Aug. 10, 1943. I. D. EBY 2,326,446

SHIP'S FUNNEL

Filed Nov. 3, 1942

Fig. 1.

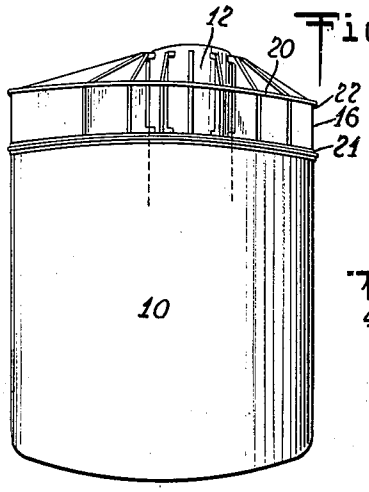


Fig. 2.

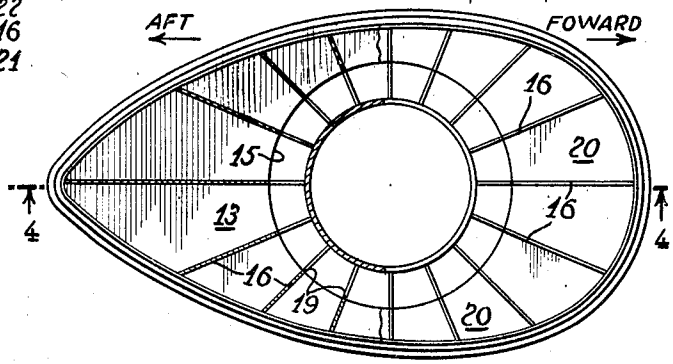


Fig. 3.

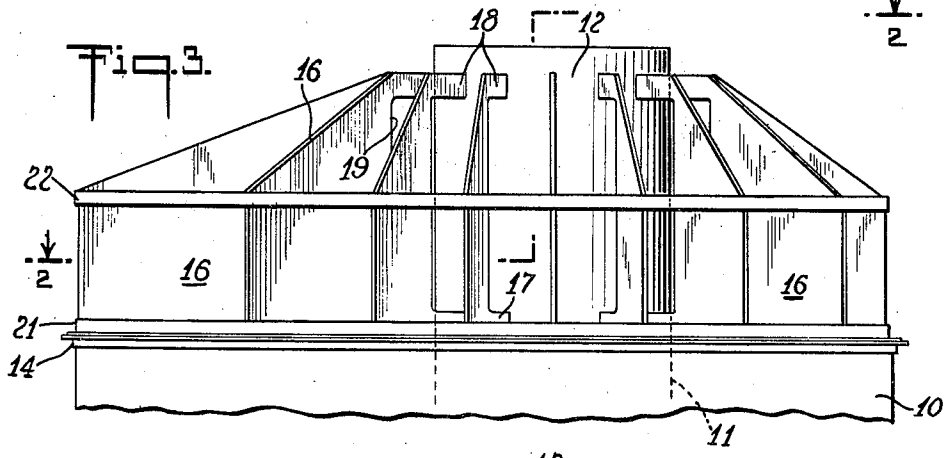
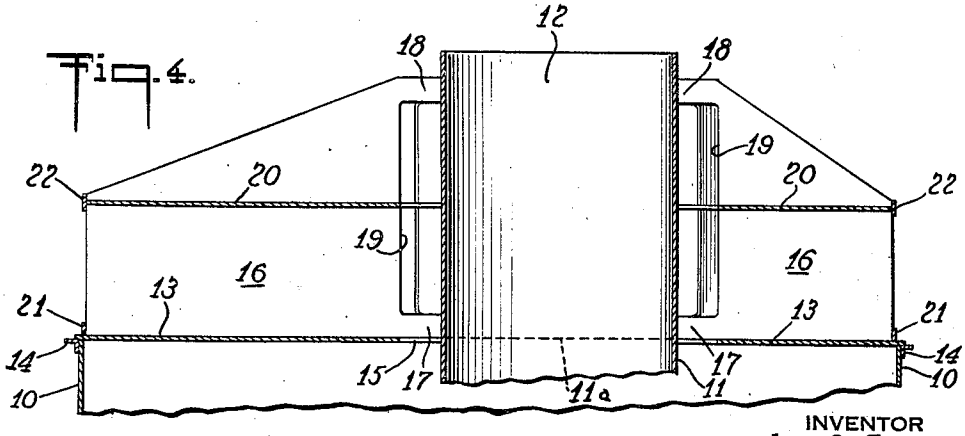


Fig. 4.



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Patented Aug. 10, 1943

2,326,446

UNITED STATES PATENT OFFICE

2,326,446

SHIP'S FUNNEL

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Application November 3, 1942, Serial No. 464,336

9 Claims. (Cl. 114—187)

The present invention relates to ships' funnels, and is more particularly directed toward such funnels designed to create a region impenetrable by the smoke discharged from the funnel so that the smoke stream cannot sag adjacent the stack.

It is customary to employ an outer stack considerably larger than the inner stack through which the smoke is discharged and to streamline this outer stack to reduce air resistance. This streamlined contour resembles an air foil, and, while streamlining reduces the resistance to movement of the stack through the air, it creates a partial vacuum or suction along the outer, and particularly the rear, surfaces of the outer stack. As is well known this suction tends to cause an external down draft whereby the products of combustion discharged from the stack and trailing the stack are sucked down and dissipated close to the superstructure of the ship and bring about a nuisance.

The present invention contemplates having the inner stack extend a comparatively short distance above the outer stack and to build in between the top of the outer stack and the outside of the inside stack a cellular structure composed of horizontal and vertical plates so arranged that air may enter the cellular structure from one side of the stack and pass out of it at the other side of the stack, thereby creating between the level in which the smoke is discharged from the inner stack and the upper level of the vacuum region produced by the streamlined lower stack an air stream having a relatively horizontal movement.

The accompanying drawing shows, for purposes of illustrating the present invention, one of the many embodiments in which the invention may take form, it being understood that the drawing is illustrative of the invention rather than limiting the same.

In the drawing:

Figure 1 is a perspective view showing a ship's funnel provided with the smoke controlling apparatus;

Figure 2 is a horizontal sectional view with parts in elevation as indicated by the line 2—2 of Figure 3;

Figure 3 is a side elevational view of the device; and

Figure 4 is a vertical sectional view taken on the line 4—4 of Figure 2.

The outer streamlined stack of a conventional ship's funnel is indicated at 10 and the usual inner stack at 11. The upper end of the usual inner stack is at approximately the same level as the upper end of the outer stack 10 and would therefore terminate at the level of the dotted line 11a. In the drawing the inner stack is shown as having an extension 12 above the level of the dotted line 11a. This extension may be formed by welding to the stack already installed a suitable length of stack material, while in new construction the usual inner stack will be designed to be of sufficient length.

The top of the outer stack 10 supports a horizontal more or less egg-shaped plate 13 welded at its edges to the top of the stack 10. It is here shown as also being welded to an angle 14 which surrounds the top of the outer stack 10. The plate 13 has an opening 15 substantially larger than the inner stack 12 for air circulation and drainage and so that a workman climbing a ladder, not shown, may pass by the plate 13.

Vertical plates 16 are welded along their lower edges to the top of the plate 13. In the form indicated in the drawing the vertical plates 16 have extensions 17 and 18 which are welded to the inner stack 12, and they are shown as cut away at 19 to provide space so that air may circulate around the inner stack. A second horizontal plate is provided by means of plate-like members 20 welded between the adjacent vertical fins 16 about midway between the lower plate 13 and the top of the stack. Coamings 21 and 22 are secured to the peripheries of the plates as indicated.

The form of construction in which the upper plate of the cellular structure is formed by separate plate-like elements welded between the vertical fins is preferred to a structure in which the upper horizontal plate is like the lower plate and separate upper and lower fins are employed. The preferred structure utilizes the material to better advantage. It is, of course, obvious, however, that the cellular structure when completed would function the same irrespective of the shape of the component parts welded to form the complete device.

The structure shown herein is suitable for use with new or existing constructions. It does not adversely affect the appearance of the ship, nor does it add a substantial amount to the height of the ship.

The air received from the windward side of the stack can enter between the plates 16, 16 and pass about the stack owing to the spaces provided by cutting back the fins. After it passes to the leeward side of the stack, it then escapes through the spaces between the fins on this leeward side. This air escapes at a very substantial horizontal velocity relative to the ship's funnel, and this rel-

ative direction of air movement is maintained for a substantial distance from and beyond the stack. The passage of the air through the structure above the outer stack and below the discharge level of the inner stack creates a pressure zone which it is impossible for the products of combustion to penetrate and enter the vacuum or low pressure zone about the outer stack. Experience has shown that a device such as shown with a height of 6½ feet added to a ship's funnel 34 feet high is more effective in keeping the products of combustion out of the suction area caused by the outer stack than any permissible extension of the inner stack alone.

It is obvious that the invention may be embodied in many forms and constructions within the scope of the claims and I wish it to be understood that the particular form shown is but one of the many forms. Various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. The combination with a ship's funnel having an inner stack and an outer stack of streamline contour which, as the ship proceeds against a head wind or through still air, tends to produce a suction along its outside surfaces and an external down draft, of means for diverting the stack discharge from said down draft comprising an extension of the inner stack above the level of the outer stack, a plate across the top of the outer stack, and vertical plate supported fins disposed radially with respect to the stack extension and having their inner edges spaced from the stack extension whereby air met at a level below the top of the stack extension and entering between the fins on the windward side is passed about the inner stack extension and discharged between the fins on the leeward side with a substantial horizontal velocity above the outer stack so that the stack discharge does not commingle therewith.

2. The combination of claim 1, wherein the fins are secured at their tops and bottoms to the inner stack.

3. The combination of claim 1, having upper plate elements spaced above the plate, the fins being open above the upper plate elements.

4. The combination of claim 1, having a coaming about the periphery of the plate.

5. The combination of claim 1, having upper plate elements spaced above the plate, the fins being open above the upper plate elements, and coamings about the peripheries of the plate and plate elements.

6. In a ship's funnel, the combination with an outer stack and an inner stack higher than the outer stack, of a cellular structure above the outer stack and outside the inner stack for creating a region impenetrable by smoke issuing from the inner stack, and comprising two horizontal plates and a multiplicity of vertical plates, the lower horizontal plate substantially closing off the top of the outer stack, the vertical plates being radial with respect to the inner stack and having their inner edges spaced therefrom so that air from any direction may enter the cellular structure at one side, pass about the inner stack and be discharged from the opposite side.

7. The combination of claim 6, having vertical plates above the upper horizontal plate whose inner edges are spaced from the inner stack.

8. In combination, a ship's funnel having an inner stack, an outer stack terminating at a level substantially lower than the top of the outer stack, a plate welded to the top of the outer stack and having an aperture concentric with the inner stack, a plurality of vertical fin members whose lower edges are welded to the plate and whose inner edges are welded to the inner stack at the top and bottom of the fin members, the fin members being cut away so that their inner edges, except at the top and bottom are spaced from the inner stack, and plate-like elements welded to the fin members substantially above the plate and below the top of the upper stack.

9. In combination, a ship's funnel having an outer stack of streamline contour and an inner main stack extending above the outer stack, a plate across the top of the outer stack, a plurality of divergent fins secured to the upper portion of the main stack and to the plate, the fins being cut away along their inner edges to provide spaces about the main stack for the passage of air about the main stack and above the plate, whereby a horizontal air stream is produced on the leeward side of the funnel above the outer stack and below the level of discharge of smoke.

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