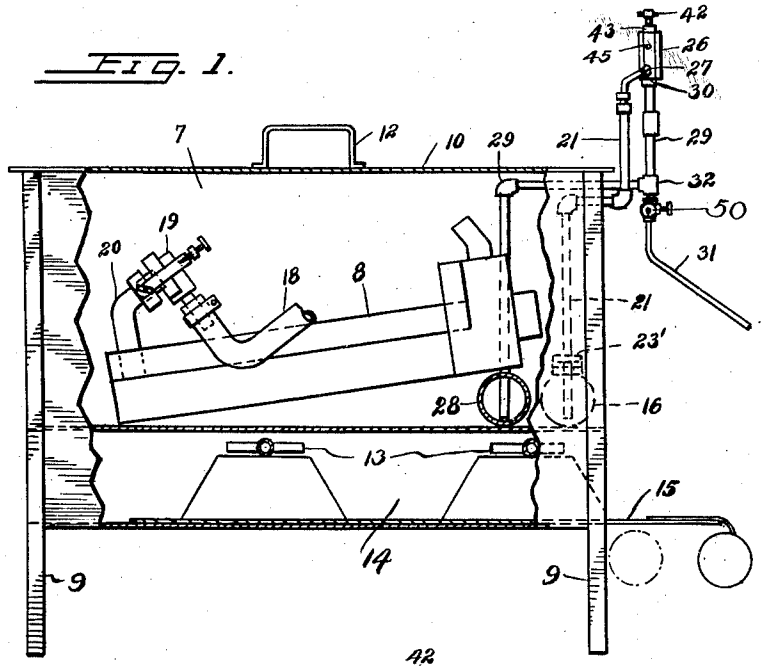
Dec. 4, 1934. B. JANUS 1,983,084

RADIATOR CLEANING APPARATUS

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Fig. 1.



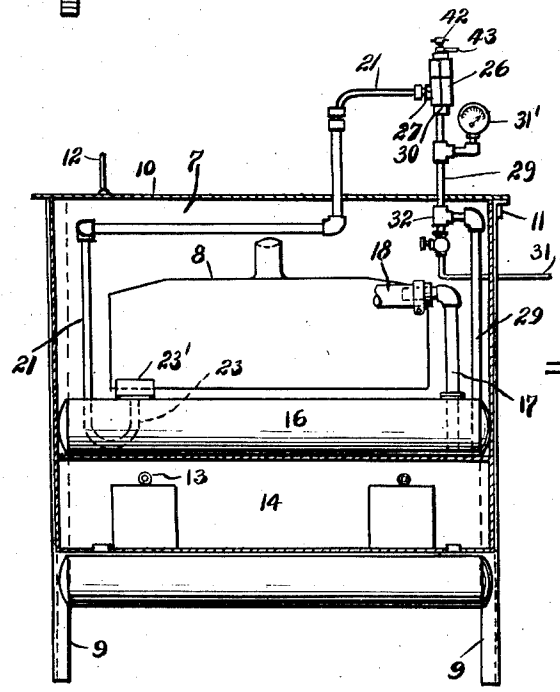


Fig. 2.

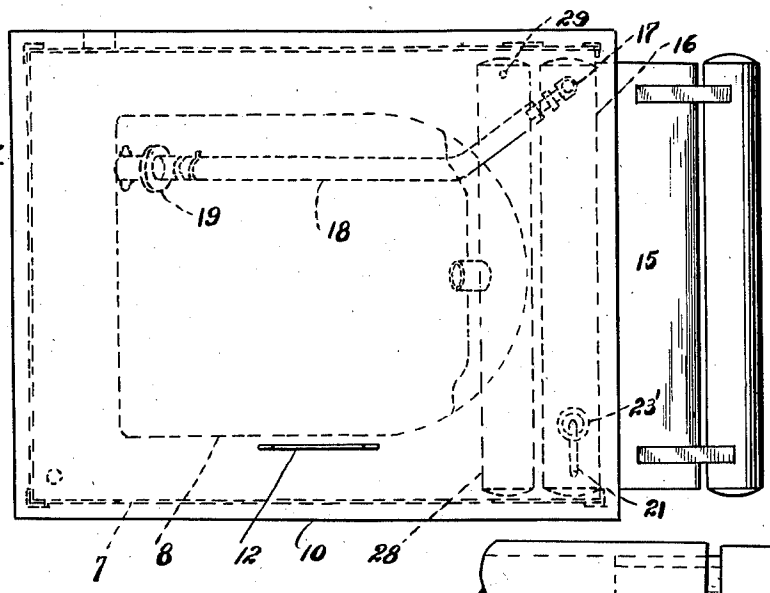
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RADIATOR CLEANING APPARATUS

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Fig. 3.



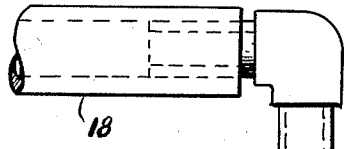
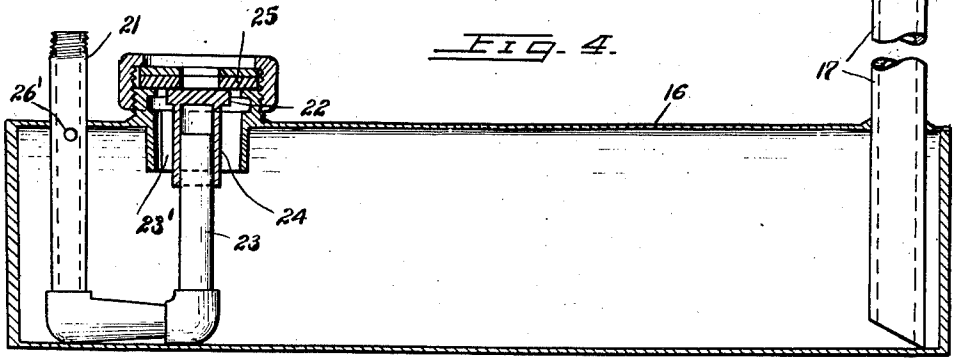


Fig. 4.



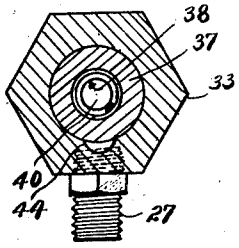


Fig. 6.

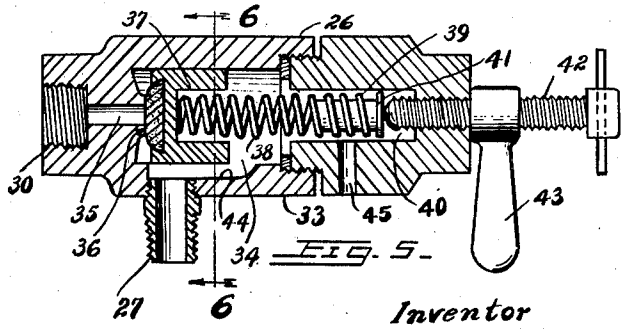


Fig. 5.

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Patented Dec. 4, 1934 1,983,084

UNITED STATES PATENT OFFICE

1,983,084

RADIATOR CLEANING APPARATUS

Bernard Janus, Sarnia, Ontario, Canada

Application October 19, 1933, Serial No. 694,271

3 Claims. (Cl. 141—1)

The invention appertains in particular to apparatus for cleaning of automobile radiators as described in the present specification and shown in the accompanying drawings which form part of the same.

The invention primarily relates to a device for discharging a cleaning solvent through a radiator in order to remove accumulated grime or grease from its interior. The invention however is also susceptible of use for cleaning other articles of a hollow nature particularly where there are crevices difficult of access.

The salient feature of the invention is that heated air and the cleaning solution is successively discharged through the radiator by an automatic blow-off valve. This is accomplished by a cylinder that fills with a charge of the heated solvent and has a connection with the interior of the radiator. Heated air is discharged from another cylinder into the solvent cylinder in order to force the solvent through the radiator. It has been ascertained from actual practice that the combined action of air and solvent thoroughly cleans the interior of the radiator and leaves its walls free of foreign matter that accumulates from the operation of the cooling system of a conventional motor car engine.

A distinctive feature of the apparatus is that upon the solvent being discharged from its cylinder, a valve automatically opens to admit a new charge and the entrapped air is allowed to escape through a by-pass in the blow-off valve. This valve then closes to build up the pressure for ejection of the new charge. Successive charges of heated air and solution are forced through the radiator automatically until it is thoroughly cleaned. Both of the cylinders are immersed in a tank of the cleaning solution and are connected to a pneumatic system for carrying out the invention.

Referring to the accompanying drawings, Figure 1 is a side elevation of the apparatus in which the solution tank is broken away.

Figure 2 is a sectional view of the tank.

Figure 3 is a plan view thereof.

Figure 4 is an enlarged longitudinal section of the solvent cylinder.

Figure 5 is a longitudinal sectional view through the blow-off valve.

Figure 6 is a cross section taken on the line 6—6 thereof.

Like numerals of reference indicate corresponding parts in each of the figures throughout the drawings of the invention.

In carrying out this invention, a metal tank 7 is provided, which tank is of a size capable of containing an automobile radiator as at 8 that has been detached from a vehicle. The tank is suitably constructed and is supported upon legs 9. A cover 10 may be hinged at 11 or otherwise arranged; and to facilitate opening and closing it a handle 12 is furnished.

The tank contains the solution which is maintained at a suitable depth and the radiator is immersed in it. The solvent may be of conventional character, hence no further description of it is required. Beneath the floor of the tank is a heating unit as generally represented by the numeral 13. The heating unit is contained in the chamber 14 and may be electric or gas. A standard unit may be employed and it is suggested that it may be mounted on a slide plate 15. The unit not only heats the solvent but also maintains it at a proper temperature.

On the floor of the tank is a cylinder 16 for containing a charge of the solvent. One end of the cylinder has an outlet pipe 17 connected to a length of flexible tubing 18 which in turn is attached to an adapter or universal clamp 19 that is attached to the outlet 20 of the radiator. The universal clamp is so constructed that it will attach to radiators of various makes of motor cars.

Opposite the outlet pipe 17 is an air line 21 extending into the cylinder and terminating in a valve 22. The air line has an upturned open-ended nipple 23 over which the sleeve 24 of the valve 22 fits and slides. The valve is disposed within an inlet or opening 23′ for admitting the solvent into the cylinder. The opening has an internal seat 25 for engagement with a valve 22 which closes said opening. This valve when not under the influence of air pressure rests under its own weight upon the nipple and in this position is open to admit solvent through the inlet 23′. As later explained in detail, pneumatic pressure in the pipe line causes this valve to rise and engage the seat 25 so as to close the inlet 23′. The air-line 21 is supplied with a hole 26′ in communication with the interior of the cylinder.

The air-line 21 extends upwardly from the solvent cylinder and through the tank to the blow-off valve 26 and is connected to the nipple 27 thereof. Adjacent to the solvent cylinder is an air-heating cylinder 28 having a pipe 29 communicating therewith and extending upwardly to the blow-off valve aforesaid. This pipe is connected to the blow-off valve at the base 30 thereof and also to a compressed air-

line 31 by means of the T 32. This air-line has a control valve 50 that is opened manually to start the apparatus operating and is maintained open during the cleaning treatment. A pressure gauge 31' is used to indicate the air pressure.

The blow-off valve is composed of a body 33 having a chamber 34 communicating with a small passage 35 leading to the pipe 29. A valve seat 36 is located at the inner end of the passage 35 for engagement with a plunger 37 urged by a compression spring 38 having an end 39 fitted in a bore 40. The end 39 has a plug 41 engaged by a screw 42 by which adjustment of the spring tension may be effected. The screw is locked by a nut 43. The nipple 27 communicates with the chamber 34 and with a port 44 which terminates short of the length of the chamber. A vent 45 communicates with the chamber and with the atmosphere.

In the operation of the apparatus, the radiator to be cleaned is deposited in the solution within the tank and its outlet 20 is connected to the universal clamp 19 so as to communicate with the solvent cylinder 16. The solvent is heated by the heating unit and since the air cylinder 28 is submerged in the solution, the air within it is also heated.

The solution cylinder is normally in communication with the body of heated solvent in the tank by means of the inlet 23' and consequently is filled from this supply. The compressed air line 31 is supplied by a conventional compressor and compressed air flows from it into the cylinder 28 and to the blow-off valve 26. By reason of the comparatively small passage 35 the spring 38 is able to hold the plunger on the seat until a substantial pressure is built up. When this pressure unseats the plunger the increased head enables it to be held open by a fairly low pressure.

It will be understood that on account of the expansion of the compressed air in the cylinder 28 due to heat, its pressure will naturally be increased over that of the air line 31; consequently this heated air will flow through the blow-off valve and through the pipe 21 to the solvent cylinder 16. This closes the valve 22 and at the same time the heated air discharges through the opening 26' into the cylinder thus forcing the heated solvent out by way of the conductors 17 and 18 to and through the radiator. It will be manifest that the air pressure is substantially maintained in driving out the solvent by reason of the resistance set up by the solvent. However when once the solvent has been discharged, the air pressure falls considerably owing to the free passageway through the cylinder 16 and its piping to the radiator.

As the pressure falls the plunger 37 of the blow-off valve closes shutting off the air. Consequently the valve 22 opens admitting a fresh charge of solvent into the cylinder 16. The air locked in the cylinder escapes through the hole 26' into the pipe 21 and through the port 44 of the blow off valve to the vent 45.

When the air pressure again builds up it opens the plunger 37 cutting off the vent 45 and again discharges by way of the pipe 21 through the hole 26' into the solvent cylinder. The valve 22 is again closed and the charge of solvent forced into the heated air through the radiator.

To give a résumé of the action of filling and emptying the cylinder 16, this is achieved largely by the blow-off valve and the compressed air line. The compressed air line, as already stated, is connected to a conventional compressor and the line is valve-controlled as at 50 as shown in Figure 1. This valve 50 is opened to start the cleaning system in operation and kept open during its entire operation, which allows air under pressure to flow to the blow-off valve. The plunger 37 remains seated until sufficient pressure is built up by the compressor to overcome the resistance of the spring 38; whereupon the plunger is unseated.

Air from the compressor air line 31 flows through the pipe 29 to the air-heating cylinder 28 and upon being heated is forced through the open blow-off valve due to its pressure being increased over that of the air in the line 31 with which it is in communication. The heated air is conducted by the pipe 21 to the solvent cylinder 16 which is filled by solvent admitted through the inlet 23'. The valve 22 is closed by the entrance of the air into the nipple 23 and at the same time the air enters the cylinder 16 through the opening 26' to drive out the solution. Having discharged the solution, the empty cylinder and the piping to the radiator are clear of the solvent, and consequently the air freely discharged and the pressure drops.

The valve 22 then opens to admit a new charge of solvent and the plunger 37 of the blow-off valve closes under its spring pressure. This is followed by an interval in which the compressor again builds up the pressure in the line 31 and in the air heating cylinder. Upon the pressure being restored, the plunger is unseated and the heated air is forced by the compressed air line to the solution cylinder so as to drive out the new charge of solvent. This cycle of operations continues as long as the air compressor line 31 remains open.

The apparatus thus automatically flushes the radiator by successive discharges of heated air and solvent. As the fluid escapes by way of the other opening in the radiator it agitates the solution in the tank and cleans the exterior surface of the radiator. While the invention is shown applied to apparatus for cleaning a radiator detached from a vehicle it might otherwise be employed, and moreover various changes and modifications may be resorted to without departing from the spirit and scope of the invention.

What I claim is:—

1. A cleaning apparatus of the class described comprising a solvent tank, a cylinder therein for containing a charge of solvent, a conduit having an opening below the top of said cylinder and exteriorly extending from the cylinder for connection to a radiator duct, there being an inlet opening for the solvent in the top portion of said cylinder, said inlet having an internal valve seat, an air line extending into the cylinder and terminating in an upright nipple beneath the said valve seat, said air line having an opening within the cylinder and in advance of the nipple, a valve for engaging said valve seat and having a tubular extension loosely fitting over the nipple to close it, said valve being supported on the nipple in its open position and being free to rise under the influence of air pressure therein, and means for supplying the air line with compressed air.

2. A cleaning apparatus of the class described comprising a heated tank for containing a solvent, a cylinder disposed on the floor of the tank and having an inlet in it for admitting the solvent, a valve for controlling said inlet, a conduit having an opening below the top of said cylinder

and exteriorly extending from the cylinder for connection to a radiator duct, an air line extending from a source of compressed air and projecting into the cylinder with its terminus associated with the valve to close it, said air line having a discharge opening within the cylinder, a blow-off valve interposed in said air line, a spring-urged plunger in said valve controlling the passage of air through the blow-off valve, there being a port in said blow-off valve alongside of the plunger, said port communicating with a vent in the blow-off valve and with that part of the air line which extends to the cylinder, and an air cylinder disposed in the tank aforesaid to be heated thereby, said cylinder communicating with the air line at a point in advance of the blow-off valve.

3. A cleaning apparatus of the class described, comprising a heated tank for containing a solvent, a cylinder disposed on the floor of the tank and having an inlet in it for admitting solvent, a pressure operated valve controlling said inlet, a conduit having an opening below the top of said cylinder and exteriorly extending from the cylinder for connection to a radiator duct, an air line extending from a source of compressed air and projecting into the cylinder with its terminus associated with said valve for supplying air under pressure to close it, said air line having a discharge opening within the cylinder, a blow-off valve interposed in said air line, said blow-off valve having a chamber leading to a small ingress passage, there being a port formed in said chamber and terminating short of the length thereof, a vent communicating with the chamber, there being an opening communicating with the chamber and port, a spring urged plunger reciprocably disposed in the chamber to close the ingress passage, said plunger in its closed position partially uncovering the port to permit it to communicate with the vent.

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