

June 28, 1927.

E. M. SCOVILLE

1,634,086

STRAINER

Filed Sept. 13, 1924

2 Sheets-Sheet 1

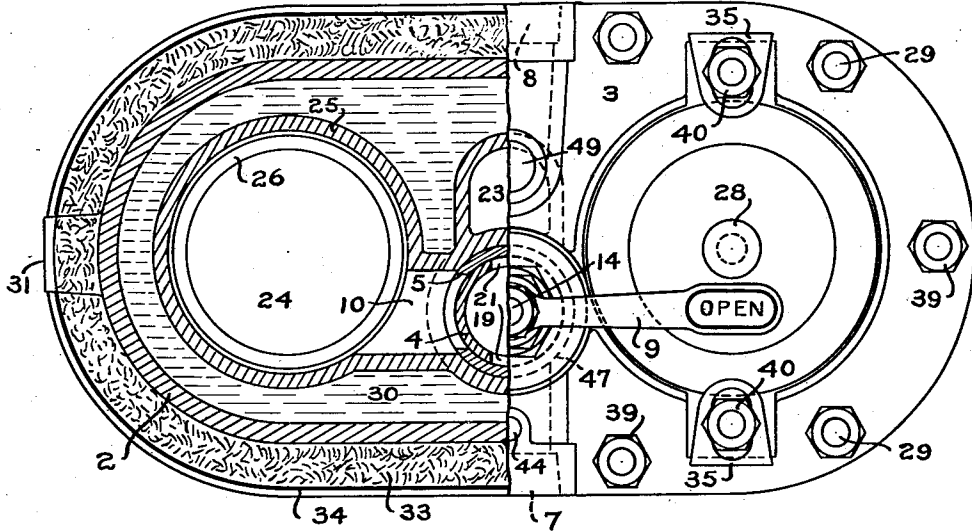


FIG. 1.

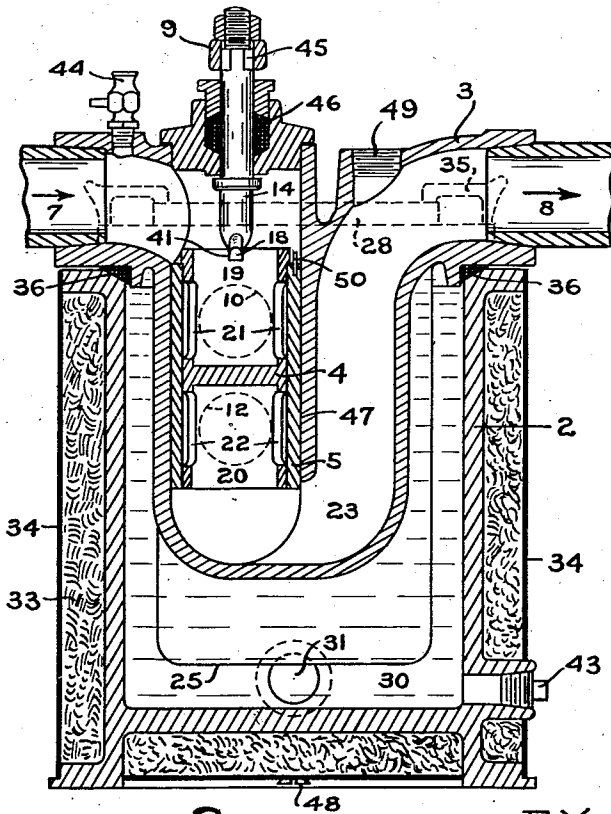


FIG. 2.

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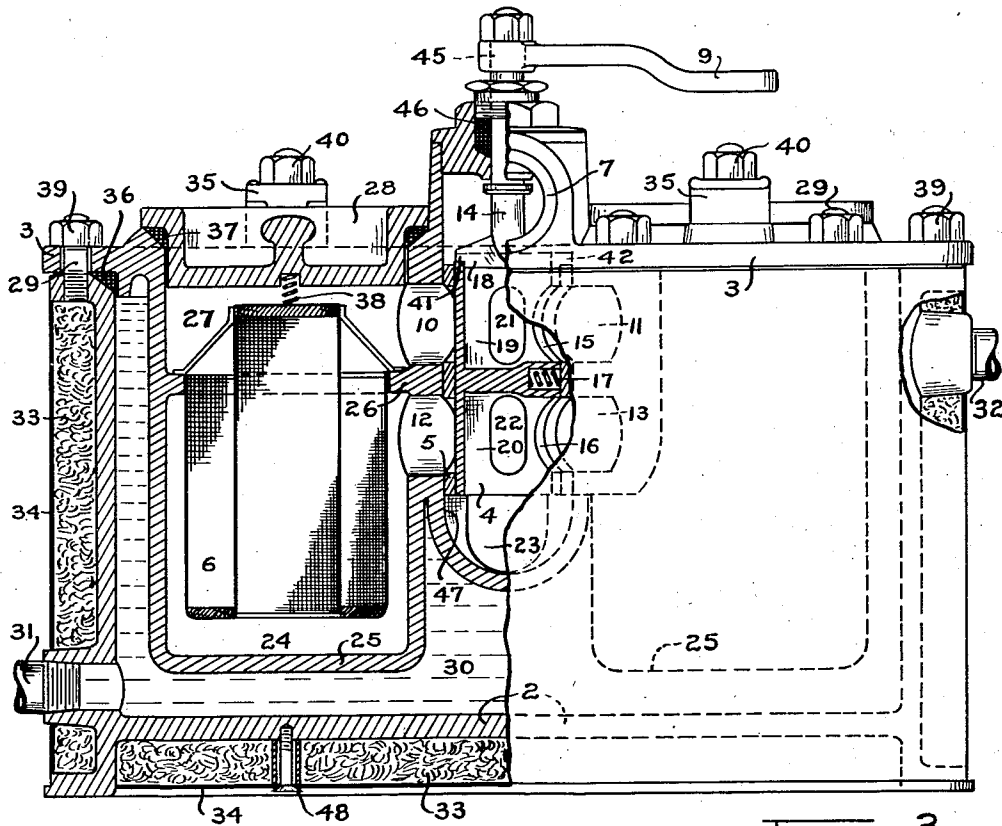


FIG. 3.

FIG. 5.

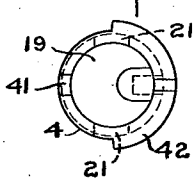


FIG. 4.

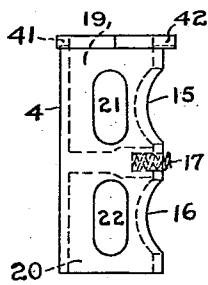
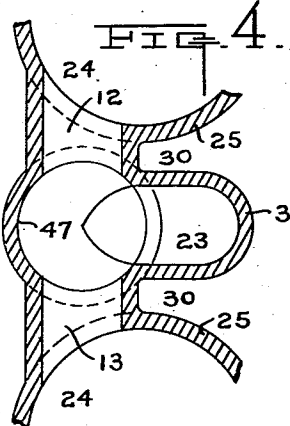


FIG. 6.

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STRAINER.

Application filed September 13, 1924. Serial No. 737,633.

This invention relates in general to improvements in the art of separating solids from fluids, and relates more specifically to improvements in the construction and operation of strainers for removing normally insoluble solid particles from liquid in which such particles are carried in suspension.

Generally stated, an object of the invention is to provide an improved strainer which is simple in construction and efficient in operation.

Other more specific objects and advantages of the invention are as follows:—

To provide improvements in the construction of strainers in which a fluid jacket is employed to control the temperature of the substance which is being purified.

To provide an improved purifying device of the type in which the filtering medium may be cleaned without interrupting the operation of the device.

To provide an improved multi-compartment strainer comprising a plurality of independently functioning separating compartments any of which may be operated or shut down, as desired.

To provide a multi-unit purifier in which the several units are accessible only when disconnected from the impure fluid supply line.

To provide a compact strainer of relatively large capacity, all parts of which are conveniently accessible for inspection and which may be readily assembled and dismantled.

To provide a durable strainer structure in which the various elements can be assembled only in correct relation to each other, and in which standard machine elements are utilized wherever possible.

To provide a purifying mechanism for liquids, in which undesirable pocketing of air is effectively prevented and in which leakage of liquid is positively eliminated.

To provide a strainer which is especially adapted for the automatic purification of oil in lubricating systems.

To provide improved distributing valve mechanism for strainers and other fluid distribution systems.

To provide improvements in rotary valve structures and seatings therefor whereby tight closing of such valves is assured.

To provide various other improvements in the details of construction of strainers

and liquid purifying apparatus, whereby the cost of manufacture of such devices is reduced to a minimum and the efficiency of operation is enhanced to a maximum.

These and additional objects and advantages attainable with the present improvement, will be apparent in the course of the following description.

A clear conception of an embodiment of the invention and of the operation of devices constructed in accordance therewith, may be had by referring to the drawings accompanying and forming a part of this specification in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional top view of an improved duplex liquid strainer.

Fig. 2 is a transverse central vertical section through the improved duplex liquid strainer.

Fig. 3 is a part sectional front elevation of the improved duplex liquid strainer.

Fig. 4 is a fragmentary horizontal section through the inner casing of the improved duplex liquid strainer.

Fig. 5 is a top view of the distributing valve of the improved duplex liquid strainer.

Fig. 6 is a side view of the distributing valve of the improved duplex liquid strainer.

The improved duplex liquid strainer specifically illustrated in the drawings is especially adapted for the purification of lubricating oil and comprises in general an outer casing 2 having an open upper end; an inner casing 3 providing a closure for the upper open end of the outer casing 2 and co-operating therewith to form a fluid jacket 30; a pair of independently functioning filtering screens 6 inclosed within the inner casing 3 by means of independently removable covers 28; a rotary distributing valve 4 for controlling the flow of liquid to and from the filtering screens 6; a main liquid inlet pipe 7 connected to the casing 3 for supplying impure liquid to the strainer; a main liquid outlet pipe 8 connected to the casing 3 for discharging purified liquid from the strainer; and mechanism for manipulating the distributing valve 4.

The outer casing 2 is provided near the bottom of one end with a fluid inlet 31 communicating with the jacket 30, and is also provided near the top of the opposite end

with a fluid outlet 32 communicating with the jacket. An insulating covering 33 surrounds the outer casing 2 and is retained in position by means of sheet metal plates 34 secured to the casing 2 by means of screws 48. The lower portion of the casing 2 is also provided with a drain 43 which is normally closed by means of a removable plug as shown in Fig. 2.

The inner casing 3 comprises a pair of integrally united cups 25 each of which is divided by a horizontal partition 26 and the screen 6 cooperating therewith, into an upper impure liquid compartment 27 and a lower purified liquid compartment 24. The inner casing 3 is completely surrounded by the fluid jacket 30, and is detachably secured to the outer casing 2 by means of studs 29 and nuts 39 which clamp the casings 2, 3 against an intervening packing 36.

Each of the filtering screens 6 is removably supported upon an adjacent partition 26, and comprises concentric tubular screens of different diameters the lower ends of which are connected by a spacing plate and the upper end of the inner of which is closed by a top plate. The covers 28 are detachably secured to the inner casing 3 above the several cups 25, by means of standard clamps 35 and nuts 40. The joints between the covers 28 and the casing 3 are sealed against leakage by means of packings 37, and a helical spring 38 coacting with each cover 28 and with the top plate of an adjacent screen 6, serves to positively hold the screen in proper position. The covers 28 are of sufficient size to permit free vertical removal of the screens 6 upon release of the clamps 35 and removal of the covers.

The common distributing valve 4 of the two strainers is rotatably mounted in a ported seating bushing 5 which is pressed into a central bore 47 of the inner casing 3. The bore 47 communicates at its upper end directly with the inlet pipe 7 and at its lower end with a discharge passage 23 leading to the outlet pipe 8. The bushing 5 has oppositely disposed upper and lower ports, the upper of which communicate with the impure strainer compartments 27 through passages 10, 11, and the lower of which communicate with the pure liquid strainer compartments 24 through passages 12, 13. The highest portion of the inlet conduit is provided with a standard radiator air vent 44 and the casing 3 is provided with a thermometer opening 49 located in line with the passage 23.

The rotary control valve 4 is snugly fitted within the bore of the bushing 5 and is divided into upper and lower chambers 19, 20 respectively, by means of an imperforate horizontal partition. The wall of the valve 4 surrounding the upper chamber 19 is penetrated by oppositely disposed side ports 21

and an intermediate port 15; and the wall surrounding the lower chamber 20 is penetrated by oppositely disposed side ports 22 and an intermediate port 16, see Figs. 2, 3 and 6. A helical compression spring 17 assists the fluid under pressure entering the inlet 7, to urge the valve 4 against the seating bushing 5. The upper extremity of the valve 4 has a semi-circular flange 42 the ends of which are adapted to engage a stop pin 50 to limit the rotary movement of the valve 4 in either direction. The flange 42 besides serving to limit the rotary movement of the valve 4, limits its downward movement by engaging the upper end of the bushing 5. The valve 4 is freely vertically removable from the bushing 5 being retained in normal position by gravity.

The upper extremity of the valve 4 is also provided with aligned notches 41, the notch on one side of the valve being somewhat wider than that on the other side. A vertical valve actuating stem 14 mounted in a cap which normally covers the bore 47, has a cross bar 18 at its lower end which is formed to fit the notches 41 in one position only. The joint between the stem 14 and its supporting cap is sealed by means of a packing 46, and the upper portion 45 of the stem 14 is flattened in such a manner that the operating handle 9 can be applied in only one position.

During normal operation of the duplex strainer and assuming both of the straining compartments to be in use, the valve operating handle 9 is set to point toward the liquid discharge pipe 8. The valve ports 21 are then in communication with the passages 10, 11 and the ports 22 are in communication with the passages 12, 13. The impure liquid admitted under pressure through the inlet pipe 7 is then free to flow through the upper valve chamber 19, valve ports 21, passages 10, 11 and the upper compartments 27 through the screens 6 thus removing the solids from the liquid. The purified liquid delivered past the screens 6 into the lower compartments 24 is discharged through the passages 12, 13, valve ports 22, lower valve chamber 20 and the passage 23 to the outlet pipe 8. During such operation of the apparatus, either steam or hot water may be supplied in regulated quantities to the jacket 30 through the inlet pipe 31, the spent heating fluid being discharged through the outlet pipe 32. The temperature of the liquid being treated may be determined by inserting a thermometer through the opening 49, and the control of the temperature may be effected by means of a valve in the inlet pipe 31. If upon starting the apparatus, or at any other time, it is found that air has accumulated in the casing 3, the air vent 44 may be opened thus permitting all of the air to escape by virtue of the fact that the

vent 44 is disposed at the highest portion of the liquid chamber with which all other portions have free communication.

If it becomes desirable to shut down one of the filtering units, it is only necessary to move the operating lever 9 in a direction away from the unit which is to be cut out, and over the cover 28 of the unit which is to continue operating. As shown in Figs. 1 and 3, the unit at the left is shut down and the unit at the right is in operating position. With the lever 9 thus set, one of the upper side ports 21 of the valve 4 is in direct open communication with the passage 11 leading to the upper compartment 27 of the operating unit; while one of the lower side ports 22 of the valve 4 is in direct open communication with the discharge passage 23 and the valve port 16 is in direct open communication with the passage 13 leading to the lower compartment 24 of the operating unit. The liquid is then free to flow through the operating units, but is positively prevented from entering the inoperative unit which is freely accessible by removal of the cover 28 thereof. By swinging the valve operating lever 9 in the opposite direction and over the unit at the left of Figs. 1 and 3, the unit at the right is made inoperative and the left unit is thrown into operation. When shutting down either of the units by manipulation of the lever 9, the pin 50 engages an end of the valve flange 42 and stops the valve 4 and the lever 9 when the desired position of adjustment has been reached. If it is desired to shut down both units, the control valve normally provided in the feed pipe 7 may be closed in an obvious manner.

By removing the covers 28, the screens 6 may be freely vertically removed; by removing the bearing cap for the valve stem 14, both the stem 14 and the valve 4 may be freely vertically removed; and by removing the nuts 39, the inner casing 3 may be freely vertically removed from within the outer casing 2. When the various parts are assembled, the packings 36, 37, 46 effectively seal the joints against leakage. By providing two separable casings 2, 3 to form the jacket 30, construction difficulties are reduced to a minimum since the necessity of utilizing complicated cores during casting, is avoided. All elements of the structure are conveniently accessible for machining, and the use of the seating bushing 5 insures a perfect seat for the valve 4 regardless of imperfections which may exist in the metal of the casing 3. The structure of the cross bar 18 of the stem 14, and of the notches 41 of the valve 4, is such that these elements can be assembled only in correct relation to each other. The upper end of the stem 14 is likewise so formed that the lever 9 may be applied only in the correct position. The helical spring 17 serves to urge the valve 4

in firm engagement with its seat, thus assisting the unbalanced liquid pressure acting to seat the valve 4 by virtue of the ports 15, 16. The helical springs 38 serve to hold the screens 6 in proper position when the covers 28 are closed, and the double concentric screens 6 provide relatively large filtering area. The use of standard clamps 35, nuts 39, 40, and studs facilitates manufacture, and the insulating covering 33 effectively prevents undesirable radiation of heat.

It will thus be noted that the invention provides a simple, compact and efficient strainer of relatively great capacity wherein cleaning of the filtering screens may be readily effected without interrupting the operation of the strainer. The apparatus is capable of being quickly assembled and dismantled without special tools, and the parts can be assembled only in proper relation to each other. The distributing valve structure is simple and effective and the apparatus is especially applicable for the purification of oil.

It should be understood that it is not desired to limit the invention to the exact details of construction and operation herein shown and described for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:—

1. In combination, outer and inner casings detachably associated to form a fluid jacket, fluid inlet and outlet connections communicating with said jacket through said outer casing only, clamping means for detachably connecting said casings, said inner casing being removable from within said outer casing upon release of said clamping means without disturbing said connections, and a strainer located within said inner casing.

2. In combination, outer and inner casings detachably associated to form a fluid jacket, a strainer located within said inner casing, liquid supply and discharge connections communicating with said strainer through said inner casing only, and clamping means for detachably connecting said casings, said outer casing being removable from said inner casing upon release of said clamping means without disturbing said connections.

3. In combination, outer and inner casings detachably associated to form a fluid jacket, fluid inlet and outlet connections communicating with said jacket through said outer casing only, a strainer located within said inner casing, liquid supply and discharge connections communicating with said strainer through said inner casing only, and clamping means for detachably connecting said casings, each of said casings being removable from the other upon release of said clamping means without disturbing the connections to said other casing.

4. In combination, outer and inner casings detachably associated along plane surfaces at the upper portions thereof to form a fluid jacket, fluid inlet and outlet connections communicating with said jacket through said outer casing below said surfaces, liquid supply and discharge connections communicating with the interior of said inner casing above said surfaces, clamping means for detachably connecting said casings at said surfaces, and a strainer located within said inner casing.

5. In combination, outer and inner casings detachably associated along plane surfaces at the upper portions thereof to form a fluid jacket, fluid inlet and outlet connections communicating with said jacket through said outer casing only below said surfaces, liquid supply and discharge connections communicating with the interior of said inner casing above said surfaces, clamping means for detachably connecting said casings at said surfaces, a strainer located within said inner casing, and means for effecting access to said strainer without disturbing said clamping means and said connections.

6. In combination, outer and inner casings detachably associated only along a horizontal joint at the upper portions of said casings to form a fluid jacket, clamping means for detachably connecting said casings at said joint, a strainer located within said inner casing, fluid inlet and outlet connections communicating with said jacket through said outer casing only below said joint, and liquid supply and discharge connections communicating with said strainer through said inner casing only above said joint.

7. In combination, a casing, a strainer within said casing, a seating bushing fixedly positioned within said casing, a control valve

rotatable within said bushing for regulating the flow of liquid to and from said strainer, and resilient means cooperating with said valve and with said bushing to urge the former against the latter.

8. In combination, a strainer, a seating bushing fixedly located adjacent to said strainer, a rotary control valve operable within and supported by said bushing for regulating the flow of liquid to and from said strainer, and resilient means cooperating with said valve and with said bushing to urge the former against the latter.

9. In combination, outer and inner casings detachably associated to form a fluid jacket, fluid inlet and outlet connections communicating with said jacket through said outer casing only, clamping means for detachably connecting said casings, said inner casing being removable from within said outer casing upon release of said clamping means without disturbing said connections, a pair of strainers within said inner casing, and means for effecting independent removal of said strainers without disturbing said clamping means.

10. In combination, outer and inner casings detachably associated to form a fluid jacket, a pair of independently removable alternately operable strainers within said inner casing, liquid supply and discharge connections communicating with said strainers through said inner casing only, and clamping means for detachably connecting said casings said outer casing being removable from said inner casing upon release of said clamping means without disturbing said strainers or said connections.

In testimony whereof, the signature of the inventor is affixed hereto.

EUGENE M. SCOVILLE.