

**March 1, 1960**

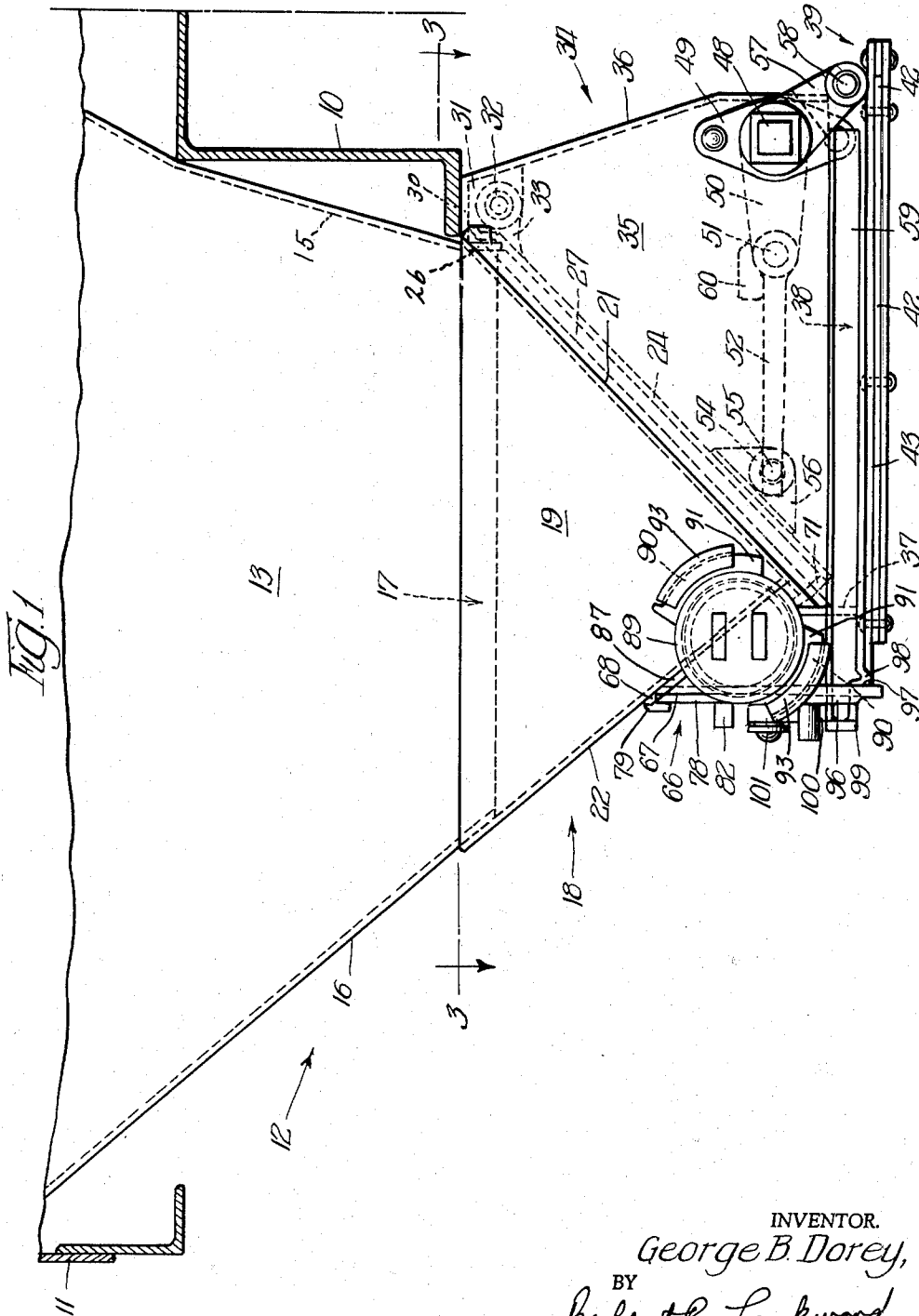
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**2,926,962**

# PNEUMATIC AND GRAVITY LOAD DISCHARGING HOPPER CAR

Filed Aug. 4, 1958

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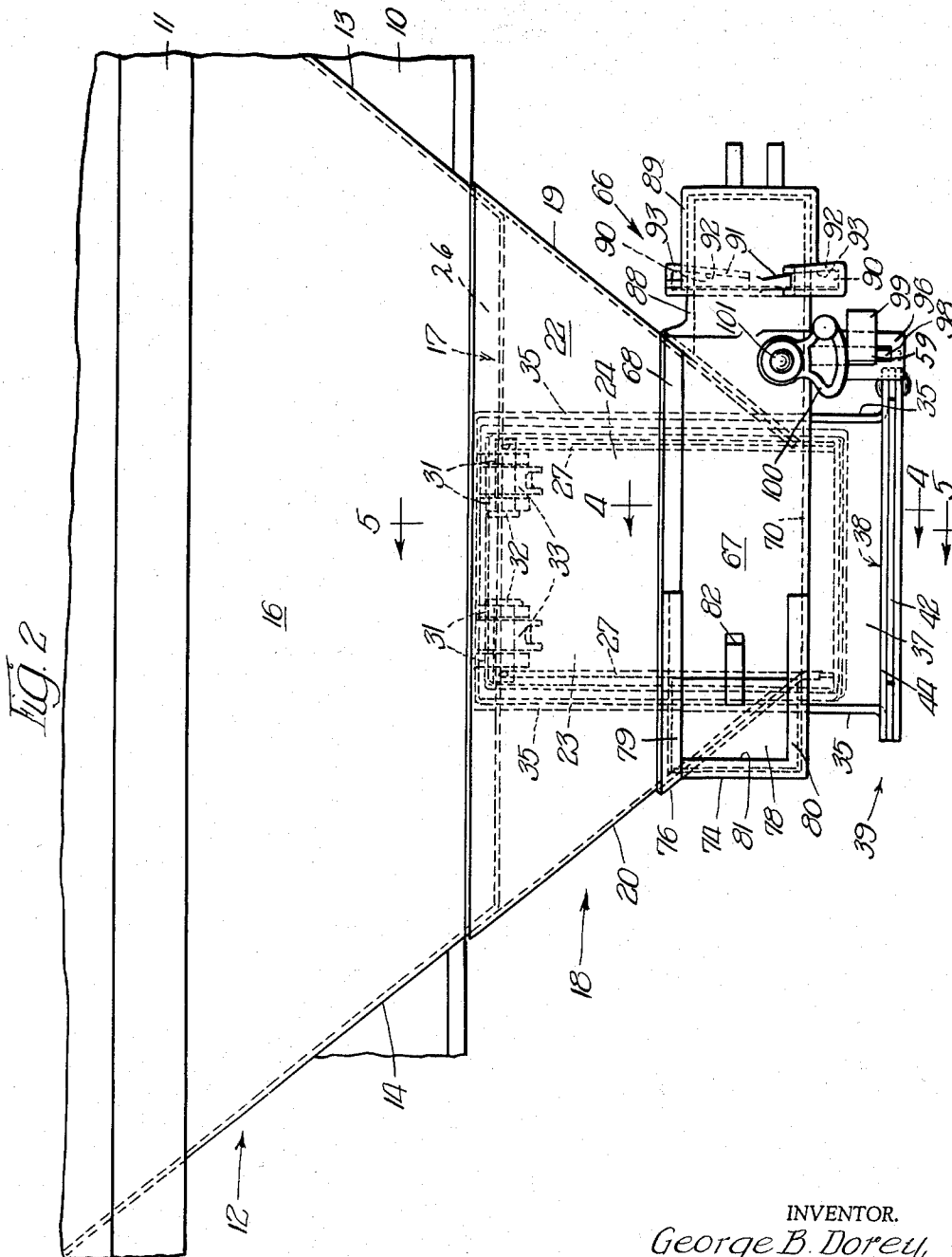
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PNEUMATIC AND GRAVITY LOAD DISCHARGING HOPPER CAR

Filed Aug. 4, 1958

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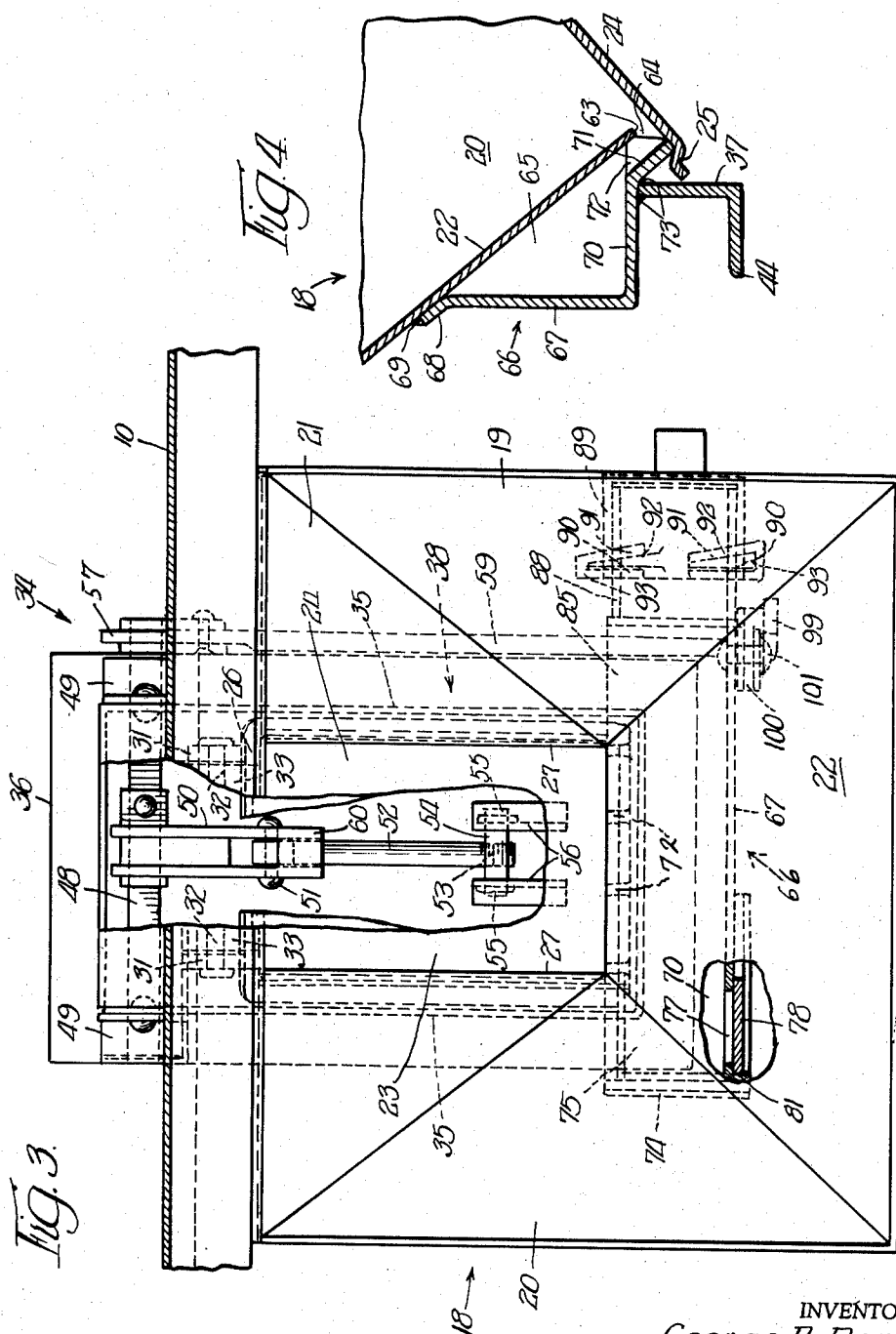
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PNEUMATIC AND GRAVITY LOAD DISCHARGING HOPPER CAR

Filed Aug. 4, 1958

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PNEUMATIC AND GRAVITY LOAD DISCHARGING HOPPER CAR

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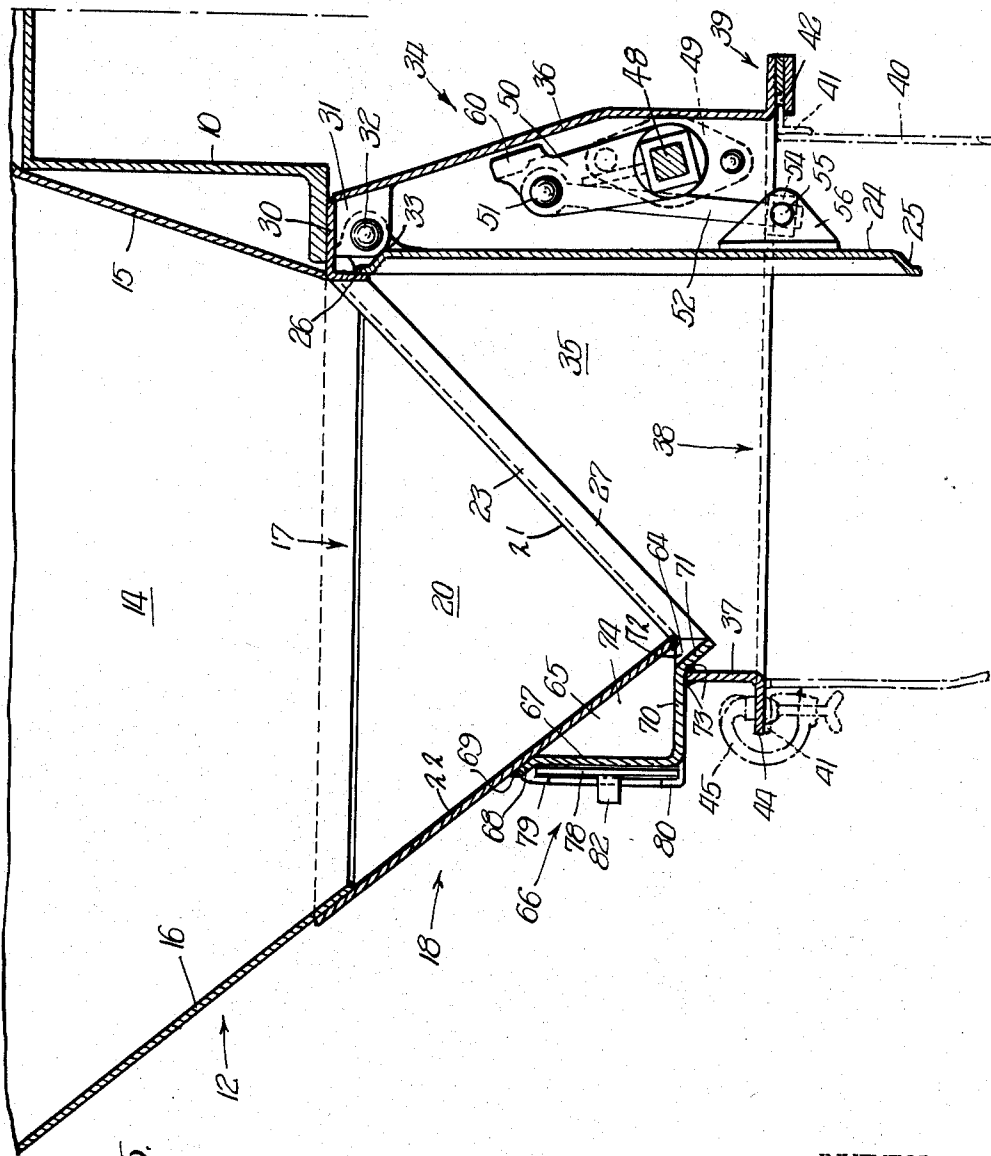


Fig. 5.

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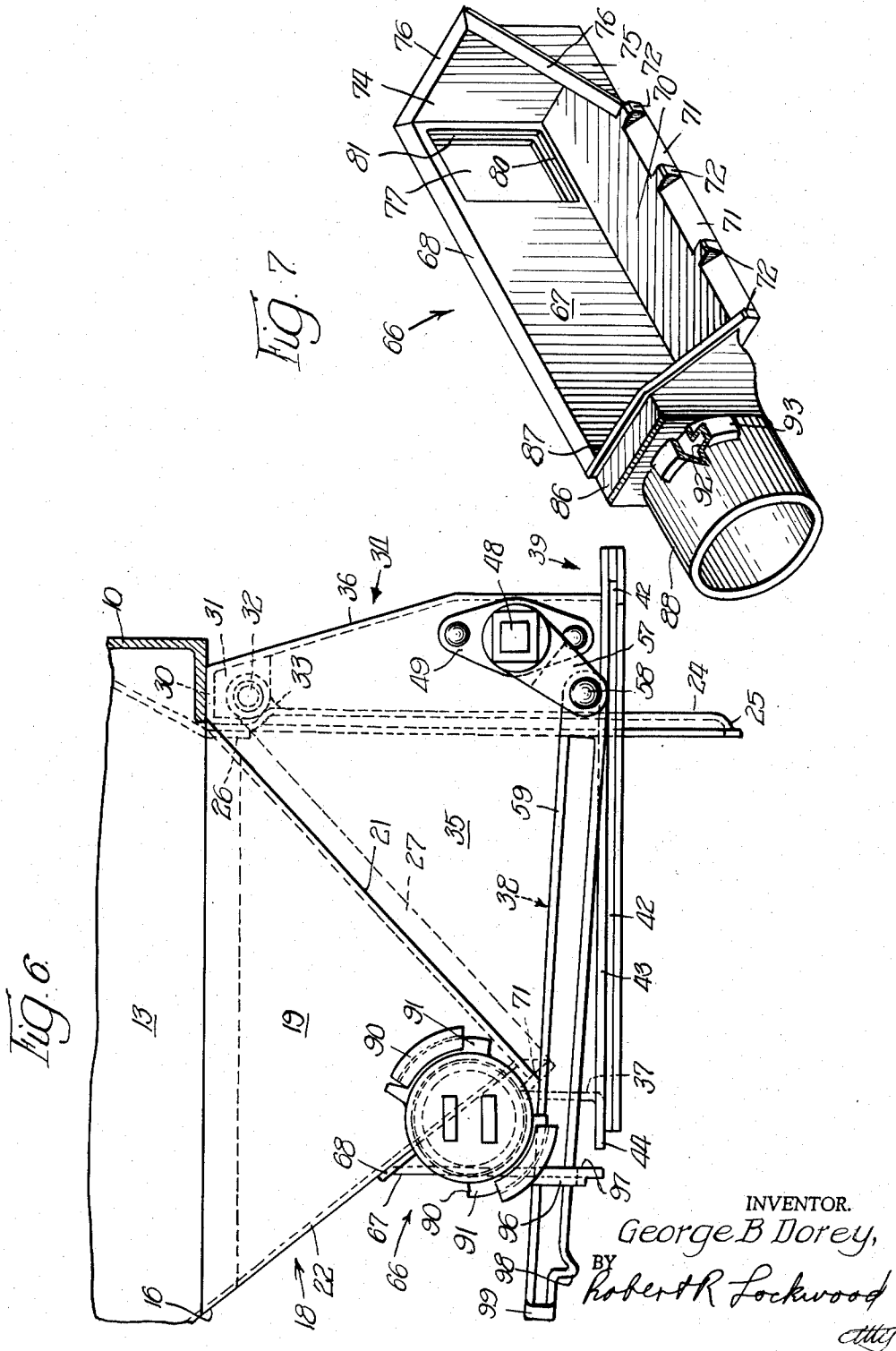
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PNEUMATIC AND GRAVITY LOAD  
DISCHARGING HOPPER CAR

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Application August 4, 1958, Serial No. 752,703

3 Claims. (Cl. 302—52)

This invention relates to an improved load discharging hopper car such as employed for carrying bulk lading and has special reference to a type of car arranged for selectively discharging the load either by gravity or pneumatically.

The objects of the invention, among others, are: To provide a structure having a V-shaped hopper with suction conduit means exteriorly of and mounted on the hopper for withdrawing lading pneumatically by suction and wherein the walls forming the V-shape direct lading to the suction conduit; to provide a V-shaped hopper with suction means adjacent the bottom of the V-shape for withdrawal of lading by suction and wherein the opposite side of the V-shaped hopper is a movable closure or door to permit selective discharge of lading by gravity; and to provide an enclosing chute-like structure for surrounding the pivoted closure and which is formed with a marginal frame adapted for receiving a removable extension chute.

The invention further resides in certain details of construction and in the means associated with the gravity discharge features such as are shown in the accompanying drawings and will hereinafter be described and claimed.

In said drawings: Figure 1 is a vertical transverse sectional view taken through the lower portion of a railway hopper car and showing an end view of the hopper structure with the gravity discharge door and the exit and outlet openings in closed position for transport of lading.

Figure 2 is a side elevational view of the structure shown in Figure 1 as viewed from left to right.

Figure 3 is a plan view of the sub-hopper assembly as viewed at a location corresponding to a line 3—3 of Figure 1 and with certain parts broken away to better illustrate the construction.

Figure 4 is a fractional vertical sectional view taken on a line 4—4 of Figure 2 showing the lower portion of the V-shaped hopper.

Figure 5 is a sectional view taken at a location corresponding to a line 5—5 of Figure 2 and with the gravity discharging door shown in open position.

Figure 6 is an end elevational view of the lower portion of the hopper structure shown in Figure 1 and showing the operating mechanism for the gravity discharge door as positioned when the door is open.

Figure 7 is a perspective view of the conduit as seen from the interior of the V-shaped hopper.

Referring now particularly to the drawings, it will be observed that a portion of a railway car structure is indicated by a center sill 10 and spaced outwardly therefrom is one of the car side walls 11. Between the center sill 10 and car side wall 11 is load containing hopper that is indicated, generally, at 12. It will be understood that a similar hopper is provided on the other side of the center sill 10 and that ordinarily two or more pairs of hoppers are provided for each car. Since the construction of the hoppers generally is identical, except for location on opposite sides of the car, only one of the hoppers is shown in the drawings and described hereinafter.

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The load containing hopper 12 is formed by oppositely sloping floors 13 and 14 and inner and outer side walls 15 and 16 which are joined together at their meeting edges and define a discharge opening 17 through which lading in the hopper 12 flows downwardly by gravity.

Below the load containing hopper 12 is a sub-hopper that is indicated, generally, at 18. The sub-hopper 18 is generally V-shaped with the bottom of the V-shape extending lengthwise of the car and parallel to the center sill 10 and well below the same. The sub-hopper 18 is formed by end walls 19 and 20 which overlie and are suitably secured to the oppositely sloping floors 13 and 14 at their lower margins. The sub-hopper 18 also is formed by inner and outer side walls 21 and 22 which overlie and are secured to the lower margins of the inner and outer sides walls 15 and 16 of the load containing hopper 12. In effect the sub-hopper 18 constitutes a continuation of the load containing hopper 12 and provision is made, as will be set forth presently, for selectively discharging lading from the sub-hopper 18 either by gravity or by pneumatic means.

In order to discharge lading from the sub-hopper 18 by gravity a rectangular opening 23 is provided in the inner side wall 21 and a rectangular movable closure or door 24 is provided for closing the opening 23. The movable closure or door 24 has an upturned marginal flange 26 on the inner side wall 21 at the top of the opening 23. Also the upturned marginal flange 25 on the closure or door 24 is arranged to overlie flanges 27 along the sides of the rectangular opening 23 in the inner side wall 21.

As shown more clearly in Figure 5 of the drawings a flange 30, formed integrally with the side wall 21, extends laterally underneath a laterally extending flange from the center sill 10 and is secured thereto as by welding. Hinge butts 31 depend from the flange 30 and hinge pins 32 extend therethrough and through hinges 33 on the closure or door 24 to rotatably mount the same about its upper edge and, as shown in Figure 5, to permit it to depend substantially vertically in the open position.

It is desirable that provision be made for preventing contamination of the movable closure or door 24. For this purpose an enclosure, shown generally at 34, is provided for enclosing the door 24 and also its path of swinging movement. The enclosure 34 includes vertical end walls 35, an inner wall 36, which extends downwardly from the flange 30, and an outer wall 37 which is relatively low in height as compared to the height of the inner wall 36. The walls 35—35, 36 and 37 of the enclosure 34 define a discharge opening 38 through which the lading can flow downwardly when the closure or door 24 is swung to the position as shown in Figure 5. Surrounding the discharge opening 38 is a marginal frame 39 to which a discharge chute 40 (shown by dot and dash lines) can be secured. The discharge chute 40 is removable and it is provided with an outstanding flange 41 around its upper periphery portions of which are arranged to enter grooves 42 in the marginal frame 39. Other portions of the outstanding flange 41 on the discharge chute 40 underlie outstanding flanges 43 and 44 on the outer wall 37 and one of the end walls 35, respectively, and are arranged to be secured thereto by a clamp 45 (also shown by dot and dash lines).

In order to swing the closure or door 24 to the closed position and to hold it closed an operating mechanism is provided. The operating mechanism includes a shaft 48 which is journaled in bearings 49 that are carried by the vertical end walls 35. The shaft 48 extends generally parallel to and below the center sill 10 and intermediate its ends there is provided an arm 50 which rotates with the shaft 48. Pivoted at 51 to the outer end of the arm 50 is a link 52. The other end of the link

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52, as shown in Figure 3, is threaded at 53 in a nut 54 which is provided with oppositely extending trunnions 55. The trunnions 55 are journaled in bearings 56 which are secured to the under side of the closure or door 24. One end of the shaft 48 extends beyond one of the vertical end walls 35, as shown in Figure 1, and an arm 57 is non-rotatably secured thereto. Pivotally connected at 58 to the outer end of the arm 57 is an operating link 59. By moving the operating link 59 from the position shown in Figure 1 to the position shown in Figure 6, the door 24 is swung from the closed position to the open position as shown in Figure 5. In the closed position of the door 24, as shown in Figure 1, the arm 50 and link 52 are in an overcenter toggle locked position. A stop 60, Figures 1 and 3 of the drawings, limits the extent of overcenter movement of the arm 50 and link 52.

Referring now particularly to Figure 4 of the drawings, it will be observed that the lower edge 63 of the outer wall 22 of the sub-hopper 18 is spaced from the inner surface of the closure or door 24 when it is in the fully closed position. This provides a passageway 64 from the bottom of the V-shaped sub-hopper 18 into a chamber 65 of a pneumatic discharge conduit 66. The pneumatic discharge conduit 66 has a generally triangular cross section and includes a vertical wall 67 having the upper edge portion 68 turned outwardly to conform to the slope of the outer side wall 22 to which it is welded as indicated at 69. The bottom of the pneumatic discharge conduit 66 is formed by a horizontal wall 70 which is provided with a downwardly sloping edge portion 71 that is spaced from and is parallel to the outer side wall 22. The passageway 64 extends between the lower portion of the outer side wall 22 and the sloping edge portion 71 of the horizontal wall 70. The passageway 64 is sub-divided by bosses 72, Figure 7, which are welded to the sloping edge 71 and also to the lower edge 63 of the outer side wall 22. It will be understood that the third side of the triangular pneumatic discharge conduit 66 is formed by the lower portion of the outer side wall 22. The upper edge of the outer wall 37 of the enclosure 34 is welded as indicated at 73 to the under side of the horizontal wall 70.

Referring to Figure 7 of the drawings it will be observed that the pneumatic discharge conduit 66 has an end wall 74 and an inner wall 75 along the edges of which there is a flange 76 that is arranged to be secured by welding to the end wall 20 of the sub-hopper 18. In the vertical wall 67 of the pneumatic discharge conduit 66 there is an air admitting opening 77 the size of which can be controlled by a slide 78 which is mounted in upper and lower slotted guideways 79 and 80 that are secured to the outer side of the vertical wall 67. In the closed position of the slide 78 one end interfits with an open groove 81, Figure 3, to completely close off the opening 77. A handle 82 is provided on the slide 78 to facilitate its movement. Any suitable sealing means can be employed for securing the slide 78 in the closed position.

Referring again to Figure 7 of the drawings it will be observed that the other end of the pneumatic discharge conduit 66 has an inner wall 85 and an extension 86 along the edges of which a flange 87 extends to facilitate welding to the under side of the end wall 19 of the sub-hopper 18. Extending from the extension 86 is a circular discharge section 88. It will be understood that the circular discharge section 88 is arranged to be connected to a suitable source of suction (not shown) so that air will be drawn in through the opening 77 when the slide is properly adjusted and lading is entrained therein as the air passes through the pneumatic discharge conduit 66. Thus lading entrained in the air flows outwardly through the discharge section 88.

In order to close the circular discharge section 88 when it is not in use, a removable closing cap 89 is

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provided. It has radially extending flange sections 90 one face 91 of each of which is arranged to engage corresponding faces 92 on flange receiving sections 93 which are carried by the circular discharge section 88. This arrangement permits the closing gap 89 to be wedged tightly in the closed position by a partial rotation thereof.

With a view to holding the operating link 59 in the position corresponding to the closed position of the door 24, a slotted lug 96 is provided as shown in Figures 1 and 6 of the drawings. The slotted lug 96 receives the outer end of the operating link 59 therethrough and it is suitably secured to the vertical wall 67 of the pneumatic discharge conduit 66 as by welding. An inner face 97 of the slotted lug 96 is arranged to receive a shoulder 98 that depends from the under side of the operating link 59. When the shoulder 98 engages the inner face 97 of the slotted lug 96, as shown in Figure 1, the closure or door 24 is held in the position and the toggle formed by the arm 50 and links 52 is in the overcenter toggle locked position. A handle 99 extends laterally from the outer end of the operating link 59 to permit manual operation. A locking dog 100, pivotally mounted at 101 on the vertical wall 67 of the pneumatic discharge conduit 66, serves to lock the operating link 59 in the position shown in Figure 1.

When the closure or door 24 is in the closed position, as shown in Figure 4 of the drawings, it will be apparent that its inner surface forms a part of the passageway 64 and, since this passageway is located at the bottom of the V-shaped sub-hopper 18, all of the lading therein can be removed pneumatically. Thus complete unloading of the hopper car can be effected pneumatically. If necessary, a further cleaning of the empty car can be accomplished by opening the closure or door 24. Also, as set forth above, the closure or door 24 can be opened to permit gravity unloading of the sub-hopper 18.

The incorporation of the gravity unloading feature provided by the closure or door 24 in addition to the pneumatic unloading means provided by the pneumatic discharge conduit 66 in a single hopper car is of importance in present day railway operation since, with such a car in which both types of unloading features are incorporated, it is unnecessary at the time of loading the car, to anticipate the method of unloading. Upon arrival of the car equipped with the dual types of unloading features, the lading, such as flour, grain, cement, etc., can be pneumatically unloaded by connecting the discharge section 88 to a source of reduced pressure and opening of the slide 78 to uncover the air admitting opening 77. Alternatively, if pneumatic unloading equipment is unavailable, the lading can be discharged by opening the closure or door 24.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matters shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a load containing hopper car having provision for selectively unloading either pneumatically or by gravity, said car having a longitudinally extending V-shaped lower hopper section, one of the sides of the V-shaped lower hopper section being stationary and the opposite side including a movable door to discharge lading by gravity, the respective sides of said hopper section being separated by an intervening space to provide an opening for withdrawal of lading pneumatically, and a conduit outwardly of said hopper section having a communicating passageway with said space at the nadir of the hopper, said conduit having an inlet opening for admission of air and an exit opening for connection with a source of reduced pressure.

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2. The invention as set forth in claim 1 wherein the door is pivotally mounted and is swingable about its upper portion to an open pendant position and its lower portion in closed position overlies the passageway from the hopper space to the conduit and directs the flow of lading thereto.

3. The invention as set forth in claim 2 wherein a discharge chute encloses the door and confines the lading within prescribed limits.

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