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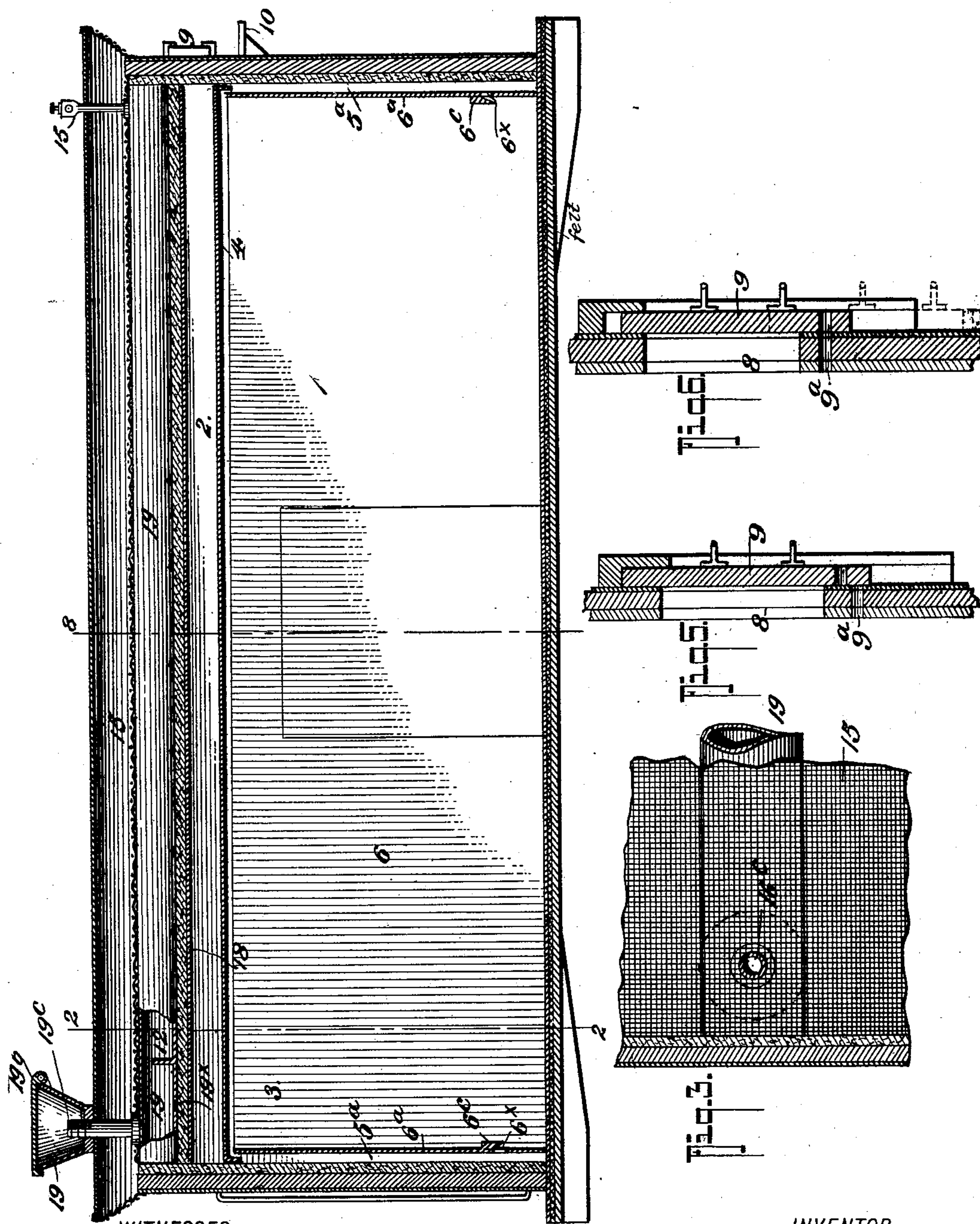
Patented May 6, 1902.

J. B. UNDERWOOD.
REFRIGERATOR CAR.

(Application filed May 15, 1901.)

(No Model.)

3 Sheets—Sheet 1.



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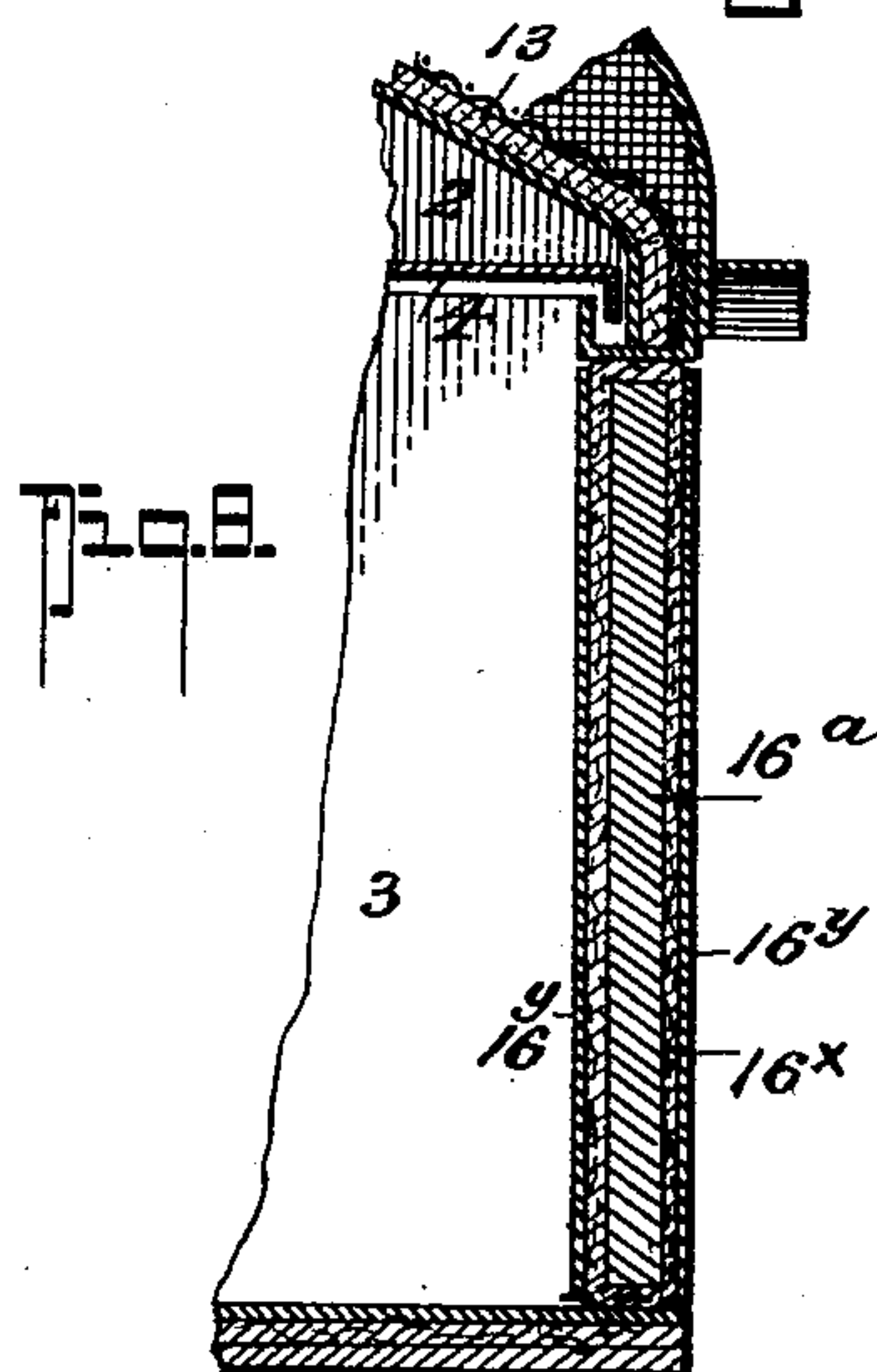
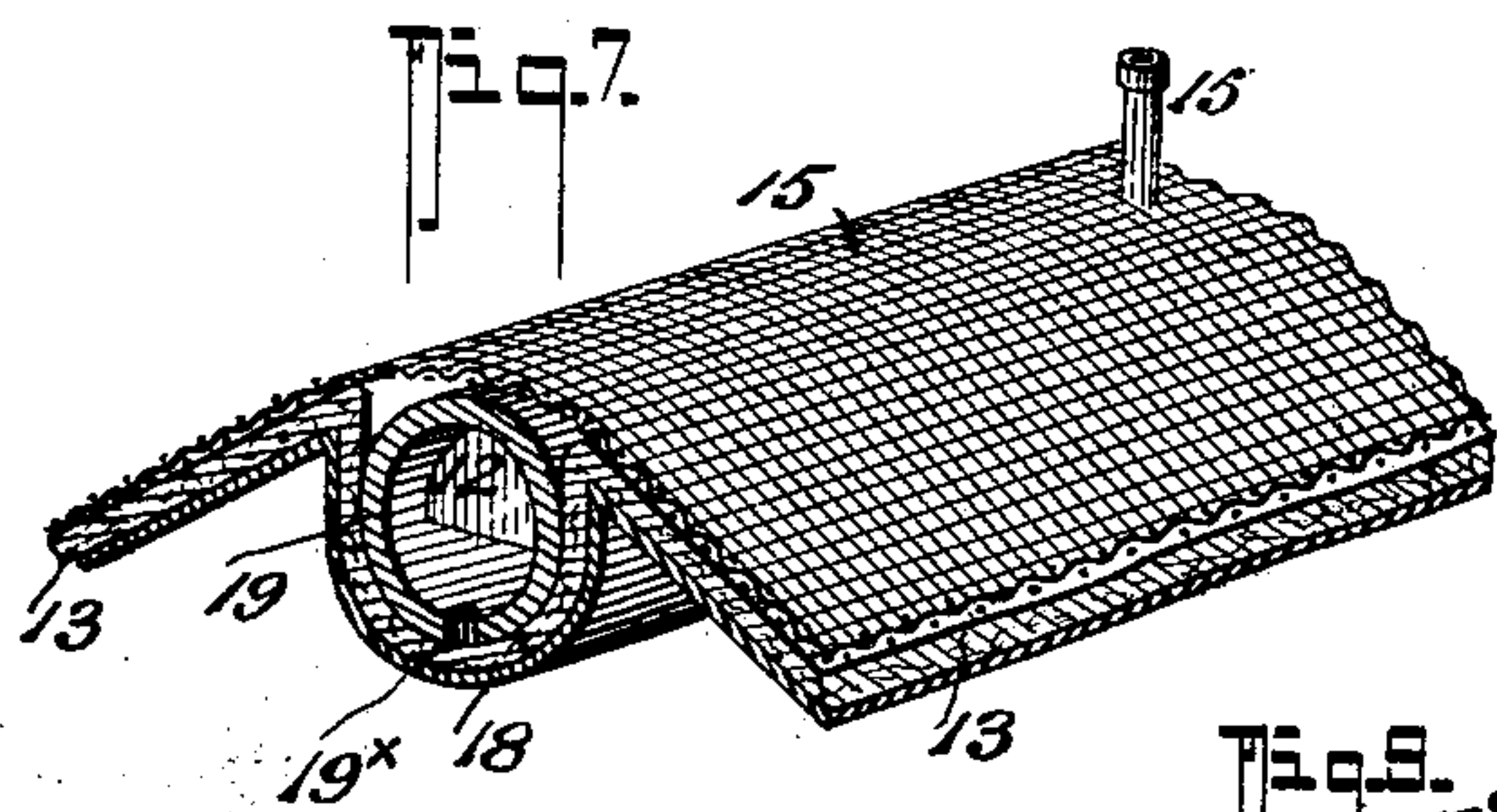
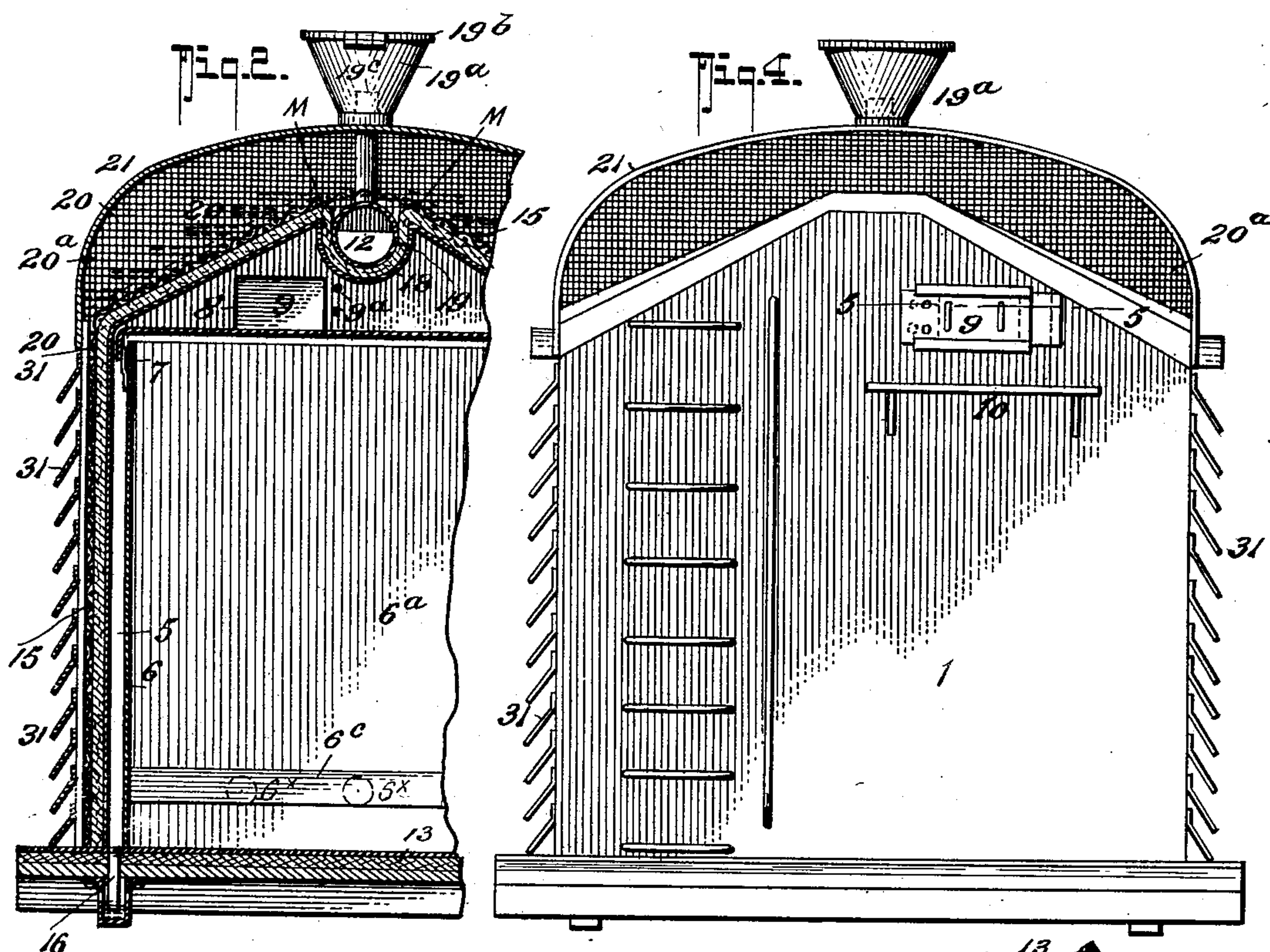
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3 Sheets—Sheet 2.



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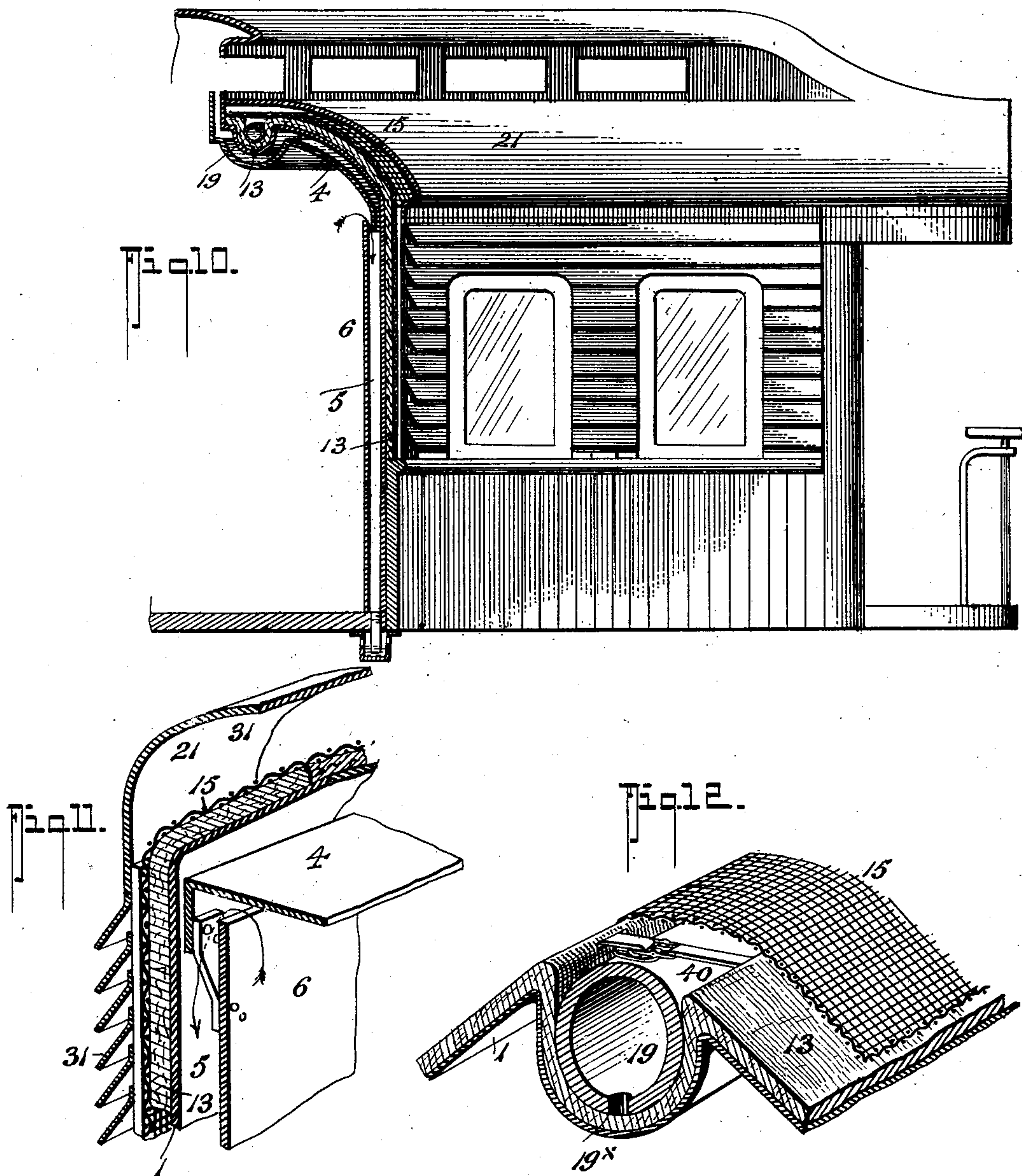
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3 Sheets—Sheet 3.



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REFRIGERATOR-CAR.

SPECIFICATION forming part of Letters Patent No. 699,260, dated May 6, 1902.

Application filed May 15, 1901. Serial No. 60,340. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH B. UNDERWOOD, residing at Fayetteville, in the county of Cumberland and State of North Carolina, have invented a new and Improved Refrigerator-Car, of which the following is a specification.

My invention comprehends in its generic nature a novel construction and arrangement of automatically-operating means for disseminating a cooling agent over the external surface of the car, whereby to produce a uniform cold-storage; and the said means includes a medium contained in an absorbent which by contact with outer walls of sheet metal produces cold air on the inner side of said walls in such manner as to maintain an approximately uniform refrigerating temperature within the car.

This invention in its more complete form includes means for maintaining a cooling agent over the external surface of the car-body by capillary attraction adapted to cooperate with an air-current-deflector means for creating a quick assimilation and evaporation of the cooling agent.

Again, this invention comprehends the employment of an agent disseminable over the outer surface of the car-body of a fireproof character, and supplemental means combined therewith for deflecting sparks that may fly against the car-body.

Another and essential feature of my invention lies in a novel correlation of a water-carrier on the car, an absorbent automatically fed therefrom and arranged to disseminate the fluid over the external surface of the car, a protecting-screen over said absorbent, and air-deflecting devices for causing a quick absorption and evaporation of the cooling agent.

This invention also includes a special external construction of the car-body in connection with end openings and adjustable closure members for the said openings, whereby under certain conditions air or ice may be fed into the interior of the car to effect either a proper ventilation for the interior of the car or the reception of an artificial cooling means (ice) for refrigerating articles, such as meats.

In its more subordinate features my invention consists in a number of novel structural combinations and detailed arrangement of parts, all of which will hereinafter be fully

explained, and particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a refrigerator-car constructed in accordance with my invention. Fig. 2 is a cross-section thereof on the line 2 2 of Fig. 1. Fig. 3 is a detail plan view of one end of the same. Fig. 4 is an end elevation of the car, the adjustable door being shown as closed air-tight. Fig. 5 is a horizontal section taken on the line 5 5 of Fig. 4, the door being shown closed air-tight. Fig. 6 is a similar view, the door being shown in full lines adjusted to admit air and in dotted lines to uncover the opening for the entrance of ice to the upper or ice-receiving compartment of the car. Fig. 7 is a detail view showing the air-valve for the fluid pipe or valley on the top of the car. Fig. 8 is a cross-section of one side of the car on the line 8 8 of Fig. 1. Fig. 9 is a diagram showing how two of the liquid-holders on two coupled cars are joined. Fig. 10 illustrates my invention as arranged for cooling passenger-cars. Fig. 11 is a detail view hereinafter specifically referred to, and Fig. 12 is a view illustrating a strap device for securing the liquid-holder.

Referring now to the accompanying drawings, in which like numerals indicate like parts in all the figures, 1 designates the car, which has the ordinary general shape, its sides and top being formed of sheet metal, while the bottom is of wood and its ends of wood and metal combined, the reason for which will presently appear. As is best shown in Fig. 2, the interior of the car has an upper compartment 2 and a lower compartment 3, the two being divided by a metal horizontally-disposed partition 4, the sides and ends of which do not extend entirely out to the sides and ends of the car, but discharge into the end and side air-spaces 5 5^a, in communication with each other and with the interior of the car-compartment 3, said spaces being provided for by the supplement metal sides 6 and ends 6^a, as shown, the lower ends of which are made fast to the car-bottom in any approved manner, while their upper ends are held secure in their upright position by the strap-brackets 7, that support the horizontal partition 4. By providing an upper compartment,

as shown, and making the bottom 4 slightly inclined toward the sides and ends to lead off condensation an increased cooling-surface is produced, as well as an air-space, above the bottom or main compartment, which not only provides for an effectual maintenance of the low temperature within the bottom compartment by reason of a fresh-air-circulation space under the top or dome of the car, but said upper compartment also provides ample space for storage of ice when it is found desirable to use it, the ends of the car being provided with openings 8 8, over which operate sliding doors 9, adapted to be manipulated from the outside, the ends of the car having platforms 10 for the trainman to stand on while shifting the doors 9. The doors 9 have air-inlets adapted when the door is adjusted to one position to register with air-passages 9^a in the door. When entirely shut and properly adjusted, the door acts as an air-tight closure for the top compartment of the car, and when entirely pulled out sufficient entrants in the upper part of the car are provided for the insertion of large ice blocks.

18 designates a valley on the crown of the car-top, which extends the full length of the car and is made by bending the metallic top down into a U shape, to receive a water-holding tube 19, which is held in place within the trough by the screen-wire covering, presently again referred to, or by strap members, as shown in Fig. 12. At one end the holder 19 has a filling-funnel 19^a, having a throw-back cap 19^b and a hose-receiving nozzle 19^c, said parts being so arranged that the holder can be filled by pouring direct into funnel or by pipe-line adapted to be attached to the receiving-nozzle 19^c, and to provide for quickly and effectively filling the holder it is equipped with an air or vent valve 15.

To provide for joining two or more of my refrigerating-cars, each end of the holder 19 has a valved coupling member 19^d to receive a flexible coupling-pipe 11. (See Fig. 9.) Thus the holders on all the cars coupled together can be filled from one end of one of the holders, and to prevent water being thrown back by the forward momentum or sudden starts of the train each holder has a number of transverse partitions 12, apertured for the circulation of the fluid and adapted to serve as breakers for dividing the fluid bulk and prevent its waving backward and forward toward the ends of the car.

13 designates what I term the "chill disseminating agent," and consists of an absorbent material, preferably hair felt, which covers the entire surface of the top, sides, and ends of the car-body, and at the top it also passes over the valley 18 between the car-top and the water-holder 19, the latter having a number of discharge-outlets 19^x in its bottom, through which the water escapes to the felt body 13 and the U-shaped valley, from which it is distributed by capillary attraction through the felt covering.

So far as described, it will be readily understood that as the felt covering 13 is in contact with the entire outer surface of the metallic car-body the same forms a porous jacket which will constantly automatically evaporate the water contained in the holder 19 for chilling the metal sides, ends, and top of the car-body. Thus both the upper and lower car-compartments are turned into a chill-room, the lower one, 3, which is intended to receive the most perishable articles, receiving, as it were, a second chill action by reason of the chill-space 2 above it, which deflects the heat that may in very hot climates radiate from the roof of the car, as well as receiving the benefits of the artificial cooling of said upper compartment in case ice is used and also the benefits of an additional cooling effected on the inside walls 6 by the ice drippings from the upper compartment down into the space 5. Furthermore, by providing the upper compartment 2 with adjustable doors arranged to be set to admit of circulation of air, especially under the top of the car and within the lower chill-compartment, it follows that the entire interior of the car can at such times as may be desirable be ventilated by pure atmospheric air to avoid the accumulation of "dead air."

In the practical application of my invention I prefer to use hair-felted cloth about one-half inch thick, as it will carry a large amount of water, and to render the cloth covering 13 fireproof it is saturated with chlorid of sodium, which is conveniently done by adding a desired quantity of such material in the water-holder 19 at the first filling of water, which being once absorbed by the cloth will not readily evaporate, but constantly remain an adherent part thereof. To further render the covering 13 fireproof and to also serve as medium for holding the cloth in proper contact with the car-surfaces, a wire-screen covering 15 is used on the sides and top. None is used over the end felt portions, as the ends of the car are of wood, against the inner face of which the felt lies, as clearly shown in Fig. 1, by reference to which it will also be seen that the end air-spaces 5^a communicate with interior of the compartment 3 through the openings 6^x in the end walls 6, which are protected by overhanging cleats 6^c to prevent any material passing through the said openings 6^x from the compartment 3 to cooling-spaces 5^a. If desired, the outside of the wooden car ends may have a metal sheathing, as shown.

The spaces 5 5^a have discharge-outlets 16 in the bottom provided with water seals to prevent the ingress of air through the car-bottom, and in the practical construction of my car the bottom is also metal sheath on a felt base, as shown.

The sides of the car have the usual doors, which in the present case are shown as hinged to swing in a horizontal plane, and at the door-openings the spaces 5 stop and do not

communicate with said openings. The doors 16^a are of heavy lumber, faced on all its external surface with felt 16^x, to effect air-tight closures, the outer and inner felt portions 16^x being held tight by metal plates 16^y, as shown.

By arranging the cooling agent in the manner shown and described and providing the circulating-spaces 5 5^a on the inside it is manifest a simple and effectively-operating means is provided for maintaining a proper and uniform chill within the compartment 3 without danger of the condensations on the inside of said compartments coming into contact with the goods held therein, as all of the condensations of the top and sides pass down into the spaces 5 5^a and discharge through the bottom of the car, maintaining, as it were, within the compartment 3 a dry cold air the temperature of which can be readily maintained about a uniform degree and always above that of freezing the contents of the car, especially fruit. Furthermore, by reason of keeping the moisture from contact with the goods and providing for ventilating the interior of the car, when desired, the well-known deleterious effects of dead air on the stored goods is overcome.

To assist in maintaining a rapid and uniform dissemination of the cooling agent, air-spaces extending the full length of the car are provided. These spaces overlie the top and sides of the car and are indicated by 20. The top space is produced by the metal hood 21 of the car, the sides of which bend down and are made fast to the car sides and the ends of the space 20 are covered by a screen 20^a to keep out sparks. The side spaces 30 are made narrow, and with said spaces cooperate a series of horizontally-disposed overhanging cleats 31, which serve to deflect the sparks and also to aid in providing for an air circulation in the spaces 30.

While I prefer to use a solid hood for the top of the car, said hood may be dispensed with and the deflector-cleats 31, such as are used for the sides, may be substituted therefor, as indicated in dotted lines in Fig. 2.

By providing air-spaces over the cooling-agent-disseminating means the water from the trough is assimilated quickly and uniformly, and evaporation correspondingly kept up. The walls over which the cooling agent passes are thoroughly chilled and maintained in this condition so long as the felt covering takes up the fluid from holder 19, it being understood that the rapid circulation of air tends to keep the refrigerant in itself cool, and thereby increases its chilling qualities.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete operation and advantages of my invention will be readily understood.

To maintain the refrigerating action, it is only necessary at times to resupply the holders 19, which can be readily done at the engine-supplying tanks.

Instead of securing the supply pipe or reservoir by the wire covering alone the same may be held secured by straps, as shown in Fig. 12, or any other suitable means.

While my improvement is more especially adapted for refrigerator-cars, the same may be readily applied for cooling passenger-cars, and when thus applied the upper part of the sides of the car, as also the top, are preferably of metal, as indicated by 1^x in Fig. 10, and a valley arranged at each side of the crown or ventilating top portion of the car. The air-spaces 5 in this latter application need extend only as low as the metal portions of the car extend, as shown, it being, however, manifest that said spaces may extend to the floor, as in the other forms illustrated.

By providing a liquid-supply pipe or reservoir held within a valley or trough and running the absorbent or felt body under the reservoir the liquid can never be held above the points indicated by M M in the drawings, to which it is constantly drawn by capillary attraction, and by further capillary action and gravitation it becomes thoroughly disseminated over the entire absorbing material, to which the cooling agent is automatically supplied as fast as evaporation takes place.

Changes in the detailed arrangement of the several parts or modifications thereof may be made without departing from the scope of the appended claims. For example, the metallic or other framing and bracing may be used to give strength and stability to the construction of cars embodying my improvements in the ordinary manner of framing and bracing cars and yet retain all the features of my invention.

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

1. In a refrigerating-car having a chill-compartment surrounded by metal walls, a second set of metal walls surrounding the first set of walls, said second set of walls forming the outer walls of the car, a means for disseminating a cooling agent over the outer surface of the said second metal walls, and a supply-tank carried on the car and forming a cooperative part of said disseminating means, as specified.

2. A refrigerating-car, having a chill-compartment, whose side, end and top walls are of metal, means for disseminating a cooling agent over the outer surface of said walls, said means including a cooling-agent reservoir, a second chill-compartment disposed above the other compartment and in communication therewith, mechanism for ventilating and sealing the chilled compartments, said second chill-compartment having doorways, for the purposes set forth.

3. The combination in a refrigerator-car provided with metallic top and sides, having means for disseminating a cooling agent over

the outer surface; of a lower chill-compartment, and an upper chill-compartment, communicating with the other compartment, said upper compartment having an end opening
5 and air-inlets, a closure member slidable over said opening, and adapted to close off the opening air-tight, and having air-openings, adapted when said closure member is adjusted in one direction to register with the air-
10 openings in the end of the upper chill-compartment for ventilating the interior of the car, as specified.

4. The combination in a metallic-sides refrigerator-car, having a means for disseminating a cooling agent over the outer surface of the metallic body; of a lower chill-compartment surrounded by supplemental side and end walls, inside the regular sides and ends, whereby intervening spaces 5 5^a are provided,
20 offtakes for discharging the condensations collected in said spaces 5 5^a, a second chilled compartment above the other, a horizontal metal surface separating the two compartments, the sides and ends of which extend
25 over and discharge into the spaces 5 5^a, said chilled compartments having doorways, for the purposes specified.

5. A metal-body refrigerator-car, having a valley extending lengthwise in the top thereof, an absorbent material covering the outer surface of the metal body and the valley-surface, and a reservoir held in the valley, said reservoir having outlets for feeding the contents onto the valley beneath it, for the purposes specified.
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6. In a refrigerator-car, provided with me-

tallic top and sides, an absorbent covering for the sides and top thereof, said covering lying in contact with the said sides and top, and having the outer surface exposed to atmosphere, means carried in the car for feeding
40 the absorbent covering, and a screen covering the outer face of the absorbent, as specified.

7. In a refrigerator-car, provided with metallic top and sides, an absorbent covering for the sides and top thereof, said covering lying in contact with the metal parts and having the outer face exposed to air, and spark-deflector devices held over the said outer face
50 of the absorbent covering, for the purposes described.

8. A refrigerating-car, having a supplemental or second top, a felt covering resting on said second top, and an ice-chamber or cooling-space, disposed between the main freight or carrying compartment, and the felt-covered top.
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9. The combination in a car of the character described, with the side and end walls; of the supplemental side and end walls 6 6^a, respectively, held apart from the regular side and end walls, whereby intervening spaces 5 5^a are provided, the end walls 6^a, having apertures and deflector-cleats on the inner
60 sides overhanging the said apertures, all being arranged substantially as shown and described.

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Witnesses:

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