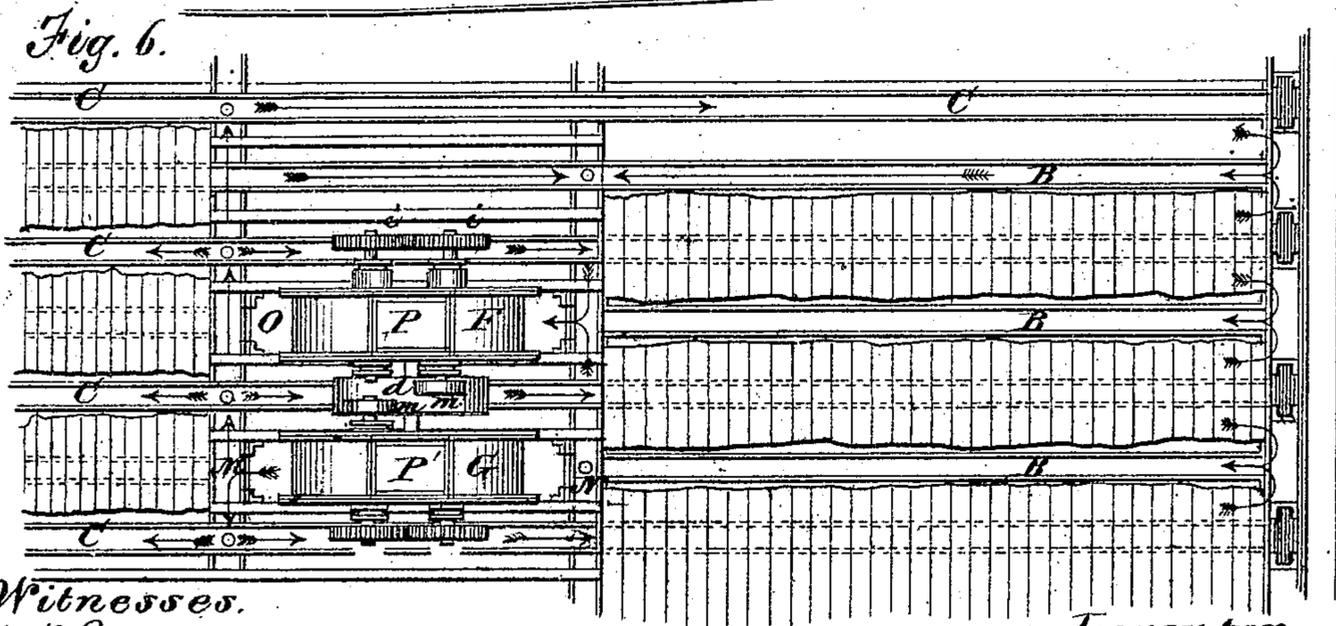
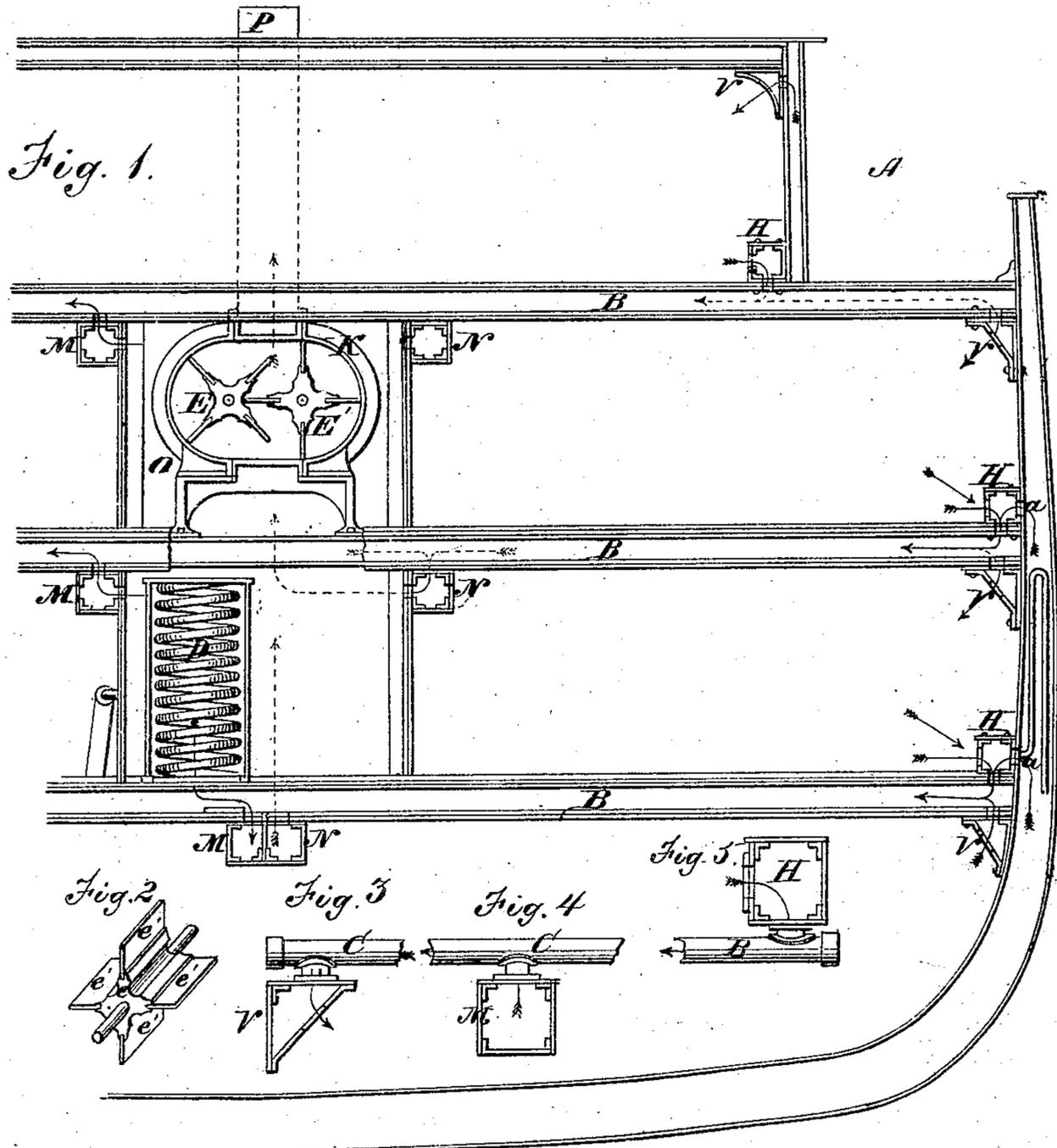


A. W. THOMPSON.  
Construction of Ships.

No. 136,393.

Patented March 4, 1873.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN THE CONSTRUCTION OF SHIPS.

Specification forming part of Letters Patent No. 136,393, dated March 4, 1873.

*To all whom it may concern:*

Be it known that I, AMBROSE W. THOMPSON, of the city, county, and State of New York, have invented a new and useful Improvement in the Construction of Ships; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a transverse section of a vessel embodying my invention; Fig. 2, a perspective view of one of the fans; Figs. 3, 4, and 5, cross-sections, showing the mode of connecting the longitudinal quadrangular and triangular channels with the transverse pipes; and Fig. 6, a plan representing a part of one of the decks, and showing the transverse pipes, longitudinal channels, and fans.

Similar letters of reference in the accompanying drawing indicate the same parts.

The object of this invention is to improve the construction of iron ships and other vessels in such a manner as to impart additional strength to their hulls, and to afford means for thoroughly ventilating every part of the vessel. To these ends the invention consists, first, in the employment of a series of hollow braces and beams for strengthening the hull of the vessel and supporting the decks; secondly, in so combining said hollow beams and braces with the various compartments of the vessel, and with pipes leading to powerful fans, as to constitute an effectual means for ventilating the vessel; and, thirdly, in an improved construction and arrangement of the fans and their accessories, whereby one fan can be used to draw the foul air from the vessel, while the other is employed to force the fresh air into its place, and so that, by changing a belt, both fans may at any time, if preferred, be employed to exhaust the foul air from the vessel or from any compartment thereof, or to force fresh air, hot or cold, to any part of the ship.

In the drawing, A is the ship, divided by the decks, partitions, and bulkheads into any number of holds, cabins, and compartments, according to the size of the vessel and the business in which it is to be employed. I O are two air-tight compartments, each containing a powerful fan-blower, the function of one, F,

being to exhaust the foul air, and that of the other, G, to replace it with fresh air. V V are hollow angular boxes, firmly secured by bolts, intercostal flanges, or other means, to the walls of the ship, from stem to stern, and so arranged as to support the edges of the decks or the deck-beams. H H are square boxes, likewise secured to the walls of the ship from stem to stern, and placed above the edges of the decks, as shown. B B are a series of pipes laid between the deck-beams, and forming a means of communication between the longitudinal boxes H H and the exhaust-chamber O. C C are a similar series of pipes, likewise laid between the deck-beams so as to alternate with the pipes B B on each side of the ship, and forming a means of communication between the longitudinal boxes V V and the induction-chamber I. N N are longitudinal square boxes or pipes in each hold, arranged so as to receive the foul air from the pipes C and convey it to the chamber O. M M are similar boxes or pipes in each hold, arranged so as to receive the fresh air from the induction-chamber I and deliver it to the pipes C C. P is a vertical pipe, through which the foul air is discharged from the chamber O. P' is a similar pipe, through which fresh air is introduced to the chamber I; and D represents either a heater or refrigerator, which may be employed to heat or cool the air from chamber I before it is discharged into the tubes M, and thence conveyed to the cabins and other compartments of the ship.

The details of construction of all these parts will be readily understood from the drawing without much further description.

The boxes V H M N are constructed of wrought-iron plates, properly flanged, and securely riveted together along the edges, and, if necessary, cemented, so that no air can escape at the angles. Thus constructed, they form braces, beams, or stringers of immense strength, and when applied to the walls of the vessel, as shown, and to the under side of the decks, beneath and alongside of the fan-compartments, they not only serve as ducts to convey the currents of air in both directions, but as a means for supporting the decks, and vastly increasing the strength of the ship. These tubes may be connected with the pipes B C in any suitable manner; and, if

preferred, the tubes H may be connected with the intercostal spaces of the ship, so as to keep even the frame of the vessel from becoming a receptacle for stagnant and foul air and gases. When such connection is made through openings *a* in the side of the tubes, water might occasionally enter the tubes from the deck, and thence pass through said openings into the lower hold and damage the cargo; but such accident may easily be prevented by attaching a bent pipe to the openings *a*, with the bend extending nearly or quite up to the next deck above, so that if the cabin and the tube H therein should be filled with water it could not pass over the bend of the pipe into the lower hold. Suitable openings are provided in the pipes H to receive the foul air in the various compartments of the ship; and dampers or valves operated by handles or by wires leading to any convenient point may be provided wherever they may be necessary in order to place the air-currents at all times completely under the control of the engineer or other person in charge. The heater D may be operated by exhaust steam from the engine, or by any other suitable means; and when a refrigerating apparatus is employed instead of the heater, it may be of any approved construction and mode of operation.

The fans may be of any form and construction; but I prefer the construction shown in the drawing—namely, the employment of two wheels, E E', each composed of a casting, *e*, keyed onto the shaft, and leaves or wings *e' e'*, fastened in any suitable manner to the casting, said wheels being constructed and arranged in the oblong box K, as shown in Figs. 1, 2, 6. The shafts of the fans are supported by bearings in the walls of the chambers, which bearings are packed air-tight in any suitable manner. The ends of the shafts project through the walls, and carry small spur-wheels *i i* that engage with each other, and thereby cause the two fan-wheels in the same box to rotate in opposite directions. A large pulley, *d*, connected by belts to the pulleys *m m'*, suffice to drive both the exhaust and the induction fan, one of the belts being crossed to give the fans a revolution in opposite directions. The elliptical cases or boxes K must be made and fitted with great care, and the following is recommended as an excellent method of construction: First, cast two semi-cylinders of iron, and two pieces to be placed between the semi-cylinders; then plane the proximate faces of the flanges upon the half-

cylinders, drill them and bolt them together, forming a temporary cylinder. Bore out this cylinder, taking care to keep its axis in exact line with the face of the flanges; then face and drill the flanges of the intermediate pieces, separate the two semi-cylinders, introduce the intermediate pieces between them, put the fan-wheels in their proper places, and bolt the parts of the case or box firmly together.

It will be observed that while the two fans ordinarily run in opposite directions, yet, should occasion require, they may both be caused to run in the same direction, either for the purpose of exhausting the foul air from the vessel or of introducing fresh air.

I do not limit myself to the described combination of pulleys, belts, gear-wheels, &c., for driving the four fan-wheels as the only proper combination for the purpose, but may, if I prefer to do so, employ any system of belting, gearing, sprocket-wheels, or other devices in use for communicating rotary motion, provided such devices are so combined and arranged as to drive the four wheels in the proper directions and at the proper velocity, as above described; and it will be observed that the whole apparatus is adapted to be reversed in operation, the exhaust-tubes and fans being used for induction purposes, and the induction tubes and fans for the exhaust.

Having thus described my invention, what I claim is—

1. The channel-boxes V H, constructed as described, and applied to the inner walls of a ship, in immediate contact with the upper and under surfaces of the decks or deck-beams, for the purposes of strengthening the walls of the vessel, supporting the decks, and ventilating the ship, substantially as described.

2. The combination of the channel-boxes V H, having air-openings, with the double system of lateral pipes B C, and the exhaust and induction blowers, substantially as and for the purposes described.

3. The longitudinal boxes M N, combined with the blowers, the pipes B C, and the boxes V H, substantially as and for the purposes described.

4. The two fan-boxes K K, each containing two fan-wheels, E E', applied to the ventilation of ships, substantially as described.

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Witnesses:

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