

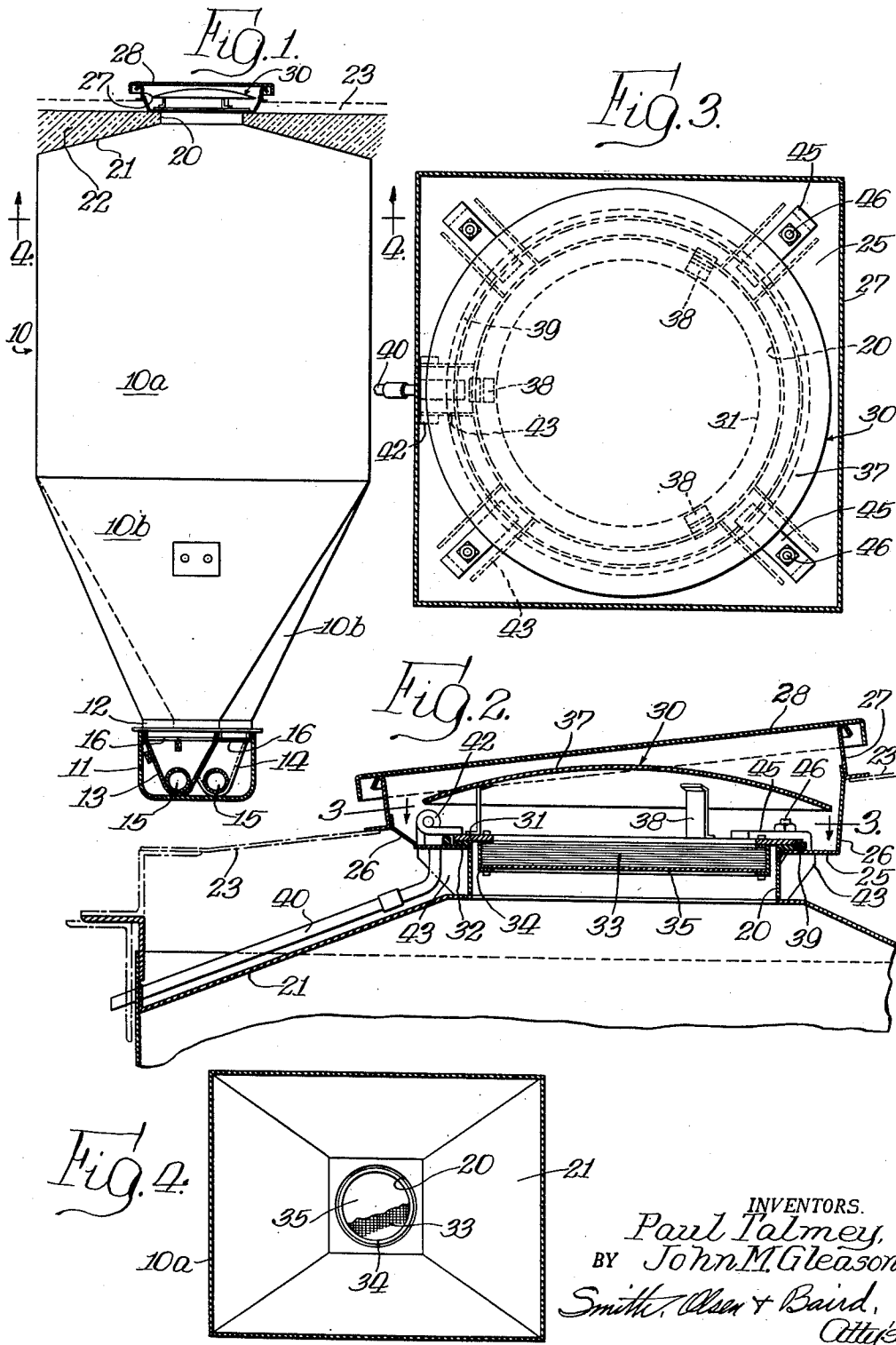
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HOPPER FOR STORING AND SHIPPING FINELY DIVIDED MATERIALS

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HOPPER FOR STORING AND SHIPPING FINELY DIVIDED MATERIALS

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1

This invention relates to improvements in hoppers for storing and transporting in bulk finely divided materials such as flour, powdered chemicals and resins, starch and the like which require protection from contamination by dust and moisture. The purpose of the present invention is to provide an improved storage and shipping hopper having means for preventing such contamination while permitting the access of air to the materials within the hopper.

The storage and shipment of finely divided materials in bulk have marked advantages in economy and sanitation as compared with the former practice of storing and handling these materials while loaded in sacks but no satisfactory means has heretofore been provided for preventing the access of dust and the like to the materials through the filling opening at the top of the hopper in which they are stored. While it would be a simple matter to seal up the hatch opening at the top of the hopper to provide a positive insurance against the entrance of dust and the like, this procedure is not possible in practice because certain types of materials which could advantageously be stored and shipped in bulk require some connection with the atmosphere and a certain breathing action during storage and transit. Also, an impervious seal could not function during the operation of unloading the hopper by the action of suction, which is the preferred practice, because an inflow of air into the hopper is necessary while the suction is in action and it is particularly important to prevent the entrance of dust at that time when it is liable to enter with the incoming air.

It is, therefore, the principal object of the present invention to provide an improved hopper for the storage and transportation of finely divided materials comprising improved means for normally closing the filling opening of the hopper and preventing the entrance into the hopper of dust or moisture during the storage, transit and unloading of the materials contained within the hopper. A further object of the invention is to provide a hopper for the storage and transportation of finely divided materials comprising an improved hatch door adapted to permit the entrance of air to the hopper while preventing the entrance of dust and moisture. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

2

Figure 1 shows a partial vertical longitudinal section through a railway car illustrating in side elevation a hopper and a portion of another hopper embodying the features of the present invention;

Fig. 2 shows an enlarged vertical section taken transversely of the car through the upper part of the hopper illustrated in Fig. 1, illustrating the hatch cover and associated parts of the present invention;

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 2, illustrating a top plan view of the hatch cover for closing the filling opening of the hopper; and

Fig. 4 is a sectional view taken on the line line 4-4 of Fig. 1 illustrating a bottom plan view of the top or ceiling of the hopper.

As illustrated in the drawings, the invention is embodied in a hopper 10 having an upper portion 10a which is of rectangular cross section, both vertically and horizontally, and which is united with a lower portion 10b having a funnel-like formation which is adapted to discharge at its bottom into discharge suction apparatus mounted within a housing 11. As illustrated, there are two hoppers 10 forming a pair extending transversely of the railway car, the lower funnel-like portion 10b only of one of these hoppers appearing in the drawing. The lower funnel-like parts of the hoppers are asymmetrically arranged transversely of the car and are adapted to discharge through rectangular discharge chutes 12 into discharge hoppers 13 and 14 located in the housing 11. These hoppers are of triangular vertical cross section having curved bottom portions in which are mounted the suction discharge tubes 15. These tubes extend transversely of the car and are adapted to be connected with a source of suction so that the finely divided materials contained within the hoppers may be withdrawn through these tubes and conveyed to desired points. The inflow of finely divided materials into these discharge hoppers 13 and 14 is controlled by louvers 16 adapted to be operated by suitable actuating rods and link mechanism so that they may be opened when suction is applied to the tubes 15 in order to permit the finely divided materials to be drawn into the tubes for the purpose of causing these materials to be discharged and the hoppers emptied of their contents. Air is adapted to be admitted to the tubes 15 at the ends thereof opposite the ends to which the suction connections are made and the inflow of air is preferably automatically controlled so that the air entering the discharge system will be automati-

cally controlled in response to the suction. These features do not in themselves constitute a part of the present invention, being claimed in the copending application of Pauly Talmey and Louis Matolin, Serial No. 49,368, filed September 15, 1948.

For filling purposes, as well as to supplement the action of the suction acting on the finely divided materials at the lower end of the hopper and to permit the access of air to the contents of the hopper, this hopper is provided with a central filling opening at its top which is formed by an annular ring 20 mounted in an aperture formed in the top plates 21 of the hopper. These plates 21, as well as the plates which form the portions 10a and 10b of the hopper, are preferably constructed of sheet metal such as stainless steel or aluminum, and the joints at the contacting edges of the plates which form the hopper are preferably welded together. The top walls 21 are preferably sloped downwardly and outwardly from the filling opening and the top wall of the hopper is preferably covered by a body of heat insulating material 22 which is located immediately below the car roof 23. The formation of the upper part of the hopper and the insulation thereof are claimed in said copending application.

As illustrated particularly in Fig. 2, the annular member 20 which forms the inlet opening of the hopper has an annular metal plate 25 extending horizontally outward therefrom. This plate is united at its edges with another plate or shell 26 of irregular vertical dimension which extends upwardly and outwardly from the plate 25 and has its top edge united with a rectangular metal frame 27 which has flanges connected to the car roof 23 and which forms a hatch opening in the roof. The member 27 has top flanges turned outwardly and downwardly forming rounded edges on which are seated a hatch door 28 adapted to be opened or removed when the hopper is being filled.

The filling opening formed by the annular member 20 is normally closed by a hatch cover 30 having a frame formed by an annular metal plate 31 which seats upon a rubber member 32 attached to the plate 25 around the margin of the member 20, thus providing a substantially tight seal around the edge of the plate 31. The annular frame or plate 31 has its central opening closed by a filter 33 made up of a plurality of layers of material of fine mesh, such as wire screen or linen cloth. These sheets are secured at their edges in the annular channel member 34 which is secured to the under side of the member 31. At the bottom of the layers 33, there is preferably provided a sheet 35 of imperforate material, such as paper or the like, which is adapted to provide positive insurance against the entrance of air and dust during the storage and shipment of the materials contained within the hopper. When suction is applied to the tube 15 of the hopper to cause the unloading of the contents of the hopper, this suction is adapted to cause the sheet 35 to break automatically by the action of the atmospheric pressure acting upon its outer side so that air is then admitted to the hopper and the atmospheric pressure acts directly upon the upper surface of the body of the material in the hopper.

For the purpose of preventing the entrance of moisture into the hopper, arising from condensation beneath the hatch door 28 or from other sources, the hatch cover 30 is constructed

to include a dome-shaped hood 37 of arcuate cross section which is spaced upwardly from the plate 31 and secured to brackets 38 which have lower outwardly extending flanges attached to the member 31. The hood 37 is thereby spaced upwardly from the frame of the hatch cover, thus permitting the access of air to the filter 33, and this hood extends outwardly beyond the margins of the frame 31 so that any moisture collecting upon the upper surface of the hood will run off of the outer edges thereof and collect upon the plate 25. This plate is provided with a sealing ring or rib 39 located outwardly of the member 32 and adapted to form a collecting channel between this member and the member 26 in which the moisture dropping from the hood 37 will collect. This moisture may be conveyed away by a drain pipe 40 which leads through the member 25 and extends downwardly and outwardly to the edge of the car above the top plates 21 of the hopper.

The hatch cover 30 of each hopper is supported by a hinge 42 attached to the plate 25 and one of the underlying brackets 43 which support this plate. When the hatch door 28 has been opened, the hatch cover 30 may be swung upwardly about the hinge 42 to permit the cargo of finely divided material to be introduced into the hopper through the filling opening. The hatch cover 30 is normally held closed by a series of clamping bars 45 which are pivoted on clamping bolts 46 carried by the plate 25. When the nuts 47 on these bolts are released, the clamping bars 45 may be swung laterally to permit the opening of the hatch cover.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed in various other embodiments which come within the scope of the appended claims.

We claim:

1. The combination in a railway car, of a car superstructure having a roof, said roof having a hatch opening, a hatch door for said opening, a hopper for finely divided material mounted beneath said roof and having a filling opening in alignment with said hatch opening, and a hatch cover for said filling opening, said hatch cover comprising a filter for admitting air to said hopper and preventing the entrance of dust, and a hood located above and movable with said filter for preventing the entrance of moisture of condensation through said filter when said hatch cover is closed.

2. The combination in a railway car, of a car superstructure having a roof, said roof having a hatch opening, a hatch door for said opening, a hopper for finely divided material mounted beneath said roof and having a filling opening in alignment with said hatch opening, and a hinged hatch cover for said filling opening mounted to swing upwardly into said hatch opening when said hatch door is open, said hatch cover comprising a filter to prevent the entrance of dust into said hopper and a hood spaced upwardly from said filter and extending outwardly beyond the outer margin of said filter for preventing the entrance of moisture.

3. The combination in means for storing or shipping finely divided material, of a material hopper having a filling opening in its upper part, a hatch door over said opening, and a hatch cover for said opening located beneath said hatch door and comprising a filter for admitting air and preventing the entrance of dust to said hopper

5

and a metal hood of arcuate cross-section mounted above and spaced from said filter, said hood having its convex side directed upwardly and being of larger area than said filter to prevent the entrance of moisture of condensation from the air beneath said hatch cover. 5

4. The combination in means for storing or shipping finely divided material, of a material hopper having a filling opening in its upper part, a horizontal plate extending around said opening, a compressible sealing member secured to said plate around said opening, a hatch cover having an annular frame hinged on said plate and normally resting on said sealing member, a filter comprising layers of fine mesh material extending across the opening of said frame, brackets mounted on said frame and extending up-

6

wardly therefrom, and an upwardly convex metal hood mounted on said brackets and extending outwardly beyond the margin of said filter.

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