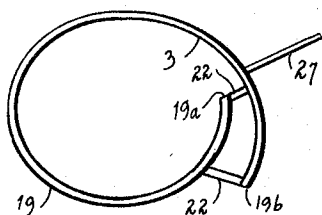


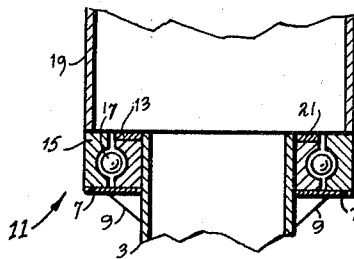
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SMOKE CONTROL APPARATUS  
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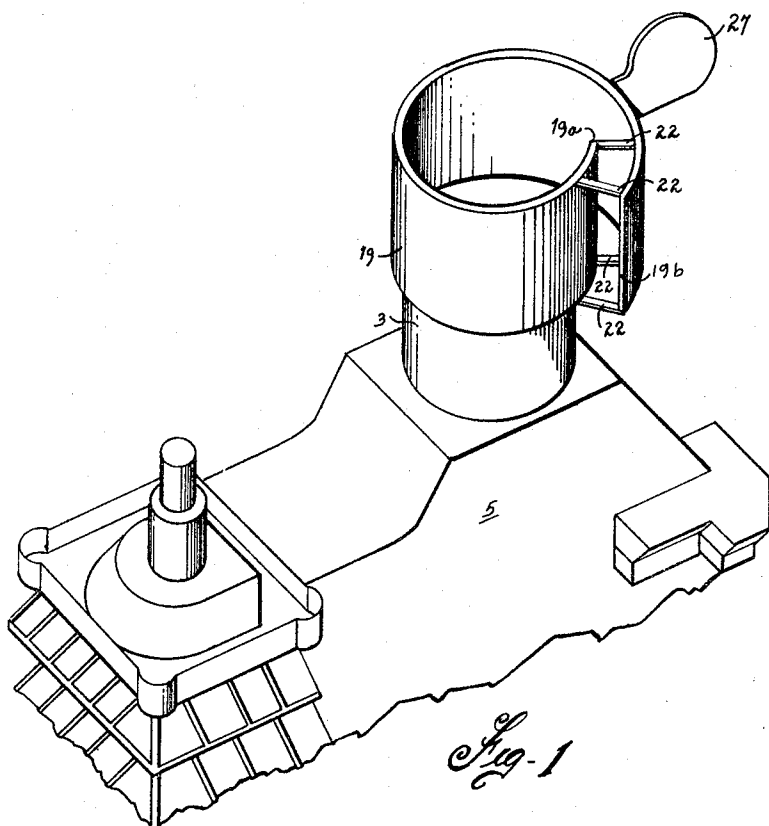
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*Fig-3*



*Fig-2*



*Fig-1*

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1

2

3,311,046

## SMOKE CONTROL APPARATUS

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4 Claims. (Cl. 98-60)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to novel and improved apparatus for controlling the discharge of a fluid from the open end of a conduit. More particularly, the invention relates to novel and improved apparatus which causes smoke to rise from the upper extremity of a stack of any kind rather than diffuse downwardly and interfere with or obscure operations about the superstructure and deck of a ship or carrier or pollute the air at ground level or at the base of the stack.

Flow of ambient air over the upper extremity of the conventional smoke stack of an aircraft carrier or any other type of stack normally produces a vortex behind the downstream lip or edge of the stack. Formation of such a vortex in turn induces general downward diffusion of the ambient air intermixed with smoke from the stack about the deck and superstructure of the carrier.

It is therefore a principal object of the present invention to provide novel and improved apparatus which facilitates maximum visibility for the performance of the various necessary operations about the deck and superstructure of an aircraft carrier or any other ship or installation.

It is a further object of the present invention to provide a novel and improved device which is attached to the upper extremity of existing conventional smoke stacks and which causes the rising smoke to converge toward the axis of the stack as it is discharged into the ambient atmosphere.

It is a further object of the present invention to provide a novel and improved smoke stack which includes a spiralled section into which ambient air flows and produces a vortex that directs the rising smoke within the stack toward its center.

FIG. 1 is a perspective view of the improved extension of the stack of the present invention as it might be attached to the stack of the superstructure of an aircraft carrier, the scale of the improved extension being enlarged in comparison to the scale of other features of the superstructure to illustrate in detail various features of its structure and operation.

FIG. 2 is a detailed cross-sectional view which illustrates the manner in which the improvement of the present invention is rotatably positioned on the conventional stack of the carrier.

FIG. 3 is a top plan view of improved device of the invention shown in FIG. 1.

Referring now to the drawing, it will be noted that the conventional stack 3 of the aircraft carrier extends upwardly from its superstructure or the like 5. The annular support plate 7 is secured to the outer peripheral surface of the stack 3 adjacent its upper extremity and is preferably supported in turn by a plurality of gusset plates or the like 9. The anti-friction bearing 11, which is of any suitable conventional design and which includes the inner and outer races 13 and 15 and the bearing elements 17, is positioned as shown on its annular support plate 7. The inner convolution of the lower extremity of the cylindrical section or extension 19 of the stack 3 is preferably secured to the outer race of bearing 11 by

a suitable tack weld or in any other suitable conventional manner. The annular retaining plate 21 which is also secured to the outer peripheral surface of the stack 3 maintains the bearing 11 and the cylindrical extension 19 of the stack in place on its support plate 7. In this way, as will be more apparent hereinafter, the section 19 is a substantially freely rotatable extension of the stack 3.

The upper edge of the cylindrical extension 19 of the stack 3 is preferably cut or slit downwardly. The juxtaposed edges 19a and 19b of the slit cylindrical section 19 are then respectively bent inwardly and outwardly as shown generally in the form of a spiral. The outwardly spiralled edge 19b of the section or extension 19 is preferably connected to the inwardly spiralled portion of the section for support by the brace members or the like 22. The elongated vane 27 is secured to the external surface of the stack extension 19 in any suitable conventional manner and extends outwardly therefrom in a direction approximately parallel to the outer portion of the outwardly spiralled edge 19b.

In operation, flow of ambient air about the stack 3 and the stack extension 19 engages its component vane 27 and automatically adjusts the spiralled extension 19 on the anti-friction bearing 11 such that the opening between spiralled edges 19a and 19b is oriented into said flow of air. The flow of air, which is then spirally directed into the interior of the stack, generates a vortex cyclone in its extension 19. The smoke which rises through the stack and its extension is then swept into the vortex and is concentrated toward its center or core. In this way, smoke discharged from the stack and its extension avoids contact with its upper trailing edge and therefore continues to rise upwards and away from the deck and superstructure of the carrier rather than become intermixed in a second vortex that forms behind the trailing edge of the stack and its extension.

Although the above described device is specifically shown herein for use on the smoke stack of an aircraft carrier, it is to be understood that the invention could be used in any other manner where smoke or another fluid is discharged from a conduit without departing from the spirit or scope of the invention.

Obviously, many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. Apparatus for controlling the discharge of a fluid from an open flue, said apparatus comprising:
  - (a) a tubular conduit having a slit which extends along the full length of one side thereof, the juxtaposed lateral edges of the slit tubular conduit being respectively spiralled inwardly and outwardly from one another, the top and bottom of the slit tubular conduit between overlapping portions of its spiralled upper and lower edges being left substantially open;
  - (b) means for rotatably mounting the spiralled tubular conduit on the open end of the flue with the longitudinal axis of the inner convolution of the conduit in substantial alignment with the longitudinal axis of the flue;
  - (c) and means for orienting the opening between the outer lateral edge of the spiralled tubular conduit and the juxtaposed surface of the tubular conduit into the direction of external fluid flow about the flue and conduit.
2. Apparatus for controlling the discharge of a fluid from an open flue, said apparatus comprising:
  - (a) a tubular conduit having a slit which extends along the full length of one side thereof, the juxtaposed

3

posed lateral edges of the slit tubular conduit being respectively spiralled inwardly and outwardly from one another, the top and bottom of the slit tubular conduit between overlapping portions of its spiralled upper and lower edges being left substantially open;

(b) means including an anti-friction bearing for mounting the spiralled tubular conduit on the open end of the flue with the longitudinal axis of the inner convolution of the conduit in substantial alignment with the longitudinal axis of the flue;

(c) and means for orienting the opening between the outer lateral edge of the spiralled tubular conduit and the juxtaposed surface of the tubular conduit into the direction of external fluid flow about the flue and conduit.

3. Apparatus for controlling the discharge of a fluid from an open flue, said apparatus comprising:

(a) a tubular conduit having a slit which extends along the full length of one side thereof, the juxtaposed lateral edges of the slit tubular conduit being respectively spiralled inwardly and outwardly from one another, the top and bottom of the slit tubular conduit between overlapping portions of its spiralled upper and lower edges being left substantially open;

(b) means for rotatably mounting the spiralled tubular conduit on the open end of the flue with the longitudinal axis of the inner convolution of the conduit in substantial alignment with the longitudinal axis of the flue;

(c) and an elongated vane which is secured to the external surface of the tubular conduit and which extends outwardly therefrom in a direction approximately normal to the plane of the opening between

4

the outer lateral edge of the spiralled tubular conduit and the juxtaposed surface of the tubular conduit.

4. Apparatus for controlling the discharge of a fluid from an open flue, said apparatus comprising:

(a) a tubular conduit having a slit which extends along the full length of one side thereof, the juxtaposed lateral edges of the slit tubular conduit being respectively spiralled inwardly and outwardly from one another, the top and bottom of the slit tubular conduit between overlapping portions of its spiralled upper and lower edges being left substantially open;

(b) means including an anti-friction bearing for mounting the spiralled tubular conduit on the open end of the flue with the longitudinal axis of the inner convolution of the conduit in substantial alignment with the longitudinal axis of the flue;

(c) and an elongated vane which is secured to the external surface of the tubular conduit and which extends outwardly therefrom in a direction approximately normal to the plane of the opening between the outer lateral edge of the spiralled tubular conduit and the juxtaposed surface of the tubular conduit.

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