Aug. 7, 1962 E. R. ALLER 3,048,448

RAILWAY HOPPER CARS

Filed Aug. 8, 1960 3 Sheets-Sheet 1

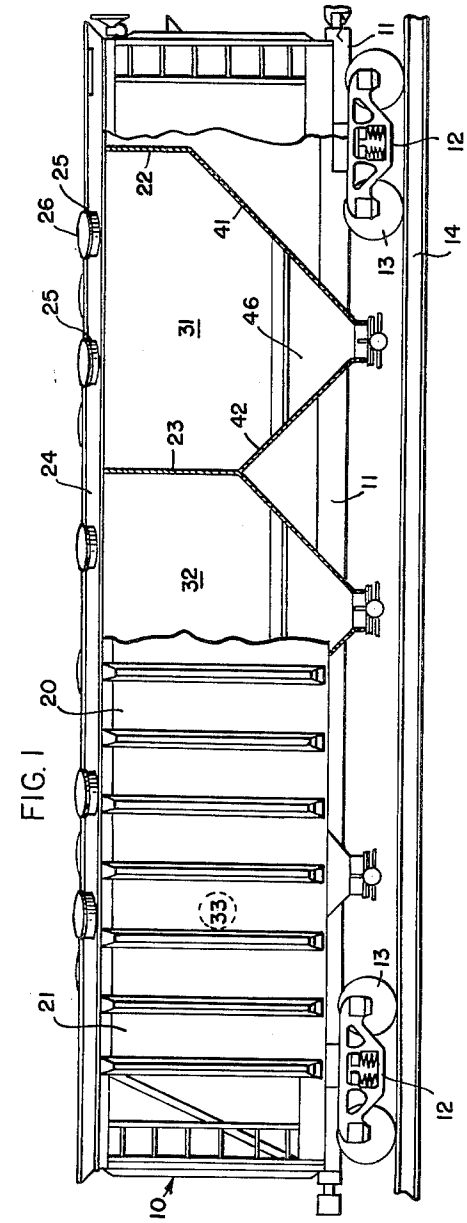



FIG. 1

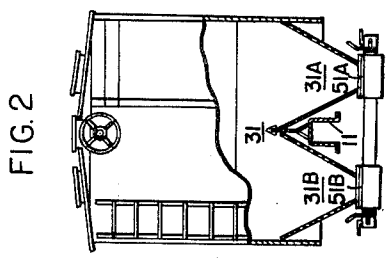



FIG. 2

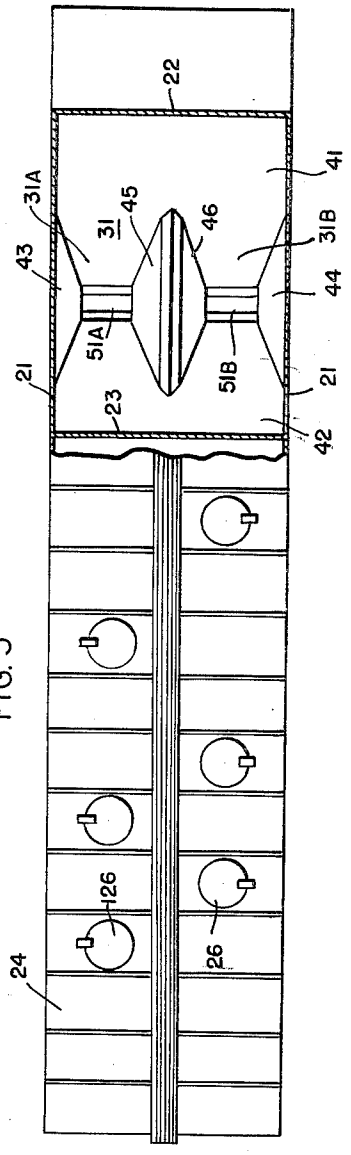



FIG. 3

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Aug. 7, 1962 E. R. ALLER 3,048,448

RAILWAY HOPPER CARS

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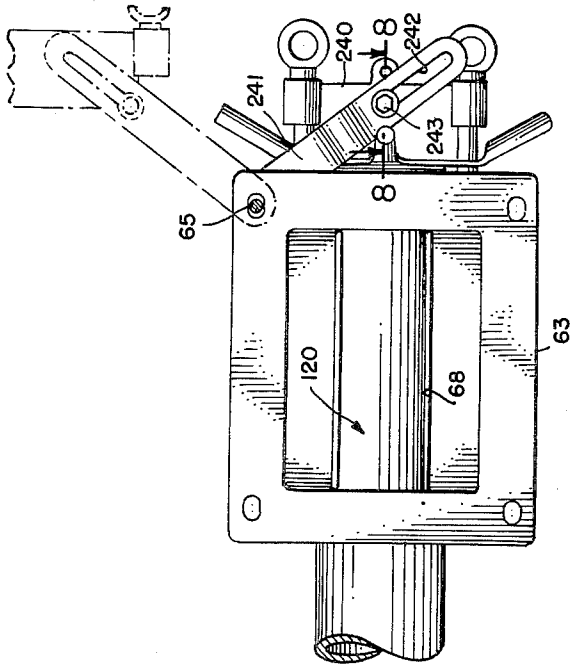



FIG. 4

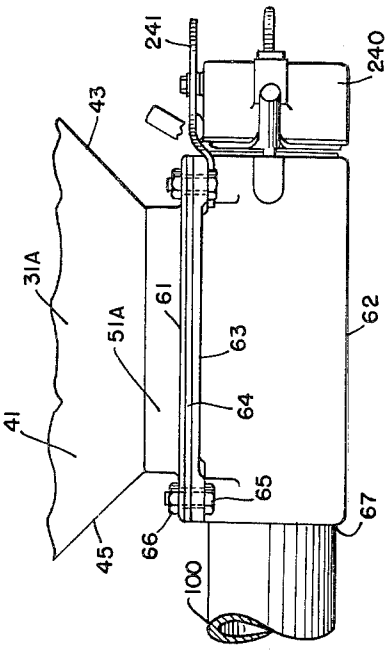
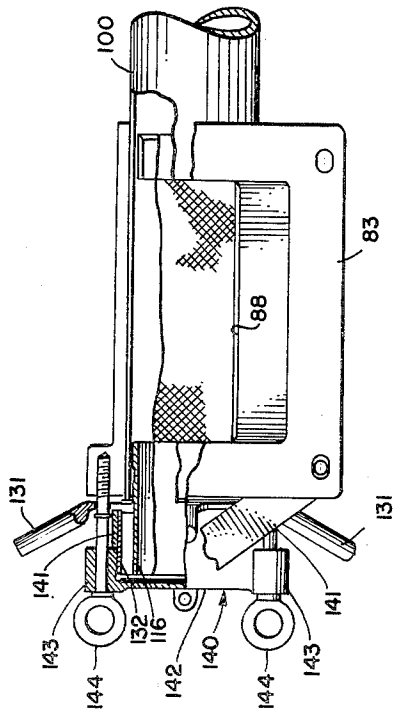
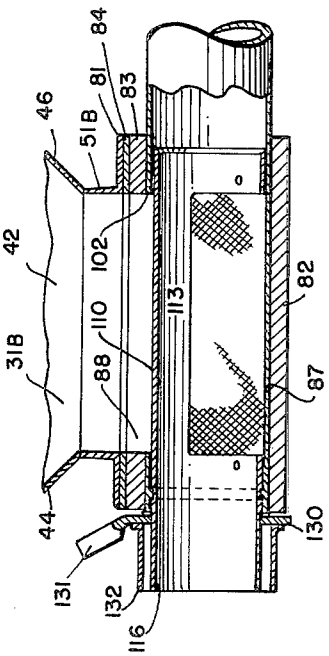



FIG. 5




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RAILWAY HOPPER CARS

Filed Aug. 8, 1960 3 Sheets-Sheet 3

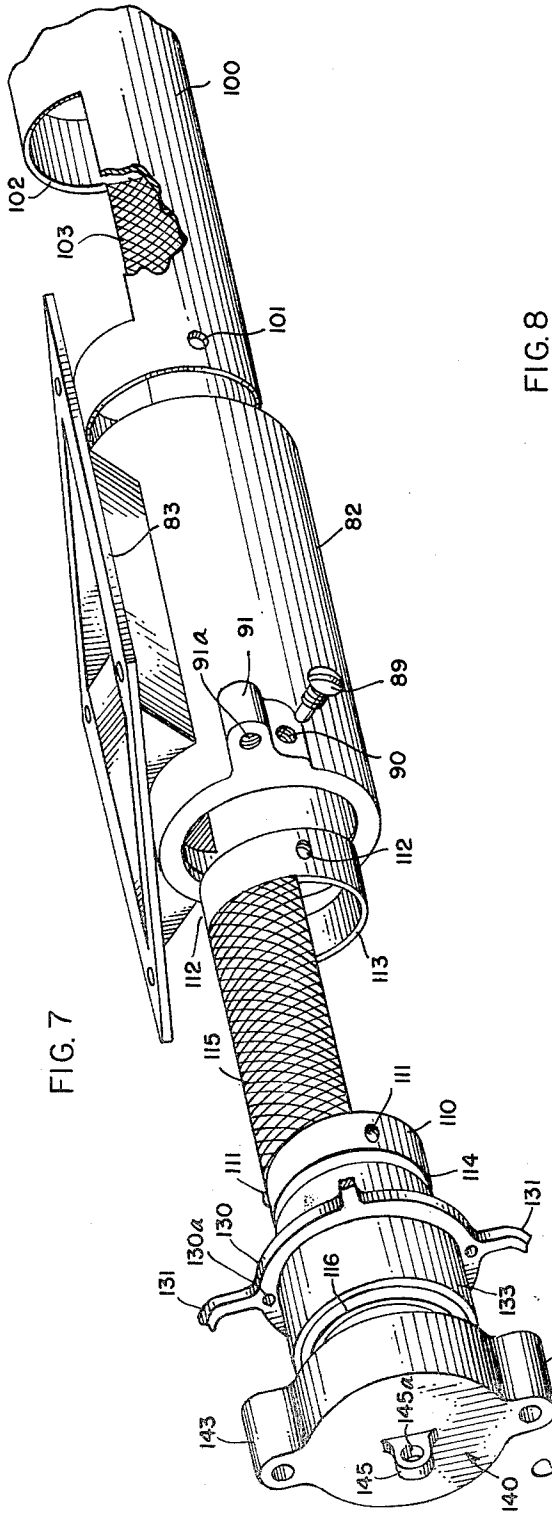



FIG. 7

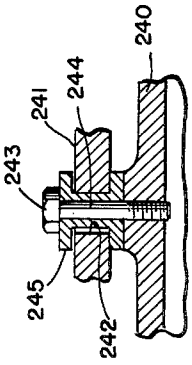



FIG. 8

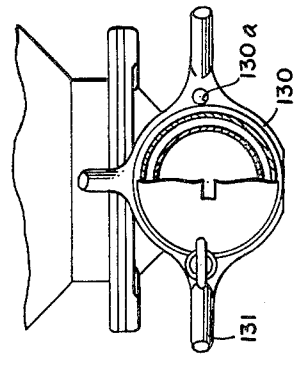



FIG. 6

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United States Patent Office 3,048,448 Patented Aug. 7, 1962



3,048,448

# RAILWAY HOPPER CARS

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Filed Aug. 8, 1960, Ser. No. 48,192
14 Claims. (Cl. 302—52)

The present invention relates to railway hopper cars for storage and transportation of finely divided or granular material, such, for example, as flour, malt, plastic resin beads, or the like; and it is the general object of the invention to provide an improved railway hopper car of the general construction and arrangement of that disclosed in U.S. Patent No. 2,650,726, granted on September 1, 1953, to Edmund R. Aller, John M. Gleason and Louis Matolin.

Another object of the invention is to provide in a railway hopper car, including a longitudinally extending body incorporating hopper structure adapted to contain granular material and provided with a pair of laterally spaced-apart bottom discharge openings, improved pneumatic unloading valve structure disposed below the bottom discharge openings for selectively controlling the unloading to the exterior of granular material from the car body through the pair of bottom discharge openings.

A further object of the invention is to provide in a railway hopper car, pneumatic unloading and valve mechanism for selectively controlling the unloading to the exterior of granular material from the car body through a bottom discharge opening associated with the hopper structure provided in the car body.

A still further object of the invention is to provide improved and simplified pneumatic unloading and valve mechanism for the bottom discharge opening of the hopper structure.

Further features of the invention pertain to the particular arrangement of the elements of the railway hopper car, whereby the above-outlined and additional operating features thereof are attained.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following specification, taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view, partly broken away, of a railway hopper car embodying the present invention;

FIG. 2 is an end elevational view, partly broken away, of the railway hopper car shown in FIG. 1;

FIG. 3 is a plan view, partly broken away, of the railway hopper car shown in FIGS. 1 and 2;

FIG. 4 is an enlarged fragmentary plan view of one of the pneumatic unloading and valve mechanisms incorporated in the railway hopper car of FIGS. 1 to 3, inclusive, the left-hand side of the valve mechanism illustrated being shown partially in section;

FIG. 5 is an enlarged fragmentary side elevational view of the mechanism, partly in section, as shown in FIG. 4;

FIG. 6 is an enlarged end elevational view, partly in section, of the left-hand end of the mechanism, as shown in FIGS. 4 and 5;

FIG. 7 is an enlarged fragmentary exploded perspective view, partly broken away, of the left-hand end of the mechanism shown in FIGS. 4 to 6, inclusive; and

FIG. 8 is a greatly enlarged vertical sectional view of a detail of the right-hand end of the mechanism illustrated, this view being taken in the direction of the arrows along the line 8—8 in FIG. 4.

Referring now to FIGS. 1 to 3, inclusive, of the drawings, the railway hopper car **10** there illustrated and embodying the features of the present invention is especially adapted for storage and transportation of finely divided or granular materials, such, for example, as flour, malt, plastic, resin beads, or the like; and the car **10** comprises a rigid underframe, including a longitudinally extending center sill **11**; which underframe is supported adjacent to the opposite ends thereof by a pair of trucks **12** carrying track wheels **13** cooperating with an associated railway track, indicated at **14**.



The underframe carries a body **20**, including a pair of longitudinally extending and laterally spaced-apart side walls **21**, a pair of laterally extending and longitudinally spaced-apart end walls **22**, and two laterally extending and longitudinally spaced-apart divider walls **23** disposed between the end walls **22** and cooperating therewith to divide the lading compartment defined within the body **20** into three upstanding hoppers **31**, **32** and **33**. Of course, it will be understood that the number of divider walls **23** required depends upon the numbers of hoppers into which the volume of the lading compartment is to be divided, two of the divider walls **23** being required for the purpose of defining the three upstanding hoppers **31**, **32** and **33**, in the present example. Also, the body **20** comprises roof structure **24** that carries a number of longitudinally spaced-apart filling hatches **25** arranged on either side thereof and communicating with the several hoppers **31**, **32** and **33**, each of the filling hatches **25** being provided with an associated removable hatch cover **26** normally arranged in sealing relation therewith. Further, the body **20** comprises bottom structure in the lower portion thereof closing the bottom ends of the three hoppers **31**, **32** and **33**; and as illustrated, the bottom structure provided in the hopper **31** includes a pair of laterally extending and downwardly sloping hopper sheets **41** and **42**, a pair of longitudinally extending and downwardly sloping hopper sheets **43** and **44**, and center structure providing a pair of longitudinally extending and downwardly sloping hopper sheets **45** and **46**. Specifically, the hopper sheets **41** and **42** converge downwardly longitudinally toward each other, the hopper sheets **43** and **45** converge laterally downwardly toward each other, and the hopper sheets **44** and **46** converge laterally downwardly toward each other. In the arrangement, as illustrated in FIG. 3, the upper portions of the hopper sheets **41** and **42** cooperate with the hopper sheets **43** and **45** to provide the upper hopper section **31A** having bottom outlet structure **51A**, and the lower portions of the hopper sheets **41** and **42** cooperate with the hopper sheets **44** and **46** to provide the lower hopper section **31B** having bottom outlet structure **51B**.

The orientation and arrangement of the hopper sections **31A** and **31B** (hereinafter referred to simply as hoppers) and the bottom outlet structures **51A** and **51B** will best be understood by reference to FIG. 5, wherein it will be observed that the hoppers **31A** and **31B** are disposed in laterally spaced-apart relation and substantially in alignment with each other, the hopper **31A** being referred to as the right-hand hopper, and the hopper **31B** being referred to as the left-hand hopper. Thus it will be appreciated that the right-hand hopper **31A** is provided with the cooperating bottom outlet structure **51A** that terminates in an outwardly directed rectangular flange **61**, and the left-hand hopper **31B** is provided with the cooperating bottom outlet structure **51B** that terminates in an outwardly directed rectangular flange **81**.

Referring now to FIGS. 4 and 5, the bottom outlet structure **51A** carries therebelow a substantially cylindrical valve casing **62** provided with a substantially rectangular outwardly directed top flange **63** disposed below the flange **61** and secured thereto, with an intervening sealing gasket **64** therebetween, by a plurality of bolts

65 provided with cooperating nuts 66; similarly, the bottom outlet structure 51B carries therebelow a substantially cylindrical valve casing 82 provided with a substantially rectangular outwardly directed top flange 83 disposed below the flange 81 and secured thereto, with an intervening sealing gasket 84 therebetween, by a plurality of bolts and cooperating nuts, not shown. Preferably, the two valve casings 62 and 82 are identical, each being formed of a suitable aluminum casting.

Referring now to FIGS. 4, 5 and 7, the valve casing 82 has a laterally extending cylindrical passage 87 formed therethrough and a top inlet port 88 formed therein and communicating between the passage 87 and the bottom outlet structure 51B, the valve port 88 extending through the top flange 83. Of course, the valve casing 62 has a corresponding cylindrical passage 67 formed therethrough that communicates via an associated top inlet port 68 with the cooperating bottom outlet structure 51A. In the arrangement, the tubular passages 67 and 87 are disposed in substantially lateral alignment, and a substantially cylindrical connecting conduit 100 extends laterally through the aligned passages 67 and 87, the left-hand end of the connecting conduit 100 terminating adjacent to the left-hand outer side of the vave casing 82, and the right-hand outer end of the connecting conduit 100 terminating adjacent to the right-hand outer side of the valve casing 62. Preferably, the connecting conduit 100 is formed of stainless steel, the extreme outer ends thereof being open and the intermediate portion thereof extending between the valve casings 62 and 82. The connecting conduit 100 is secured in place against both longitudinal sliding movement and rotational movement with respect to the valve casings 62 and 82 by a pair of screws respectively carried by the valve casings 62 and 82, the screw carried by the valve casing 82 being illustrated at 89 in FIG. 7, the inner end of the screw 89 projecting through a cooperating hole 101 provided in the adjacent left-hand end of the connecting conduit 100, as illustrated in FIG. 7. In the arrangement, the screw 89 that is carried by the valve casing 82 is removably secured in place in a threaded opening 90 provided in the left-hand end of the valve casing 82, as shown in FIG. 7. A top valve port 102 is provided in the left-hand upper portion of the connecting conduit 100 and directly communicates with the top inlet port 88 formed in the valve casing 82; and a top tube valve port, not shown, is provided in the right-hand end portion of the connecting conduit 100 and directly communicates with the top inlet port 68 formed in the valve casing 62.

A first substantially cylindrical valve sleeve 110 is arranged within the left-hand end of the connecting conduit 100, and, of course, within the tubular passage 87 formed in the valve casing 82 and surrounding the left-hand end of the connecting conduit 100; similarly, a second substantially cylindrical valve sleeve 120 is arranged within the right-hand end of the connecting conduit 100, and, of course, within the tubular passage 67 formed in the valve casing 62 and surrounding the right-hand end of the connecting conduit 100. Preferably, the valve sleeves 110 and 120 are identical, each being formed of stainless steel. The valve sleeve 110 illustrated is mounted for rotary movement within the adjacent left-hand end of the connecting conduit 100 and out of contact therewith by an arrangement including two laterally spaced-apart sets of radially outwardly projecting buttons 111 and 112 carried thereby (see FIG. 7), whereby the two sets of buttons 111 and 112 engage two laterally spaced-apart interior surfaces of the connecting conduit 100 disposed on opposite sides of the valve port 102. Also, the valve sleeve 110 has a valve port 113 formed therein that is adapted to be selectively rotated into registry with the valve port 102 formed in the left-hand end portion of the connecting conduit 100. Accordingly, the valve sleeve 110 is selectively rotatable into closed and open positions with respect to the valve port 102



formed in the left-hand end portion of the connecting conduit 100 for the purpose of selectively opening and closing the bottom outlet structure 51B with respect to the interior of the left-hand end portion of the connecting conduit 100, as well as the interior of the valve sleeve 110. While the valve sleeve 110 is mounted for rotary movement within the left-hand end portion of the connecting conduit 100, it is restrained against longitudinal sliding movements by the cooperating screw 89 that is carried by the adjacent valve casing 82. More particularly, as shown in FIG. 7, the extreme inner end of the screw 89 projects into an annular groove 114 provided in the outer cylindrical surface of the valve sleeve 110, when the screw 89 occupies its normal set portion in the cooperating threaded opening 90 provided in the valve casing 82. Thus, it will be understood that the screw 89 prevents both sliding movement and rotational movement of the left-hand end portion of the connecting conduit 100 with respect to the vaive casing 82; and also the screw 89 prevents sliding movement of the valve sleeve 110, while accommodating rotational movement thereof with respect to the associated valve casing 82.

The interior surface of the left-hand end of the connecting conduit 100 facing the valve port 102 provided therein is serrated or knurled, as indicated at 103 in FIG. 7; and similarly, the exterior surface of the valve sleeve 110 connecting the opposite ends of the valve port 113 formed therein is serrated or knurled, as indicated at 115 in FIG. 7. In the arrangement, the knurled outer surface 115 carried by the valve sleeve 110 is rotated out of contact with the knurled inner surface 103 carried by the left-hand end portion of the connecting conduit 100 and spaced closely radially inwardly therefrom; which spacing is achieved by virtue of the mounting buttons 111 and 112, that may be formed of a suitable plastic material, such, for example, as nylon. This arrangement permits ready rotation of the valve sleeve 110 with respect to the left-hand end of the connecting conduit 100, but effects a grinding action upon any granular material that may find its way between the two knurled surfaces 115 and 103, thereby to prevent frictional wedging or jamming of the rotary motion of the valve sleeve 110 with respect to the left-hand end of the connecting conduit 100.

Referring now to FIGS. 4 to 7, inclusive, the extreme left-hand end of the valve sleeve 110 projects laterally outwardly from the adjacent left-hand end of the valve casing 82, thereby to provide an interior suction tube 116 on the extreme left-hand end thereof. Also, the left-hand end of the valve sleeve 110 carries an annular ring 130 disposed adjacent to the left-hand end of the valve casing 82; which annular ring 130 carries a plurality of radially outwardly extending handle elements 131 that accommodate ready manual rotation of the valve sleeve 110 between its open and closed positions, as previously explained. Also, the annular ring 130 carries an outer suction tube 132 sealed thereto at the inner end thereof and disposed in surrounding relation with respect to the inner suction tube 116; whereby the inner and outer suction tubes 116 and 132 are disposed in nested radially spaced-apart relation with respect to each other. In the arrangement, the outside diameter of the inner suction tube 116 may be 5¼"; whereby it is adapted to receive a 5" coupling to a corresponding relatively small diameter suction conduit, not shown. Similarly, the outside diameter of the outer suction tube 132 may be 6¼"; whereby it is adapted to receive a 6" coupling to a corresponding relatively large diameter suction conduit, not shown. Accordingly, the suction tubes 116 and 132 constitute a suction tube set carried on the extreme left-hand end of the valve sleeve 110 outwardly of the adjacent left-hand end of the valve casing 82 and are adapted to be selectively connected to two different sizes of suction conduits for the unloading purpose, as explained more fully hereinafter.

Further, the extreme left-hand outer end of the valve sleeve 110 is provided with a cover or cap 140 that is selectively movable into open and closed positions with respect to the suction tubes 116 and 132; which cap 140 is carried upon a bracket 241 for pivotal movements between its open and closed positions, as described more fully below. More particularly, the cap 140 comprises a tubular wall 141 that is adapted to receive and to fit over the outer suction tube 132, and a closing end wall 142 that is adapted to stopper the extreme left-hand outer ends of the suction tubes 116 and 132. Specifically, the cap 140 may comprise a suitable aluminum casting and is provided with a pair of radially outwardly extending protuberances 143 that are adapted to match a corresponding pair of radially outwardly extending protuberances 91 carried by the adjacent valve casing 82. Two securing bolts 144 are respectively mounted for rotation within two corresponding holes provided through the protuberances 143; whereby each of the securing bolts 144 is rotatably mounted upon the associated one of the protuberances 143. When the cap 140 occupies its normal closed position with respect to the suction tubes 116 and 132, the inner ends of the securing bolts 144 are adapted to project through cooperating holes 130*a* provided in the ring 130, but only in the event the ring 130 has been rotated so as to move the valve sleeve 110 into its closed position, as previously explained. Furthermore, the extreme inner ends of the securing bolts 144 project through the holes 130*a* provided in the ring 130 and thence into cooperating threaded holes 91*a* formed in the protuberances 91 carried by the adjacent valve casing 82. Accordingly, it will be understood that when the ring 130 has been rotated to move the valve sleeve 110 into its closed position, the cap 140 may be placed upon the extreme left-hand outer ends of the suction tubes 116 and 132 in covering relation therewith; whereby the inner ends of the securing bolts 114 project through the holes 130*a* provided in the ring 130 and thence into the holes 91*a* provided in the protuberances 91 carried by the adjacent valve casing 82; whereby the securing bolts 144 hold the cap 140 in covering relation with respect to the extreme outer left-hand ends of the suction tubes 116 and 132 and also lock the ring 130 against rotation; whereby the valve sleeve 110 is restrained in its closed position. Further, the central portion of the cap 140 carries a tab 145 having a hole 145*a* formed therein that may be used for the purpose of placing a seal upon the cap 140 in its closed position. Of course, it will be understood that the sealing wire will extend through the hole 145*a* and through the loop provided in the outer end of one of the securing bolts 144, the two ends of the sealing wire being sealed together in the usual manner, thereby to indicate that the cap 140 has not been removed during the transit of the railway hopper car 10.

Of course, the construction and arrangement of the valve sleeve 120 provided in the right-hand end portion of the connecting conduit 100 and within the tubular passage 67 provided within the valve casing 62 are the same as that of the valve sleeve 110 described above. Moreover, the extreme right-hand end of the valve sleeve 120 carries a suction tube set, not shown, disposed outwardly from the right-hand end of the adjacent valve casing 63; which last mentioned suction tube set is provided with the removable cap 240, corresponding to the removable cap 140 described above.

As previously noted, the cap 140 is pivotally mounted by an associated bracket 141 upon the adjacent valve casing 82; and likewise, the cap 240 is pivotally mounted by an associated bracket 241 upon the adjacent valve casing 62. More particularly, as shown on the right-hand sides of FIGS. 4 and 5, one end of the bracket 241 is disposed immediately below the top flange 63 carried by the valve casing 62 and has a hole formed therein, through which the associated bolt 65 extends; whereby this one end of the bracket 241 is pivotally mounted upon the lower surface of the top flange 63 by the associated bolt 65 that is employed for the purpose of securing the valve casing 62 to the flange 61 carried by the bottom outlet structure 51A. The other or outer end of the bracket 241 extends upwardly and outwardly and has an elongated slot 242 formed therethrough; which slot 242 receives a screw 243 carried by the cap 240; whereby the arrangement, including the screw 243, mounts the cap 240 upon the outer end of the bracket 241 for relative sliding movements in the slot 242, thereby to accommodate placement and removal of the cap 240 with respect to the adjacent extreme right-hand end of the associated suction tube set carred by the extreme right-hand end of the valve sleeve 120 outwardly from the adjacent right-hand end of the valve casing 62.

Referring more particularly to FIG. 8, the constructional details of the mounting arrangement of the cap 240 upon the bracket 241 are illustrated; and in the arrangement, it will be observed that the inner end of the screw 243 is threaded into a cooperating opening provided in the top of the cap 240; which screw 243 is provided with a shank 244 that extends through a centrally disposed opening provided in a cooperating eyelet 245 that is, in turn, arranged within the slot 242 provided in the bracket 241. This arrangement of the eyelet 245 in surrounding relation with respect to the shank 244 of the screw 243 and disposed in the slot 242 provided in the bracket 241 prevents over-tightening of the screw 243 and consequent binding between the cap 240 and the bracket 241, since the eyelet 245 is sufficiently rigid to prevent deformation thereof incident to tightening of the screw 243; whereby free sliding movement between the eyelet 245 and the slot 242 provided in the bracket 241 is preserved, notwithstanding over-tightening of the screw 243.

In view of the foregoing description of the construction and arrangement of the pneumatic unloading and valve mechanism that is carried by the two hoppers 31*a* and 31*b* of the hopper structure 31, it will be understood that two identical such mechanisms are carried by each of the pairs of hoppers respectively associated with the hopper structures 32 and 33.

Considering now the general mode of loading granular material into the hopper structure 31 provided in the body 20 of the railway hopper car 10, it is first assumed that the valve sleeves 110 and 120 occupy their closed positions and that the caps 140 and 240 occupy their covering positions with respect to the associated suction conduit sets, as previously explained. At this time, several of the hatch covers 26 are removed from the associated loading hatches 25, and the granular material is placed within the hopper structure 31; and specifically, the granular material is normally blown through the open loading hatches 25 into the hopper structure 31. After loading of the hopper structure 31, the several hatch covers 26 are returned to their sealed positions with respect to the hatches 25; and also, at this time, seals are normally placed upon the caps 140 and 240, so that an inspector may readily determine whether the caps 140 and 240 have been removed during transit of the railway hopper car 10.

Of course, the loading of the hopper structures 32 and 33 is the same as that described above in conjunction with the loading of the hopper structure 31.

Considering now the general mode of unloading of the granular material from the hopper structure 31, several of the hatch covers 26 are normally removed from the corresponding ones of the loading hatches 25. The seals provided on the caps 140 and 240 are broken and the caps 140 and 240 are removed, in the manner previously explained. At this time, it may be assumed that the suction conduit is to be connected to one of the suction tubes 116 or 132 that are carried by the valve sleeve 110 and that conveying is to be admitted into the other valve sleeve 120. More particularly, the suction conduit, not

shown, is connected to one of the suction tubes 116 or 132, depending upon the size thereof, as previously explained; and for purpose of explanation, it may be assumed that a relatively large size suction conduit is employed; whereby the coupling thereof is arranged in engagement with the outer suction tube 132. Incident to the removal of the caps 140 and 240 from the associated suction tube sets, the caps 140 and 240 are merely pivoted out of the way, as indicated by broken lines in FIG. 4 in conjunction with the cap 240; whereby the caps 140 and 240 are not lost and are not contaminated by contact with the ground or other exterior apparatus.

At this time, the person unloading the hopper structure 31 determines which of the individual hoppers 31A or 31B is to be unloaded, or whether both of the individual hoppers mentioned are to be simultaneously unloaded. Assuming that both of the individual hoppers 31A and 31B are to be simultaneously unloaded, the person rotates the handle structure carried by the ring 130, so as to rotate the valve sleeve 110 into its open position with respect to the adjacent left-hand end portion of the connecting tube 100, thereby to place the interior of the individual hopper 31B into communication with the interior of the left-hand end of the connecting conduit 100 through the bottom outlet structure 51B. In a like manner, the handle structure carried by the valve sleeve 120 is rotated, thereby to place the interior of the individual hopper 31A into communication with the interior of the right-hand end portion of the connecting conduit 100.

At this time, a suction effect is produced in the connected suction conduit; whereby the granular material moves from the hopper 31A through the bottom outlet structure 51A into the interior of the valve sleeve 120 in its open position and thence into the adjacent right-hand end portion of the connecting conduit 100 and thence through the valve sleeve 110 and out of the suction tube 116 into the suction conduit. Also, the granular material moves from the hopper 31B through the bottom outlet structure 51B into the interior of the valve sleeve 110 in its open position and thence through the suction tube 116 into the suction conduit. Of course, in this case, the two hoppers 31A and 31B are unloaded simultaneously since the two corresponding valve sleeves 120 and 110 occupy their open positions.

It will, of course, be understood that only one of the hoppers 31A or 31B may be selectively unloaded by the simple expedient of operating only the coresponding one of the valve sleeves 120 or 110 into its open position, leaving the other one of the valve sleeves mentioned in its closed position; whereby only the selected one of the hoppers 31A or 31B will then be unloaded into the connected suction conduit. Further, it will be understood that during an unloading operation involving the simultaneous unloading of the two hoppers 31A and 31B, one or the other of the hoppers may be first unloaded; whereby the corresponding one of the valve sleeves 120 or 110 is returned into its closed position, so as to facilitate the complete unloading of the other of the hoppers 31A or 31B.

After the unloading operation, the suction conduit is removed from the associated suction tube 132 and the handle structure is manipulated to return the valve sleeve 110 back into its closed position; whereupon the associated cap 140 is replaced with respect to the adjacent valve casing 82, in the manner previously explained. Also, the handle structure associated with the valve sleeve 120 is manipulated to return the valve sleeve 120 back into its closed position; whereupon the associated cap 240 is replaced with respect to the adjacent valve casing 62, in the manner previously explained. Also, at this time, the several hatch covers 26 are returned into sealed relation with respect to the loading hatches 25.

In view of the above description of the unloading of the granular material from the hopper structure 31, it will be understood that in a similar manner, the granular material may be selectively unloaded from the hopper structures 32 and 33.

In view of the foregoing, it is apparent that there has been provided a railway hopper car incorporating an improved pneumatic discharge and valve mechanism that greatly facilitates the unloading of finely divided or granular material from the hoppers provided in the car body.

While there has been described what is at present considered to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a railway car, a longitudinally extending body including hopper structure adapted to contain granular material and provided with a pair of laterally spaced-apart bottom discharge openings, a pair of laterally spaced-apart valve casings carried by said hopper structure and respectively disposed below said bottom discharge openings, each of said valve casings having a tubular passage extending laterally therethrough and a top inlet port therein communicating between said passage and the adjacent one of said bottom discharge openings, said passages being arranged in substantial lateral alignment with each other, a connecting conduit extending laterally between said valve casings and communicating at the opposite ends thereof with the adjacent inner ends of said passages, a pair of laterally extending valve sleeves independent of said connecting conduit and respectively arranged in said passages and respectively independently rotatably mounted upon said valve casings, each one of said valve sleeves including an intermediate portion having a valve port therein that is adapted to be rotated selectively into and out of registry with the adjacent one of said top inlet ports, whereby each one of said valve sleeves has open and closed positions with respect to the adjacent one of said top inlet ports, the inner ends of said valve sleeves being arranged in laterally spaced-apart relation and respectively communicating with the adjacent end portions of said connecting conduit and the outer ends of said valve sleeves respectively projecting laterally outwardly from the adjacent ones of said valve casings and constituting a pair of air tubes, whereby a suction conduit may be connected to either one of said air tubes and the other of said air tubes may serve to admit conveying air thereinto, and a pair of handle structures respectively carried by said valve sleeves and respectively disposed laterally outwardly of the adjacent ones of said valve casings, thereby to facilitate independent rotation of each one of said valve sleeves between its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through both of said bottom discharge openings or through either one of said bottom discharge openings as desired.

2. The railway car set forth in claim 1, wherein the outer ends of said connecting conduit respectively project into the adjacent ones of said passages, and the inner ends of said valve sleeves respectively project into the adjacent ones of the ends of said connecting conduit.

3. In a railway car, a longitudinally extending body including hopper structure adapted to contain granular material and provided with a pair of laterally spaced-apart bottom discharge openings, a pair of laterally spaced-apart valve casings carried by said hopper structure and respectively disposed below said bottom discharge openings, each of said valve casings having a tubular passage extending laterally therethrough and a top inlet port therein communicating between said passage and the adjacent one of said bottom discharge openings, said passages being arranged in substantial lateral alignment with each other, a connecting conduit extending laterally between said valve casings and communicating at the opposite ends thereof with the adjacent inner ends of said passages, a pair of laterally extending valve sleeves independent of said connecting conduit and respectively

arranged in said passages and respectively independently rotatably mounted upon said valve casings, each one of said valve sleeves including an intermediate portion having a valve port therein that is adapted to be rotated selectively into and out of registry with the adjacent one of said top inlet ports, whereby each one of said valve sleeves has open and closed positions with respect to the adjacent one of said top inlet ports, the inner ends of said valve sleeves being arranged in laterally spaced-apart relation and respectively communicating with the adjacent end portions of said connecting conduit and the outer ends of said valve sleeves respectively projecting laterally outwardly from the adjacent ones of said valve casings and constituting a pair of air tubes, whereby a suction conduit may be connected to either one of said air tubes and the other of said air tubes may serve to admit conveying air thereinto, a pair of handle structures respectively carried by said valve sleeves and respectively disposed laterally outwardly of the adjacent ones of said valve casings, thereby to facilitate independent rotation of each one of said valve sleeves between its open and closed positions, whereby the granular materal in said hopper structure may be selectively unloaded therefrom through both of said bottom discharge outlets or through either one of said bottom discharge outlets as desired, a pair of covers respectively removably carried by said air tubes for closing the same when they are not in use, and a pair of securing devices respectively cooperating with said covers and said handle structures and said valve casings for selectively retaining said covers in place and for selectively restraining said handle structures in positions actuating said valve sleeves into their closed positions.

4. The railway car set forth in claim 3, wherein each of said securing devices essentially comprises a bolt carried by the associated one of said covers and rotatably mounted thereon, said bolt in its securing position projecting through a hole provided in the associated one of said handle structures when the same is in a rotated position actuating the associated one of said valve sleeves into its closed position, and said bolt having a threaded inner end engaging in its securing position a cooperating threaded hole provided in the associated one of said valve casings.

5. In a railway car, a longitudinally extending body including hopper structure adapted to contain granular material and provided with a pair of laterally spaced-apart bottom discharge openings, a pair of laterally spaced-apart valve casings carried by said hopper structure and respectively disposed below said bottom discharge openings, each of said valve casings having a tubular passage extending laterally therethrough and a top inlet port therein communicating between said passage and the adjacent one of said bottom discharge openings, said passages being arranged in substantial lateral alignment with each other, a connecting conduit extending laterally between said valve casings and communicating at the opposite ends thereof with the adjacent inner ends of said passages, a pair of laterally extending valve sleeves independent of said connecting conduit and respectively arranged in said passages and respectively independently rotatably mounted upon said valve casings, each one of said valve sleeves including an intermediate portion having a valve port therein that is adapted to be rotated selectively into and out of registry with the adjacent one of said top inlet ports, whereby each one of said valve sleeves has open and closed positions with respect to the adjacent one of said top inlet ports, the inner ends of said valve sleeves being arranged in laterally spaced-apart relation and respectively communicating with the adjacent end portions of said connecting conduit, a pair of air tube sets respectively carried by the outer ends of said valve sleeves and respectively communicating therewith and respectively projecting laterally outwardly from the adjacent ones of said valve casings, each of said air tube sets including an inner air tube and an outer air tube arranged in nested radially spaced-apart relation, whereby a relatively large suction conduit may be connected to the outer air tube of either one of said air tube sets and a relatively small suction conduit may be connected to the inner air tube of either one of said air tube sets and the other of said air tube sets may serve to admit conveying air thereinto, and a pair of handle structures respectively carried by said valve sleeves and respectively disposed laterally outwardly of the adjacent ones of said valve casings, thereby to facilitate independent rotation of each one of said valve sleeves between its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through both of said bottom discharge openings or through either one of said bottom discharge openings as desired.



6. In a railway car, hopper structure adapted to contain granular material and provided with a bottom discharge opening, a valve casing carried by said hopper structure and disposed below said bottom discharge opening, said valve casing having a tubular passage extending therethrough and a top inlet port therein communicating between said passage and said bottom discharge opening, a first tubular metal conduit arranged in and projecting through said passage, the intermediate portion of said first conduit having a first valve port therein registering with said top inlet port, securing means carried by said valve casing for preventing rotation of said first conduit in said passage, a second tubular metal conduit arranged in said first conduit, means including a plurality of bearing members carried by one of said conduits for supporting said second conduit within said first conduit and spaced radially inwardly with respect thereto and out of contact therewith and for mounting said second conduit for rotation with respect to said first conduit, each of said bearing members being formed of plastic material, whereby said bearing members prevent metal-to-metal contact between said first and second conduits, the intermediate portion of said second conduit having a second valve port therein that is adapted to be rotated selectively into and out of registry with said first valve port, whereby said second conduit has open and closed positions with respect to said first valve port, one end of said second conduit projecting outwardly from the adjacent one end of said first conduit and from said valve casing and constituting an air tube and the other end of said second conduit communicating with the adjacent portion of said first conduit, whereby a suction conduit may be connected to said air tube and the other end of said first conduit may serve to admit conveying air thereinto, and handle structure carried by said second conduit inwardly of said air tube and outwardly from the adjacent one end of said first conduit, thereby to facilitate rotation of said second conduit betweeen its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through said bottom discharge opening as desired.

7. The railway car set forth in claim 6, wherein the interior surface of said first conduit surrounding said second conduit and spaced radially outwardly therefrom is serrated in order to produce a grinding action upon any of the granular material disposed between said first and second conduits incident to rotation of said second conduit with respect to said first conduit and between its open and closed positions.

8. The railway car set forth in claim 6, wherein the exterior surface of said second conduit surrounded by said first conduit and spaced radially inwardly therefrom is serrated in order to produce a grinding action upon any of the granular material disposed between said first and second conduits incident to rotation of said second conduit with respect to said first conduit and between its open and closed positions.

9. In a railway car, hopper structure adapted to contain granular material and provided with a bottom discharge opening, a valve casing carried by said hopper structure and disposed below said bottom discharge open-

ing, said valve casing having a tubular passage extending therethrough and a top inlet port therein communicating between said passage and said bottom discharge opening, a first tubular metal conduit arranged in and projecting through said passage, the intermediate portion of said first conduit having a first valve port therein registering with said top inlet port, a second tubular metal conduit arranged in said first conduit, means including a plurality of bearing members carried by one of said conduits for supporting said second conduit within said first conduit and spaced radially inwardly with respect thereto and out of contact therewith and for mounting said second conduit for rotation with respect to said first conduit, each of said bearing members being formed of plastic material, whereby said bearing members prevent metal-to-metal contact between said first and second conduits, the intermediate portion of said second conduit having a second valve port therein that is adapted to be rotated selectively into and out of registry with said first valve port, whereby said second conduit has open and closed positions with respect to said first valve port, a securing device carried by said valve casing and cooperating with both said first and second conduits, said securing device preventing both longitudinal sliding and rotation of said first conduit with respect to said valve casing, said securing device preventing longitudinal sliding of said second conduit with respect to said valve casing and accommodating rotation of said second conduit with respect to said valve casing, one end of said second conduit projecting outwardly from the adjacent one end of said first conduit and from said valve casing and constituting an air tube and the other end of said second conduit communicating with the adjacet portion of said first conduit, whereby a suction conduit may be connected to said air tube and the other end of said first conduit may serve to admit conveying air thereinto, and handle structure carried by said second conduit inwardly of said suction tube and outwardly from the adjacent one end of said first conduit, thereby to facilitate rotation of said second conduit between its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through said bottom discharge opening as desired.

10. The railway car set forth in claim 9, wherein said securing device projects through a cooperating hole provided in said first conduit and into an annular recess provided in said second conduit.

11. In a railway car, hopper structure adapted to contain granular material and provided with a bottom discharge opening, a valve casing carried by said hopper structure and disposed below said bottom discharge opening, said valve casing having a tubular passage extending therethrough and a top inlet port therein communicating between said passage and said bottom discharge opening, a first tubular metal conduit arranged in and projecting through said passage, the intermediate portion of said first conduit having a first valve port therein registering with said top inlet port, securing means carried by said valve casing for preventing rotation of said first conduit in said passage, a second tubular metal conduit arranged in said first conduit, means including a plurality of bearing members carried by one of said conduits for supporting said second conduit within said first conduit and spaced radially inwardly with respect thereto and out of contact therewith and for mounting said second conduit for rotation with respect to said first conduit, each of said bearing members being formed of plastic material, whereby said bearing members prevent metal-to-metal contact between said first and second conduits, the intermediate portion of said second conduit having a second valve port therein that is adapted to be rotated selectively into and out of registry with said first valve port, whereby said second conduit has open and closed positions with respect to said first valve port, an air tube set carried by one end of said second conduit and communicating therewith and projecting outwardly from the adjacent one end of said first conduit and from said valve casing and the other end of said second conduit communicating with the adjacent portion of said first conduit, said air tube set including an inner air tube and an outer air tube arranged in nested radially spaced-apart relation, whereby a relatively large suction conduit may be connected to the outer air tube of said air tube set and a relatively small suction conduit may be connected to the inner air tube of said air tube set and the other end of said first conduit may serve to admit conveying air thereinto, and handle structure carried by said second conduit inwardly of said suction tube set and outwardly from the adjacent one end of said first conduit, thereby to facilitate rotation of said second conduit between its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through said bottom discharge opening as desired.

12. In a railway car, hopper structure adapted to contain granular material and provided with a bottom discharge opening, a valve casing carried by said hopper structure and disposed below said bottom discharge opening, said valve casing having a tubular passage extending therethrough and a top inlet port therein communicating between said passage and said bottom discharge opening, a first tubular metal conduit arranged in and projecting through said passage, the intermediate portion of said first conduit having a first valve port therein registering with said top inlet port, securing means carried by said valve casing for preventing rotation of said first conduit in said passage, a second tubular metal conduit arranged in said first conduit and mounted for rotation with respect thereto, means including a plurality of bearing members carried by one of said conduits for supporting said second conduit within said first conduit and spaced radially inwardly with respect thereto and out of contact therewith and for mounting said second conduit for rotation with respect to said first conduit, each of said bearing members being formed of plastic material, whereby said bearing members prevent metal-to-metal contact between said first and second conduits, the intermediate portion of said second conduit having a second valve port therein that is adapted to be rotated selectively into and out of registry with said first valve port, whereby said second conduit has open and closed positions with respect to said first valve port, one end of said second conduit projecting outwardly from the adjacent one end of said first conduit and from said valve casing and constituting an air tube and the other end of said second conduit communicating with the adjacent portion of said first conduit, whereby a suction conduit may be connected to said air tube and the other end of said first conduit may serve to admit conveying air thereinto, handle structure carried by said second conduit inwardly of said air tube and outwardly from the adjacent one end of said first conduit, thereby to facilitate rotation of said second conduit between its open and closed positions, whereby the granular material in said hopper structure may be selectively unloaded therefrom through said bottom discharge opening as desired, a cap for said air tube, and a link interconnecting said cap and the adjacent portion of said valve casing and mounting said cap for selective movements in a substantially horizontal plane between covering and uncovering positions with respect to the outer end of said air tube.

13. In a railway car, hopper structure adapted to contain granular material and provided with a bottom discharge opening, a valve casing carried by said hopper structure and disposed below said bottom discharge opening, said casing having a tubular passage extending therethrough and a top inlet port therein communicating between said passage and said bottom discharge opening, a valve element arranged in said casing and selectively movable betwen open and closed positions with respect to said inlet port, whereby the granular material may pass from said hopper structure through said bottom discharge opening and said inlet port into said passage when said valve element occupies its open position with respect to

said inlet port, means for selectively moving said valve element between its open and closed positions with respect to said inlet port, an air supply conduit connected at the inner end thereof to said casing in communication with one end of said passage, an air tube set connected at the inner end thereof to said casing in communication with the other end of said passage, said air tube set including an inner air tube and an outer air tube arranged in nested radially spaced-apart relation, whereby a relatively small suction conduit may be connected to the outer end of said inner air tube and a relatively large suction conduit may be connected to the outer end of said outer air tube so hat the granular material may be unloaded from said other end of said passage through the connected one of the suction conduits with the supply of conveying air into said one end of said passage from said



air supply conduit, a cap for the outer end of said tube set, and means cooperating between said casing and said cap for removably securing said cap in place in covering relation with the outer end of said tube set.

14. The railway car set forth in claim 13, wherein said inner air tube is substantially cylindrical and has a diameter appropriate to connect to the relatively small suction conduit having an inside diameter of about 5" and said outer air tube is substantially cylindrical and has a diameter appropriate to connect the relatively large suction conduit having an inside diameter of about 6".

**References Cited** in the file of this patent

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# UNITED STATES PATENT OFFICE

# CERTIFICATE OF CORRECTION

Patent No. 3,048,448 August 7, 1962

Edmund R. Aller

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 13, line 13, for "hat" read -- that --; column 14, line 10, after "connect" insert -- to --.

Signed and sealed this 18th day of December 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents