Aug. 31, 1948. C. W. PORTER 2,448,048

RAIN AND SPRAY PROOF VENTILATOR

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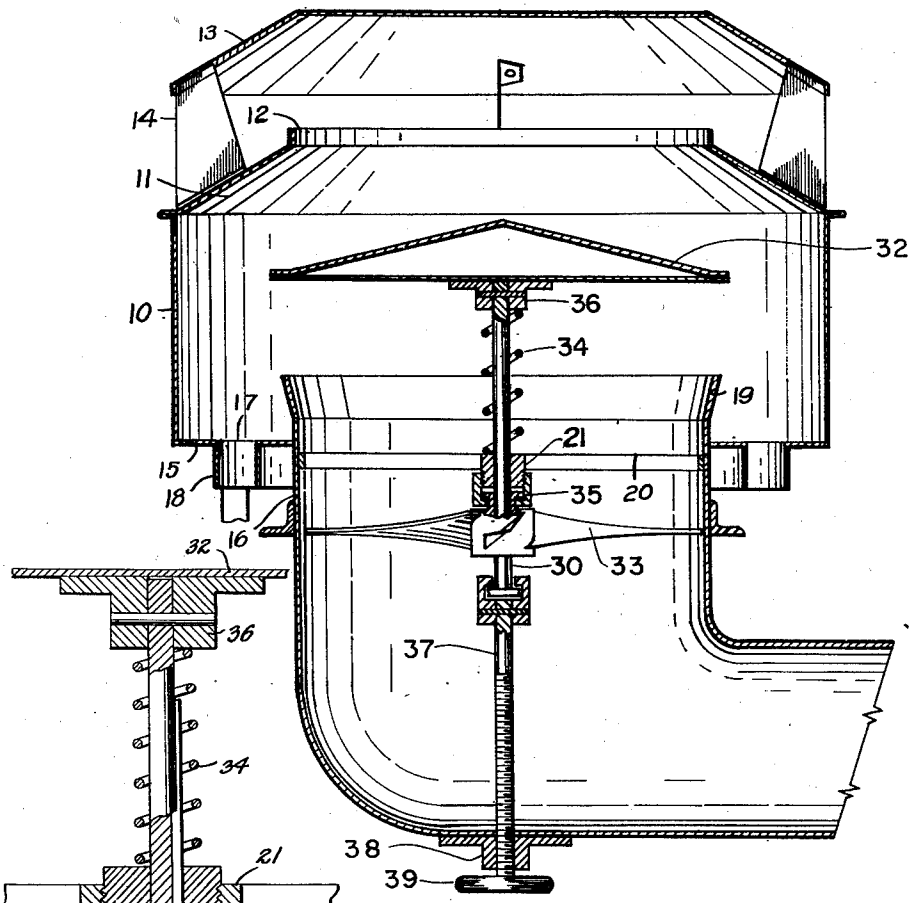


FIG. 1.

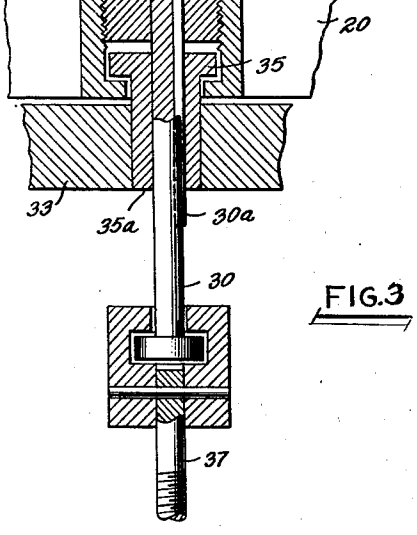


FIG. 3

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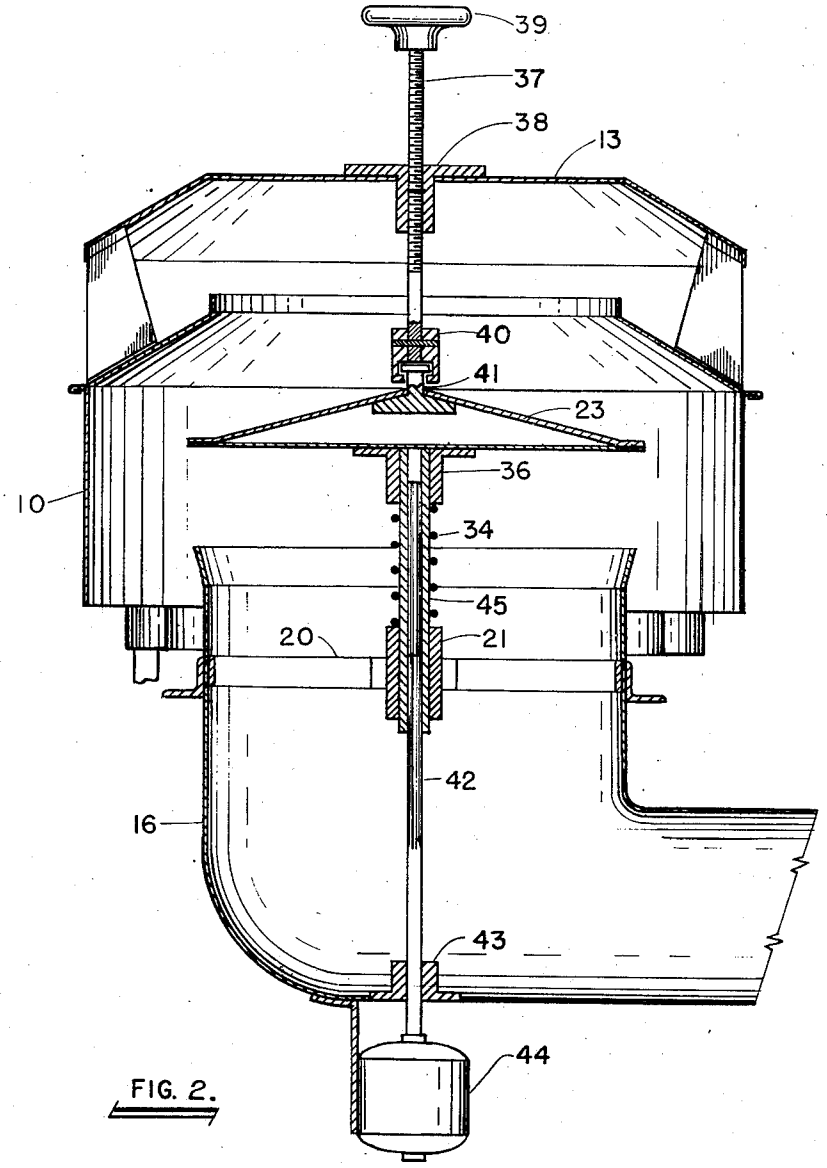


FIG. 2.

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RAIN AND SPRAYPROOF VENTILATOR

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Application August 9, 1945, Serial No. 609,904

3 Claims. (Cl. 183—77)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to apparatus adapted to separate matter of different specific gravities through the action of centrifugal force. More particularly it relates to apparatus in which water and/or other matter entrained or entrapped in an air current, is separated therefrom by centrifugal force imparted to the entrapped material by means of a rotating deflecting plate.

One object of the invention is to provide apparatus which will separate water or other matter from an air current and which is strong and economical in construction and operation. A further object is to provide an apparatus adaptable to be used as a ventilation air intake or discharge terminal in which the separating means is operated through the reaction of an impeller to the motion of the air current upon the pitched blades of said impeller.

An additional object is to provide an apparatus for connecting to an air duct and adaptable to be used as a ventilator in which, if a large amount of water is introduced into the intake, the deflecting plate can be moved into position over the open end of the air duct thereby preventing the further flow of water into the air duct.

To accomplish this effect the device is constructed similar to a stop valve in that the deflecting plate may be moved axially of the duct into a position where it will be seated against the lip of the duct, thus stopping the flow of water and air into the ventilating system.

The present invention is shown applied to a shipboard ventilator where its value in separating water from the ventilating air will be readily apparent. However, it will be obvious that the invention may be employed in many other devices and for a more complete understanding of the invention reference should now be had to the drawings in which;

Fig. 1 is a vertical sectional view of one embodiment of the present invention.

Fig. 2 is a similar view through another embodiment of the present invention.

Fig. 3 is an enlarged view of a portion of the structure of Fig. 1.

In particular the embodiment shown in Fig. 1 comprises a casing 10 which has a frusto conical top 11 with a central opening 12 therein. Top 11 supports hood 13 by means of brackets 14 which are of sufficient number to support the hood in a firm and rigid manner above top 11 and spaced therefrom. The casing 10 has an annular bottom plate 15 forming the bottom thereof and fitting around the discharge duct 16. In bottom plate 15 are ports 17 connecting with drains 18

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the function of which is to carry away the material separated from the air stream. In this embodiment ports 17 are four in number spaced at ninety degree intervals.

The upper end of duct 16 is flared outwardly as at 19 and to the duct 16 are attached supporting arms 20 which hold ball bearing assembly and housing 21 in position. Below bearing 21 and attached to shaft 30 by means of a sliding key 30a is impeller 33. As shown in detail by Fig. 3, the impeller 33 is rotatably secured to the bearing assembly 21 by a flange element 35 formed as part of the impeller hub 35a.

Rotary deflecting plate 32 is firmly attached to the upper end of shaft 30 by hub 36. Between the top face of bearing 21 and the lower face of hub 36 is coil spring 34 which normally holds deflecting plate 32 in elevated position.

Pull rod 37 is freely attached to shaft 30 at its lower end so that said shaft may easily rotate with respect to pull rod 37 which extends to the outside of the duct as shown in Fig. 1.

Pull rod 37 passes through screw bearing 38 and is threaded to match the threads in the bearing. On the lower end of pull rod 37 is attached hand wheel 39 for turning the pull rod 37. In turning hand wheel 39 the screw action of pull rod 37 in bearing 38 raises or lowers the deflecting plate 32 axially as desired.

In the modification shown in Fig. 2 means is provided exteriorly of the duct for rotating the deflecting plate and means adapted to move the deflecting plate to close the duct is also shown. In this modification deflecting plate 23 is rigidly attached to hollow shaft 45 by hub 36. Tubular shaft 45 is slidably mounted in bearing 21 which in turn is supported by arms 20 in duct 16. Deflecting plate 23 is held in normal, elevated position by means of coil spring 34 positioned around shaft 45 between bearing 21 and deflecting plate 23. Hollow shaft 45 is slidably splined to driving shaft 42 which is mounted in bearing 43 carried by the side wall of duct 16. Shaft 42 is directly connected to motor 44 which imparts a rapid rotation to shaft 42 and thereby to hollow shaft 45 and to deflecting plate 23. Motor 44 is supported by brackets 44a secured to the duct 16.

Mounted centrally in hood 13 is screwbearing 38 which supports threaded rod 37. On the lower end of rod 37 is a flanged coupling 40 which freely fits over the flanged portion of hub 41. The latter is mounted on deflecting plate 23 on the vertical axis thereof. Hand wheel 39 is rigidly attached to the upper end of rod 37 and is adapted by its rotation to move deflecting plate 23 to a

closed position on the lip of duct 16 or to allow the deflecting plate to rotate in elevated position.

The operation of the embodiment shown in Fig. 1 is as follows: Air, containing entrained water or other matter, is drawn at relatively high velocity into the ventilator through the opening between hood 13 and conical top 11 by means of a blower or fan (not shown). The air current passes through opening 12 and impinges upon rotating deflecting plate 23. By reason of the rapid rotation of deflecting plate 23, the water or other matter entrained in the air current is thrown tangentially from the periphery of the rotating deflecting plate by centrifugal force developed by the rotation of the deflecting plate acting upon the entrained matter. The material discharged as above described collects on bottom plate 15 whence it is discharged through ports 17. The cleansed air passes the periphery of the deflecting plate and enters duct 16 where it impinges upon the pitched blades of impeller 33. Reaction of the pitched blades of the impeller to the flow of the air through duct 16 imparts a rapid rotation to the impeller and to deflecting plate 23.

The operation of the embodiment of the invention as shown by Fig. 2 is similar to that of Fig. 1. Under normal conditions the impeller and deflecting plate function with the deflecting plate in its elevated position.

However, whenever it is desirable to close the duct against the entrance of excessive quantities of water, as in the case of a ship rolling in heavy seas, the deflecting plate can be brought into contact with the upper edge of the air duct thereby closing the air duct and preventing the entrance of water into the system.

In the embodiments here shown the invention has been drawn to ventilating or low pressure systems, but the same principle is applicable to the removal of foreign material from high pressure air lines such as the removal of entrained water, oil and dirt from compressed air systems.

Furthermore, in the embodiments illustrated in Figs. 1 and 2, the impeller is shown as being located below the deflecting plate. This impeller may be located above the deflecting plate or even be an integral part thereof without departing from the scope of the invention.

Furthermore, the rotary deflecting plate may be power driven by means located outside of the ventilator as shown by Fig. 2. This is also considered to be within the scope of the invention.

From the above description it will be apparent that the invention may be carried out in other ways, structurally, without departing from the spirit of the invention or going beyond its scope and it is therefore contemplated by the appended claims to cover any such modifications.

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

What I claim is:

1. A device adapted for use in ventilating systems to eliminate water and other entrained material from the air passing therethrough, comprising a casing having an opening therein for the intake of air and connecting to a duct, the bottom of said casing exteriorly of said duct being adapted to trap and remove water and other material collecting thereon, a driven rotary deflecting plate rigidly attached to one end of a stub shaft, said stub shaft extending axially in said duct and being adapted to slide longitudinally in a supporting bearing, said bearing being supported axially of said duct, a coil spring surrounding said stub shaft and positioned between said bearing and said deflecting plate, bladed impeller means slidably keyed to said stub shaft below said bearing and a pull rod freely connected to the lower end of said stub shaft and adapted to pull said deflecting plate into a position closing the open end of said duct.

2. A device adapted to be used in ventilating systems to eliminate water and other material from the air passing therethrough, comprising a casing having an opening therein for the intake of air and connecting to a duct, the bottom of the casing exteriorly of the duct being adapted to trap and remove water and other material collecting thereon, a driven rotary deflecting plate rigidly keyed to a shaft extending axially in said duct and being adapted to slide longitudinally in a supporting bearing which is supported axially of the duct, a coil spring surrounding the shaft and positioned between the bearing and the deflecting plate and adapted to hold the plate in operating position, driving means located exteriorly of the casing and the duct adapted to impart rotation to the shaft and the deflecting plate and means freely connected to the shaft adapted to move the shaft and thte deflecting plate longitudinally of the shaft to close the duct.

3. A device adapted for use in ventilating systems to prevent water and other entrained material from passing therethrough comprising a casing provided with an opening for the intake of air, a duct projecting into and connected to said casing, the bottom of said casing, exteriorly of said duct, adapted to trap and remove water and other material collecting thereon, an assembly of a rotary deflecting plate rigidly attached to one end of stub shaft within said casing, a bearing mounted within and axially of said duct for rotatably supporting said stub shaft, the said stub shaft being longitudinally movable with respect to said bearing, a coil spring surrounding said stub shaft positioned between said bearing and said deflecting plate adapted to bias the latter into operative position, driving means slidably connected to the other end of said stub shaft below said bearing and means axially connected to one end of said assembly for moving said deflecting plate into and out of closure relationship with respect to said duct.

CARL W. PORTER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,434,562	Quam	Nov. 7, 1922
1,530,825	Grimes	Mar. 24, 1925
2,100,801	Green	Nov. 30, 1937

FOREIGN PATENTS

Number	Country	Date
683,986	France	June 19, 1930