

July 30, 1946.

T. SORRENTINO
VACUUM PUMPING SYSTEM
Filed May 10, 1945

2,404,869

5 Sheets-Sheet 1

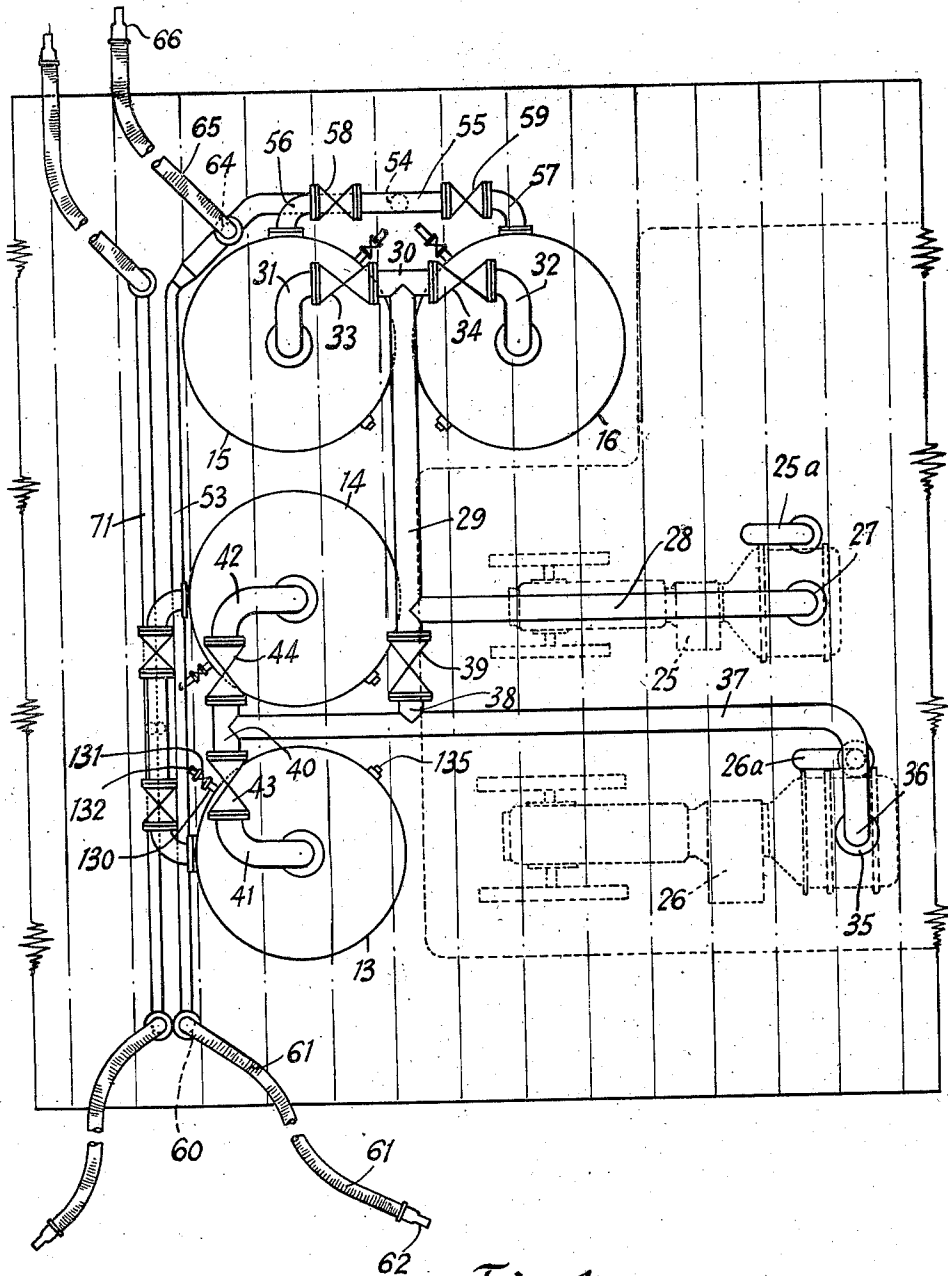


Fig. 1

INVENTOR
Thomas Sorrentino
BY
J. B. Felskin
ATTORNEY

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5 Sheets-Sheet 2

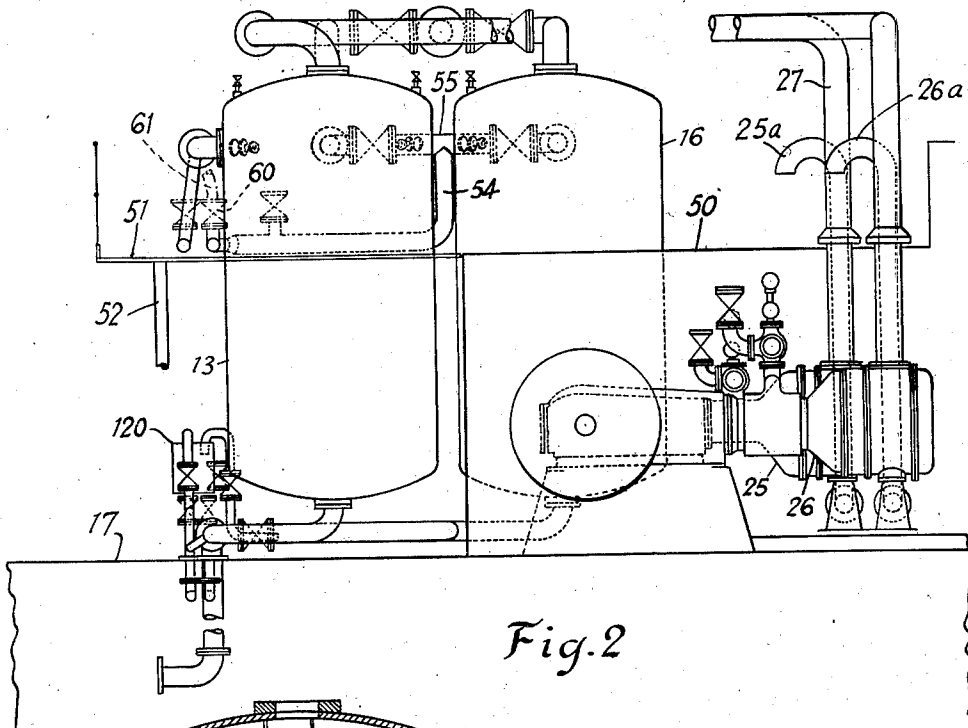


Fig. 2

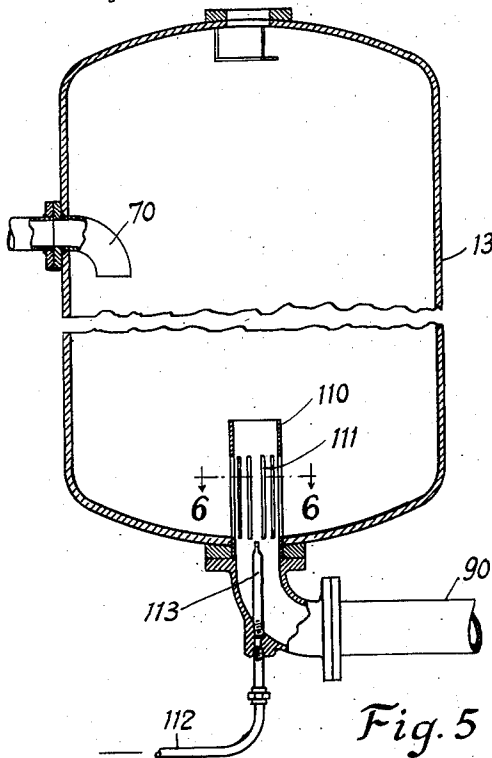


Fig. 5

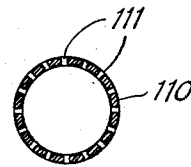


Fig. 6

INVENTOR
Thomas Sorrentino
BY
J. B. Felskin
ATTORNEY

July 30, 1946.

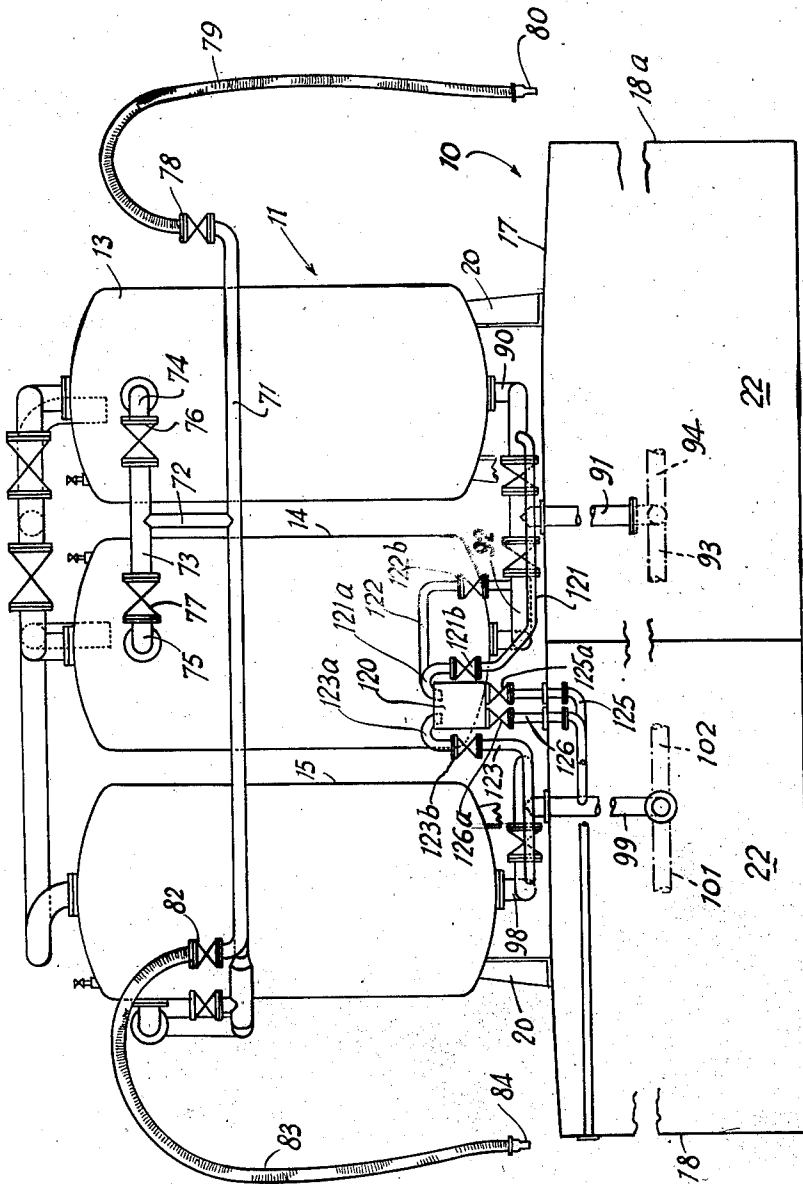
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Fig. 3



INVENTOR
Thomas Sorrentino
BY
J. B. Felshin
ATTORNEY

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T. SORRENTINO

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5 Sheets-Sheet 4

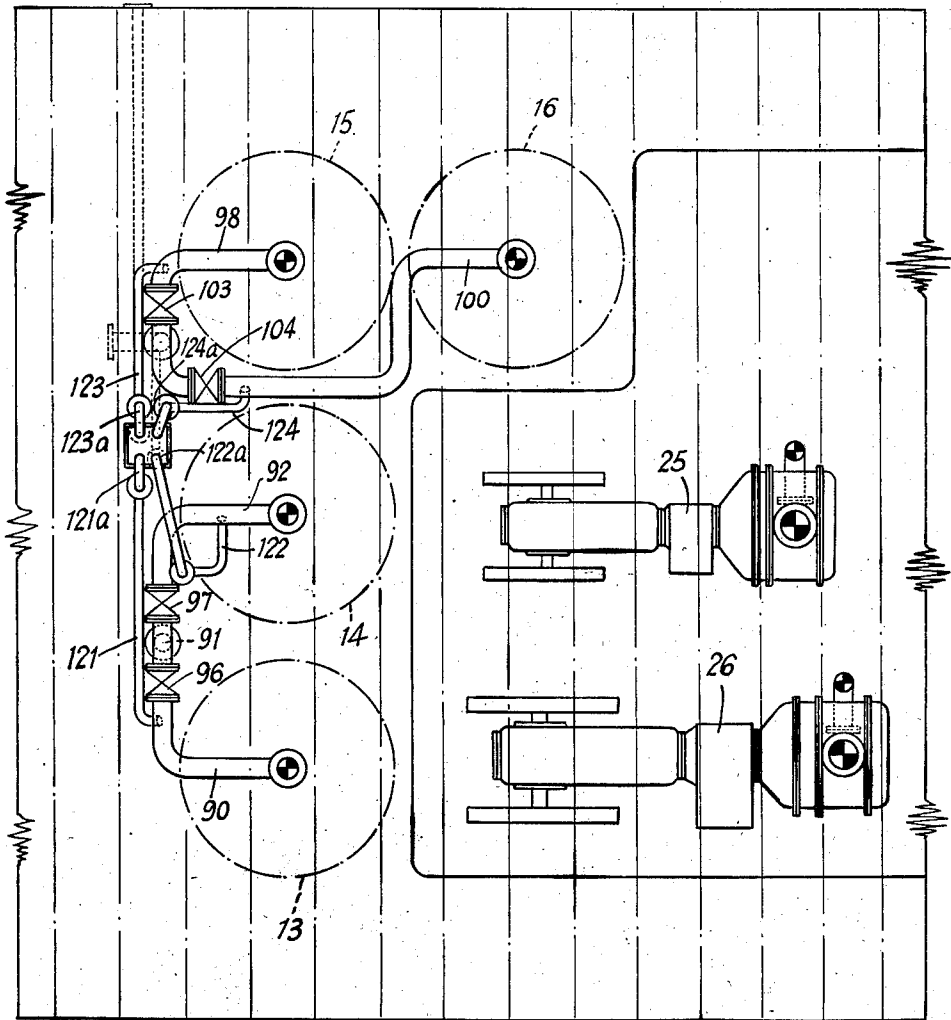


Fig. 4

INVENTOR
Thomas Sorrentino
BY
J. B. Felskin
ATTORNEY

July 30, 1946.

T. SORRENTINO
VACUUM PUMPING SYSTEM
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Fig. 8

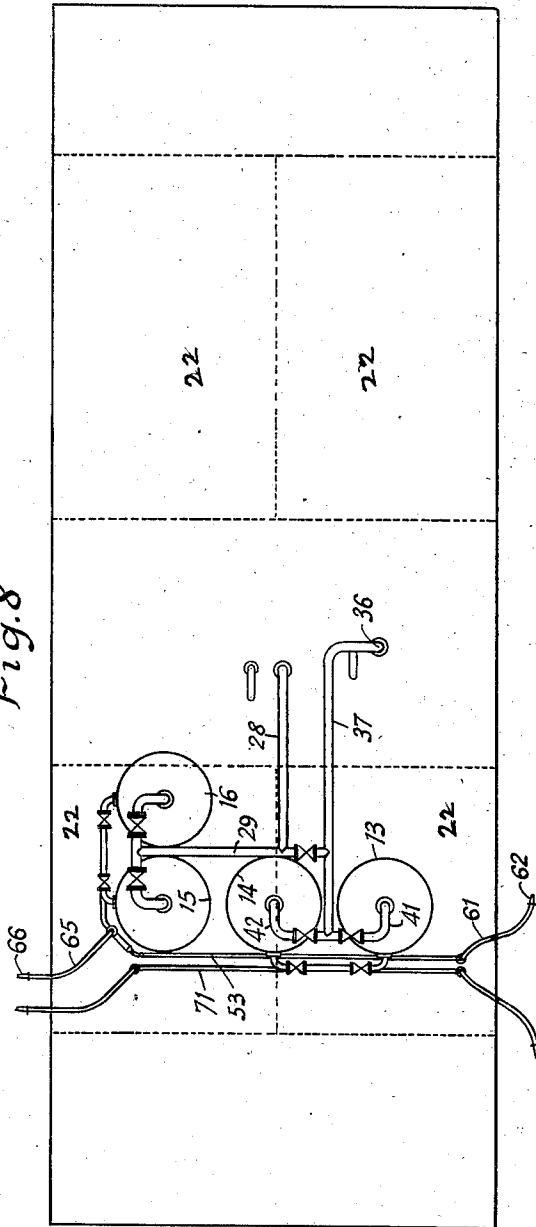
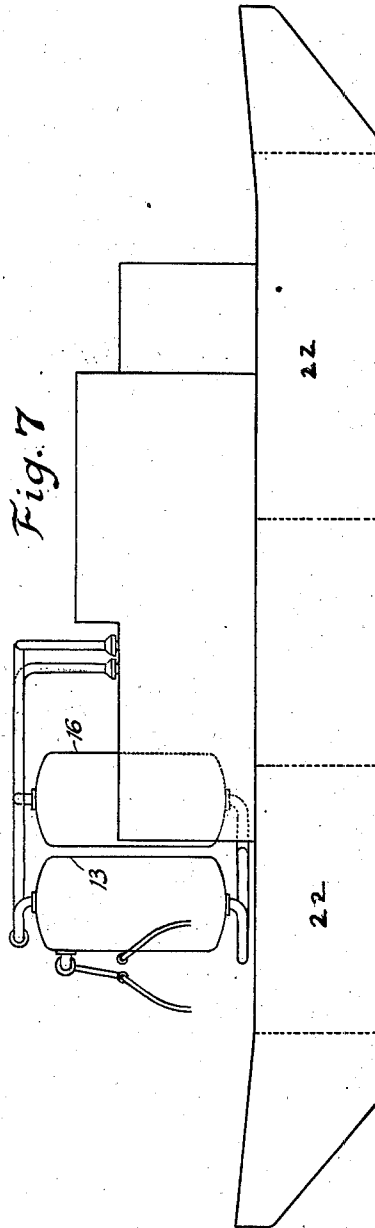


Fig. 7



INVENTOR.
Thomas Sorrentino
BY *J. B. Felshin*
ATTORNEY.

UNITED STATES PATENT OFFICE

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VACUUM PUMPING SYSTEM

Thomas Sorrentino, New York, N. Y., assignor to
Oceanic Tank Processing Corp., Brooklyn, N. Y.,
a corporation

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13 Claims (Cl. 103—236)

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This invention relates to vacuum pumping system. It is particularly directed to a system for pumping out oil, sludge or other liquids from boats, tanks or other vessels.

An object of this invention is to provide a highly improved vacuum pumping apparatus of the character described adapted to be carried on a barge for use in cleaning out tanks, ships, or other containers located on either side of the barge.

Yet another object of this invention is to provide in apparatus of the character described vacuum pump means to pump air out of a tank, a suction hose connected to the tank, and provided with a nozzle adapted to be inserted into the liquid to be cleaned out, so that the liquid will flow through the hose into the tank due to reduction of pressure within the tank, and an outlet at the bottom of the tank connected by a conduit to a storage on the barge for storing the cleaned out liquid.

Yet another object of this invention is to provide in apparatus of the character described, means to test the liquid in the tank, including a small testing container, and means to run the liquid from the testing container off the barge.

Yet a further object of this invention is to provide in a tank, improved strainer means to prevent accumulated sediment from running into the storage tanks; and means to heat and break up material passing through the strainer to the discharge tank.

Yet a further object of this invention is to provide in a vacuum system of the character described installed on the barge, two pairs of tanks, and two vacuum pumps; and means interconnecting said pumps to the tanks, so arranged that either pump may withdraw the air from either pair of tanks.

Still another object of this invention is to provide two pair of suction hoses provided with nozzles for cleaning out boats, tanks, or other vessels; and means interconnecting the hoses with the tanks, the arrangement being such that material from any one of the hoses may pass to any one of the tanks, so as to facilitate pumping of liquid or other material to the tanks from either the right side or the left side of the barge.

Still a further object of this invention is to provide in a system of the character described, means to supply steam to the upper ends of the vacuum tanks; to facilitate cleaning of said vacuum tanks.

Yet another object of this invention is to provide in a vacuum tank system of the character

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described, installed on a barge, a plurality of vacuum tanks, conduits at the lower ends of the tanks for carrying the contents thereof to storage containers at the bottom of the barge, means to bleed liquid from said conduits to a testing tank, means to selectively pass the liquid from the testing tank overboard or to one of the conduits for passage to one of the storage containers.

Still another object of this invention is to provide a compact, durable apparatus of the character described adapted to be installed on a barge for cleaning out vessels lying on either side of the barge, which shall be relatively inexpensive to manufacture, which shall be sure and positive in operation; easy to manipulate; economical to operate, and yet practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims:

In the accompanying drawings, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a top plan view of apparatus embodying the invention;

Fig. 2 is a side elevational view thereof;

Fig. 3 is a front elevational view thereof;

Fig. 4 is a top plan view taken just below the vacuum tanks;

Fig. 5 is a partial, enlarged view of the lower end of the tank with parts broken away and in cross-section;

Fig. 6 is a cross-sectional view taken on line 6-6 of Fig. 5;

Fig. 7 is a side elevational view of the barge; and

Fig. 8 is a top plan view thereof.

Referring now in detail to the drawings, 11 designates a barge provided with a vacuum tank system 11 embodying the invention for cleaning out liquids, oil, sludge or other material from other vessels, tanks, or other containers.

The apparatus 11 comprises a plurality of vertical vacuum tanks 13, 14, 15 and 16 mounted on the deck 17 of the barge. Tanks 13, 14, 15 are in alignment. Tank 16 is in back of tank 15. The barge has side walls 18 and 18a. The tanks may be supported on the decks 17 by any suitable supports 20. In the bottom of the barge are a plurality of storage tanks or containers 22. Four

such storage tanks may be provided. On the deck are a pair of vacuum pumps 25 and 26 which may be operated by steam or any other suitable power. The pump 25 is provided with an air outlet 25a, whereas pump 26 is provided with an air outlet 26a.

Extending from the suction end of pump 25 is an upstanding pipe 27 connected to a horizontal pipe 28 disposed above the upper level of the vacuum tanks. Pipe 28 connects to a crossing pipe 29. Pipe 29 communicates with a transverse pipe 30 connected to the upper ends of tanks 15 and 16, respectively, by means of pipes 31 and 32.

Interposed between pipe 30 and the pipes 31 and 32 are gate valves 33 and 34, respectively. Extending upwardly from the suction end 35 of pump 26 is a pipe 36 connected to a horizontal pipe 37. Pipe 37 is interconnected to pipe 29 by means of pipe 38. Interposed between pipe 38 and pipes 28, 29 is a gate valve 39. Pipe 37 is connected to a crossing pipe 40. Pipe 40 is connected to the tanks 13 and 14 by means of pipes 41 and 42, respectively. Interposed in pipes 41, 42 are gate valves 43, 44, respectively. When valve 39 is closed and valves 43, 44 are opened, tanks 13 and 14 are connected to the suction pump 26. The valves 43, 44 may both be opened or either one of them may be closed. Upon turning valve 39 and closing valves 43, 44 and opening valves 33, 34 pump 26 will be connected to tanks 15 and 16. Of course, either of the valves 33, 34 may be closed so that either tank 15 alone or 16 alone will be connected to the pump 26. If valve 39 is closed and valves 33, 34 are opened, tanks 15 and 16 will be connected to vacuum pump 25. Upon closing valves 33, 34 and opening valves 39, 43, 44 tanks 13 and 14 will be connected to pump 26.

Furthermore, it may be desired for both pumps to act on one pair of tanks, and that may also be done. Thus for example, if valves 33, 34 are closed and valves 39, 43 and 44 are opened, and both pumps operate, then both pumps will act on tanks 13 and 14. Likewise, if the valves 33, 34 are closed both pumps may operate for creating vacuum in tanks 15 and 16.

Means is provided to suck material into the tanks. To this end, the barge is provided with a deck house top 50 and extending from the deck house top is a platform extension 51, mounted on supports 52. On platform 51 is a pipe 53 which is formed with an upward extension 54 connected to transverse pipe 55. Pipe 55 is connected to the tanks 15 and 16 by pipes 56 and 57. Interposed between pipe 55 and the pipes 56 and 57 are gate valves 58 and 59, respectively. Pipe 53 extends transversely across the boat. Connected to one end and located adjacent one side of the boat, is a gate valve 60 to which is connected a hose 61 provided with a nozzle 62. Extending upwardly from the opposite end of pipe 53 and located adjacent the opposite side of the boat is a gate valve 64 to which may be connected a flexible suction hose 65 likewise provided with a nozzle 66. It will now be understood that the nozzle of either hose 61 or 65 may be inserted into a vessel or tank located on either one side or the other of the barge for sucking liquid through the hose and through pipe 53 to pipes 54 and hence to the tanks 15 and 16. Either one of the valves 58 or 59 may be opened and the other closed, or both may be opened. The inlet pipes 57 are located below the upper ends of the tanks. On each tank is an inwardly and

downwardly extending spout or elbow 70 serving as a filling connection and connected to the inlet pipe which extends to said tank.

Also mounted above the platform 51 and disposed parallel to pipe 53, is a pipe 71. Extending upwardly from pipe 71 is a pipe 72 disposed between the tanks 13 and 14. At the upper end of pipe 72 is a crossing pipe 73. Pipe 73 is connected to tank 13 by pipe 74 and to tank 14 by pipe 75. Interposed between pipe 73 and pipes 74 and 75 are valves 76 and 77. Pipes 74 and 75 are connected to the tank somewhat below the upper end thereof as shown in the drawings, and they are each connected to a pipe connection or elbow 70. At one end of pipe 71 and disposed adjacent one side of the barge is a gate valve 78 connected to a suction hose 79 provided with a nozzle 80. At the opposite end of pipe 71 and adjacent the opposite side of the boat is a gate valve 82 connected to a suction hose 83 likewise provided with a nozzle 84. The nozzles 80 and 84 may be inserted into the vessels, boats, tanks at opposite sides of the barge for sucking liquid through pipe 71, pipe 72 to the tanks 13 and 14. Valves 76 and 77 may be selectively opened or closed so that material can be pumped to either tank 13 or 14 from either side of the boat.

Means is provided to transfer the contents of the vacuum tanks to storage tanks 22 at the bottom of the barge. To this end there is connected to the bottom of the tank 13 a pipe 90 connected to a downwardly extending pipe 91. Connected to the bottom of tank 14 is a pipe 92 likewise connected to the pipe 91. Pipe 92 may be connected to branch pipes 93, 94 which may lead to various storage tanks 22 in the barge.

Interposed in pipes 90 and 92 are gate valves 96 and 97, respectively. By opening the valves 96, 97 the contents of the tanks 13 and 14 may be emptied into various storage tanks at the bottom of the barge.

Connected to the bottom of tank 15 is a discharge pipe 98 connected to a pipe 99. Connected to the bottom of tank 16 is a pipe 100 likewise connected to the pipe 99. The pipe 99 is connected to branch pipes 101 and 102 which lead to other storage tanks 22 at the bottom of the barge.

Interposed in pipe 98 is a gate valve 103 and interposed in pipe 100 is a gate valve 104. By properly manipulating said valves the contents of tanks 15 and 16 may be selectively discharged to various storage tanks in the barge.

In Fig. 5 there is illustrated a typical tank which is designated by numeral 13. Means is provided to strain the liquids at the bottom of the tank and to retain sediment within the tank. To this end there is provided at the bottom of tank 13 an upwardly extending cylinder 110 communicating with the discharge pipe which leads from the tank. Tube or cylinder 110 is opened at the top. It is formed with a plurality of vertical parallel, narrow slits 111. The tube 110 projects a short way up into the tank and is of such height as to always project above the sediment. The liquids will pass through the slits 101, whereas the sediment will remain at the bottom of the tank. While Fig. 5 shows the construction for tank 13, it will be understood that the construction is similar for all of the tanks.

Means is provided to heat the discharged material from the outlet end of the tank. To this end there is provided a pipe 112 receiving a supply of live steam. Pipe 112 projects into pipe 90 and is formed with an extension 113 axially dis-

posed with respect to pipe 90. The upper end of pipe 113 is flattened to form a nozzle, and is disposed substantially at the level of the bottom of the tank. It projects into the tube 110. Upon flattening the upper end of pipe 113, a narrow discharge slit is provided. The live steam entering the bottom of cylinder 110 under pressure serves to heat the material and break it up so as to facilitate the discharge thereof.

Means is provided to test the material within the tanks. If the liquid is found to be salt water, it is let overboard, and as soon as oil starts running, the oil is fed back to the storage tanks. The means for carrying out the testing comprises a test tank 120 open at its upper end and formed with a bottom wall. Extending from pipes 90, 92, 98 and 100 are bleeder pipes 121, 122, 123 and 124, respectively. These bleeder pipes are all provided with faucets 121a, 122a, 123a and 124a leading into the upper end of the test tank. Said bleeder pipes are furthermore provided with gate valves 121b, 122b, 123b and 124b, respectively, so that any one of the bleeder pipes may be shut off. Connected to the bottom of the test tank is a pipe 125 which leads to one side of the boat. Interposed in pipe 125 is a gate valve 125a. Connected to the bottom of the test tank 120 is another pipe 126 which connects to discharge pipe 99. Interposed in pipe 125 is a gate valve 126a. When making a test, the valves 125a, 126a are first closed. One of the valves in the bleeder pipes is then opened to let some liquid into the test tank. If the liquid runs salt water, valve 121a is opened so as to permit discharge of the salt water overboard. When oil starts to run, valve 125a is closed and valve 126a is opened so that the oil can run back into the discharge valve 99. After the test is made, the valve in the bleeder pipe is closed so that the vacuum tank may discharge directly into the discharge pipe.

Means is provided to clean out the inside of the vacuum tanks when they are empty. To this end, each tank is provided with an inlet pipe 130 disposed adjacent the upper end of the tank. Attached to each pipe 130 is a gate valve 131 and attached to said valve is a pipe 132 leading to a supply of live steam. After the vacuum tanks are emptied, valves 131 are opened to permit steam to enter the tanks to volatilize fats and oils and to clean out the tanks.

Each tank may also be provided at its upper end with a vacuum break valve 135.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a vacuum tank system of the character described, a vacuum tank, means to pump the air out of the tank, inlet means adjacent the upper end of the tank, a suction hose connected to said inlet means, said hose being provided with a nozzle, means at the lower end of the tank to discharge the contents thereof, a test tank, and bleeder means on said discharge means leading to the test tank.

2. In a vacuum tank system of the character

described, a vacuum tank, means to pump the air out of the tank, inlet means adjacent the upper end of the tank, a suction hose connected to said inlet means, said hose being provided with a nozzle, means at the lower end of the tank to discharge the contents thereof, a test tank, bleeder means on said discharge means leading to the test tank, and conduit means connecting the test tank with the discharge means.

3. In a vacuum tank system of the character described, a vacuum tank, means to pump the air out of the tank, inlet means adjacent the upper end of the tank, a suction hose connected to said inlet means, said hose being provided with a nozzle, means at the lower end of the tank to discharge the contents thereof, a test tank, bleeder means on said discharge means leading to the test tank, conduit means connecting the test tank with the discharge means, and outlet means on said test tank.

4. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, and valve means between each hose and said pipe.

5. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, valve means between each hose and said pipe, a pair of storage tanks at the bottom of the barge, and means to discharge the contents of either tank to either of said storage tanks.

6. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, valve means between each hose and said pipe, a pair of storage tanks at the bottom of the barge, means to discharge the contents of either tank to either of said storage tanks, a test tank, bleeder means connecting the discharge means for each tank with the test tank, means to discharge the contents of the test tank over the side of the barge, and means to discharge the contents of the test tank back to the discharge means for said vacuum tank.

7. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction

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hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, valve means between each hose and said pipe, a pair of storage tanks at the bottom of the barge, means to discharge the contents of either tank to either of said storage tanks, a test tank, bleeder means connecting the discharge means for each tank with the test tank, means to discharge the contents of the test tank over the side of the barge, means to discharge the contents of the test tank back to the discharge means for said vacuum tank, and means at the bottom of each tank to strain the liquids passing to the discharge means.

8. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, valve means between each hose and said pipe, a pair of storage tanks at the bottom of the barge, means to discharge the contents of either tank to either of said storage tanks, a test tank, bleeder means connecting the discharge means for each tank with the test tank, means to discharge the contents of the test tank over the side of the barge, means to discharge the contents of the test tank back to the discharge means for said vacuum tank, means at the bottom of each tank to strain the liquids passing to the discharge means, and means at the discharge end of each vacuum tank to supply steam to the tank.

9. In combination, a barge, a pair of vacuum tanks, thereon, a vacuum pump on the barge, means to connect the vacuum pump to the upper ends of said tanks, valve means to selectively shut off communication between the vacuum pump and either of said tanks, a pipe extending transversely across the barge, a flexible suction hose connected to each end of said pipe, means to connect said pipe to each of said tanks, valve means to shut off communication between said pipe and either of said tanks, valve means between each hose and said pipe, a pair of storage tanks at the bottom of the barge, means to discharge the contents of either tank to either of said storage tanks, a test tank, bleeder means connecting the discharge means to each tank with the test tank, means to discharge the contents of the test tank

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over the side of the barge, means to discharge the contents of the test tank back to the discharge means for said vacuum tank, means at the bottom of each tank to strain the liquids passing to the discharge means, means at the discharge end of each vacuum tank to supply steam to the tank, and means to supply steam to the upper end of each tank.

10. In combination, two pairs of vacuum tanks, a pair of vacuum pumps, means interconnecting the pumps and the tanks to permit either or both pumps to withdraw air from said tanks or any selected one or number of them.

11. In combination, two pairs of vacuum tanks, a pair of vacuum pumps, means interconnecting the pumps and the tanks to permit either or both pumps to withdraw air from said tanks or any selected one or number of them, a pair of pipes, a pair of flexible suction hoses on each pipe, means to connect one pipe to one pair of vacuum tanks, and the other pipe to the other pair of vacuum tanks, said pipes lying alongside each other, and the connection between a pair of hoses and one pipe being disposed adjacent the connection between the other pair of hoses and the other pipe.

12. In combination, two pairs of vacuum tanks, a pair of vacuum pumps, means interconnecting the pumps and the tanks to permit either or both pumps to withdraw air from said tanks or any selected one or number of them, a pair of pipes, a pair of flexible suction hoses on each pipe, means to connect one pipe to one pair of vacuum tanks, and the other pipe to the other pair of vacuum tanks, said pipes lying alongside each other, and the connection between a pair of hoses and one pipe being disposed adjacent the connection between the other pair of hoses and the other pipe, and means to discharge the contents of said tanks.

13. In combination, two pairs of vacuum tanks, a pair of vacuum pumps, means interconnecting the pumps and the tanks to permit either or both pumps to withdraw air from said tanks or any selected one or number of them, a pair of pipes, a pair of flexible suction hoses on each pipe, means to connect one pipe to one pair of vacuum tanks, and the other pipe to the other pair of vacuum tanks, said pipes lying alongside each other, and the connection between a pair of hoses and one pipe being disposed adjacent the connection between the other pair of hoses and the other pipe, means to discharge the contents of said tanks, and strainer means at the lower end of each tank to strain the discharged liquids.

THOMAS SORRENTINO.