2 Sheets—Sheet 1.

E. FIXARY.

AIR-COOLING APPARATUS.

No. 191,232. Patented May 29, 1877.

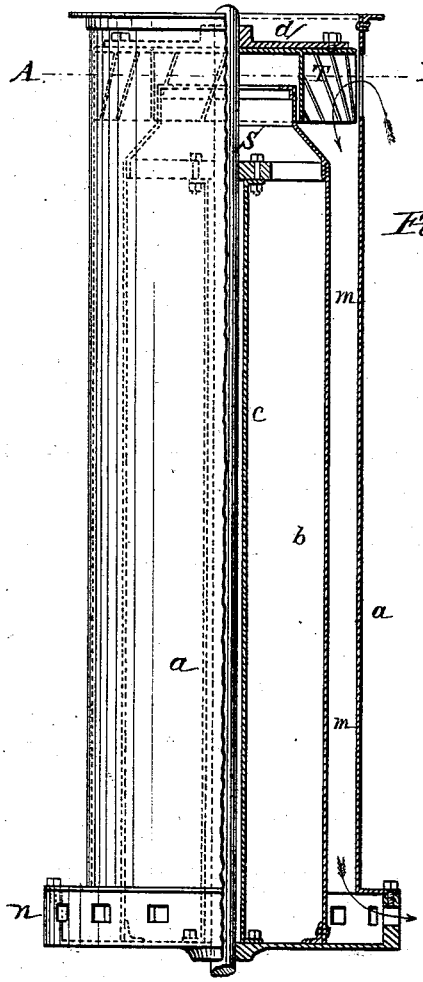


Fig. 1.

Fig. 2.

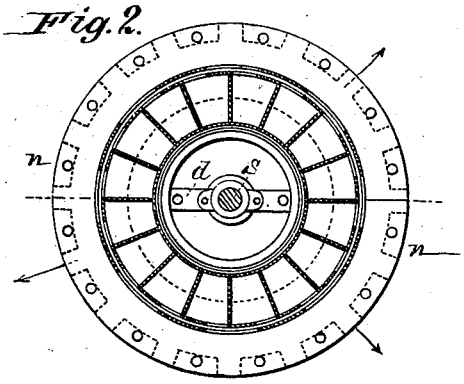
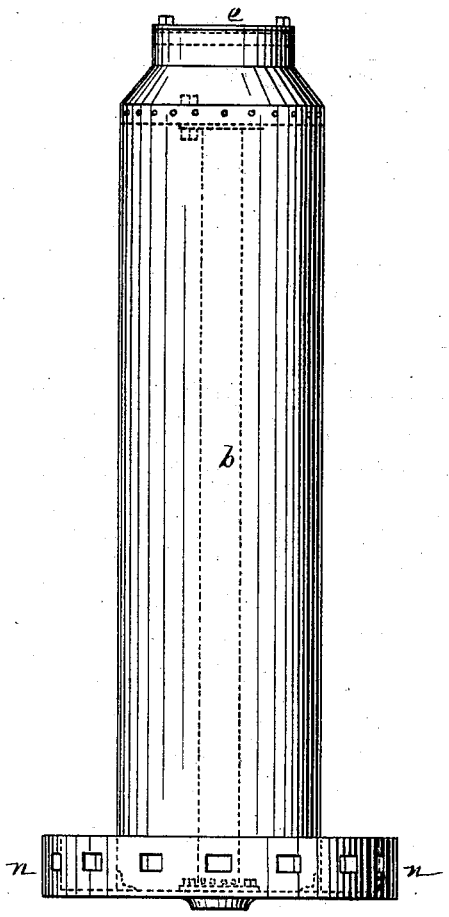


Fig. 3.



Attest:
E. E. Masson
Ewell a Sick

Inventor:
Edward Fixary
by Pollok & Bailey his attorneys.

2 Sheets—Sheet 2.

E. FIXARY.

AIR-COOLING APPARATUS.

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Fig 4.

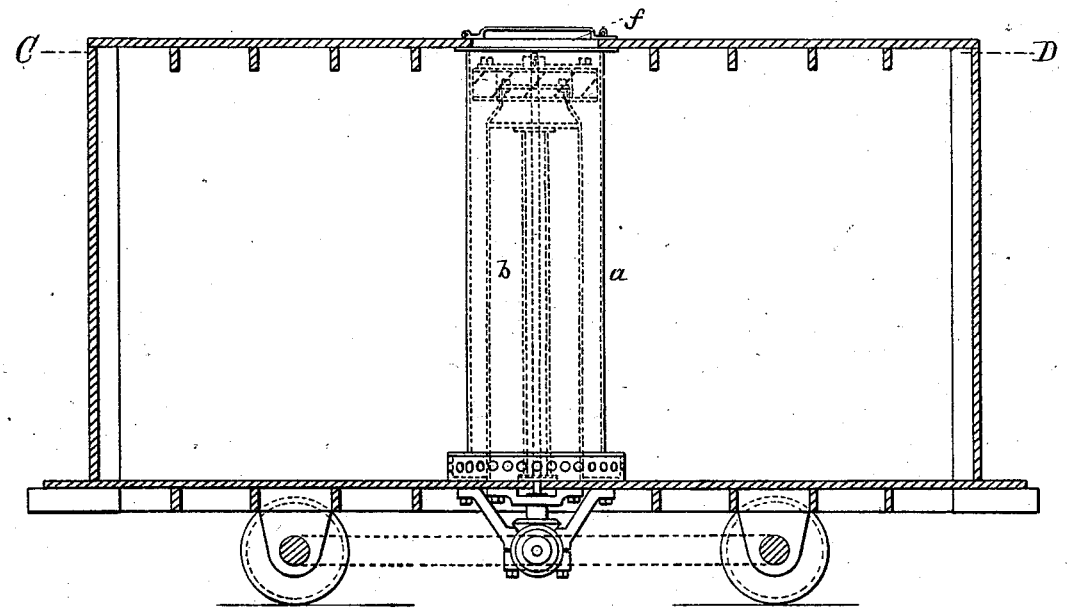
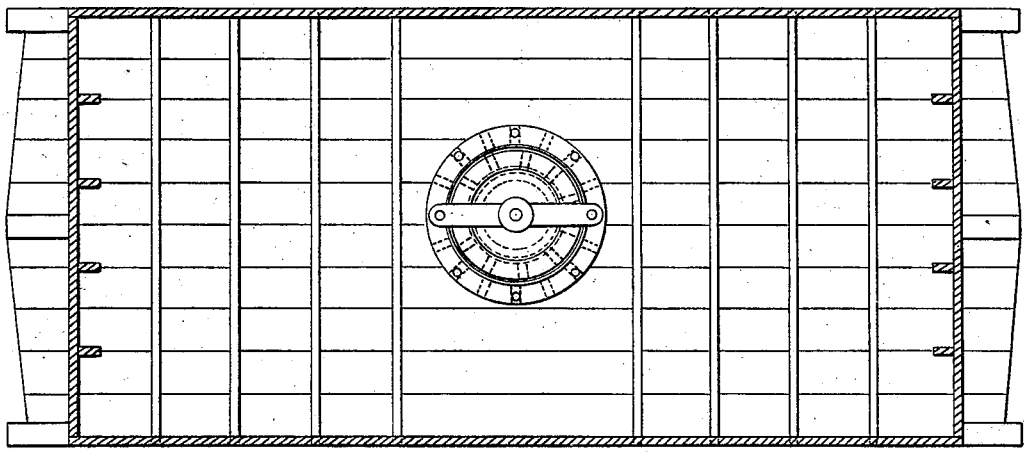


Fig. 5.



Attest:
E. E. Masson
Ewell a Dick

Inventor
Edward Fixary
by Pollok & Bailey his
Attorneys.

UNITED STATES PATENT OFFICE.

EDWARD FIXARY, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF HIS RIGHT TO ALBERT C. JANIN, OF SAME PLACE.

IMPROVEMENT IN AIR-COOLING APPARATUS.

Specification forming part of Letters Patent No. **191,232**, dated May 29, 1877; application filed February 6, 1877.

To all whom it may concern:

Be it known that I, EDWARD FIXARY, of New Orleans, Louisiana, have invented certain new and useful Improvements in Apparatus for Cooling and Purifying Air in Cars, Ships, Breweries, and other buildings or structures, of which improvements the following is a specification:

My invention has for its object the equable distribution of cold and the purification of air within any apartment or structure designed to be used for the preservation of animal or vegetable matters of any kind.

My invention is characterized by the combination of two cylinders—an inner cylinder, which receives the ice or other refrigerant, and an outer surrounding cylinder or jacket, between which and the refrigerating-cylinder is a space for the passage of air, which becomes during this passage cooled by contact with the refrigerating-surfaces of the apparatus. With these cylinders I further combine air-forcing devices, such as a turbine wheel, which agitates the air and forces it to pass between the two cylinders.

I arrange the ice or refrigerating cylinder so that it may at the top be opened and filled from the outside of the apartment without affecting the temperature of the interior of said apartment. The outer or radiating cylinder is provided around its upper part and below the ceiling or roof of the apartment with openings, through which the turbine takes the air, and it forms, with the refrigerating-cylinder, a chamber open at the bottom, so as to permit escape of the cooled air, which, in this chamber, is deprived of its humidity and of any bad odors before it spreads itself through the apartment.

This outer cylinder being in proximity, and, indeed, having points of contact with the refrigerant cylinder, maintains the proper degree of cold in the apartment by radiation, as soon as the temperature has been sufficiently lowered by the action of the air-forcing apparatus.

Any suitable air-forcing apparatus may be used to force the air between the cylinders; and the air-chamber between said cylinders may be closed by valves in such manner that the air forced into the chamber will not escape except under considerable pressure.

This, however, is, on some accounts, objectionable, and I prefer on the whole to leave the chamber open, and to employ as the air-forcing device a turbine wheel with helicoidal vanes, which will always take the same quantity of air at each revolution, and will force this air in an agitated condition against all the refrigerating-surfaces of the cylinder.

The form of apparatus which I prefer to employ is represented in the accompanying drawing.

Figure 1 is an elevation of the apparatus partly in vertical central section. Fig. 2 is a horizontal section on line A B, Fig. 1. Fig. 3 is an elevation of the inner cylinder with the outer cylinder removed. Fig. 4 is a longitudinal vertical central section of a car, with the cooling apparatus applied thereto. Fig. 5 is a horizontal section on the line C D, Fig. 4.

The inner or refrigerating cylinder *b* is fixed at its lower end to a base, *n*, to which is also fixed the outer or radiating cylinder *a*. The space *m* between the two cylinders is for the passage of the air. The base *n* constitutes a chamber or receptacle to contain drying and purifying chemicals, and in its periphery numerous holes are formed to permit the escape of the air forced through the cooling-chamber *m* and the drying and purifying chamber *n*.

Within the outer cylinder, and above and around the top of the inner cylinder, is placed the turbine T, which is mounted on a driving-shaft, S, that passes up axially through the inner cylinder, which is provided with an axial tube, *c*, for the protection of said shaft. The turbine draws the air from the upper portion of the apartment through the side openings *p* in the radiating-cylinder. The turbine is fixed by two screws to a cross-piece, *d*, keyed onto the shaft S. The inner cylinder *b* is closed by a cover, *e*, fixed in place also by two screws. To fill the inner cylinder the turbine is detached from the cross-piece *d* and drops so as to rest on the crown of the inner cylinder, the cross-piece is unkeyed and removed. The cover *e* is then taken off, and the cylinder *d* is filled through a funnel, which

is introduced through the open top of the exterior cylinder *a*.

The course of the air through the apparatus when the turbine is in motion is indicated by the arrows in Fig. 1.

In Figs. 4 and 5 the apparatus is represented as applied to the interior of a car. The exterior cylinder *a* reaches, and is fixed to, the roof of the car, in which is an orifice closed by a door, *f*, through which access may be had to the inner cylinder at any time without affecting the temperature of the interior of the car.

The turbine is in this instance actuated by having its shaft driven, by the revolving car-wheels, through the intermediary of gearing and belting, as indicated in Fig. 4. It may, however, be moved by any other suitable means, and the power instead of being below may be above, in which case there will not be required a central shaft extending up through the cylinders.

I prefer, naturally, to locate the air-forcing apparatus as near the top of the apartment as practicable. There it takes the air which has the highest temperature. But this location may, of course, be changed for one lower down, although the latter will not be so productive of good results.

As a motive-power on cars, I can even use a second turbine placed on the outside of the car, and driven by the resistance from the air when the cars are in motion, for a very slight power is all that is needed to actuate the inner turbine sufficiently for my purposes. Indeed, for the use of the apparatus in breweries and like localities I may use a windmill as the motive-power, and for smaller apparatuses spring-power can be employed with good effect.

The refrigerating-cylinder can be put in more direct contact with the outer cylinder by means of intermediate blades of strips of a conducting metal, winding around the inner cylinder, and forming one or more spiral passages through which air will pass, and thus, when the air is reduced to the proper degree of temperature, it can be so maintained by radiation from the outer cylinder alone without movement of the turbine.

The inner or refrigerating cylinder is in the example given in the drawings designed to contain ice, and for this purpose it may have in its base holes for escape of water.

In case, however, I use a refrigerating material such as employed in ice-machines, which I could well and economically do in case the apparatus were used in connection with an ice-machine, then instead of a single cylinder I should use a congeries of tubes, comparatively of small diameter, either in the form of columns or spirals in such manner as to obtain the required extent of refrigerating-surface. This arrangement, however, would be the equivalent of that first described, the only difference being in the details of construction, which necessarily will vary according to the nature of the refrigerating material employed.

Having described my invention and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The combination, within the cooling-chamber, of the refrigerator, the enveloping radiating jacket or cylinder, and the air-forcing apparatus, these elements being arranged for joint operation, as set forth.

2. The combination, within the cooling-chamber, of the inner refrigerating-cylinder, the outer radiating-cylinder with air-openings at top and bottom, and the intermediate turbine with helicoidal vanes for taking the air from the chamber, forcing it through the passage between the cylinders in contact with the refrigerating-surfaces, and returning it again to the chamber, substantially as set forth.

3. The purifying-chamber, in combination with the inner and outer cylinders and the air-forcing apparatus, substantially as set forth.

EDWARD FIXARY.

Witnesses:
E. DE LAUNAY,
ALBERT C. JANIN.