P. PORGES.

REFRIGERATING DEVICE FOR RAILWAY CARS.

APPLICATION FILED JULY 7, 1913.

1,093,075.

Patented Apr. 14, 1914.

2 SHEETS—SHEET 1.

Fig. 1

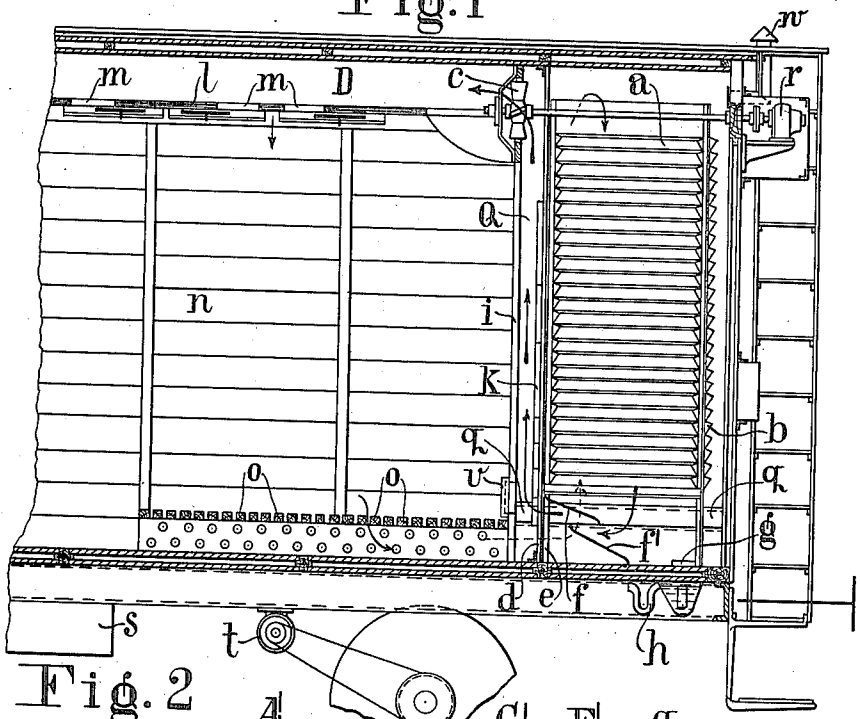
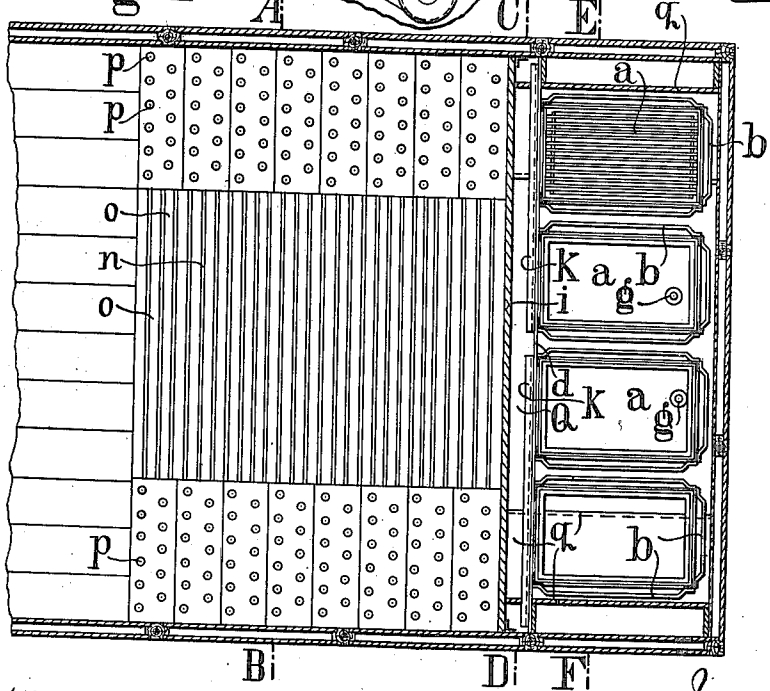


Fig. 2



Witnesses:
B. Dommers
E. Leckert.

Inventor.
Philipp Porges.
By Kenneth & Co.
Attys.

P. PORGES.

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2 SHEETS—SHEET 2.

Fig. 3

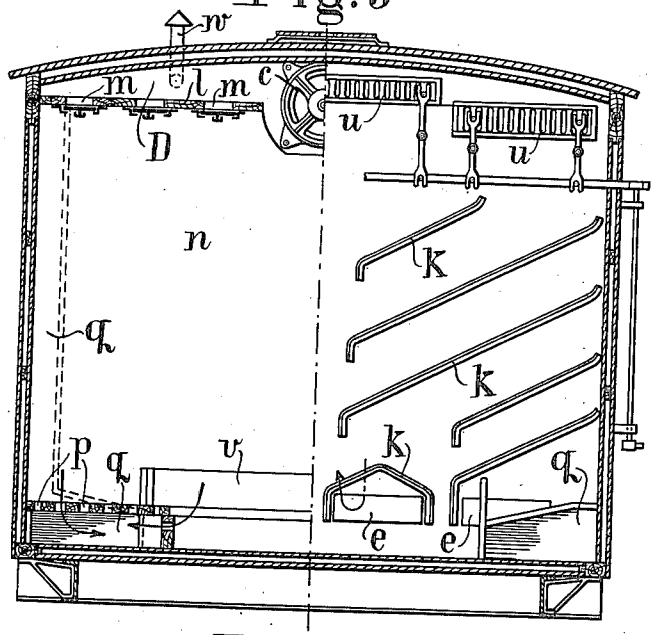
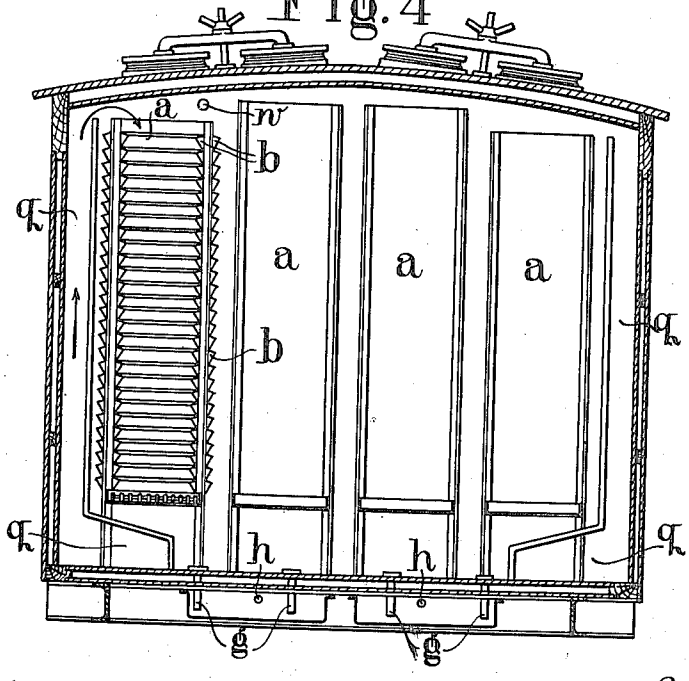


Fig. 4



Witnesses:
B. Sommers
E. Leckert.

Inventor.
Philipp Porges.
By Munn & Co
Atty

UNITED STATES PATENT OFFICE.

PHILIPP PORGES, OF VIENNA, AUSTRIA-HUNGARY.

REFRIGERATING DEVICE FOR RAILWAY-CARS.

1,093,075. Specification of Letters Patent. Patented Apr. 14, 1914.

Application filed July 7, 1913. Serial No. 777,685.

To all whom it may concern:

Be it known that I, PHILIPP PORGES, subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Refrigerating Devices for Railway-Cars, of which the following is a specification.

My invention relates to refrigerating apparatus especially designed for railway cars and it has for its object to improve the circulation of the air through the refrigerating compartments and the car and to provide means for drying the cooled air.

The invention consists in the construction and arrangement of parts hereinafter described and claimed.

The accompanying drawings show an arrangement according to this invention, Figure 1 being a vertical longitudinal section, Fig. 2 a horizontal section. Fig. 3 is a cross section, the left hand half of which is taken on the line A—B, Fig. 2, and the right hand half taken on the line C—D of Fig. 2, and Fig. 4 is a cross section on line E—F of Fig. 2.

At one or both end walls of the car body, are arranged in a row several ice tanks *a* provided on three sides with series of superposed air inlet slots *b* with inclined guide surfaces for the air to be cooled. The fourth side of the ice tanks *a* adjoins a sheet metal partition *d* which separates the cooling chamber from the rest of the car and is provided with openings *e* for the escape of the cold air only near the bottom. Under the ice tanks *a* are arranged inclined surfaces *f* and *f'* in such manner that the water produced by the melting of the ice in the tanks, does not flow through the circulation openings *e* and so as to prevent drops of water from being carried away by the air current. The water runs along the surfaces *f* and *f'* to a sheet metal tray arranged on the floor, whence it is removed by a closed siphon *g h* under the floor of the car, so that no outer air can get into the ice chamber. Above the ice tanks is arranged a small air pipe *w* which can be opened, in order to draw in from time to time fresh air, while the excess of foul air escapes owing to the porosity and leakages of the car, or is removed in the normal manner through closing caps. The sheet metal partitions *d* cooled by ice, forms with a parallel insulating wooden wall *i* shutting off the interior of the car, a conduit Q extending throughout the whole width of the car and connecting the space under the ice tanks, to the fan *c*. The sheet metal wall *d* is provided with ribs *k* arranged in such manner that the water of condensation formed, is carried past the openings *e*. At the highest points of the sheet metal wall *d* are arranged ventilating valves *u*, while at the bottom of the wooden wall *i* there is a valve *v*. These two parts become operative only in case of the other devices getting out of order.

The fan *c* is mounted above the wooden wall *i*. Its spindle is extended in such manner that the motor *r* required for driving it, can be arranged outside. Under the car are arranged one or more dynamos *t* driven from the axles and used for charging accumulators *s*. The latter supply current to the motor *r* of the fan. The number of revolutions of the fan can be regulated by means of resistances, so that the speed of circulation of the air can be increased or reduced. In that way, it is possible to regulate the temperature in the interior. This regulation could be effected either from the outside, or by hand, or by means of thermostats projecting into the interior of the car, the inside temperature being determined by means of thermometers arranged on the lateral walls and visible from the outside.

Between the insulated roof of the car and the interior of the car is provided an intermediate ceiling *l*, so that a hollow space is formed between it and the roof of the car. The intermediate ceiling *l* is provided with outlets *m* distributed over the whole area of the top of the car, the said outlets opening into the storing space *n*, and being regulated by means of slides. The storing space of the car has a double floor and communicates through slots between the slats *o* and holes *p* with conduits *q* at both sides of the ice tanks *a* and again returning the air into the space above the ice tanks.

During the working, the warm air from the storing space *n* rises through the conduits *q* and passes over the ice tanks *a* where it sinks owing to its being cooled. Its natural movement is accelerated by the draft of the fan. It enters the space under the ice tanks and is drawn by the fan *c* through the openings *e* of the sheet metal wall *d* into the conduit Q between the latter and the wooden wall *i*, and in passing through the said conduit, deposits on the sheet metal wall cooled by ice, in the form of water, the moisture

mechanically carried away by contact with the melting ice and water, and a portion of the hygroscopic moisture, so that the air retains only the moisture corresponding to its temperature. The water of condensation is guided by the ribs *k* of the sheet metal wall *i* past the openings *e*, in order that the air drawn through the said openings should not have to pass through a regular shower. The fan *c* forces the air drawn in, into the hollow space D between the two roofs, whence the air which by that time is cooled and deprived of moisture, is uniformly distributed through the numerous adjustable openings *m* over the whole storing space *n* and owing to the higher specific gravity of the cold air, accelerated by the action of the fan, sinks in the same. It passes again through the slots between the laths *o* and the holes *p* of the floor, into the double bottom in order to begin again its circulation. From time to time, a portion of the air is renewed by drawing in fresh air through the air pipe *w*.

In the event of the motor, fan or one of the machines getting out of order, the cooling does not stop altogether, as the ventilating slides *u* and the valve *v* in the wooden wall *i*, are opened, so that a natural circulation is produced, the warm air from the interior of the car passing through the openings of the slides *u* in the ceiling over the ice tanks *a*, sinking through the latter owing to the greater weight of the cold air and flowing again through the openings *e* and the valve *v* into the storing space.

This arrangement has therefore the following technical advantages: 1. Owing to the use of electric drive by accumulators which are charged during the traveling, the fans do not stop working during the stoppage at the stations, and the temperature can be regulated by modifying the number of revolutions of the fan, while the possibility of arranging the fan at the most favorable point, insures perfect circulation or air. 2. Owing to the described method of guiding the air, the air is first strongly cooled and moistened, and then dried as far as possible and desirable, by the arrangement of the cooled sheet metal wall *d* and of the chamber Q, so that it is saturated with moisture only to the degree corresponding to its temperature. 3. The distribution of air is extremely uniform owing to the arrangement of a false roof and of a false floor, the air being both uniformly supplied to the whole space and uniformly exhausted.

Owing to this arrangement, it is possible to comply with the requirements of the transport and to arrange large quantities of goods in one car, and in spite of its size, to insure a uniform temperature in its interior.

Claims—

1. A refrigerator car, comprising a storage compartment, an ice compartment having a sheet metal wall opposite a wall of the storage compartment and forming therewith an air-conduit communicating with said compartments, and ribs on the sheet metal wall for carrying off water of condensation on the latter.

2. A refrigerator car, comprising a storage compartment, an ice compartment having a sheet metal wall opposite a wall of the storage compartment and forming therewith an air-conduit communicating with said compartments, ribs on the sheet metal wall for carrying off water of condensation on the latter, and a fan for conveying the air from the conduit to the storage compartment.

3. A refrigerator car, comprising a storage compartment, an ice compartment having a sheet metal wall parallel to an end wall of the storage compartment and forming therewith an air conduit communicating with the storage and ice compartments at the top and bottom respectively, and ribs on the sheet metal wall in the conduit for carrying off water of condensation on the latter.

4. A refrigerator car, comprising a storage compartment surrounded by air chambers and communicating therewith through openings in the top and bottom of the compartment, an ice compartment adjacent the storage compartment and having a sheet metal wall forming a conduit with the end wall of the storage compartment and communicating with the latter, said sheet metal wall having an opening near its bottom through which the ice compartment communicates with the conduit, baffle plates in the ice compartment above said opening and ribs on the metal wall in the conduit to conduct the water of condensation around said opening.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PHILIPP PORGES.

Witnesses:
JOSEF RUBARCH,
AUGUST FUGGER.