April 23, 1946. P. C. MORSE 2,398,842

STILL

Filed June 8, 1943 2 Sheets-Sheet 1

Fig. 1.

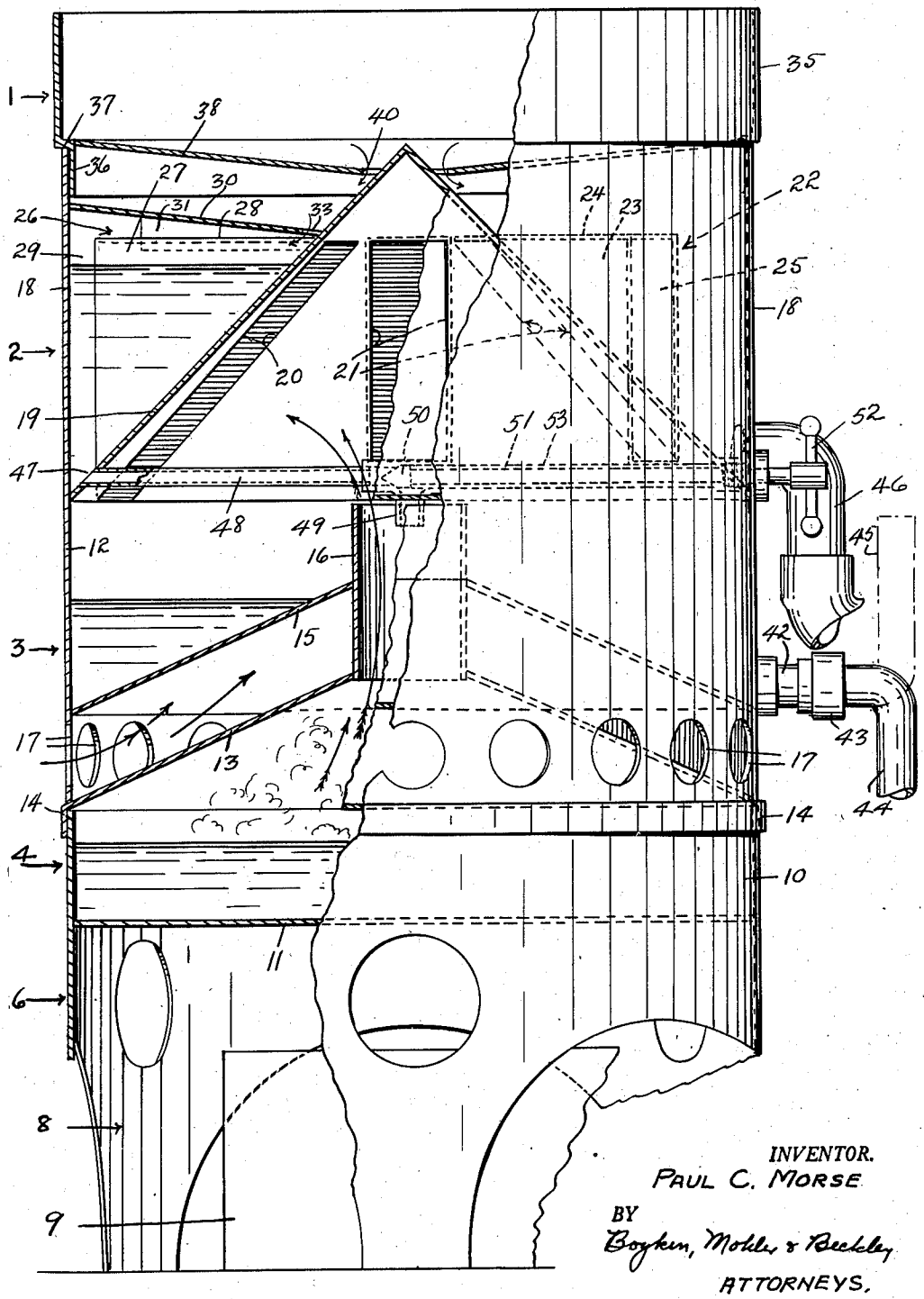

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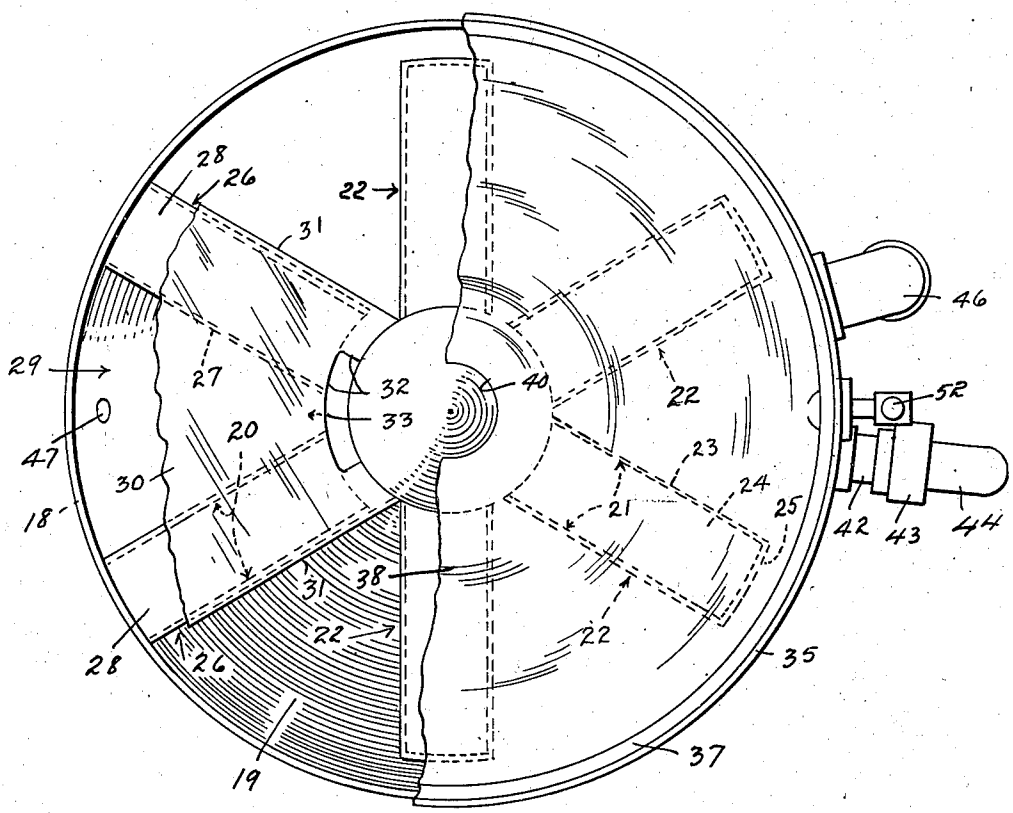
Fig - 2.



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2,398,842

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2 Claims. (Cl. 202—189)

This invention relates to a still, and has for objects the provision of a compact, efficient and economically made device for condensing sea water or other water having impurities therein. This device is provided with means for more efficiently cooling the steam than heretofore and which device also has provision for maintaining a supply of hot water for replenishing the boiler.

Other objects and advantages will appear in the drawings and in the description.

In the drawings,

Fig. 1 is a part sectional, part elevational view of a condenser embodying the invention.

Fig. 2 is a plan view of the device of Fig. 1 but with part of the top receptacle thereof broken away to disclose structure below the top.

In detail, the still illustrated comprises four principal parts that may be identified in order from the top down as a receptacle 1 for cooling water, a condenser 2, a collector compartment 3 for condensed steam, and a boiler 4.

The boiler is lowermost and may carry a base 6 having three or more legs 8 for supporting the boiler and the elements thereabove over a heater such as a can 9 of solidified fuel, one type of which is known by the trade name of "Sterno." Of course any other type of fuel may be used for heating the water in the boiler, but the one mentioned is most convenient where it is supplied or is available.

The boiler 4 has cylindrical lateral walls 10 and a bottom 11. The base 6 may also be cylindrical and co-extensive with the walls 10, but extends below the bottom 11 to a point about even with the source of heat, such as the upper side of can 9 so as to afford some protection to said source of heat from any wind that may be present. Where only three legs are employed the boiler is more readily supported on a relatively uneven surface, but any number of legs or any other suitable support may be employed.

The receptacle 3 for condensed steam has cylindrical walls 12 that are preferably coaxial with the walls of the boiler and said walls 12 are also of substantially the same diameter as the walls of the boiler 4.

Preferably the receptacle 3 carries the cover 13 for the boiler at its lower end, which cover is of generally frusto-conical shape with its larger diameter end resting on the upper edges of the walls 10, and which latter end carries a depending flange 14 embracing the upper marginal portion of walls 10. Thus the receptacle 3 may be lifted from walls 10 for cleaning the boiler.

The bottom 15 of the receptacle 3 is also frusto-conical in shape and is spaced above the top 13 of the boiler. The top 13 and bottom 15 are preferably identical in shape and their smaller diameter ends are respectively uppermost so that the walls of each extend divergently downward. The edges of the bottom 15 may be brazed or secured in any suitable manner to walls 12, and an open ended, vertically disposed tube 16 is supported in the coaxial, central opening of the top 13 and bottom 15. The lower end of said tube 16 is about at the edges of the central opening in top 13, while the upper end of said tube extends a distance above the smaller diameter and of the bottom 15.

Between the lower, larger diameter ends of top 13 and bottom 15 the walls 12 are formed with a plurality of air inlet openings 17. Openings 17 are relatively close together and provide for movement of cooling atmospheric air laterally between top 13 and bottom 15 when the condenser is in the open air in normal use.

Walls 18 of the condenser 2 are preferably cylindrical and are co-extensive with walls 12 therebelow, thus the compartment 3 and the condenser are virtually a single unit inasmuch as the top wall 19 of the compartment 3 is the bottom wall of the condenser.

This top wall 19 is of conical form with its apex uppermost, and the pitch of the wall 19 is preferably somewhat greater than that of the bottom 15 or the top 13 of the boiler. The lower edges of said wall 19 may be brazed or soldered, or secured in any other suitable manner to walls 18 along a line that may be about level with the top of tube 16.

The top wall 19 is formed with a plurality of equally spaced slots that extend generally radially relative to the central vertical axis of said top wall. In the device shown in the drawings there are six of these slots and the slots of one adjacent pair thereof, one slot of which is indicated at 20 in Fig. 1, extend to the side 18 at the lower edge of wall 19, while the remainder of the slots 21 terminate at their outer ends a uniform distance from said wall 19. The inner ends of all of the slots 20, 21 terminate the same distance from the apex of the wall 19.

Each of the slots 21 is covered by an upstanding, flattened hollow member generally designated 22, each of which members comprises a pair of opposed, vertical, generally triangular shaped plates 23, the lower edges of which are secured to the wall 19 along the elongated opposite edges of each slot 21. The upper edges of plates 23 are substantially horizontal and are connected by a

top strip 24, while the remaining edges of said plates are vertical and are connected by a vertical strip 25. The plates 23 and strips 24, 25 completely seal each of slots 21 against any leakage past the top 19, but steam may pass through the slots 21 and into the hollow members formed by by said plates and strips. The end or vertical strips 25 are spaced from the walls 18 to permit passage of water between said strips and walls as will later be described (Fig. 2).

The two adjacent slots 20 are covered by similar members generally designated 26, except that the triangular, vertical, opposed plates 27 of each member extend to walls 18 at their vertical outer edges so that the space between said adjacent slots may contain water up to the level of the upper edges of the plates 27, and which upper edges of each pair of said plates are connected by strips 28 that extend from the upper edges of slots 20 to the walls 18. Thus steam may pass through the slots 20 and into the space between each pair of opposed plates 27, but the steam cannot escape from such space upwardly past top 19 and past said members 22, 26.

The adjacent pair of members 26 and the side wall 18 between said members coact with the wall 19 to form a receptacle 29 for water, the bottom of which is said wall 19 and which wall slants downwardly. A plate 30 extends over the said members 26 and slants downwardly from walls 18 toward the inner ends of said members. Flanges 31 may extend over the opposite outwardly facing sides of said members 26 for positioning said plate. The inner edge of plate 29 is cut away as at 32 (Fig. 2), between the inner ends of members 28 to leave a passageway 33 (Fig. 1) for water to flow into the receptacle 29.

The upper receptacle 1 may have cylindrical side walls 35 of substantially the same diameter as walls 18. Also a flange 36 of lesser diameter than walls 35 may slidably fit inside the upper end of the condenser so that the receptacle 1 will have a shoulder 37 resting on the upper edges of walls 18.

At about said shoulder 37 the outer edges of a downwardly dished bottom wall 38 may be secured in any suitable manner, which bottom has a central opening 40, the edges of which are equally spaced from the conical upper end of the conical top wall 19 therebelow. Thus an annular passageway is provided for water to flow from bottom 38 over annular edge 40 and onto the conical wall 19 for flowing over the latter.

The wall 12 of the compartment for condensed steam is formed with an outlet adjacent the lower edge of the bottom 15 in which is secured a fitting 42 provided with a swivel joint 43 for a discharge pipe 44. This pipe 44 is normally in the position 45 indicated by dot-dash line in Fig. 1 when no water is being drawn from the compartment 3. To withdraw water, the pipe 44 is merely swung downward to its full line position shown in Fig. 1. The joint 43 is preferably a conventional friction joint so that the pipe 44 will stay in any position to which it is swung without holding the same.

The wall 18 outwardly of the receptacle 29 has an outlet near the bottom of wall 19 that communicates with a waste drain pipe 46 that may lead to any desired point for draining water at all times from all of the space above the wall 19 except that between the members 28.

In the bottom of receptacle 29, which bottom is that portion of wall 19 that extends between members 26, is a discharge outlet 47 that communicates with a pipe 48 that leads to a point centrally over the hollow tube 16 where a branch 49 extends downwardly and opens into said tube 16. A valve 50 at the juncture between tube 48 and branch 49 is adapted to open and close the pipe 48 to passage of water in receptacle 29 to branch 49 for replenishing the boiler with water as desired.

The valve 50 has a stem 51 that extends to outside the walls 18 and which carries a handle 52 at its outer end for manually controlling the flow of water from receptacle 29 to the boiler. This stem may extend through a tube 53 that is sealed relative to the stem by the usual packing, and that is also sealed relative to the walls 18 and branch 49 so that no steam or water will leak from said tube to the outside.

In operation, when pipe 44 is in position 45 and the boiler 4 is provided with water, the heat from source 9 will create steam that will rise through tube 16 and into the compartment 3. The operator will supply the upper receptacle 1 with cool water from any desired source, which water will cool the wall 19 and the walls of members 22, 28 to condense the steam that contacts said wall. The steam so condensed will flow down the underside of wall 19 for collection on the bottom 15 to the height of tube 16.

Some of the cooling water that is distributed through the central opening 40 of the bottom 38 will flow through passage 33 into receptacle 29. This water in receptacle 29, being held there, will become heated from the steam therebelow and as the water in the boiler is used up the operator may replenish it with hot water from receptacle 29.

The spacing between the edges of opening 40 in the top bottom of the upper receptacle is such as to provide a uniform distribution of water over the top 19 and some of which water will also flow over the members 22.

The plate 30 over receptacle 29 is slanted to prevent any great amount of the cooling water from flowing thereover so as to retain the heat in the receptacle 29.

The provision of members 22, 26 provides for greater cooling area for the steam than would otherwise be provided.

As it is desirable to insulate the boiler from the compartment thereover, the air space between walls 13, 14 provides for such insulation, and openings 17 permit air to freely enter the space between said walls.

Where the device of this invention is for use as an emergency condenser for life rafts, and the like, it may be no larger than the size shown in the drawings, and as all main parts thereof are concentric, provision may easily be made for storing the same on a life raft or life boat, or the like. Of course, the size may vary according to its intended use.

Having described the invention, I claim:

1. A still comprising a hollow vertical cylindrical body; a plurality of vertically spaced walls in said body dividing the interior thereof into a plurality of superposed enclosed compartments, the lowermost of which constitutes a boiler for water to be boiled; the adjacent pair of said walls immediately above said boiler being centrally apertured and a vertical open-ended tube secured in such apertures providing a passageway for conducting steam to above the uppermost wall of said pair; the said uppermost wall of said pair being the bottom wall of the compartment for condensate of such steam; openings formed in said cylindrical body communicating with the space be-

tween said adjacent pair of walls for circulation of atmospheric air therein to cool said uppermost wall of said pair; the one of said walls defining the top of said compartment for said condensate being generally conical with its apex uppermost for passage of water by gravity over its inclined upper sides to its lower annular edges; and a discharge opening for such water formed in the wall of said cylindrical body adjacent said lower edge; a plurality of hollow members projecting upwardly from said top of the condensate compartment and opening at their lower sides downwardly into the said condensate compartment; said members being flattened vertically and extending radially relative to the central axis of said conical top, one adjacent pair thereof extending to the walls of said body thereby providing a receptacle between the said pair for water; and a valved conduit from said receptacle to said tube for feeding water from said receptacle through said conduit and tube into said boiler.

2. A still comprising a hollow vertical cylindrical body; a plurality of vertically spaced walls in said body dividing the interior thereof into a plurality of superposed enclosed compartments, the lowermost of which constitutes a boiler for water to be boiled; the adjacent pair of said walls immediately above said boiler being centrally apertured and a vertical open-ended tube secured in such apertures providing a passageway for conducting steam to above the uppermost wall of said pair; the said uppermost wall of said pair being the bottom wall of the compartment for condensate of such steam; openings formed in said cylindrical body communicating with the space between said adjacent pair of walls for circulation of atmospheric air therein to cool said uppermost wall of said pair; one of the said walls defining the top of said compartment for said condensate being generally conical with its apex uppermost for passage of water by gravity over its inclined upper sides to its lower annular edge; a discharge opening for such water formed in the wall of said cylindrical body adjacent said lower edge; and a centrally open annular wall above said conical top wall supported on said body with the edges of its central opening spaced around the apexial end of said top wall for distributing water to be poured on said annular wall to the sides of said conical top wall for downward passage over the latter.

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