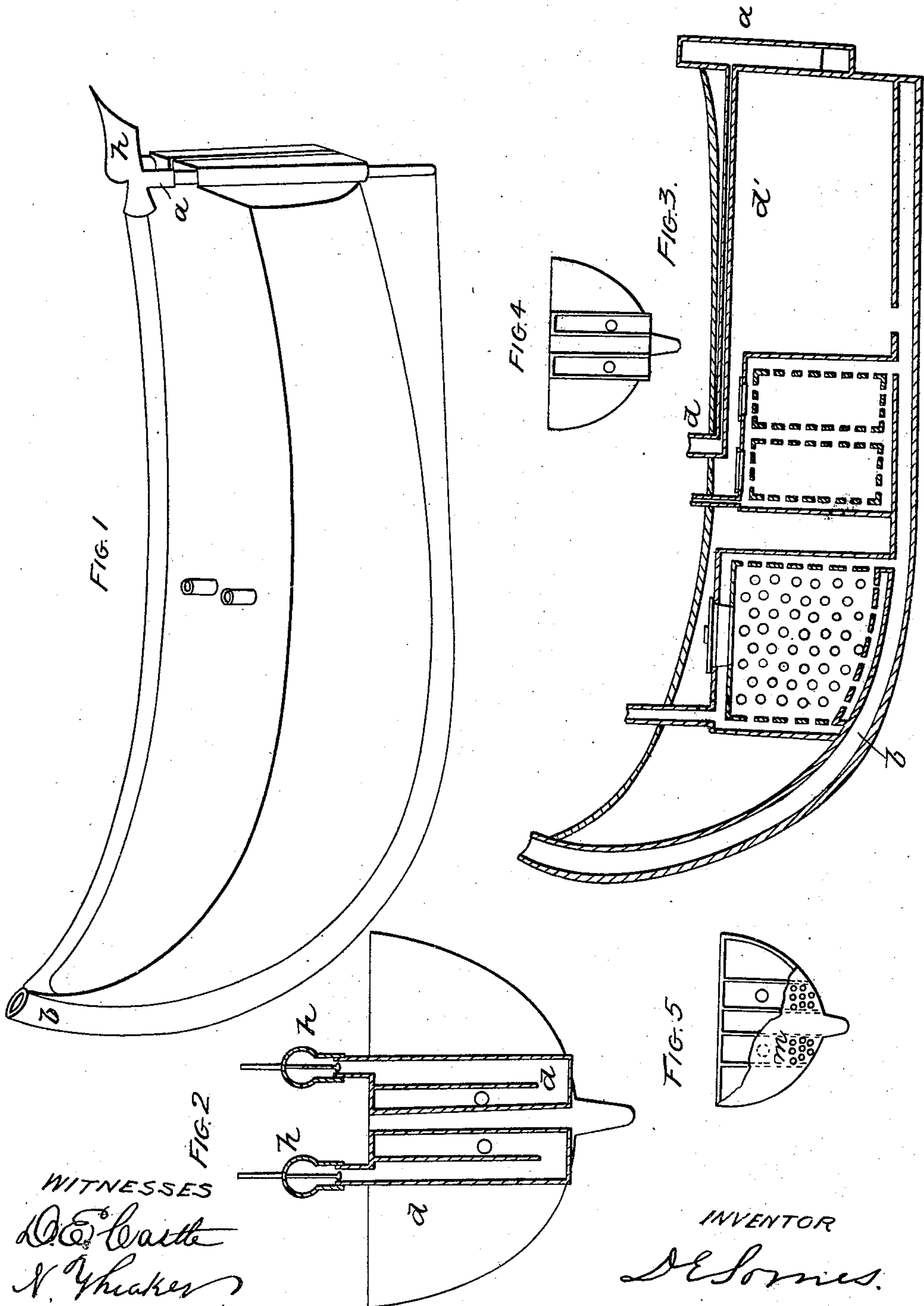


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Cooling and Ventilating Ships and other Vessels.

No. 46,593.

Patented Feb. 28, 1865.



WITNESSES
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IMPROVEMENT IN COOLING AND VENTILATING SHIPS AND OTHER VESSELS.

Specification forming part of Letters Patent No. **46,593**, dated February 28, 1865.

To all whom it may concern:

Be it known that I, DANIEL E. SOMES, of the city of Washington, in the District of Columbia, have made a new and useful Improvement in Cooling and Ventilating Ships and other Vessels; and I hereby declare that the following is a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 shows a perspective view of a vessel with my improvements. Fig. 2 is an end view of such a vessel, and Fig. 3 is a longitudinal vertical section.

The nature of my invention consists in cooling the air to be used in ventilating ships and other vessels by bringing it in contact with surfaces cooled by the water in which the vessel sails or floats or bringing the air in contact with cold water.

My invention also consists in the arrangement and combination of apparatus and devices for cooling, drying, and forcing air for the purpose of cooling and ventilating vessels, as hereinafter more fully described.

The temperature of the waters of oceans and seas varies but little during the entire day and night, and is therefore never above the mean daily temperature of the place. By going a short distance below the surface of the water the temperature is still cooler. It frequently happens in the summer months that the atmosphere becomes highly heated, while the water near the ship's bottom is very cold. By availing myself of these facts I am able to preserve a comfortably-low temperature on either sailing or steam vessels, and at the same time secure a proper ventilation, which is so necessary on all passenger-vessels.

To enable others to use my invention, I proceed to describe the best means with which I am acquainted for carrying it into practical use.

For the purpose of cooling the air I arrange at any convenient point on the ship's wall a system of pipes, tubes, or chambers in contact with the water. I also use some means to bring in and force air into and through said tubes. This may be done when the wind is blowing by means of the usual hood, as shown at *h*, Figs. 1 and 2. The air passes down the tube *a* into the cooling-tubes, and is thence to be

carried to any part of the vessel to be cooled and ventilated. In steam-vessels it will frequently be better to employ a blowing apparatus or air-pump of any of the usual forms to force air through the tubes.

In Fig. 2 the cooling-tubes are placed on each side of the stern of the vessel, as shown at *a a*. This mode of applying them will be found convenient when the invention is to be applied to vessels which have been built without express reference to my invention. Instead of placing the refrigeratory tubes, as shown, at *a*, they may be placed along the keel of the vessel, as shown at *b*, Figs. 1 and 3. The air may be taken in at any point on the deck of the vessel, as shown at *d*, Fig. 3, and carried to the refrigerators.

In building new vessels with my invention the air-cooling tubes can readily be provided for and made part of the vessel, and when made of strong metal and properly placed will add to the strength of the vessel.

By the use of my invention vessels will be able to carry large numbers of passengers without danger to their health, and also avoiding the discomforts of close, warm, and foul air. In many instances it is important that the cargo and freight should be kept cool. This can also be accomplished by my invention.

Instead of forcing the air through the tubes, as already described, I propose to cool it by forcing it into the water itself, which may be let into tanks or reservoirs in the bottom or hold of the vessel provided for that purpose.

Instead of using the force of the wind to drive air into the vessel, the motion of the vessel itself may be made to furnish the air for ventilating and cooling. This may be accomplished by placing a bell, box, or tube, or equivalent device, fore and aft of the vessel, the lower end of the bell, box, or tube dipping into the water. The upper portion of the bell should be furnished with a valve, opening inward. As the vessel rises, air is drawn into the bell or other receptacle, and as the vessel goes down the air is forced into the ship. Instead of a valve, the box may be formed as shown at Fig. 4. The partition does not reach to the bottom of the box, and as the ship rises out of the water the space is filled with air.

As the box becomes submerged, the air in the space *m* is forced into the vessel. I have called this a bell, box, or tube for the sake of illustration; but in building a vessel the attachment may be put at the stern, prow, or on either side, and may be made of metal plates fastened to the vessel, and made to conform in outline to the general contour of the vessel. Fig. 5 of the drawings shows a device for this purpose. The lower part of the box or air-vessel is perforated, as shown, so that when the box is made flush with the vessel water enters these holes, and when they become submerged the air is forced by the rising of the water in the box into the ship or vessel.

When a greater degree of cold is desired than can be produced by driving the air through pipes in contact with water or through water, I compress the air in the pipes or in suitable tanks in contact with the water by means of any suitable air compressing apparatus. The first effect of compressing air is to increase its temperature, but as the pipes or tanks into which it is compressed are in contact with water or other cold medium, the compressed air will soon acquire the temperature of the substances immediately surrounding it. If the air is now permitted to expand, so as to assume its original volume, it will be found to be greatly reduced in temperature. By this treatment the air will also be dried, as the compressing and cooling causes it to deposit moisture if it is charged with aqueous vapor. This principle of compressing, drying, and cooling air can be used with great advantage in vessels for carrying grain either in bulk or in sacks, also in cooling the store-rooms for carrying fish, meat, and other provisions on ships and vessels. In steam-vessels the power of the engine may be used to compress the air, and a small expenditure of force will serve to cool all or any part of the vessel desired. In case still further means are required for removing moisture from grain on board of ships and boats, the air may be warmed, and passed through the grain or through channels and spaces between the bins or compartments in which the grain is stored. Devices such as now employed for drying grain in stores or granaries may be employed for this purpose. After being dried by means of warm air, the grain may then be cooled in the manner already explained.

My invention may be applied with great advantage in vessels for carrying grain and other materials that are injured by heating when kept in the holds of ships, steamboats, canal-boats, and the like as now constructed. I apply my invention to such vessels by means of an air-space surrounding the freight or cargo a little removed from the inner surface of the vessel. The inner wall of the air space is to be tight or perforated. The pure air

from without is to be forced through the air-space in any of the ways above described, thus keeping up a free circulation throughout the bulk or body of the vessel, and all heating of the cargo is prevented. Instead of the air-space surrounding the freight, I propose to construct a room or apartment in the vessel with perforated walls, floor, and ceiling, or either, and with a narrow air space surrounding the walls of said room, which space is connected with any suitable air-conductor, so that by means of the perforated wall air is forced through the freight, see D, Fig. 3; or the narrow spaces may be omitted and the air conducted directly into the body of the grain or other perishable freight.

In vessels with paddle-wheels the air in the wheel-house will be cooled by the spray of the water. This cool air may be introduced into the vessel by any suitable means. All the ventilating devices should be provided with suitable registers or valves, so that the currents of air may be regulated or entirely stopped, if desired.

In vessels for carrying grain the hold of the vessel or boat may be divided into compartments or bins for carrying different kinds of grain or different lots of the same kind. Between the several compartments may be air-spaces connected with air-ducts, so that any portion of the grain may be ventilated, cooled, or dried, as may be found desirable. The person in charge will always be able to judge of the condition of the cargo by the odor and temperature of the air which comes from the several bins, and can therefore detect the slightest tendency to heating or mustiness.

Vessels cooled according to my invention are useful also in carrying volatile liquids, such as petroleum, benzine, and the like, which by heat generate combustible and explosive gases.

Having thus described my invention, I wish it to be understood that I do not confine myself to the several arrangements and devices shown, as these may be greatly varied, both in applying my invention to vessels already constructed and also in building new vessels, without departing from the principle of my invention.

What I claim is—

1. Cooling and ventilating vessels in the manner herein set forth and described.
2. Cooling air for the purpose of cooling and ventilating vessels by forcing the air through submerged pipes or their equivalents, substantially as set forth and described.
3. The forcing of air into ships and other vessels by the motion of such vessel in the water or by the action of the waves against or around the vessel.
4. Affixing to the side of the ship or vessel a device or devices, substantially as described,

so that the motion of the vessel in the water, or of the water against the vessel shall produce a blast of air, as described.

5. The devices herein described, or their equivalents, for airing, cooling, and ventilating vessels for carrying grain or other perishable freight.

6. Constructing the interior of a vessel for carrying grain or other perishable freight,

substantially as described, so that air may be conveyed through said vessel by means of perforated walls or tubes, as set forth, and this whether the air has been previously cooled or not.

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Witnesses:

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