Dec. 8, 1936. L. C. SHIPPY 2,063,702

CORE WASHING MACHINE

Filed July 22, 1935 3 Sheets-Sheet 1

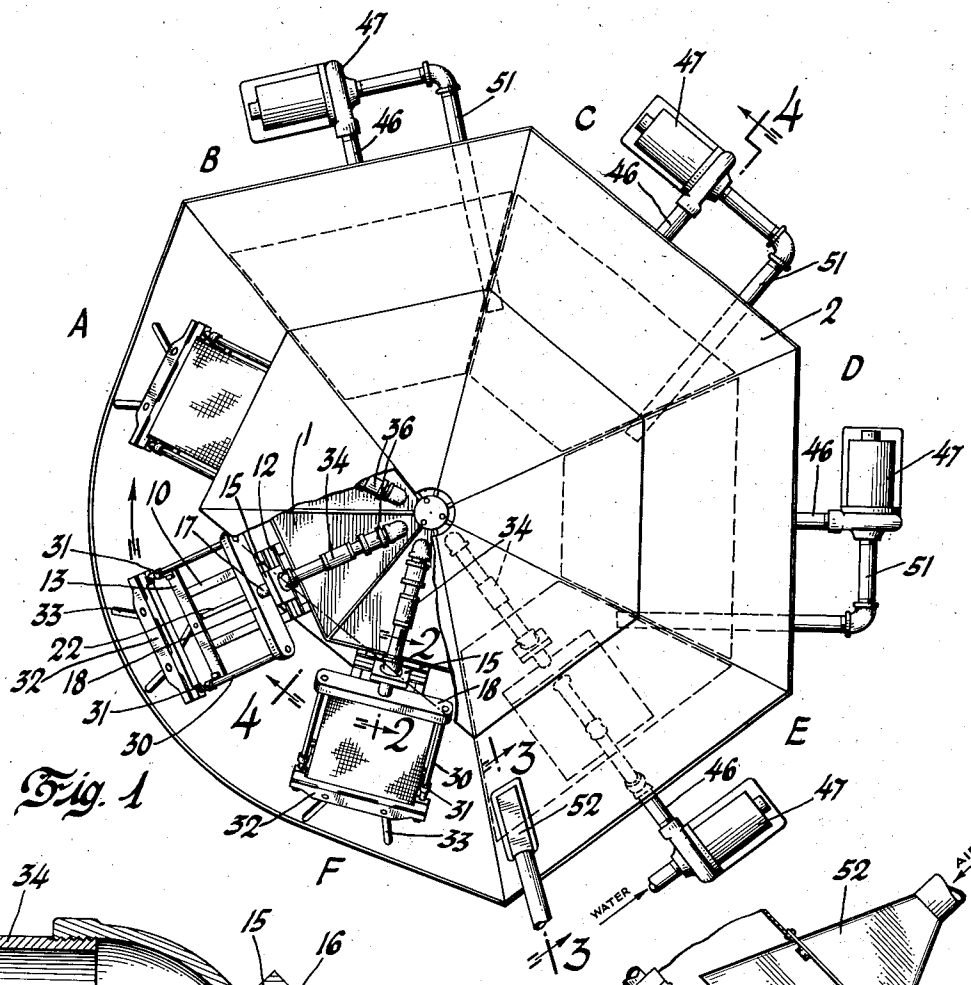


Fig. 1

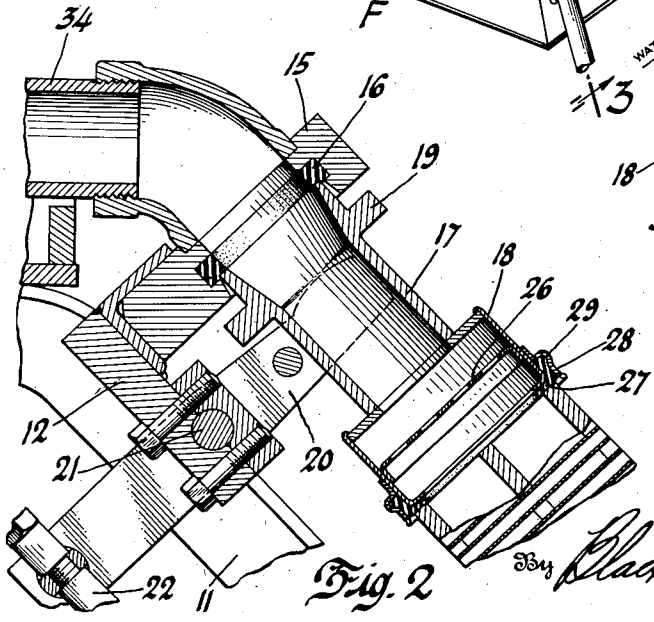


Fig. 2

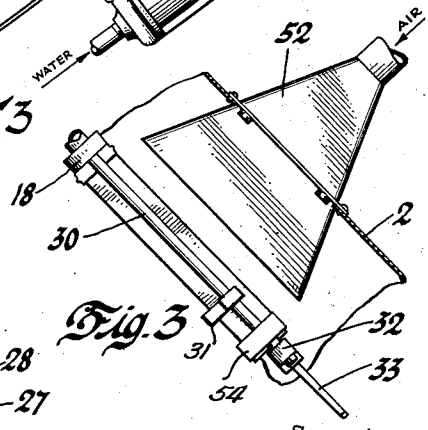


Fig. 3

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CORE WASHING MACHINE

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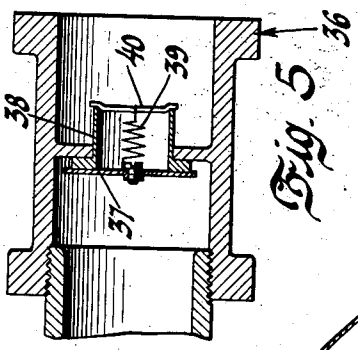


Fig. 5

Fig. 4

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CORE WASHING MACHINE

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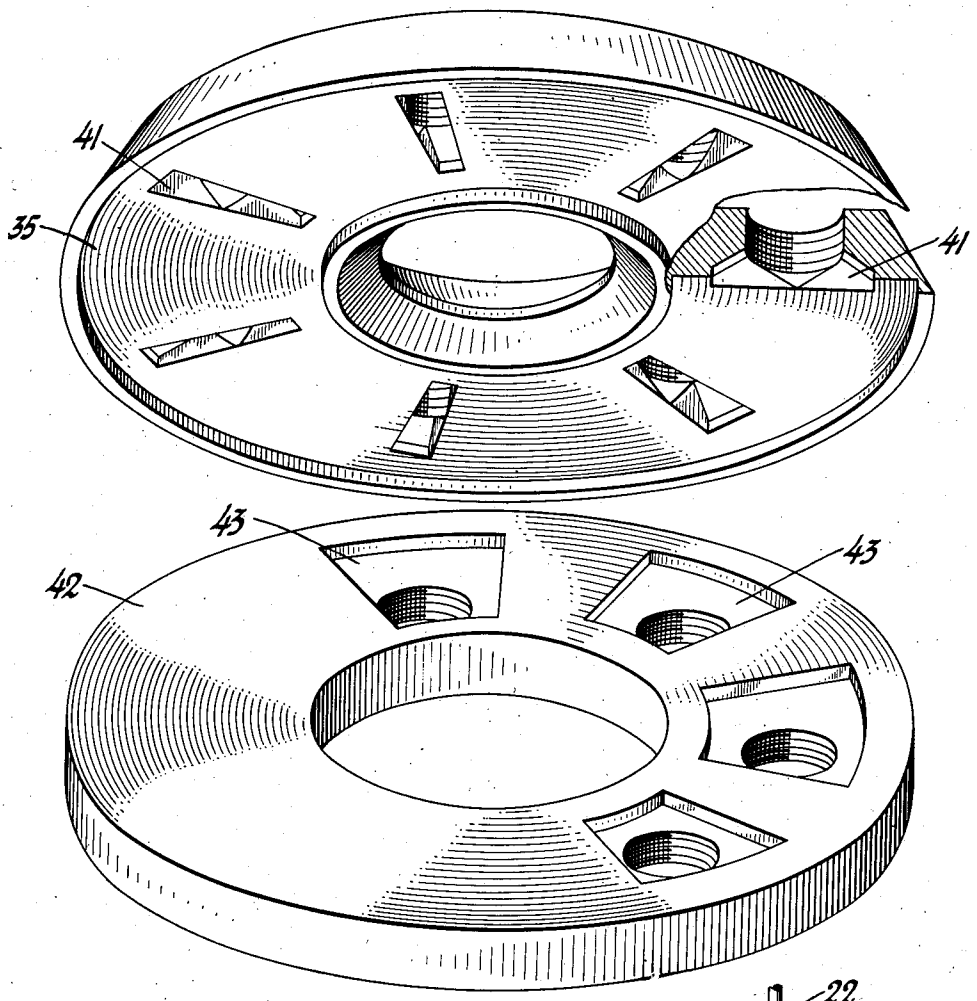


Fig. 6

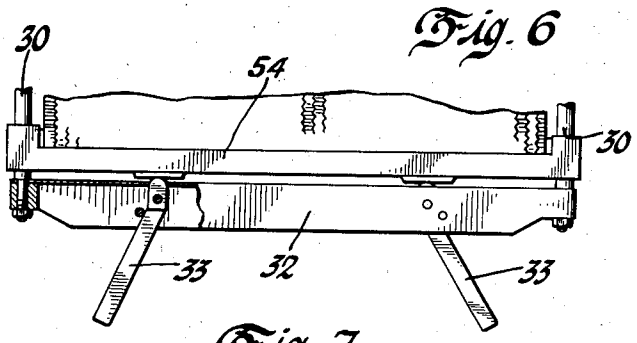


Fig. 7

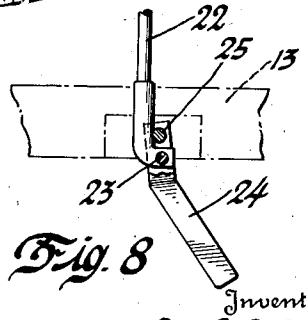


Fig. 8

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UNITED STATES PATENT OFFICE

2,063,702

CORE WASHING MACHINE

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Application July 22, 1935, Serial No. 32,683

5 Claims. (Cl. 141—1)

Automobile radiators and other similar types of heat exchange devices comprise a radiating core having a number of spaced tubes for the flow therethrough of cooling system liquid between inlet and outlet headers on opposite ends of the core structure. In the manufacture of the core the several parts are soldered together and immediately thereafter surplus soldering flux must be washed off the parts to prevent damage thereto. To this end the usual practice is to immerse the soldered core in a tank containing water or a cyanide solution. It is to improve upon this part of the manufacturing procedure that the machine constituting the subject matter hereof has been devised.

Primarily the present invention deals with pressure flushing of both the inside and outside surfaces of the core whereby the washing operation is performed more thoroughly and in less time.

A further object of the invention is to provide a machine which operates automatically to flush each core several times. Different kinds of solution may be used for succeeding flushes if that is deemed desirable, but the same kind of liquid may be used throughout, in which event provision preferably is made so that the same liquid is used only once for each core with the fresh liquid entering at the final wash and being worked back to the initial wash where it is discarded. Thus each succeeding wash is in cleaner liquid and the last in the fresh supply. This enables the liquid to be used over a reasonable number of times with the same result as though clean liquid were used each time and of importance is the saving of expense.

The various novel details of the machine will become apparent during the course of the following specification when taken in connection with the accompanying drawings, in which Figure 1 is a top plan view with parts broken away, of a preferred, but not necessarily the only embodiment of the machine; Figures 2 and 3 are detail sectional views taken, respectively, on lines 2—2 and 3—3 of Figure 1; Figure 4 is a vertical sectional view through a portion of the machine and is taken on line 4—4 of Figure 1; Figure 5 is a detail sectional view of a pressure relief valve which allows drainage of the core following each washing operation; Figure 6 is a detail perspective view showing the two elements of a rotary multiple valve, and Figures 7 and 8 are fragmentary views showing details of the core supporting frame, Figure 8 being a view looking in the direction of the arrows on line 8—8 of Figure 4.

In the drawings the numeral 1 indicates a rotating wheel or conveyor enclosed within a hood or housing 2 and adapted to carry a number of core assemblies from the loading station A through the washing stations B, C, D, and E in succession to the unloading station F. The conveyor wheel has a vertical driving shaft 3 mounted in suitable bearings in the stationary supporting tube 4 and provided at its lower end with a gear 5 in mesh with the driving pinion 6 on a shaft 7 driven from an electric motor 8 through suitable speed reduction gearing enclosed within the box 9.

The core supporting frames spaced circumferentially about the wheel 1 may each comprise a pair of angle irons having lateral extensions 10 bolted or otherwise secured to the wheel and downwardly and outwardly projecting legs 11 connected at the top and bottom by transverse straps 12 and 13, respectively. A diagonal brace bar 14 extending between the remote ends of the legs 10 and 11 lends increased strength to the frame.

Extending upwardly from the cross bar 12 is an apertured block 15 which provides a seat for a sealing gasket 16 (see Figure 2) engageable with the end of the inlet pipe 17 of a replaceable header 18. Formed on the inlet pipe 17 is an annular flange 19 engaged on diametrically opposite sides of the tube by the adjacent ends of a pair of spaced rock levers 20 pivoted on opposite ends of a pin 21, which is clamped or otherwise carried by the cross bar 12. The opposite ends of the rock levers 20 are connected through a universal joint of suitable design with a tie rod 22 which extends downwardly and, as shown in Figure 8, terminates in a lateral extension which is hinged by a pin 23 to the hand lever 24 pivoted at 25 on the cross bar 13. In the position of the parts shown the pivot pin 23 is past dead center position and through the tension rod 22, the rock levers 20 are held in clamping engagement with the flange 19. By swinging the lever 24 the levers 20 may be operated to free the header 18 for its removal and for the substitution of a replaceable header. By the use of replaceable headers of different sizes the same machine may be utilized for washing cores of varying shapes and dimensions.

Each header preferably is provided within the hollow interior thereof in alinement with the spout 17 with a suitable baffle 26, which may be perforated and which serves to distribute or spread the liquid supplied thereto throughout the header for uniform flow through the interior of the several tubes comprising the core. For affording a temporary seal between the header

and the core being tested, use may be made of a rubber or other flexible flap 27 secured within a retainer strip 28 and provided with a beaded portion to fit within a corresponding groove 29 in the retainer strip 28.

Both ends of the replaceable header are provided with connections for a pair of tie rods 30 which are inclined downwardly and are supported near their lower ends by brackets 31 extending upwardly and forming a part of the cross bar 13 of the supporting frame. These tie rods 30 carry at their lower ends a cross bar 32 which is provided with one or more pivoted camming levers 33 bearing on a clamping bar 54 which is slidably mounted on the rods 30 and is adapted to engage with the lower end of the core assembly and thereby hold its opposite end in tight engagement with the sealing flap 27. By this arrangement the cores to be washed may be easily and quickly positioned in or removed from the supporting frames of the conveyor at the loading and unloading stations.

Water or other washing liquid is supplied under pressure to the inlet 17 through suitable piping 34 associated with the movable element 35 of a rotary valve. Also associated with the piping 34 is a pressure relief or check valve 36, which as shown in Figure 5 may consist of a plate or disc 37 seating against the flanged end of a tube 38 and being located on its seat under influence of a light coil spring 39 fastened at one end to the plate and at its opposite end to a wire 40 extending transversely across the tube and seating at the opposite end thereof. The action of this valve is to close whenever liquid under pressure is supplied for passage through the interior of the core and to open after the interval of liquid delivery to allow the passage of air to the pipe 34 for draining the interior of the core.

The structure of each of the core supporting frames is similar to that before described and the rotary member 35 of the multiple valve is, therefore, provided with a series of spaced ports 41 therein, one for each of the core supporting structures. The bottom or stationary plate 42 is provided with only four ports 43, one for each of the washing stations B, C, D and E, and upon relative movement of the plates the slots 41 individually are moved into and out of alinement successively with the ports 43 for connecting the interior of the core with the source of cleansing liquid under pressure.

For supporting the stationary plate there has been provided a pedestal in the form of a table 44 extending across a pair of standards or uprights 45. Each port 43 is connected by a suitable pipe or conduit as at 46 in Figure 4 which leads from a pressure pump 47 or other pressure supply source. A branch pressure line 48 extends upwardly and terminates in a shower or spray head 49 for directing washing liquid over the exterior surfaces of the core.

The liquid supplied by the pump 47 after thoroughly flushing the core and cleaning the same of excess soldering flux drops by gravity and instead of draining to a sewer may be caught in a storage reservoir as indicated at 50. From the tank 50, the liquid may be withdrawn through a pipe leading to the suction side of the pump for recirculation. Optionally, the suction side of the pump may be connected to the storage tank of the neighboring washing station as shown at 51 whereby the flushing liquid is transferred from station to station in a direction opposite to that of conveyor travel. In this event at station B, where each core receives its initial wash, the storage tank may be omitted and the liquid allowed to drain into a sewer or other place of disposal and the suction side of the pump for station E, where the core receives its final wash, may be connected to a suitable source of either hot or cold liquid. If city water is to be used the pressure pump at the final station may be entirely omitted and connection made directly to the city water main. Alternately the city supply may be connected so as to flow through the interior only of the core at the final washing station and a pressure pump employed to supply water from the catch basin to the shower head only.

In the event a cyanide solution is to be used, for example, for the third wash, then the suction side of the pump at the third or D station is connected with the tank 50 forming a part of the station for the recirculation of the cyanide solution at that station only. Additionally the suction conduit of the pump associated with the preceding C station extends to and withdraws liquid from the tank at the final washing or E station. It is possible also to subject the cores to alternate hot and cold washes and these and various other alternative arrangements of the apparatus will be obvious to those skilled in the art.

To dry the core and facilitate handling after the wash operation it is proposed to provide just beyond the final wash a funnel 52 connected to a source of either hot or cold air under pressure to direct a draft of air over the entire outer surface of the core and thereby blow the core dry.

In operation the conveyor 1 rotates continuously at a preselected speed of travel and the cores traveling through the several stations are intermittently flushed and allowed to drain and under pressure flushing are thoroughly cleansed of any foreign matter that otherwise would cause injury.

I claim:

1. In a radiator core washing machine, a traveling conveyor having a series of headers adapted to fit the open ends of cores carried by the conveyor in open communication with the core interiors, means supplying the headers individually with washing liquid under pressure for flow through the cores at spaced intervals in their travel with the conveyor, and means acting automatically to promote drainage of liquid from the cores between succeeding intervals of liquid delivery, including an air inlet passage leading to the upper portion of a header and a pressure actuated valve closing said passage during liquid delivery.

2. In a radiator core flushing machine, a conveyor having a plurality of headers for detachable engagement with cores carried by the conveyor in open communication with the interior passages thereof, a series of washing stations, each including a spray head directing liquid under pressure over the exterior of cores passing thereby and a conduit for liquid under pressure adapted for communication in succession with the headers as they move into alinement therewith for the flow of liquid through the cores, means providing for the flow of air to the upper portion of each header thereby to promote drainage of liquid interiorly of the core when the header is out of communication with the station conduits and a pressure actuated one way valve acting automatically to close said air flow means during liquid delivery from the conduit to the header.

3. In a radiator core washing machine, a series of spaced supporting frames, means on each frame for removably mounting a core carrying fixture,

a core carrying fixture including a header for engagement with one end of a core and an adjustable clamping member for engagement with the other end of the core to hold the same removably in the fixture, a traveling carrier for said frames, a series of liquid conduits on said carrier, connected one to each header, means operative to supply liquid to said conduits individually at a given station in the travel of said carrier, an air inlet passage in each conduit for promoting drainage of liquid from the core beyond said station, and a pressure actuated one way valve to close said air inlet passage when liquid is being supplied through the conduit.

4. In a radiator core washing machine having a series of flushing stations and a traveling conveyor provided with a series of spaced conduits to deliver flushing liquid at the several stations, and being characterized by a series of core positioning devices, each including a supporting frame mounted on the conveyor, a core clamping fixture comprising a pair of relatively movable members engageable with opposite ends of a core for removably mounting a core therein, one of said members constituting a header for communication with the core interior, and means on the frame removably securing the fixture thereon with said header in communication with an adjacent conduit.

5. A radiator core washing machine of the character described, including a conveyor, a series of radiator core supporting frames carried by the conveyor, a liquid supply conduit leading to each supporting frame, a core engaging header connected to each conduit, means on each frame detachably mounting the header thereon, a pair of spaced dependent rods at opposite ends of the header, a cross bar fixedly carried by said rods, a clamping member slidably carried by the rods for engagement with one end of a radiator core and adjustable means on said cross bar for engagement with said member to clamp the opposite end of the radiator core against said header.

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