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(54) **PARTICULATE HANDLING**

SCHUTTGUTFÖRDERUNG

MANIPULATION DE MATIERES PARTICULAIRES

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(56) References cited:
WO-A-99/52775
DE-A- 3 335 515
DE-C- 927 012
US-A- 2 299 702
US-A- 3 265 443

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Description

[0001] This application relates to particulate handling apparatus, and in particular to a hopper for use in the loading of catalyst pellets into drums.

[0002] It is frequently desired to load catalyst pellets into drums either for the transportation or storage of said catalyst pellets. There are generally two locations where catalyst pellets are loaded into drums. The first is at the point of manufacture of the catalyst pellets and the other is adjacent to a reactor vessel that contains catalyst pellets which is being emptied either for work to be carried out on the reactor itself, or for treatment or replacement of the catalyst pellets.

[0003] At the point of manufacture of the catalyst pellets the drums are loaded using apparatus that is fixed in one position and which is not the subject of the present application. When drums are being loaded adjacent to a reactor vessel, the apparatus being used for loading said drums must in itself be portable. It would be economically very inefficient to have all the requisite apparatus for loading and unloading a reactor vessel permanently stationed adjacent to said reactor vessel.

[0004] Currently known apparatus for use in loading catalyst pellets into drums include a hopper, a hopper support frame, and optionally a roller conveyor. In operation, an empty drum is placed beneath the hopper either directly onto the surface supporting the apparatus (here after "the floor") or, if one is being used, on the roller conveyor. The drum is open ended and the open end placed upmost and directly beneath the hopper. The drum is loaded from the hopper and the open end or mouth of the drum then sealed. The drum is then either man-handled from beneath the hopper or, if a roller conveyor is being used, is rolled out from beneath the hopper. The drum is then man-handled onto a pallet suitable for one or more drums and subsequently removed from the area of the hopper by a fork lift truck. This is unsatisfactory in that it requires manual labour to move the filled drums. Manhandling the drums endangers the people handling the drums because of the weight of the drums and, potentially, because of the drum contents and the danger of either contamination of the outside of the drum or the lid becoming unsealed from the drum during the handling process.

[0005] According to the present invention there is provided apparatus for the filling at least a pair of drums substantially simultaneously whilst minimising the manual handling of said drums.

[0006] According to as defined in claim 1 present invention there is provided a loading hopper, in which the hopper is provided with an inlet port, at least two outlet ports, and division means arranged to substantially divide a stream of pellets entering the hopper via the inlet port and direct the divided stream of pellets towards each outlet port.

[0007] The term 'pellet' includes particulate material, shaped or formed bodies, or the like.

[0008] The division means may include the walls of the hopper which are shaped and dimensioned to substantially divide a stream of pellets entering the hopper via the inlet port and direct a stream of pellets towards each outlet port.

[0009] In a preferred embodiment of the present invention, the hopper is provided with a pair of outlet ports. However, the apparatus of the present invention may be configured to operate equally effectively with other numbers of outlet ports, most preferably three or four outlet ports.

[0010] In a particularly preferred embodiment of the present invention the hopper is provided with two outlet ports and is so shaped and configured that the bisection of the stream of pellets is by way of the stream of pellets impacting an edge defined by the intersection of a pair of side walls of the hopper. Said side walls preferably intersect at an acute angle so presenting a bisecting edge which may be a substantially sharp edge to a stream of pellets entering the hopper via the inlet port. In this particular preferred embodiment of the present invention the side walls which define the bisecting edge also form a part of a substantially conical or pyramidal construction which narrows toward its vertically lower end to an outlet port. The substantially pyramidal or conical construction serves to direct the pellets to the first and second outlet ports of the hopper.

[0011] In an alternative embodiment of the present invention the stream of pellets may be bisected by one or more baffles or dividing plates located within the hopper. Said baffles or dividing plates are preferably supported in their correct position by being anchored or fixed to one or more side walls of the hopper.

[0012] Using baffles or dividing plates gives a designer of a hopper according to the present invention a degree of freedom over the design of the outer wall of the hopper.

[0013] In the most preferred embodiment of the present invention the stream of catalyst pellets enters the hopper with a substantially vertically downward direction. The pellets then travel under the force of gravity past the division or bisecting means and, thence, to the outlet ports.

[0014] According to the invention, the catalyst pellets are transported to the hopper entrained with a conveying gas. The conveying gas is drawn out of said hopper via one or more conveying gas outlet ports. Each conveying gas outlet port is preferably located in such a position that it is very unlikely that any catalyst pellets entering the hopper would travel from the hopper inlet port to the conveying gas outlet port.

[0015] The conveying gas outlet ports are preferably attached, via ducting, to a means for inducing negative pressure relative to the pressure within the hopper, so causing conveying gas to exhaust from the hopper via the conveying gas outlet ports.

[0016] It is particularly preferred that the hopper is provided with at least one aperture adjacent to each out-

let port.

[0017] Each aperture is sealed with a transparent sheet of material so as to form viewing windows in the hopper. These viewing windows allow an operator of said hopper to ascertain the conditions within the hopper and, in particular, how full or empty the hopper is.

[0018] Engaged with each outlet port is a reversible port closure means or valve to which, on the side remote from the hopper, there is attached a first end of a flexible hose or duct. Attached to the second end of each flexible hose or duct is a drum filling lid of known type. Each drum filling lid is essentially adapted to sealingly engage with the open mouth of a drum. The sealing engagement is adapted to be reversible so as to allow the removal of the drum filling lid once the drum is full.

[0019] In a most preferred embodiment of the present invention the drum filling lids adapted to be engaged with the outlet ports are all fixed to a support frame. In an alternative embodiment of the present invention each drum filling lid is independently fixed on its own support frame.

[0020] According to the invention the drum filling lid is provided with means to create a negative pressure in the drum being filled when the drum filler lid is sealingly engaged with the drum mouth. Particularly preferred apparatus for inducing a negative pressure in the drum is provision of a dust line, or small bore pipe or duct, which provides communication for gas and dust between the inside of the drum, and either the inside of the hopper in the region of the conveying gas outlet port or ports, or directly into the duct or pipe connected with a conveying gas outlet port.

[0021] The apparatus of the present invention may further be provided with a hopper support frame. The hopper support frame preferably includes at least two support posts which may be either permanently or releasably fixed to the hopper. The support frame may, optionally, include one or more cross members fixing the support posts relative to each other.

[0022] It is particularly preferred that the support posts are telescopic so that the apparatus may be adapted for use with drums and/or pallets of different vertical heights.

[0023] The lower end of each support post is, preferably, fixed to a cross bar which, at either end of said cross bar, engages with ground engaging means. This provides stability to the hopper and the support frame. It is particularly preferred that the ground engaging means for each cross bar are rollers, endless belt tracks, wheels or the like, so allowing the apparatus of the present invention to be rolled, assuming the surface on which it is resting is sufficiently flat and smooth. In one particularly preferred embodiment of the present invention the orientation of the axis of rotation of the rollers is fixed and substantially parallel and substantially perpendicular to the orientation of the longitudinal axis of each cross bar.

[0024] The support frame or frames for the drum filling lids are mounted on the hopper support frame and are so constructed and configured that they allow movement of the drum filling lids either together or separately between a first retracted position and a second extended position. Both retracted and extended positions are at vertically lower levels than the hopper outlet ports, when the hopper is orientated for use, with the retracted position being at a vertically higher level than the extended position.

[0025] The attachment of the or each drum filling lid support frame to the hopper support frame results in the hopper support frame supporting the weight of the drum filling lids when they are not sealingly engaged with the mouth of a drum.

[0026] The hopper support frame is so dimensioned and configured that it supports the hopper in such a position that the level of the mouth of a drum when ready for filling whilst that drum is sitting on a pallet suitable for lifting with a fork lift truck is between the levels of the retracted and extended positions of the drum filler lids.

[0027] In use, the apparatus of the present invention having two outlet ports is transported by known means, such as a lorry, to a position adjacent to a reactor vessel. It is then connected with an appropriate, known, catalyst pellet transportation means.

[0028] An operator then checks that the outlet port closure means are in a closed position and that the drum filling lids are in the substantially retracted position. A fork lift truck is employed to place a pallet bearing two or four empty drums, their mouths all facing vertically upwards, between the support posts and cross bars of the hopper support frame. The support frame or frames for the drum filler lids are then manipulated to move the drum filler lids to engage with the mouth of an empty drum. The filling lids are sealed to the mouths of the drums. If necessary, the operator can adjust the telescopic legs (if present) of the hopper support frame to ensure that the drum filler lids may engage with the mouth of the drums.

[0029] The drums with which the filler lids are engaged are next placed under negative pressure by known means not discussed herein. The operator of the apparatus then opens the closure means to each outlet port causing catalyst to flow, both under the force of gravity and the pressure differential between the hopper and the drum, into the drum. Placing each drum under negative pressure relative to the hopper avoids needing to place an air lock or air vent in the drum filling lids.

[0030] When each drum is full, the operator closes the appropriate outlet port closure means and disengages each drum filling lid from the mouth of the now filled drum. The drum filling lids are then moved back to their retracted position and the mouths of the now full drums sealed.

[0031] If the pallet has four drums located on it, the apparatus of the present invention is next rolled so that the drum filling lids are vertically above the mouths of the two remaining empty drums and the process for fill-

ing the drums is repeated. The force needed for rolling the apparatus of the present invention between the filling positions may either be provided by a human, or by a motor, for instance an electric motor.

[0032] Once all four drums are full, a fork lift truck is employed to pick up the pallet bearing the full drums and to transport it to a position of storage or onto a vehicle for transportation. A fresh pallet bearing empty drums is then placed beneath the apparatus of the present invention and the above described actions repeated, with the exception of the initial setting up adjustments.

[0033] The apparatus of the present invention is particularly advantageous over currently known apparatus for drum filling both because of the minimalisation of the manual effort needed to handle the drums, and because of the increased loading rates for drums. The previously known apparatus only loaded one drum at a time, whereas the present apparatus loads at least two drums at a time. Furthermore, the present apparatus allows the use of bigger drums which would previously not have been usable because of the difficulty of handling said drums when full.

[0034] The apparatus of the present invention will be further described and explained by way of example with reference to the accompanying Figure which represents a schematic view of the apparatus of the present invention.

[0035] With reference to the Figure, a hopper (2) is defined by walls (4, 6, 8, 10 and others not visible in the Figure) so as to create a volume that is comprised of a rectangular volume descending from which are two substantially pyramidal volumes. The two substantially pyramidal volumes and the rectangular volume intersect at a bisecting edge (12).

[0036] Substantially vertically above bisecting edge (12) is an inlet port (14) into the hopper. The inlet port (14) is adapted to engage with known apparatus for the transportation of particulate catalysts when entrained in a conveying gas. The hopper (2) is provided with first and second outlet ports (16A, 16B respectively) and viewing windows (20). Not shown are conveying gas outlet ports. Said conveying gas outlet ports are located adjacent to the vertically uppermost edge of the face of hopper (2) opposite to viewing windows (20). Each conveying gas outlet port is in communication with a means for inducing negative pressure and, hence, for sucking conveying gas out of hopper (2).

[0037] Attached to each outlet port (16A and 16B) is a plate valve (18A and 18B respectively). Said plate valves (18A and 18B) may, by manual operation, be reversibly moved from an open position whereby catalyst pellets can flow through said plate valve to a closed position whereby catalyst pellets are prevented from exiting hopper (2).

[0038] In communication with the mouth of each plate valve (18A, 18B) remote from hopper (2) is a flexible hose (22A and 22B respectively). The ends of the flexible hoses (22A and 22B) remote from the plate valves (18A and 18B) are each engaged with and in communication with a drum filling lid (24A and 24B). The drum filling lids (24A and 24B) are provided with means, not shown, for sealingly engaging with the open mouth of a drum. Furthermore, each of the drum filling lids (24A and 24B) is provided with an aperture through said filling lid with which the respective hoses (22A and 22B) are in communication, and with means adapted to create a negative pressure in the drum when the filling lid is sealingly engaged with the mouth of the drum.

[0039] Both of the drum filling lids (24A and 24B) are fixed to a support frame (26). The support frame (26) is, in turn, mounted on a hopper support frame (28). Support frame (26) is so constructed that with a single lever action by an operator, the drum filling lids (24A and 24B) may be moved from the retracted position into engagement with the mouths of a pair of empty drums which would, when the apparatus were in use, be located in the position shown by dashed lines (38A and 38B).

[0040] Hopper support frame (28) is comprised of a pair of support posts(30), the upper ends of which are attached to hopper (2). Support posts (30) are preferably telescopic and constructed in a known fashion. The advantage of support posts (30) being telescopic is that in addition to allowing the overall height of the apparatus of the present invention above the surface upon which it is supported to be adjusted, it enables the apparatus of the present invention to be packed to a smaller volume for transportation.

[0041] The lower ends of posts (30) are affixed to cross bars (32). Cross bars (32) engage the surface upon which the apparatus of the present invention is resting via fixed direction rollers (34). The rollers (34) are so configured and attached to cross bars (32) that the apparatus of the present invention may be rolled over a flat and hard surface in directions parallel to the principal axis of cross bars (32).

[0042] In use, the apparatus of the present invention is used as described above.

Claims

1. A loading hopper (2) which includes

a pellet inlet port(14);
at least two pellet outlet ports (16A, 16B), each pellet outlet port (16A, 16B) having a reversible port closure means (18A, 18B) attached to at least one drum filling lid (24A, 24B), each drum filling lid (24A,24B) is provided with means for inducing a negative pressure in a drum being filled relative to the pressure within the hopper (2) when the drum filling lid (24A,24B) is sealingly engaged with the drum;
division means (12)arranged to substantially divide a stream of pellets transported in a conveying gas entering the hopper (2)via the pellet

inlet port (14) and direct a stream of pellets carried in a conveying gas towards each pellet outlet port (16A,16B); and
a conveying gas outlet port in communication with the means for inducing negative pressure.

2. A loading hopper (2) according to claim 1, wherein the division means (4) includes the walls of the hopper being shaped and configured so as to substantially divide a stream of pellets.

3. A hopper according to claim 1 or 2 which includes three or four outlet ports.

4. A hopper according to any preceding claim, wherein the division means (4)includes one or more baffles or dividing plates located within the hopper (2), preferably the baffles or dividing plates are supported in position by anchoring or fixing means to one or more side walls of the hopper (2).

5. A hopper (2) according to any preceding claim which includes at least one aperture adjacent to each outlet port which is sealed with a transparent sheet of material so as to form a viewing window (20).

6. A hopper (2) according to any preceding claim which further includes a hopper support frame (28) typically having at least one support post (30) which is preferably a telescopic post.

7. A hopper (2) according to claim 6, wherein the support post (30) is permanently or releasably fixed to the hopper (2).

8. A hopper (2)according to any of claims 6 or 7 wherein the hopper support frame (28)includes ground engaging means (34).

9. A hopper (2) according to claim 18, wherein the ground engaging means includes rollers, wheels or endless belt tracks.

10. A hopper (2) according to any preceding claim wherein the port closure means (18A, 18B) is attached to the drum filling lid (24A, 24B) by means of a flexible hose.

11. A hopper (2) according to any preceding claim, wherein the apparatus for inducing a negative pressure in the drum is a dust line, or small bore pipe or duct, which provides communication for gas and dust between the inside of the drum, and either i) the inside of the hopper in the region of the conveying gas outlet port or ports, or ii)directly into the duct or pipe connected with a conveying gas outlet port.

12. A hopper according to any of claims 8 to 11 wherein the drum filling lid (24A, 24B) is mounted on the hopper support frame (28) and is arranged to permit movement of each drum filling lid (24A,24B)(either together or separately) between a first retracted position and a second extended position.

13. A hopper according to any of claims 6 to 12, wherein each drum filling lid (24A, 24B) which is adapted to be engaged with the outlet ports are either fixed to the hopper support frame, or are fixed to a separate lid support frame.

14. A method of transferring pellets from a hopper, which method includes:

positioning a hopper according to any of claim 1 to 13 having pellets therein above at least two drums and permitting the drum filling lid to sealingly engage with a respective drum; placing each drum under negative pressure relative to the hopper; and;
permitting the pellets to exit the outlet ports and to enter the drums.

15. A method according to claim 14, wherein the pellets exit the outlet ports under the force of gravity.

Patentansprüche

1. Füllbehälter (2), beinhaltend
einen Pellet-Einlassanschluss (14);
mindestens zwei Pellet-Auslassanschlüsse (16A, 16B), wobei jeder Pellet-Auslassanschluss (16A, 16B) ein reversibles Anschlussverschlussmittel (18A, 18B) aufweist, welches mit mindestens einem Trommelfülldeckel (24A, 24B) verbunden ist und jeder Trommelfülldeckel (24A, 24B) mit Mitteln zum Einleiten eines negativen Drucks in eine Trommel versehen ist, die relativ zum Druck innerhalb des Behälters (2) befüllt wird, während der Trommelfülldeckel (24A, 24B) dichtend mit der Trommel in Eingriff steht;
ein Einteilungsmittel (4), das im Wesentlichen zum Teilen eines Stroms aus Pellets angeordnet ist, welcher in einem Fördergas transportiert wird und über den Pellet-Einlassanschluss (14) in den Behälter (2) eintritt und zum Leiten eines Stroms aus Pellets, welcher in einem Fördergas in Richtung jedes Pellet-Auslassanschlusses (16A, 16B) getragen wird; und ein Fördergas-Auslassanschluss, welcher mit den Mitteln zum Einleiten eines negativen Drucks kommuniziert.

2. Füllbehälter (2) gemäß Anspruch 1, bei dem das Einteilungsmittel (4) beinhaltet, dass die Wände des Behälters im Wesentlichen zum Teilen eines

Stroms aus Pellets geformt und konfiguriert sind.

3. Behälter gemäß Anspruch 1 oder 2, der drei oder vier Auslassanschlüsse beinhaltet.

4. Behälter gemäß einem der vorangehenden Ansprüche, bei dem das Aufteilungsmittel (4) ein oder mehrere Leitbleche oder Aufteilungsplatten beinhaltet, die innerhalb des Behälters (2) angeordnet sind, wobei die Leitbleche oder Aufteilungsplatten bevorzugt durch Verankerungs- oder Befestigungsmittel in Position zu einer oder mehr Seitenwänden des Behälters (2) gestützt werden.

5. Behälter (2) gemäß einem der vorangehenden Ansprüche, welcher mindestens einen Ausschnitt benachbart zu jedem Auslassanschluss beinhaltet, der mit einem transparenten Blatt eines Materials geschlossen ist, um ein Sichtfenster (20) auszubilden.

6. Behälter (2) gemäß einem der vorangehenden Ansprüche, welcher ferner einen Behälterstützrahmen (28) beinhaltet, der üblicherweise mindestens eine Haltestütze (30) aufweist, die bevorzugt eine teleskopische Stütze ist.

7. Ein Behälter (2) gemäß Anspruch 6, bei dem die Haltestütze (30) permanent oder lösbar am Behälter (2) befestigt ist.

8. Behälter (2) gemäß einem der Ansprüche 6 oder 7, bei dem der Behälterstützrahmen (28) Bodeneingriffsmittel beinhaltet.

9. Behälter (2) gemäß Anspruch 8, bei dem die Bodeneingriffsmittel Laufwalzen, Räder oder endlose Bandlaufbahnen beinhalten.

10. Behälter (2) gemäß einem der vorangehenden Ansprüche, bei dem das Anschlussverschlussmittel (18A, 18B) mittels eines flexiblen Schlauchs mit dem Trommelfülldeckel (24A, 24B) verbunden ist.

11. Behälter (2) gemäß einem der vorangehenden Ansprüche, bei dem die Vorrichtung zum Einleiten eines negativen Drucks in die Trommel eine Staubleitung oder eine kleine Bohrungsleitung oder ein Kanal ist, welche eine Kommunikation für Gas und Staub zwischen der Innenseite der Trommel und entweder i) der Innenseite des Behälters im Bereich des Trägergas-Auslassanschlusses oder der Trägergas-Auslassanschlüsse oder ii) direkt in den Kanal oder die Leitung, welche mit einem Trägergas-Auslassanschluss verbunden sind.

12. Behälter gemäß einem der Ansprüche 8 bis 11, bei dem der Trommelfülldeckel (24A, 24B) auf dem Behälterstützrahmen (28) befestigt und so angeordnet ist, um das Bewegen jedes Trommelfülldeckels (24A, 24B) (entweder zusammen oder getrennt) zwischen einer ersten eingefahrenen und einer zweiten ausgefahrenen Position.

13. Behälter gemäß einem der Ansprüche 6 bis 12, bei dem jeder Trommelfülldeckel (24A, 24B), welcher zum Eingreifen in die Auslassanschlüsse angepasst ist, entweder am Behälterstützrahmen oder an einem separaten Deckelstützrahmen befestigt ist.

14. Verfahren zum Fördern von Pellets aus einem Behälter, wobei das Verfahren beinhaltet:

Positionieren eines Behälters gemäß einem der Ansprüche 1 bis 13, welcher Pellets beinhaltet, über mindestens zwei Trommeln und Ermöglichen des dichtenden Eingreifens des Trommelfülldeckels mit der betreffenden Trommel;
Platzieren jeder Trommel unter negativem Druck relativ zum Behälter; und;
Ermöglichen des Austretens von Pellets aus dem Auslassanschluss und des Eintretens in die Trommeln.

15. Verfahren gemäß Anspruch 14, bei dem die Pellets den Auslassanschluss durch die Gravitationskraft verlassen.

Revendications

1. Trémie de chargement (2) qui comprend :

un orifice d'alimentation en granules (14) ;
au moins deux orifices de sortie des granules (16A, 16B), chaque orifice de sortie des granules (16A, 16B) disposant d'un moyen de fermeture d'orifice réversible (18A, 18B) attaché à au moins un capot de remplissage de fût (24A, 24B), chaque capot de remplissage de fût (24A, 24B) étant muni de moyens permettant d'induire une pression négative dans un fût à remplir par rapport à la pression au sein de la trémie (2) lorsque le capot de remplissage de fût (24A, 24B) est engagé par fermeture étanche avec le fût ;
des moyens de division (12) disposés de façon à séparer essentiellement un courant de granules transportés dans un gaz de transport qui pénètre dans la trémie (2) via l'orifice d'alimentation en granules (14), et à diriger un courant de granules transportés dans un gaz de transport vers chaque orifice de sortie des granules (16A, 16B) ; et un orifice de sortie du gaz de

transport en communication avec le moyen permettant d'induire une pression négative.

2. Trémie de chargement (2) selon la revendication 1, dans laquelle les moyens de division (4) comprennent les parois de la trémie façonnées et configurées pour diviser essentiellement un courant de granules.

3. Trémie selon la revendication 1 ou 2, qui comprend trois ou quatre orifices de sortie.

4. Trémie selon l'une des revendications précédentes, dans laquelle les moyens de division (4) comprennent une ou plusieurs chicanes ou plaques de division situées dans la trémie (2), les chicanes ou plaques de division étant de préférence supportées en position par des moyens d'ancrage ou de fixation sur une ou plusieurs des parois de la trémie (2).

5. Trémie (2) selon l'une des revendications précédentes, qui comprend au moins une ouverture adjacente à chaque orifice de sortie et qui est rendue étanche par une feuille de matériau transparent de façon à former une fenêtre de visite (20).

6. Trémie (2) selon l'une des revendications précédentes, qui comprend de plus un bâti (28) de support de trémie ayant de façon type au moins un montant de support (30) qui est de préférence un montant télescopique.

7. Trémie (2) selon la revendication 6, dans laquelle le montant de support (30) est fixé de façon permanente ou détachable à la trémie (2).

8. Trémie (2) selon l'une des revendications 6 ou 7, dans laquelle le bâti (28) de support de trémie comprend un moyen de prise au sol (34).

9. Trémie (2) selon la revendication 8, dans laquelle le moyen de prise au sol comprend des rouleaux, des roues ou des chenilles à bande sans fin.

10. Trémie (2) selon l'une des revendications précédentes, dans laquelle le moyen de fermeture d'orifice (18A, 18B) est fixé au capot de remplissage de fût (24A, 24B) au moyen d'un raccord flexible.

11. Trémie (2) selon l'une des revendications précédentes, dans laquelle l'appareil destiné à induire une pression négative dans le fût est une ligne de poudre, ou un tuyau ou conduit de petit calibre qui fournit une communication au gaz et à la poudre entre l'intérieur du fût et i) l'intérieur de la trémie dans la région de l'orifice ou des orifices de sortie du gaz de transport ou ii) directement dans le conduit ou tuyau raccordé à un orifice de sortie du gaz de transport.

12. Trémie selon l'une des revendications 8 à 11, dans laquelle le capot de remplissage de fût (24A, 24B) est monté sur le bâti (28) de support de trémie et est disposé de façon à permettre le mouvement de chaque capot de remplissage de fût (24A, 24B) (ensemble ou séparément) entre une première position rétractée et une seconde position étendue.

13. Trémie selon l'une des revendications 6 à 12, dans laquelle chaque capot de remplissage de fût (24A, 24B), qui est adapté de façon à s'engager avec les orifices de sortie, est fixé au bâti de support de trémie ou est fixé à un châssis séparé de support de couvercle.

14. Méthode de transfert de granules depuis une trémie, ladite méthode comprenant :

le positionnement d'une trémie selon l'une des revendications 1 à 13 dans laquelle se trouvent des granules au-dessus d'au moins deux fûts et la réalisation de l'engagement par fermeture étanche du capot de remplissage de fût avec un fût respectif ;
le placement de chaque fût sous une pression négative par rapport à la trémie ; et
le fait de laisser les granules quitter les orifices de sortie et entrer dans les fûts.

15. Méthode selon la revendication 14, dans laquelle les granules quittent les orifices de sortie sous la force de gravité.

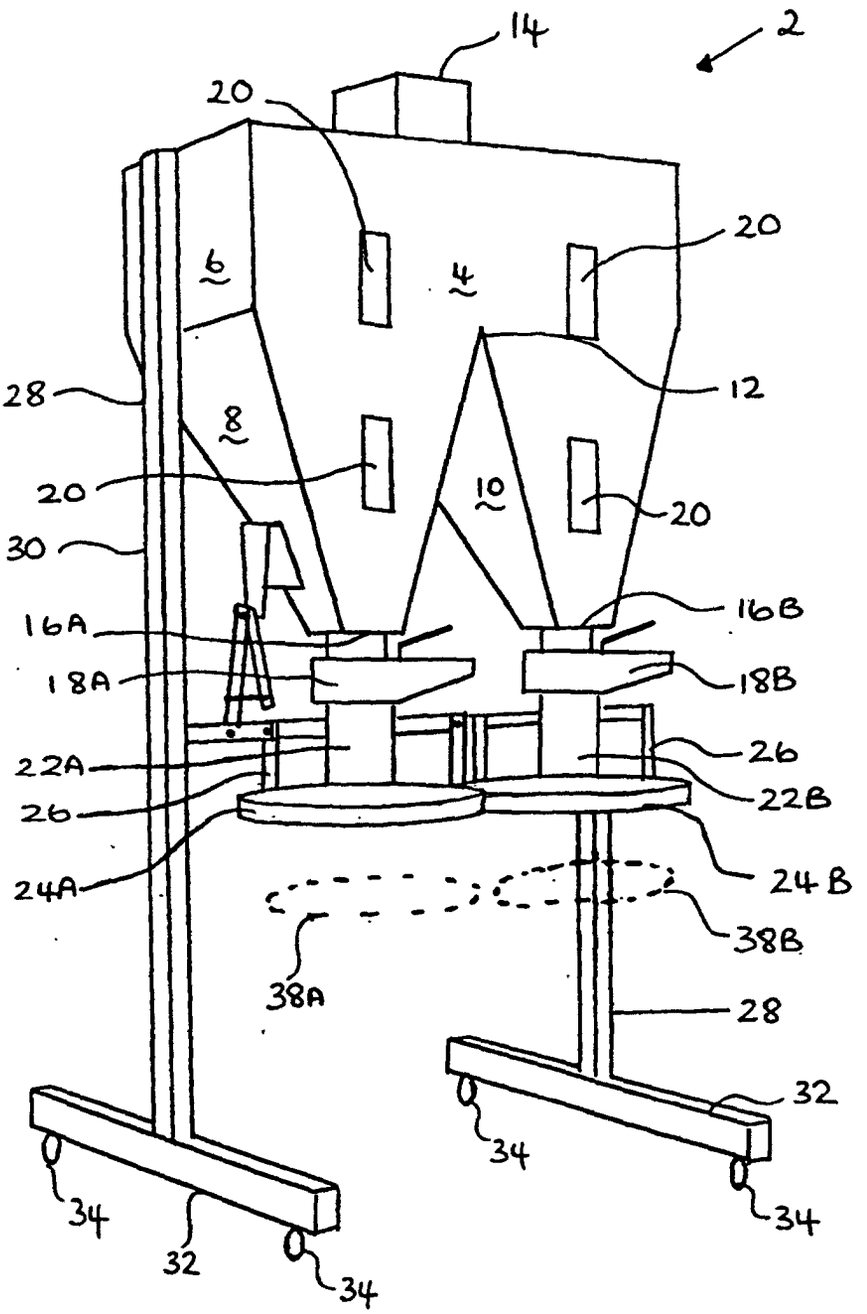
14
2
20
20
6
4
28
12
8
20
10
20
30
16B
16A
18A
18B
26
22A
22B
26
24B
24A
38B
38A
28
32
34
34
32
34

Figure 1