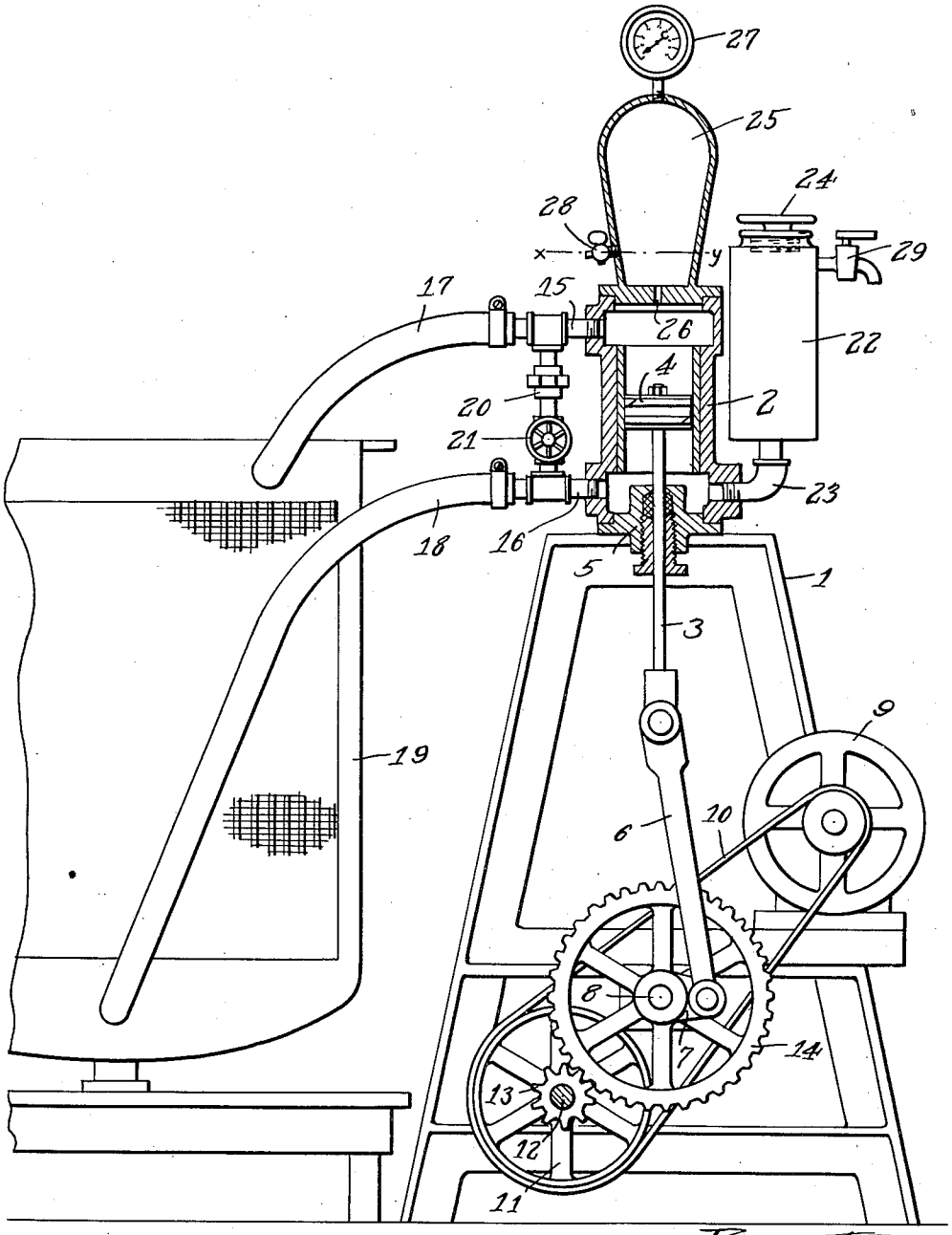
July 11, 1933. C. MARXMAN 1,918,048

RADIATOR CLEANING MACHINE

Filed Nov. 25, 1929



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Patented July 11, 1933 1,918,048

UNITED STATES PATENT OFFICE

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RADIATOR CLEANING MACHINE

Application filed November 25, 1929. Serial No. 409,471.

This invention relates to a machine especially designed and adapted for the cleaning of radiators for automotive vehicles, but, of course, capable of use for cleaning anything of a generally similar nature.

The job of cleaning a radiator usually took several hours even where the most up-to-date methods and the best cleaning equipment available were employed, and the cleaning machines were usually so complicated and expensive that many radiator repair shops could not afford to install the same. It is, therefore, the two-fold purpose of my invention to provide a radiator cleaning machine capable of thoroughly cleaning a radiator in a fraction of the time otherwise required and which is so simple in construction that it can be built at an extremely low cost.

Still another object of my invention is to provide an improved method of cleaning radiators, consisting in continuously forcing the cleaning solution back and forth through the radiator, instead of continuously in one direction, and starting the cleaning operation with a comparatively small amount of cleaning solution and gradually increasing the amount as the passages in the radiator become more and more cleared. The reversals are in accordance with the simple harmonic motion of the reciprocating piston or diaphragm and I have found that the cleaning of a radiator by this method insures a much more thorough job in much less time than was otherwise required. There is the further advantage in this method that a reservoir for the cleaning solution is not needed and the machine is generally simplified.

It is a further object of my invention to provide in a machine designed to operate according to the above method, means for gauging the resistance to the flow of the cleaning solution so as to guard against the danger of opening up a seam or rupturing some weak portion of the radiator core or tanks because of excessive pressure developed therein during the cleaning operation, and to provide a by-pass valve for the cleaning solution which can be opened to cut down the amount of solution being forced through in the event there is indication of too much pressure being developed.

The invention is illustrated in the accompanying drawing, showing in vertical section a machine embodying my invention, connected up with a radiator to be cleaned.

The machine has a suitable base 1 on which a hydraulic pump cylinder 2 is mounted vertically with the piston rod 3 for the piston 4 extending downwardly therefrom through a suitable stuffing box 5 provided on the lower end of the cylinder. A pitman 6 is connected to the lower end of the rod 3 and has connection with a crank 7 on a shaft 8 mounted in the lower end of the base 1. The shaft 8 is driven by an electric motor 9 suitably supported in the base, which has a belt connection 10 with a pulley 11 on a countershaft 12, and a small pinion 13 on the shaft 12 meshes with a gear 14 fixed to the shaft 8. Any other reduction gearing suitable for the purpose might be provided to afford the proper ratio driving connection between the motor 9 and the pump. Pipes 15 and 16 communicate with the upper and lower ends of the cylinder 2 and communicate with hose connections 17 and 18 arranged to be attached to the radiator to be cleaned, such as that shown at 19. The pipes 15 and 16 have a by-pass connection 20 therebetween, the flow through which is controlled by a valve 21. A tank 22, disposed alongside the pump, has connection with the lower end of the cylinder 2, as indicated at 23, and has a removable filling cap 24 in the upper end thereof. An air chamber 25 is mounted on the upper end of the cylinder 2 and is in restricted communication with the cylinder through a small hole 26 in the bottom wall thereof. An air pressure gauge 27 communicates with the upper end of the chamber 25. 28 is an overflow pet cock, and 29 is another pet cock arranged to serve as a safety valve for the relief of pressure in the system, as will presently appear.

In operation, the radiator to be cleaned is inverted, as indicated, and the hose 17 fixed to the one connection thereof, and the hose 18 to the other connection, the radiator being

also at the same time otherwise sealed so as to be water-tight for the purposes of the cleaning operation. Then the cap 24 is removed from the tank 22 to fill the system with any suitable, but preferably alkaline cleaning solution up to the dot and dash line x—y, the pet cock 28 being left open and being closed as soon as the solution commences to flow therefrom. The cap 24 is then replaced to seal the system. Then, before starting the motor 9, the by-pass valve 21 is opened all the way so that in the first few reciprocations of the piston 4 the bulk of the solution is simply by-passed from one end of the cylinder 2 to the other. The motor is then started and, in the reciprocation of the piston 4, a continuous column of cleaning solution is set into motion, washing quickly back and forth through the passages in the radiator 19, the reversals being naturally in accordance with the simple harmonic motion of the piston which moves the solution. The solution courses through the passages in the radiator to whatever extent is permitted, assuming that the passages are more or less clogged with scum and sediment. The operator can tell by reading the gauge 27 whether there is much resistance to the washing of the solution through the radiator, because on each up-stroke of the piston 4, a certain amount of solution will find its way up into the air chamber 25, more or less, depending on the resistance to the flow of the solution through the radiator. The air in said chamber is, therefore, more or less compressed, and the pressure is indicated by the gauge. If very little pressure is produced in the chamber 25, the operator knows that the machine is not operating under load and so the valve 21 is given one or more turns so as to cut down the amount of solution being by-passed. The operator watches the dial 27 so as not to restrict the by-pass connection too much, otherwise there might be danger of a pressure being developed enough to open up a seam in the radiator or rupture the wall at some weak spot in the core of the radiator. In case a pressure as high as, say, ten pounds is registered on the dial, the by-pass valve 21 should be opened a trifle. In an emergency, where a high pressure is suddenly developed and there might be danger of damage to the radiator, the operator may open the pet cock 29 or the pet cock 28, or both, closing the same as soon as the proper adjustment has been made on the machine, so that no excessive pressure will be developed again. During the process of cleaning a radiator, the operator will now and then adjust the valve 21, as the passages in the radiator become more and more cleared, so as to keep the machine operating under load and thus speed up the cleaning operation as much as possible. When the valve 21 can be closed entirely without excessive pressure being indicated by the gauge 27, the operator knows that the radiator is thoroughly clean. It has been found that the continuous, rapid, and regular surging back and forth of the cleaning solution with uniform harmonic motion will loosen up any scum or sediment much more readily than solution passed through the radiator in one direction, for example. In my machine, it is common to have the solution reversed in its direction of flow as many as ninety times per minute. It is due to this vigorous motion of the solution that a thorough job can be done with this machine in a fraction of the time required with other machines with which I am familiar.

It is believed the foregoing description conveys a clear understanding of my invention and all of its advantages over devices that have been provided for a similar purpose. The following claims have been drawn with a view to covering all legitimate modifications and adaptations of my invention such as are apt to occur to those skilled in the art, especially after my disclosure. For example, the term "piston" should be taken in the broad sense as including any form of reciprocating or vibrating diaphragm, it being apparent that such an element would give substantially the same results as the piston herein illustrated and described.

I claim:

1. A device of the class described comprising a vertically disposed cylinder, a piston reciprocable vertically in said cylinder, means having connection with the piston from below the cylinder for reciprocating the same, fluid conduit connections communicating with the upper and lower ends of said cylinder and arranged to be connected with the inlet and outlet of the chamber or receptacle to be cleaned, an air chamber communicating with the top of said cylinder, a by-pass connection establishing communication between the upper and lower ends of said cylinder, a valve for controlling the flow through said connection, a filling tank vertically disposed alongside the cylinder and communicating with the lower end thereof, said tank extending beyond the upper end of the cylinder and having a removable closure therefor, there being an overflow opening in the air chamber above the cylinder and approximately at the same elevation as the upper end of the filling tank, and means for closing said overflow opening.

2. A device of the class described comprising a vertically disposed cylinder, a piston reciprocable vertically in said cylinder, means having connection with the piston from below the cylinder for reciprocating the same, fluid conduit connections communicating with the upper and lower ends of said cylinder and arranged to be connected with the inlet and outlet of the chamber or receptacle to be cleaned, an air chamber communicating

with the top of said cylinder, a by-pass connection establishing communication between the upper and lower ends of said cylinder, a valve for controlling the flow through said connection, a filling tank vertically disposed alongside the cylinder and communicating with the lower end thereof, said tank extending beyond the upper end of the cylinder and having a removable closure therefor, there being an overflow opening in the air chamber above the cylinder and approximately at the same elevation as the upper end of the filling tank, a valve for closing said opening, said valve being arranged to be used as a pressure relief valve to be opened when excessive pressure exists in the air chamber, and another valve communicating with the upper end of the filling tank, likewise adapted to be used as a pressure relief valve in the event excessive pressure is developed in the cylinder.

3. A device of the class described adapted for cleaning a chamber or receptacle by back and forth flow of cleaning solution through the chamber or receptacle, comprising a pump cylinder, a reciprocatory pumping element in said cylinder having a rod extending therefrom for operation thereof from outside the cylinder, power means connected with the rod for reciprocating said pumping element at a certain speed to move a certain volume of cleaning solution back and forth, the opposite ends of the cylinder having openings, a fluid conduit communicating with each of said openings, each conduit being adapted for connection at its other end with the inlet or outlet opening of the chamber in which cleaning solution is to be moved back and forth, a by-pass for affording direct restricted communication between opposite ends of the cylinder, and a manually adjustable valve for regulating the flow through said by-pass, whereby to accordingly vary the amount of solution caused to flow back and forth in the chamber.

4. A device of the class described adapted for cleaning a chamber or receptacle by back and forth flow of cleaning solution through the chamber or receptacle, comprising a pump cylinder, a reciprocatory pumping element in said cylinder having a rod extending therefrom for operation thereof from outside the cylinder, means connected with the rod for reciprocating said pumping element, the opposite ends of the cylinder having openings, a fluid conduit communicating with each of said openings, each conduit being adapted for connection at its other end with the inlet or outlet opening of the chamber or receptacle, an air chamber communicating with one end of said cylinder adapted to contain air compressed therein by movement of cleaning solution in said cylinder, and manually adjustable means for relieving the pressure in said chamber whereby to keep the device operating below predetermined pressure.

5. In a device of the class described, a cylinder, a pumping elemnt reciprocable therein, conduits communicating with the opposite ends of the cylinder and adapted to be placed in communication with the respective ends of the chamber or receptacle to be cleaned, whereby when the cylinder and chamber as well as the conduits are filled with cleaning solution the reciprocation of the pumping element in the cylinder causes the solution to flow back and forth in short reciprocatory movement in the chamber, power operated means for reciprocating the pumping element at a certain speed to move a certain volume of cleaning solution back and forth, a by-pass passage to afford direct communication between opposite ends of the cylinder and a manually adjustable valve for regulating the flow back and forth through said passage, whereby to accordingly vary the amount of solution caused to flow back and forth in the chamber or receptacle to be cleaned.

6. In a device of the class described, a cylinder, a pumping element reciprocable therein, conduits comunicating with the opposite ends of the cylinder and adapted to be placed in communication with the respective ends of the chamber or receptacle to be cleaned, whereby when the cylinder and chamber as well as the conduits are filled with cleaning solution the reciprocation of the pumping element in the cylinder causes the solution to flow back and forth in short reciprocatory movement in the chamber, power operated means for reciprocating the pumping element, an air chamber communicating with one end of said cylinder adapted to contain air compressed therein by movement of cleaning solution in said cylinder, and manually adjustable means for relieving the pressure in said chamber whereby to keep the device operating below a predetermined pressure.

In witness of the foregoing I affix my signature.

CARL MARXMAN.