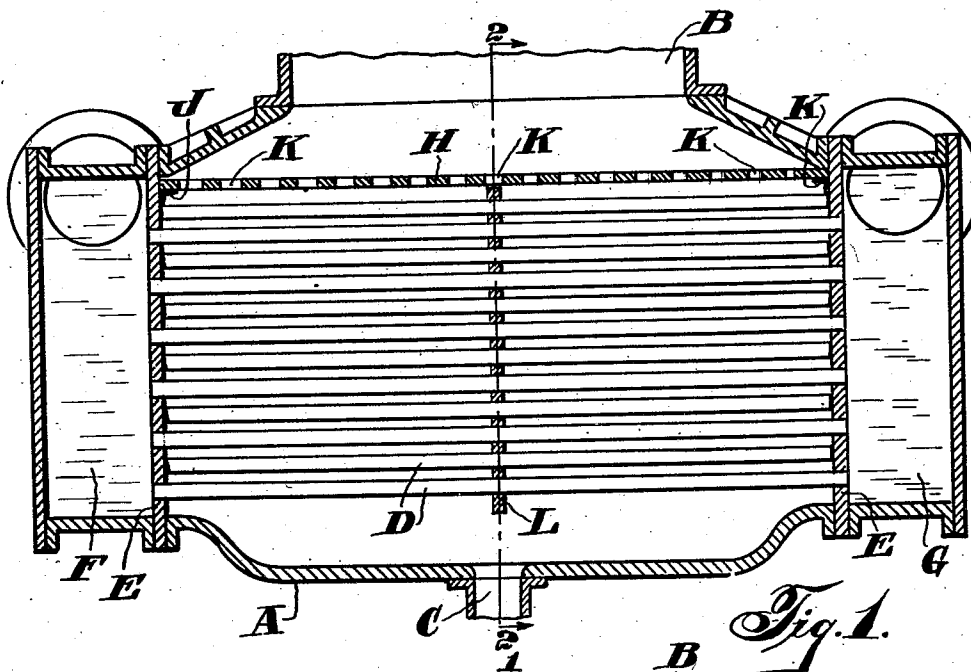
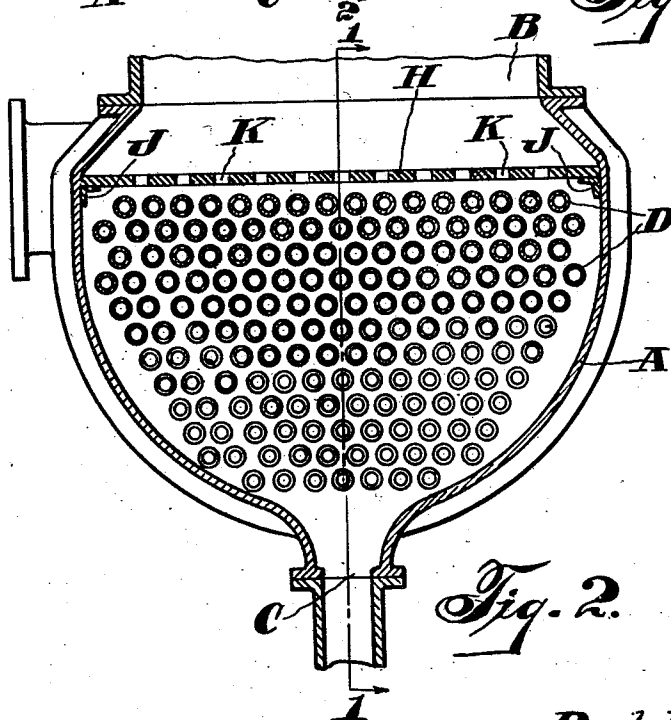


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SURFACE CONDENSER

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SURFACE CONDENSER.

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This invention relates to surface condensers and more particularly to that type of condenser in which condensation is effected by means of water conducting cooling tubes.

One object of the invention is to effectively distribute steam to be condensed to the tubes in quantities proportionate to their steam condensing capacity. Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing in which similar reference characters refer to similar parts.

Figure 1 is a vertical longitudinal section through a condenser constructed in accordance with the practice of the invention, a section being taken along the line 1—1 of Figure 2, looking in the direction of the arrows, and

Figure 2 is a central cross section taken along the line 2—2 of Figure 1 looking in direction of the arrows.

Referring to the drawing the condenser comprises a shell A having a steam inlet B and an outlet for condensate and uncondensable gases C relatively remote from the steam inlet. Interposed between the steam inlet B and the outlet C for uncondensable gases, a plurality of water conducting tubes D are arranged transverse to the direction of steam flow from the inlet B. The tubes D are sealed from the casing A by means of tube sheets E at either end of the casing and are supplied with water from an inlet water box F. After having absorbed the heat from the steam, the water from the tubes D is discharged into an outlet water box G.

In a condenser of the type described, the tubes D are progressively warmer from the water inlet end adjacent the water box F to the end adjacent the water outlet box G for the reason that the water in the tubes D keeps on absorbing heat from its entrance into the tubes D until it leaves the tubes. This results in unequal specific steam condensing capacities along the length of the tubes D. The tendency of the steam is to be completely condensed at the cooler ends of the tubes before reaching the lowest bank, which is to say that the tendency of the steam is to penetrate less deeply in vertical sections nearer the water inlet end than in those sections nearer the water outlet end having less steam condensing or heat absorbing capacity. The tendency of the steam

is to leave a portion of the condensing tubes D near the bottom or remote from the steam inlet B relatively untouched by steam. Water will, therefore, pass through the lower tubes relatively unheated since such tubes contact with relatively little steam and only nearer the outlet ends of the tubes D. This is a waste of water and energy in pumping water through the tubes. Furthermore, it is a waste of space and steam condensing capacity, as more tube surface is provided than is used effectively.

To this end, means is provided to distribute the steam to the surface of the tubes D throughout the length of the condenser in proportion to the specific steam condensing capacity of the tubes. This means comprises a plate H preferably parallel to the rows of tubes D and in this instance supported above the tubes D by means of suitable channels J attached to the tube sheets E and to the side walls of the casing A. The plate H is perforated as by means of apertures K relatively larger near the water inlet end of the tubes D than at the water outlet end of the tubes. Preferably the size of the apertures K is graduated and decreases progressively in accordance with the decrease of specific steam condensing capacity of the tubes D. Any suitable form of aperture K may be provided, it being desirable merely that the opening per unit of area decrease in the direction of the plate from the inlet water box F toward the water outlet box G.

Preferably a tube support L is provided intermediate the ends of the condenser which, in addition to preventing undue vibration or sagging of the tubes D, prevents diagonal current flow of steam from the upper cooler ends of the tubes D toward the lower warmer ends of the tubes.

In this manner steam is distributed in larger quantities to the cooler ends of the tubes D in which the specific steam condensing capacity is greater than to the warmer portions where the vertical steam condensing capacity is less.

Thus by the above construction are accomplished, among others, the objects hereinbefore referred to.

I claim:

1. A surface condenser comprising a casing having a steam inlet and an outlet for uncondensable gases, water tubes within

said casing interposed between said inlet and said outlet having portions of unequal specific steam condensing capacity, and means including a perforated plate having openings of graduated size to cause the steam to pass to said portions in proportion to their specific steam condensing capacity.

2. A surface condenser comprising a casing having a steam inlet and an outlet for air or uncondensable gases, a plurality of water tubes interposed between said inlet and said outlet and having portions of unequal specific steam condensing capacity, and a perforated plate interposed between
15 said steam inlet and said tubes having larger openings adjacent those portions of the tubes having greater specific steam condensing capacity.

3. A surface condenser comprising a cas-

ing having a steam inlet and an outlet for
20 air and uncondensable gases, parallel water tubes interposed between said inlet and said outlet, a water inlet for said tubes at one end of said casing and a water outlet at the other end of said casing resulting in
25 greater specific steam condensing capacity at the inlet ends of said tube than at the outlet ends and a plate interposed between said steam inlet and said tubes having apertures of progressively decreasing opening
30 per unit of area in the direction from the water inlet to the water outlet to distribute the steam to the water tubes in proportion to their specific steam condensing capacity.

In testimony whereof I have signed this
35 specification.

PAUL A. BANCEL.