



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.06.2019 Bulletin 2019/23

(51) Int Cl.:
B65D 88/16 (2006.01)

(21) Application number: **18208948.2**

(22) Date of filing: **28.11.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **29.11.2017 NL 2019993**

(54) **CONTAINER FOR STORAGE AND TRANSPORT OF BULK MATERIAL, FILLING SYSTEM AND METHOD THEREFOR**

(57) The present invention relates to a container (10) for storing and/or transporting bulk material, in particular a so-called "big bag". The container for storing and/or transporting bulk material comprises:

- a bag (18) configured to hold the bulk material;
 - at least one filling and/or emptying opening arranged in the bag;
 - an upper edge arranged on or close to the opening;
 - an outer bag (20) substantially enveloping the bag as an outer liner; and
 - fastening means (26, 28) for fastening the outer bag to the upper edge,
- wherein the outer bag at least partially comprises a substantially transparent wall for the purpose of checking for contamination.

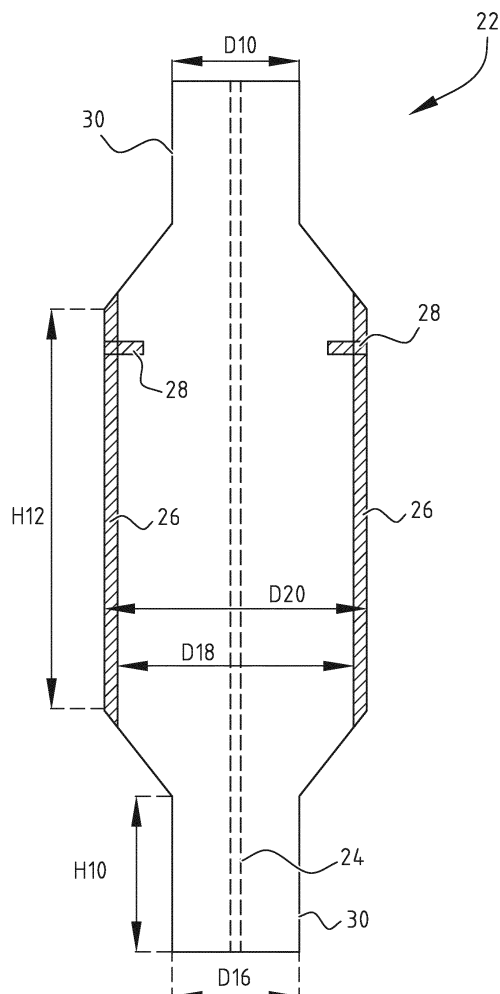


FIG. 2

Description

[0001] The present invention relates to a container for storing and/or transporting bulk material, in particular a so-called "big bag".

[0002] Containers known in practice, in particular big bags, are applied for bulk material in, among others, the food, pharmaceutical and other industries.

[0003] It has been found in practice that contamination of the contents can occur in such known containers for storing and/or transporting bulk material, particularly during discharge/emptying. Contamination can occur here with these containers because contamination on the outer side of the container can contaminate the contents of the container during discharge/emptying. This is undesirable when filling with products which must remain unadulterated, for instance in the case of containers being filled within a high care environment.

[0004] A container is also provided in practice with a sleeve. Such a sleeve with the container therein is placed on a pallet and then filled. Product or other contamination can here come between the container and the sleeve during the filling. After filling, the sleeve is pulled upward. This removal of the sleeve is also referred to as tipping. There is also a risk of contamination occurring here.

[0005] The present invention has for its object to provide a container with which the container for storing and/or transporting bulk material can be filled effectively, efficiently and preferably without undesirable contamination.

[0006] The present invention provides for this purpose a container for storing and/or transporting bulk material as according to claim 1.

[0007] The bag configured to hold bulk material as described above is also understood to mean a big bag. Where reference is made in the description to a container, this can also be understood to mean a big bag, and vice versa.

[0008] Said upper edge of the big bag is also referred to as a top deck and the outer bag is also referred to as an outer liner.

[0009] The container comprises a bag for holding the bulk material with at least one filling and/or emptying opening arranged in the bag. An upper edge is arranged on or close to the opening and the bag is substantially enveloped by an outer bag.

[0010] Fastening the upper edge to the outer bag by means of fastening means has the advantage that no fouling, contamination, can enter between the big bag and the outer bag. Fastening can for instance take place by means of sewing-in, stitching, clamping, sealing, glueing or screwing, but is not limited to any of the foregoing methods. Through use of fastening means the outer bag is substantially secured to the edge. This has the advantage that no contamination, or a lesser degree of contamination, can occur with constituents foreign to a product. An additional effect is that health hazards do not occur, or do so to lesser extent.

[0011] In the container according to the invention the outer bag of the container envelops the (inner) bag. By providing the outer bag as an outer liner it can be removed in relatively simple manner. The bag for holding the bulk material is left for further processes. The bag is preferably provided for this purpose with a number of lifting loops, for instance 2, 3, 4, 6 or other suitable number. In this embodiment the outer bag has no significant bearing function and can therefore be removed in relatively simple manner from the container. Such a removal of the outer bag makes it possible in effective manner to take the bulk material to an environment with stricter (hygiene) requirements.

[0012] During use a container according to the invention with a bag for the bulk material and an outer bag is provided for transport purposes with protection, for instance in the form of a wrapping film. Once the container has been received at the destination, usually in a low care environment, the protection is removed and the container taken to a so-called medium care environment. By then removing the outer bag from the inner bag, for instance by cutting preferably in a substantially horizontal direction, pulling, tearing or other appropriate manner, the container can be placed in a high care environment. Bulk material can in this way be placed effectively and efficiently in a high care environment without the risk of for instance contamination. It is thus possible with the container according to the invention to operate wholly or for a substantial part in automated manner. This reduces even further the risk of for instance contamination in a high care environment. Labels or stickers are optionally provided on or attached to the outer bag, for instance for the medium care environment, and/or on the bag, for instance for the high care environment.

[0013] An additional advantage is that, in the case of damage to the protection (e.g. wrapping film), the outer bag still provides some protection. The container hereby need not be processed as (residual) waste and/or returned to sender. This hereby reduces return shipments and loss of raw material.

[0014] Application of the container according to the invention has the further additional advantage that the process can be more readily automated because actions required for the purpose of filling by the operator are avoided, including cleaning and/or providing a separate cover or sleeve, for instance for a pallet, and/or preventing contamination. The process hereby becomes more effective and more efficient.

[0015] An additional advantage of preventing or at least reducing the risk of contamination between the big bag and the outer bag is that production can take place more effectively and more efficiently. This is achieved in that there is no longer any risk of bags having to be destroyed as a result of contamination. This results in their being less environmental impact due to the destruction of contaminated bags. In addition, the invention has the additional advantage that a clean big bag can be transported or stored. This has the additional advantage that

recycling is optionally possible, for instance by the company which empties the big bag and which optionally disposes of the outer bag. Separation can hereby already take place at the filling system following the filling process.

[0016] In an advantageous embodiment according to the invention the fastening means comprise a stitched edge.

[0017] The use of a stitched edge has the advantage that contamination cannot enter between outer bag and big bag. Providing such a stitched edge can also be performed relatively easily since there is already an existing production process for the big bag.

[0018] In a possible embodiment according to the invention the fastening means comprise releasable fastening means.

[0019] Providing releasable fastening means makes it simpler to release the outer bag from the other parts of the container. This makes the container according to the invention simpler to use.

[0020] According to invention the outer bag comprises a substantially transparent wall.

[0021] Providing a transparent wall has the advantage that it is easily possible to check for contamination. This has the additional advantage that the printing on the big bag can be read. Possible errors are hereby detected sooner and safety is increased still further. As further additional advantage possible construction errors in the big bag can be easily detected.

[0022] The wall of the outer bag is provided in a currently preferred embodiment with a thickness in the range of 120-60 μ , preferably 110-70 μ , more preferably 100-80 μ , most preferably 95-85 μ .

[0023] It has been found that such a wall thickness can withstand the forces which occur. An additional advantage is that this wall can impart some extra strength to the big bag.

[0024] In a further preferred embodiment according to the invention the bag of the container is provided with a spout provided with the emptying opening, wherein the spout is located wholly within the outer bag in a transport mode of the container.

[0025] By keeping the spout wholly within the outer bag in a transport mode the risk of for instance contamination is reduced or even wholly avoided. In a situation where the container is in use the spout with the emptying opening is released from the outer bag, for instance by removing the outer bag in a high care environment and/or arranging an opening in the outer bag in a medium care environment. It will be apparent that other situations are also possible.

[0026] In a further preferred embodiment according to the invention the bag and/or the outer bag comprises a biodegradable material.

[0027] Waste-related problems are mitigated by providing the bag and/or the outer bag with a biodegradable material. An example of a currently preferred material is a biodegradable polyester such as PLA or PBS. This ma-

terial can advantageously be applied particularly in the case of the outer bag since the outer bag is usually removed separately, for instance during the transfer of the bulk material to an environment requiring higher standards such as an above-mentioned high care environment.

[0028] In a further possible embodiment according to the invention the inner bag and/or outer bag is substantially gas-tight due to the inner bag and/or outer bag being provided from a material with barrier properties. The bulk material can hereby be packaged and transported in substantially gas-tight manner. The container hereby therefore provides a conditioned environment for the bulk material with substantially desired gas conditions. This makes the container according to the invention even more effectively deployable. The desired properties for the inner bag and/or outer bag can for instance be obtained by mixing material with material of the inner bag and/or outer bag and/or by arranging an additional layer, for instance an inner liner.

[0029] The invention further relates to a system for filling and/or emptying a container for storing and/or transporting bulk material, the system comprising:

- at least one container according to the invention; and
- at least one filling device.

[0030] Such a system provides the same effects and advantages as those stated in respect of the container.

[0031] In an advantageous embodiment a system makes use of a removing mechanism for removing the outer bag. This has the advantage that a ready-to-use bag with bulk material is produced for a customer. This has the additional advantage that the filling process can be more readily automated because preparatory actions by the operator are avoided. It is also possible to limit/reduce the environmental impact since, for instance during emptying, the outer bag can be separated and, if desired, disposed of separately so as to be processed in a proper manner.

[0032] The container according to the invention can consist of different materials or combinations of materials. Options for materials are paper, cardboard, plastic, cotton, jute and/or polymers, although the options are not limited to any of the foregoing materials. The container according to the invention can further be manufactured in different embodiments, for instance a big bag with one filling mouth or with two filling mouths. The container is however not limited to any of the foregoing embodiments. This is likewise further the case for all dimensions and shapes of the container.

[0033] The invention also further relates to a method for filling a container for storing and/or transporting bulk material, comprising the steps of:

- providing a container according to the invention;
- filling the container in a filling system according to the invention; and

- closing the container.

[0034] Such a method provides the same effects and advantages as those stated in respect of the container and/or the filling system.

[0035] The method makes particular use of providing a relevant big bag. This is preferably placed in a filling system and filled there with the desired product. Providing the container with an outer bag prevents contamination of the big bag during the filling process.

[0036] In a currently preferred embodiment the method further comprises of removing the outer bag, this having the advantage of leaving a clean big bag, for instance by performing a cutting movement in a substantially horizontal direction in order to remove the outer bag. An additional advantage of the method according to the invention is that a higher degree of efficiency is achieved since there is less product loss due to contamination. This method also has less environmental impact since the outer liner is removed after the emptying process and can thereby be disposed of in the correct manner. The outer bag or outer liner is thus transported together with the container and removed at the processing location in the so-called tipping zone (transition from medium to high care) where the container is discharged/emptied in the high care zone for further processing or filling of smaller packagings. The outer bag can here be removed and disposed of in controlled manner.

[0037] The invention further comprises the method step of arranging the outer bag with fastening means. This step has the advantage that the outer bag as such can be secured to the upper edge and contamination can be prevented.

[0038] Further advantages, features and details of the invention are elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- Figure 1 is a schematic view of a big bag with a filling mouth;
- Figure 2 is a schematic view of a cross-section of a big bag; and
- Figure 3 is a schematic representation of the process of filling the big bag.

[0039] Big bag 10 (Figure 1) is provided with bag 18 with an inner diameter of D12 and provided on the outer side with outer liner 20 with outer diameter D14, and further comprises filling mouth 12 with diameter D10 and height H10 for the purpose of filling container 10. Big bag 10 has a number of lifting loops 14 and top deck 16. The outer side of bag 18 of big bag 10 is fastened to outer liner 20 with fastening means.

[0040] In the shown embodiment the fastening means comprise a stitched edge.

[0041] Big bag 22 (cross-section of Figure 2) comprises fold line 24 and stitching edge 26. In the shown embodiment stitching edge 28 comprises the whole periph-

ery of container 10 with height H12, inner diameter D18 and outer diameter D20. The contents can be added to and/or removed from big bag 10 by means of filling mouth 30 with width D10 and/or D16 and height H10. Other parts or elements of big bag 22 (Figure 2) are the same or provided with the same function as corresponding parts or elements of big bag 10 (Figure 1).

[0042] In big bag 10, 22 the weight of the bulk material is substantially supported by bag 18, optionally with lifting loops 14. Outer liner 10 is removable by for instance performing a substantially horizontal cutting movement close to top deck 16.

[0043] The dimensions of big bag 10 in the shown embodiment are 0.5-2 metres for D10, 0.5-4 metres for H10, 0.5-4 metres for D12, 0.5-4 metres for D14, 0.5-2 metres for D16, 0.5-4 metres for D18 and 0.5-4 metres for D20. In the shown embodiment the volume of big bag 10, 22 is 0.5-2 m³. Possible materials are paper, cardboard, plastic, cotton, jute and/or polymers, including biodegradable material such as PLA and PBS. It will be apparent that the invention is not limited to a big bag of these dimensions and/or materials.

[0044] Filling process 32 (Figure 3) comprises of providing filling system 34, wherein a number of steps are performed. After supplying 36 a big bag, there follows placing 38 of big bag 10 in filling system 34. The process 40 of filling big bag 10 with bulk material is then performed. A filled big bag 10, 22 is hereby obtained.

[0045] A number of optional method steps are also included in the shown embodiment. It is thus possible for instance to optionally remove outer bag 20 in removing step 42, to optionally recycle outer bag 20 in step 44 and/or optionally make possible storage and/or transport of big bag 10, 22 in step 46.

[0046] In an exemplary application, big bag 10, 22 is filled and provided with a wrapping film for the transport mode. Following arrival in a low care environment at the destination this wrapping film or other protection is removed so that the product can be transferred to for instance a medium care environment. Outer bag or outer liner 20 is here removed and the bulk material in bag 18 can be transferred to a high care environment. These steps can be performed wholly or partially automatically.

[0047] The present invention is by no means limited to the above described preferred embodiments thereof. The rights sought are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Container for storing and/or transporting bulk material, comprising:

- a bag configured to hold the bulk material;
- at least one filling and/or emptying opening arranged in the bag;

- an upper edge arranged on or close to the opening;
- an outer bag substantially enveloping the bag as an outer liner; and
- fastening means for fastening the outer bag to the upper edge,

11. Method as claimed in claim 10, further comprising the step of removing the outer bag.
12. Method for arranging the outer bag with fastening means.

wherein the outer bag at least partially comprises a substantially transparent wall for the purpose of checking for contamination.

2. Container as claimed in claim 1, wherein the fastening means comprise a stitched edge.
3. Container as claimed in claim 1 or 2, wherein the fastening means comprise releasable fastening means.
4. Container as claimed in any of the foregoing claims, wherein the outer bag is provided with a thickness in the range of 120-60 μ , preferably 110-70 μ , more preferably 100-80 μ , most preferably 95-85 μ .
5. Container as claimed in any of the foregoing claims, wherein the bag is provided with a spout provided with the emptying opening, wherein the spout is located wholly within the outer bag in a transport mode of the container.
6. Container as claimed in any of the foregoing claims, wherein the bag and/or the outer bag comprises a biodegradable material.
7. Container as claimed in any of the foregoing claims, wherein the outer bag is provided with barrier properties such that the outer bag provides a conditioned container with desired gas conditions.
8. System for filling and/or emptying a container for storing and/or transporting bulk material, the system comprising:
- at least one container as claimed in any of the foregoing claims; and
 - at least one filling device.
9. System as claimed in claim 8, further comprising a removing mechanism for removing the outer bag.
10. Method for filling a container for storing and/or transporting bulk material, comprising the steps of:
- providing the container as claimed in any of the claims 1-7;
 - filling the container in a filling system as claimed in claim 8 or 9; and
 - closing the container.

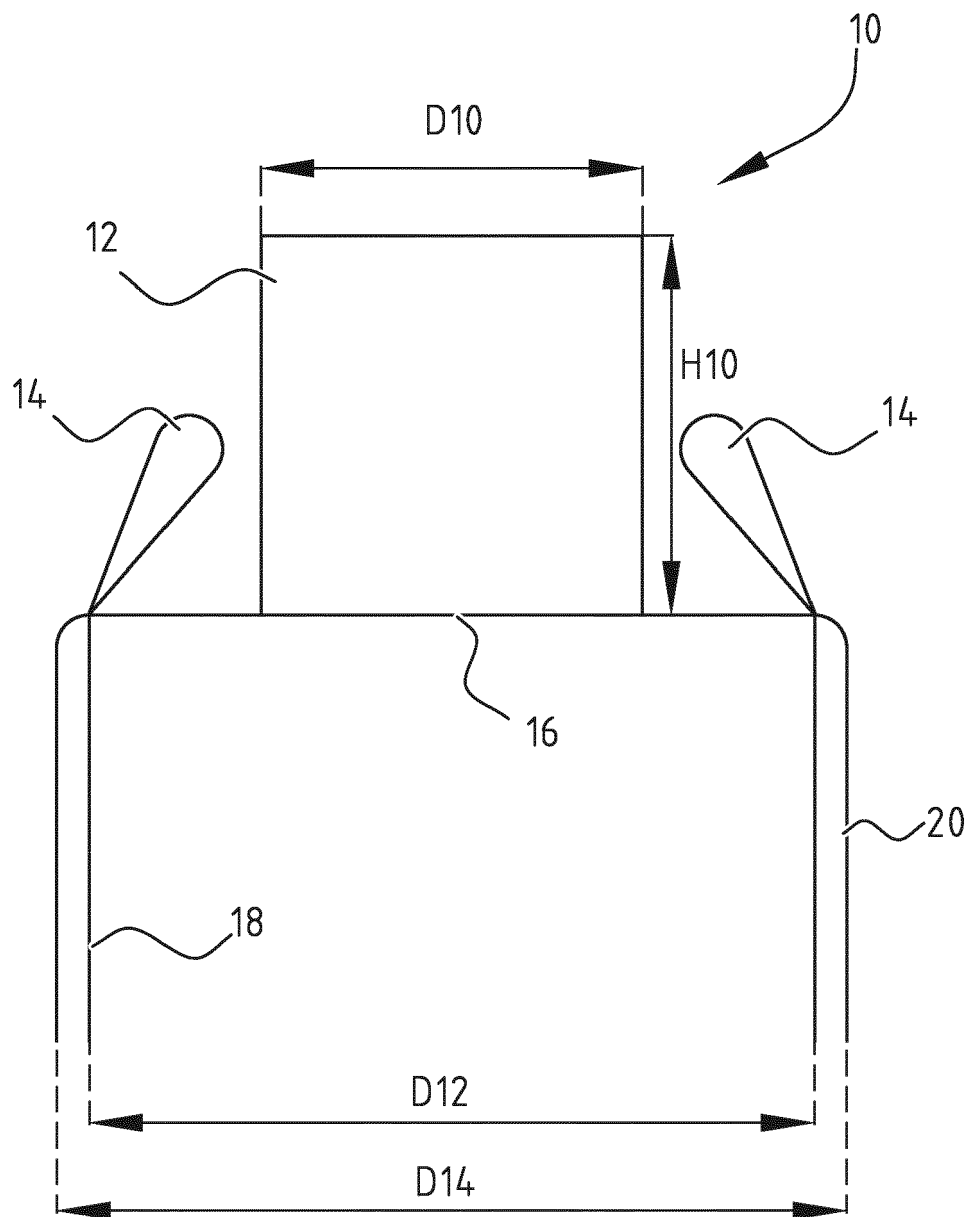


FIG. 1

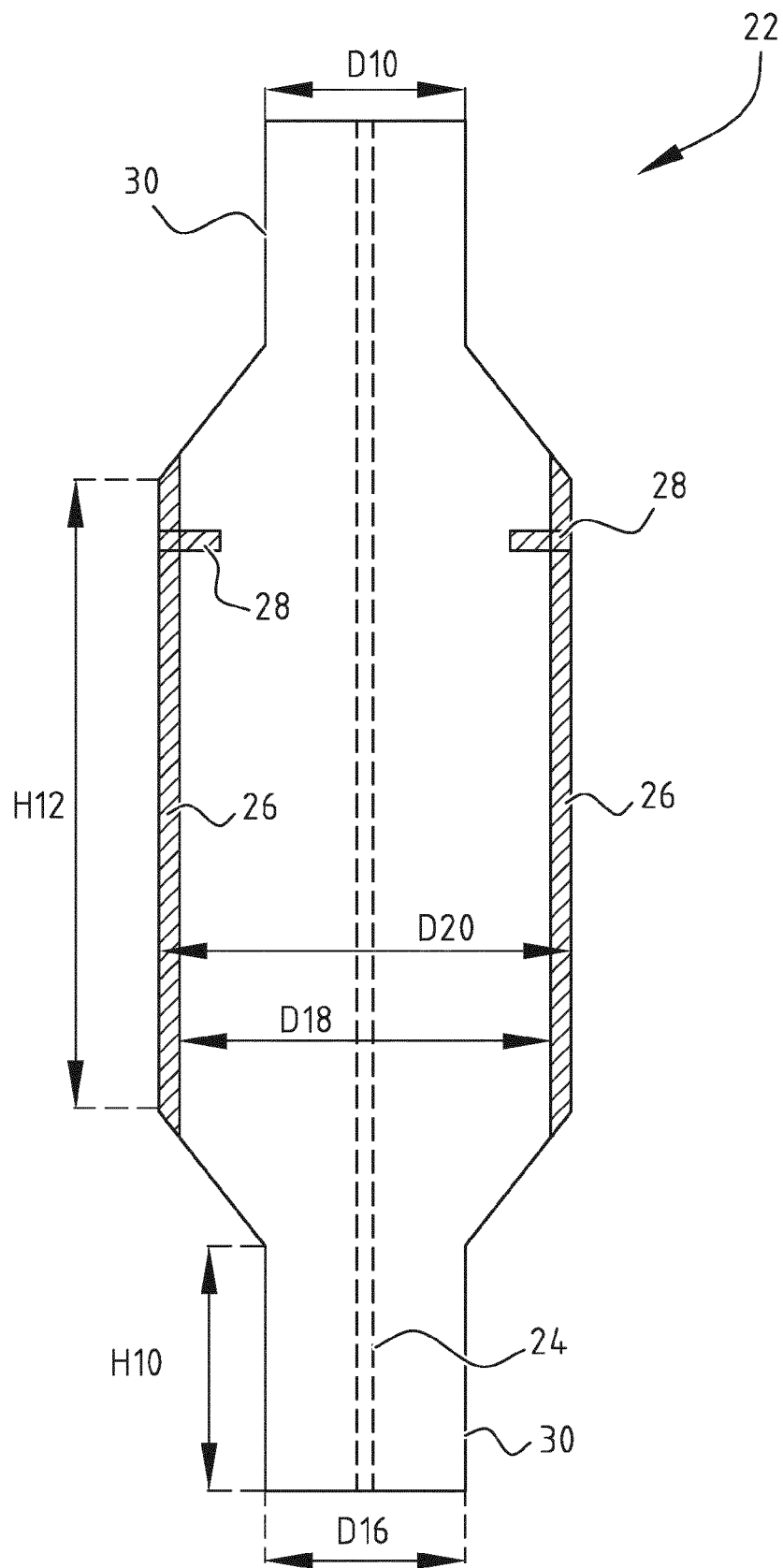


FIG. 2

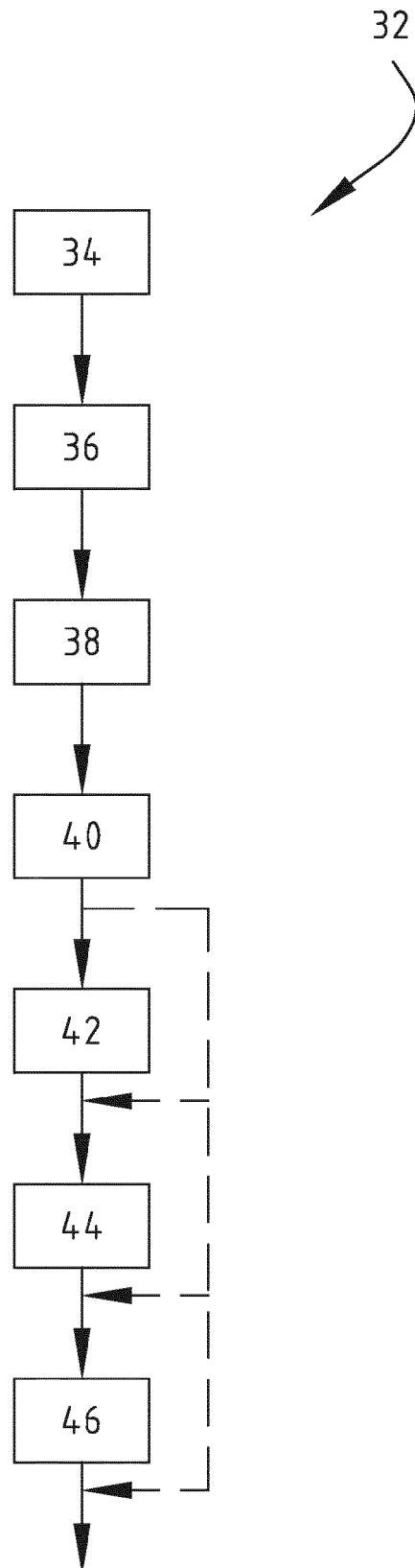


FIG. 3



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