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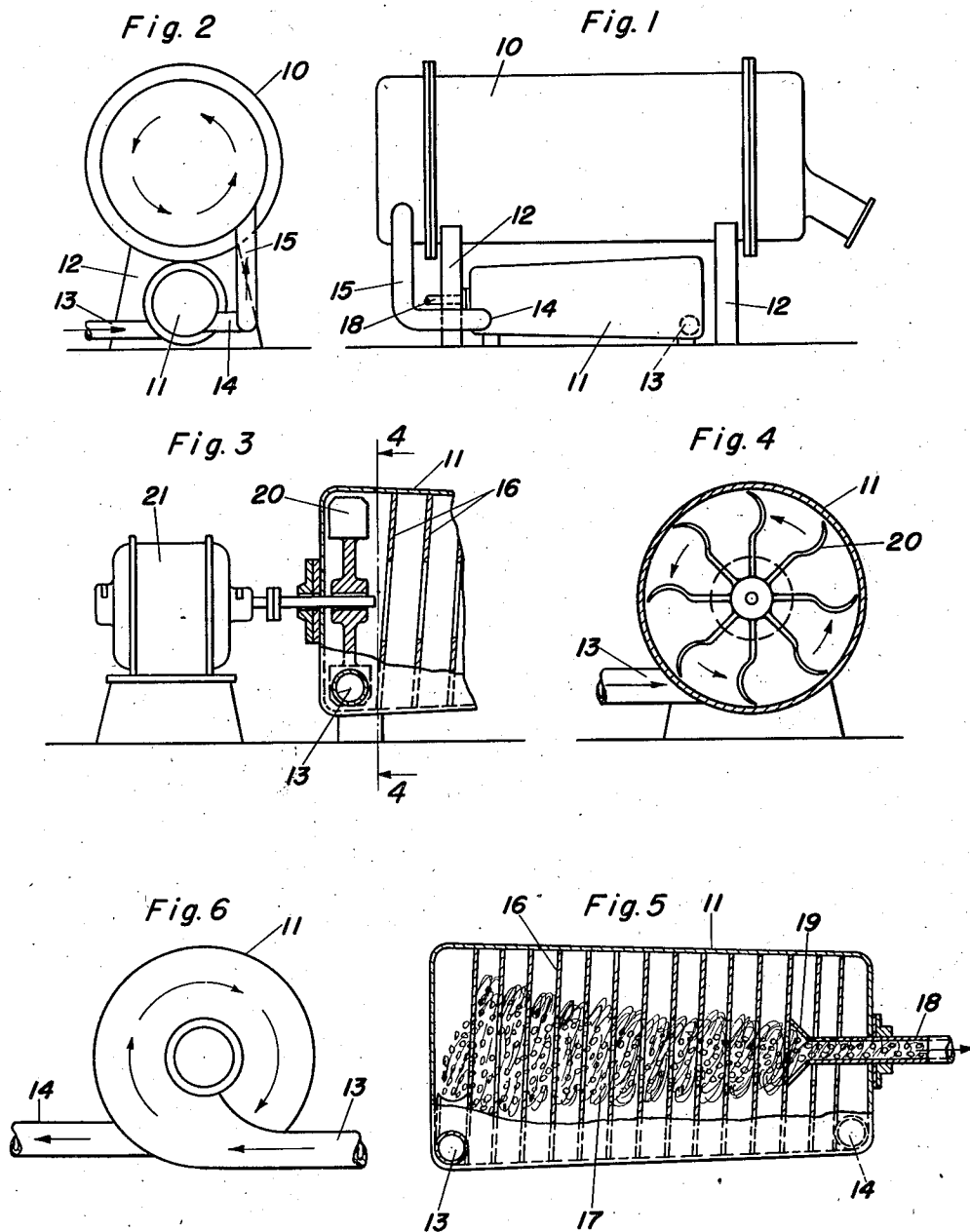
M. G. STEELE

2,277,651

AIR ELIMINATOR FOR SURFACE CONDENSERS

Filed March 30, 1939

2 Sheets-Sheet 1



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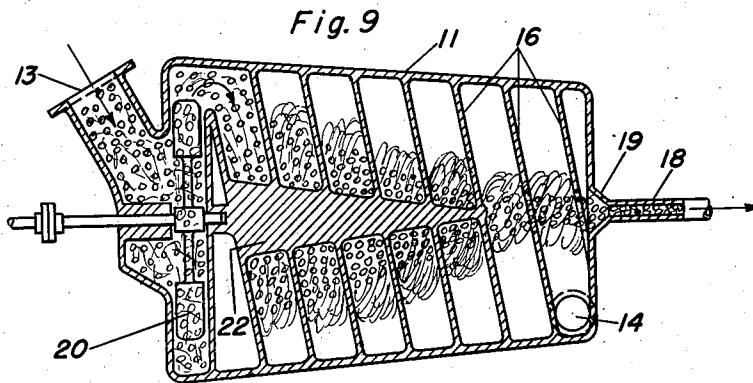
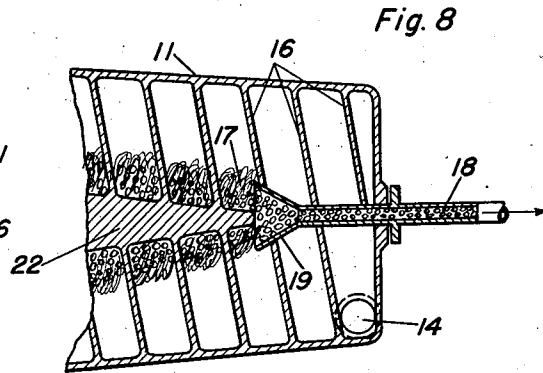
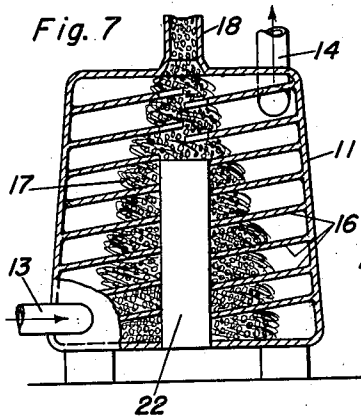
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AIR ELIMINATOR FOR SURFACE CONDENSERS

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AIR ELIMINATOR FOR SURFACE
CONDENSERS

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2 Claims. (Cl. 183—2.5)

This invention relates to surface condensers, and it has a particular relation to means for eliminating the air from the water passing there-through.

Heretofore, considerable trouble has been experienced by the corrosion of the tubes of surface condensers and particularly at the water inlet ends. This trouble has been traced to the electrolytic action of sea water and also to the action of air bubbles in the water, which impinge with considerable force upon the outer ends of the tubes where the water converges in passing there-through, and pits and wears away the metal.

The principal object of the present invention is the provision of means for reducing this undesirable condition by eliminating as much as possible the air content of the water passing through the condenser tubes, and more specifically by causing the water to gyrate or whirl rapidly so as to cause the denser water to move outwardly under centrifugal action, and the air laden water forming a central vortex which is drawn off, the outer denser water free from air being passed through the condenser tubes.

With these and other objects in view, as well as other advantages that may be incident to the use of the improvements, the invention consists in the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportion and arrangement without departing from the nature and scope of the invention, as defined in the appended claims.

In order to make the invention more clearly understood, there are shown in the accompanying drawings, means for carrying the invention into practical use, without limiting the improvements in their useful application to the particular construction, which, for the purpose of explanation, have been made the subject of illustration.

In the accompanying drawings:

Fig. 1 is a diagrammatic side elevational view of a surface condenser and associated air eliminator;

Fig. 2 is an end view of the structure shown in Fig. 1;

Fig. 3 is a fragmentary vertical longitudinal sectional view of another form of air eliminator and cooperating pump mechanism;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is a vertical longitudinal sectional view of another form of air eliminator;

Fig. 6 is an end elevational view of the structure shown in Fig. 5;

Fig. 7 is a vertical sectional view of a vertical air eliminator for use with commercial condensers;

Fig. 8 is a fragmentary vertical sectional view of a horizontal type of air eliminator particularly adapted for use with marine condensers; and Fig. 9 is a similar view of another form of air eliminator shown in Fig. 8.

Referring to the drawings, a surface condenser and associated air eliminator 10 and 11, respectively, are shown as arranged in superposed relation, the former being supported by suitable pedestals 12. The air eliminator 11 is provided with an inlet opening 13 and an outlet opening 14 which is connected with the waterbox portion of the condenser 10 by a pipe 15. The interior of the eliminator 11 is provided with a helically arranged vane or baffle 16 which causes the water passing therethrough to whirl rapidly, with the result that the denser water hugs the wall of the eliminator while the less dense water containing air in suspension forms a central vortex 17 which is drawn off through an air outlet pipe 18. This pipe communicates with the outlet end of the eliminator and may extend coaxially into the eliminator a short distance as shown in Fig. 8. The pipe 18 is preferably formed with a flared end or collector 19. The inlet and outlet openings 13 and 14 are arranged tangentially so as to impart an initial circular motion to the water when it enters the eliminator and to permit it to pass to the condenser with least resistance from a point where it is the most dense. The eliminator may be of frusto-conical configuration with the portion of least diameter at the outlet end. This causes an increase in the angular velocity of the water as it passes through the eliminator, resulting in increased centrifugal action. A centrifugal pump or impeller 20 driven by a motor 21 may be located within the eliminator 11 adjacent to the inlet end, as shown in Figs. 3, 4 and 7, if desired, to effect a positive and more rapid circulation of the water.

It has been found that the water passing through the eliminator tends to short circuit through the central annular space formed by the vane 16. This may be avoided, however, by providing a central core 22 extending part way through the helix, as shown in Figs. 7, 8 and 9. The core may be cylindrical, as shown in the commercial eliminator (Fig. 7), or conical as shown in Figs. 8 and 9. This will insure that the

water will travel a circular course and be subjected to centrifugal action. The inner vortex of water laden with air and lighter particles of foreign matter will follow the contour of the core and escape through the pipe 18.

It will be understood that the above description and accompanying drawings comprehend only the general and preferred embodiment of the invention, and that various other changes in the construction, proportion and arrangement of the parts may be made by those skilled in the art without departing from the nature and scope of the invention as defined in the appended claims.

I claim:

1. An air eliminator for surface condensers comprising a frustro-conical casing having a water inlet at one end thereof and a water outlet and an air outlet at its other end, said air outlet being disposed coaxially of said casing and said water outlet being offset radially therefrom; a helical vane disposed within said casing in contact with the walls thereof and having uniformly spaced convolutions of decreasing diameter from the inlet end toward the outlet end of said casing for causing the water passing through said casing to whirl with accelerating angular velocity from the inlet end toward the outlet end of said casing, the denser water thus tending to accumulate adjacent to the outer wall of said casing for escape through the radially offset water outlet and the less dense water containing air

in suspension to accumulate in the form of a central vortex for escape through said coaxial air outlet, and a conical core extending coaxially through said casing and cooperating with said vane to form a passageway for the water entering said casing.

2. An air eliminator for surface condensers comprising a frustro-conical casing having a water inlet at one end thereof and a water outlet at its other end, said air outlet being disposed coaxially of said casing and said water outlet being offset radially therefrom; a helical vane disposed within said casing in contact with the walls thereof and having uniformly spaced convolutions of decreasing diameter from the inlet end toward the outlet end of said casing for causing the water passing through said casing to whirl with accelerating angular velocity from the inlet end toward the outlet end of said casing, the denser water thus tending to accumulate adjacent to the outer wall of said casing for escape through the radially offset water outlet and the less dense water containing air in suspension to accumulate in the form of a central vortex, a conical core extending coaxially through said casing and cooperating with said vane to form a passageway for the water entering said casing, and a pipe extending into said casing coaxially therewith and terminating adjacent to the apex of said core for permitting the escape of air laden water.

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