2 Sheets—Sheet 1.

W. FITZ J. THIERS.

SHIPS' VENTILATORS AND FOG-ALARMS.

No. 187,430. Patented Feb. 13, 1877.

Fig. 1.

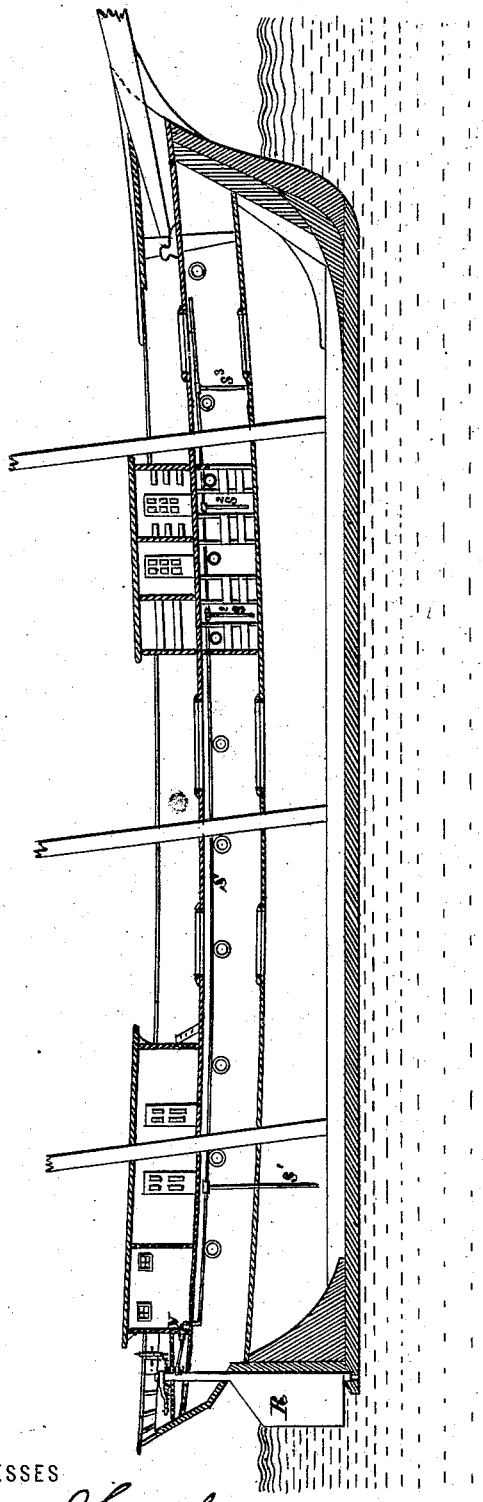
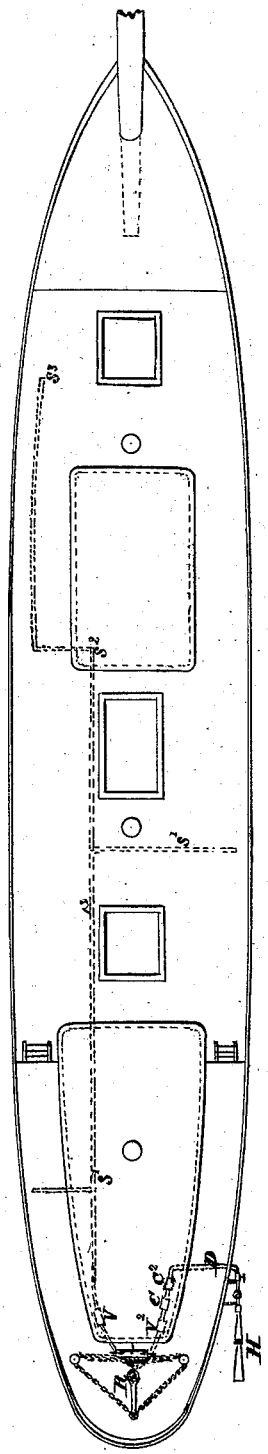


Fig. 2.



WITNESSES

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2 Sheets—Sheet 2.

W. FITZ J. THIERS.

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Fig. 5.

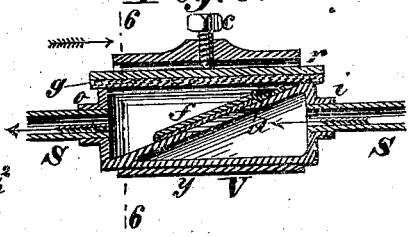

Fig. 6.

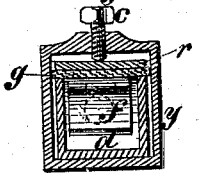

Fig. 3.

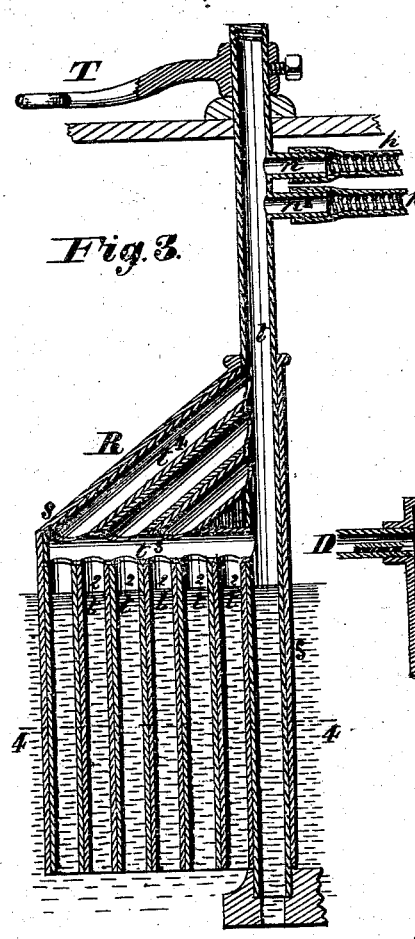

Fig. 7.

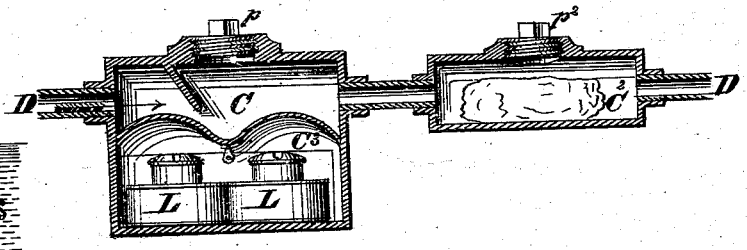

Fig. 8.

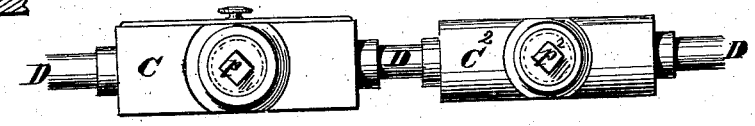

Fig. 4.

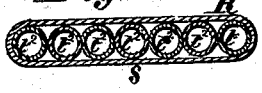

Fig. 9.

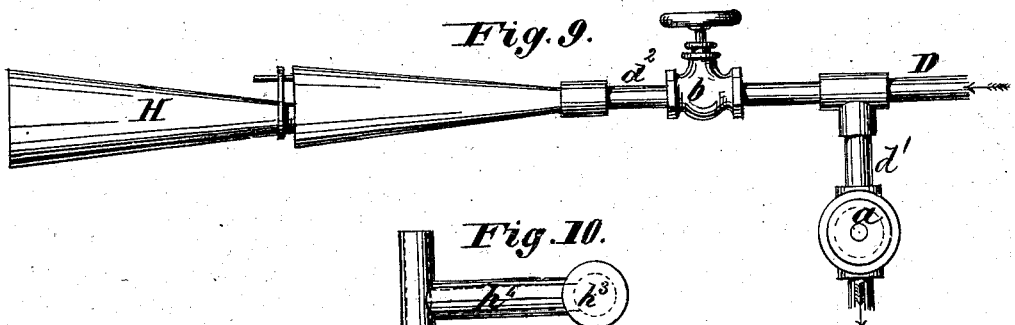

Fig. 10.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM FITZ JAMES THIERS, OF NEW YORK, N. Y., ASSIGNOR OF THREE-FOURTHS OF HIS RIGHT TO MILTON C. JEFFERS, OF NEW YORK CITY, EUGENE F. BEECHER, OF BROOKLYN, NEW YORK, AND AMELIA PITTS ARMSTRONG, OF NEW YORK CITY.

IMPROVEMENT IN SHIPS' VENTILATORS AND FOG-ALARMS.

Specification forming part of Letters Patent No. **187,430**, dated February 13, 1877; application filed June 30, 1876.

To all whom it may concern:

Be it known that I, WILLIAM FITZ JAMES THIERS, of the city and county of New York, in the State of New York, doctor of medicine, have invented a new and useful Improvement in Ventilators and Fog-Alarms for Ships and other floating craft, of which the following is a specification:

The first part of the present invention consists in a simple and efficient mechanical device, operating automatically, and without friction of solids, and at but small running expense, whereby ships and every other description of floating craft having deck and rudder can be perfectly and continuously ventilated by night and by day, so long as they remain afloat, and while lying at wharf, as well as when sailing.

The same apparatus can be employed as an automatic fog-alarm, when so required.

The improved ventilator and alarm occupies no appreciable space on shipboard, and operates in combination with the water in which the vessel floats.

A tubular rudder, or a tubular attachment to an ordinary rudder, forms at that part of the vessel at which there is the greatest vertical motion, and where waves and swells have the most unobstructed access, a number of air-cells extending downward below the lowest water-line. In these cells the water works with exhaustive and propulsive force, alternately on the air contained in the tubes and their connections, sufficient relative motion at all times being insured by the said location of the tubes within or upon the rudder. The connections extend, through a suction valve, to one or more compartments of the vessel, and, through a discharge-valve, into the open air, the terminal end of the discharge-pipe being provided with a fog-horn and controlling-valves, or adapted to receive such horn.

The suction and discharge valves are constructed and arranged in peculiar manner, so as to operate automatically with the least possible resistance, and so as to be readily accessible at all times for inspection, cleansing, and adjustment.

The improved ship-ventilator by its continuous automatic operation not only induces an abundant supply of fresh air and discharges the lighter or more accessible vitiated air, but it effectually removes, from the lowest depths and the most remote recesses of the hold or steerage, the heavy foul air arising from bilge-vapor and the decay of animal and vegetable matter, and the heated air and explosive gases from cargoes. At the same time it removes all miasmatic and mephitic vapors from noxious exhalations, with the floating morbific germs of infectious or contagious diseases, such as Asiatic cholera, yellow fever, ship-fever, small-pox, and their kindred scourges; and the apparatus is readily made to localize any such disease in the ship by simply making the hospital compartment or infected state-room a focal point from which the air is drawn.

The second part of this invention consists in a deodorizing and disinfecting device, whereby the disease-germs and noxious odors in the removed air may be readily destroyed or neutralized in the most effective manner. The wind might otherwise return contagion to the ship, or waft it to neighboring or passing vessels, or to the shore.

This device consists of one or more chambers, combined with the discharge-pipe or the suction-pipe, and adapted to receive chemicals, and to be heated as required. Besides the application of heat or the supply of suitable chemicals from time to time, when required, no attention to this part of the apparatus is needed.

In addition to the specific advantages above briefly referred to there are many other general advantages of the utmost sanitary and commercial importance, besides other special advantages which belong to the present invention, any detailed mention of which must be omitted for want of space.

Figure 1 represents a vertical longitudinal section of a ship provided with a disinfecting-ventilator and fog-alarm illustrating this invention. Fig. 2 is a plan or top view of the same. Fig. 3 represents a vertical section of

the tubular rudder and its connections on a larger scale. Fig. 4 represents a transverse section of the rudder on the line 4 4, Fig. 3. Fig. 5 represents a vertical longitudinal section of one of the automatic air-valves. Fig. 6 represents a transverse section of the same on the line 6 6, Fig. 5. Fig. 7 represents a vertical longitudinal section of the disinfecting device. Fig. 8 is a top view of the latter. Fig. 9 is an elevation of a portion of the discharge-pipe, showing the alarm-valves. Fig. 10 is a top view of a substitute swivel-connection for the air-pipes.

Like letters of reference indicate corresponding parts in the several figures.

The disinfecting ship-ventilator and fog-alarm, which is the subject-matter of this invention, is applicable to every description of nautical vessel or floating craft of sufficient size to require a ventilator, and need involve no alteration whatever in the structure of the vessel.

This apparatus, in a preferred form, consists of a tubular rudder, R, a pair of horizontal air-valves, V V^2, a series of deodorizing and disinfecting chambers, C C^2, and a fog-horn, H, with a suction-pipe, S, and a discharge-pipe, D, leading to and from the rudder, and connecting the other parts. The tubular rudder R is composed of a system of metallic tubes, t t^2 t^3 t^4, as large and as numerous as the proper dimensions of the rudder will permit, securely united in one compact body, with a strong metallic sheathing, s. The main tubes t t^2 are vertical, with open lower ends extending down into the water, and the entire internal area of these tubes, which make up the lower part of the rudder, is available for pumping air, and this is accomplished whenever the rudder rises or is depressed, and whenever a wave or swell causes the surface of the water at the rudder to rise and fall. With six tubes of only one square inch water-area per tube six cubic inches of air, less a small fraction, are drawn through the suction-pipe or forced through the discharge-pipe for every inch of variation in the height of the water-surface in the tubes. The variation is usually several inches every few seconds, and the operation is incessant. Abundant capacity is consequently had.

The front tube t constitutes the tiller-shaft. A horizontal tube, t^3, unites all the vertical tubes so that each of the outer pumping-tubes communicates at top with the tubular tiller-shaft, and a series of oblique tubes, t^4, connect the horizontal tube and tiller-shaft in the form of diagonal braces, serving also as additional conduits. The number, shape, and arrangement of the tubes are not essential elements. The employment of tubes square in cross-section, and all vertical, except a single connecting-tube, has been contemplated. Copper is considered the most suitable material for the rudder, but galvanized iron may, in some cases, be preferable. The parallel tubes may be brazed or soldered together throughout their length, and their union may be re-enforced by one or more strong metallic hoops or bands, which may, in some cases, take the place of the sheathing s. Ordinary rudders now in use may be converted by the attachment thereto of one or more pumping-tubes in any convenient and secure manner, but the employment of a substitute tubular rudder is preferred. The latter, besides its special functions, possesses superior strength and durability as a steering device.

The tubular rudder is intended to be attached to the rudder-post, or otherwise hung in any ordinary or approved manner, so as to have the required freedom of motion under control of the tiller T. In the illustration a step-bearing is attached to the keel, and a collar to the deck below the tiller.

The rudder-tubes must be connected to the suction and discharge pipes in such manner as to prevent any obstruction to the passage of air on the one hand, and to the motion of the rudder on the other. In the illustration (see Fig. 3) this is accomplished by providing the tubular tiller-shaft with lateral necks n n^2, below the deck, and applying thereto flexible rubber hose h h^2, of ample length, leading to the respective pipes; the upper end of the tiller-shaft being plugged. The hose is supported internally by copper wire. A stationary coupling-tube, for use in some cases, is illustrated in Fig. 10. A packed hollow head or collar, h^3, is in this modification swiveled to the tiller-shaft, and a T, h^4, leads therefrom to the main pipes. The swivel may be above the tiller or below the deck. Care must be taken to have all the joints in the rudder and connections air-tight. Pumping-tubes attached to ordinary rudders will be connected to the air-pipes by flexible hose of sufficient length. The suction and discharge valves V V^2, in the illustration, are precisely alike in construction. The former is shown in detail in Figs. 5 and 6. They are horizontal in position, and are rectangular in shape, having inlet and outlet necks i o, the direction of which determines the operation of the individual valve.

In order to offer the least possible resistance to the air-column, a central oblique diaphragm, d, forms the valve-seat of each valve, and a sensitively-hinged flap, f, forms the valve proper. The orifice in the valve-seat is made in line with the bore of the pipe, and of equal or greater area. The only resistance to be overcome in the valves is consequently that proportion of the weight and friction of the light sensitively-hinged flaps, which is met in lifting them from an inclined to a horizontal position—say, twenty-five to forty-five degrees—and in sustaining them in horizontal position during the passage of the air. It is of the utmost importance thus to reduce as low as possible the requisite compression and attenuation of the air in the pumping-tubes, in order that the slight motion of the rudder and water during calms, and at

the wharf, shall be effective, which is one of the chief objects of this invention. In order to enable the valves to be readily opened for inspection, and for the removal of accumulated dust, or the adjustment of the flaps, should this be required, the top of each valve is formed by a removable cover, *r*, packed by an interposed gasket, or packing-strip, *g*, of rubber or leather, and held down by a central clamping-screw, *c*, working in a yoke, *y*, which embraces the valve, and can be slid off at one end when loosened. More than one screw, or a different fastening, can be employed, if preferred. Brass is proposed as a suitable metal for these valves, with platinum or equivalent non-corrosive metal for the flaps and valve-seats.

The deodorizing and disinfecting chambers C C^2, in the illustration, are adapted respectively to receive suitable chemicals in dry and in liquid state, the latter being provided with a sponge. The chamber C is also adapted for the application of heat, having a heating-chamber, C^3, beneath it, supplied with a pair of lamps, L, which are removable through a door in the side. This chamber, as shown, has an undulating bottom, and a deflector to insure the contact of the disease-germs with the chemical or heated plate; but these details are not considered essential, and heat can be applied in any preferred way. Removable plugs *p* p^2 give access for the supply of chemicals, and afterward seal the chambers. Copper is considered the most suitable material for forming these chambers.

An ordinary fog-horn, H, is represented, and the proposed mode of attaching it is illustrated in Fig. 9. A branch, d^1, of the discharge-pipe forming the main outlet, extends downward, and is provided with a stop-valve, *a*. A second branch, d^2, having a stop-valve, *b*, extends toward the stern, and is coupled to the horn. Ordinarily the valve *b* is closed, and *a* is open. When an alarm is to be given, *a* is closed, and *b* is opened. In some cases a screw-thread at the extremity of the discharge-pipe may provide for attaching a removable horn, the stop-valves and branches to be omitted.

The suction-pipe S in the illustration has branches s^1 extending into the hold, a branch, s^2, extending into a hospital compartment, and a branch, s^3, extending into the steerage. Stop-valves in all the branches or registers at their extremities will be employed, and with these it will be apparent that the entire effect of the apparatus may be concentrated at any given point.

A hospital compartment is shown to illustrate the utilization of this provision. If a case of contagious disease occurs on shipboard, the patient is at once isolated here, and this is rendered the focal point from which the ventilator with all its capacity constantly carries off the fouler air. To supply the partial vacuum which is thus created, air flows toward the hospital from every direction below decks, and in no case escapes from it.

The suction-pipe may be extended to an infected state-room by rubber tubing. The direct spread of contagion is thus prevented, and by the employment of the disinfecting-chambers the germs of the disease are destroyed before they escape into the external atmosphere.

It may be desirable to locate these chambers in the hospital compartment, in which case they will form a part of the suction-pipe. In the illustration they form parts of the discharge-pipe, and with the valves are arranged at the stern of the vessel. These parts, which are the largest on shipboard, will ordinarily not exceed three or four inches in width.

In smaller vessels the hospital and disinfecting devices will usually be omitted, when the suction-pipe may extend directly into the hold, and the discharge-pipe directly to one side at the stern, or as may be required or preferred.

The fog-horn attachment may also be entirely omitted in some cases.

Having described this my invention, the following is what I claim as new, and desire to secure by Letters Patent, namely:

1. A rudder, having one or more air-tubes, with open lower ends, extending downward into the water, and connected at their upper ends to suction and discharge pipes, substantially as herein illustrated and described.

2. A horizontal air-valve, having an oblique diaphragm, in combination with the suction-pipe or the discharge-pipe of a ship-ventilator, substantially as herein shown and set forth.

3. A horizontal air-valve, having a removable cover, giving access to the valve-seat and either compartment of the valve-chamber, and secured by a yoke and a clamping-screw or their equivalent, in combination with the suction-pipe or the discharge-pipe of a ship-ventilator, substantially as herein specified.

4. One or more deodorizing and disinfecting chambers, in combination with the discharge-pipe or the suction-pipe of a ship-ventilator, for the application of heat and chemicals, either or both, to destroy the germs of infectious and contagious diseases, and to neutralize foul odors, substantially as herein illustrated and described.

5. The combination of the tubular rudder R, the air-valves A A^2, the discharge-pipe D, and a fog-horn, H, the latter attached to the said discharge-pipe by the branches d^1 d^2, having stop-valves *a* *b*, substantially as herein specified, for sounding alarms, in the manner set forth.

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Witnesses:

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JONAS SONNEBORN.