Jan. 6, 1953 J. R. OKON 2,624,354

MACHINE FOR CLEANING OIL COOLER RADIATORS, ETC

Filed Oct. 29, 1948 3 Sheets-Sheet 1

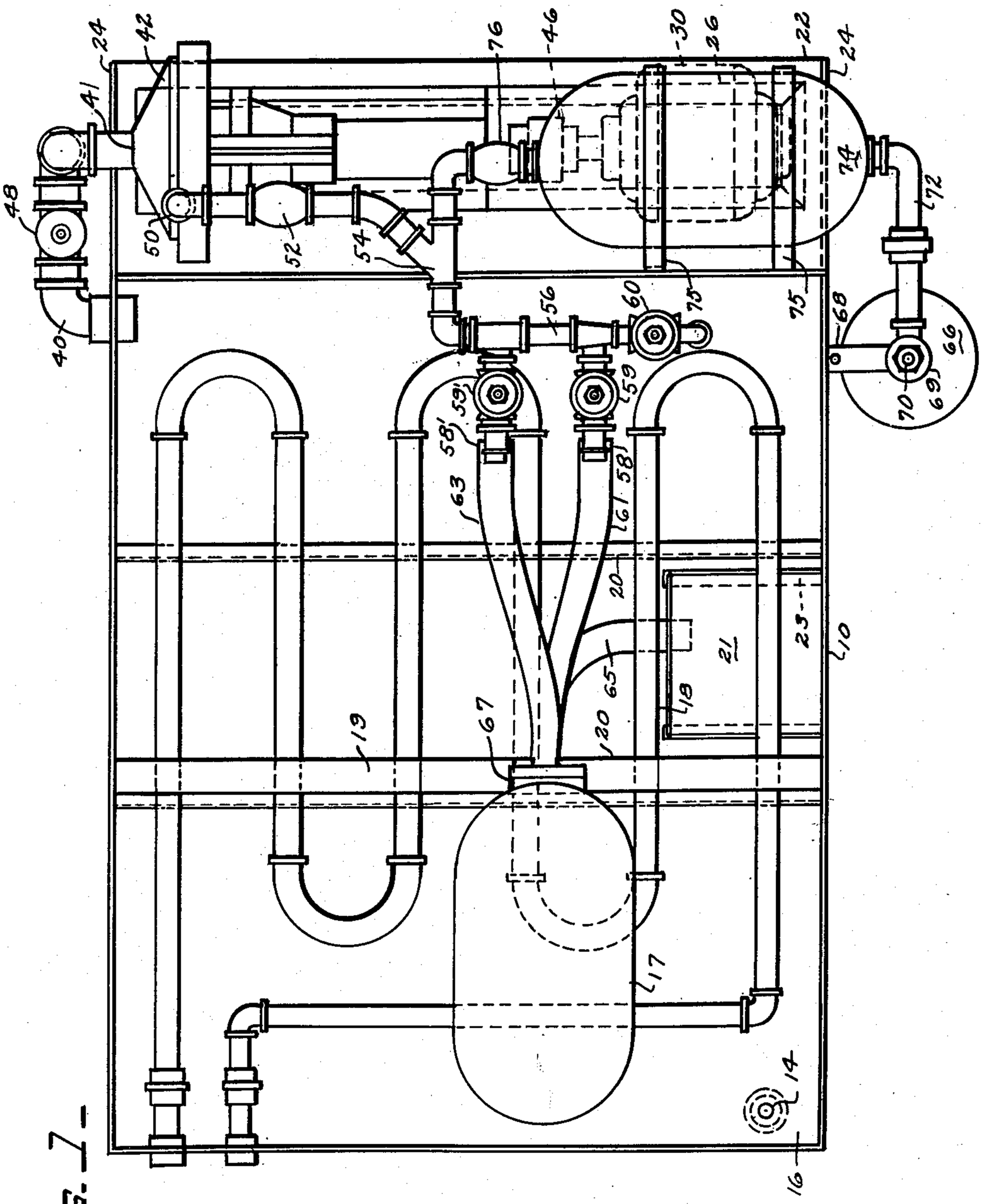

FIG. 1.

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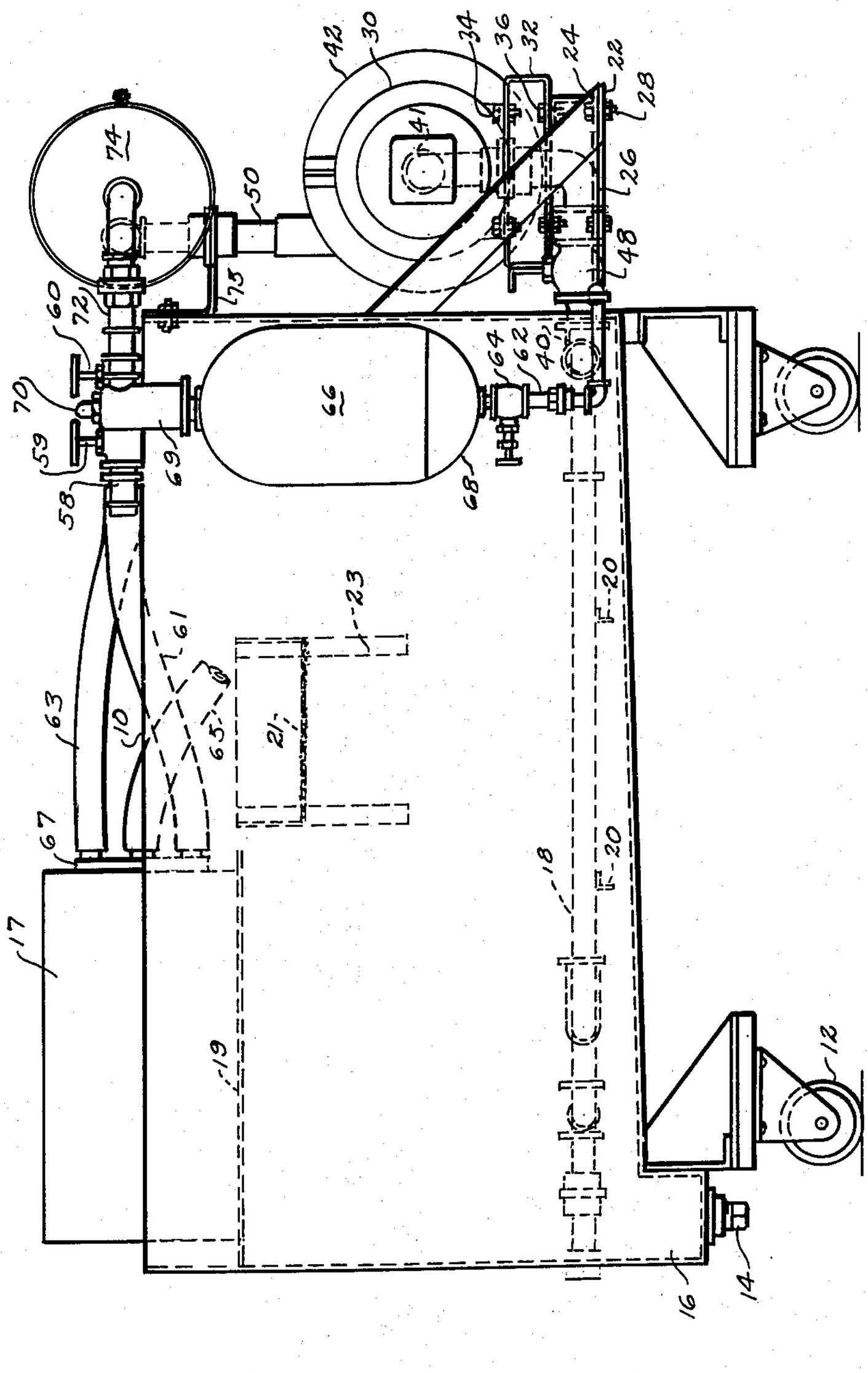

FIG. 2.

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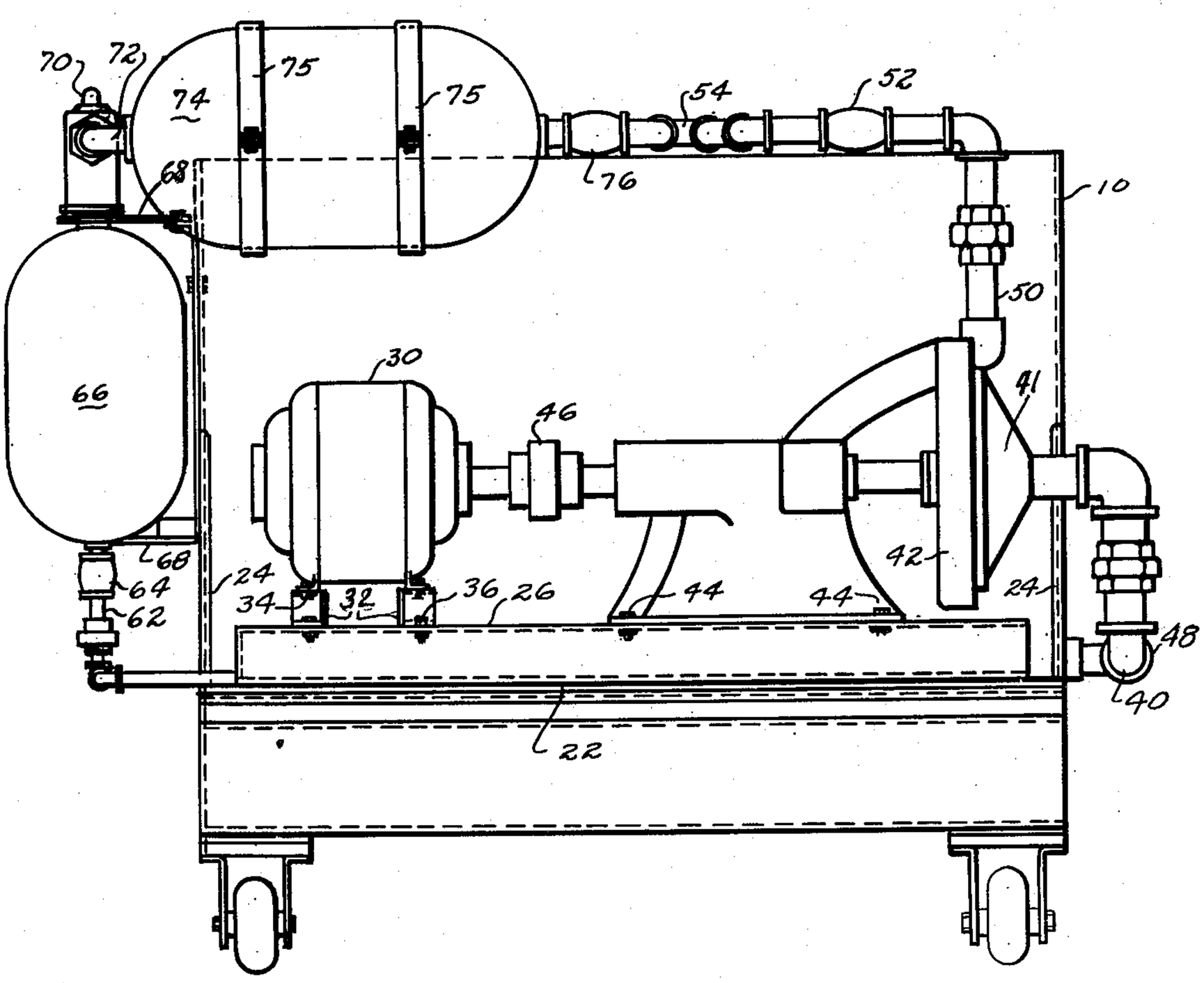
FIG. 3



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UNITED STATES PATENT OFFICE

2,624,354

MACHINE FOR CLEANING OIL COOLER RADIATORS, ETC.

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5 Claims. (Cl. 134—101)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without payment to me of any royalty thereon.

This invention relates to a machine for cleaning out radiator cores of oil coolers particularly such as are used in aircraft where frequent and thorough cleaning is a prime necessity.

An object of the invention is to provide a machine of this kind which will clean out a radiator core more thoroughly than by cleaning methods heretofore used in common practice.

Another object is to provide a cleaning machine of this character which will clean out a radiator core in less time than is taken in current practice.

Other objects and advantages will become evident as the invention is further described with reference to the drawings, wherein:

Figs. 1, 2 and 3 are plan view, side elevation and end elevation respectively of one embodiment of my invention.

Like reference characters refer to like parts throughout the several views.

Referring now to the drawings, a supply tank 10 may preferably be provided with castors 12 for moving it from place to place. A pipe plug 14 may be removed from the sump 16 to drain the tank when desirable. A heating unit 18 is supported on transverse members 20 near the bottom of the tank 10 for maintaining a cleansing liquid at a desired heat. A shelf 19 extends across the inside of the tank near the top for holding the work 17 which is to be cleaned. A screen 21 is supported on brackets 23 along one side within the tank. The cleaning fluid after passing through the work is passed through this screen back into the tank.

A shelf 22 is supported on the end of the tank 10 by brackets 24. A box frame 26 is fastened to the top of the shelf 22 by bolts 28. A motor 30 is secured to transverse members 32 by bolts 34, the transverse members 32 being in turn secured to the box frame 26 by bolts 36. A switch (not shown) may be provided for effecting operation of the motor 30.

A suction connection 40 extends from the tank 10 near the bottom thereof to the suction side 41 of a pump 42, the pump being mounted on the box frame 26 by bolts 44 (see Fig. 3). A coupling 46 connects the shafts of the motor 30 and pump 42 in driving relation. A gate valve 48 is inserted for controlling flow through the pump inlet. A pump discharge conduit 50 extends from the discharge side of the pump 42

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upward and through a check valve 52 and Y fitting 54 to the manifold 56 from which two hose connections 58 and 58′ having shut-off valves 59 and 59′ respectively are taken. An additional gate valve 60 at the end of the manifold 56 may be opened if it is desired to allow the pump 42 to run while both of the valves 59 and 59′ have been closed for the purpose of removing a cooler which has been cleaned and connecting another for cleaning. Flexible hose 61 and 63 extend from the hose connections 58 and 58′ respectively to the cooler 17. A special adapter 67 is provided whereby fluid flowing through the hose 61 will pass through the core of the cooler 17 and fluid flowing through hose 63 will pass through the shell of the cooler, the fluid in both cases returning through the hose 65 to the screen 21 and back into the tank 10. Hose 61 and 63 are permanently connected to the hose connections 58 and 58′.

The air or other gas under pressure is brought in from a source of supply (not shown) through an air pressure line 62, through a gate valve 64 into an air reservoir 66 which is mounted on the long side of the tank by a bracket 68.

From the reservoir 66, the compressed gas passes through and operates a spring loaded pop-off valve 69, the spring of which is adjustable by removal of the cap 70, then through piping 72, to a surge tank 74, which is mounted on the end of the tank 10 by brackets 75, thence through a check valve 76 through the Y fitting 54, where the cleaning fluid and the pressurized gas mix, then through the manifold 56 to the hose connection shut-off valves 59 and 59′ and, if they are closed, then through the gate valve 60 into the tank 10.

The operation of cleaning an oil cooler radiator with the special equipment herein disclosed may preferably be carried out substantially as follows:

The air inlet valve 64 and the gate valves 59 and 59′ should be closed while the hose 61, 63 and 65 are being connected to the adapter 67. With the suction inlet valve 48 and the relief valve 60 open, the pump 42 may now be started.

The gate valves 59 and 59′ may next be opened and the relief valve 60 closed, whereupon cleaning fluid will flow out by way of the hose 61 through the core of the cooler 17 and back through the hose 65 and screen 21 to the tank 10, and out by way of the hose 63 through the shell of the cooler 17 and back through the hose 65 and screen 21 to the tank 10. At this time

the check valve 76 prevents cleaning liquid from the pump side entering the surge tank 74.

The compressed air inlet valve 64 is now opened, and, because the spring loaded pop-off valve 69 is closed, pressure builds up in the reservoir 66 until the spring in the spring loaded pop-off valve yields, whereupon a predetermined volume of compressed air is let out of the reservoir 66 and into the surge tank 74, whereupon the spring in the spring loaded pop-off valve 69 closes the valve until more pressure builds up in the reservoir 66 when the cycle is repeated.

The surges of air pressure received by the surge tank 74 are passed on through the check valve 76 and Y fitting 54, where they combine with the pressurized cleaning liquid before entering the manifold 56 from whence they are passed through the cooler 17 in the form of highly aerated surges of cleaning mixture. A check valve 52 prevents liquid being returned through the pump by the air pressure in the surge tank 74 in case the pump for any reason failed to keep up its pressure while the air was still connected.

The frequency of the surges may be controlled by properly relating the air pressure at the source with the pop-off valve 69 and its adjusting spring (not shown). In average practice the surge cycle may preferably occur at from seventy to one-hundred fifty cycles per minute, depending on the size of the relief valve, the strength and adjustment of its spring, the restrictions in the cooler 17 being cleaned and the pressure of the air at the source which may preferably be from 100 to 150 p. s. i.

The cleaning fluid may preferably be a mixture composed of 2½ gallons of soft soap, 50 gallons of water, 5 gallons of tricloroethylene and 5 gallons of creosote oil. When the apparatus is in operation the cleaning fluid mixture is preferably kept at a temperature of 180° F.

Having described an embodiment of my invention, I claim:

1. Apparatus for cleaning oil coolers and the like, which comprises, in combination, a main tank for a cleaning fluid, a pump having its suction side connected to said main tank, a source of compressed air, a compressed air reservoir having its inlet connected to said source of compressed air, a surge tank, a pop-off valve having its inlet connected to said reservoir and its discharge side connected to said surge tank, a Y fitting, a passageway connecting the discharge side of the pump to one branch of the Y fitting, a passageway connecting the discharge side of the surge tank to another branch of the Y fitting, a manifold, a passageway connecting the third branch of the Y fitting to said manifold, and a plurality of hose connections emanating from said manifold for attachment to coolers to be cleaned.

2. Claim 1 with a valved conduit between the manifold and the main tank for returning the fluid in the manifold back into the main tank.

3. Claim 1 with a valve for each hose connection for shutting off flow from the manifold into the hose connections.

4. Claim 1 with a check valve in the pump discharge passageway and biased to prevent return flow from the Y connection back to the pump and a check valve in the surge tank discharge passageway and biased to prevent return flow from the Y connection back to the surge tank.

5. Apparatus for cleaning aircraft oil coolers, embodying a core and a shell, which comprises, in combination, a main tank for a cleaning fluid, a pump having its suction side connected to said main tank, a source of compressed air, a tank reservoir having its inlet connected to said source of compressed air, a control valve in said inlet, a surge tank, an adjustable pressure-responsive pop-off valve having its inlet connected to said tank reservoir and its discharge side connected to said surge tank, a Y fitting, a passage-way connecting the discharge side of the pump to one branch of the Y fitting, a passageway connecting the discharge side of the surge tank to another branch of the Y fitting, a check valve in said latter passageway biased to prevent return flow from the Y fitting to the surge tank, a manifold, a passageway connecting the third branch of the Y fitting to said manifold, two hose connections emanating from said manifold, and an adapter attachable to the oil cooler being cleaned and having separately valved connections with the said manifold for directing the fluid mixture to the core and shell respectively of the cooler and having a passageway leading from the said cooler to the said tank, said passageway providing a common return for the fluid mixture from the core and the shell of the cooler.

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