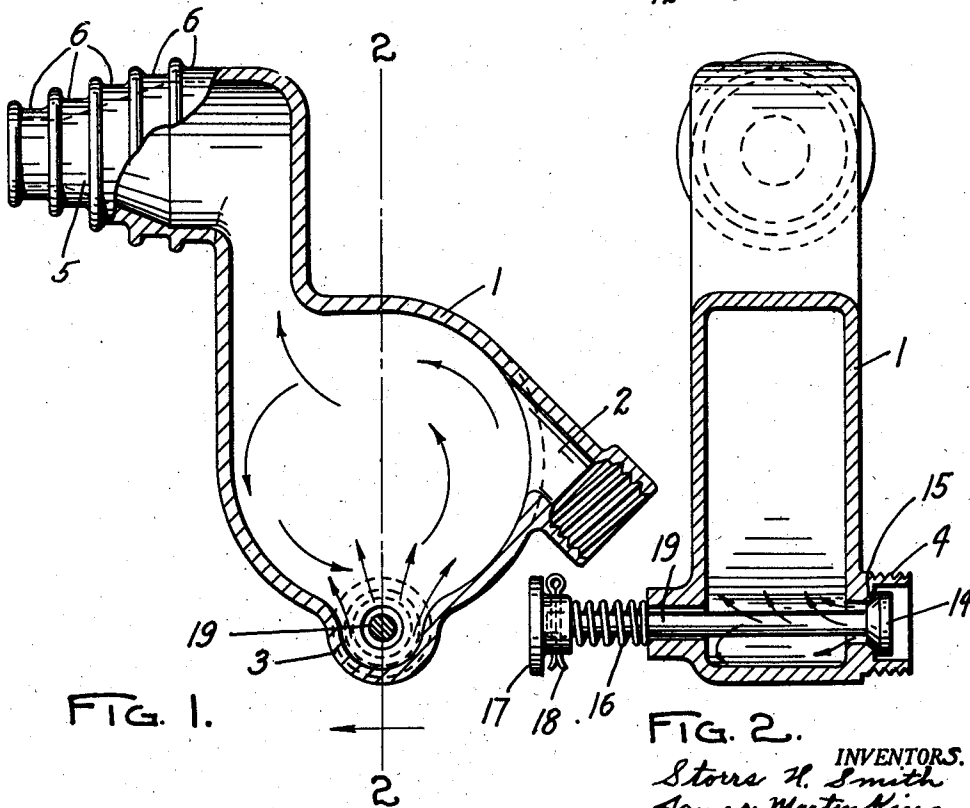


FIG. 1.

FIG. 2.

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RADIATOR AND CYLINDER BLOCK CLEANER

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This invention relates to radiator and cylinder block cleaning devices and more especially to such devices which are operated by the combination of water and compressed air.

The object of this invention is to provide a radiator and cylinder block cleaner which will clean dirty or clogged radiators and cylinder blocks.

A further object is to provide a radiator and cylinder block cleaner which may be used to clean the radiator and cylinder block of an automotive vehicle or water cooled stationary engine without the removal of the radiator and cylinder block, or either of them.

A further object is to provide a radiator and cylinder block cleaner which may be operated in any garage or repair shop that is provided with compressed air and with water.

A further object is to provide a radiator and cylinder block cleaner which will fit any standard radiator or cylinder block hose connection.

A further object is to provide such a cleaner so simple to operate that any ordinary shopman without special experience in cleaning radiators or cylinder blocks may successfully operate it.

A further object is to provide such a cleaner in the operation of which no chemical and no boiling process is required.

A further object is to provide such a cleaner which without injury to the radiator will remove scale, rust, alkali and sediment not only from the radiator but from the cylinder block and from the entire cooling system. A further object is to provide an air and water operated radiator and cylinder block cleaner in which the construction is such as to pass through the radiator a cleaning fluid composed of water charged with air bubbles under pressure, whereby a vibratory concussive cleaning effect is produced.

The details of construction by which the above results are obtained are fully described below, and are illustrated in the drawings, in which:—

Figure 1 is an elevation in partial section of our radiator and cylinder block cleaner.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a sketch showing one method of using the radiator and cylinder block cleaner.

Figure 4 is a sketch showing another method of using the radiator and cylinder block cleaner.

The concussion mixing chamber 1, is provided with the threaded water supply channel 2, the air supply off-set 3, the air supply threaded connection 4, and the discharge passage 5. The discharge passage wall is tapered and is provided with a plurality of ridged hubs 6 of different diameters, whereby without extra parts or special fittings any of the ordinary sizes of radiator or cylinder block hose may be directly connected to the cleaner by the use of the hose clamp already in place on the hose as it is connected in the cooling system of the engine.

In Figure 3 the upper radiator hose 7 is connected to the cleaner after being disconnected from the radiator. The water supply hose 8 is attached to the cleaner by the ordinary hose connection 9, and the flow of water through the radiator is controlled by the valve 10, which may be in the water supply hose as shown, or at a more distant point, as may be desired.

When cleaning a large radiator it may be desired to connect the check valve 11' in the water supply line to prevent reverse movement of the water therethrough when the air is applied.

This will apply especially where there is a very low pressure on the supply water.

The upper radiator hose 7 being usually of large size will fit upon one of the larger hubs 6 of the cleaner, the joint being made tight by the hose clamp 7' which was loosened when the hose 7 was removed from the radiator.

The air hose 11 is connected to the cleaner by the elbow 12 and the ordinary fitting 13.

The air valve 14 rests upon the seat 15 and is held thereon resiliently by the spring 16 about the stem 19, and by the button 17 and the cotter pin 18, which passes through the button 17 and the stem 19.

In Figure 4 the lower radiator hose 20 is connected to the cleaner after being disconnected from the pump 22, the hose clamp 21 which was loosened when the hose was removed from the pump being used to make the joint tight.

Since the lower hose 20 is generally smaller than the upper hose 7, it will fit upon one of the smaller hubs 6 of the cleaner. In Figure 3 is shown the method of connecting the radiator and cylinder block cleaner which will generally be found to be satisfactory. It is true the scale, rust and sediment from the cylinder block is by this connection blown up through the radiator, and at first thought this would appear to be a mistake.

But, as a matter of actual test, it is found that this method is generally quite satisfactory, even though it appears that it should not be. It is possible that in actual practice the material removed from the cylinder block and the rest of the cooling system and blown through the radiator acts in an abrasive capacity and may aid in the cleaning of the radiator.

In exceptional cases it may be found necessary to make the connection shown in Figure 4; but in any case for a perfect job the cylinder block and remainder of the cooling system should be cleaned before the radiator is cleaned and the upper radiator hose left unconnected but plugged till the radiator is cleaned.

Figure 4 shows the method to be used only in the case of a rush job with a large size radiator, or where a new cylinder block has been put in a vehicle with an old radiator.

But, even in such a case it would be better to disconnect the hose 7 to prevent material from passing from the radiator to the cylinder block during the blowing process.

The operation of our cleaner is as follows:—

Suppose the connection shown in Figure 3 to be used, with the water and the air hose connected to proper sources of supply. The water valve 10 is opened up and water flows into the system till the radiator begins to overflow. The air valve 14 is then opened by pressure of the palm of the hand against the valve button 17, and against the pressure of the spring 16.

The length of time the air valve should be left open will depend upon the size of the cooling system and its condition, as well as upon the number of pounds pressure in the air hose, but is ordinarily about one second.

In any case, as the water comes from the water hose it passes into the concussion mixing chamber 1 and the tendency is for it to be deflected by the curved walls of the chamber and to flow in a circle as indicated by the large arrows in Figure 1.

When the air valve 14 is opened the air passes about the valve and along the stem 19 as indicated by the small arrows in Figures 1 and 2.

The effect of the off-set of the valve from the smooth inner curve of the interior of the mixing chamber is to spread out the entering air and force it to follow varied paths, which paths will continue to change as the valve 14 is opened wider and wider.

The result of this, and of the circular whirling effect given the water supply by its tangential entrance into the mixing chamber, is to form instantly a churned up mixture of air bubbles and water.

As this passes through the cooling system it results in a geyser from the radiator as indicated in Figures 3 and 4, and the valve 14 should be closed just before the geyser action ceases. This generally means the valve 14 will remain open about one second, which however may vary in different cases as the operator will learn with a little experience.

The water continues to flow into the system from the water hose, and when the radiator is again full the air blast is again applied as before.

This is repeated till the condition of the geyser from the radiator indicates that the cooling system is clean.

The results obtained from this cleaner are far greater than anyone would suspect before an actual test. Radiators that have already been cleaned by boiling out and by every other method used by radiator repairmen have been connected to this cleaner and without exception it has removed mud, rust, scale and sediment from every supposedly clean radiator that was in a bad condition before the previous attempted cleaning.

For this reason it is thought that the peculiar construction of the device results not only in a churned up mass of water and air bubbles, but also to some extent in a condition similar in a way to a water hammer, probably due to the intermittent or un-even flow of the water out of the mixing chamber when the air is applied.

The self-contained valve and mixing chamber with no flexible and slightly expansible hose between the valve and the chamber gives an instantaneous air pressure effect in the chamber which undoubtedly greatly assists in the above mentioned action and results.

Having now described our invention, what we claim as new and desire to protect by Letters Patent, is as follows:—

1. In a cleaner for the cooling system of internal combustion engines, a hollow mixing chamber having substantially parallel side walls joined by a substantially circular wall, the chamber having means for the connection of a water supply joined to the interior of said chamber by a water passage tangential to said circular wall, means for the connec-

tion of a compressed air supply joined to the interior of said chamber by a passage through one of said side walls and at right angles to the flow of water from said water passage, and having a manually operated, spring-closed, valve, and means forming a discharge from said chamber tangential to said circular wall.

2. In a cleaner for the cooling system of internal combustion engines, a hollow mixing chamber having substantially parallel side walls joined by a substantially circular wall, the chamber having means for the connection of a water supply joined to the interior of said chamber by a water passage tangential to said circular wall, means for the connection of a compressed air supply joined to the interior of said chamber by a passage at right angles to the flow of water from said water passage and through one of said side walls and having a manually operated, spring-closed valve, and means forming a discharge from said chamber joined to the interior of said chamber by a passage tangential to said circular wall and at an angle to said water passage.

3. In a cleaner for cooling systems of internal combustion engines, a chamber, having side walls joined by a substantially circular wall having a longitudinally extending depression therein, and having an air supply passage through one of said side walls substantially aligned with said depression, and having a water supply and a discharge passage through said circular wall, and having means acting as water supply, air supply and discharge connections, and a spring closed, manually operable valve in the air passage between the chamber and the air connection.

4. In a cleaner for cooling systems of automotive vehicles, a chamber having a substantially circular wall joined by parallel end walls and provided with an axially extending air supply passage and water supply and discharge passages tangential to said circular wall and having means acting as water supply, air supply and discharge connections adjacent the terminations of said passages.

5. In a cleaner for the cooling systems of internal combustion engines, a chamber having a substantially circular wall joined by parallel end walls and provided with an axially extending air supply passage and water supply and discharge passages and having means acting as water supply, air supply, and discharge connections adjacent the termination of said passages, said water supply and discharge passages connecting with the chamber parallel to the end walls and tangential to the circular wall and extending in opposite directions of rotation with respect thereto.

6. In a cleaner for cooling systems of automotive vehicles, a chamber having a substantially circular wall joined by parallel end

walls and provide with an axially extending air supply passage and water supply and discharge passages tangential to said circular wall and having means acting as water supply, air supply, and discharge connections adjacent the terminations of said passages, the water supply passage entering the chamber when viewed from one side of the chamber in a clockwise direction and the discharge passage leaving the chamber in a counter-clockwise direction.

In testimony whereof we affix our signatures.

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JAMES MARTIN KING.

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