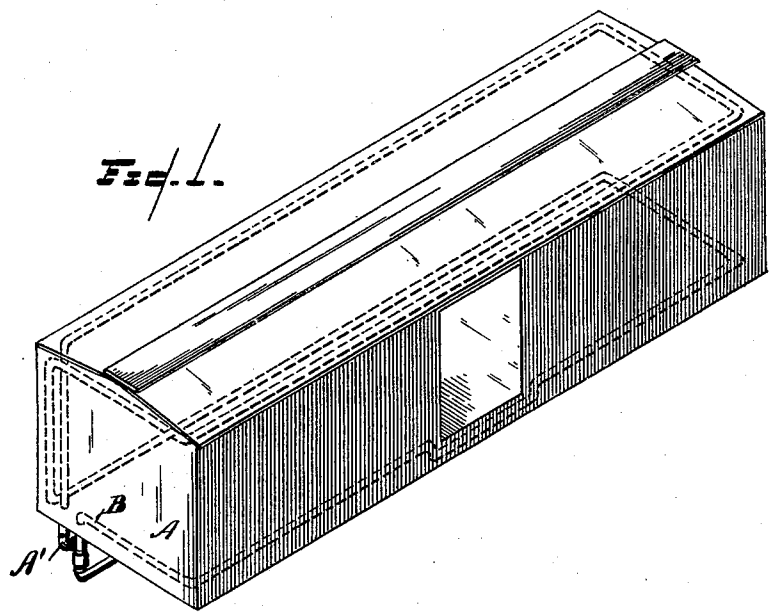
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# W. H. WOODS.

## REFRIGERATOR CAR.

No. 591,316. Patented Oct. 5, 1897.

Fig. 1.



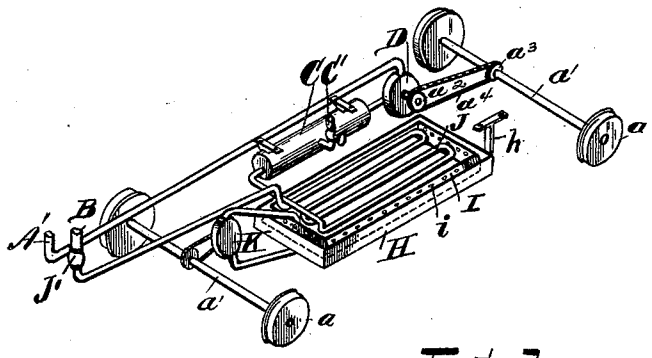




Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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## REFRIGERATOR CAR.

No. 591,316. Patented Oct. 5, 1897.

Fig. 3.

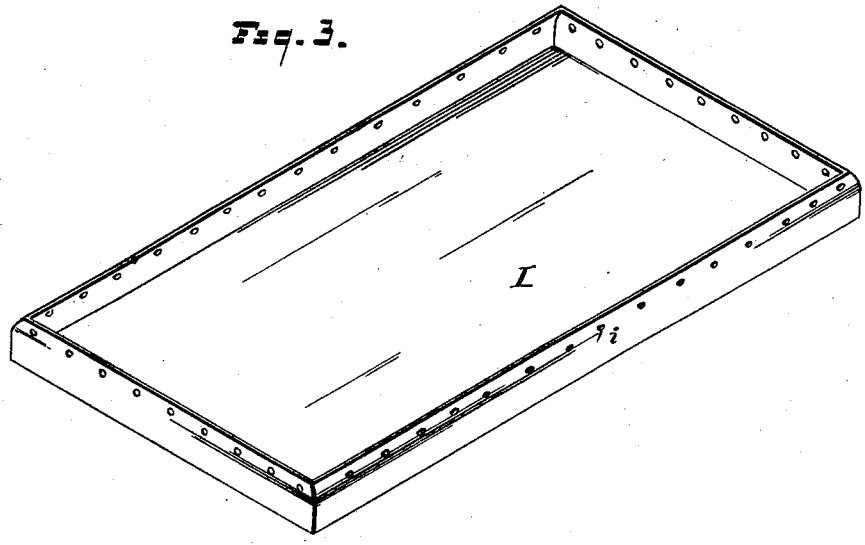
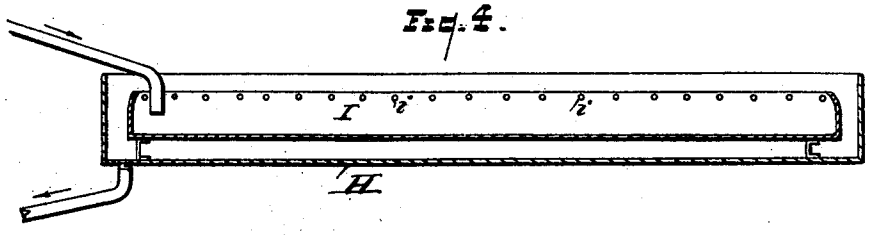



Fig. 4.




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# UNITED STATES PATENT OFFICE.

WILLIAM H. WOODS, OF DETROIT, MICHIGAN, ASSIGNOR OF TWO-THIRDS TO ROBERT FERGUSON AND ELBERT R. TODD, OF SAME PLACE.

## REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 591,316, dated October 5, 1897.

Application filed November 23, 1896. Serial No. 613,087. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. WOODS, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Refrigerator-Cars; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to refrigerator-cars, and its object is to provide means for compressing and circulating ammonia-gas or other refrigerating vapor by means of the power generated by the movement of the car.

My invention is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a car, showing the refrigerating-pipes in dotted lines. Fig. 2 is a perspective showing the means of compressing the circulating vapor used in refrigerating. Fig. 3 is a separate view of the tank I. Fig. 4 is a longitudinal sectional view showing the tank I located within the tank H, but with the coil removed.

In the drawings, A represents the body of a car, $a$ $a$ the car-wheels, and $a'$ $a'$ the axles.

B represents the supply end of the circulating-pipes in the car, and A′ the return end. These pipes I prefer to pass around the car at the top and bottom.

C is an ammonia-tank bolted to the under side of the car.

D is a rotary pump which receives the gas on the return from the circulation and compresses it into the tank C.

$a^2$ and $a^3$ are sprocket-wheels on the shaft of the pump and the car-axle, respectively, and $a^4$ is a sprocket-chain by means of which the pump is driven from the car-axle.

C′ is an inlet-valve through which to charge the tank with ammonia in starting the device.

H is a water-tank supported on the hangers $h$ $h$ underneath the car and is left open at the top.

I is another tank inside of the tank H, also open at the top, and around the edge it is provided with the perforated rim $i$.

J J are coils of pipe forming a part of the circulating system and are located in the inner tank, where they are surrounded by the water contained in that tank. The tank I is filled with water, the tank H partially so, and the pump K, operating from the axle of the car in like manner as the ammonia-pump, is employed to pump the water from the tank H into the inner tank, where it overflows through the perforations in the rim $i$ into the outer tank, causing the water to circulate constantly from one tank to the other while the car is in motion.

J′ is a resistance-valve arranged to pass the ammonia or gas upward from the coils into the circulating-pipes in the car only when the pressure in the tank and coils gets above a determined amount, preferably a pound or two above that necessary to compress the ammonia-gas into a liquid.

The operation of the device is as follows: The ammonia-tank is filled with liquid ammonia, which is held in this state by the resistance-valve J′, with a difference of about thirty pounds below and above the valve. As soon as the car starts the pump D reduces the pressure in front of the valve by exhausting from the refrigerating-pipe, which admits ammonia from below the valve to pass into the refrigerating-pipes, where it expands and takes up heat in the manner common to such devices. The coils J J are kept in the water-tank to keep the ammonia at as low temperature as possible. The water overflowing from the inner tank is cooled by contact with the air brought over it by the movement of the car.

I show a rotary pump for compressing the ammonia or other vapor, but any form of pump may be used.

While I show gearing for the pump adapted to work when the car is going in one direction only, suitable gearing may be employed to run the pump in one direction, whatever direction the car may be going.

What I claim is—

In a refrigerator-car, the combination of the expansion-pipes within the car, a coil of pipe underneath the car connecting opposite ends of said pipes, means for circulating water over the coil of pipes operated by the movement of

the car, said means consisting of an outer tank H, and an inner tank I within which the coil lies suitably suspended beneath said car, and a pump operated by the movement of said car, pipes connecting said tanks with the pump whereby the pump may draw water from one tank and discharge it into the other, a pump to draw the vapor from the pipes and force it into the coil, and a resistance-valve adapted to deliver the vapor from the coil into the pipes only at a high pressure, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

WILLIAM H. WOODS.

Witnesses:
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A. F. EBELING.