

D. HENNESSY.

REFRIGERATOR SYSTEM FOR CARS.

No. 321,601.

Patented July 7, 1885.

Fig. 1.

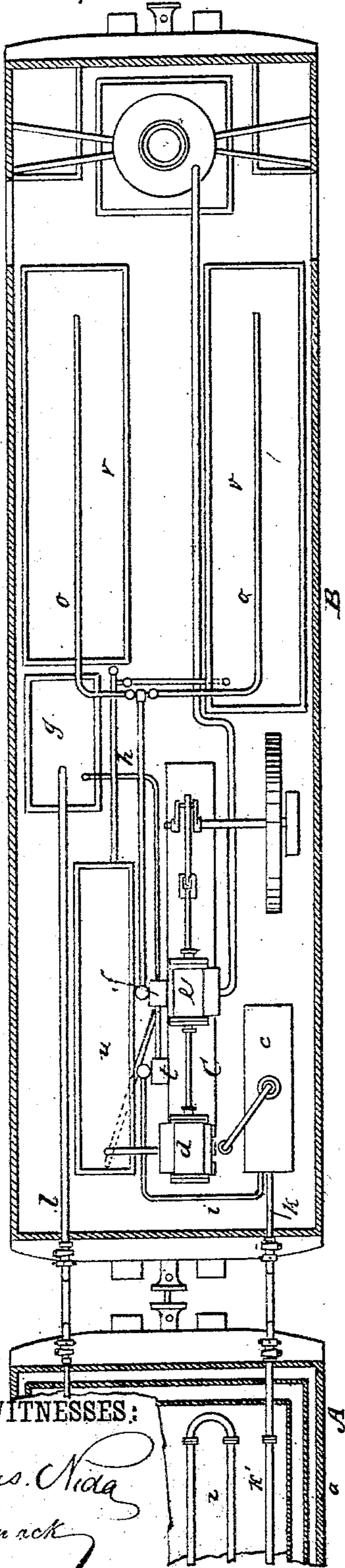
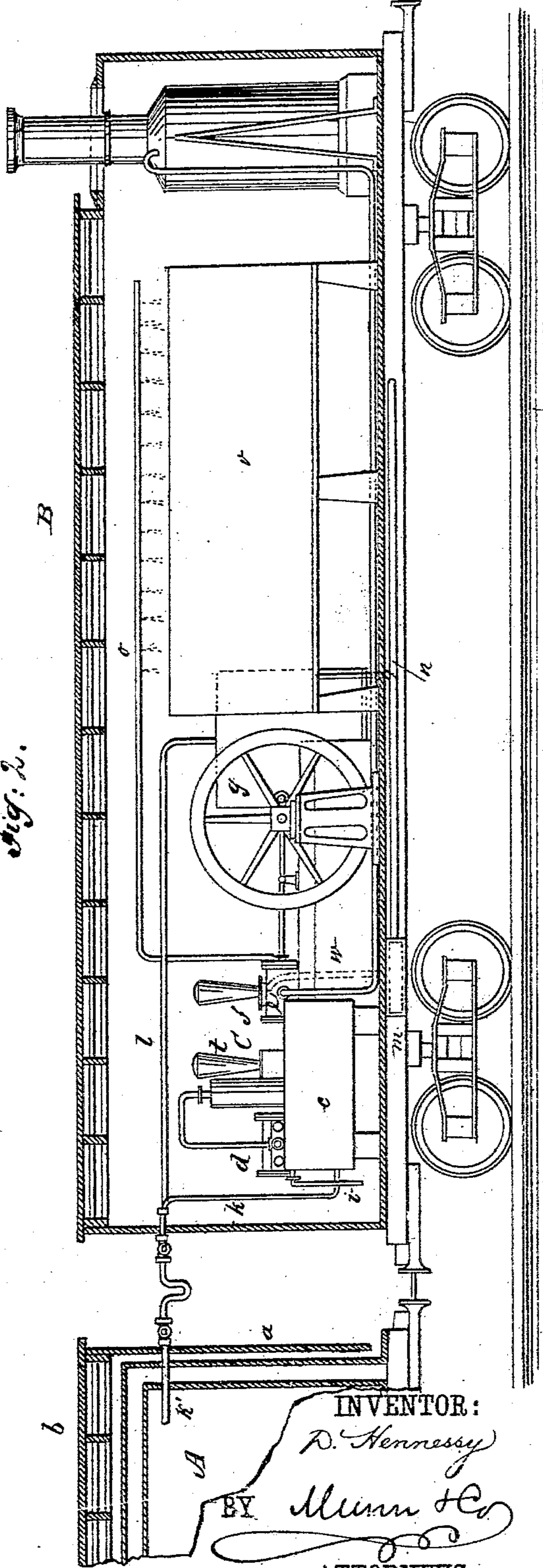


Fig. 2.



WITNESSES:

Chas. Nida
C. Sedgwick

INVENTOR:

D. Hennessy

BY

Munn & Co

ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

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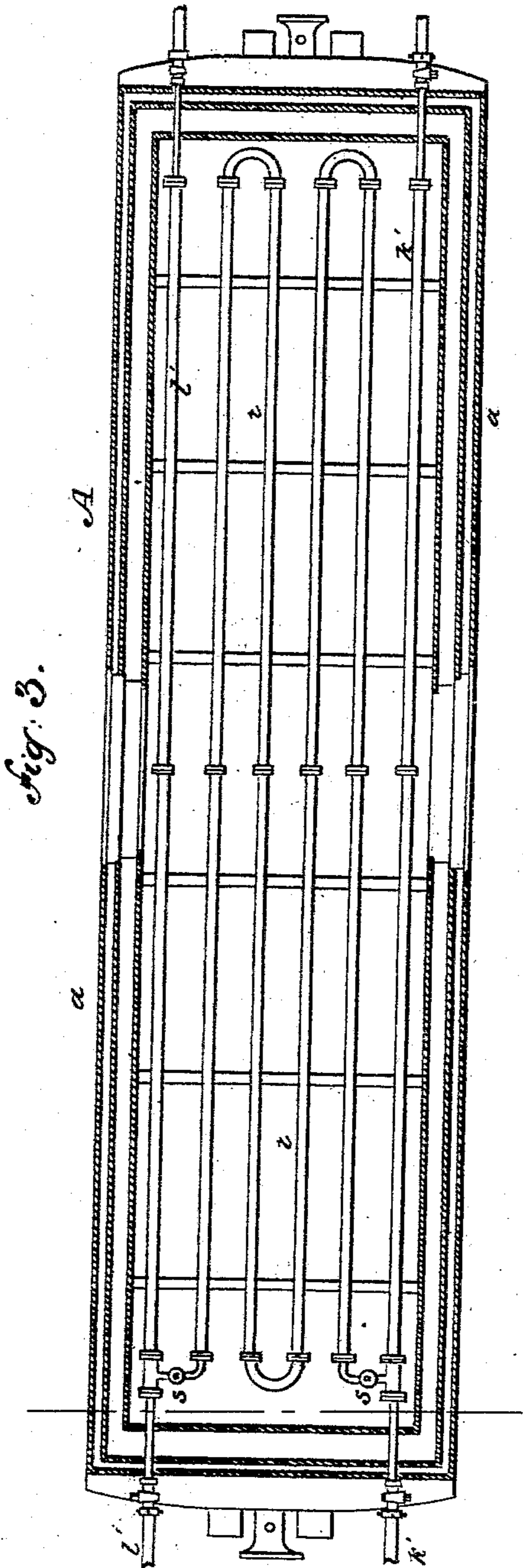


Fig. 4.

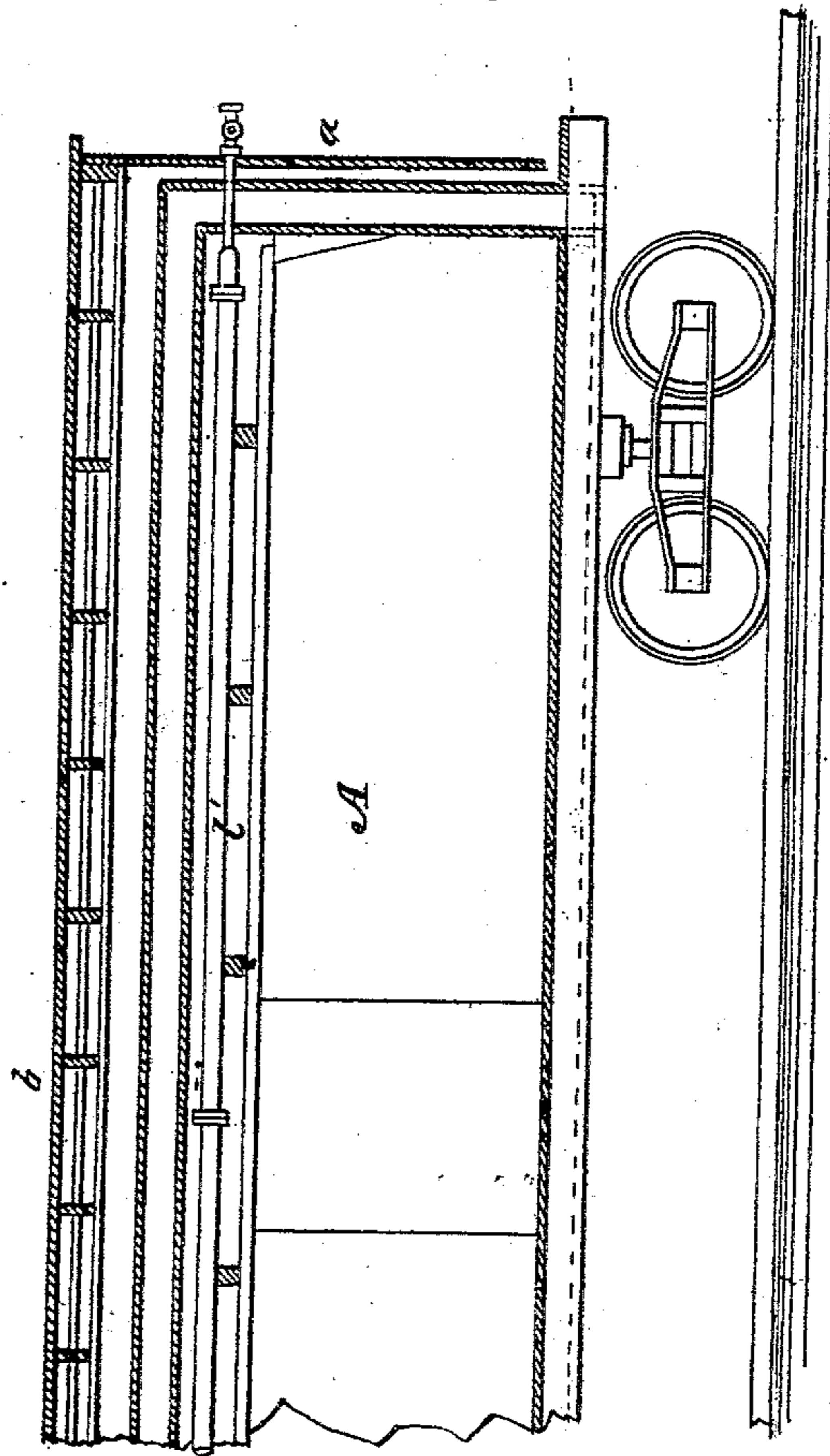
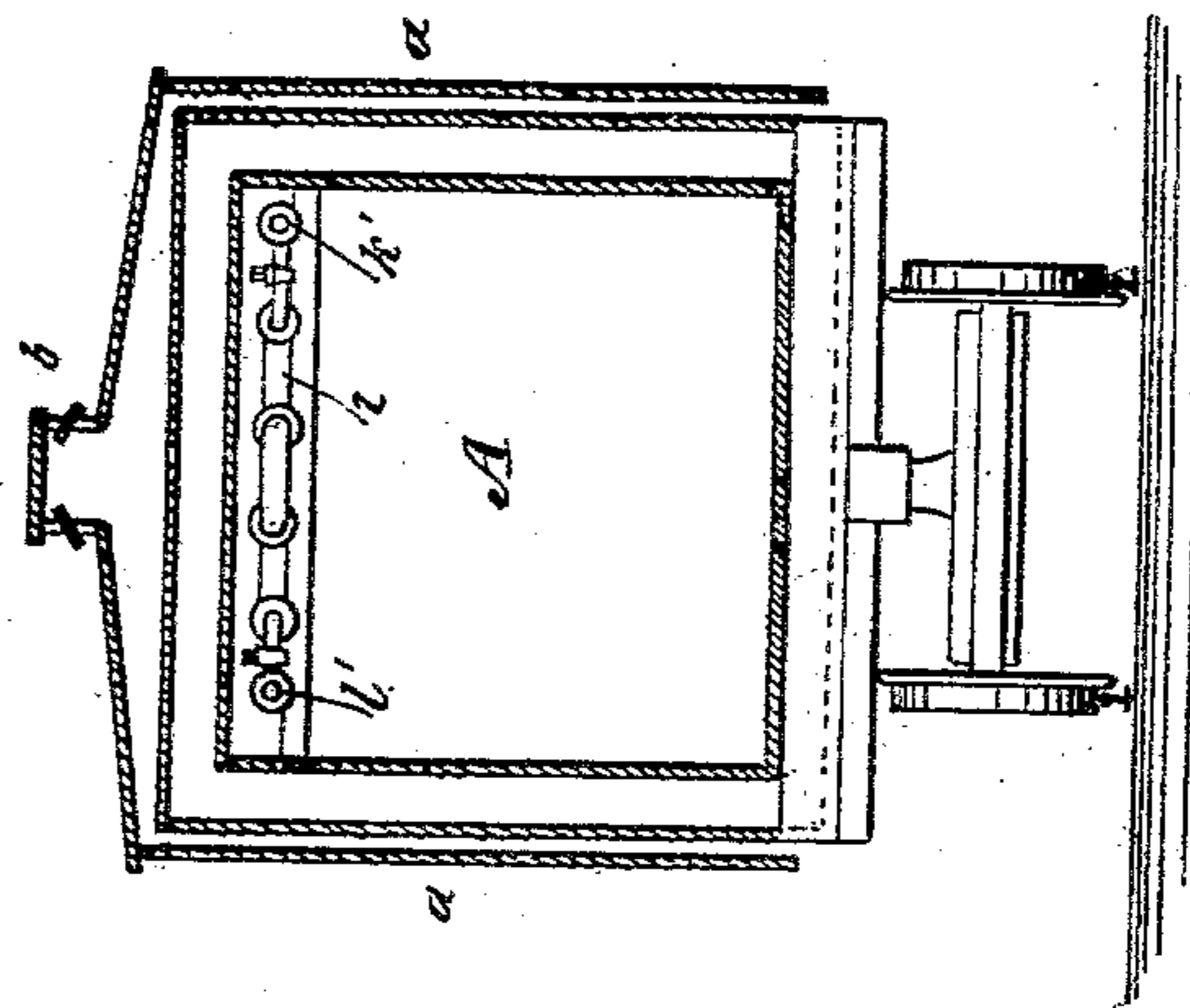


Fig. 5.



WITNESSES:

Chas. A. Aida
C. Sedgwick

INVENTOR:

D. Hennessy

BY *Munn & Co*

ATTORNEYS.

UNITED STATES PATENT OFFICE.

DAVID HENNESSY, OF NEW YORK, N. Y.

REFRIGERATOR SYSTEM FOR CARS.

SPECIFICATION forming part of Letters Patent No. 321,601, dated July 7, 1885.

Application filed August 16, 1884. (No model.)

To all whom it may concern:

Be it known that I, DAVID HENNESSY, of the city, county, and State of New York, have invented a new and Improved Refrigerator System for Cars, of which the following is a full, clear, and exact description.

This invention relates to that system of refrigeration the object of which is to dispense with ice as a means for refrigerating cars used in transporting perishable freight, and substitute therefor brine reduced in temperature to a low degree—say, 20° below freezing-point—and circulated continuously by pipes extending through all the cars of the train, so as to obtain the desired temperature. I provide a car carrying an ice-machine and brine and water tanks, and from this car pipes extend through the freight-cars, and by a pump the brine, after passing through the ice-machine refrigerator, is forced to the end of the train and returned to the brine-tank, so that a continued circulation is kept up, all as specified more particularly hereinafter.

The invention consists in the employment of a fresh-water condenser in combination with the motor that works the refrigerating apparatus, and in certain details connected therewith, whereby special advantages are obtained, substantially as hereinafter specified; and the invention further consists in a novel provision within the freight-cars of the train of certain brine passing, return, and circulating pipes, hereinafter described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional plan view, and Fig. 2 a vertical longitudinal section of the machine car. Fig. 3 is a sectional plan view. Fig. 4 is a sectional side view, and Fig. 5 a cross-section, of the refrigerator freight-car.

The freight-cars A may be of any suitable construction. As shown, they are constructed with double top, bottom, and sides filled with sawdust, and with an outer covering, *a*, set off from the sides and ends, so as to form an air-space which is open at the bottom and connects with ventilators *b* at the top of the car, so that the air may pass freely upward, thus insuring a circulation of air and cutting off

the direct rays of the sun from the main body of the car.

It is to be observed that the air-space extends over the top of the car as well as at the sides, and by the opening to the ventilators a constantly-moving current of air is caused on all sides of the car, so that the air changes constantly, and there is no accumulation of heated air.

The car B, which is preferably placed at the rear of the train, carries an ice-machine, C, of any ordinary kind. *c* is the refrigerating-chamber; *d*, the compression or a vacuum pump. *t* is the brine-pump. *e* is an engine connected for operating the compression or vacuum and brine pumps, and also operating a water-pump, *f*, that maintains a circulation of water through the condenser *u*, and back to the fresh-water tanks *v*. *g* is a tank to contain brine. *v* are tanks containing fresh water for the condenser and to supply the engine-boiler. *h* are suction-pipes from the brine-tank to pump *t*. *i* are pipes from the pump *t* to the refrigerating-chamber *c*. *k* are pipes from the chamber *c*, for conveying the cooled brine. *l* are the return-brine pipes leading to the brine-tank *g*. *m* is a tank, and *n* a series of pipes, which are placed beneath the bottom of the car, to serve as a cooler for the water used in condensing. From the pump *f* pipes *o* extend over the tanks *v*, and these pipes are perforated, so as to discharge the water into the tanks in fine streams or in a spray. The fresh-water pump *f* is connected by pipes *w* to the tank *m*, and the condenser connects by pipes to tanks *v* and *m*, so as to obtain a circulation through the condenser *u*, tank *m*, coil *n*, pump *f*, and pipes *o*. The cars A are provided with tubes *k' l'*, which extend lengthwise at the top of the car and at opposite sides, and these connect to the opposite ends of the back-and-forth pipes, *r*, at the top part of the cars. The pipes *k' l'* connect to the pipes *k l* at car B, so as to form a continuous line of pipe from the ice-machine to the end of the train and back again, and the pipes *r* allow an independent circulation in each car and a return of the water by pipes *l'*, so that the brine used in one car is not sent through other cars, but returned directly to the car B and brine-tank. At *s* are cocks for cutting off the

supply of brine from the pipes *r*, so that in case any one car is being unloaded the circulation can be stopped therein.

In operation the brine is drawn from the tank *g* by the pump *t*, and forced through the refrigerating-chamber of the ice-machine, from whence it issues by pipe *k*, cooled to a low temperature, and passes by pipes *k'* and *r* to and through the cars. Returning by pipes *l'*, *l*, the brine goes to the brine-tank. The fresh water from tanks *v* passes through the condenser of the ice-machine, and from thence goes to the tank *m* and series of pipes *n*, which being exposed to the outer air, act to reduce the temperature of the water the few degrees it has gained, and this cooling is assisted by the spraying of the water into the tank, so that it is in condition for being used over again. In this manner the refrigeration of cars can be kept up for any required length of time without expense, except for the small amount of fuel necessary to run the ice-machine. The same water is used over and over for condensing, with no waste except to supply the boiler, so that renewal is required only at long intervals, and in case of delay where water is not accessible the operation of the ice-machine will not be stopped.

In case it becomes necessary at any time to vary the temperature in one or more of the cars, or cut off the circulation entirely from any of the cars, that can be done, as it is allowed by the independent system of circulation-pipes in each car. This arrangement also allows one or more cars of the train to be used for ordinary freight in case that becomes desirable.

The use of the fresh-water condenser or condensing means, in connection with the motor that works the refrigerating apparatus, is very important. By it the engine is prevented from stopping for lack of water, and on long routes, and especially where detention occurs on the road in a place where water is not accessible, by using the same water over again the refrigeration is maintained, and the contents of the train are preserved indefinitely without having recourse to water outside of

the car in which the refrigerating machine is placed. The arrangement of the water-cooling tank *m*, and especially the water-cooling pipes *n* under the bottom of the car, where they are always exposed to strong drafts of air, and the spray-pipes *o*, which deliver the water of condensation in jets cooled by contact with the air, most effectually obtain the desired results so far as the combination of a fresh-water condenser with the motor that works the refrigerating apparatus is concerned.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a refrigerator system for railroad-cars, in which an ice-machine is used, the combination of a fresh-water condenser with the refrigerating apparatus and with the motor which operates said apparatus, substantially as specified.

2. In combination with the car B, ice-machine C, condenser *u*, the motor which operates said machine and tank or tanks *v*, for supplying both the condenser and motor-boiler of the water-cooling tank *m*, essentially as described.

3. In combination with the car B, its ice-machine C, and motor for operating the refrigerating apparatus, of water-cooling circulating means, substantially as described, arranged beneath and outside of the car-body, essentially as and for the purposes herein set forth.

4. The perforated water-spray pipes *o*, in combination with the tanks *v* *m*, pump *f*, and condenser *u*, substantially as specified.

5. The combination, with car B, ice-machine C, and tank *v*, of the tank *m*, coil *n*, and spray-pipe *o*, substantially as and for the purpose specified.

6. The cars A, provided with pipes *k' l'*, and the back-and-forth circulation-pipes *r*, substantially as described.

D. HENNESSY.

Witnesses:

GEO. D. WALKER,
C. SEDGWICK.