Feb. 27, 1951 J. W. LITTLE ET AL. 2,543,322

MEANS FOR SUPPORTING EVAPORATORS AND VAPOR PIPES THEREOF

Filed March 29, 1948 2 Sheets-Sheet 1

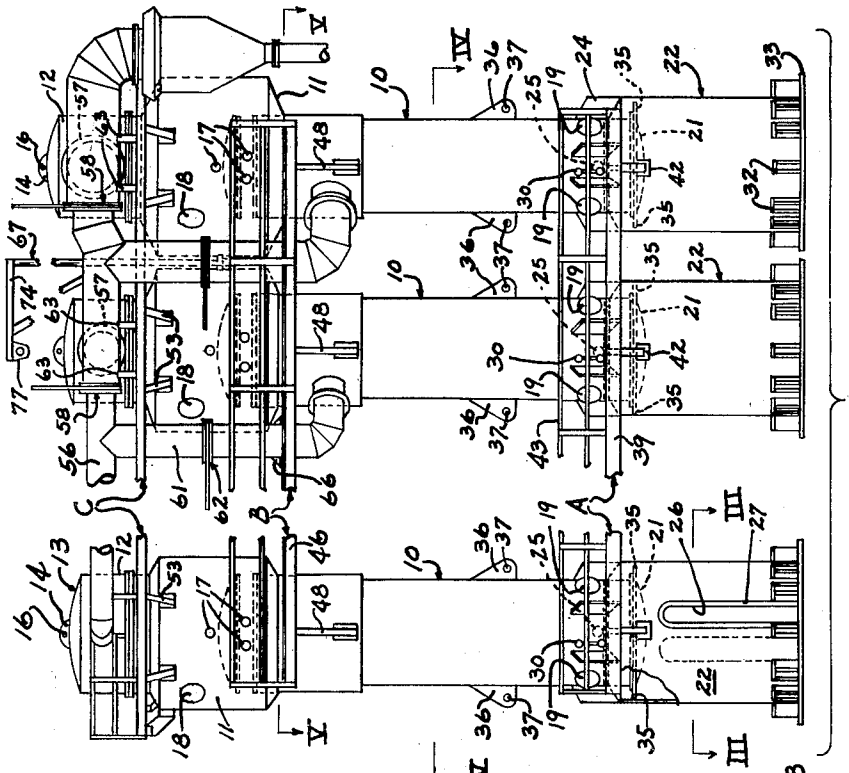


Fig. 1

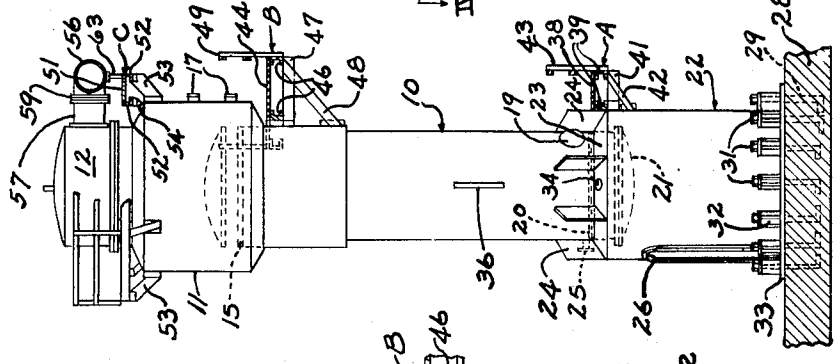


Fig. 2

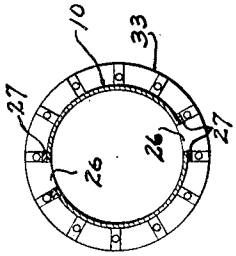


Fig. 3

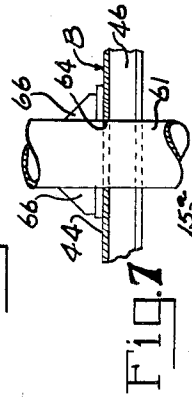


Fig. 7

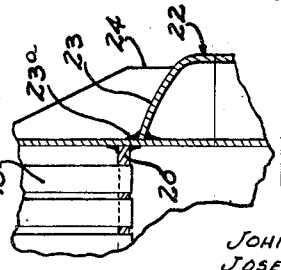


Fig. 9

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MEANS FOR SUPPORTING EVAPORATORS AND VAPOR PIPES THEREOF

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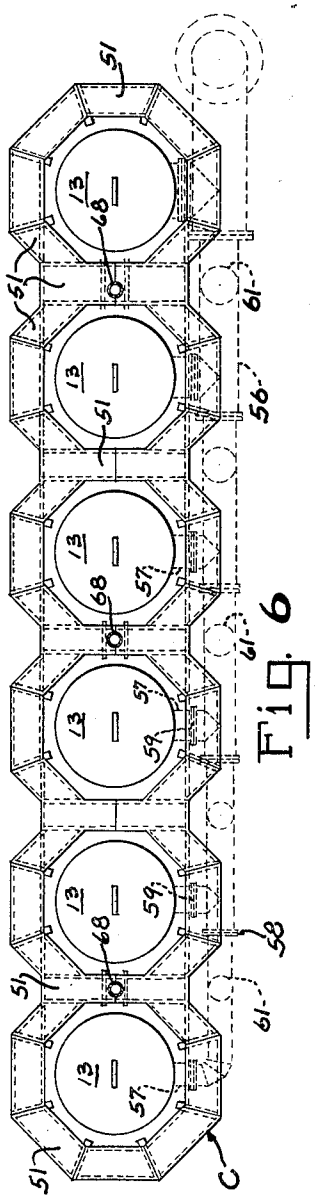


Fig. 6

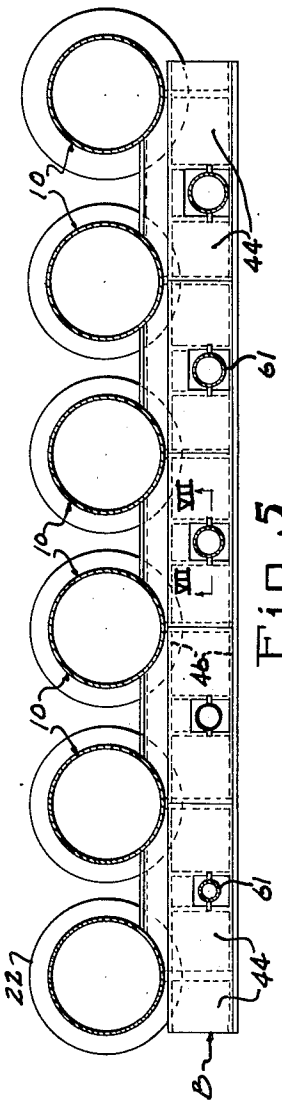


Fig. 5

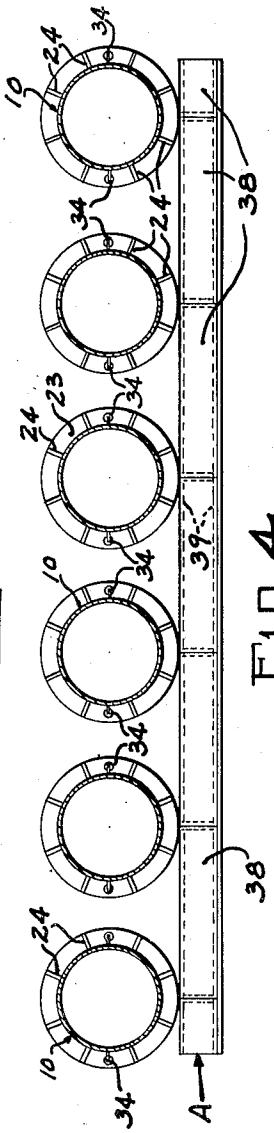


Fig. 4

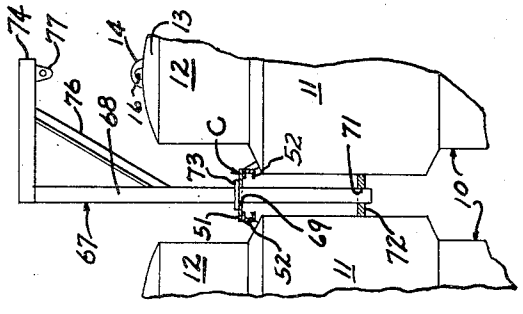


Fig. 8

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MEANS FOR SUPPORTING EVAPORATORS AND VAPOR PIPES THEREOF

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5 Claims. (Cl. 159—17)

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Our present invention relates to evaporators, and more particularly to vertical tube evaporators, and has for an object the provision of improved means for supporting the main body of the evaporator, together with improved means for supporting the vapor pipes thereof.

Another object of our invention is to provide apparatus of the character designated in which the evaporator is wholly supported at its bottom on a cylindrical base, the base extending upwardly from the bottom of the evaporator only a short distance, and stopping at a point beneath the upper surface of the lower tube sheet, thereby leaving the various manholes, gauges, and pipe connections installed above the lower tube sheet accessible for manipulation, observation, or adjustment.

Another object is to provide the top of the supporting base with a pair of diametrically opposed openings through which a rope or cable may be attached to the removable bottom of the evaporator for raising or lowering the same when required, together with a bracket mounted on the sides of the evaporator body above each of the holes, and disposed to form an anchor for the upper end of the rope or cable, whereby the bottom may be raised or lowered without the necessity of workmen entering beneath the evaporator.

Another object of our invention is to provide walkways disposed at desired elevations on the body, and wholly supported from the sides thereof, the upper of which walkways serve also to support the vapor pipes connected to the evaporator, whereby when opening or closing the usual plate valves controlling the pipes, the latter are supported to the extent that additional temporary supporting means therefor is not necessary.

A further object of our invention is to provide apparatus of the character designated especially adapted for use in conjunction with other like units thereby to form a multiple effect system, and wherein the uppermost walkway adjacent the vapor heads of each unit is disposed around and between the evaporators and is wholly supported from the vapor heads thereof, thereby making it possible for a workman to have access to all sides of the vapor heads and to the plate valves controlling the vapor pipes.

A still further object of our invention is to mount between adjacent evaporators a crane by means of which the cover or dome for the vapor head may be removed, the crane being pivotally mounted so as to serve the adjacent evaporators.

Apparatus illustrating the features of our invention is shown in the accompanying drawings forming a part of this application in which—

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Fig. 1 is an elevational view, partly broken away, of a plurality of vertical tube evaporators embodying our invention;

Fig. 2 is an end elevational view, partly broken away and in section, of one of the evaporators at the end of the group of effects with tie bolts in place;

Fig. 3 is a detail sectional view taken along line III—III of Fig. 1;

Fig. 4 is a sectional view taken along line IV—IV of Fig. 1;

Fig. 5 is a sectional view taken along line V—V of Fig. 1;

Fig. 6 is a plan view of the group of evaporators shown in Fig. 1, the cranes at the top thereof being broken away and in section, and the vapor pipes therefor being shown in dotted lines;

Fig. 7 is a detail sectional view taken along line VII—VII of Fig. 5;

Fig. 8 is a fragmental side elevation, partly in section, of the top of a pair of evaporators, and showing our improved crane in position therebetween; and

Fig. 9 is a detail fragmental sectional view showing the position of the upper end of the base with respect to the lower tube sheet.

Referring now to the drawings for a better understanding of our invention and more particularly to Fig. 1 thereof, we show a plurality of vertical tube evaporators each of which comprises a body 10 with a vapor head 11 at the top thereof. The dome 12 of each vapor head is removable in the manner well understood, and the top of the dome 13 is provided with a lifting bracket 14 having an opening 16 therein. The vapor head is provided with the usual observation openings 17 and a manhole 18. An upper tube sheet 15 receives the upper ends of a plurality of tubes 15a, Fig. 9.

Each of the bodies 10 is provided adjacent its lower end with manholes 19, disposed immediately above the lower tube sheet 20, and the bottom of the body is closed by means of a removable cover 21.

Likewise provided in the side of each body, immediately above the upper surface of the lower tube sheet 20, is a condensate connection 25, Fig. 2, and a gauge 30, Fig. 1.

Each evaporator is wholly supported on an individual cylindrical base 22, Fig. 9. The top 23 of each base 22 slopes inwardly and upwardly toward the body 10 and the two are secured together by welding as indicated at 23a, and braced by gusset plates 24 welded to the outer surfaces thereof. The gusset plates 24 are spaced apart as shown in the drawing so as to leave the lower manholes 19 and covers therefor, gauges 30, and condensate connections 25, free and un-

obstructed. Each base 22 is provided with a pair of walk-in openings 26, of a size to permit a workman to enter beneath the lower end of the body, and each such opening is reinforced around its perimeter by means of a curved bar 27. The base 22 may be secured to a concrete floor 28 by means of the usual tie bolts 29, removably secured by nuts 31 to brackets or the like 32 welded to the bottom of the base, mounted on top of a ring 33, likewise welded to the bottom of the base 22.

As shown more clearly in Figs. 2 and 4, the upwardly sloping portion 23 at the top of the base 22 is provided with diametrically opposed openings 34. Welded to the body 10, in vertical alignment with the openings 34 are brackets 36, each of which has an opening 37. As is understood, it is often necessary to remove the bottom 21, and we propose to accomplish this conveniently and safely by passing a rope or cable through each of the openings 34 and thence through the openings 37, the lower end of the rope or cable being secured to suitable brackets 35 on the outer perimeter of the bottom 21, thereby to lower and raise the same when required.

Extending alongside each of the series of evaporators are lower, intermediate, and upper walkways A, B and C, respectively. Each of the walkways is disposed at the correct elevation on the evaporators to afford access to the various manholes and gauges, and to the plate valves controlling the vapor pipes, later to be explained in detail, and are wholly supported from the evaporator bodies. The lower walkway A comprises a series of plates 38, laid end to end on top of a pair of channels 39. The channels are supported at intervals on horizontal members 41 welded at their inner ends in suitable manner to the base 22, and braced by knee braces 42. The outer edge of the walkway A is provided with a hand rail 43.

The intermediate walkway B comprises a series of plates 44, similar to the plates 38, and supported on channels 46. The channels 46 are likewise supported at intervals on horizontal members 47, secured in suitable manner at their inner ends to each body at a point immediately below the vapor head 11 and braced by knee braces 48. A suitable handrail 49 is provided on the outer edge of the walkway B.

As best shown in Fig. 6, walkway C comprises a series of plates 51 disposed about the domes 12 of the vapor heads 11 to form an octagonal platform, completely surrounding the upper end of each of the evaporators. The plates 51 are carried on a pair of channels 52, and the channels are supported by braces 53 and 54, spaced at intervals along the sides of and between the domes 12 of the several evaporators.

Connecting the vapor heads of adjacent evaporators is a stepped-diameter header pipe 56. In the header 56, adjacent a lateral conduit 57 leading thereto from each vapor dome, is a plate cutoff valve 58 of the usual type. A similar plate valve 59 is provided in each of the laterals 57. At the top of the body 10, beneath the lower end of each of the vapor heads 11, is a pipe 61 leading to the header 56, and each of these pipes are provided with a plate valve 62. The arrangement of the header and pipes 57 and 61, together with the valves 58, 59, and 62 permit any one of the group of evaporators to be cut out of service when necessary. As will be understood, the plate valves are of the type connected by bolts, not shown, to flanges carried on the meeting ends of the pipe in which they are installed. When closing or opening such a valve the bolts are removed, breaking the joint, and separating entirely the flanged ends of the pipe.

The header 56 is supported at intervals on vertical members 63 carried by the upper walkway C. As shown more clearly in Fig. 7, each of the vertical pipes 61 passes through an opening 64 provided therefor in the plates 44 of the walkway B. Each pipe 61 is secured to the plate 44 by means of gusset plates 66 welded to the side of the pipe, and if desired welded to the upper surface of the plates. The entire assembly of vapor pipes for each effect is thus supported in fixed manner from the walkways B and C. Accordingly, when the bolts are removed preparatory to closing or opening plate valves 58, 59 or 62, no further support for the pipes is required. With evaporators heretofore known to us, temporary supporting means for sections of the vapor pipes and header between valves were required whenever the joints were broken to open or close the valves. By our arrangement, however, the sections of pipe between the plate valves are made self-supporting by securing the same in the manner shown and described to the walkways B and C.

Mounted between alternate evaporators we provide a swinging crane 67 disposed to form means for lifting the dome 12 of the vapor head from the evaporators when necessary. As shown in Fig. 8, the crane comprises a vertical tubular mast 68 passing downwardly through an opening 69 in the plate 51 of walkway C. The lower end of the mast passes through an opening 71 provided in a bracket 72, secured in suitable manner to the sides of the vapor heads 11 of adjacent effects. A collar 73 is welded to the mast 68 to hold the same at the correct elevation. The mast carries a boom 74, the free end of which is supported by a knee brace 76. The bracket 77 is disposed on the end of the boom to lie directly over the bracket 14 carried by the dome 12 when the boom is swung thereover. The crane is thus pivotally mounted in the openings 69 and 71 whereby the boom may be swung over the vapor heads of adjacent effects.

From the foregoing it will be apparent that we have devised an improved support for the body and vapor tubes of evaporators. It is to be especially noted that the base 22 stops short of the upper surface of the lower tube sheet 20, and hence terminates below the manholes 19 and the various pipe connections and gauges usually placed on the lower ends of such units. These elements of the evaporator are thus left accessible for observation, or manipulation, and may be installed directly on the body 10 without the necessity of extending them through the supporting shell as has been the case in some prior types of apparatus.

When it is desired to remove the bottom 21 from the evaporator, a rope or cable may be secured to the lugs 35 carried on the periphery of the bottom and passed upwardly through the holes 34 at the top of the base and through a block and tackle if desired. The block and tackle may be anchored to the brackets 36. The bottoms may thus be lowered and raised without the dangerous procedure of having workmen enter beneath the bottom 21 during the raising and lowering thereof.

It is to be noted that our invention is characterized by the absence of supporting columns either for the evaporator body itself or for the vapor pipes or walkways. It is to be noted that by

terminating the cylindrical base adjacent the lower end of the body, instead of extending the same completely up the body, we obtain the additional advantage of being able to use a base of a diameter only slightly greater than the diameter of the body itself. Sizable quantities of material thus are saved, in addition to obtaining the advantages already pointed out. The walkways B and C serve additionally to support the header 56 and the vertical pipes 61 so that temporary means for holding the sections of pipe in place need not be used while the plate valves are being opened or closed. The provision of the cranes 67 permits a group of evaporators to be installed either indoors or outdoors without the necessity of providing overhead cranes for removing the domes when required.

While we have not shown the same, it will be understood that vertically disposed ladders or other means are provided for gaining access to the walkways A, B and C.

From the foregoing it will be apparent that we have devised an improved support for an evaporator body and for the vapor pipes thereof which is simple of construction, economical in required materials, and wholly effective for its intended purpose.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. In an evaporator and the like embodying a vertically disposed cylindrical body having a lower tube sheet and a removable bottom, a cylindrical base for supporting the body, of larger diameter than the bottom, said base surrounding the body and secured thereto, said base terminating below the lower tube sheet, a pair of lugs carried on the side of the body above the base for supporting one end of each of a pair of cables, and means in the base beneath the lugs for passing the cables therethrough whereby the other ends thereof may be secured to the bottom for lowering and raising the same.

2. In an evaporator and the like embodying a vertically disposed cylindrical body having a tube sheet adjacent the lower end of the body and a vapor head at the top of the body, the combination of a cylindrical base surrounding the lower end of the body and stopping short of the upper surface of the tube sheet, means to secure the lower end of the body to the upper end of the base, a pair of vertically spaced walkways wholly supported from the top of the evaporator, vapor pipes extending upwardly from the body below the vapor head, a vapor pipe extending outwardly from the top of the vapor head, a header to which both of said vapor pipes connect plate valves in the vapor pipes and header, means to support the upwardly extending pipe from the lower of said walkways, and means to support the header from the uppermost of said walkways whereby all sections of said pipes are supported while said plate valves are being opened and closed.

3. Apparatus as defined in claim 2 in which the means to support the upwardly extending pipe from the lower walkway of said pair comprises a horizontal plate, there being an opening in said plate through which the upwardly extending pipe passes, and plates secured to the side of said pipe and resting on top of the horizontal plate.

4. In apparatus of the character described embodying a group of vertically extending evaporators disposed side by side, each of which evaporators comprises a body and a vapor head at the top of the body, a cylindrical base surrounding the lower end only of each body, means to secure the lower end of the body to the upper end of the base, a walkway wholly supported from the body beneath the vapor heads and extending alongside said group of evaporators, an upper walkway wholly supported from the upper portion of the vapor heads of said evaporators, said upper walkway encircling each of the vapor heads of said evaporators, a vapor pipe for each evaporator connected to the body of each evaporator and extending vertically, a second vapor pipe projecting outwardly from the upper part of each vapor head, a header to which the vertical and second pipes of each evaporator are connected, means to support the vertical pipes from the lower of said walkways, and means to support the header from the uppermost walkway.

5. In an evaporator and the like embodying a vertically disposed cylindrical body having a tube sheet adjacent the lower end of the body and a removable bottom; a cylindrical base for supporting the evaporator, larger in diameter than the evaporator body and terminating below the upper surface of the tube sheet, an inwardly tapering frusto-conical top for the base provided with a central opening for passing the evaporator body therethrough, plates welded to the outer sides of the body and the top of the base for securing the same together, there being a pair of diametrically opposed openings in the top of said base giving access to said removable bottom, and a bracket on the sides of the body above each opening in the base for supporting said removable bottom when installing and removing it.

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