Oct. 29, 1935. A. V. SIMS 2,018,687

BILGE PUMP MECHANISM

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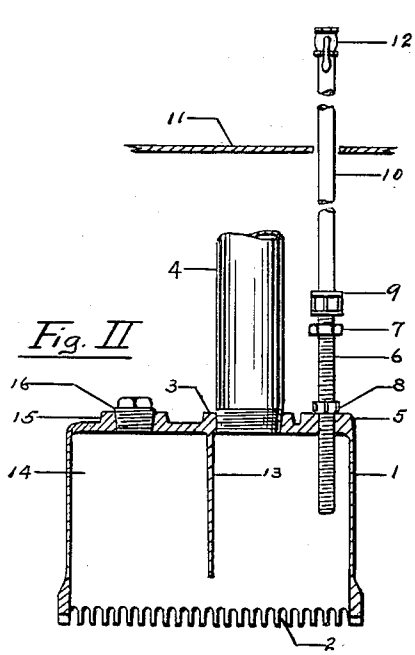

Fig. II

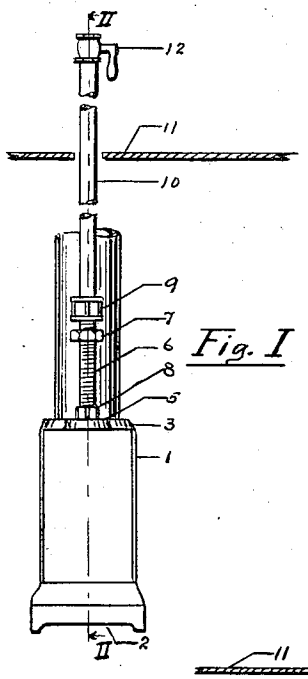

Fig. I

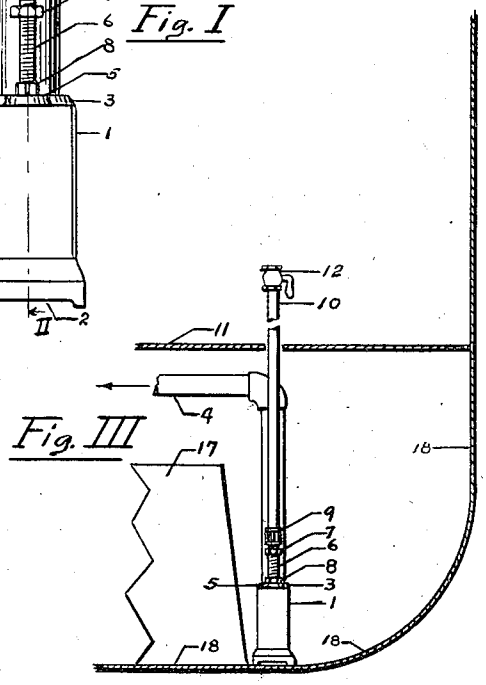

Fig. III

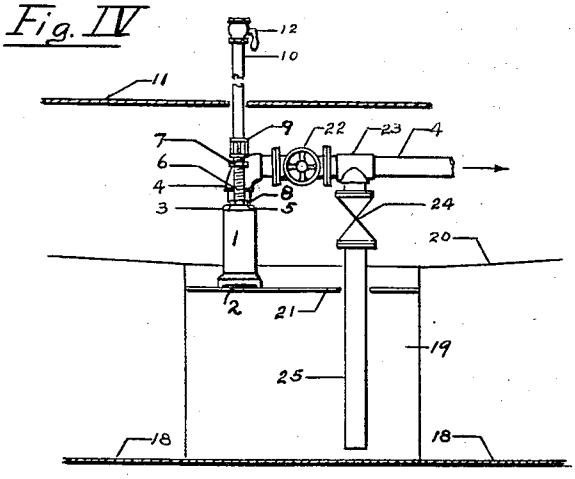

Fig. IV

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BILGE PUMP MECHANISM

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10 Claims. (Cl. 103—202)

This invention relates to the eduction of liquids of different specific gravities, and which are not readily diffusible through each other, whereby liquids of different specific gravities may be separated.

It is an object of the invention to provide improved means for effecting the separation of liquids of different specific gravities as referred to, for example the pumping of water from under oils, stick-water, from which glue is made, from under tallow and the like.

It has been found that the pumping overboard from vessels of oil in connection with the pumping of bilge water overboard from vessels has resulted in great damage to vegetation and even to animal life so that stringent legal regulations have been enacted to prevent the throwing of oil overboard from vessels.

It is a further object of the invention to provide improved means for educting water from the bilges of vessels but thoroughly and surely eliminating all risk of pumping overboard with it of any waste, drip fuel or lubricating oils.

A further object of the invention is to provide improved eduction control means whereby the eduction of the water may be accurately controlled. Where the water is educted from beneath overlying oil the eduction can be accurately controlled so that in pumping the bilge water overboard from a vessel the inadvertent pumping overboard of any overlying oil may be certainly and accurately avoided.

A further object of the invention is to provide a means for facilitating salvaging oil, tallow or like substances from liquids of different specific gravities.

A further object of the invention is to provide means in a bilge pumping mechanism for preventing erosion by the water entering the mechanism and cause the eduction to be smooth instead of jerky.

When used in connection with a pump or other vacuum producing mechanism the invention comprises an addition to a suction pipe line of a mechanism which, while acting as a strainer, will also automatically stop the eduction of all liquid at any predetermined level to which the device is adjusted, by admitting air at such point while the pump or vacuum producing mechanism continues in action, and which by excluding the air, which may be done by closing one valve, will reestablish the vacuum and cause eduction to automatically begin again and continue to the bottom of the device when the admission of air through the strainer openings will interrupt and stop the eduction. The invention may be used in connection with the operation of large mechanical separators, centrifugal and the like, and when so used it will greatly reduce the expense of the operation or supplant them entirely.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawing which illustrates the invention—

Fig. I is an end elevation of apparatus embodying the invention with the eduction pipe and also the air inlet pipe being partly broken away;

Fig. II is a section on the line II—II of Fig. I;

Fig. III shows an end elevation of apparatus embodying the invention showing the installation of the mechanism in the forward bilge of a vessel having fore and aft bilges, the vessel being shown in transverse section and broken away except for sufficient to show the relation of the bilge pumping mechanism thereto; and

Fig. IV is an end elevation of the apparatus of Figs. I and II with additions thereto and as applied to the eduction of water from a ship having its bilge water drained to a sump or collecting well, a sufficient portion of the ship to show the relation of the educting apparatus thereto being shown in transverse section, the remainder of the ship being broken away.

Referring to the drawing and first to Figs. I and II, the apparatus comprises a housing 1 in the bottom edges of which are the openings 2 through which water is drawn into the housing (the bottom of this housing usually resting upon the bilge or other supporting surface). While permitting the passage of the liquid into the housing the passage of rags, waste or other objects that might choke the suction pipe or pump is arrested.

In a boss 3 in the top of the housing 1 is screwed a suction pipe 4 so as to make air tight communication with the interior of the housing. This eduction pipe 4 connects with a pump or other vacuum producing mechanism. It will be noted that the pipe 4 does not project into the housing and this is desirable for the reasons that will appear herein below.

Also in the top of the housing 1 is another boss 5 through which extends a screw-threaded opening. Screw-threaded in this opening and extending from the exterior to the interior of the housing is an air inlet pipe 6, communicating with the atmosphere, and the turning of which in one direction or the other, will cause its open end within the housing to be projected further inwardly or retracted outwardly. In other words,

the inlet opening of the air duct may be placed at any desired point between the bottom and the top of the housing 1. The pipe 6 has the thread cut on its outside from its bottom extremity to the hexagonal nut 7 which is fixedly secured to the pipe 6 and provides a wrench-hold by which the pipe may be turned to adjust its open end to the desired height, and the pipe may be secured in any desired position of adjustment by means of a lock-nut 8. Suitably joined with the pipe 6, by means of a coupling 9, is a pipe 10 which, in bilge service may extend through the floor plates 11 to any convenient location for the manually operated valve 12 controlling the air inlet duct.

When the level of the liquid is below the top of the housing 1, the pumping of the liquid may be controlled by this valve 12. When the valve is closed the pumping takes place but the eduction may be instantly stopped by opening the valve. When pumping water overboard from beneath overlying oil it may be desirable for the person in charge to have the air valve 12 at hand in some convenient location and watch the overboard discharge for the first appearance of oil when the valve may be opened and the eduction of liquid immediately stopped although the pump continues in operation.

With regard to the apparatus referred to it is to be observed that any change in elevation of the bottom of the suction pipe above the air inlet has no effect whatever on the level at which the suction will be broken and the eduction stopped. Under such conditions the elevation of the air inlet is controlling. For this reason the suction pipe 4 is ended in the boss 3 in the top of the housing 1, while the air inlet pipe 6 passes through the boss 5 down into the housing 1, and this open end is adjusted at any predetermined level at which it may be desired to break the suction and stop the eduction of liquid through the pipe 4. The vertical position of the bottom of the air inlet pipe 6 will control the level of the liquid in the bilge or other vessel at which the pump will stop educting liquid, if the air valve 12 is open. When the air valve 12 is closed the eduction will take place down to the bottom of the vessel in which the mechanism is working, subject to the condition that the eduction may be stopped at any instant after the end of the air intake duct has been uncovered, by opening the valve 12. It will be apparent that by the adjusting and control means described, the pumping of the bilge may be stopped at or before all the water is pumped from beneath the oil so that no oil will be pumped overboard.

If the suction pipe 4 should extend into the housing to a level below the open end of the air inlet pipe 6, then when the valve 12 is open, the bottom of the suction pipe would control the elevation at which the suction would be broken and, in such cases the level of the open end of the air inlet pipe 6 would have no influence on the point at which the suction would be broken.

The housing 1 has a transverse vertical partition 13 which joins the top and sides of the housing, but its lower edge is spaced a distance from the bottom edges of the housing, such spacing providing the only means of communication between the chamber 14 and the chamber upon the other side of the partition 13, into which open the pipes 6 and 4. The chamber 14 is a suction air chamber which serves to eliminate the pulsative or jerky effects of reciprocating pumps on the fluid pumped. When the liquid being pumped has been lowered to a level a short distance above the point at which the open end of the air pipe 6 has been set, the modifying of the effects of the pulsations or jerks of the pump will prevent globules of air from being sucked out of the air duct before the adjusted level of the liquid has been reached and the suction definitely broken and eduction stopped. Also, by the elimination or reduction of the pulsatory effect of the pump, the rate of flow of the liquid through the openings 2 is made more nearly uniform and its maximum velocity is greatly reduced. This is of importance for the reason that where bilge suction pipes are placed close to the bottom of plates of vessels, thus making the velocity of intake high, the composite bilge liquids will erode holes even entirely through the vessel's plates. This erosive effect varies as the square of the velocity of inflowing liquid so that the reduction of the maximum velocity by making the periphery of the housing relatively large and by providing the air chamber 14, is of great importance. A plug 16 screwed into a boss 15 in the top of the housing provides a means for connecting an additional suction air chamber where the volume of the air chamber 14 within the housing is not sufficient.

Referring now to Fig. III, the housing is shown located in a longitudinal bilge formed between the tank 17 and the side and bottom, or "skin" 18 of a vessel. The air duct pipe 10 is shown extending through the floor plates 11 above which is the suction-breaking air valve 12 conveniently located and the eduction pipe 4 leading to the bilge pump.

Referring now to Fig. IV, the apparatus is shown as adapted to a sump or well. In this construction of vessels a given volume of oil will occupy a much greater depth until the sump 19 has become filled and the accumulated oil and water flow out over the tank tops 20. In such cases the housing 1 may be of such dimensions as to extend from the sump bottom 18 to the required distance above the sump top. However, the housing 1 may be made of less height and rest on a supporting platform 21. In the arrangement shown, a valve 22 is inserted in the eduction pipe 4 and connected with the eduction pipe by a T, 23, and a valve 24 is a pipe 25 reaching nearly to the bottom of the sump 19. During the pumping of the water from beneath the oil, the valve 22 is open and the valve 24 is closed whereupon the mechanism operates in the manner as previously described. When it is desired to give a periodic cleaning as required by legal regulations, the valve 22 is closed and the emptying of the sump 19 to the bottom of the pipe 25 results. The valve 24 might generally be omitted entirely as no liquid could be drawn up through it below the setting of the air duct 6 so long as the valve 12 was open, causing the air admitted to the housing through the air duct to break the suction. Even if the air valve 12 were closed the bilge liquid could not be pumped below the openings 2 because the air entering those openings would break the suction. When the bilge liquid is at a level covering all air openings into the housing, the liquid would be drawn through both the housing 1 and the pipe 25.

While the invention has been illustrated in what are considered its best applications it may have other embodiments without departing from its spirit and is not limited to the structures shown in the drawing.

What I claim is:

1. In a bilge pumping mechanism, the combi-

nation with a housing having openings for admitting fluid to the interior of the housing, a liquid eduction duct opening into said housing and an air inlet duct opening into said housing at a point nearer the first mentioned openings than is the eduction duct opening.

2. In a bilge pumping mechanism, the combination with a housing having openings for admitting fluid to the interior of the housing, a liquid eduction duct opening into said housing, an air inlet duct opening into said housing and means for adjustably mounting said duct to permit the opening of said air duct into said housing to be varied in distance from the first mentioned openings.

3. In a bilge pumping mechanism, the combination with a housing having openings for admitting fluid to the interior of the housing, a liquid eduction duct opening into said housing, an air inlet duct opening into said housing and means for adjustably mounting said duct to permit the opening of said air duct into said housing to be varied in distance from the first mentioned openings, said opening of said air inlet duct into said housing being nearer the first mentioned openings than is the said eduction duct opening.

4. In a bilge pumping mechanism, the combination with a housing having openings adjacent its bottom for admitting fluid to the interior of the housing, a liquid eduction duct passing through the top of said housing and an air inlet duct screw-threaded in the top of said housing whereby its opening may be advanced or retracted in said housing with relation to the intake of said liquid eduction duct.

5. In a bilge pumping mechanism, the combination with a housing having an open bottom with recesses at the edges of its sides for admitting fluid to be pumped to the interior of the housing, a liquid eduction duct opening into said housing and an air inlet duct opening into said housing at a point nearer the said recesses than is the eduction duct opening.

6. In a bilge pumping mechanism, the combination with a housing having an open bottom with recesses at the edges of its sides for admitting the fluid to be pumped to the interior of the housing, a liquid eduction duct passing through the top of said housing and an air inlet duct adjustably passing into said housing whereby its opening may be advanced or retracted in said housing with relation to the intake of said liquid eduction duct.

7. In a bilge pumping mechanism, the combination with a housing having openings for admitting fluid to the interior of the housing, a liquid eduction duct opening into said housing and an air inlet duct opening into said housing at a point nearer the first mentioned openings than is the eduction duct opening, and a valve controlling the passage of air through said air duct.

8. In a bilge pumping mechanism, the combination with a housing having openings adjacent to its bottom for admitting fluid to the interior of the housing, a liquid eduction duct passing through the top of said housing and an air inlet duct screw-threaded in the top of said housing whereby its opening may be advanced or retracted in said housing with relation to the intake of said liquid eduction duct and a valve controlling the passage of air through said air duct.

9. In a bilge pumping mechanism, the combination with a housing having an open bottom with recesses at the edges of its sides for admitting fluid to the interior of the housing, a liquid eduction duct passing through the top of said housing and an air inlet duct screw-threaded in the top of said housing whereby its opening may be advanced or retracted in said housing with relation to the intake of said liquid eduction duct and a valve controlling the passage of air through said air duct.

10. In a bilge pumping mechanism, the combination with a housing having openings for admitting fluid to the interior of the housing, a liquid eduction duct opening into said housing and terminating at the top of said housing and an air inlet duct passing through said top, opening into said housing and extending into said housing to a point removed from said top.

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