May 30, 1961 J. NAAB 2,986,377

CONDENSER

Filed April 17, 1956 2 Sheets-Sheet 1

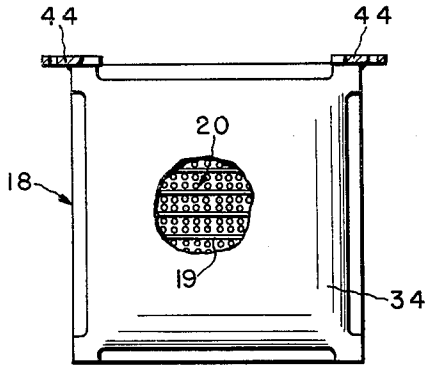


FIG. 4

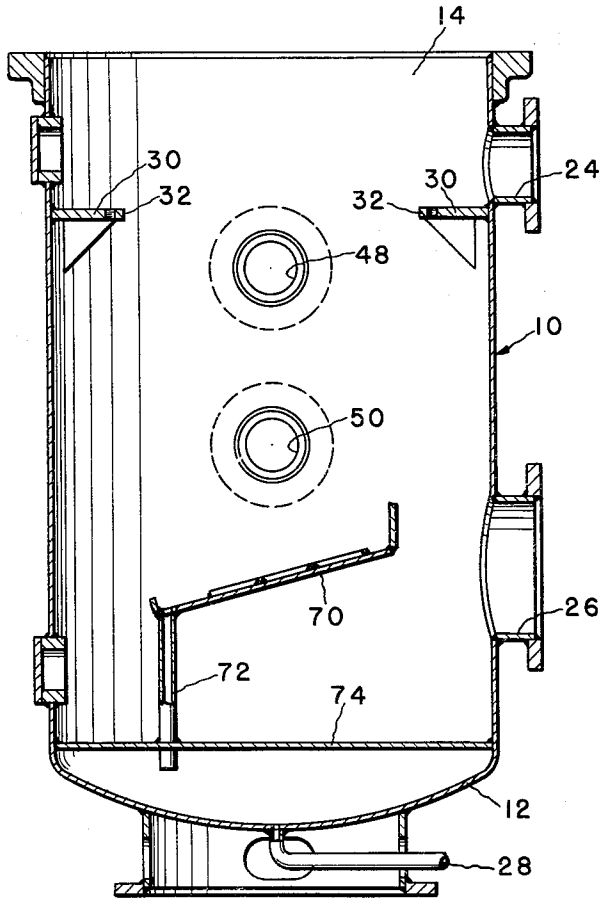


FIG. 1

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CONDENSER

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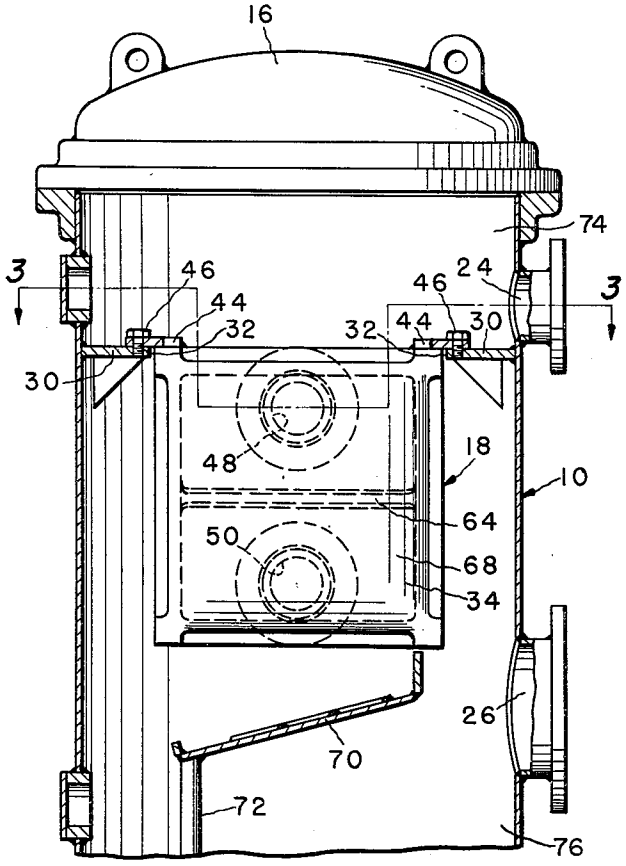


FIG. 2

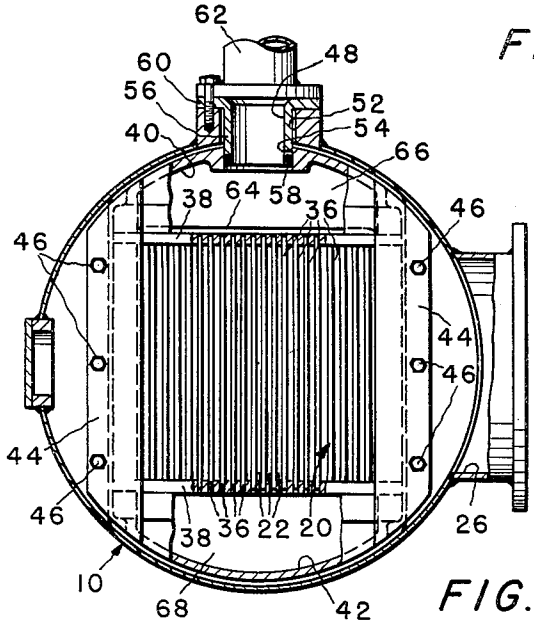


FIG. 3

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United States Patent Office 2,986,377
Patented May 30, 1961

2,986,377

CONDENSER

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Filed Apr. 17, 1956, Ser. No. 578,797

4 Claims. (Cl. 257—43)

This invention relates to condensers, and more particularly to steam condensers of the type wherein steam is passed over a plurality of tubes through which cooling water or other cooling medium is passed for cooling and condensing the steam.

One object of this invention is to provide a condenser of this type in which the casing is adapted to receive a standard type tube nest cooling unit and is constructed in such fashion to insure that substantially all of the steam passes through the tube nest rather than along its exterior.

Another object is to provide such a condenser in which the cooling fluid supply and discharge connections for the cooling unit are slidably connected thereto so as to permit easy assembly and disassembly of the cooling unit relative to the casing.

Further objects will become obvious from the following specification and drawings in which,

Fig. 1 is a longitudinal sectional elevation showing the casing with the cooling unit removed,

Fig. 2 is a view similar to Fig. 1 with a cooling unit mounted in assembled relation in the casing,

Fig. 3 is a cross sectional view of Fig. 2 taken along the line 3—3 looking in the direction of the arrows, and

Fig. 4 is an external view, partly in section, of the cooling unit disassembled from the casing.

Referring to the drawings, and first to Figs. 1 and 2, the condenser is shown as including, in general, a casing 10 of substantially tubular shape having a closed end 12 and an open end 14 normally covered by a cover 16. Mounted within the casing 10 is a cooling unit 18 through which cooling water circulates in a tube nest 20 and has a longitudinal passage 22 through which steam passes in traveling from the casing inlet 24 to the casing outlet 26. Baffle plates 19 are disposed between banks of tubes in the nest 20. Water condensed out of the cooled steam drains to the bottom, or closed end 12, of the casing 10 and may be drawn off through the drain pipe 28.

Referring now in greater detail to the construction of the condenser, a pair of segment shaped flanges 30 are secured on the opposite sides of the interior of the casing 10 adjacent the open end portion thereof. These flanges serve the dual purpose of supporting the cooling unit 18 and to cooperate therewith to block off the flow of steam along the exterior of the cooling unit. In furtherance to this end, these flanges 30 are in the form of segments mounted transversely of the casing 10 diametrically opposite each other with their straight edges 32 inward (see Fig. 3).

The cooling unit 18 includes a fluid tight housing 34 in which is mounted the tube nest 20 comprising a plurality of tubes 36 having their ends secured in tube sheets 38. The portions of the housing 34 overlying the tube sheets are substantially circular sections in cross section forming water boxes 40 and 42 on the opposite sides of the tube nest.

With this construction, the inlet end relative to steam flow of the cooling unit is, in cross sectional form, shaped

to conform substantially to the opening between the flanges 30. In practice the plates are formed to correspond with the shape of the cooling unit. In order that the cooling unit may be mounted on the flanges 30, plates 44 are mounted on the opposite sides of the tube nest housing 34 at its inlet end and overlie the flanges 30 such that it may be secured thereto, for example, by means of bolts 46. Accordingly when the cooling unit 18 is mounted in the casing 10, the end of the cooling unit in cooperation with the flanges 30 partition the interior of the casing 10 to provide an inlet chamber 74 on one side of the partition and a discharge chamber 76 on the opposite side of the partition. The partitioning of the interior of the casing 10 is arranged to block off the interior marginal portion of the casing so as to confine the flow of steam entering the inlet chamber 74 above the flanges 30, via the inlet 24, to the passage 22 in flowing to the discharge chamber 76 and therefrom to the outlet 26 positioned below the flanges 30.

In order to provide ease in assembly and disassembly of the cooling unit 18 with the casing 10, the cooling water supply and discharge connections 48 and 50, respectively, are of the type which permit ready connection with the cooling unit after the unit is positioned in the casing. More particularly each connection includes an opening 52 in the casing 10 and a similarly shaped axially aligned opening 54 in the housing 34. Connection between these openings is accomplished by means of a sleeve 56 having a slide fit in the opening 54 and having a sealing ring 58 therebetween. The outer end of the sleeve 56 is provided with a flange 60 clamped between the casing and the pipe 62. The particular type cooling unit shown is of the double pass type and accordingly both the supply and discharge connections 48 and 50 are positioned on the same side of the casing 10. A partition 64 is positioned in the water box 40 dividing this box into a supply chamber 66 and discharge chamber 68. Water flows from the supply chamber 66 through the tubes 36 in the upper half of the cooling unit and into the water box 42 and flows thence through the lower tubes 36 into the discharge chamber 68.

Positioned immediately below the discharge end of the passage 22 is a drip tray 70 for catching condensate and includes a pipe 72 leading through a support 74 and thence to the drain 28.

With the condenser construction described, it is apparent that a standard type cooling unit may be readily inserted into the casing 10 and secured in position by merely tightening the bolts 46. This positions the openings 54 in alignment with the openings 52 so that the sleeves 56 may be slid into position. It is then merely necessary to clamp down the cover 16 and the unit is completely assembled. The cooling unit 18 may be easily removed for cleansing or repair by merely carrying out these steps in reverse.

I claim:

1. A condenser comprising, a casing, a pair of flanges mounted transversely and diametrically opposite each other in the casing, a cooling unit having a fluid tight housing disposed in said casing and secured at one end portion to said flanges, said unit including means cooperating with the flanges to partition the interior of the casing to provide an inlet chamber on one side of said partition and a discharge chamber on the opposite side of said partition, an inlet through the casing opening into said inlet chamber for the supply of fluid to be condensed, an outlet through the casing communicated with said discharge chamber for the escape of such fluid, a passage through said unit for the flow of fluid to be condensed from the inlet chamber to the discharge chamber, connections through the casing and with the unit for the supply and discharge of cooling fluid to such unit, a drain in the casing for condensed liquid.

2. The condenser claimed in claim 1 in which said

flanges constitute the sole supporting means for the cooling unit and the cooling unit is releasably secured to such flanges, and in which each of said cooling fluid connections includes a sleeve having a slidable sealing connection with said unit and being releasably held in such sealing connection such that the cooling unit may be disconnected from the casing for removal by only disconnecting the sleeves and said flanges form the unit.

3. A condenser comprising, a casing of substantially circular cross section, a substantially segment shaped flange transverely mounted in the casing, and another substantially segment shaped flange mounted transversely in the same plane and opposite relative to the first said flange, said flanges having their opposing ends in spaced relation, a cooling unit in said casing having a fluid tight housing releasably connected at one end to said flanges, the end of the housing connected to said flanges having a cross sectional shape adapted to cooperate with said flanges and the inner surface of said casing to partition the interior of said casing to provide an inlet chamber on one side of said partition and a discharge chamber on the opposite side of said partition, a longitudinal passage through said housing for the flow of fluid to be condensed from the inlet chamber to the discharge chamber, an inlet through the casing opening into the inlet chamber for the supply of fluid to be condensed, an outlet through the casing communicated with said discharge chamber for the escape of fluid to be condensed, connections through said casing and with said housing for the supply and discharge of cooling fluid to said cooling unit, a drain in the casing for condensed liquid.

4. The condenser claimed in claim 2 in which each of said connections includes an opening in the cooling unit housing and a similar axially aligned opening in the casing, and the sleeve having a slidable sealing fit in each of said openings and extending from the outer end of said casing opening into said housing opening.

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