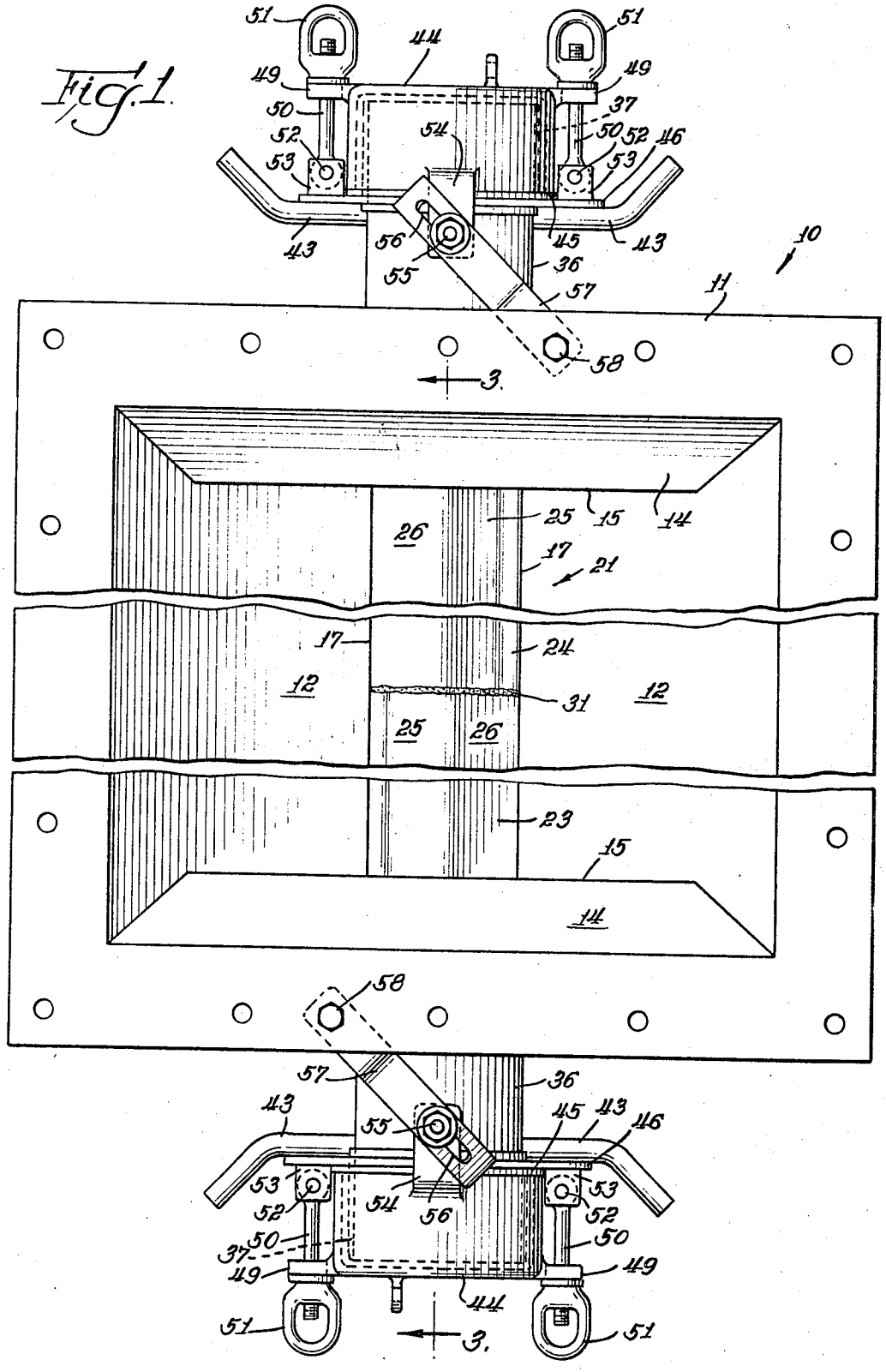
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HOPPER OUTLET CONSTRUCTION

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Fig. 1



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Fig. 2.

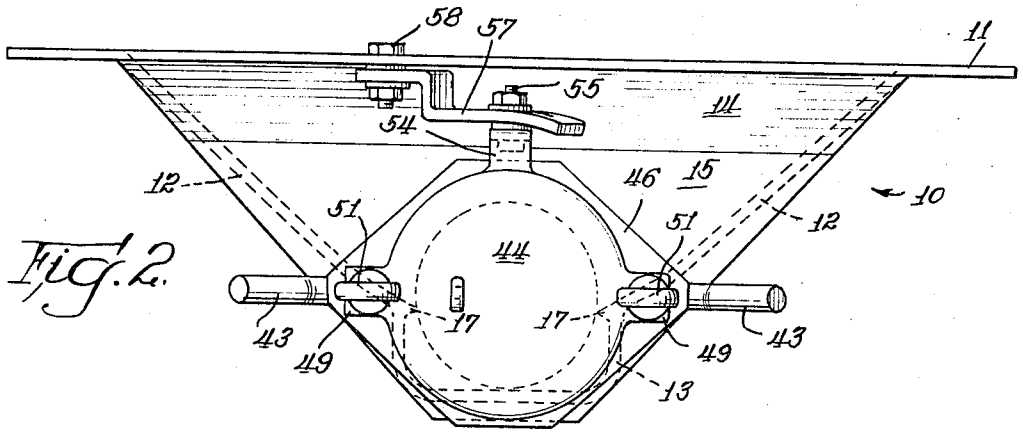


Fig. 3

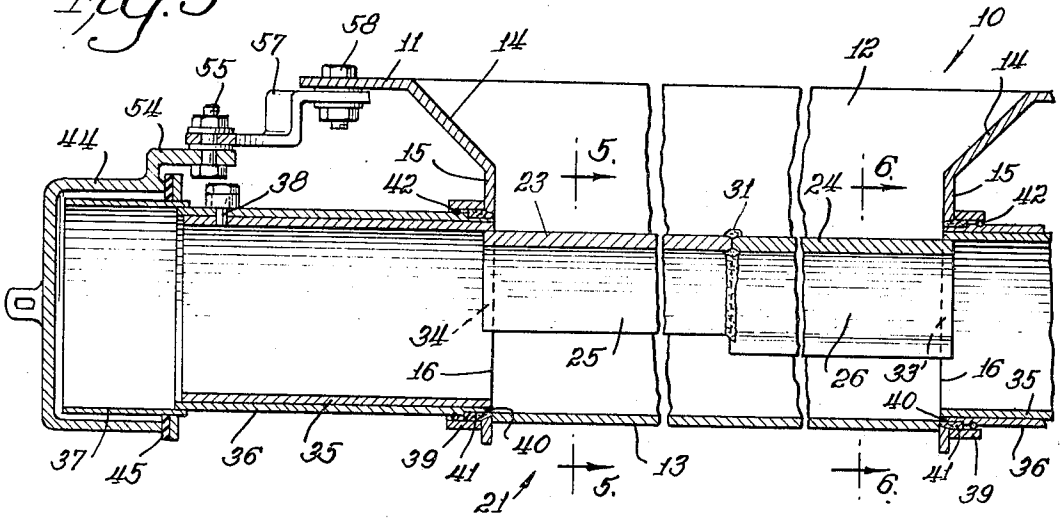
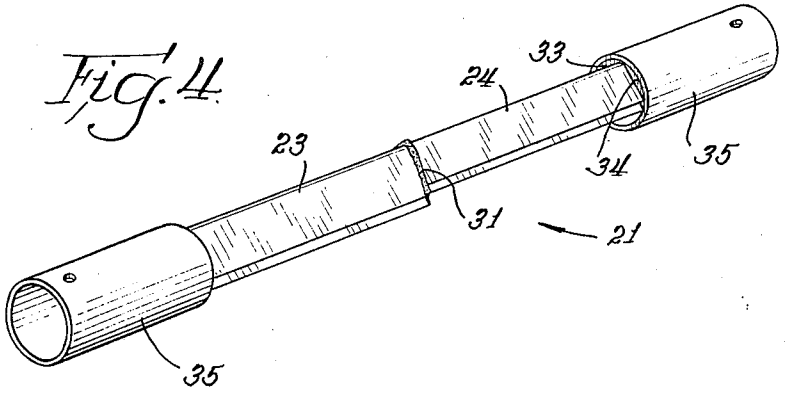


Fig. 4



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Fig. 5

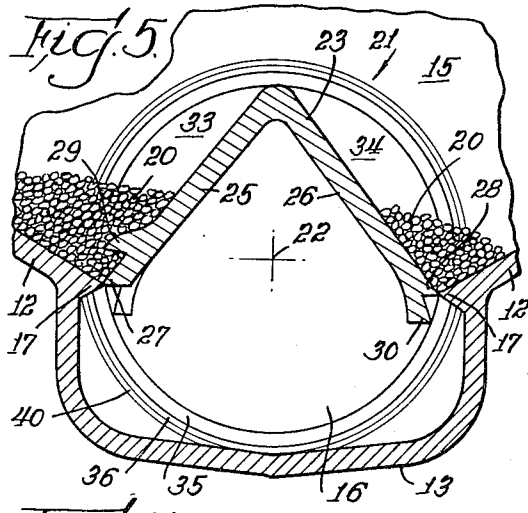


Fig. 6

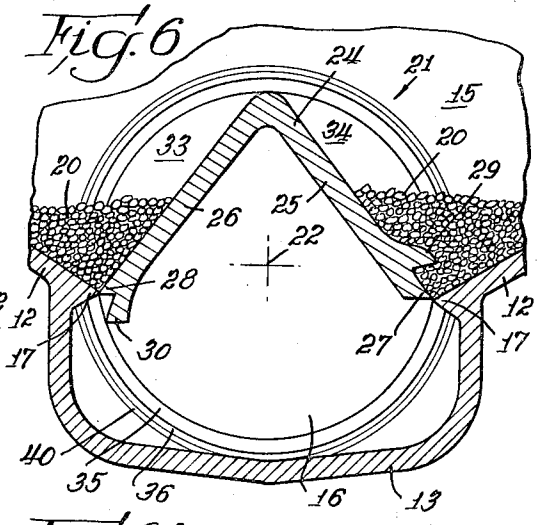


Fig. 5A.

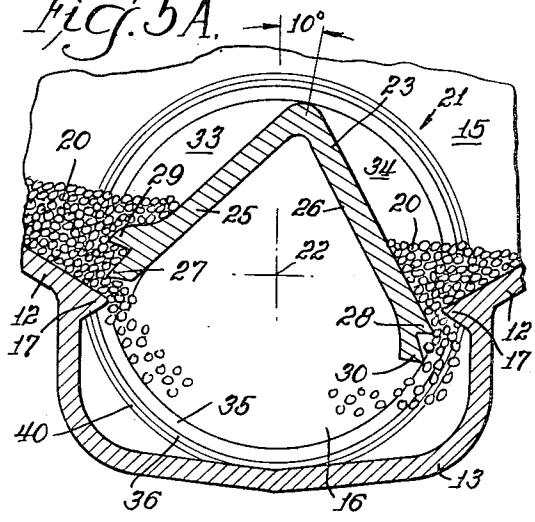


Fig. 6A.

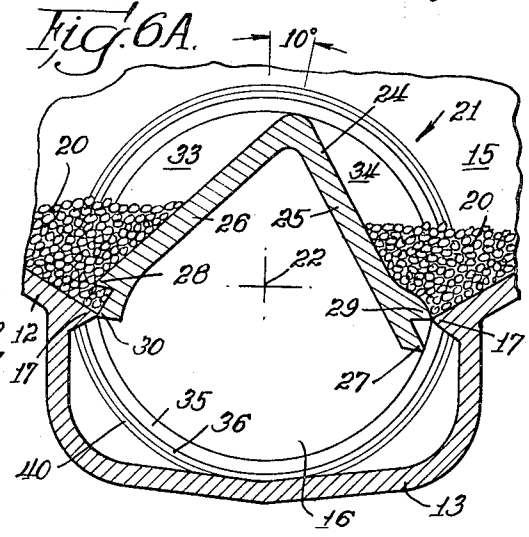


Fig. 5B.

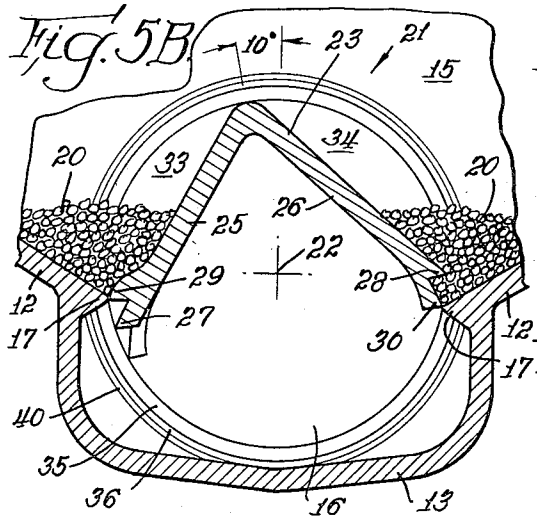
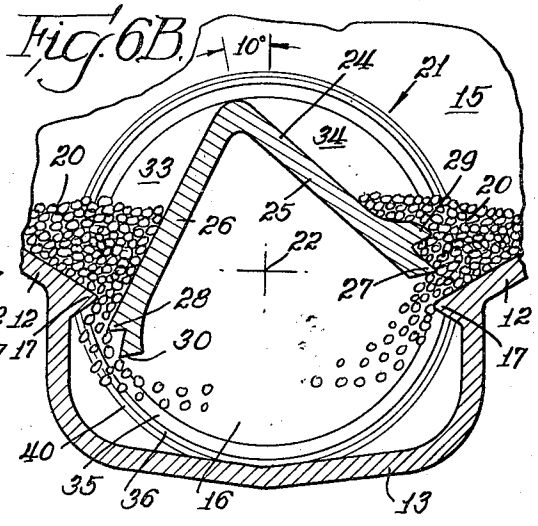


Fig. 6B.



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3,482,741

HOPPER OUTLET CONSTRUCTION

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Int. Cl. B67d 3/00
U.S. Cl. 222—554 5 Claims

ABSTRACT OF THE DISCLOSURE

The inclined bottom members of a hopper discharge outlet have knife edges for juxtaposition with knife edges of an inverted V-shaped valve in closed position which also has second knife edges above and below the first mentioned knife edges along a portion of the valve and below and above the first mentioned knife edges to provide first and second alternate closed positions of the valve with corresponding first and second open positions.

This invention is an improvement over the construction in Fritz U.S. Patent 3,306,675, issued Feb. 28, 1967.

Among the objects of this invention are: To provide for the discharge of granular material from a railway hopper car or the like in such manner that it will fall freely and completely from the car; to arrange a valve for controlling the discharge which will not interfere with the free flow of the lading when it is in the open position; to construct the valve to permit partial opening along different portions and thereby selectivity of unloading of the lading, particularly in those instances where the pneumatic unloading system has limited vacuum capacity; to form an inverted V-shaped rotatable valve member with knife edges along the lower ends of the legs for juxtaposition with knife edges along the lower portions of inclined bottom members of a hopper outlet whereby, on rotation of the valve member to open positin, the lading can discharge freely; to provide additional edges above and below the knife edges along the lower ends of the inverted V-shaped valve member along one portion and below and above them along another portion whereby, on rotation of the valve member in one direction, it is partially opened along said one portion and, on rotation in the opposite direction, it is partially opened along the other portion; and to lock the valve member in closed position when caps for closing off pneumatic discharge openings are in place.

According to the invention the inclined bottom members or floor plates of a lading discharging hopper outlet have knife edges along their lower ends for juxtaposition with knife edges along hte lower ends of the legs of an inverted V-shaped rotatable valve member. A trough like member interconnects the bottom members and underlies the valve member to receive the lading for pneumatic unloading. Along one portion of the valve member additional knife edegs are provided above and below the knife edges thereon for juxtaposition with the knife edges of the bottom members or floor plates in a first alternate valve closed position and similar knife edges are provided along the remaining portion of the valve member below and above the knife edges thereon for juxtaposition with the knife edges of the bottom members or floor plates in a second alternate valve closed position. The arrangement is such that, on rotation of the valve member in one direction, one portion of the valve member is open and the other portion is closed while, on rotation of the valve member in the opposite direction, the one portion of the valve member is closed and the other portion is opened. Discharge conduits are connected to the valve member for attachment to pneumatic unloading equipment. Caps close off the open ends of these conduits. Removable locking links interconnect the caps and the hopper outlet to hold them and the valve member attached thereto against rotation in the valve closed position.

In the drawing:

FIG. 1 is a top plan view of a hopper outlet for a railway hopper car or the like in which this invention is embodied.

FIG. 2 is a view, in end elevation, of the construction shown in FIG. 1.

FIG. 3 is a vertical sectional view taken generally along the line 3—3 of FIG. 1.

FIG. 4 is a perspective view of the inverted V-shaped valve means.

FIG. 5 is a vertical sectional view, at an enlarged scale, taken generally along the line 5—5 of FIG. 3, and showing the valve means in the closed position.

FIG. 5A is a view similar to FIG. 5 but showing that portion of the valve means there illustrated in the open position.

FIG. 5B is a view, similar to FIG. 5, showing that portion of the valve means in an alternate closed position.

FIG. 6 is a vertical sectional view taken generally along the line 6—6 of FIG. 3 and at an enlarged scale showing the valve means in the closed position.

FIG. 6A is a view, similar to FIG. 6, but showing that portion of the valve means in an alternate closed position corresponding to the open position of the section of the valve means shown in FIG. 5A.

FIG. 6B is a view, similar to FIG. 6, showing that portion of the valve means in the open position and corresponding to the closed position of the other portion of the valve means as shown in FIG. 5B.

In FIGS. 1 and 2 a hopper outlet for a railway hopper car or the like is indicated, generally, at **10**. It may be formed of aluminum. The hopper outlet **10** includes a flat marginal flange **11** that is arranged to be secured, as by bolts, to the underside of the open lower end of a hopper of a hopper car. Inclined hopper bottom members **12** extend toward each other from the marginal flange **11** and are interconnected by trough like means **13** to provide for pneumatic unloading. Inclined side sheets **14** extend downwardly from the sides of the marginal flange **11** and terminate in vertical side members **15** which are provided with openings **16** to permit pneumatic unloading. The hopper bottom members **12** terminate in knife edges **17** as shown more clearly in FIGS. 5 and 6. It will be understood that the knife edges **17** extend throughout the entire length of the lower portions of the inclined hopper bottom members **12**. An important reason for employing the knife edges **17** and cooperating knife edges to be described on valve means is to permit the free flow of granular lading **20** which experience has indicated is not always obtainable in the construction disclosed in the above patent.

For controlling the flow of the granular lading **20** inverted V-shaped valve means **21**, FIGS. 3 and 4, is provided. The valve **21** is arranged to be rotated about a horizontal axis **22** which is indicated in FIGS. 5 and 6. The valve means **21** is divided into a near section **23** and a far section **24** and provision is made for rotating the valve means **21** in one direction or the other to permit opening of either the near section **23** or the far section **24** to permit corresponding flows of the granular lading **20**. One reason for employing this construction is to permit a partial opening of the valve means **21** which requires for pneumatic unloading a lesser capacity in the vacuum producing means than is required if the valve means **21** is opened throughout its entire length. However, it will be understood that provision can be made for opening the valve means **21** through its entire length if this is desired.

For descriptive purposes the inverted V-shaped valve means **21** is described as comprising a shorter leg **25** and a longer leg **26**. The construction is illustrated in FIG. 5 and in reverse in FIG. 6. A knife edge **27** is formed on the shorter leg **25** and a knife edge **28** is formed on the longer leg **26**. In FIG. 5 these edges are shown in juxtaposition to the knife edges **17** along the lower ends of the inclined hopper bottom members **12**. This is the closed position of the valve means **21** for the near section **23** as well as for the far section **24** shown in FIG. 6. On the shorter leg **25** a second knife edge **29** is provided which is located above the knife edge **27**. Likewise a second knife edge **30** is provided on the longer leg **26** below the knife edge **28**.

Initially the inverted V-shaped valve means **21** is formed of an aluminum extrusion of a suitable length. Then it is cut to provide the near section **23** and the far section **24** with the latter being turned end to end and welded at **31** to the juxtaposed near section **23**. This materially reduces the cost of construction of the inverted V-shaped valve means **21** and provides the various knife edges in the proper locations.

When it is desired to open the near section **23** of the valve means **21**, it is rotated about the horizontal axis **22** in a clockwise direction through about 10°. As shown in FIG. 5A the knife edges **27** and **28** are separated from the knife edges **17** and the granular lading **20** is allowed to flow downwardly into the trough like means **13** for pneumatic unloading. At the same time, as shown in FIG. 6A, knife edges **29** and **30** move into juxtaposition with the knife edges **17** and thus far section **24** remains in the closed position.

When the granular lading **20** has been unloaded as far as possible through the near section **23** of the valve means, or it is desired to unload the granular lading **20** through the far section **24** of the valve means **21**, the V-shaped valve means **21** is rotated in the opposite or counterclockwise direction to the position shown in FIGS. 5B and 6B. Here the near section **23** of the valve means **21** is closed off while the far section **24** is opened and the granular lading **20** can flow freely into the trough like means **13** therebelow.

For closing off the spaces above the legs **25** and **26** segmental closure plates **33** and **34** are welded to the ends thereof. Thus the space below the legs **25** and **26** and above the trough like means **13** is subject to the vaccum created by the pneumatic unloading means.

The inverted V-shaped valve means **21** is mounted for rotation about the horizontal axis **22** by the provision of sleeves **35** at each end. These sleeves can be formed of aluminum and at their inner ends are welded to the segmental closure plates **33** and **34** to provide a unitary structure. The sleeves **35** are telescoped within discharge conduits **36** which may be formed of stainless steel and are provided with discharge conduit extensions **37** one of which is shown in FIG. 3. It will be understood that both ends of the hopper outlet **10** are of identical construction. The discharge conduit extension **37** is secured, as by welding, to the end of each conduit **36**. In order to effect conjoint rotation of the sleeve **35** and conduit **36** together with the extension **37** a bolt **38**, FIG. 3, extends inwardly through the conduit **36** into the sleeve **35**. On removal of the bolt **38** it is possible to dismantle the inverted V-shaped valve means **21** together with the sleeves **35** from the hopper outlet **10**. The inner end of each conduit **36** is journaled within a bearing ring **39** which is secured to the outer side of the respective vertical side members **15**. The reduced diameter end **40** of each conduit **36** has between it and the bearing ring **39** an antifriction ring **41** of suitable plastic material such as nylon. A sealing O-ring **42** of neoprene or the like provides an effective seal against the entrance of air between the outer surface of the conduit **36** and the inner surface of the bearing ring **39**. For manually rotating the valve means **21** and parts rotatable therewith diametrically oppositely extending handles **43** are employed. They are secured as by welding at their inner ends to opposite sides of the conduit **36**.

For closing off the discharge end of each of the extensions **37** a closure cap **44** is employed. As shown in FIG. 3 the closure cap **44** is telescoped over the respective extension **37** and bears against a gasket **45** which overlies a clamping plate **46** which is secured, as by welding, to the inner end of each extension **37**. Outwardly extending ears **49** on opposite sides of each closure cap **44** cooperate with locking bolts **50** and eye nuts **51** for holding each closure cap **44** in place under pressure against the respective gasket **45**. The locking bolts **50** are pivoted at **52** to ears **53** which are suitably secured to the ends of the clamping plate **46**.

In order to lock the V-shaped valve means **21** against rotation from the valve closed position an L-shaped bracket **54** is provided on each closure cap **44** as shown in FIGS. 1, 2 and 3. By means of a bolt **55** extending through a slot **56** in a locking link **57**, rotation of the assembly is prevented. The other end of the locking link **57** is suitably secured to the under side of the marginal flange **11**. For illustrative purposes a bolt **58** is shown for this purpose. However, it will be understood that, when the hopper outlet **10** is mounted on the under side of the hopper of a railway car or the like, the bolt **58** would extend through a cooperating flange thereon.

In order to unload the hopper outlet **10** pneumatically both of the closure caps **44** are removed. The eye nuts **51** are loosened to permit the locking bolts **50** to be swung away so that the closure caps **44** can be swung to one side with the links **57**.

What is claimed as new is:

1. A hopper outlet for downwardly discharging lading such as granular material and the like comprising

a pair of hopper bottom members inclined toward each other and terminating in knife edges at their horizontally parallel spaced apart lower ends,

inverted V-shaped valve means rotatable about a horizontal axis between said lower ends of said hopper bottom members and terminating in knife edges at their hoizontally parallel spaced apart lower ends,

means for rotating said valve means about said horizontal axis to shift said valve means from a valve closed position in which said knife edges are juxtaposed to a valve open position in which said knife edges are spaced apart,

said lower ends of said inverted V-shaped valve means along one portion thereof each having a second knife edge one above and the other below the respective knife edges on said hopper bottom members when said valve means is in said closed position to provide a first alternate closed position, and

said lower ends of said inverted V-shaped valve means along another portion thereof each having a second knife edge one below and the other above the respective knife edges on said hopper bottom members when said valve means is in said closed position to provide a second alternate closed position,

whereby, when said valve means is rotated in one direction to said first alternate closed position, said other portion of said valve means is in open position, and when said valve means is rotated in the opposite direction to said second alternate closed position, said one portion of said valve means is in open position.

2. The hopper outlet according to claim **1** wherein

trough like means interconnect said lower ends of said hopper bottom members to receive said lading,

a discharge conduit is connected to and is rotatable with each end of said valve means for attachment to pneumatic unloading means,

a removable cap closes each discharge conduit, and

a locking link is connected to each cap to hold the same against rotation and said valve member in closed position.

3. A hopper outlet for downwardly discharging lading such as granular material and the like comprising

a pair of hopper bottom members inclined toward each other and terminating in knife edges at their horizontally parallel spaced apart lower ends,

inverted V-shaped valve means rotatable about a horizontal axis between said lower ends of said hopper bottom members and terminating in knife edges at their horizontally parallel spaced apart lower ends,

means for rotating said valve means about said horizontal axis to shift said valve means from a valve closed position in which said knife edges are juxtaposed to a valve open position in which said knife edges are spaced apart,

said hopper outlet including a pair of apertured end members interconnecting said hopper bottom members,

a bearing ring extending laterally outwardly from each end member around the respective aperture,

a discharge conduit rotatably mounted at one end in each bearing ring and extending outwardly therefrom with handle means at the other end for rotating the same,

a sleeve telescoped within each discharge conduit and secured at one end to the juxtaposed end of said valve means, and

means interconnecting said discharge conduit and the respective sleeve therein.

4. The hopper outlet according to claim 3 wherein

a clamping plate is secured to said other end of each discharge conduit, and

a closure cap for each discharge conduit is detachably secured to each clamping plate.

5. The hopper outlet according to claim 4 wherein a locking link interconnects each closure cap and said hopper outlet to hold said closure cap and said valve member against rotation.

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HADD S. LANE, Assistant Examiner

U.S. Cl. X.R.

105—280, 283; 215—309; 302—52