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APPARATUS FOR FLUSHING WATER COOLING SYSTEMS

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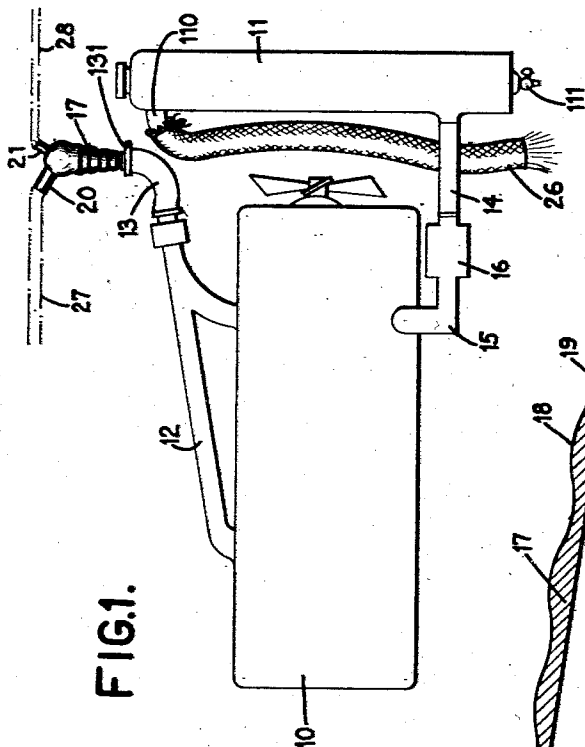


FIG. 1.

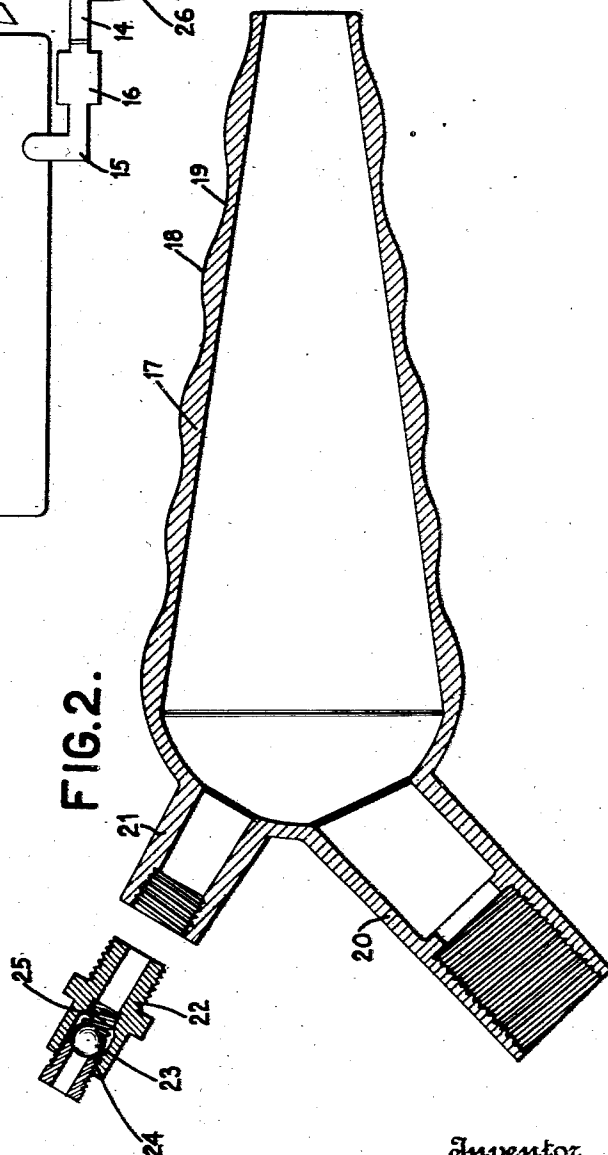


FIG. 2.

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APPARATUS FOR FLUSHING WATER
COOLING SYSTEMS

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2 Claims. (Cl. 141—1)

This invention relates to equipment employed for the purpose of removing sediment of various sorts from the water jackets of automobile engines and the radiators connected therewith, or from other similar systems. In the normal course of operation of systems of this sort, a certain amount of scale, rust and other sediment accumulates in the corners and crevices and, if it is not periodically removed, it may in time serve to completely stop up a portion of the system and possibly disable the system altogether. For this reason it has been recognized as desirable to periodically drain off the water, or other cooling medium employed, and to replace it by a fresh supply. The expedient has occasionally been adopted in the past of flowing a continuous stream of water through such a system in an effort to dislodge particles of sediment but for various reasons this has not proved entirely effective nor satisfactory.

I have found that to obtain completely satisfactory results it is necessary to systematically follow out a series of steps which involve first introducing into the system a compound or solution which, in conjunction with the water, will tend to loosen particles of scale or rust from the inner walls of the system. These particles should then be flushed out in the usual way; fairly satisfactory results are obtained in this way. However, by subsequently applying periodical shocks or pulsations of pressure to a stream of water, or other flushing medium, passed through the system, the results obtained are very materially improved. In fact this final step, if properly carried out, will be found quite effective without the preceding steps as a means of eliminating a large percentage of the objectionable sediment.

An object of the present invention has been to devise suitable attachments which are both simple and effective for use in these flushing operations, particularly the final step mentioned, and which will permit water or other fluid to be forced through the system and be subjected to occasional impulses of relatively high pressure. In carrying out my improved method, I have found it advantageous to introduce the flushing medium continuously and to produce the desired shocks by way of suddenly and intermittently varying the pressure on the fluid through the introduction of compressed air, or the like. If desired, the flushing medium might also be introduced intermittently rather than continuously but I find the varia-

tion in pressure alone to be more convenient and more effective.

A specific feature of the invention is the provision of an attachment of the character mentioned which may be inserted into fittings of various sorts having openings of different dimensions and which may, at the same time, be readily held in place without danger of being separated from the fitting at a time when the sudden shocks or pressure increases are applied to the system. The construction contemplated is such, furthermore, that a tight joint is provided between the attachment or nozzle and the fitting into which it is inserted. This is an important consideration as it lends greatly to the effectiveness of the operation.

Other features and advantages of the novel equipment forming a part of the present invention and of the preferred method of cleaning or flushing out a water circulating system, such as the cooling system of an automobile, or the like, will be made apparent as the detailed description progresses in conjunction with the accompanying drawing, in which:

Figure 1 is a diagrammatic view of an engine and radiator showing the new flushing devices attached, and

Figure 2 is a detail sectional view of the flushing nozzle forming a part of the present invention.

Referring now to Figure 1, there is conventionally shown a cooling system, such as is embodied in practically any type of automobile. The engine 10 is provided with a water jacket, surrounding the cylinders, adapted to carry a continuously circulating body of water, or similar cooling medium, during operation of the machine. In front of the engine there is provided the usual radiator 11 adapted to receive the relatively hot water which has been passed through the jacket of the engine and has picked up considerable heat from the latter. The connection between the water jacket and the radiator may comprise a manifold 12 and flexible hose 13 attached to a fitting 110 at the top of the radiator. The water then descends in the radiator and is cooled by a stream of air passing through the latter. From the bottom of the radiator the water which has been cooled to a certain extent is passed through a flexible hose 14 which may lead directly to a manifold 15 connected to the bottom of the water jacket of the engine, if thermosyphonic action is depended upon for the circulation of the water, or which may be connected to an interposed

pump 16 if forced circulation is desired. In the ordinary operation of the machine the water will be continuously circulated through the jacket of the engine and through the radiator, from the top to the bottom of the latter, in the manner indicated.

Now, when it is desired to remove the accumulated sediment from the system, the following procedure should be adopted: A suitable quantity of any well known type of scale-removing compound or solution, which will not harmfully affect the copper, brass, aluminum, rubber, and similar materials commonly utilized in systems of the type contemplated, should be introduced into the radiator through the usual opening at the top. The engine should then be started up and continued in operation under conditions which will cause it to heat up excessively. This may be done by closing off the front of the radiator by any suitable means to prevent, in whole or in part, the passage of cooling air through the radiator. After the water and special compound have been circulated through the system and the water has been brought to a boiling temperature and maintained in such condition for a suitable time, say a period of ten or fifteen minutes, a pet-cock 111 located at the bottom of the radiator, or at any other suitable point in the cooling system, should be opened while the engine is continued in operation. At the same time flushing water should be introduced through the usual opening at the top of the radiator and this water should be circulated through the system until the discharge from the outlet 111 is clean and apparently free from sediment. This operation will serve to free and remove a large part of the rust, scale and dirt from the system but it will not effectively remove accumulations of these particles which may have become deposited upon shoulders and in sharp corners within the system.

To effectively remove accumulations of the type specified, I have found it necessary to employ special flushing devices, which preferably include as a primary element a nozzle 17 of particular construction. This nozzle has a tapered body or shank provided with a large central cavity. The wall surrounding the cavity is annular in cross-section and converges toward the outlet end, as best indicated in Figure 2. The outer surface of this wall is provided with a series of protuberances 18 and depressions 19 extending circumferentially of the nozzle. These protuberances and depressions are so formed as to present a smooth corrugated surface which is entirely free from abrupt shoulders and is preferably free from flat faces. They constitute what may be termed a gentle undulation in the outer surface of the nozzle. It will be understood that due to the general taper of the device as a whole, the successive annular protuberances are of graduated diameter, increasing from the outlet end of the nozzle toward the opposite or inlet end. An extension 20 at the inlet end of the device is preferably threaded at its outer end to receive the fitting or coupling of an ordinary water hose. A somewhat smaller extension 21 at the same end of the nozzle carries a suitable check-valve which may comprise a main body 22 adapted to be screwed into the extension 21, a ball 23 cooperating with an annular valve seat 24 and a spring 25 for holding the ball valve against the seat. The spring 25 engages a shoulder or re-

taining pin in the customary way, at its opposite end. This structure, therefore, serves to provide the desired function of admitting air into the device whenever desired but it prevents the passage of water or other fluid in the opposite direction.

Now, in the use of the device, as shown in Figure 1, the hose 13 is preferably detached from the radiator fitting 110 and the smaller end of the tapered body of the nozzle is inserted into the free end of the hose until a tight fit is obtained. At this time the clamping ring 131, which will have been loosened slightly to permit the detachment of the hose from the radiator, may be tightened around the adjacent depression 19 in the surface of the nozzle. A hose 26, formed preferably simply of a flexible piece of canvas, may be placed over the fitting 110 and may be tied to the latter by means of a string, or the like, so as to form a substantially water-tight joint. The opposite end of the hose may lead to any suitable point for disposal of the water, or other flushing medium, to be passed through the system. The hose should be of adequate size in circumference to be applicable to the largest fittings customarily encountered in the use of the equipment. Due to the flexibility of the hose, it may be applied to fittings of various dimensions and provide substantially water-tight joints therewith.

After the completion of the preliminary cleaning operations explained hereinbefore, the devices 17 and 26 are applied to the engine and radiator in the way indicated and a water-hose 27 extending from a spigot, or any other suitable source of water, is connected to the extension 20 of the nozzle while an air-hose 28 extending from any suitable source of compressed air, or similar gaseous medium, is connected to the projection 21 of the nozzle. Water is then continuously introduced into the cooling system through the nozzle 17 and the manifold 12 while the engine is left out of operation. This water will flow, under the preferred conditions specified, in the opposite direction to the normal flow of the water through the system and will be forced out at the top of the radiator into the hose 26. It will be understood that the pet-cock 111 is at this time closed. After the water has completely filled the system and is freely flowing from the end of the hose 26, compressed air, or other gaseous medium, is preferably introduced during a number of successive brief periods of a few seconds through the check-valve 22. The application of the air should be repeated at intervals of a few seconds until substantially all of the removable sediment has been set free and discharged from the system. The production of the intermittent shocks or sudden increases in pressure may be effected either by manipulation of a valve connected with the source of the compressed air or by merely applying the usual chuck of a tire pump hose to the end of the check-valve 22 intermittently during the brief intervals desired.

It may be found advantageous and somewhat more effective to separately apply the shock flushing action to the engine water-jacket and to the radiator. For this purpose the hose 14 may be disconnected from the pump so that when the nozzle 17 is inserted in the hose 13, as shown, the water or similar medium will be passed only through the engine jacket and through the pump 16. After this part of the system has been satisfactorily cleaned out, the

nozzle 17 may be inserted into the end of the hose 14 so that the shocks or pressure pulsations of the flushing medium may be applied, in a similar way, merely to the radiator.

5 While the novel flushing devices have been described in considerable detail, and a quite specific method of flushing the water cooling system of an automobile has been set forth, it is to be understood that many modifications may be made in the particular form of the devices employed and in the particular procedure followed without departing from the spirit and scope of the invention. Furthermore, while the invention has been disclosed as being especially useful in connection with the cooling systems of automobiles, it will be understood that the method and equipment may be applied to advantage to any similar system in which sediment collects in certain confined spaces from which it should be removed at periodic intervals. The terms employed in the foregoing disclosure are used merely by way of describing one form of the invention and are not to be regarded as imposing any limitations thereon.

25 What I claim is:

1. A flushing nozzle comprising a tapered hollow body having a free outlet at the smaller end

thereof, a projection adapted to receive the end of a water hose, a second projection adapted to receive an air hose, said projections entering said body at an acute angle to the axis of the body and being arranged to provide a free flow of the water and air toward said outlet, and a check valve in said second projection, the outer surface of said body being smoothly formed into a series of graduated protuberances adapted to fit into a part of a system to be flushed.

2. A flushing nozzle for flushing radiators and the like which comprises a main hollow body portion having an uninterrupted interior, tapered surface, the exterior surface of said body portion being correspondingly tapered and having a series of annular depressions providing a number of graduated hose retaining projections, an inlet at the larger end of said body portion adapted to be connected with a water line, a second inlet adjacent the first mentioned inlet adapted to be connected with an air line, said inlets extending into said body portion at angles of less than 45° to the axis of said portion, said body portion having a discharge opening at its opposite end.

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