A. THOMA.

REFRIGERTOR CAR.

No. 171,591. Patented Dec. 28, 1875.

Fig. 1.

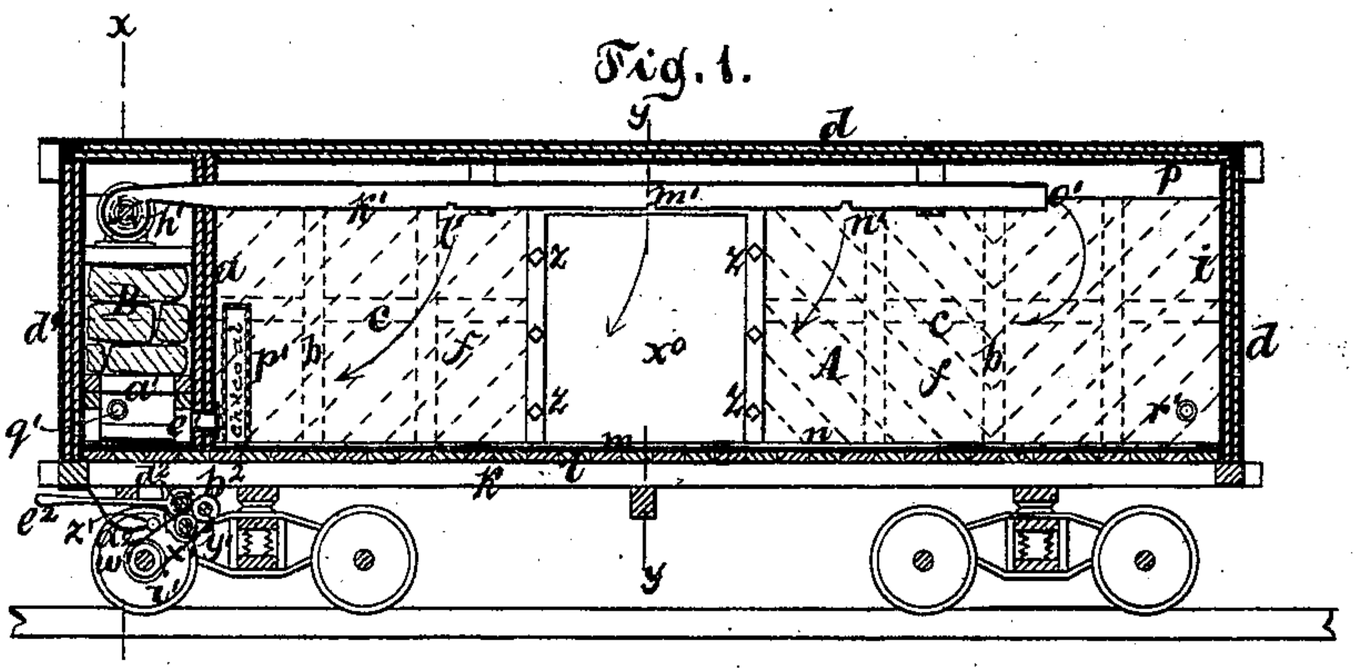

Fig. 2.

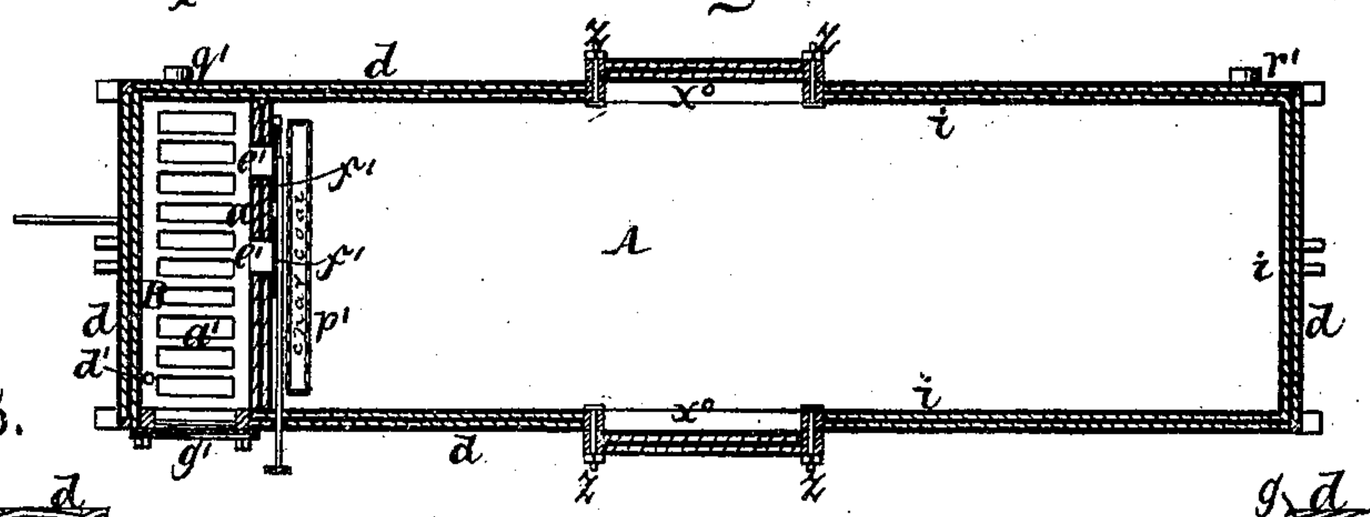

Fig. 8.

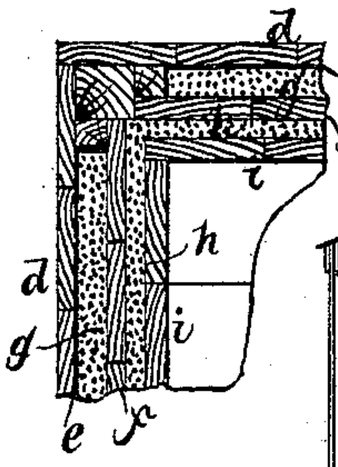

Fig. 3.

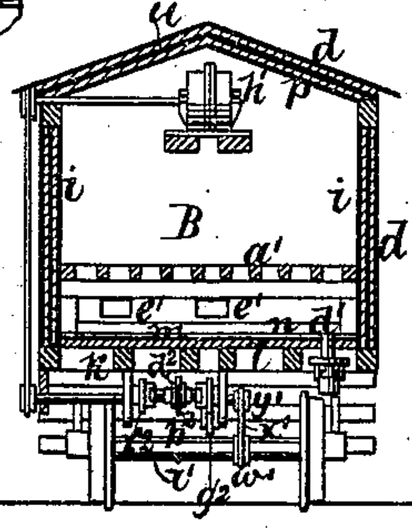

Fig. 4.

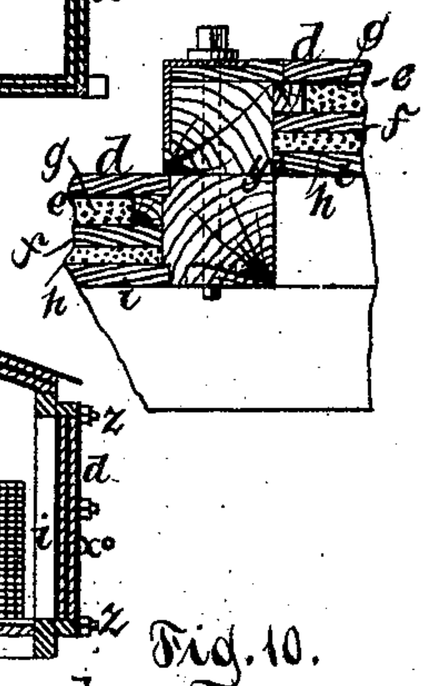

Fig. 9.

Fig. 10.

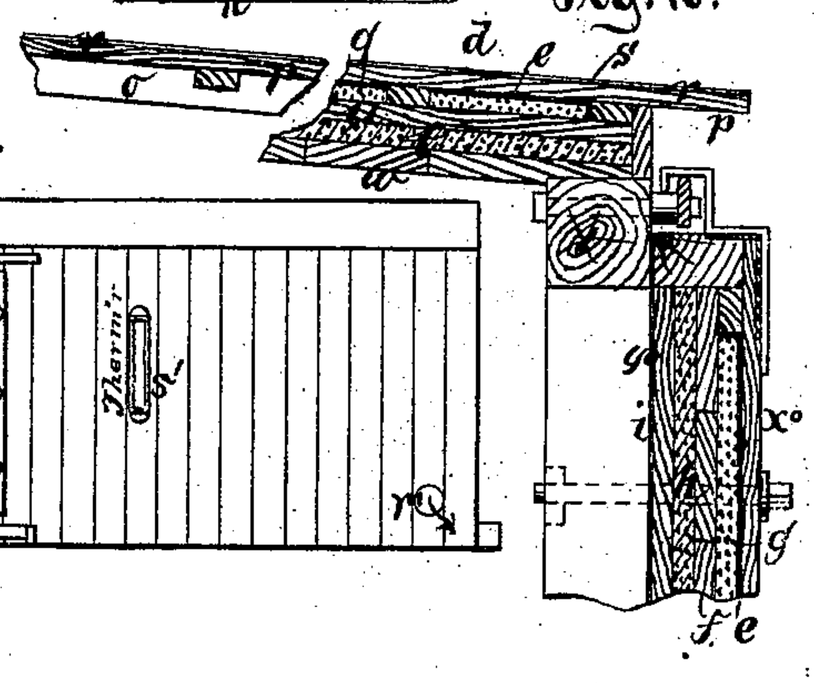

Fig. 5.

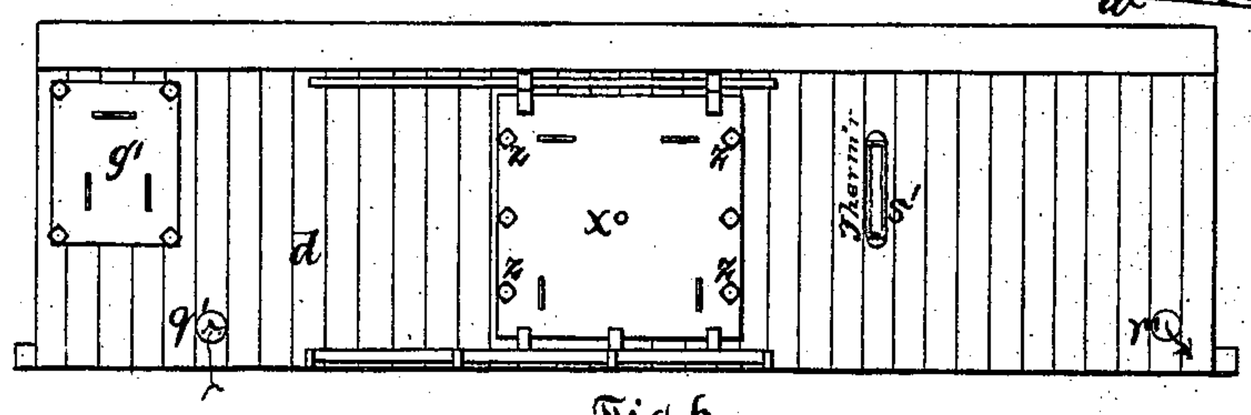

Fig. 6.

Fig. 7.

Witnesses.
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per
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Attys.

UNITED STATES PATENT OFFICE.

ALOIS THOMA, OF HOBOKEN, NEW JERSEY.

IMPROVEMENT IN REFRIGERATOR-CARS.

Specification forming part of Letters Patent No. **171,591,** dated December 28, 1875; application filed December 9, 1875.

To all whom it may concern:

Be it known that I, ALOIS THOMA, of Hoboken, in the county of Hudson and State of New Jersey, have invented a new and Improved Refrigerator-Car, which invention is fully described in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a longitudinal vertical section of my car. Fig. 2 is a horizontal section of the same. Fig. 3 is a transverse section in the plane *x x*, Fig. 1. Fig. 4 is a similar section in the plane *y y*, Fig. 1. Fig. 5 is a side view.

The remaining figures are details, which will be referred to as the description progresses.

Similar letters indicate corresponding parts.

This invention relates to a railroad-car, which is air and water tight, and the sides, top, and bottom of which are protected by soluble glass, felt, and several layers of boards, so as to exclude all influence of the external atmosphere, and to prevent the escape of cold air from the interior of the car. Pure fresh air can be made to circulate through the ice-chamber and through the provision-chamber, and a circulation of the air in the interior of the car can be produced through these chambers, and through an intermediate filtering-vessel filled with charcoal to retain the offensive gases which may become mixed with the air. The provision-chamber is separated from the ice-chamber by a perfectly insulating partition provided with apertures and gates, whereby the communication between the two chambers can be regulated, and the consumption of ice can be controlled.

The circulation of the air is produced by a fan-blower, which receives its motion from one of the axles of the car, and the motion of which is controlled by a reversing gear and clutch, so that it can be accomodated to the direction in which the car moves, or that it can be stopped whenever desirable.

The interior of my car is divided in two unequal compartments, A B, the compartment A being intended for the provision-chamber, and the compartment B for the ice-chamber. These compartments are separated from each other by the partition *a*, which is air-tight, and which, by its peculiar construction, forms a perfect insulator for heat and cold.

The body of my car is different in its construction from ordinary cars, inasmuch as the uprights *b* are connected simply by horizontal braces *c*, which are secured by any suitable means. The outside shell of my car is formed of boards *d*, as usual, which are painted with a coat of very light paint, so as to reduce the action of the sun's rays to a minimum.

The inner surface of these boards is coated with a water and air tight varnish, which I prepare particularly for this purpose, and on this coat of varnish I place a sheet, *e*, of paper, (see Fig. 8,) which is also coated with the same kind of varnish. After the varnish has fully dried and hardened, I secure on the paper suitable strips or supports on which are nailed boards *f* of very porous wood, said boards having been previously coated on both sides with a strong solution of soluble glass. These boards are secured in oblique positions, as shown in dotted lines in Fig. 1, so that they act as braces, and impart to the car a certain degree of firmness.

It is a well-known fact that glass is one of the worst conductors of heat, and by the application of a coat of soluble glass to the boards *f*, therefore, these boards are converted into the best possible insulators for heat and cold. Furthermore, by the application of the soluble glass to the porous boards *f*, the air contained in the pores of the wood becomes confined therein, and the insulating quality of said boards is still further increased. The space *g* between the boards *d* and *f* is filled up with a pulverized vitreous slag, which is converted into a thin pasty mass, by mixing it with a solution of soluble glass, and which, when hardened, forms a vitreous mass, which proves to be a perfect insulator for heat and cold, but instead of such vitreous mass, other bad conductors of heat may be substituted, such as disintegrated moss, well-dried spent tan, or felt of cow's hair.

After the boards *f* have been secured in position another coat of soluble glass is applied, care being taken to fill up all cracks and joints. A layer, *h*, of felt, one inch thick, is then secured to the inner surface of said boards, and

on this layer I nail boards *i*, which are coated inside and outside with soluble glass.

The bottom of my car is formed of the frame *k*, on which is secured a layer, *l*, of two-inch boards. These boards are coated with the varnish above mentioned; then a layer of paper is applied, the same as on the side walls, and on the paper is placed a layer, *m*, of felt, on which are nailed boards *n*, coated on both sides with soluble glass.

The roof of my car is constructed of rafters *o*, Fig. 10, on which are secured the boards *p*. These are painted on the outside with my air and water tight varnish, and on them is placed a layer, *r*, of paper, which is also painted with my varnish. On this layer is placed the roof *s*, of galvanized sheet metal, which is firmly nailed down, and finally painted with a very light oil paint. On the inside the boards *p* are also provided with a coat of varnish, on which is placed a layer of paper. On this paper are secured suitable supports for boards *u*, which have been previously coated carefully with soluble glass. The space *v* is filled up with a bad conductor of heat. On the boards *u* is secured a layer, *t*, of felt, and then a layer, *w*, of boards, is applied, which are coated on both sides with soluble glass. The doors x^0 are made precisely like the sides of the car, and on their inner surfaces, near their edges, are secured strips y^0 of india-rubber, so that when they are pressed up against the sides of the car by means of screws *z*, tight joints will be produced.

The ice-chamber B is constructed as follows: The ice is placed on the wooden grate *a'*. The floor is covered with sheet-zinc, which catches the small quantity of water flowing off from the ice. This water is carried off through a suitable waste-pipe, *d'*, which is provided with a trap or siphon to prevent the entrance of air.

The communication between the provision-chamber A and the ice-chamber B is effected by openings e^1, which may be closed by gates f^1. The ice is introduced through a door, g^1, which is constructed like the doors x^0, and which can be closed tight by means of screws. In the upper part of the ice-chamber is situated a fan-blower, *h'*, which receives its motion from the axle *i'*. It sucks in the cold air from the ice-chamber, and expels it through the pipe *k'* into the provision-chamber. This pipe has openings *l' m' n'*, through which a portion of the air escapes, while the largest part of said air passes out through the open end *o'* of said pipe. As the ventilator sucks in the air from the ice-chamber and expels it into the provision chamber, the air must return through the apertures e^1 after the same has circulated through the provision-chamber, as indicated by the arrow in Fig. 1.

In front of the aperture e^1 is placed a box, *p'*, of wire-netting, which is filled with dry charcoal. If the air in passing through the provision-chamber becomes contaminated with offensive gases, such gases are absorbed by the charcoal, and the air is kept pure. If the provision-chamber is filled with meat, the evolution of offensive gases takes place particularly on the first day, and then the apertures e^1 are closed by the gates f^1, the openings *q'* in the ice-chamber and *r'* in the provision-chamber are opened, and the fan-blower is set in motion. In a short time, by the circulation of fresh cold air, the gases are driven out, and the openings *q' r'* are then closed by suitable stoppers.

The temperature in the chambers A and B can be read off by the thermometer *s'*.

The walls of my car, particularly by the action of the soluble glass applied to the boards, retain the cold to such an extent that the fan-blower may remain at rest for days in succession; but it is best, on account of obtaining a circulation of air through the provision-chamber, to set the fan-blower in motion every day for a short time. The provisions are distributed on suitable shelves, or suspended from hooks provided for this purpose.

The car rests upon trucks of the ordinary or any suitable construction. On the axle *i'*, from which motion is to be imparted to the fan-blower, is mounted a pulley, *w'*, from which motion is imparted to a pulley, *y'*, by means of a belt, *x'*. Both these pulleys are wide, so that the motion is not disturbed by the changes in the position of the truck toward the body of the car which take place in passing over curves or switches. By these changes, and by the rising and falling motion of the car, caused by jars or shocks, the distance between the pulleys *w'* and *y'* changes, and for this reason a roller, *z'*, is pressed up against the belt *x'* by two springs, a^2, so that said belt retains its proper tension at all times. A suitable reversing-gear, b^2, is applied, so that by shifting this gear, the motion imparted to the fan-blower will take place in one and the same direction, whether the car runs backward or forward. The clutch d^2 can be moved by the lever e^2, so that the gears f^2 or g^2 are alternately set in motion. The gears f^2, Fig. 7, move in the direction of the arrows marked thereon, while the motion of the wheels g^2 is in the opposite direction. By moving the clutch to an intermediate position, as shown in Fig. 3, the fan-blower is thrown out of gear and no motion is imparted to it.

My car is intended particularly for the transportation of meat. After the provision-chamber has been filled with meat, the doors are closed and the ice-chamber is supplied with ice. If desired, the fan-blower can be set in motion by hand or other power before the car starts, so as to reduce the temperature in the provision-chamber to the desired point. During the passage, the temperature in the car is kept at from 44° to 46° Fahrenheit. When this temperature has been attained the fan-blower is stopped, and it is only set going at proper intervals to be determined by the thermometer *s'*. The ice-chamber is large

enough to receive a sufficient supply of ice for a long journey.

On the arrival at the point of destination, the meat is brought into cool, well-ventilated rooms, and it can be kept therein for several days.

My car can also be used with advantage for the transportation of fruit, vegetables, and other materials which are liable to be spoiled by changes in the temperature.

What I claim as new, and desire to secure by Letters Patent, is—

1. A non-conducting structure for the tops, bottoms, sides, or partitions of refrigerating apparatus, consisting of boards *d*, coated with an air and water tight varnish, a layer, *e*, of water and air tight paper, a layer, *g*, of felt, a layer, *f*, of boards, coated on both sides with water-glass, all combined substantially in the manner set forth.

2. The combination, in a railroad-car, of chambers A B, insulating-partition *a*, openings e^1, gates f^1, pipe *k'*, fan-blower *h'*, axle *i'*, and reversing-gear b^2, all constructed and operating substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 7th day of December, 1875.

ALOIS THOMA. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.