

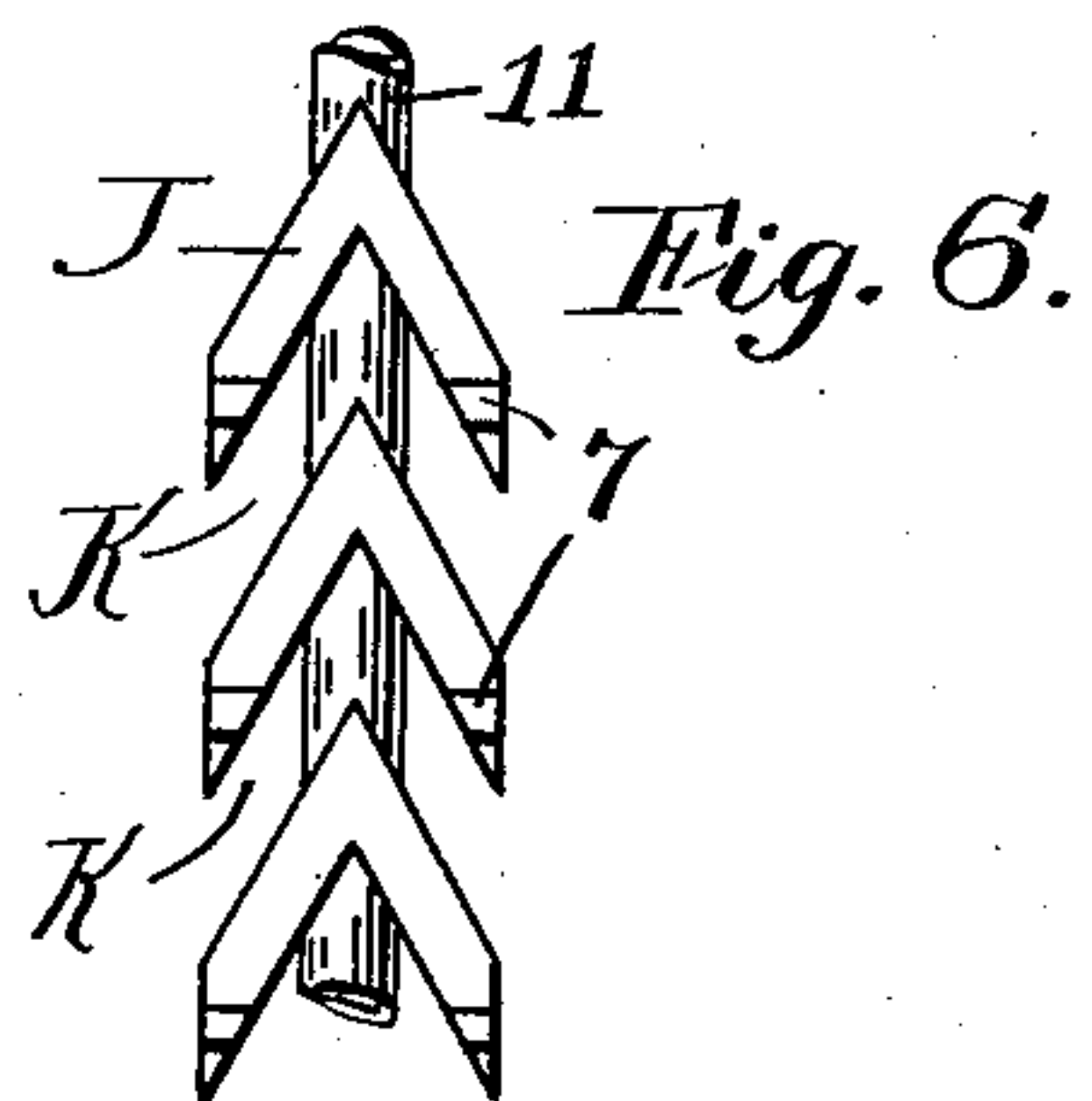
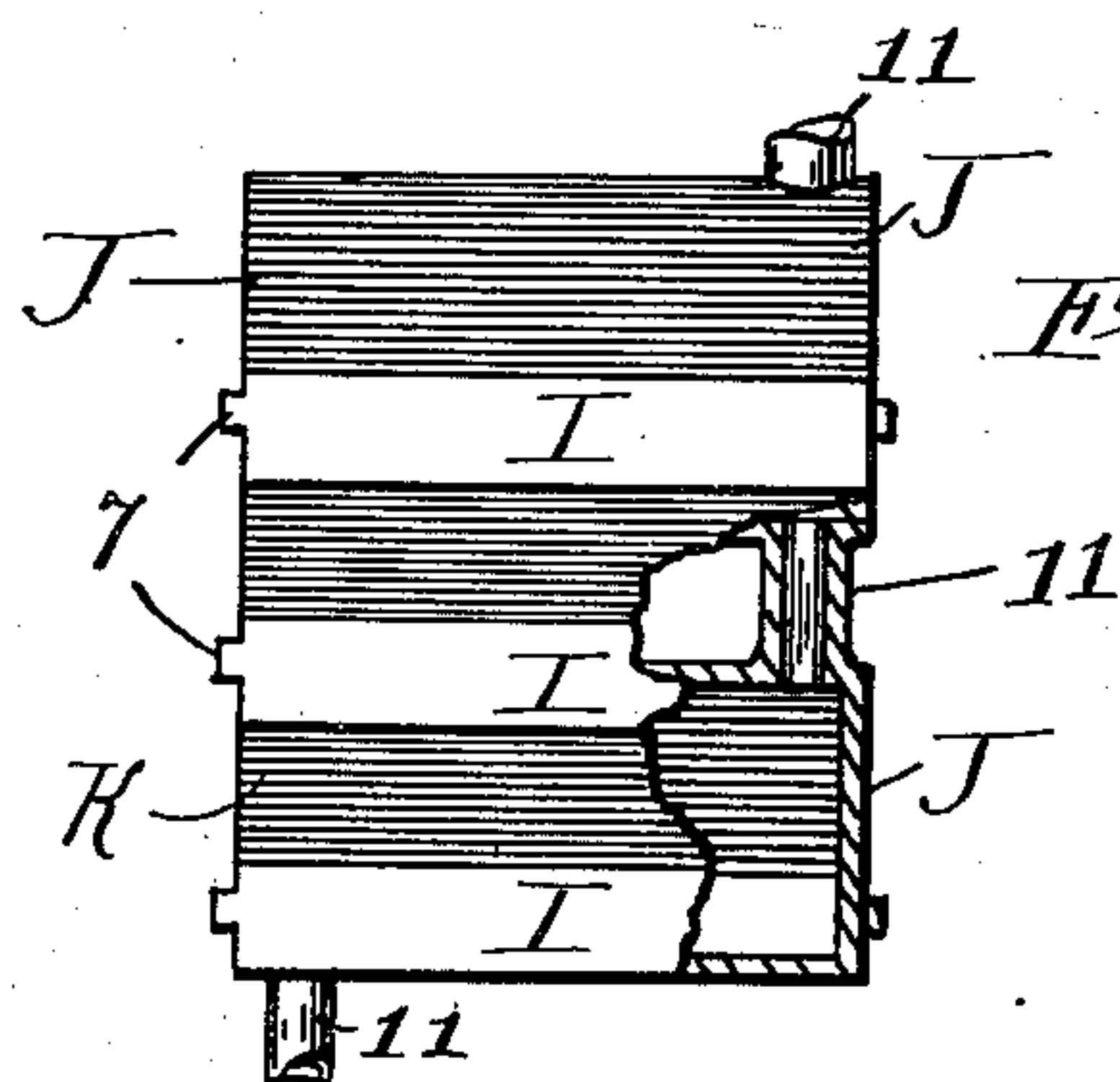
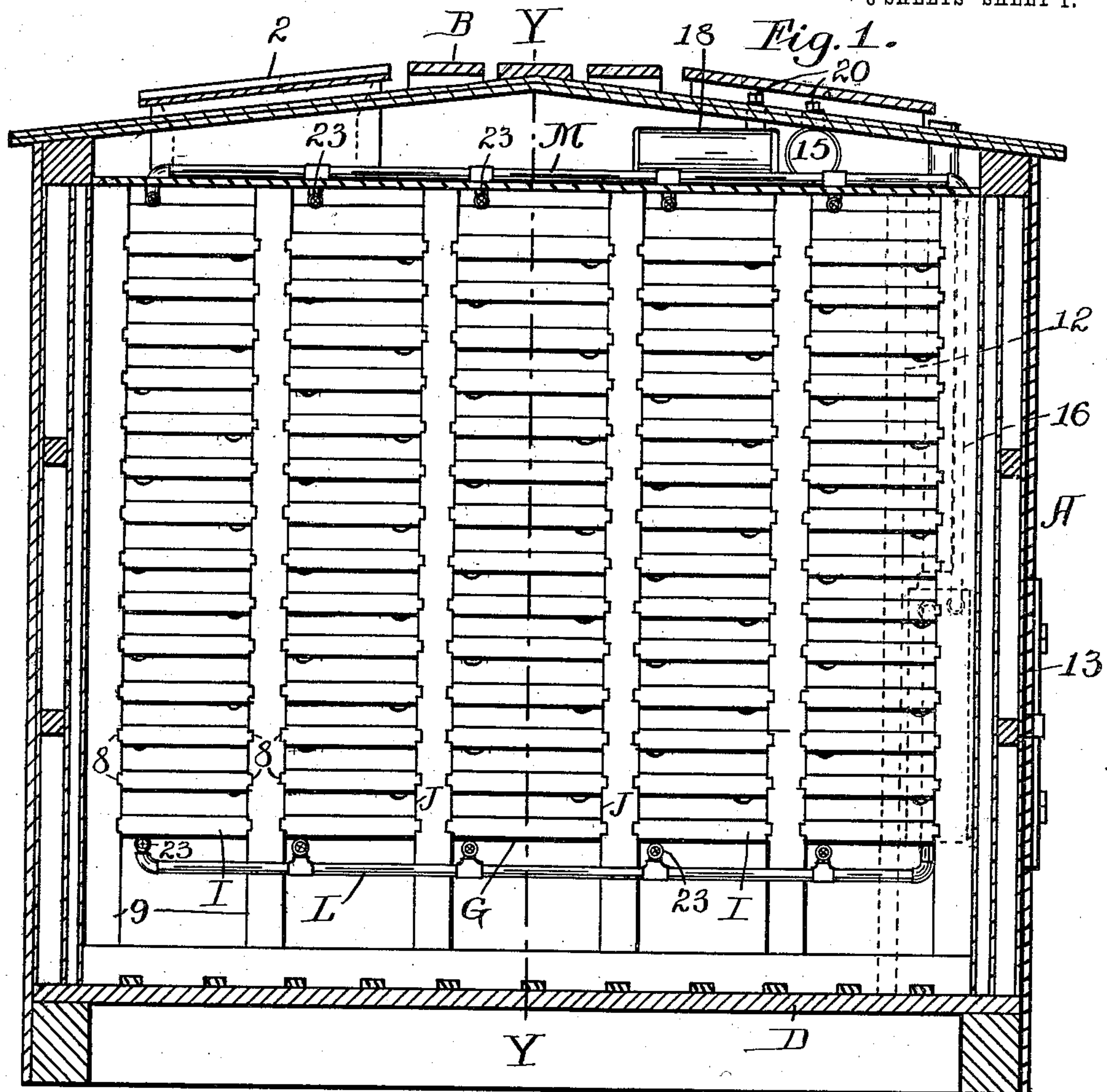
No. 891,294.

PATENTED JUNE 23, 1908.

J. A. SEEGER.  
COMBINED REFRIGERATOR AND HEATER.

APPLICATION FILED NOV. 13, 1905.

3 SHEETS—SHEET 1.



Witnesses:  
E. M. Baul.  
W. H. Williams.

Inventor:  
John A. Seeger.  
by: J. H. Bradbury  
Attorney.

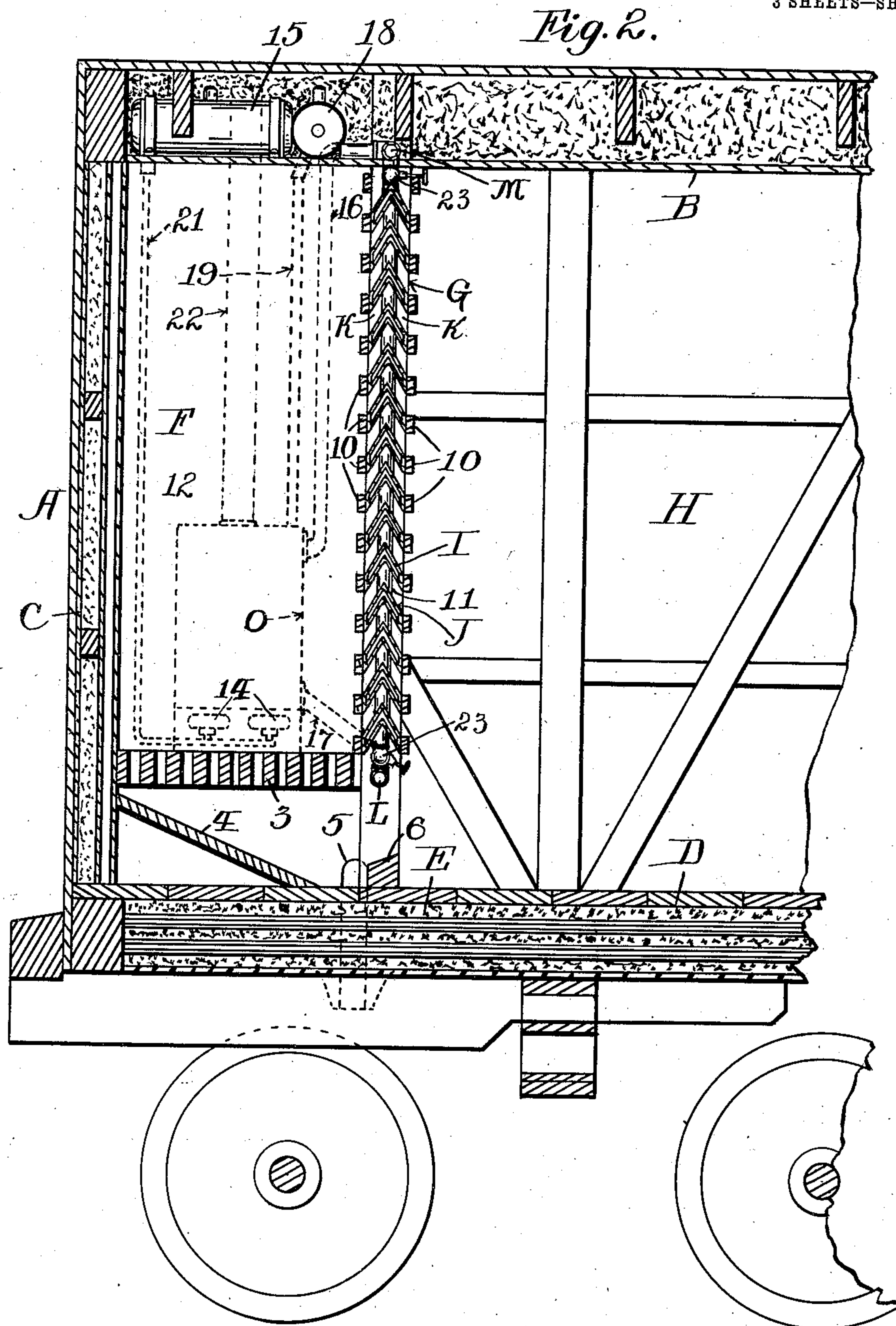
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3 SHEETS—SHEET 2.



Witnesses:

E. M. Bessel.

W. H. Williams.

Inventor:

John A. Seeger,

by: H. S. Bradley.

Attorney.



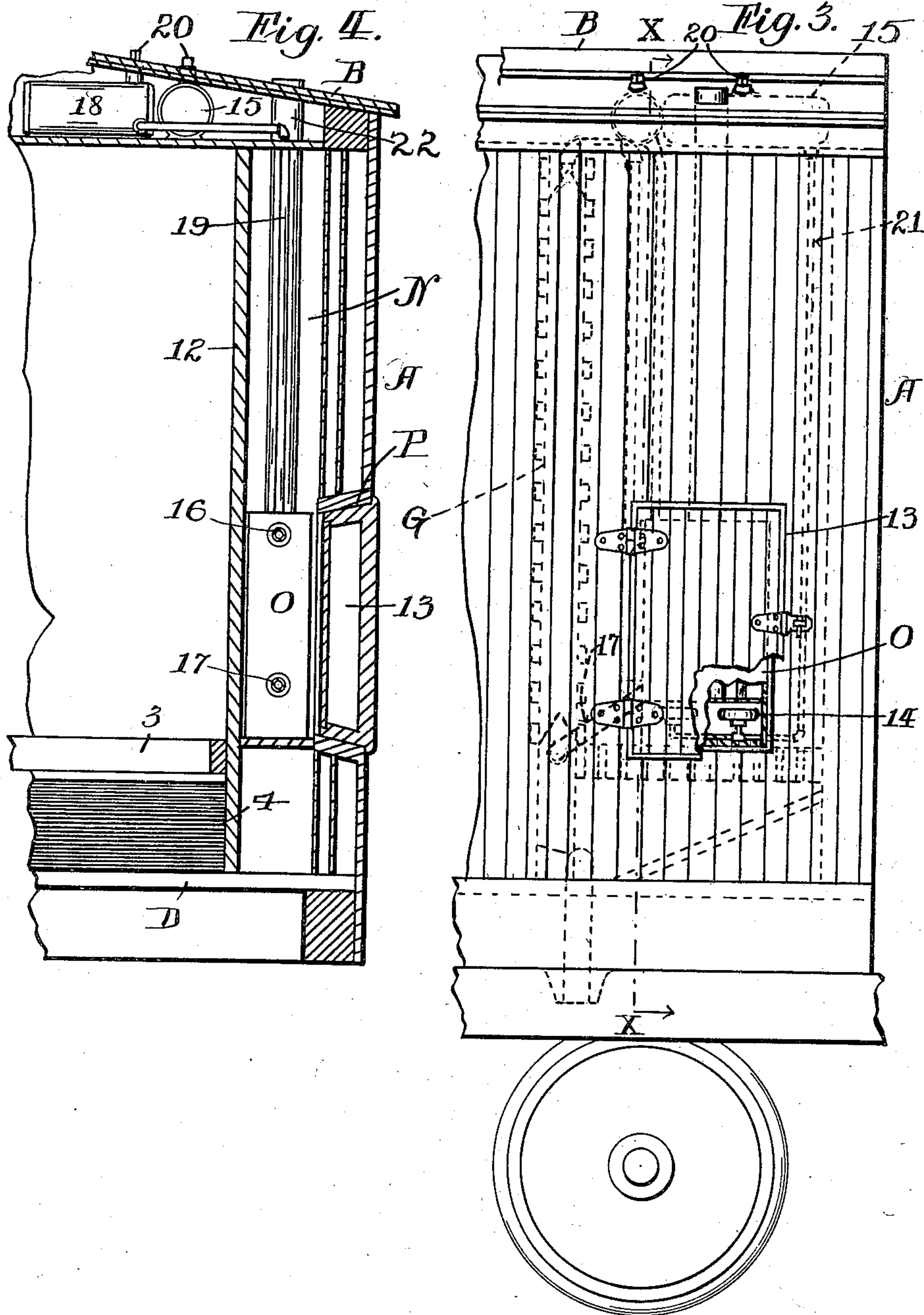
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APPLICATION FILED NOV. 13, 1905.

3 SHEETS—SHEET 3.



Witnesses:  
E. M. Boesel.  
W. H. Williams.

Inventor:  
John A. Seeger,  
by: W. S. Bradbury.  
Attorney.



# UNITED STATES PATENT OFFICE.

JOHN A. SEEGER, OF ST. PAUL, MINNESOTA.

## COMBINED REFRIGERATOR AND HEATER.

No. 891,294.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed November 13, 1905. Serial No. 287,028.

*To all whom it may concern:*

Be it known that I, JOHN A. SEEGER, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Combined Refrigerator and Heater, of which the following is a specification.

My invention relates to improvements in a combined refrigerator and heater.

More particularly, this invention is applicable to railway cars, although it may be used as a stationary fixture in places where it is desired to preserve food and other perishable articles, which are likely to be impaired by heat in the summer time or cold in the winter time.

Two objects attained by this invention are the maintenance of a sufficiently low temperature within the car when the outside atmosphere is warm and of a temperature above freezing when the outside atmosphere is below.

A further object of my invention is to provide an efficient system of internal air circulation in the car and means for prolonging for as great a time as possible the contact of the refrigerant with the air and the maintenance of the heater, thereby avoiding waste and increasing the distance which the car can travel without a fresh supply of ice or fuel.

Further objects are simplicity of construction and greater effectiveness in use. Depending in part upon these requirements I provide a combined refrigerator and heater, by means of which the air within the car is kept at the proper temperature and humidity in the simplest and most direct and efficient manner to accomplish the objects sought.

My invention further consists of the features, details and combinations of parts hereinafter described and claimed.

In the accompanying drawings forming part of this specification, Figure 1 is a sectional view through a refrigerator car, looking toward the end containing the ice bunker and showing the guards (to be hereinafter described) removed; Fig. 2 is a longitudinal section, taken on the line Y—Y, of Fig. 1, the guards being shown in place; Fig. 3 is a detail side elevation of an end of the car, showing part of the heater and the door broken away to expose the interior mechanism; Fig. 4 is a detail sectional view, taken on the line X—X, of Fig. 3; Fig. 5 is a detail

view, partly in section, looking toward the side of one of the radiators, and Fig. 6 is an end view of Fig. 5.

The car proper, that is its walls A, roof B, ends C and flooring D, is made in any of the desired forms, and I do not wish to limit the application of my particular improvements to the special and general construction shown in the drawings. The walls, flooring and roof of the car are preferably made double, treble or quadruple, with any desired number of air spaces E between the separate portions of the wall, which air spaces may, if desired, be filled with any suitable material which will serve to insulate the interior of the car. This car is provided with an ice bunker F (or more than one), made substantially in the form shown in Fig. 2. This bunker or cooling chamber is provided with the usual trap 2 covering an opening through the roof for the admission of ice, and near the floor of the car is arranged a grate 3 for supporting the ice. Beneath the grate, near the floor of the car, is arranged a drip pan or deflector 4, which catches the drip and causes it to egress through a discharge opening 5, which adjoins a stop 6 across the floor and in front of the pan. These parts are all of ordinary construction and permit the air to pass freely through the ice bunker when filled with ice or when the heater (to be hereinafter described) is in use.

The front of the ice bunker above the grate is provided with a partition G having a plurality of radiators I, which facilitate the production of suitable air currents throughout the provision container H. Each of these radiators consists of a series of horizontal, hollow and inverted V- or any other suitable shaped tubes J arranged in a vertical row with the apex of each tube higher than the lower extremity of the one next above and spaced therefrom, thus forming ports K, as shown in Fig. 2. The tubes J are provided with suitable tenons 7, which are mortised into vertical posts 9. The frame of the partition G is constructed out of these posts and, with the radiators, forms the front wall of the ice bunker. The radiator tubes are locked in place by means of horizontal guards 10, which serve to prevent the tubes moving and the ice in the bunker and the provisions in the container from coming into direct contact with the radiators.

The tubes constituting each radiator are



connected in series, as shown, by means of pipes 11, and the lower end of the radiator is connected to a header L and its upper end to a header M.

5 In one end of the ice bunker is a vertical transverse partition 12, which forms a compartment N, in which is placed a heater O. Entering this compartment through the wall of the car is an opening P, which provides access to the heater for the purpose of regulating its supply of fuel. A door 13 is adapted to close said opening.

The heater may be of any suitable form and may be operated by coal, oil or other 15 suitable fuel. As shown, I have provided oil burners 14, which are supplied with oil by means of an overhead tank 15 and a pipe 21. The heater serves to heat a body of water, which is conducted to and from the radiators 20 by means of pipes 16 and 17, leading respectively through the headers M and L.

A reserve supply of water to the heater is provided by means of a supply tank 18, which is located overhead and connected 25 with the heater by means of a pipe 19. The water in the heater is prevented from freezing by adding a small quantity of salt or chlorid of calcium, which, with the water, in effect constitutes ordinary brine. The supply tanks 15 and 18, as shown, are located 30 between the walls of the roof of the car and access is had to them from the outside for the purpose of replenishing oil and brine by means of screw stoppers 20. A vent pipe 22 35 connected with the top of the heater and passing through the roof of the car serves as a vent for the gases or smoke from the heater.

In use, when it is desired to cool the atmosphere in the car, ice is placed in the 40 bunker by removing the trap 2. The cold air in the bunker passes down through the grate and through the opening below the same into the container, where it reduces the temperature of the atmosphere therein. The 45 air of lower temperature in the container passes up through the port or siphon-shaped openings between the radiator tubes and is deflected down upon the ice in the bunker. These spaces between the tubes are termed 50 "siphon-shaped" because they tend to act as siphons, drawing the warm air in the car up and then sharply deflecting it down by means of the difference in density between the atmosphere in the container and that in the ice 55 bunker.

When the atmosphere outside of the car is below the freezing point and it is desired to keep the temperature of the interior of the car above 32 degrees Fahrenheit, the ice in 60 the bunker is removed and the heater O used. As the water in the heater is heated, it passes down through the plurality of radiating tubes in each radiator and thence returns through the pipe 17. The air which is heated be- 65 tween the radiator tubes is drawn up from the

ice bunker and thence sharply deflected down into the container through the port passageways. The warm air is circulated in the container and, as it is reduced in temperature, passes back below the grate and upward 70 through the bunker. Thus the direction of the current of air passing through the port passageways between the tubes of the radiators when the refrigerator and heater are used is reversed. The radiators acting to heat 75 and to facilitate the radiation and circulation of the air when the heater or refrigerator is used simplifies the construction and tends to more effectively accomplish the objects sought. Valves 23 are placed in the connections 80 between the headers L and M and may be closed when it is desired to cut out any radiator for heating purposes if it leaks or if it is not desired to operate the same.

It is obvious that the shape and details of 85 construction of the radiators may be altered and that other means may be provided for heating and cooling the car without departing from the principles which I have applied, and I do not wish to confine myself to the exact construction described. It is further ob- 90 vious that any suitable heater for accomplishing the results specified may be used and that said heater may be placed in any suitable part inside or outside of the car, if de- 95 sired, or that the radiators may be connected with any suitable source of supply of hot water of other heating medium, which are all within the spirit of this invention.

Having described my invention, what I 100 claim as new and desire to protect by Letters Patent, is:—

1. In combination with a refrigerator car employing gravity circulation of air and provided with a provision container, air cooling 105 means in said car, a heater, and means employing siphonic action associated with said heater and cooling means for increasing the circulation of hot and cold air in the provision container of said car.

2. Apparatus of the class set forth, comprising a suitable inclosure, an ice bunker, a provision container, a partition between said 110 bunker and container, and a heat radiator having ports downwardly-inclined into said bunker and container, for the purposes specified.

3. Apparatus of the class set forth, comprising, in combination with a refrigerator car provided with a provision container and a 120 cooling chamber, a partition between said container and chamber provided with cold air ports, and means adjacent to said ports for heating the air passing therethrough.

4. Apparatus of the class set forth, comprising, in combination with a car employing 125 gravity circulation of air, an ice bunker, a provision container, a partition between said bunker and container, a heater, and a heat radiator in said partition connected with said 130



heater and provided with passageways which are adapted to circulate air between said bunker and container when the radiator is used to produce warmth or the ice bunker to produce cold.

5. Apparatus of the class set forth, comprising, in combination, a suitable inclosure, means for cooling said inclosure, and a heat radiator associated with said means and provided with air-conducting passageways which are adapted by gravity to direct the air in said inclosure from an upward into a downward direction, for the purposes specified.

6. Apparatus of the class set forth, comprising, in combination with a car employing gravity circulation of air and provided with means for heating it, means for cooling it, a provision container, and a partition, separating the parts from said provision container, provided with means for heating the car and a plurality of ports passing therethrough and inclined downwardly on each of its sides, for the purposes specified.

7. Apparatus of the class set forth, comprising, in combination with a refrigerator car, a provision container in said car, an ice bunker, a partition between said container and bunker provided with inverted, substantially V-shaped ports leading from said bunker into said container and a heat radiator and means for heating said radiator, for the purposes specified.

8. In a combined refrigerator and heater, a suitable inclosure employing gravity circulation of air, a provision container in said inclosure, an ice bunker, a combined heat radiator and partition between said container and bunker having a plurality of ports connecting said container with said bunker and a grating in the bottom of said bunker having its openings communicating with said container.

9. Apparatus of the class set forth, comprising, in combination with a car, a provision container in said car, an ice bunker, a partition separating said bunker from said provision container having a plurality of ports communicating therewith and a plurality of heat radiators adjoining said ports, grating in the bottom of said bunker and in communication with said provision container, means for cutting out one or more of said radiators, and a heater connected with said radiators.

10. Apparatus of the class set forth, comprising, in combination with a suitable inclosure, a provision container therein, an ice bunker, a partition between said provision container and bunker formed by a series of heat radiator sections, angular in cross section, placed one above the other and spaced apart forming inclined ports into said bunker and provision container, and a heater connected with said radiator sections.

11. Apparatus of the class set forth, comprising, in combination with a car having a suitable inclosure, a provision container and ice bunker in said inclosure, a partition formed by a series of heat radiator sections, angular in cross section, placed one above the other and spaced apart forming inclined ports connected with said provision container and ice bunker, a heater in said inclosure and connected with said radiator sections, and a doorway through the wall of said inclosure and connected with said heater.

12. Apparatus of the class set forth, comprising, in combination with a car provided with a suitable inclosure, a provision container and ice bunker contained in said inclosure, a partition between said container and bunker formed by a series of heat radiator sections placed one above the other and spaced apart forming a plurality of ports leading from said container into said bunker, a wall across said ice bunker forming a compartment, and a heater in said compartment and connected with said radiator sections.

13. Apparatus of the class set forth, comprising, in combination with a car, a provision container in said car, an ice receptacle, a partition separating said container from said receptacle having a plurality of radiator tubes connected in series and spaced apart to form air ports between said container and ice receptacle, and a heater connected with said radiator tubes.

14. Apparatus of the class set forth, comprising, in combination with a refrigerator car employing gravity circulation of air, a provision container therein, a cooling chamber, and a combined heat radiator and partition between said container and chamber provided with air ports passing therethrough, for the purposes specified.

15. In combination with a refrigerator car provided with a provision container, air cooling means in said car, and a heater between the air cooling means and said provision container having port passageways which are adapted to direct the air passing over the same from an upward to a downward direction.

16. In combination with a refrigerator car having provision and air cooling chambers, a partition between said chambers having a heater, for the purposes specified.

17. In combination with a refrigerator car provided with air cooling and provision chambers, a partition between said chambers having an air port passageway and a heater associated therewith for increasing the temperature passing through said passageway.

18. A car inclosure having a provision container, means for cooling said container, and a combined partition and heat radiator between said container and means.

19. In combination with a refrigerator car provided with a provision container, air cool-

ing means in said car, and a heater for warming the air passing between said parts and adapted to increase by gravity the circulation of the air from the cooling means into  
5 the provision chamber when the heater is not producing warmth.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

JOHN A. SEEGER.

Witnesses:

ELSIE M. BOESEL,  
F. G. BRADBURY.