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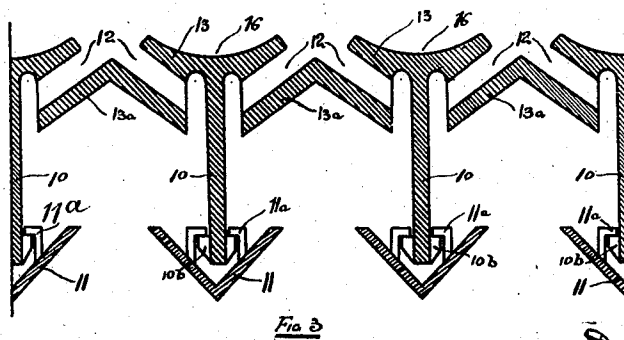
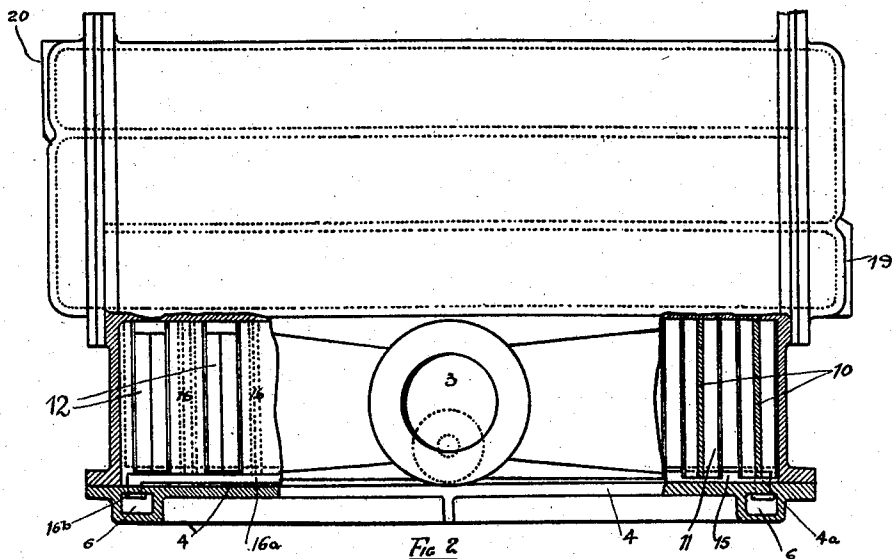
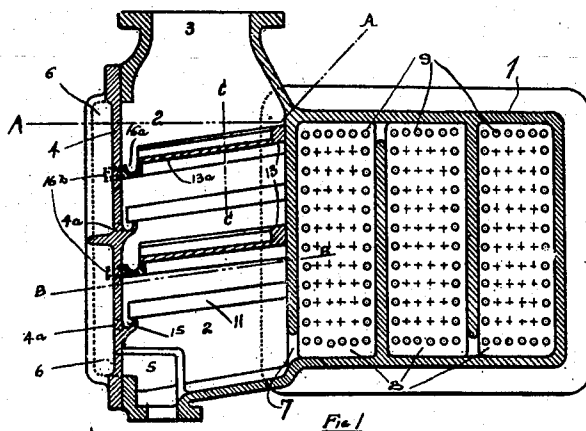
PATENTED OCT. 8, 1907.

D. B. MORISON.

APPARATUS FOR SEPARATING OIL AND WATER FROM STEAM.

APPLICATION FILED JULY 3, 1905.

3 SHEETS—SHEET 1.



Witnesses
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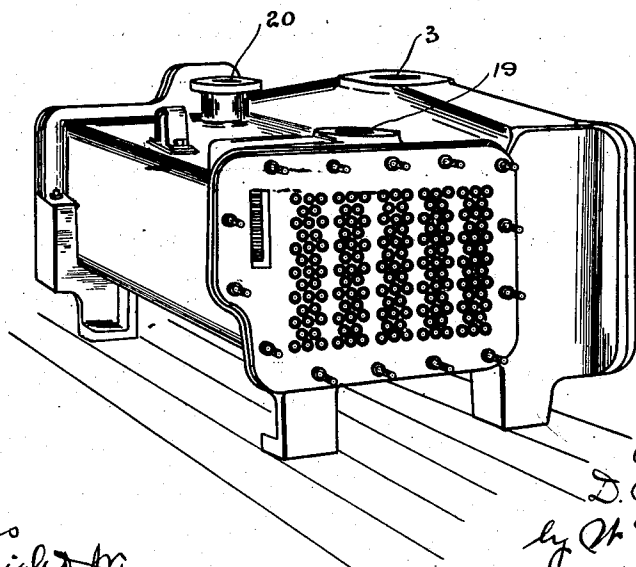
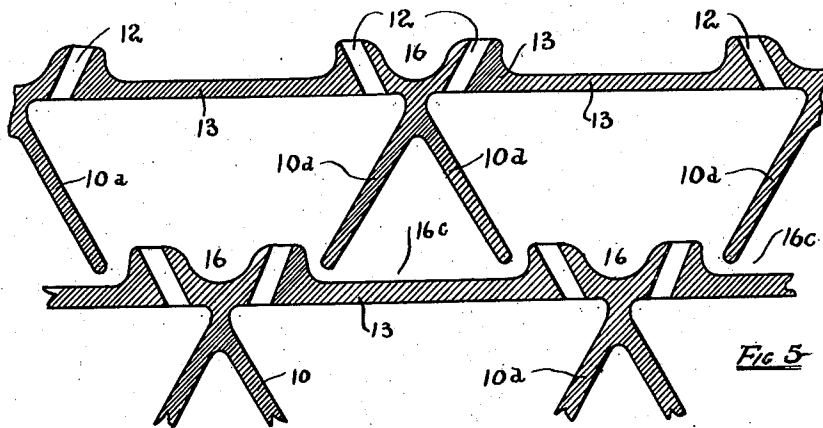
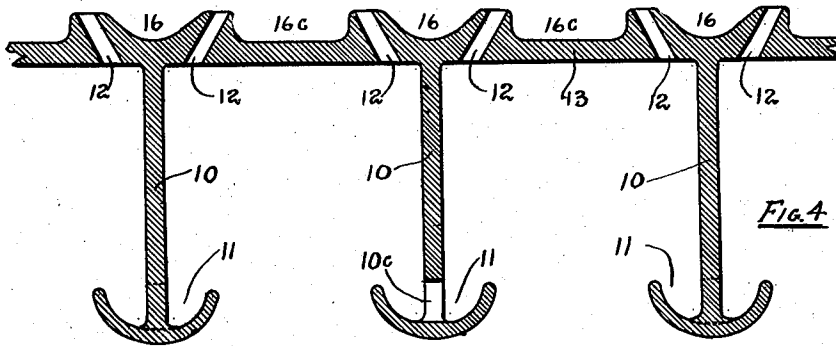
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3 SHEETS—SHEET 2.



Witnesses
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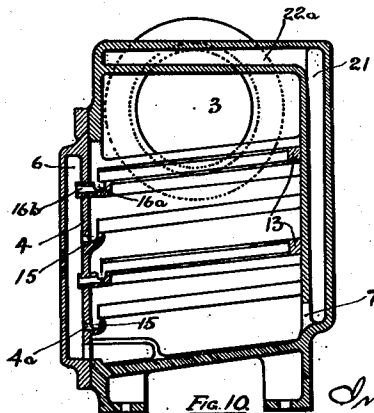
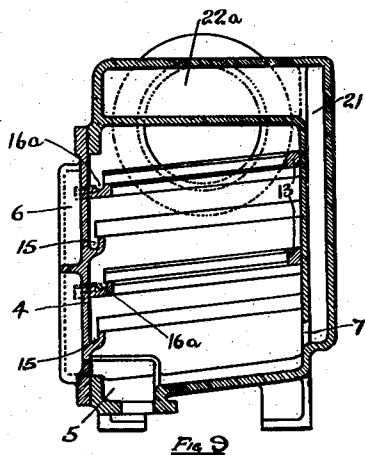
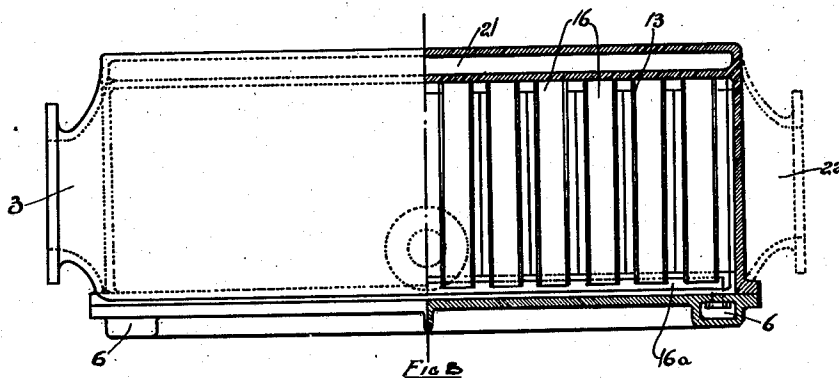
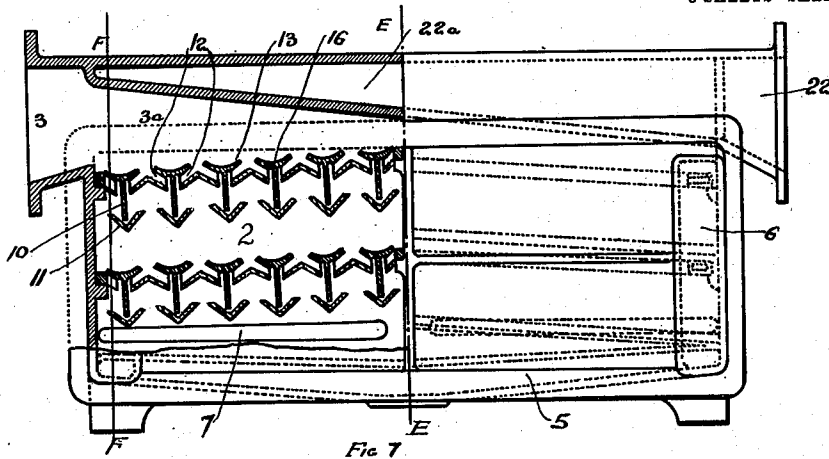
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SEPARATING OIL AND WATER FROM STEAM.

No. 867,742.

Specification of Letters Patent.

Patented Oct. 8, 1907.

Application filed July 3, 1905. Serial No. 268,251.

To all whom it may concern:

Be it known that I, DONALD BARNES MORISON, a subject of the King of Great Britain and Ireland, residing at Hartlepool, in the county of Durham, England, have invented Improvements in Apparatus for Separating Oil and Water From Steam Before it is Condensed, of which the following is a specification.

This invention relates to apparatus for separating oil and water from steam before it is condensed, and particularly to steam cleansing and condensing apparatus for use on steamships in connection with steam winches, steering engines, steam pumps and other auxiliary engines in which oil is freely used and where such oil if it should pass into the boilers with the feed water, will be a source of danger by causing overheating of furnaces, and will decrease the efficiency of the heating surfaces. In such apparatus the cleansing and condensing of the steam may advantageously be effected in one combined structure in order to obtain high efficiency of cleansing and condensing, a minimum of weight, and the occupation of a minimum of space, which, on shipboard, are features of great importance. Such a compound apparatus may conveniently comprise a vessel or casing constructed with compartments or chambers that are in communication with each other in such a manner that steam admitted to the first chamber can flow through the succeeding chamber or chambers in such a manner as to sweep practically through every part of the chambers, the first chamber or the first and one or more succeeding chambers being provided with devices that are arranged to offer a large surface to the steam flowing through the chamber or chambers and are adapted to distribute such steam throughout the width and length of the chamber or chambers and to separate and collect oil and water therefrom and lead them into an oil and water collecting receptacle, and the delivery end of the chamber or of the last cleansing chamber, being in communication with the condensing portion of the apparatus through an opening or openings that extends or extend practically throughout the length of the condenser between the tube plates so that a practically uniform flow of cleansed and dry steam will take place from the cleansing portion of the apparatus to the condensing or heating portion thereof.

My invention may be applied to various types of surface and direct contact condensers. By way of example, I will describe it in connection with surface condensers such as those used on steam ships for condensing the steam from auxiliary steam engines and usually termed winch or auxiliary condensers.

In the accompanying illustrative drawings, Figure 1 is a transverse section, and Fig. 2 a plan partly in horizontal section on the line A A and partly on the line

B B of Fig. 1, showing one construction of combined cleansing and condensing apparatus according to this invention. Fig. 3 is a vertical section, corresponding to the line C C of Fig. 1, but to a larger scale, showing some of the steam distributing and oil and water separating and collecting devices. Figs. 4 and 5 are sectional detail views showing modifications. Fig. 6 is a perspective view showing a modified arrangement of the apparatus. Fig. 7 shows partly in vertical section and partly in front elevation, Fig. 8 partly in plan and partly in horizontal section, and Figs. 9 and 10 in cross section on the lines E E and F F respectively of Fig. 7, one construction of steam cleansing apparatus according to this invention for use separately from a condenser.

Referring to Figs. 1, 2 and 3, along one side, say the front side, and extending practically the whole length and depth of the casing 1 of the apparatus is formed a chamber 2 (hereinafter called for distinction the cleansing chamber) which contains the steam distributing and oil and water separating and collecting devices, hereinafter described, and is provided with a steam inlet 3, the front of the chamber 2 being provided with a removable cover 4 which enables the interior of the chamber to be easily and quickly inspected and cleaned. The steam distributing and oil and water separating and collecting devices are arranged so that oil and water separated from the steam flowing through the cleansing chamber 2 can drain into a receptacle 5 at the bottom of the chamber through suitable passages 6 in the cover 4. 7 is a communicating passage between the cleansing chamber 2 and the next adjacent chamber 8 of the condensing portion of the apparatus, the said passage extending practically the entire length of the cleansing chamber, and therefore the entire length of the condenser tubes 9, thereby maintaining a uniform velocity of flow from the cleansing chamber and facilitating uniform deposition of oil and water on the various surfaces in the cleansing chamber and avoiding the creation of eddies and the disturbing influences of locally increased velocities, and also increasing the efficiency of the condensing surfaces by insuring a uniform flow of steam over such surfaces. This uniform flow of the steam through and from the cleansing chamber, particularly from the said chamber, is a feature of considerable practical value, as it avoids any local discharge of steam from the chamber which would cause a disturbance of flow that would tend to sweep away any fine globules of oil and water which would otherwise be deposited, and also to pick up particles of oil and water that had been deposited and carry them off, and thus interfere with the efficiency of the apparatus. The condenser in the example of apparatus shown, is of the multiple compartment type

having condensing tubes 9 through which cooling water is caused to flow, but any other suitable condensing arrangement may be used. 19 and 20 (Fig. 2) are the inlet and outlet respectively for cooling water. The steam distributing devices located in the cleansing chamber 2 each comprise a plate or diaphragm 13 formed with a number of inclined guide slots 12 through which the steam to be cleansed will flow and thereby be divided up into a number of streams.

The oil and water separating devices comprise, as shown more clearly in Fig. 3, vertical plates 10 carried by the plates or diaphragms 13 and against the opposite sides of which steam flowing through the guide slots 12 in the plates or diaphragms 13 is caused to impinge at such an angle as will facilitate the deposition thereon of oil and water from the steam without causing any undue back pressure or resistance to flow of the steam. The oil and water collecting devices comprise horizontal or slightly inclined liquid collecting troughs or channels 11 supported at the lower ends of the plates 10. Each diaphragm 13 is in the form of a portable tray supported, like a shelf, in a slightly inclined position, upon ledges at the sides of the cleansing chamber 2 so that, on the removal of the cover 4, the diaphragms with separating and collecting devices 10-11 can be easily withdrawn and cleaned. The top of each diaphragm is formed with transverse oil and water collecting channels 16 that drain into a longitudinal channel 16^a (Fig. 1) which is in communication through passages 16^b in the cover 4 with the drain passages 6, so that oil and water that may be separated in the channels 16 can readily drain through the passages mentioned into the receptacle 5. The guide slots 12 are formed in downward extensions 13^a of the diaphragm 13 and are so inclined to the plates 10 that the steam flowing through them and impinging upon the plates will be deflected from such plates clear of the troughs 11 below, so that such troughs will not offer any serious obstruction to the flow of the steam through the cleansing chamber 2.

The troughs 11 are of V shape and are made separate from the vertical plates 10 from which they are supported by engaging hook-like supports 11^a at their ends upon lugs 10^b on the plates. The lower ends of each set of troughs 11 are arranged to discharge into a gutter 15 that is carried by the inner side of the cover 4 and is in communication through holes 4^a in the cover with the drain passages 6 so that the separated oil and water can drain from the troughs into the receptacle 5. The number of steam distributing diaphragms 13 and sets of liquid separating and collecting devices 10-11 used therewith, will depend on the amount of oil in the steam and the degree of extraction thereof desired.

Steam distributing and oil and water separating and collecting devices of the kind hereinbefore described can be constructed in various forms. Thus, in Fig. 4, the guide slots 12 are formed singly in the corresponding diaphragm 13, and the metal around such slots is extended upward to form channels 16, 16^a in the upper side of the diaphragm. Also, each liquid collecting trough 11 is formed in one piece with the corresponding supporting plate 10, the two portions of each trough at opposite sides of the plate, being connected together by holes 10^c.

In Fig. 5, each oil and water separating device com-

prises a pair of plates 10^d arranged at an angle to one another so as to form a device of A shape in section, that may, as shown, be cast in one piece with the corresponding diaphragm 13, and has an inclined guide slot 12 for steam on each side of it, so that steam flowing through the slots will strike on the inclined faces of the two plates and deposit oil and water thereon. The collecting troughs for the oil and water separated by the separating devices 10^d are, in this case, formed by the collecting channels 16^e in the top of the diaphragm 13 below such separating devices which extend into such channels as shown.

Fig. 6 is a perspective view showing combined steam cleansing and condensing apparatus somewhat like that illustrated in Figs. 1 and 2, but wherein the water inlet and outlet branches 19 and 20 respectively are arranged at the top of the apparatus instead of at opposite ends thereof as in Figs. 1 and 2.

Steam cleansing apparatus with steam distributing and oil and water separating and collecting devices of the kind hereinbefore described may also be constructed separately from a condenser. Figs. 7 to 10 inclusive show one arrangement of this kind. The exhaust steam, containing oil, enters the wedge shaped distributing chamber 3^a by the inlet 3 and flows into the cleansing chamber 2 through the guide slots 12 in the diaphragms 13 and over the separating and collecting devices 10 and 11 which are constructed and arranged substantially as in Figs. 1, 2 and 3, the separated oil and water passing through the drain passages 6 into the receptacle 5, and the cleansed steam flowing from the cleansing chamber 2 through openings 7 extending practically the entire length of the chamber into a jacket or passage 21 and a wedge shaped outlet chamber 22^a and thence to the cleansed steam outlet 22. The construction of the steam inlet chamber 3^a of gradually decreasing cross sectional area in an inward direction from the steam inlet 3, and the construction of the steam outlet chamber 22^a of gradually increasing cross sectional area in a direction towards the steam outlet 22, particularly the latter construction, is a feature of great practical value as it allows of a uniform flow of steam through and from the cleansing chamber 2 as and for the purpose hereinbefore described.

What I claim is:—

1. In apparatus for separating oil and water from steam before it is condensed, a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end extending practically the whole length of said chamber, and steam distributing and oil and water separating and collecting devices extending across said chamber between said inlet and outlet.
2. Apparatus for separating oil and water from steam before it is condensed, comprising a vertically arranged steam cleansing chamber having a steam inlet at the top and a laterally arranged steam outlet near the bottom extending practically the whole length of said chamber, and a condenser arranged adjacent to said cleansing chamber and in direct communication therewith through said steam outlet.
3. Apparatus for separating oil and water from steam before it is condensed, comprising vertically arranged steam cleansing and condensing chambers arranged side by side and in communication with each other near their lower ends through a laterally arranged steam outlet extending practically the whole length of said chambers.

4. Apparatus for separating oil and water from steam before it is condensed, comprising a casing formed with vertically arranged steam cleansing and condensing chambers arranged side by side and in communication with each other near their lower ends through a laterally arranged steam outlet extending practically the whole length of said chambers, and steam distributing and oil and water separating devices arranged to extend across said cleansing chamber between the steam inlet and outlet. 80
5. Apparatus for separating oil and water from steam before it is condensed, comprising a vertically arranged steam cleansing chamber having a steam inlet at the top and a laterally arranged steam outlet near the bottom extending practically the whole length of said chamber, a slotted steam distributing plate or diaphragm arranged nearly horizontally across said chamber between its inlet and outlet, oil and water separating and collecting devices arranged nearly horizontally below said plate or diaphragm, and a condenser arranged adjacent to one side of said cleansing chamber and in direct communication therewith through said steam outlet. 85
6. Apparatus for separating oil and water from steam before it is condensed, comprising steam cleansing and condensing chambers arranged side by side and in communication with each other through an opening or openings extending practically the whole length or height of said cleansing chamber, said chambers being formed in one casing or structure. 90
7. Apparatus for separating oil and water from steam before it is condensed, comprising a casing having steam cleansing and condensing chambers arranged side by side and in communication with each other through an opening or openings extending practically the whole length or height of said cleansing chamber, said opening or openings being formed in a wall or division that is common to one side of the cleansing chamber and the adjacent side of the condensing chamber. 95
8. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber, oil and water separating and collecting devices located in said chamber, and a condensing chamber having water tubes extending lengthwise thereof, said chambers being in direct communication with each other through an opening or openings parallel to said tubes and extending practically the whole length of the cleansing chamber and water tubes. 100
9. Apparatus for separating oil and water from steam before it is condensed, comprising a vertically arranged steam cleansing chamber having a steam inlet at its upper end, and at its lower end, a laterally arranged steam outlet that extends practically the whole length of said chamber and a separate outlet for separated oil and water, a steam distributing plate extending across said chamber in a nearly horizontal direction and having inclined guide slots therethrough, oil and water separating devices arranged below said plate with their surfaces inclined to said guide slots, and oil and water collecting devices arranged below said separating devices and adapted to direct the separated oil and water to said separate outlet. 105
10. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, and a separate outlet for oil and water, a steam distributing plate extending in a nearly horizontal direction across said chamber and having inclined guide slots therethrough, oil and water separating devices carried by said plate and having surfaces inclined to and arranged opposite said guide slots, and oil and water collecting devices below said separating devices and arranged to direct the separated oil and water to said separate outlet. 110
11. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, and a separate outlet for oil and water, a steam distributing plate extending in a nearly horizontal direction across said chamber and having inclined guide slots therethrough, oil and water separating devices carried by said plate and having surfaces inclined to and arranged opposite said guide slots, and oil and water collecting devices detachably supported by and below said separating devices and arranged to direct separated oil and water to said separate outlet. 115
12. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, and a separate outlet for oil and water, a steam distributing plate extending in a nearly horizontal direction across said chamber and having inclined guide slots therethrough, oil and water separating devices carried by said plate and having surfaces inclined to and arranged opposite said guide slots, and oil and water collecting devices detachably supported by and below said separating devices and arranged to direct separated oil and water to said separate outlet. 120
13. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a wide steam outlet therefrom, a steam distributing plate supported in an inclined position in said chamber, said plate having a channeled upper side and inclined guide slots therethrough, oil and water separating devices carried from the lower side of said plate and against which steam issuing from said slots will impinge in an inclined direction, oil and water collecting troughs carried by said separating devices, and drain passages for leading away separated oil and water. 125
14. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a wide steam outlet and a removable side wall or cover, a steam distributing plate supported in an inclined position in said chamber and formed with guide slots for passages of steam, oil and water separating and collecting devices arranged below said plate, a receptacle for separated oil and water, and drain passages that are formed in said side wall or cover, are in communication with said receptacle, and into which the collecting devices can drain. 130
15. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, a separate outlet for separated oil and water, and a movable side wall or door, and slotted steam distributing plates with oil and water separating and collecting devices carried thereby, said plates being removably supported within said chamber so as to be capable of being withdrawn therefrom and replaced when the movable side wall or door is opened. 135
16. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, a separate outlet for separated oil and water, and a movable side wall or door, and slotted steam distributing plates with oil and water separating and collecting devices carried thereby, said plates being removably supported within said chamber so as to be capable of being withdrawn therefrom and replaced when the movable side wall or door is opened. 140
17. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, a separate outlet for separated oil and water, and a movable side wall or door, and slotted steam distributing plates with oil and water separating and collecting devices carried thereby, said plates being removably supported within said chamber so as to be capable of being withdrawn therefrom and replaced when the movable side wall or door is opened. 145
18. Apparatus for separating oil and water from steam before it is condensed, comprising a steam cleansing chamber having a steam inlet at its upper end, a laterally arranged steam outlet at its lower end, a separate outlet for separated oil and water, and a movable side wall or door, and slotted steam distributing plates with oil and water separating and collecting devices carried thereby, said plates being removably supported within said chamber so as to be capable of being withdrawn therefrom and replaced when the movable side wall or door is opened. 150

5 ranged steam outlet at its lower end, a separate outlet for separated oil and water, and a movable side wall or door having drain passages therein that normally communicate with said separate outlet, slotted steam distributing plates removably supported within said chamber and capable of being withdrawn therefrom and replaced when the side wall or door is opened, oil and water separating devices carried by said plates, and oil and water collecting troughs carried by said separating devices and arranged to direct

separated oil and water to the drain passages in said 10 movable side wall or door.

Signed at West Hartlepool in the county of Durham this 23rd day of June 1905.

DONALD BARNS MORISON.

Witnesses:

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HARRY MIGHT.