March 24, 1953 T. B. TANKERSLEY 2,632,719

MEANS AND METHODS FOR FLUSHING THE PASSAGEWAYS OF VEHICLE RADIATORS AND ENGINES

Filed Oct. 11, 1947 3 Sheets-Sheet 1

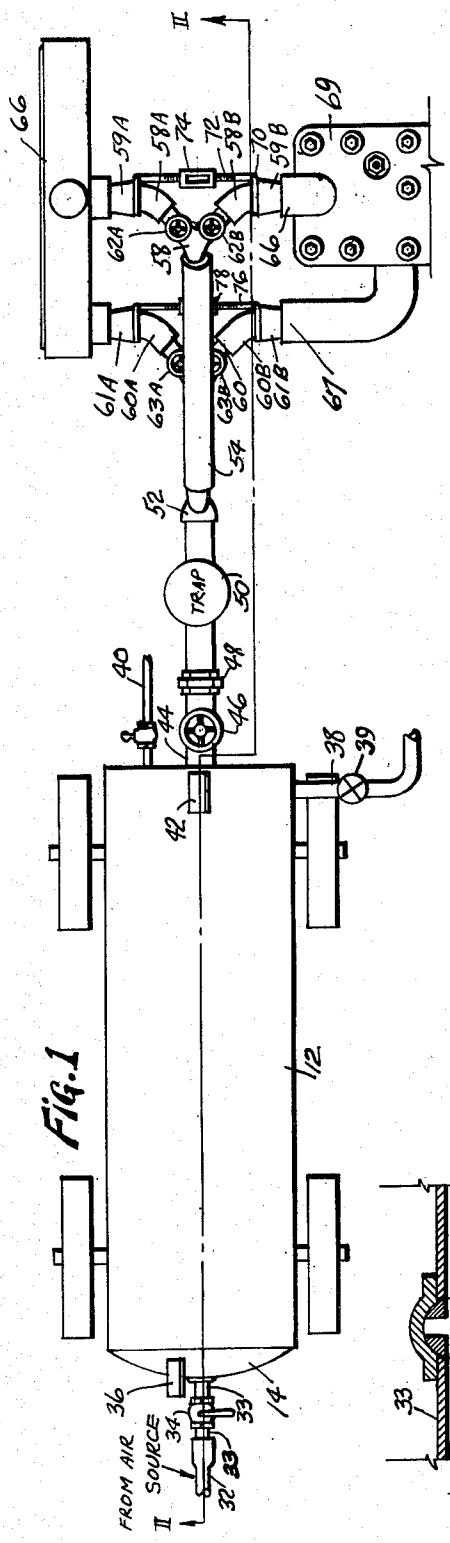

Fig. 1

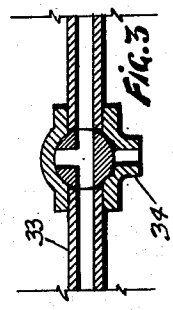

Fig. 3

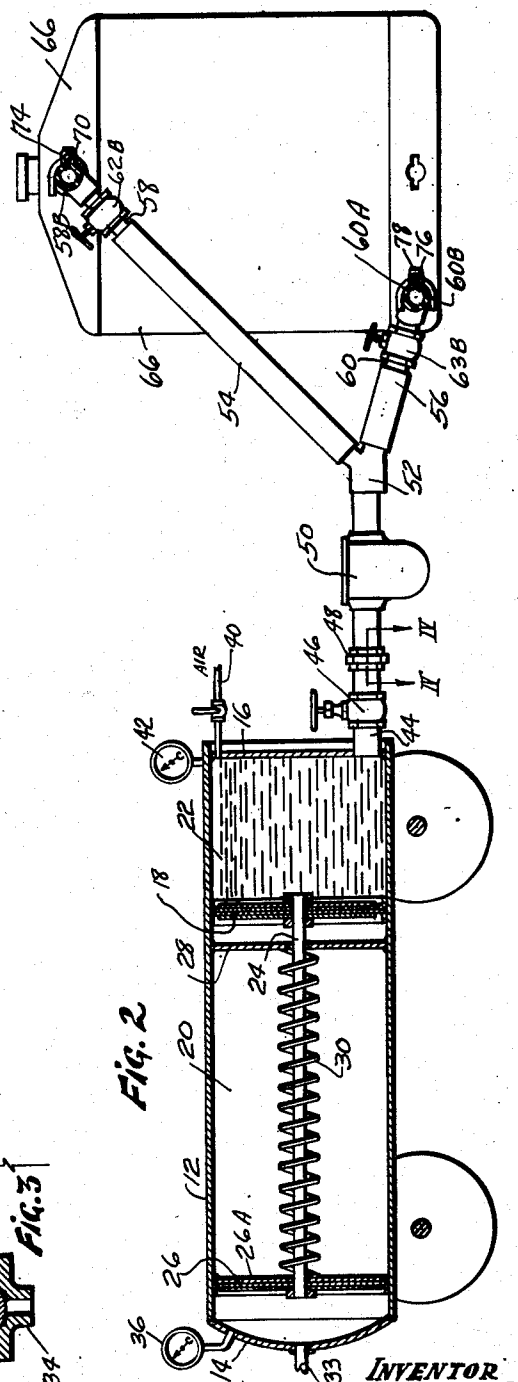

Fig. 2

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MEANS AND METHODS FOR FLUSHING THE PASSAGEWAYS OF VEHICLE RADIATORS AND ENGINES

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Fig. 5

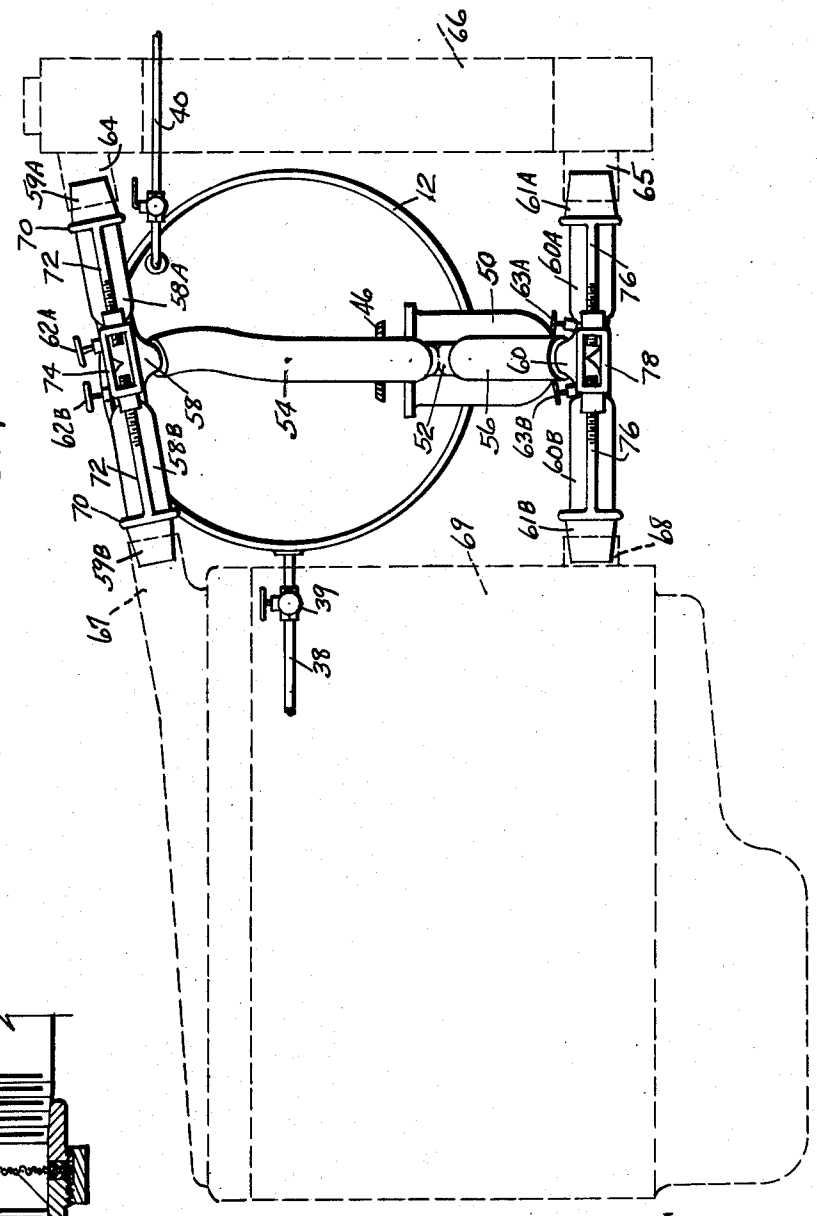
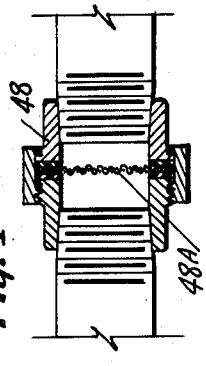


Fig. 4



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MEANS AND METHODS FOR FLUSHING THE PASSAGEWAYS OF VEHICLE RADIATORS AND ENGINES

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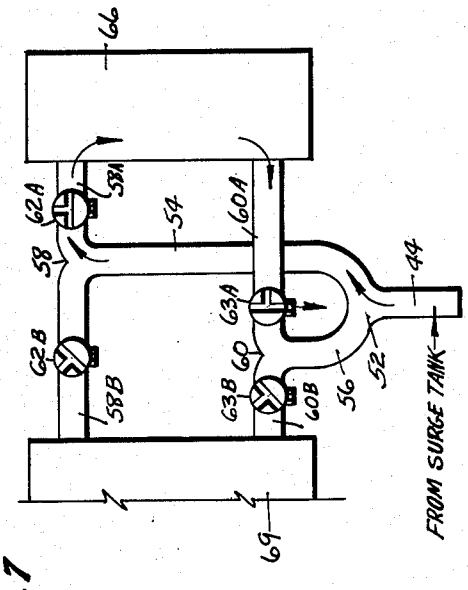

Fig. 7

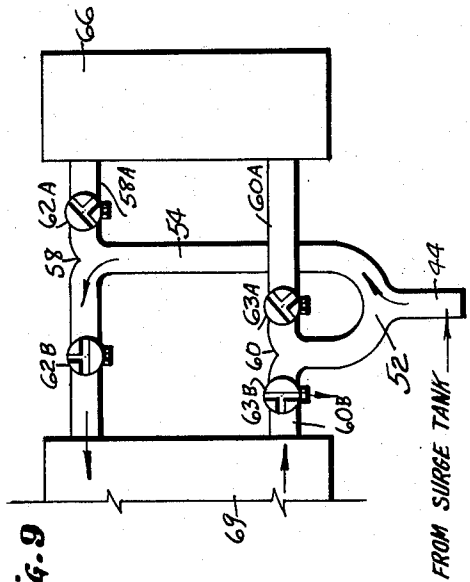

Fig. 9

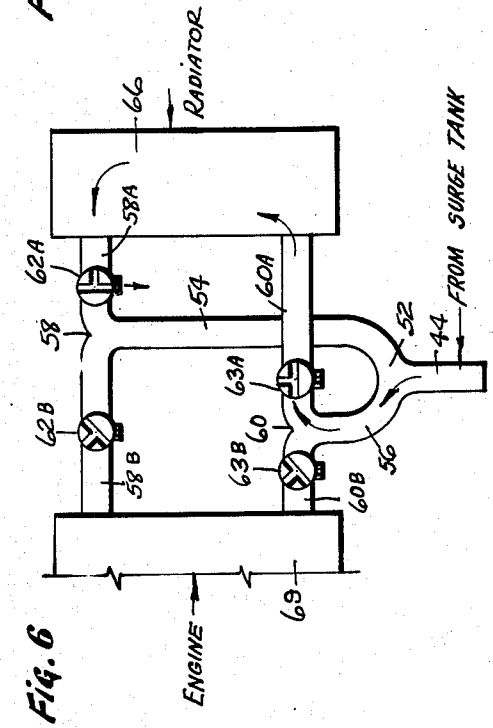

Fig. 6

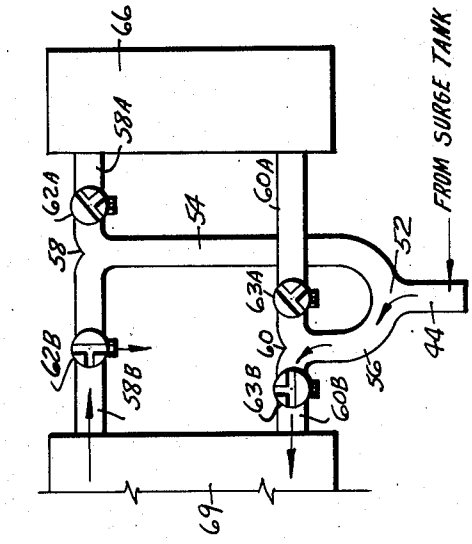

Fig. 8

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UNITED STATES PATENT OFFICE

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MEANS AND METHODS FOR FLUSHING THE PASSAGEWAYS OF VEHICLE RADIATORS AND ENGINES

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Application October 11, 1947, Serial No. 779,321

5 Claims. (Cl. 134—24)

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This invention relates to a flushing method and mechanisms especially adapted for cleaning foreign matter from the water passageways of internal combustion vehicle engines and radiators without necessarily removing either from the vehicle.

It particularly relates to a flushing method and mechanism which includes liquid surging means, and a pipe having valve controlled branches leading therefrom, which branches are connected for use, by removing the upper and lower hose connection between the motor and radiator passageways and coupling one branch between the upper connections and the other branch between the lower connection, and controlling the direction of flow by valve manipulation.

It further relates to means for and a method of quickly and efficiently accomplishing the respective connections.

In motor vehicles having radiators and liquid cooled internal combustion motors the passageways through which the cooling liquid flows become clogged in time by deposits and the cooling is inefficiently accomplished. Flushing of the passageways usually requires removal of the radiator and is, therefore, postponed and neglected until it becomes a major repair job or becomes necessary to replace the radiator or even the engine. Flushing of either engine or radiator by flow in one direction loosens some of the deposits but often has no effect on others which may be loosened by opposite flow.

The objects of the present invention are:

To provide means for flushing the engine and the radiator without removing either;

To provide means for quickly and easily attaching the mechanism for use to, and subsequently detaching it from, the engine and radiator;

To provide attaching means which accomplishes attachment to both engine and radiator simultaneously;

To provide means for flushing the engine and the radiator in which flushing action is accomplished by pulsating the cleansing liquid;

To provide means for flushing either the engine or the radiator or both; and

To provide means for reversing the primary direction of flow of the cleansing liquid through the engine or through the radiator.

The means by which the foregoing and other objects are accomplished, and the manner of their accomplishment will readily be understood from the following specification on reference to the accompanying drawings in which:

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Fig. 1 is a plan view of the flusher connected for use between the radiator and the engine of a vehicle, a fragmentary portion only of the engine being shown.

Fig. 2 is a corresponding sectional side elevation taken on the line II—II of Fig. 1.

Fig. 3 is a sectional view of the air control valve.

Fig. 4 is a fragmentary detail section on the line IV—IV of Fig. 2.

Fig. 5 is an enlarged end elevation of the mechanism with the engine and radiator in outline only.

Figs. 6, 7, 8 and 9 are diagrammatic flow diagrams.

Referring now to the drawings in which the various parts are indicated by numerals:

12 is a cylindrical surge tank or cylinder having oppositely disposed heads 14 and 16. Reciprocably mounted in the tank, is a piston 18 which divides the tank into air and water sections 20 and 22 respectively. The piston 18 has oppositely faced cup leathers, and is connected by a piston rod 24 to a guide piston 26 preferably having a cup leather 26A facing the head 14. Interposed between the two pistons is an abutment 28 which cooperates with the piston 18 to delimit the two sections. A compression spring 30 is interposed between the abutment 28 and the piston 26, the spring being of a strength which will positively return the piston 18 to, and hold the piston against, the abutment 28 when air pressure is released from the air section.

Air is introduced into the tank under pressure from the air compressor or other source (not shown) through an air hose 32, which is coupled through a nipple 33 into the tank, air flow being controlled by a three-way valve 34, shown open for air flow to the tank in Fig. 3, and which may be turned to cut off air flow and concurrently release the air pressure from within the tank. 36 is an air gage.

A pipe 38 having a cut off valve 39 is used for introducing water into the water section 22 of the tank. A valve controlled air hose 40 from a source of air (not shown) may be used for introducing air into the water section. 42 is a pressure gage.

A pipe 44 leads from the water section 22 of the tank 12, and is provided with a valve 46 and coupled by a union 48 to succeeding sections. As shown in Fig. 4, a filter screen 48A is preferably mounted in the union 48. The union is connected through a nipple to a trap 50 in which sediment is collected and which may be removed by cleaning. Beyond the trap is a Y 52 from which flex-

ible branches 54, 56, preferably sections of hose, diverge. These sections are provided with additional Y sections 58 and 60 respectively, from which flexible branches 58A, 58B and 60A, 60B diverge and curve into oppositely faced alinement. The branches carry at their ends tapered plugs 59A and 59B and 61A and 61B respectively, and each branch is provided with a cut off valve 62A, 62B, and 63A, 63B respectively, these valves being three-way valves which may be substantially identical with the three-way valve 34 shown in Fig. 3. The plugs are of size to enter the nipples 64 and 65 of the radiator 66, and nipples 67 and 68 of the engine 69 when the hose connections (not shown) between the engine and radiator are removed.

The pair of plugs 59A, 59B are secured as by yokes 70 to struts 72 which have threaded engagement with a turnbuckle 74 by which they are advanced or retracted, and the plugs 61A, 61B are secured to a similar assembly of struts 76 and turnbuckle 78.

In use, the hose connections between the engine and radiator are removed from the nipples 64 and 65 of the radiator 66 and 67 and 68 of the engine 69. The plugs 59A, 59B are engaged in the nipples 67 and 64 and the turnbuckle 74 tightened to seat them in place. Similarly the plugs 61A, 61B are engaged in the nipples 68 and 65, and the turnbuckle 78 set up to effect sealing engagement.

The valve 34 is turned to cut off air flow to the tank and the nipple 33 is coupled through the air hose 32 to a suitable source of air under pressure.

With the air valve 34 closed, the spring 30 holds the piston 18 retracted and the water section 22 of the tank is filled through the water connection 38 and the valve 39 is closed.

As shown in Fig. 6, two of the valves, as the valves 62B and 63B, are closed to cut off flow between the surge tank and the engine 69. One of the valves, as the valve 62A, is turned to discharge from the radiator 66, and the valve 63A is turned to complete a passageway between the water chamber and the radiator.

The air valve 34 is opened and the air pressure against the piston 26A compresses the spring 30 against the abutment 28 and through the piston rod and piston 18 forces the water from the chamber of the tank through the pipe 44, the Y 52, the hose connection 56, the Y 60, the valve 63A and hose connection 60A into the bottom of the radiator 66 surging upward through the radiator discharging the water therein through the valve 62A and replacing it. As the stroke of the piston assembly is completed the valve 34 is turned to cut the air off from the compressor and bleed the pipe 33 so that the air may discharge from the tank and allow action of the spring 30 against the abutment 28 to return the piston assembly to starting position and withdraw the water from the radiator into the water chamber of the tank. The valve 34 is again opened and water surged from the tank upward through the radiator, the valve closed and this operation repeated a number of times. From the first upward surge, scale dislodged from the radiator is discharged through the valve 63A and all scale loosened and carried by the water is withdrawn across the trap 50 into which it will largely drop. Any scale, however, failing so to drop into the trap will be stopped by the screen 48A in the union 48 and be subsequently returned and dropped into the trap by the succeeding outward surge of the water from the tank.

After the water has been surged upward through the radiator a number of times the valve 62A is turned to establish flow (as shown in Fig. 7) to the upper portion of the radiator. The valve 63A is turned to discharge, the valves 62B and 63B being allowed to remain unchanged and closed to flow. The air valve 34 is then alternatively opened and closed and the surging operation again carried out in the radiator with the preliminary flow downward.

When washing of the radiator is completed (as shown in Fig. 8) one of the valves, as the valve 63B, leading to the engine is turned to establish flow through the engine and the valve 62B opened to discharge, the valves 62A and 63A to the radiator being cut off and surging flow is established through the engine. The valve 62B is subsequently opened for flow through the engine and the valve 63B turned to discharge and surging operation repeated with flow in reversed direction (as shown in Fig. 9). Should it be desired, the water chamber of the tank may be partially filled with air and the air discharged with the water by the surging operation.

Whenever it becomes necessary the union 48 may be disconnected and the screen therein cleaned and the trap 50 may be removed, if necessary, and also cleaned.

It will be understood that in cases where the radiator or the engine, or both thereof, are badly clogged the above described operations can be repeated. It will also readily be understood that chemicals of desired kind may be introduced into the water chamber of the surge tank to assist in the scale removal, and that either the radiator or the engine may be left filled either with plain water or with chemically treated water while subsequent operations are being performed on the other thereof by closure of both valves adjacent the radiator or both valves adjacent the engine as the case may be, while the piston 18 in the water chamber 22 is held by the air pressure in the air chamber 20. If the water is so retained the water chamber 22 must be refilled to permit return of the piston 18.

It will be understood that many of the details of construction herein shown are illustrative only and that except as they are hereinafter specifically set out in a claim, such claim shall not be limited thereby.

I claim:

1. Means for flushing, while in place in the vehicle, water passageways of vehicle engines and radiators, which respectively have water passageways with terminals of the one respectively each facing and spaced from a terminal of the other; which flushing means includes a conduit and means for reciprocably surging liquid through said conduit; said conduit having four diverging branches adapted to extend respectively to said terminals, each said branch having a tapered end portion adapted to engage in a said terminal, and means for forcing the tapered end portions of pairs of said conduit branches leading to facing terminals, oppositely into seating engagement in said terminals; each said conduit branch including an interposed three-way valve including branch-connecting ports and a relief discharge port, said valves being respectively manually operable to establish flow through a first said branch into

a said passageway, to cut off flow through a second branch to the opposite end of said passageway and allow discharge flow therefrom, and to cut off all flow to the other said passageways.

2. Means for flushing, while in place in the vehicle, water passageways of vehicle engines and radiators, which engine and radiator respectively have water passageways with terminals of the one respectively each facing and spaced from a terminal of the other; which flushing means includes a conduit and means for reciprocably surging liquid through said conduit; said conduit having four diverging branches adapted to extend respectively to said terminals, each said branch having an end portion adapted to engage a said terminal, and means for effecting said engagement, each said conduit branch including an interposed three-way valve including branch-connecting ports and a relief discharge port, said valves being respectively manually operable to establish flow through a first said branch into a said passageway, to cut off flow through a second branch to the opposite end of said passageway and allow discharge flow therefrom, and to cut off all flow to the other said passageways.

3. Means for flushing the water passageways of vehicle engines and radiators, which means include a cylinder having closed ends, a piston assembly reciprocably mounted in said cylinder and alternately establishing adjacent opposite said ends, sections for air and liquid, abutment means intermediate the length of said cylinder, a compression spring cooperating with said assembly and said abutment means for urging movement of said assembly and establishment of said section for liquids, manually controlled means for filling said liquid section, a conduit in communication with said liquid section, said conduit having a pair of branches adapted for connection respectively into opposite ends of a said passageway to be cleaned, each said branch respectively including an interposed three-way valve having branch-connecting ports and a port discharging to waste, said valves being manually controllable respectively one to allow flow through its related said branch into one end of said passageway and the other to cut off flow through the other said branch to the opposite end of the passageway and allow discharge flow from the latter said end; manually controlled means for alternately introducing air under pressure into, and releasing said air from, said air section of said cylinder to overcome said compression spring and effect discharge of liquid through said conduit into said passageway, and to subsequently relieve said pressure in said cylinder, and allow said spring urged piston assembly to withdraw said liquid from said passageway.

4. Means for flushing the water passageways of vehicle engines and radiators, which means include a cylinder having closed ends, a piston assembly reciprocably mounted in said cylinder, an abutment intermediate the length of said cylinder limiting movement of said assembly away from one of said ends to establish a section for liquid, a compression spring within said cylinder interposed between said abutment and a part of said assembly for urging said movement, manually controlled means for filling said liquid section, a conduit in communication with said liquid section, said conduit having branches adapted for connection respectively into opposite ends of a passageway to be cleaned, each said branch respectively having an interposed three-way valve having branch-connecting ports and a port discharging to waste, said valves being individually manually controllable to respectively allow flow through one said branch into one end of said passageway and cut off flow through the other said branch to the opposite end of the passageway and allow discharge flow from the latter said end, manually controlled means for alternately introducing air under pressure into and releasing same from said air section of said cylinder to overcome said compression spring and effect discharge of liquid through the open branch of said conduit into said passageway, and for subsequently relieving said pressure to allow said spring urged piston assembly to withdraw said liquid from said passageway.

5. The method of cleaning water passageways of an internal combustion engine and the water cooling radiator therefor in place as in a vehicle powered by said engine; which method includes disconnecting the outlets of the engine and radiator passageways from the respective inlets of the radiator and engine passageways, connecting a conduit having dual two way branches to a container for liquid and oppositely connecting the two legs of said two way branch respectively to the outlet and inlet of said engine passageway and the two legs of the other said two way branch respectively to the outlet and inlet of said radiator passageway, cutting off discharge flow from said container through both legs of a first of said two way branches, and opening said first leg of said second branch for discharge to waste, surging liquid from said container through the second said leg of said second two way branch into its connected said passageway to fill said passageway to overflow and discharge to waste through the first said leg of said branch, and repeatedly withdrawing and resurging the retained liquid in said passageway; reversing the cut off and opening to waste of the legs of said second branch and repeating the operations in reverse direction through said passageway; subsequently effecting cut off of both legs of the second two way branch, and repeating in said first two way branch the valve openings and closures of the legs of said first two way branch and the cycles of flushing operations therethrough; and subsequently disconnecting said conduit branches and reestablishing connections between said engine and radiator passageways.

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