Jan. 2, 1934. D. W. VOLTZ 1,942,315

BODY CONSTRUCTION

Filed Aug. 21, 1930 4 Sheets-Sheet 1

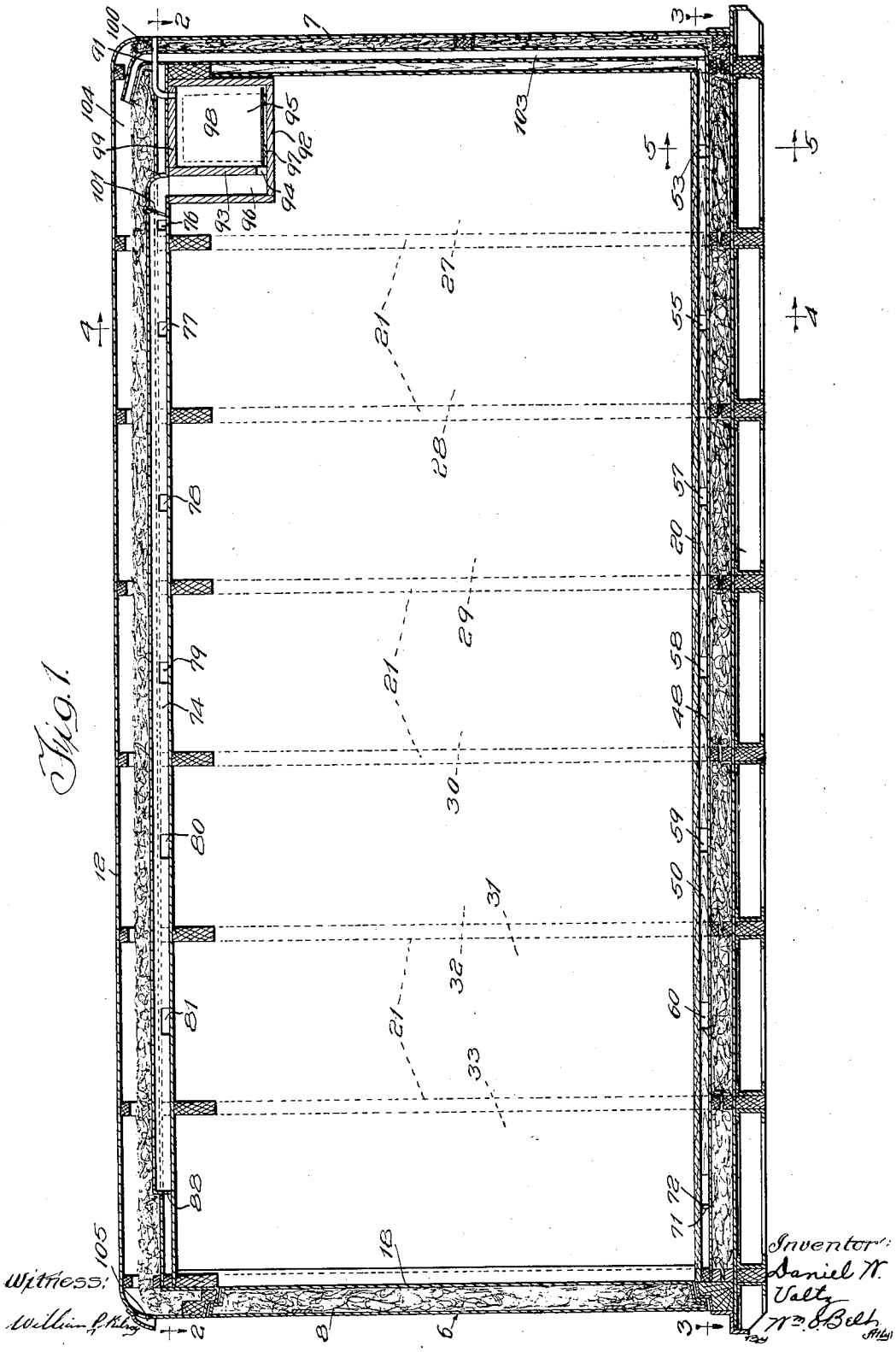


Fig. 1.

Witness:
William L. Kling

Inventor:
Daniel W. Voltz
Wm. E. Bell
Atty

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Filed Aug. 21, 1930 4 Sheets-Sheet 2

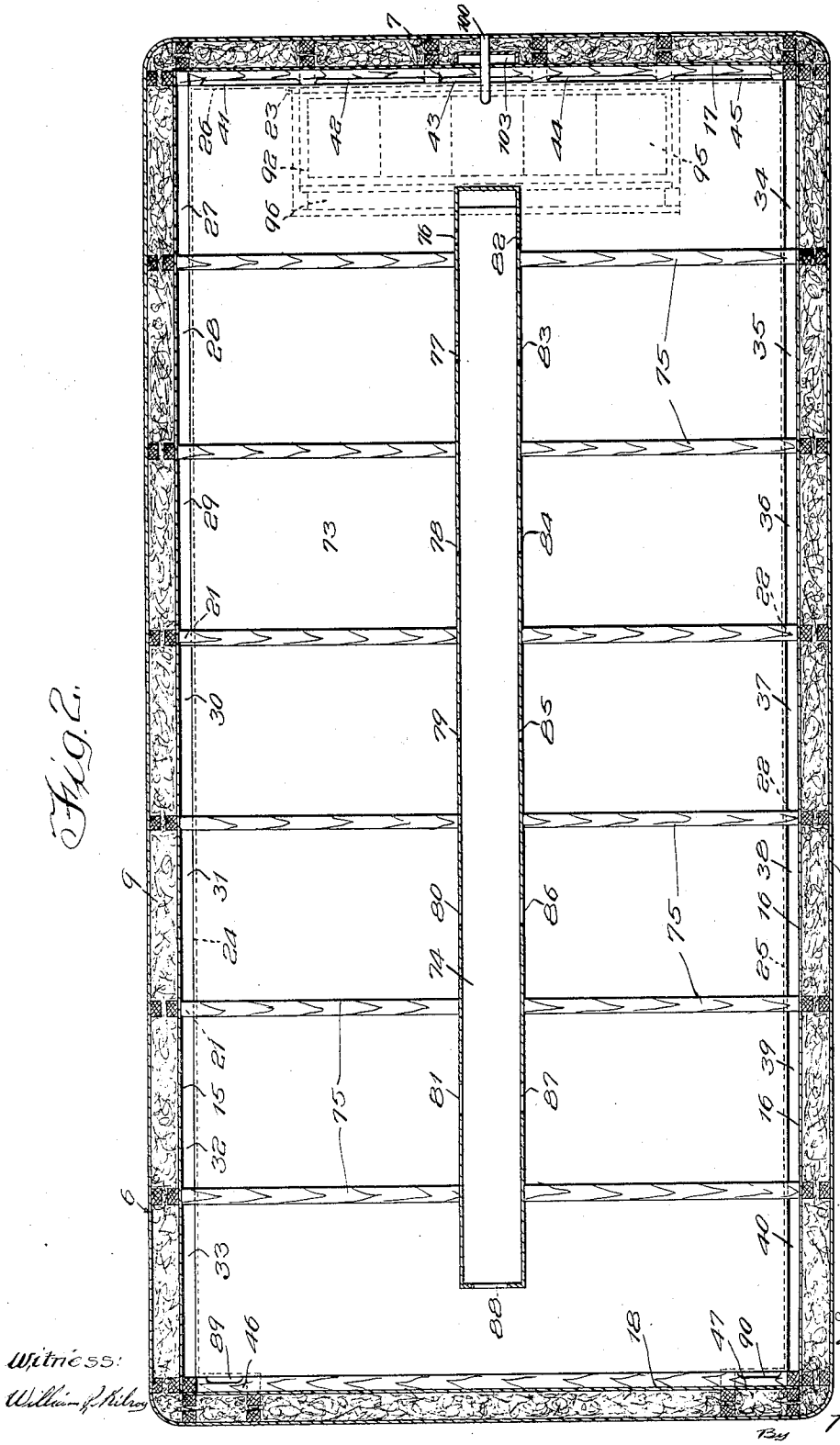


Fig. 2.

Witness:
William J. Kilroy

Inventor:
Daniel W. Voltz
By Wm. O'Brien
Atty

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Filed Aug. 21, 1930 4 Sheets-Sheet 3

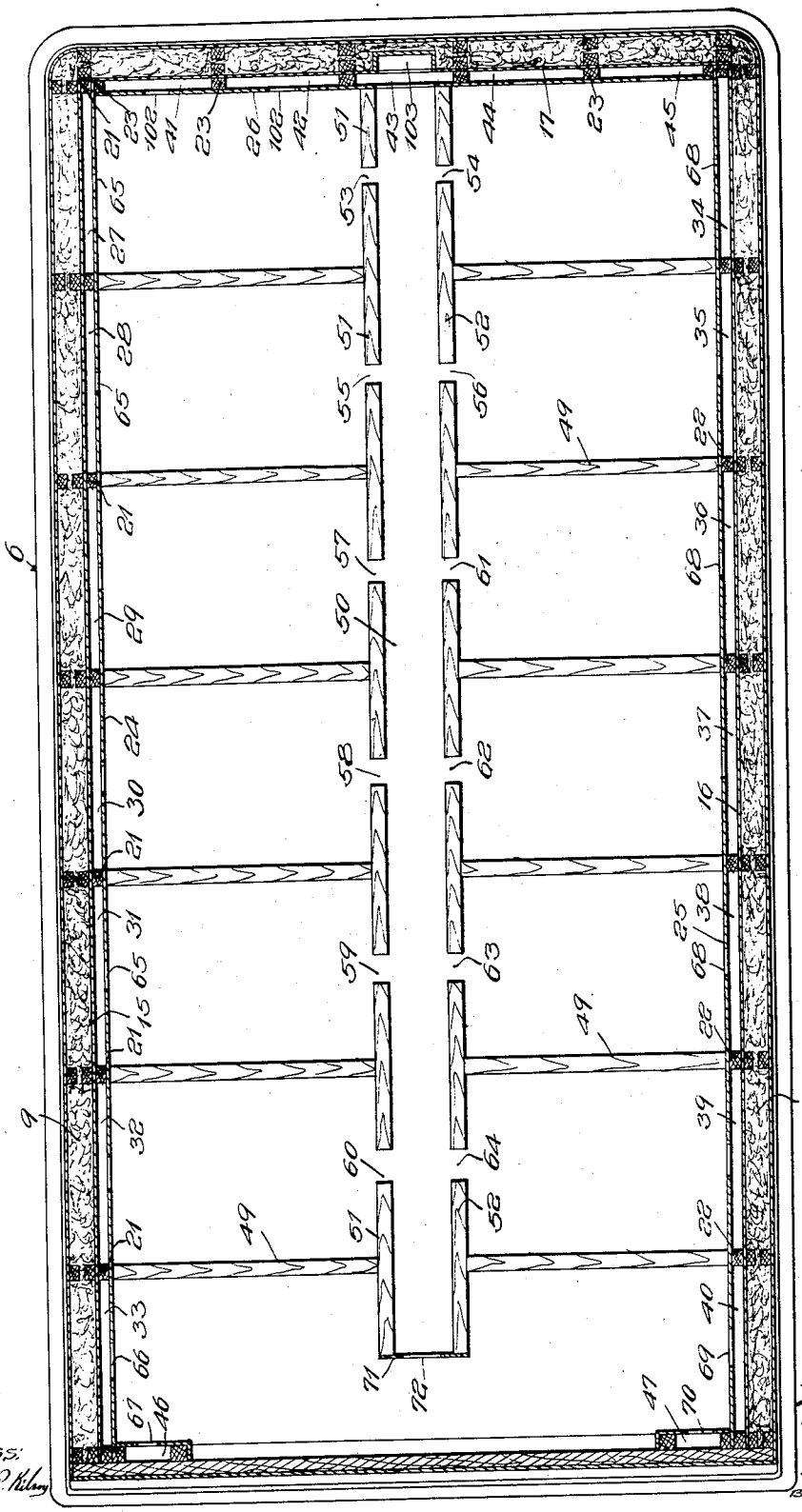


Fig. 3.

Witness:
William P. Kilroy

Inventor:
Daniel W. Voltz
Wm. O. Bates
by Atty

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BODY CONSTRUCTION

Filed Aug. 21, 1930 4 Sheets-Sheet 4

Fig. 4.

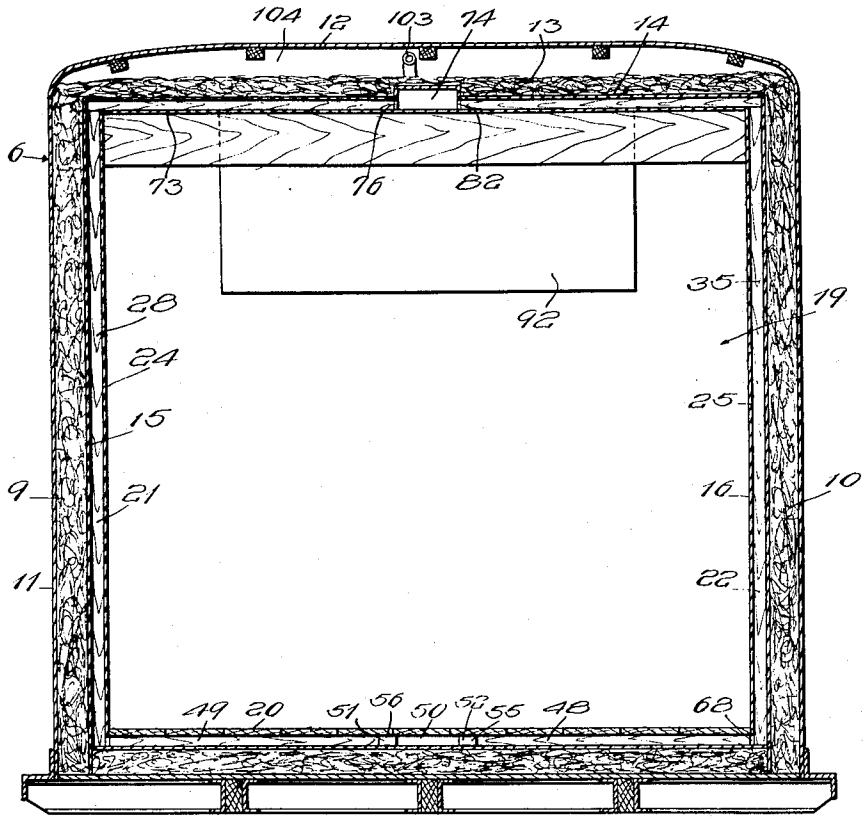
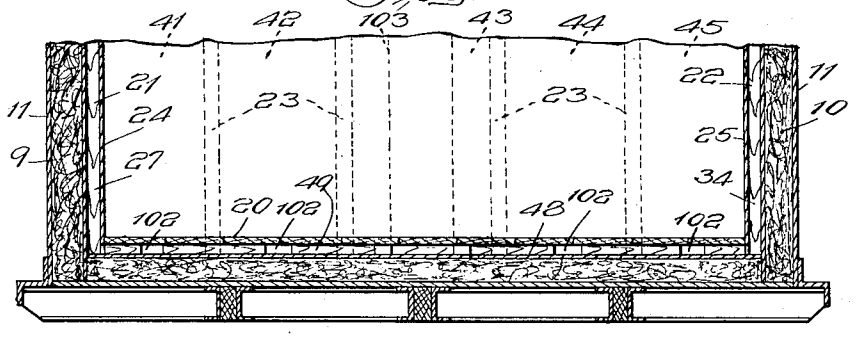


Fig. 5.



Witness:
William P. Kilroy

Inventor:
Daniel W. Voltz
By Wm. O. Belt
Atty.

Patented Jan. 2, 1934 1,942,315

UNITED STATES PATENT OFFICE

1,942,315

BODY CONSTRUCTION

Daniel W. Voltz, Chicago, Ill., assignor to Voltz Brothers, Inc., Chicago, Ill., a corporation of Illinois

Application August 21, 1930. Serial No. 476,749

8 Claims. (Cl. 62—91.5)

This invention relates to body constructions, and more particularly to a body construction embodying an arrangement providing a circulating system whereby a cooling medium may be effectively circulated in the body to provide refrigeration.

Meat and other perishable produce is being distributed by the use of automotive trucks and other vehicles, and it is necessary that this perishable produce be refrigerated. It has been the custom in the past to provide a suitably insulated body and to provide in this body a refrigerating medium such as ice or so-called Dry Ice which is solid carbon dioxide. However, convection has been relied on to provide circulation in the body in order to effectively cool the produce stored therein. The disadvantages of this are many and will be readily apparent to anyone skilled in the art, and a very marked disadvantage is attendant to the use of Dry Ice, for when such a refrigerating medium is used the aerated carbon dioxide is circulated directly into the compartment to be cooled, and when the compartment is opened, to afford access thereto, a great deal of this carbon dioxide escapes, which manifestly reduces the efficiency as the escaped carbon dioxide is wasted.

While my invention is not limited to the use of Dry Ice, it may be most advantageously used in connection with such a refrigerating medium, and the salient objects of my invention are to provide a body construction wherein the cooling medium may be circulated about the compartment to be cooled rather than in the compartment; to provide an arrangement for effectively circulating the cooling medium in a manner such that all portions of the body will be cooled in substantially equivalent amounts; to provide an arrangement which may be associated with any type of insulated body whether arranged on a truck for transportation or whether used as a stationary refrigerator in a store or the like; to provide a circulating arrangement wherein the full effect of the cooling medium will be secured; and to provide a circulating arrangement which will be of simple and economical construction and efficient in operation.

In the accompanying drawings a selected embodiment of my invention is illustrated, and

Fig. 1 is a longitudinal vertical sectional view of an insulated body with which a selected embodiment of my invention is associated;

Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 on Fig. 1;

Fig. 3 is a horizontal sectional view taken substantially on the line 3—3 on Fig. 1;

Fig. 4 is a transverse vertical sectional view taken substantially on the line 4—4 on Fig. 1; and

Fig. 5 is a fragmentary transverse vertical sectional view taken substantially on the line 5—5 on Fig. 1.

In the accompanying drawings, wherein I have illustrated a selected embodiment of my invention, 6 generally indicates the body with which my circulating system is associated, and while this body may be formed in any desired manner, I have shown in the accompanying drawings a body constructed in accordance with that disclosed in my co-pending application, Serial No. 476,748, filed August 21, 1930, to which reference may be made for the details of construction of the body. The body includes an insulated front wall 7, an insulated rear wall 8, and insulated side walls 9 and 10. A suitable facing 11 is provided on the outer surface of the body 6, which may be in the form of panels or the like, and a portion of this facing provides the roof 12 which is arranged above and spaced from the insulation 13 associated with the ceiling 14 of the body 6. The ceiling 14, the interior faces 15 and 16 of the side walls 9 and 10, the interior face 17 of the front wall 7, and the interior face 18 of the rear wall 8, are preferably formed of metal or other analogous material to provide a smooth inner surface for the compartment generally indicated by 19. The floor 20 of the compartment 19 is preferably made of hard wood or the like, as best illustrated in Fig. 3. Along the side wall 9, inwardly of the inner face 15, a plurality of furring strips 21 are provided at spaced intervals, and furring strips 22 are similarly arranged inwardly of the inner face 16 of the side wall 10. Furring strips are arranged inwardly of the face 17 of the front wall 7. Mounted on the furring strips 21 is a metal plate 24. Mounted on the furring strips 22 is a metal plate 25. Mounted on the furring strips 23 is a metal plate 26. Between the furring strips 21 and the metal plate 24, compartments 27, 28, 29, 30, 31, 32 and 33 are formed. Between the furring strips 22 and the plate 25, compartments 34, 35, 36, 37, 38, 39 and 40, are provided, which are transversely aligned with the compartments 27 to 33, respectively. Between the furring strips 23 and the metal plate 26, are compartments 41, 42, 43, 44 and 45. The compartments 27 to 45 inclusive extend from the ceiling 14 to a metal plate 48 arranged below and spaced from the floor 20,

said compartments extending past said floor. On the rear wall 8 at the corner thereof, two compartments 46 and 47 are provided, which are substantially similar to the compartments 27 to 45, inclusive. Disposed between the floor 20 and the metal plate 48 are furring strips 49, which are aligned with the furring strips 21 and 22. The furring strips 49, the metal plate 48, and the floor 20, define compartments in alignment with the compartments 27 to 33, respectively. Extending longitudinally of the body at the medial portion thereof, is a duct 50 formed from a plurality of blocks 51 and 52, which are arranged to extend parallel to each other. Between the first two of the blocks 51 there is an opening 53, and between the first two of the blocks 52 there is an opening 54 which is aligned with the opening 53, and the openings 53 and 54 are intended to communicate with the compartments 27 and 34 and the compartments defined by the furring strips 49, floor 20 and metal plate 48. Between the second and third of the blocks 51 there is an opening 55, and between the second and third of the blocks 52 there is an opening 56 which is aligned with the opening 55. The openings 55 and 56 communicate with the compartments 28 and 35 in the same manner as that in which the openings 53 and 54 communicate with the compartments 27 and 34. The openings 55 and 56 are larger than the openings 53 and 54. Similarly, between each of the succeeding pairs of blocks 51 there are openings 57, 58, 59 and 60, which respectively communicate with the compartments 29, 30, 31 and 32. In alignment with the openings 57 to 60, inclusive, between each of the succeeding blocks 52, there are openings 61, 62, 63 and 64, and these openings, 61 to 64, respectively communicate with the compartments 36 to 39. The opening 57 is larger than the opening 55, and similarly the opening 58 is larger than the opening 57, and each of the succeeding openings is larger than the preceding opening, and the openings 61 to 64 are similarly arranged. Openings, such as 65, corresponding in size to the openings into the duct 50, are provided in the wall 24 to establish communication between the vertically extending ducts adjacent the side wall 9 and the ducts below the floor 20. An opening 66, similar to the openings 65, and larger than the last of the openings 65, establishes communication between the compartment 33 and the last of the compartments defined by the furring strips 49, and an opening 67 establishes communication between the compartment 46 and the last compartment defined by the furring strips 49. Openings 68, corresponding to the openings 65, establish communication between the compartments inwardly of the side wall 10 and the compartments defined by the furring strips 49. An opening 69, similar to the opening 66, and an opening 70, corresponding to the opening 67, establish communication between the compartments 40 and 47 and the last of the compartments defined by the furring strips 49. The last of the blocks 51 and 52 extend into the last compartment and are connected by a plate 71 having an opening 72 therein, and communication between the duct 50 and the last of the compartments defined by the furring strips 49 is established to this opening 72. Arranged to extend between the upper ends of the compartments 44 and 45 and spaced below the ceiling 14, is a plate 73. Extending longitudinally of the body 6 above the plate 73, and disposed in an opening in the ceiling 14, is a duct 74. Furring strips 75 are disposed between the ceiling 14 and the plate 73 and serve to define compartments in alignment with the compartments 27 to 40, inclusive, which defined compartments are similar to those defined by the furring strips 49. In one side wall of the duct 74 are ports 76, 77, 78, 79, 80 and 81, which respectively communicate with the compartments 27 to 32, inclusive. The port 77 is larger than the port 76, and the port 78 is larger than the port 77, and so on; that is, each succeeding port is larger than the preceding port. In the other side wall of the duct 74 are ports 82, 83, 84, 85, 86 and 87, which communicate with the compartments 34 to 39, inclusive, and these ports are arranged so that each succeeding port is larger than the preceding port, and these ports 82 to 87, inclusive, are respectively aligned with the ports 76 to 81, inclusive. At the rear end of the duct 74 is a port 88 which communicates with the last of the compartments defined by the furring strips 75 between the plate 73 and the ceiling 14, and ports 89 and 90 establish communication between this last compartment and the compartments 46 and 47. The compartments 33 and 40 also communicate with this last compartment. Suitably supported at the forward end of the compartment 19, adjacent the upper corner thereof, is a beam 91 carrying a housing 92. In the housing 92 there is a vertically extending partition 93 that is spaced from the lower wall of the housing 92 to provide an opening 94 to establish communication between the main compartment 95 of the housing 92 and the passage 96 therein. The passage 96 communicates with the forward end of the duct 74, as clearly illustrated in Fig. 1. A tray 97 is provided in the main compartment 95 and supports a block 98 of Dry Ice or the like, and the upper wall of the compartment 95 is closed by a plate 99. A vent 100 opens through the front wall 7 of the body 6 and into the compartment 95 so that air may pass therethrough into said compartment. Air admitted into the compartment 95 will pass over the block of Dry Ice 98 or other refrigerating medium and will pass through the opening 94 into the passage 96 and into the duct 74. Passage of the air into the duct 74 is controlled by a damper 101 that may be arranged for manual or automatic operation, as desired, and this damper is arranged forwardly of the openings 76 and 82. When Dry Ice is used as a refrigerating medium, the air passing thereover will be effectively cooled by reason of evaporation of the solid carbon dioxide which will gasify and mingle with the air. Carbon dioxide is heavier than air and a mixture of air and carbon dioxide will therefore be heavier than ordinary air, and in addition this mixture will be effectively cooled and the temperature will be less than the temperature in the compartment 19. The intermixed and cooled air and carbon dioxide will pass through the duct 74, and this intermixture will be hereinafter known as the cooling medium. Manifestly, the cooling medium adjacent the front end of the duct 74 will be cooler than that adjacent the rear end thereof. Since this is true, more of the cooling medium will need be emitted from the rear end of the duct 74 than from the forward end thereof, and this is accomplished by successively increasing the size of the openings in the direction of the rear end of the duct. The largest of the openings is the opening 88 and, therefore, more of the cooling medium will pass out through this opening and into the compart-

ments 33, 40, 46 and 47. Varied quantities of the cooling medium will pass through the openings 81 and 87, 80 and 86, 79 and 85, 78 and 84, and so on, and, therefore, more of the cooling medium will pass into the compartments 32 and 39 than will pass into the compartments 31 and 38, and similarly more of the medium will pass through the compartments 31 and 38 than will pass through the compartments 30 and 37. In this manner, an equalized distribution of the cooling medium with respect to the cooling properties thereof will be attained, and thus the compartment 19 will be substantially uniformly cooled throughout the area thereof. The compartments 41, 42, 43, 44 and 45 at the front end of the body 6 will receive a supply of cooling medium through the openings 76 and 82, and even though these openings supply cooling medium to more compartments than the others, their size need not be materially increased by reason of the fact that the cooling medium at this point will be much colder. It has been pointed out that the cooling medium is heavier than air and it will therefore flow downwardly. The cooling medium in this downward movement will effectively chill the plates 24 and 25 and other plates in and surrounding the compartment 19, and these chilled plates, which are preferably formed from a metal of high heat conductivity will, in turn, cool the compartment 19. It is, therefore, manifest that the cooling medium need not be introduced into the compartment itself and, therefore, when the usual door (not shown) is opened, the cooling medium will not escape. It has been pointed out that the openings into the duct 50 are increasingly larger toward the end thereof and, therefore, the cooling medium, which is circulated across the top of the compartment and down the sides thereof, may freely pass into the duct 50. The cooling medium, which passes through the compartments 41, 42, 43 and 44, will pass out through openings 102 into the compartments with which the openings 53 and 54 communicate and, therefore, the cooling medium which has served to cool the compartment 19 will be collected in the duct 50. In view of the fact that air will be continually emitted through the vent and by reason of the weight of the cooling medium, this circulation into the duct 50 will be naturally brought about. Extending up through the front wall 7, in alignment with the duct 50, is a duct 103, the upper discharge end of which opens into the space 104 between the insulation 13 and the roof 12. The cooling medium emitted into this space will tend to spread over the area thereof and will form a blanket above the insulating material, and this blanket will aid insulation. Since the medium providing this blanket will still be cooler than the surrounding air, a cooling effect will result, and in this manner all of the cooling effect of the cooling medium is utilized. The cooling medium passing into the space 104 will be discharged through a vent 105 at the rear of the body 6, and it will be forced out through this vent by reason of the weight of the cooling medium just being introduced into the system.

It is manifest from the foregoing description that I have provided a circulating system wherein an equalized distribution of the cooling medium with respect to the cooling properties thereof may be attained, and I have arranged this device in such a manner that substantially all of the cooling effect of the cooling medium will be utilized. Further, by reason of the fact that the cooling medium is directed through passages defined by plates arranged in the cooling compartment, it is manifest that the cooling medium will not be wasted by being permitted to escape from the compartment. Further, since the arrangement is such that it may be disposed in a compartment, it is manifest that it may be used in connection with bodies of many different types of construction, and such utilization is intended to be within the purview of my invention.

While I have illustrated and described a selected embodiment of my invention, it is to be understood that this is capable of variation and modification, and I, therefore, do not wish to be limited to the precise details set forth, but desire to avail myself of such variations and modifications as fall within the spirit and scope of the following claims.

I claim:

1. A body construction providing a compartment, ducts arranged outwardly of the upper and lower walls of said compartment, means for supporting a refrigerating medium adjacent to and communicating with the forward end of one of said ducts, said ducts having openings therein of increasing size toward the rear end thereof, means providing passages about said compartment communicating with said ducts through said openings, and means providing an inlet to said supporting means whereby air may pass over the refrigerating medium therein to be cooled thereby to provide a cooling medium which may first pass through the duct communicating with said supporting means and then through said passages to be collected in the other of said ducts to be discharged therethrough from said body.

2. A body construction providing a compartment, ducts arranged outwardly of the upper and lower walls of said compartment, means for supporting a refrigerating medium adjacent to and communicating with the forward end of one of said ducts, said ducts having openings therein of increasing size toward the rear end thereof, means providing passages about said compartment communicating with said ducts through said openings, and means providing an inlet to said supporting means whereby air may pass over the refrigerating means therein to be cooled thereby to provide a cooling medium which may first pass through the duct communicating with said supporting means and then through said passages to be collected in the other of said ducts to be directed thereby to a passage arranged above said compartment whereby said cooling medium may pass through said passage prior to discharge from said body.

3. A body construction providing a compartment, ducts arranged outwardly of the upper and lower walls of said compartment, means for supporting a refrigerating medium adjacent to and communicating with the forward end of one of said ducts, said ducts having openings therein of increasing size toward the rear end thereof, means providing passages about said compartment communicating with said ducts through said openings, means providing an inlet to said supporting means whereby air may pass over the refrigerating means therein to be cooled thereby to provide a cooling medium which may first pass through the duct communicating with said supporting means and then through said passages to be collected in the other of said ducts to be directed thereby to a passage arranged above said compartment whereby said cooling medium may pass through said passage prior to discharge from said

body, and adjustable means for controlling passage through the duct communicating with said supporting means.

4. A body construction including side, end, floor and roof walls, partition walls spaced inwardly of the walls of said body construction and joined together to provide a compartment, refrigerant supporting means adapted to receive a refrigerant and having an inlet and an outlet whereby air flowing thereinto through said inlet contacts with the refrigerant to provide a refrigerating medium adapted to flow therefrom through said outlet, a duct leading from said outlet and disposed on one of said partition walls, and means cooperating with the partition walls and the adjacent walls of the body construction to provide independent passages about said compartment, said duct having openings therein respectively communicating with said independent passages whereby the refrigerating medium flowing into said duct from said outlet flows through said openings into said passages to cool said compartment.

5. A body construction including side, end, floor and roof walls, partition walls spaced inwardly of the walls of said body construction and joined together to provide a compartment, refrigerant supporting means adapted to receive a refrigerant and having an inlet and an outlet whereby air flowing thereinto through said inlet contacts with the refrigerant to provide a refrigerating medium adapted to flow therefrom through said outlet, a duct leading from said outlet and disposed on the partition wall spaced from said roof wall, means cooperating with the partition walls and the adjacent walls of the body construction to provide independent passages about said compartment, said duct having openings therein respectively communicating with said independent passages whereby the refrigerating medium flowing into said duct from said outlet flows through said openings into said passages to cool said compartment, and means common to and communicating with said independent passages for discharging said refrigerating medium after it has flowed through said passages and cooled said compartment.

6. A body construction including side, end, floor and roof walls, partition walls spaced inwardly of the walls of said body construction and joined together to provide a compartment, refrigerant supporting means adapted to receive a refrigerant and having an inlet and an outlet whereby air flowing thereinto through said inlet contacts with the refrigerant to provide a refrigerating medium adapted to flow therefrom through said outlet, a duct leading from said outlet and disposed on the partition wall spaced from said roof wall, means cooperating with the partition walls and the adjacent walls of the body construction to provide independent passages about said compartment, said duct having openings therein respectively communicating with said independent passages whereby the refrigerating medium flowing into said duct from said outlet flows through said openings into said passages to cool said compartment, and a discharge duct positioned between said floor wall and the adjacent partition wall, said discharge duct having openings therein respectively communicating with said independent passages whereby the refrigerating medium flows into said duct through said openings to be discharged after it has flowed through said independent passages and cooled said compartment.

7. A body construction including side, end, floor and roof walls, partition walls spaced inwardly of the walls of said body construction and joined together to provide a comprartment, insulating means disposed between said partition walls and the adjacent walls of said body construction, ducts extending along the partition walls spaced from the floor and roof walls of said body construction, means arranged between said insulating means and said partition walls and providing independent passages about said partition walls, said ducts having openings therein respectively communicating with said independent passages, and means supplying a refrigerating medium to one of said ducts whereby the medium flows through said duct and out of the openings therein into said independent passages from whence it flows through the openings in the other duct into said other duct to be discharged.

8. A body construction including side, end, floor and roof walls, partition walls spaced inwardly of the walls of said body construction and joined together to provide a compartment, insulating means disposed between said partition walls and the adjacent walls of said body construction, said insulating means being spaced from said roof wall to provide a passage intermediate said insulating means and said roof wall, ducts extending along the partition walls spaced from the floor and roof walls of said body construction, means arranged between said insulating means and said partition walls and providing independent passages about said partition walls, said ducts having openings therein respectively communicating with said independent passages, means supplying a refrigerating medium to one of said ducts whereby the medium flows through said duct and out of the openings therein into said independent passages from whence it flows through the openings in the other duct into said other duct, and means connecting said other duct to said passage below said roof wall whereby the refrigerating medium flows through said means to said passage below said roof wall to be discharged to atmosphere.

DANIEL W. VOLTZ.