A method and an equipment for the transportation of granular or floury material, i.e. of so-called bulk cargo, on the platform (2) of a truck (1) or in a container, by using a large sack (3) lining the load space during the transportation, inside the platform or container, as well as by using a funnel device (4) for unloading the cargo. According to the invention, the funnel device (4) is placed on its side in the platform (2) or container at the rear end of same with the outlet opening (5) directed towards the rear of the platform (2) or container so that the rear end of the load space can be kept closed during the transportation, and the large sack (3) is at its mouth opening fixed dust- and water-tightly to the edges of the funnel (7) of the funnel device (4). Before the bulk cargo is loaded, out of the funnel device (4) the cover (6) covering the funnel (7) is opened and the large sack (3), which has been stored as folded into the funnel (7) for the time of other transportation, is pulled out from the funnel (7) and, from the end opposite the mouth opening, fastened to the front end of the platform (2) or container. Hereupon the large sack (3) is filled through its filling opening. After the unloading of the bulk cargo, when, e.g., parcels are to be transported, the large sack (3) is detached at its front end and stored in the funnel device (4) for protection, and the funnel (7) of the funnel device (4) is closed by means of the cover (6).
FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT:

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Method and equipment for the transportation of granular or floury material

The present invention relates to a method for the transportation of granular or floury material, i.e. of so-called bulk cargo, on the platform of a truck or in a container by during the transportation, inside the platform or container, using a large sack lining the load space as well as a funnel device for unloading the cargo.

The method in accordance with the invention is mainly characterized in that, before the bulk cargo is loaded, out of the funnel device, which is placed on its side in the platform or container at the rear end of same with the outlet opening directed towards the rear of the platform or container, the cover covering the funnel is opened and the large sack, which has been stored as folded into the funnel for the time of other transportation and which is at its mouth opening permanently fixed tightly to the funnel edges of the funnel device, is pulled out from the funnel and, from the end opposite the mouth opening, fastened to the front end of the platform or container, whereupon the large sack is filled through its filling opening, and that when, e.g., parcels are to be transported after the unloading of the bulk cargo, the large sack is detached at its front end and stored in the funnel device for protection, and the funnel of the funnel device is closed by means of the cover.

The invention also comprises equipment for carrying out the above method, and the circumstances characteristic of the invention come out from claims 2 to 6.

The invention comes out more closely from the following description and from the attached drawings, wherein

Figure 1 is a schematical side view of a truck provided with an unloading funnel and a large sack, the construction of the platform being shown in section,
Figure 2 is a more detailed illustration of the arrangement of the front end of the platform construction shown in Figure 1.

Figure 3 is a more detailed illustration of the rear end of the platform construction shown in Figure 1 including the funnel.

Figure 4 is a top view in section of the construction shown in Figure 3,

Figure 5 shows a fluidization element as viewed perpendicularly to its plane,

Figure 6 is a sectional view of the fluidization element shown in Figure 4, along line A-A,

Figure 7 is a sectional view of the fluidization element shown in Figure 4, along line B-B,

Figure 8 is a top view of the truck provided with a discharge funnel and large sack, shown in Fig. 1,

Figure 9 is a side view of the unloading process of the large sack, and

Figure 10 is a sectional side view of a large sack that has been stored completely inside the funnel for the return transportation.

Figure 1 schematically illustrates a situation in which a granular or floury material, i.e. so-called bulk cargo, is being transported by a truck 1. The truck 1 is provided with a platform 2, which may be a conventional exchange platform. Onto the platform 2, a large sack 3 is fitted, which is at its rear part dust- and water-tightly connected to the front edge of the funnel 7 of the funnel device 4. The upper part of the large sack 3 is provided with a filling opening 8. The rear part of the funnel device 4 is provided with a discharge opening 5, to which a discharge device 9 can be connected. During the transportation the funnel device 4 and the large sack 3 are totally inside the load space of the platform 2 so that the rear gates or the rear board of the platform 2 can be kept closed. This is a very important circumstance, e.g., during possible railway
transport. The discharge device 9 is, as a rule, not connected to the funnel device 4 during transportation, but the connecting takes place only at the discharge site.

As comes out from Figure 2, a transverse beam 10 is fixed at the bottom edge of the front part of the large sack 3, to which beam fastening hooks 11 are also connected for fastening the front part of the large sack 3 to the front end of the platform 2, which is provided with fastening loops 12 for the fastening hooks 11.

Figure 3 shows the locations of the various components at the rear part of the platform 2. The funnel device 4 is located at the rear part of the platform 2, and the discharge device 9 is connected by means of hanging hooks 14 onto a frame construction 13 belonging to the funnel device 4, which discharge device 9 is hereby connected to the discharge opening 5 of the funnel device 4. Figure 3 also shows a detailed view of the connecting of the rear part of the large sack 3 to the front edge of the funnel 7 of the funnel device 4. The funnel device 4 also includes a protecting cover attached by means of hinges to the bottom edge of the funnel 7, which cover is, as shown in Fig. 3, pivoted down against the bottom of the platform 2, where it forms a ramp from the bottom face of the platform 2 into the funnel 7.

Figure 4 shows the construction shown in Fig. 3 as a sectional top view. The discharge opening 5 is placed in the rear part of the funnel 7 at the middle. At both sides of the discharge opening 5, against the rear wall of the funnel 7, fluidization elements 15 are provided. The fluidization elements 15 inside the funnel 7 are readily detachable, separate modules. The fluidization elements 15 consist of a box structure, as comes out from its sectional view in Figures 6 and 7.

The front wall 16 of the fluidization element is perforated in accordance with Figure 5. In each fluidization element 15, at the rear wall 19, there is an inlet pipe 18
for passing the fluidization air through the inlet pipe 18 into the box structure of the fluidization element 15 and from there further through the holes 17 in the front wall 16 of the fluidization element 15 into the funnel 7.

Each fluidization element 15 is, at the inlet pipe 18, divided by a partition wall 21 into two separate box compartments, into both of which the fluidization air enters through the inlet pipe 18. At the connection point of the inlet pipe, the rear wall 19 of the fluidization element 15 is, at both sides of the partition wall 21 in the rear wall 19, provided with holes 20 and 22 for the supply of fluidization air into the various compartments of the fluidization element. By means of the relative size of the holes 20 and 22 it is possible to control the quantity of air entering into the compartments. The holes 22 passing into the compartments of the fluidization elements 15 placed closer to the discharge opening 5 of the funnel 7 in the fluidization elements 15 are preferably smaller than the holes 20 passing into the compartments of the fluidization elements 15 placed more distant from the discharge opening 5. Moreover, a fluidization fabric 23 is fastened to the fluidization elements 15. The fluidization fabric 23 is fastened by glueing so that the fabric is not glued within the area of the front wall 16 of the fluidization element 15, but only at its edge portions onto the rear wall 19 and bottom 24 of the fluidization element 15 in the way shown in Figures 6 and 7.

When transportation of a granular or floury material by means of the equipment in accordance with the invention is started, the funnel device 4 is fastened to the rear part of the platform 2 so that the funnel device 4 cannot move on the platform 2 and that it cannot fall down either when the loaded platform 2 is dumped. The large sack 3 is spread onto the platform 2 and fastened at its front end by means of belts and hooks 11 to the fastening loops 12 at the front end of the platform 2. The large sack 3 is filled with the granular or floury
material through the filling sock forming the filling opening 8, which is after filling closed by means of a sack-closing cord. The air-removal opening 25 consists of an air-removal sock, which is also closed by means of a sack-closing cord. When the truck arrives at the unloading site, the discharge device 9 is connected to the rear part of the funnel device 4 in the way shown in Figures 3 and 4 as supported by the hanging hooks 14, and the screw feeder or compartment feeder 26 of the discharge device 9 is connected to the discharge opening 5 of the funnel device. Un prevented by the discharge device, the platform 2 may be dumped fully up without the device contacting the ground. Through a discharge hose connected to the discharge device 9, it is possible to unload the load from the large sack, e.g., into a silo above the ground or into any other desirable location. The load may also be unloaded without a discharge device by dumping the load through a piece of discharge hose into an underground container. During the discharge operation, air is passed into the fluidization elements 15 via the inlet pipes 18, whereby the flowing of the material from the large sack 3 into the funnel 7 and from there further into the discharge opening 5 can be made smooth. By the arrangement of two separate compartments in each fluidization element 15, it is achieved that the air cannot escape the easiest route out, e.g., when the other end of the fluidization elements 15 is already uncovered and there is still material on the other end, e.g., a thick layer of cement. In stead of the fluidization elements 15, inside the funnel 7 it is possible also to use a different type of activating device, such as a vibrator, expansion fabrics, etc. However, especially in the case of transportation of cement, fluidization devices of the type shown in the drawings are particularly well suited as activating devices inside the funnel 7, said fluidization devices being coated with fluidization fabric 23. The inside walls and the bottom of the funnel 7 may be
lined with fabric, which may be of the same material as the large sack 3 itself. Owing to the said lining, the cement is no longer gradually hardened on the walls of the funnel 7.

When the load is completely unloaded, the platform 2 is lowered from the dumped position, the discharge device 9 is detached from the funnel device 4, and additionally the fastening of the front end of the large sack is detached. Hereupon the large sack 3 is wound as a roll in the way shown in Figure 10 into the funnel 7, in which it is closed by the protective cover 6. Hereupon the platform 2 is free for use for other transportation, e.g. of parcels. In such a case, during the transportation, the funnel device 4 may still be fastened to the rear part of the platform 2, or it may be detached from its fastenings and be shifted to any desired position on the platform 2, or it may be removed entirely.
WHAT IS CLAIMED IS:

1. A method for the transportation of granular or floury material, i.e. of so-called bulk cargo, on the platform (2) of a truck (1) or in a container by during the transportation, inside the platform or container, using a large sack (3) lining the load space as well as a funnel device (4) for unloading the cargo, characterized in that, before the bulk cargo is loaded, out of the funnel device (4), which is placed on its side in the platform (2) or container at the rear end of same with the outlet opening (5) directed towards the rear of the platform (2) or container, the cover (6) covering the funnel (7) is opened and the large sack (3), which has been stored as folded into the funnel (7) for the time of other transportation and which is at its mouth opening permanently fixed tightly to the funnel (7) edges of the funnel device (4), is pulled out from the funnel (7) and, from the end opposite the mouth opening, fastened to the front end of the platform (2) or container, whereupon the large sack (3) is filled through its filling opening (8), and that when, e.g., parcels are to be transported after the unloading of the bulk cargo, the large sack (3) is detached at its front end and stored in the funnel device (4) for protection, and the funnel (7) of the funnel device (4) is closed by means of the cover (6).

2. Equipment for carrying out the method as claimed in claim 1, wherein the platform (2) of a truck (1) or a container is provided with a large sack (3) and with a funnel device (4) for the transportation of granular or floury material, characterized in that the funnel device (4) is placed on its side inside the platform (2) or container at the rear end of same with the discharge opening (5) facing towards the rear end of the platform (2) or container so that the rear end of the load space can be kept closed during the transportation and that the large sack (3) is, at its mouth
opening, fastened to the funnel (7) edges of the funnel device (4) dust- and water-tightly.

3. Equipment as claimed in claim 2, characterized in that the funnel (7) of the funnel device (4) is provided with a protective cover (6) attached to the bottom edge of the funnel (7) by means of hinges, which cover (6), when the bulk cargo is being removed from the truck, functions as a ramp guiding the bulk cargo into the funnel device (4) underneath the large sack (3) in front of the funnel (7).

4. Equipment as claimed in claim 2, characterized in that fluidization elements (15) are provided inside the funnel device (4) at both sides of the discharge opening (5) for passing air through the box structure of the fluidization elements (16) and through holes (17) in the front walls (16) of the elements (15) into the funnel (7).

5. Equipment as claimed in claim 4, characterized in that the fluidization elements (15) are coated with fluidization fabric (23) so that the fabric is not fastened to the face of the front wall (16) of the fluidization elements (15), but it is placed freely on the said front wall (16).

6. Equipment as claimed in claim 4, characterized in that the fluidization element (15) is divided by a transverse partition wall (21) into two compartments, into which the passage of air is arranged so that the air is passed into the compartment placed closer to the discharge opening (5) through a smaller hole (22) than into the compartment placed more distant from the discharge opening (5), into which a hole (20) passes via the inlet pipe (18).
AMENDMENT CLAIMS
(Received by the International Bureau on 8 September 1982 (08.09.82))

1. (amended)
A method for the transportation of granular or floury material, i.e. of so-called bulk cargo, on the platform (2) of a truck (1) or in a container by during the transportation, inside the platform or container, using a large sack (3) lining the load space, as well as a funnel device (4) for unloading the cargo, which funnel device is placed on its side in the platform (2) or container at the rear end of same with the outlet opening (5) directed towards the rear of the platform (2) or container and that the large sack (3) is, at its mouth opening, permanently fixed tightly to the edges of the funnel (7) of the funnel device (4), characterized in that, before the bulk cargo is loaded, out of the funnel device (4) the cover (6) covering the funnel (7) is opened and the large sack (3), which has been stored as folded into the funnel (7) for the time of other transportation, is pulled out of the funnel (7) and, by its end opposite the mouth opening, fastened to the front end of the platform (2) or container, and that when, e.g., parcels are to be transported after the unloading of the bulk cargo, the large sack (3) is detached at its front end and stored in the funnel device (4) for protection, and the funnel device (4) is closed by means of the cover (6) of the funnel (7).

2. (amended)
Equipment for carrying out the method as claimed in claim 1, wherein the platform (2) of a truck (1) or a container is provided with a large sack (3) and with a funnel device (4) for the transportation of granular or floury material, and that the funnel device (4) is placed on its side at the rear end of the platform (2) or container with the discharge opening (5) facing towards the rear end of the platform (2) or container and that the large sack (3) is, at its mouth opening, fastened to the funnel (7) edges of the funnel device (4) dust- and water-tightly, characterized...
in that the funnel device (4) is fitted inside the platform (2) or container so that the rear end of the load space can be kept closed during transportation.

3. (amended)
   Equipment as claimed in claim 2, characterized in that the funnel (7) of the funnel device (4) is provided with a protective cover (6) attached to the bottom edge of the funnel (7) by means of hinges, which cover (6), when the bulk cargo is being unloaded, functions as a ramp guiding the bulk cargo into the funnel device (4) underneath the large sack (3) in front of the funnel (7).

4. (original claims 4. and 6.)
   Equipment as claimed in claim 2, characterized in that the fluidization elements (15) fitted inside the funnel device (4) at both sides of the discharge opening (5) are divided by a transverse partition wall (21) into two compartments, into which the passage of air is arranged so that the air is passed into the compartment placed closer to the discharge opening (5) through a smaller hole (22) than into the compartment placed more distant from the discharge opening (5), into which latter compartment a hole (20) passes via the inlet pipe (18).

Original claim 5. (cancelled)
INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both National Classification and IPC:

B 360 P 1/60; B 65 D 88/22

II. FIELDS SEARCHED

Minimum Documentation Searched *

Classification System Classification Symbols

IPC 2 B 65 J 1/00-1/06; B 65 D 89/00-89/24
IPC 3 B 60 P 1/00, 1/54-1/54, 3/22, 3/42; B 65 D 88/00-88/78
National Cl 63c 43/07

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT *

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* Special categories of cited documents:

AA document defining the general state of the art which is not considered to be of particular relevance

A document published on or after the international filing date

P document published prior to the international filing date but later than the priority date claimed

** Notes:

16 Document cited after the international filing date on priority data are not in conflict with the application but cited to understand the principle or theory underlying the invention.

17 Document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

18 Document member of the same patent family

IV. CERTIFICATION

Date of Actual Completion of the International Search 19

1962-07-13

International Searching Authority

Swedish Patent Office

Date of mailing this International Search Report

1962-07-19

Signature of Authorized Office

B K Carlsson

BAD ORIGINAL
II. Fields Searched (cont)

US CL
220:1, 5
280:5
295:15, 39

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE

This international search report has not been established in respect of certain claims under Article 17(3) (a) for the following reasons:

1. Claim numbers because they relate to subject matter not required to be searched by the Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This International Searching Authority found multiple inventions in this international application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claim

3. No additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims, it is covered by claim

4. As all search fees could be searched without effort, justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remarks on Protest:
- The additional search fees were accompanied by applicant's protest.
- No protest accompanied the payment of additional search fees.