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(54) **Eljárás téli szolgálati járművekre való szóróberendezés folyadéktartályának töltésére és ürítésére, valamint szóróberendezés**

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This invention relates to a method for filling and a method for emptying a liquid tank of a spreading material device for winter service vehicles, and to a spreader for winter service vehicles that is accordingly arranged for carrying out said methods, and to a winter service vehicle as such that is equipped with such a spreader.

German laid-open application DE 10 2010 029 142 A1 discloses a spreader for winter service vehicles which combines three different spreading methods, namely dry salt spreading, wet salt spreading and pure brine spreading. Normally the brine for wet salt spreading and pure brine spreading is located in an additional tank which is mounted for example laterally of the spreading material container in which the spreading salt is kept. Since the additional tanks are too small for spreading pure brine over a standard spreading path of approx. 50 km, DE 10 2010 029 142 A1 proposes utilizing the spreading material container electively as a further tank container for receiving brine. The additional tanks are retained in case wet salt is to be spread and the spreading material container is required for receiving solid thawing materials. Instead of employing the spreading material container itself as a further tank container, there can alternatively be provided a tank sack insertable into the spreading material container. The brine required for pure brine spreading is conveyed out of

the additional tanks in the conventional manner here, and the additional tanks are automatically refilled with brine from time to time from the spreading material container or the tank sack received therein. This is done using a pump which pumps into the additional tanks the brine received in the spreading material container or tank sack via a hose protruding thereinto. The pump used may be a suction pump 51, as represented in Figures 17 and 18, or alternatively a submerged pump.

The use of the pumps for automatically filling the additional tanks has turned out to be trouble-prone, however.

The object of the present invention is hence to overcome this disadvantage of the prior art.

This object is achieved by a method for filling and a method for emptying a liquid tank of a winter service spreader and by an accordingly adapted spreader having the features of the independent claims. Claims dependent thereon state advantageous developments and embodiments of the invention.

The core of the invention is to be seen in that the automatic refilling of the additional tanks with brine from the spreading material container or the tank sack inserted therein is obtained substantially solely through hydrostatic forces. By means of the solution according to the invention it is not only possible to refill the additional tanks during operation, however, but it is likewise possible to couple the first-time filling of the additional tanks with the filling of the spreading material container

or the tank sack received therein such that this can be effected in one step. The different tank containers thus no longer need to be filled separately, which means a considerable facilitation and time saving.

Accordingly, the method according to the invention, for filling a liquid tank which comprises as a first tank container e.g. the spreading material container or the tank sack received therein and as one or more second tank containers e.g. the above-mentioned additional tanks, provides that the first tank container is connected to the second tank container or containers via a liquid line such that the first tank container is first filled with liquid, for example with brine, up to a moment as of when the liquid filled into the first tank container begins to flow through the liquid line into the at least one second tank container, with the filling of the second tank container or containers with liquid from the first tank container being effected through the liquid line following this moment.

This can be done in two different ways, in principle. Either the liquid line is connected at the lower part of the spreading material container to the latter or the tank sack inserted therein in such a way that it connects the latter to the additional tank or tanks with a preferably continuously downward path, so that when filling the main tank, in other words the spreading material container or the tank sack within it, the liquid starts to flow directly into the additional tank. If the height of the main tank overlaps the height of the additional tank and if the

liquid level in the main rises, the liquid level in the additional tanks will also rise until these are completely filled. After this, filling of the main tank can continue until its maximum filling volume is reached. When the liquid tank is emptied by taking liquid from the additional tank, the liquid level in the main tank will drop first until it reaches the highest level of the additional tank, whereupon the liquid level in the main and additional tanks will drop equally as emptying continues.

The first possibility of hydrostatic filling and emptying of the liquid tank can be achieved relatively easily if the spreading material container is used as the first tank container, in other words as the main tank. In this case, the liquid line can be connected in a relatively simple way to the front sides of the main and additional tanks. However, this is more problematic if e.g. a tank sack inserted in the spreading material container is used as the first tank container or main tank. If this is so, the tank sack must then be connected to the spreading material container walling, or passed through the latter, at the lower part of the spreading material container. Access to this lower part of the spreading material container is difficult, however, especially if a tank sack is inserted in it. Since use of a tank sack as the main tank is preferable to the use of the spreading material container itself, the second method of hydrostatic filling emptying of the liquid tank as described below offers certain advantages.

According to this second possibility, the liquid line has a highest point between the two line openings at the respective ends of the liquid line. This highest point preferably lies at the height of an upper region of the first tank container (main tank) or thereabove, so that the step of filling the second tank container or containers (additional tanks) only begins when the first tank container is completely or at least almost completely filled. For the filling of the second tank container or containers only begins after the liquid in the liquid line has reached the highest point, and thereafter the filling of the second tank container or containers with liquid from the first tank container continues automatically through the liquid line exploiting hydrostatic forces, namely as long as the line opening of the liquid-line end protruding into the second tank container (additional tank) lies below the liquid level of the first tank container (main tank). This second possibility is not restricted to the employment of a tank sack as the first tank container, but can also be used, if certain basic conditions are heeded which are to be explained hereinafter, when e.g. the spreading material container itself is utilized as the first tank container (main tank).

Preferably, the (first) line opening of the liquid line lies near the bottom of the first tank container, in order for the first tank container to empty as completely as possible upon emptying. For the same reason, the (second) line opening of the liquid-line end attached to the second tank container

(additional tank) or protruding thereinto lies at a place below the (first) line opening of the opposing liquid-line end attached to the first tank container (main tank) or protruding thereinto, in order for the first tank container to empty as deeply as possible upon emptying of the liquid tank. Hence, the (second) line opening preferably lies below the bottom of the first tank container.

The liquid line can be guided over an upper edge of the spreading material container. The highest point of the liquid line then lies above the spreading material container or a tank sack received therein. On the one hand, this offers the advantage that the maximum filling volume of the first tank container (spreading material container or tank sack received therein) can be completely filled with liquid without any problems before the filling of the second tank container through the liquid line begins. However, it is problematic that in this case, upon the employment of a tank sack as the first tank container, an excess pressure must be built up in the tank sack in order to urge the liquid out of the tank sack through the liquid line beyond the highest point of the liquid line. It is also important here that the liquid is pumped into the first tank container at a volume flow rate such that the liquid not only spills over the highest point, but fills the liquid line completely. For it is only with a closed liquid column in the liquid line that one achieves the goal of the liquid being dragged from the first tank container into the

second tank container automatically due to hydrostatic forces.

When, in contrast, the first tank container is not formed by a tank sack but e.g. by the spreading material container itself, the production of an excess pressure in the first tank container is not possible. In this case there can for example be provided a suction pump on the liquid line, with which the liquid is sucked beyond the highest point of the liquid line once. Subsequently, the suction pump can be switched off and the further filling operation takes place automatically solely due to hydrostatic forces.

The excess pressure problem can be avoided when the liquid line is guided, not around the upper edge of the spreading material container, but in an upper region through the walling of the spreading material container. Then the filling of the second tank container begins when the first tank container is almost completely filled, and continues automatically provided it is ensured that a closed liquid column forms in the liquid line at the start of the independent filling operation, as previously explained.

In the upper region of the spreading material container the walling of the spreading material container is relatively well accessible even in the presence of a tank sack, so that the liquid line can be readily guided to the tank sack through the walling of the spreading material container at this place, or the tank sack can be attached at the corresponding place to an opening in the spreading material

container, on the opposing side of which a hose leading to the additional tank is then attached.

The filling of the first tank container can be ended as soon as the second tank container automatically fills due to the acting hydrostatic forces. The first tank container then empties to the extent that the second tank container fills. Hence, it is preferred to fill the first tank container further while the second tank container is automatically filling with liquid from the first tank container until both tank containers are completely filled.

When, in the later operation of the spreader, one empties the liquid tank by liquid being diverted from the second tank containers (additional tanks), the liquid level in the first liquid tank (main tank, that is, spreading material container or tank sack) first sinks until its liquid level has sunk to the height of the highest second tank container (additional tank). Subsequently, the liquid levels in the two tank containers sink to the same extent until the (first) line opening in the first tank container protrudes over the liquid level. At this moment the liquid column in the liquid line breaks. When the diameter of the liquid line is small and the capillary forces sufficiently great, the liquid column located in the liquid line is dragged upon the further emptying of the second tank container. This effect is familiar to everyone in connection with drinking straws. Hence, it can be expedient to form the liquid line from a bundle of lines with a sufficiently small cross section in order to promote this effect.

Preferably, vent openings are provided on the first and second tank containers, so that the air located therein can escape to the extent that the corresponding tank container fills with liquid. Furthermore, a fill level limiter can be provided in the second tank container or in the first tank container, depending on the selected filling principle, which sends a stop signal to the filling apparatus when a specified fill level is reached.

Hereinafter the invention will be described by way of example with reference to the accompanying drawings. Therein are shown:

Figure 1: an isolated spreader according to a first exemplary embodiment in a perspective view,

Figures 2 to 9: different states upon filling and emptying of the liquid tank of the spreader represented in Figure 1, in a schematic cross section,

Figure 10: an equivalent diagram for the spreader according to Figures 1 to 9,

Figure 11: a schematic cross section through a spreader according to a second exemplary embodiment,

Figure 12: a schematic cross section through a spreader according to a third exemplary embodiment,

Figure 13: a schematic cross section through a spreader according to a fourth exemplary embodiment,

Figure 14: a schematic cross section through a spreader according to a fifth exemplary embodiment,

Figure 15: a schematic cross section through a spreader according to a sixth exemplary embodiment,

Figure 16: a schematic cross section through a spreader according to a seventh exemplary embodiment,

Figure 17: a spreader according to the prior art having a tank sack received in the spreading material container, and

Figure 18: the spreader according to the prior art from Figure 17 without the tank sack.

Represented in Figure 1 is an attachable spreader 1 as a superstructure on a loading surface of a truck, which is not represented explicitly here. On a welded support frame 2 there is constructed a spreading material container 3 which possesses a funnel-shaped cross section, so that thawing materials received in the spreading material container collect at the tapered bottom of the spreading material container 3. A screw conveyor at the bottom of the spreading material container transports solid spreading materials, in particular spreading salt, out of the spreading material container 3 to an outlet 4, through which the spreading materials can in turn fall due to gravity into the downpipe 5 of a spreading device 6 and through the downpipe 5 onto a spreading disk 7 of the spreading device 6. Two additional tanks 10 for liquid, in particular for a salt solution (brine), are provided in order to admix liquid in a suitably metered quantity to the dry spreading materials falling through the downpipe 5. This is effected in a per se known manner via a suction line 15 while employing an accordingly actuated pump 16. The place of admixture need not necessarily be in the downpipe itself, but may for example also be only at the lower end of the downpipe 5 on the spreading disk 7.

Further additional tanks 10 can be provided for example before the spreading material container 3. In particular, the additional tanks 10 can be of considerably smaller size than represented in Figure 1, so as to allow the content of the spreading material container 3 to be enlarged. If a plurality of additional tanks 10 for admixing liquid thawing materials are provided, they are preferably interconnected via lines.

The functions of pure brine spreading, dry salt spreading and wet salt spreading can be obtained with the pump 16 and suitable valves 11.2. By means of the valve 11.2 configured as a three-way cock (for example ball cock), the pump 16 can be connected to the spraying device 17 or to the downpipe 5 in order to switch over between pure brine spreading and wet salt spreading. If dry salt is to be spread, i.e. without the admixture of brine from the additional tanks 10, either the pump 16 can be switched off or the three-way cock 11.2 be so swivelled that the route from the pump 16 both to the spraying device 17 and to the spreading device 6 is interrupted. On the other hand, it is also possible with the position of the three-way cock 11.2 represented in Figure 1 to spread both dry salt by means of the spreading device 6 and pure brine by means of the spraying device 17. Through suitable modification of the system, for example through different or additional way valves and/or additional lines and/or line branches and/or through one or more further pumps, it can also be guaranteed that

simultaneously pure brine is spread via the spraying device 17 and wet salt via the spreading device 6.

To now increase the brine receiving capacity of the spreader 1, a liquid tank 40 is inserted in the spreading material container 3 and connected to the additional tanks 10 via a liquid line 50. The liquid tank 40 can be filled with brine via a filling port 42.

In addition to the filling port 42 there is provided a feed-through port 43 through which the liquid line 50 is guided into the liquid tank 20 with a hose extension 50A. The hose extension 50A reaches down to the bottom of the liquid tank 40. Thus, the liquid tank 40 can be completely emptied through the liquid line 50 and the liquid be supplied to the additional tanks 10, that is, in the concrete exemplary embodiment according to Figure 1 to the suction line 15 connecting the two additional tanks 10.

In the exemplary embodiment according to Figure 1, the liquid tank 40 is formed by a tank sack 40A which is inserted into the spreading material container 3, as described. For the purposes of the present invention, the tank sack 40A need not necessarily consist of a flexible, foldable material, it can equally well be configured as a rigid insertable tank. However, it is preferred when the tank sack is flexible and foldable, as described in DE 10 2010 029 142 A1, so that it is better storable.

The tank sack 40A fills only half of the spreading material container 3. In the remaining other

half there can be received a second tank sack 40A or else dry spreading material which is then conveyed through below the tank sack 40A to the spreading device 6. If a second tank sack 40A is provided, an overflow between the tank sacks can be provided which, for easier operability, is disposed as far upward as possible. The overflow of the second tank sack then in turn has a hose extension attached thereto which reaches to the bottom of the second tank sack.

With reference to Figures 2 to 9 the principle of filling and emptying the liquid tank will hereinafter be described, said tank being composed here of the first tank container formed by the tank sack 40A, and by two additional tanks 10 as second tank containers. The representations are to be understood as purely schematic.

Figure 2 shows a first phase of the filling operation of the tank container 40A. At this moment the additional tanks 10 are still completely empty. The blocking valve 18 is closed. Instead of the blocking valve 18, the closing of the suction line 15 attached to the two additional tanks 10 can also be ensured solely by the pump 16 (Figure 1). According to the liquid level represented in Figure 2, the tank sack 40A is not yet completely filled. The pressure acting on the liquid corresponds to the ambient pressure p_0. The arrow indicates that the tank sack 40A is being filled with liquid further through the filling port 42.

In Figure 3 the liquid level has risen so far that the vent valve 44 (cf. also Figure 1) closes. A

float 45 in the vent valve 44 ensures that no liquid can exit from the tank sack 40A. The pressure acting on the liquid in the tank sack 40A still corresponds at this time to the ambient pressure p_0. The liquid level has already risen in the liquid line 50 over the tank sack 40A.

Upon further filling of the tank sack 40A (Figure 4) the pressure p acting on the liquid located in the tank sack 40A is increased above the ambient pressure p_0. The tank sack 40A blows up (not shown), as indicated by the arrows represented in the tank sack, and the liquid located in the tank sack 40A is urged through the liquid line 50 out over the highest point 50B of the liquid line 50. This moment is represented in Figure 4. The volume flow rate through the filling port 42 is sufficiently great for the liquid to not only spill over the highest point 50B of the liquid line 50, but to completely fill and flow down the liquid line 50 as a closed liquid column.

As soon as the liquid column has fallen below the lowest point of the tank sack 40A, liquid from the tank sack 40A automatically flows through the liquid line 50 into the right-hand additional tank 10 and via the connecting line 15 also into the left-hand additional tank 10. Figure 5 illustrates this principle. The liquid level in the additional tanks 10 rises in parallel fashion to the extent that the liquid level in the tank sack 40 sinks. It is not necessary at this moment to feed more liquid through the filling port 42 (but this is advisable in order to keep the total filling time as short as possible).

Figure 6 shows the state in which the liquid levels in all tank containers 40A and 10 have reached the same level. There is no further liquid flowing through the liquid line 50. The liquid level of the additional tanks 10 has risen into the upward leading vent pipes 30. Now, at the latest, the filling operation is continued by further feeding of liquid through the filling port 42 into the tank sack 40A. The liquid level in the vent pipes 30 rises further until the maximum filling volume is reached, as represented in Figure 7. Accordingly, the vent pipes 30 end above the highest filling level of the tank sack 40A.

For emptying the liquid tank, the blocking valve 18 is opened or the pump 16 operated accordingly. Liquid is then removed from the additional tanks 10 through the suction line 15 and, to the same extent, liquid flows from the tank sack 40A into the additional tanks 10 through the liquid line 50, as represented in Figure 8. The liquid level sinks uniformly in all tank containers 40A and 10 until it has reached the lowermost level, shown in Figure 9, at which the line opening of the hose extension 50A protruding in the tank sack 40A emerges from the liquid level. From this moment on, the further emptying of the liquid tank is effected solely out of the additional tanks 10.

Instead of the vent pipes 30, the additional tanks 10 can also be equipped with vent valves 31, as represented in Figure 1. This vent valve 31, similarly to the vent valve 44 of the tank sack 40A, closes

automatically when an accordingly high fill level is reached. This moment can be captured by measuring technology and serve as a signal for adjusting the further filling of the tank sack 40A, this only being expedient, however, when the filling of the tank sack 40A is continued while the additional tanks 10 are filling with liquid passed from the tank sack 40A through the liquid line 50.

Figure 10 shows an equivalent circuit diagram for the spreader represented in Figure 1. Via a filling port 42, liquid is passed into the tank sack 40A. The tank sack 40A vents via the vent valve 44 and the liquid is fed via the liquid line 50 and hose extension 50A to the connecting line 14 between the two additional tanks 10 via which the liquid then flows into the additional tanks 10. The two additional tanks 10 are attached via vent pipes 30 to a common vent 30A which ends above the additional tank 40A (not represented in the equivalent diagram). A separate fill level limiter 32 is attached to one of the two additional tanks 10 and signals the end of the filling operation at a specified fill level.

Via lines 19 the additional tanks 10 are coupled to a distributor 20 which feeds the liquid out of the additional tanks 10 electively to the spreading device 6 or to a further distributor 21 with which the liquid can be allocated to a plurality of spray heads 17A, 17B, 17C.

Figure 10 thus simultaneously represents a second exemplary embodiment as a deviation from the first exemplary embodiment, which is schematically rendered

again in Figure 11. Accordingly, the liquid line 50 leads here into a connecting line 14 between the two additional tanks 10, which is different from the suction lines 19 leading to the distributor 20, via which liquid is removed from the additional tanks 10.

Figure 12 shows as a third exemplary embodiment a further modification which was likewise already explained in connection with the equivalent diagram according to Figure 10. Accordingly, the vent pipes 30 of the additional tank 10 end in a common vent 30A, which is in turn configured as a self-closing valve which closes when the liquid level in the total liquid tank has reached the vent 30A. This can, as mentioned, be captured by measuring technology and serve as a signal for switching off the filling operation. Accordingly, in this third exemplary embodiment the filling port 42 lies above the vent 30A in order that the filling port 42 can be closed safely without liquid exiting from the liquid tank.

Figure 13 shows as a further modification a fourth exemplary embodiment. Here the uppermost point 50B of the liquid line 50 lies in an upper region of the tank sack 40A directly below the maximum filling height of the tank sack 40A. The liquid hence flows out of the tank sack 40A into the liquid line 50 when the maximum fill level in the tank sack 40A is approximately reached, without an excess pressure having to be produced in the tank sack 40A. The liquid line 50 then leads further in the upper region of the spreading material container 3 through a walling 3A of the spreading material container 3. Couplings 61 and

62 on the container wall 3A are provided in order to attach thereto the liquid line 50 from the outside and the hose extension 50A from the inside. This is also relatively unproblematic on the inner side of the spreading material container 3, because this place on the spreading material container 3 is readily accessible even in the presence of the tank sack 40A.

Figure 14 shows a further modification as a fifth exemplary embodiment, in which the liquid line 50 is connected at the lower part of the tank sack 40A, namely the base of the tank sack 40A, and connects to one of the two additional tanks 10 with a preferably continuously downward path. A horizontal arrangement of the liquid line 50 would also be possible. Couplings 61 and 62 in the wall 3A of the spreading material container 3 are provided here as well in order to attach the connection to the tank sack 40A on the inside and the connection to the additional tank 10 on the outside.

Figure 15 shows as a further modification a sixth exemplary embodiment. In this case, the first tank container (main tank) is formed, not by a tank sack inserted into the spreading material container, but by the spreading material container 3 itself. A plate 28 inserted sealingly into the spreading material container 3 forms the bottom of the first tank container. Below it there extends the conveying device for conveying solid spreading materials in case the spreading container 3 at other times does not serve as a liquid tank, but in the conventional manner as a container for receiving spreading salt for example.

The liquid line 50 is guided into the spreading material container 3 via an aperture 63 in the walling 3A of the spreading material container 3 and protrudes with its hose extension 50A down to the bottom of the spreading material container 3. The filling and emptying principle corresponds to the previously described principle, being in particular similar to the fourth exemplary embodiment according to Figure 13. If the liquid pressure upon filling the tank containers does not suffice to produce a closed water column in the liquid line 50 in order to guarantee thereafter an independent flow of liquid out of the spreading material container 3 into the additional tank 10, there can additionally be provided e.g. a suction pump 52 and a blocking valve 53. First, the blocking valve 53 is closed and subsequently the suction pump 52 put into operation. As soon as the suction pump 52 has sucked in liquid, the suction pump 52 can be switched off and subsequently the blocking valve 53 opened. Then the liquid flows through the liquid line 50 automatically from the spreading material container 3 into the additional tank 10. Other possibilities for setting off a flow through the liquid line 50 are likewise possible.

Figure 16 shows a further modification as a seventh exemplary embodiment. As already seen in the sixth exemplary embodiment, the spreading material container 3 also acts here as the first tank container (main tank) to accommodate the brine, and similar to the fifth exemplary embodiment the connecting line 50 runs continuously downwards from the lower part of the

spreading material container 3, or alternatively horizontally, into the additional container 10.

Instead of the spreading material container 3, another tank can also serve as the main tank or "first tank". The previously described principles, in particular the employment of a connecting line 50 passing through a highest point, are applicable thereto in the same way.

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ELJÁRÁS TÉLI SZOLGÁLATI JÁRMŰVEKRE VALÓ SZÓRÓBERENDEZÉS FOLYADÉKTARTÁLYÁNAK TÖLTÉSÉRE ÉS ÜRÍTÉSÉRE, VALAMINT SZÓRÓBERENDEZÉS

SZABADALMI IGÉNYPONTOK

1. Eljárás téli szolgálati járművekre való szóróberendezés (1) folyadéktartályának (40A, 10; 3, 10) töltésére, ahol a folyadéktartály rendelkezik egy első tanktartállyal (40A; 3) és legalább egy második tanktartállyal (10), amely egy folyadékvezetéken (50, 50A) keresztül össze van kötve az első tanktartállyal, és ahol az első tanktartály (40; 3) szóróanyagtartály (3), amely a benne tárolt szilárd szóróanyagok kiszórására össze van kötve vagy összeköthető egy szórószerkezettel (6), vagy az első tanktartály a szóróanyagtartály (3) által befogadott tartályzsák (40A) vagy merev betéttank,

amelyre jellemzőek a következő lépések:

– az első tanktartályt (40A; 3) folyadékkal, például sólével addig a pillanatig töltjük, amelytől kezdve az első tanktartályba (40A; 3) töltött folyadék a folyadékvezetéken (50, 50A) keresztül elkezd folyni a legalább egy második tanktartályba (10), és

– nevezett pillanatot követően a legalább egy második tanktartályt (10) az első tanktartályból (40A; 3) a folyadékvezetéken (50, 50A) keresztül folyadékkal töltjük,

vagy

– a legalább egy második tanktartályt (10) folyadékkal, például sólével addig a pillanatig töltjük, amelytől kezdve a legalább egy második tanktartályba (10) töltött folyadék a folyadékvezetéken (50, 50A) keresztül elkezd folyni az első tanktartályba (40A; 3), és

– nevezett pillanatot követően az első tanktartályt (40A; 3) a legalább egy második tanktartályból (10) a folyadékvezetéken (50, 50A) keresztül folyadékkal töltjük.

2. Az 1. igénypont szerinti eljárás, amelynél a folyadékvezetéknek (50, 50A) van egy legmagasabb pontja (50B), és a legalább egy második tanktartály (10) töltésének lépése csak akkor kezdődik el és folytatódik hidrosztatikus erők kihasználásával, miután a folyadék a folyadékvezetékben (50, 50A) elérte a legmagasabb pontot (50B).

3. A 2. igénypont szerinti eljárás, amelynél a folyadékvezeték (50, 50A) legmagasabb pontja (50B) az első tanktartály (40A; 3) felső részének magasságában vagy a fölött helyezkedik el, úgyhogy a legalább egy második tanktartály (10) töltésének lépése csak akkor kezdődik el, amikor az első tanktartály (40A; 3) teljesen vagy legalábbis csaknem teljesen meg van töltve.

4. A 3. igénypont szerinti eljárás, amelynél mielőtt a legalább egy második tanktartály (10) töltése elkezdődik, az első tanktartály (40A; 3) maximális töltési térfogatát teljesen megtöltjük folyadékkal.

5. Az 1–4. igénypont egyike szerinti eljárás, amelynél a második tanktartály (10) töltése közben folytatjuk az első tanktartály (40A; 3) töltését.

6. Eljárás téli szolgálati járművekre való szóróberendezés (1) folyadéktartályának (40A, 10; 3, 10) ürítésére, ahol a folyadéktartály rendelkezik egy első tanktartállyal (40A; 3) és legalább egy második tanktartállyal (10), amely egy folyadékvezetéken (50, 50A) keresztül össze van kötve az első tanktartállyal, a folyadékvezetéknek (50A) egy első vezetéknyílása az első tanktartályban (40A; 3), előnyösen annak fenekénél helyezkedik el, és az első tanktartály (40A; 3) szóróanyagtartály (3), amely a benne tárolt szilárd szóróanyagok kiszórására össze van kötve vagy összeköthető egy szórószerkezettel, vagy az első tanktartály a szóróanyagtartály (3) által befogadott tartályzsák (40A) vagy merev betéttank,

amelyre jellemzőek a következő lépések:

– az első tanktartályból (40A; 3) folyadékot veszünk ki a második tanktartályon (10) keresztül, amelyben a folyadékvezetéknek (50) egy második vezetéknyílása úgy van elhelyezve, hogy a folyadéknak a második tanktartályból (10) történő kivétele során egyedül a hidrosztatikus erők révén az első tanktartályból (40A; 3) folyadék áramlik utána a második tanktartályba (10).

7. A 6. igénypont szerinti eljárás, amelynél a folyadékvezeték (50, 50A) úgy van elrendezve, hogy a folyadékvezeték (50, 50A) legmagasabb pontja (50B) a folyadékvezeték (50) első vezetéknyílása és a folyadékvezeték (50A) második vezetéknyílása között helyezkedik el.

8. A 7. igénypont szerinti eljárás, amelynél a folyadékvezeték (50, 50A) legmagasabb pontja (50B) az első tanktartály (40A; 3) felső részének magasságában vagy a fölött helyezkedik el.

9. Szóróberendezés (1) téli szolgálati járművekre, amely szóróberendezésnek van egy folyadéktartálya (40A, 10; 3, 10), amely magában foglal legalább egy első tanktartályt (40A; 3) és legalább egy második tanktartályt (10), amely egy folyadékvezetéken (50, 50A) keresztül össze van kötve az első tanktartállyal, ahol az első tanktartály (40A; 3) szóróanyagtartály (3), amely a benne tárolt szilárd szóróanyagok kiszórására össze van kötve vagy összeköthető egy szórószerkezettel (6), vagy az első tanktartály a szóróanyagtartály (3) által befogadott tartályzsák (40A) vagy merev betéttank, és ahol a folyadékvezeték (50, 50A) egy első véggel az első tanktartályhoz (40A; 3) van csatlakoztatva, vagy abba belenyúlik, és ott, előnyösen az első tanktartály (40A; 3) fenekénél van egy első vezetéknyílása, továbbá a folyadékvezeték egy második véggel a legalább egy második tanktartályhoz (10) van csatlakoztatva, vagy abba belenyúlik, és ott, előnyösen az első vezetéknyílás alatti helyen van egy második vezetéknyílása, ahol a folyadékvezeték (50, 50A) úgy van elrendezve, hogy a folyadékvezetéken (50, 50A) keresztül az első tanktartályból (40A; 3) a második tanktartályba (10) vagy fordítva a folyadék aktív szállítására szolgáló bármiféle szerkezet nélkül, egyedül hidrosztatikus erők révén folyadék legyen szállítható.

10. A 9. igénypont szerinti szóróberendezés, amelynél a folyadékvezetéknek (50, 50A) az első vezetéknyílás és a második vezetéknyílás között van egy legmagasabb pontja (50B), ami az első tanktartály (40A; 3) felső részének magasságában vagy a fölött helyezkedik el.

11. A 9. igénypont szerinti szóróberendezés, amelynél a folyadékvezeték (50, 50A) az első vezetéknyílás és a második vezetéknyílás között folytonosan lefelé vagy vízszintesen van vezetve.

12. A 10. vagy 11. igénypont szerinti szóróberendezés, amelynél a folyadékvezeték (50, 50A) át van vezetve a szóróanyagtartály (3) falán (3a).

13. A 9–12. igénypont egyike szerinti szóróberendezés, amelynél az első tanktartálynak (40A; 3) van egy első légtelenítőnyílása (44), amely arra alkalmasan van kialakítva, hogy rajta keresztül levegő tudjon kiáramlani, mialatt az első tanktartály (40A; 3) folyadékkal van töltve az első légtelenítőnyílástól (44) különböző nyíláson (42) keresztül.

14. A 9–13. igénypont egyike szerinti szóróberendezés, amelynél a legalább egy második tanktartálynak (10) van legalább egy második légtelenítőnyílása (30; 30A; 31), amely arra alkalmasan van kialakítva, hogy rajta keresztül levegő tudjon ki-

áramlani, mialatt a legalább egy második tanktartály (10) folyadékkal van töltve a második légtelenítőnyílástól (30; 30A; 31) különböző nyíláson keresztül.

15. Téli szolgálati jármű, amely magában foglal a 9–14. igénypont bármelyike szerinti szóróberendezést.

A meghatalmazott:

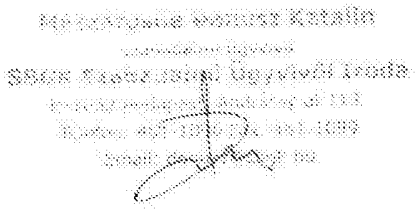


FIG 1

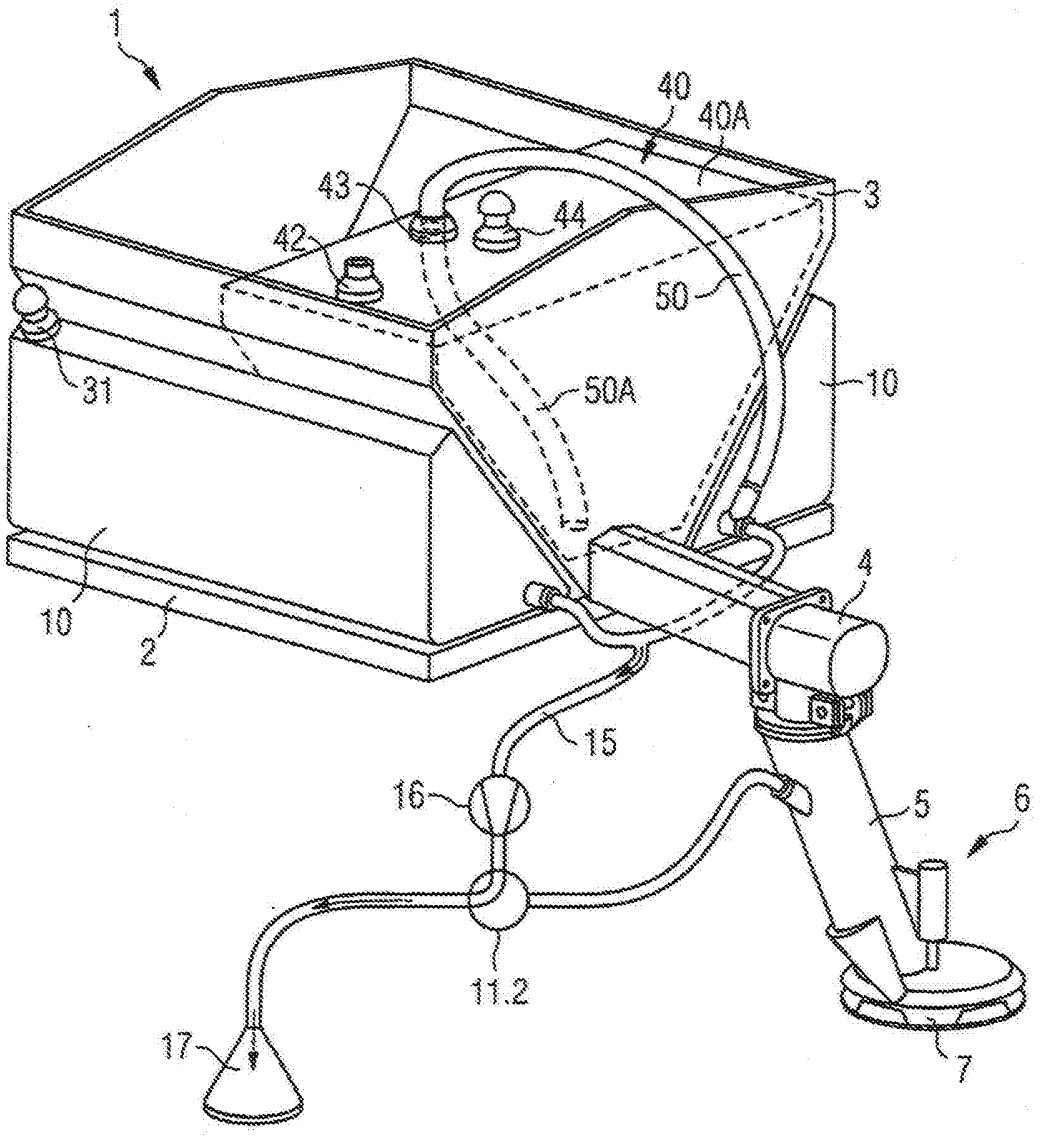


FIG 2

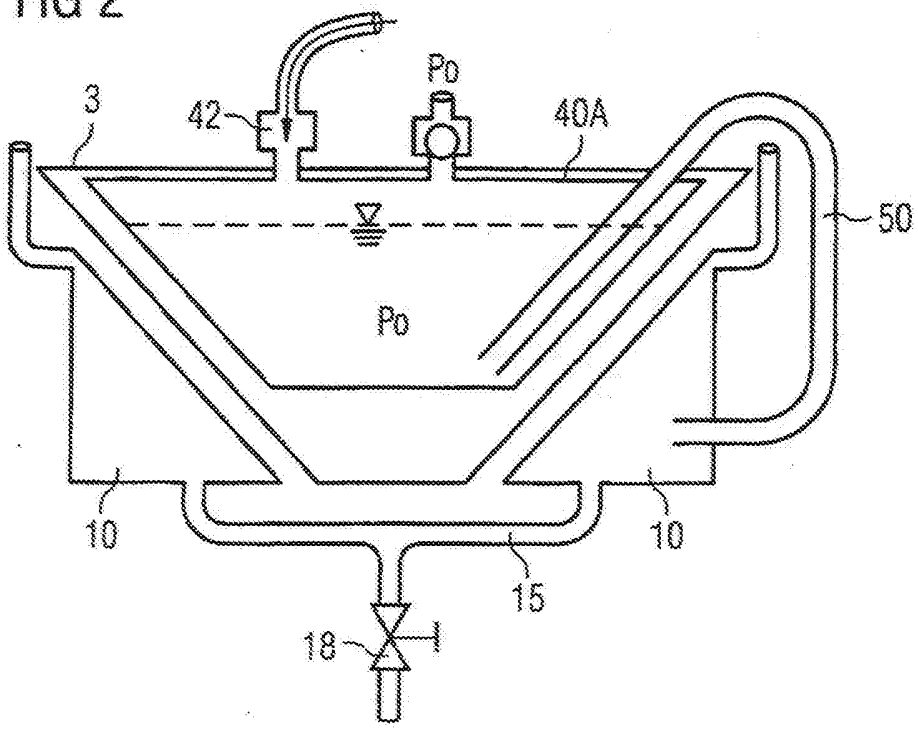
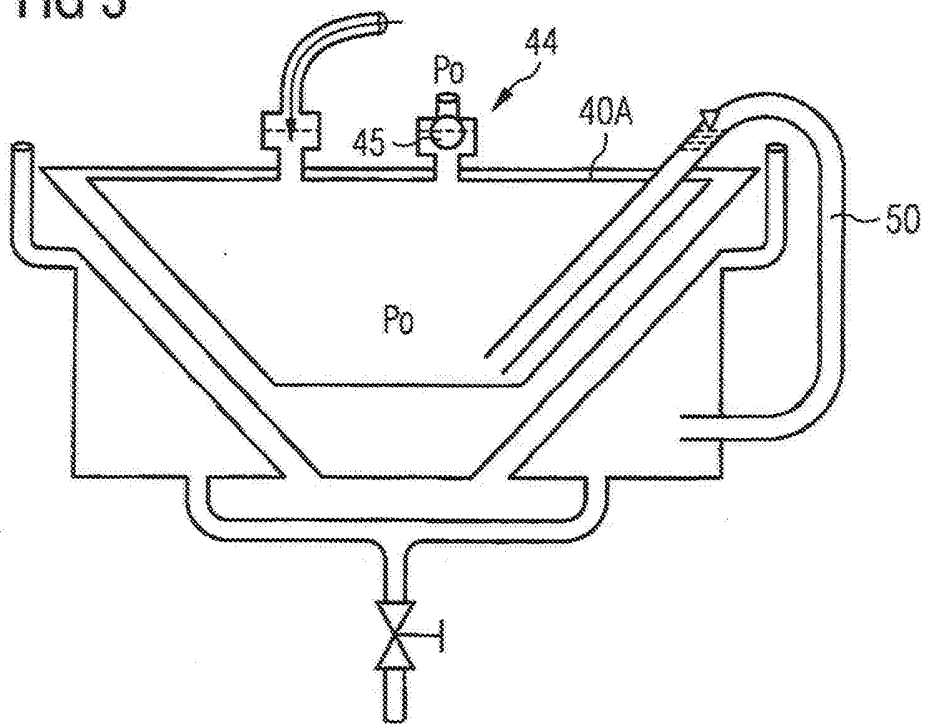


FIG 3



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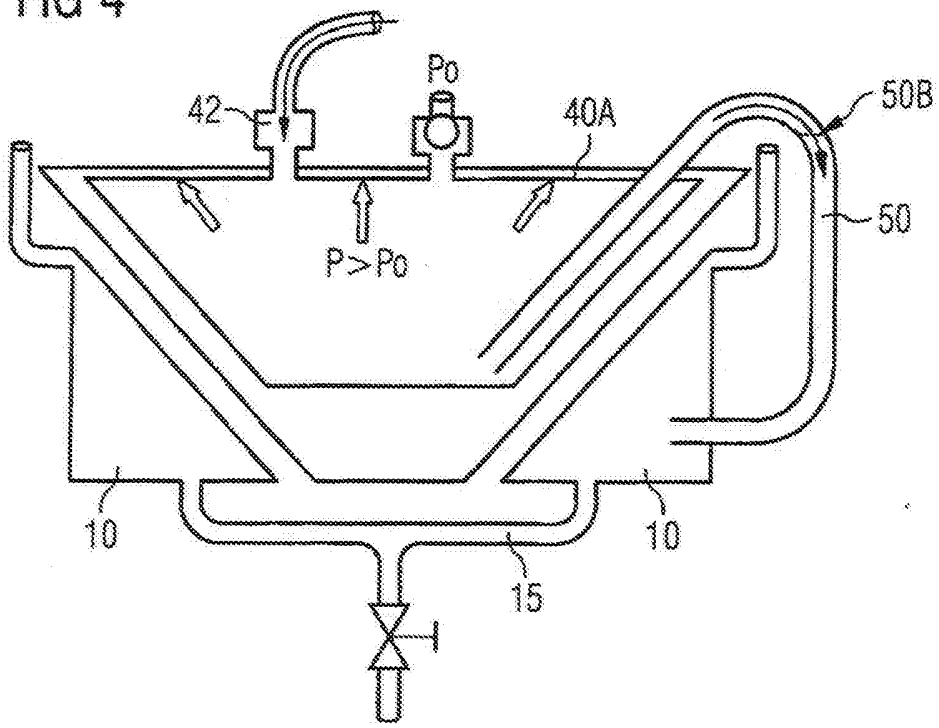


FIG 5

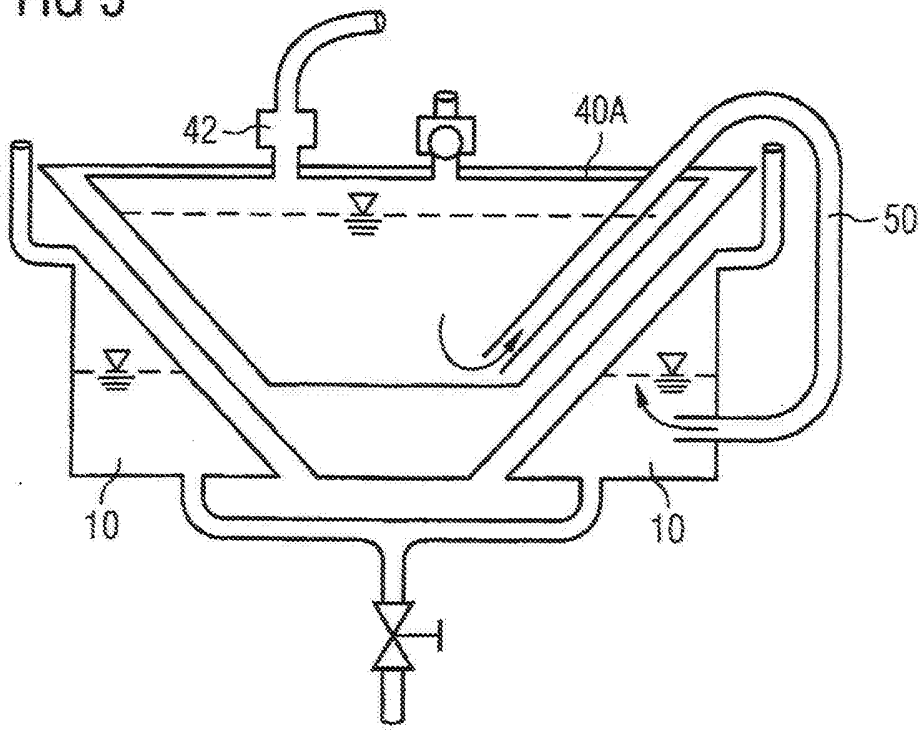


FIG 6

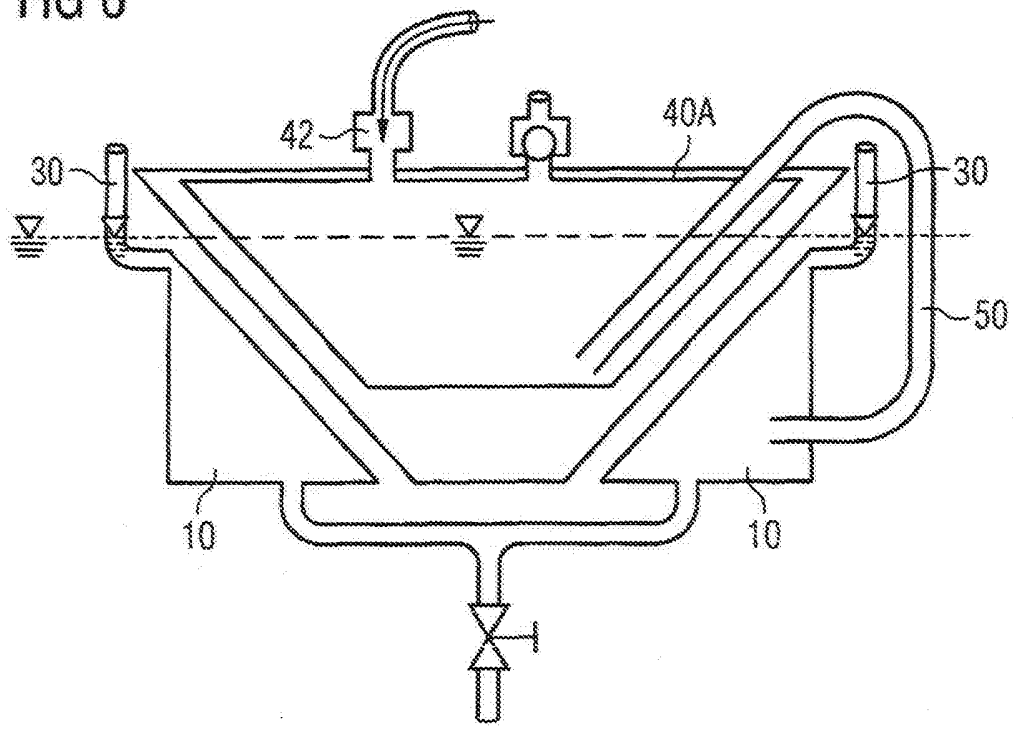


FIG 7

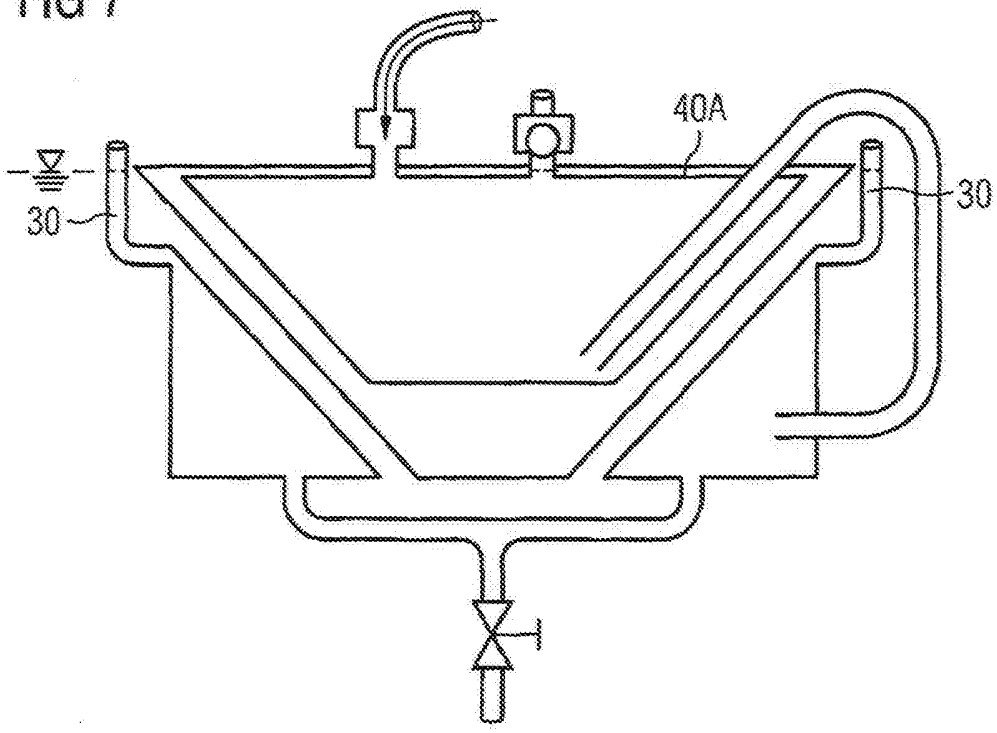


FIG 8

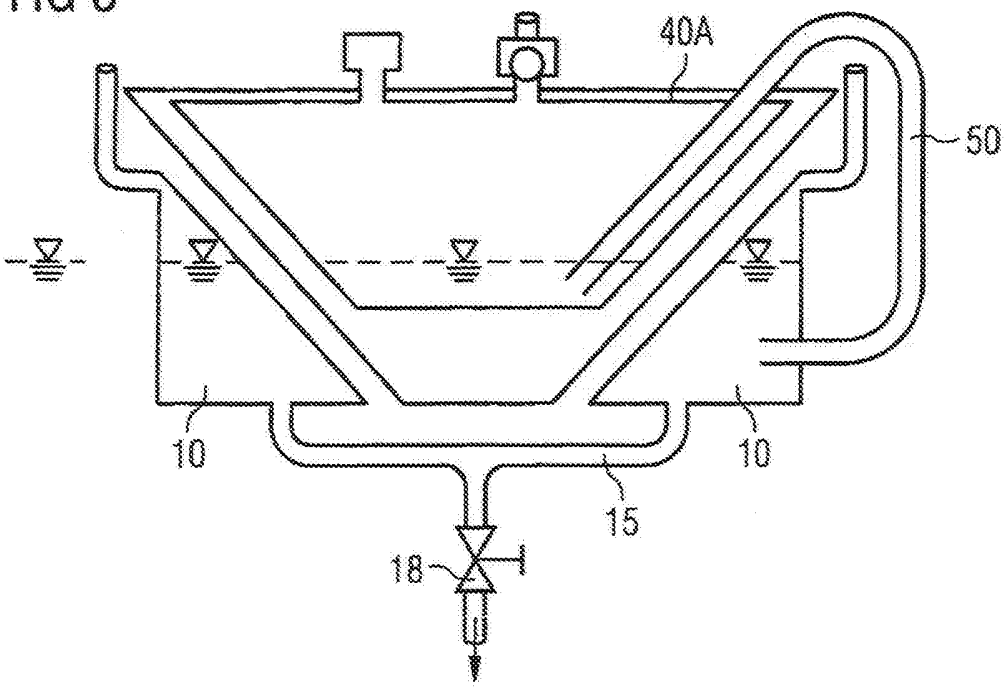
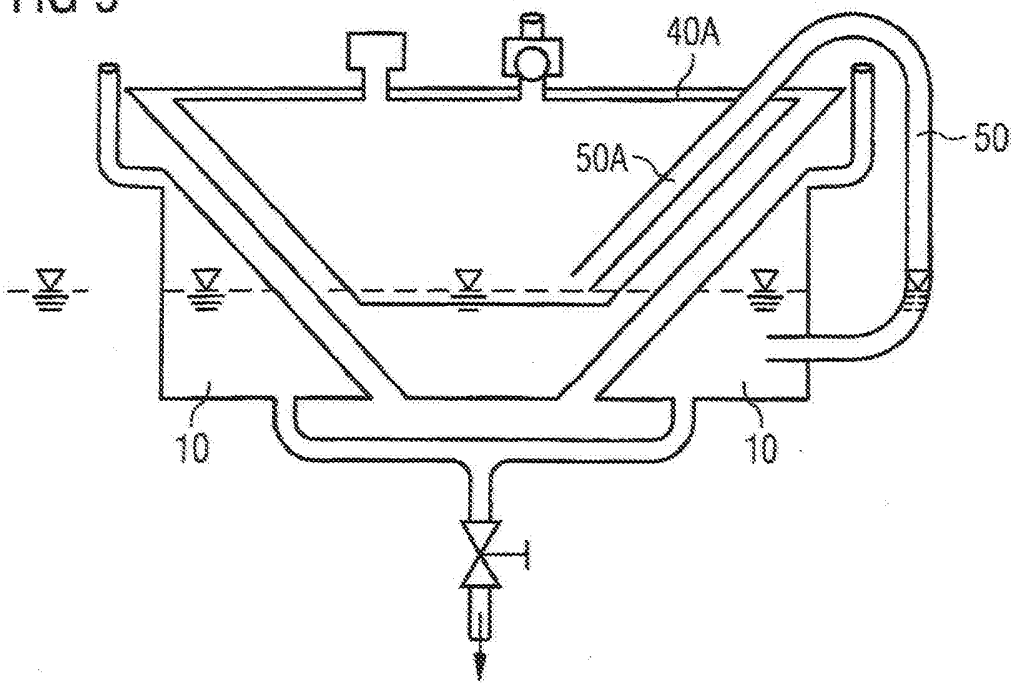


FIG 9



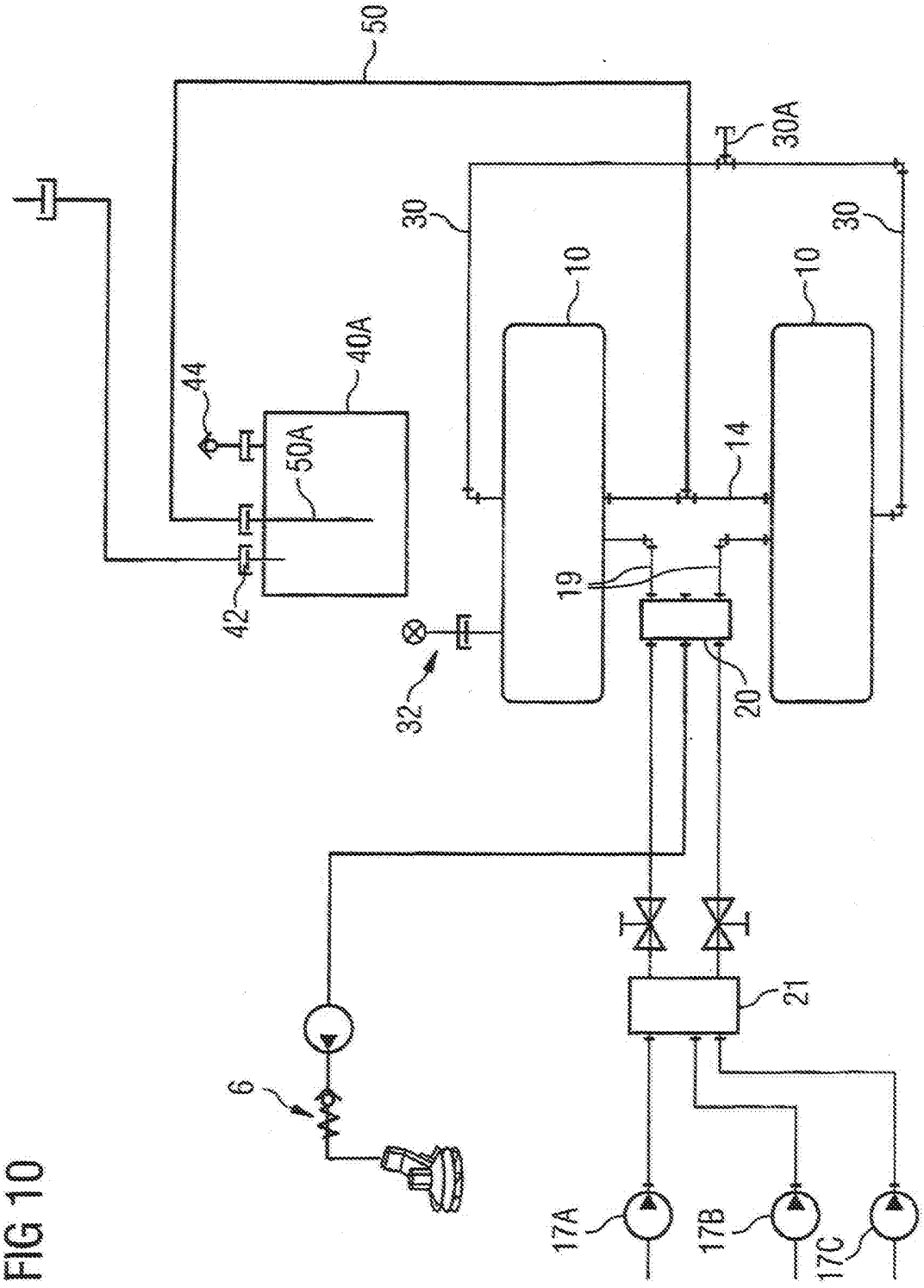


FIG 10

FIG 11

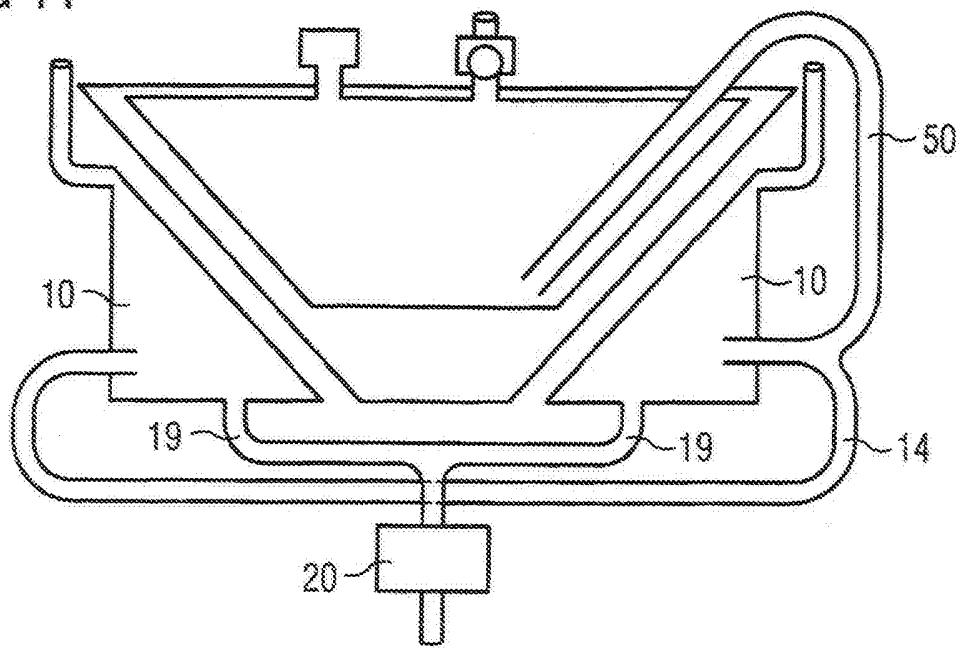


FIG 12

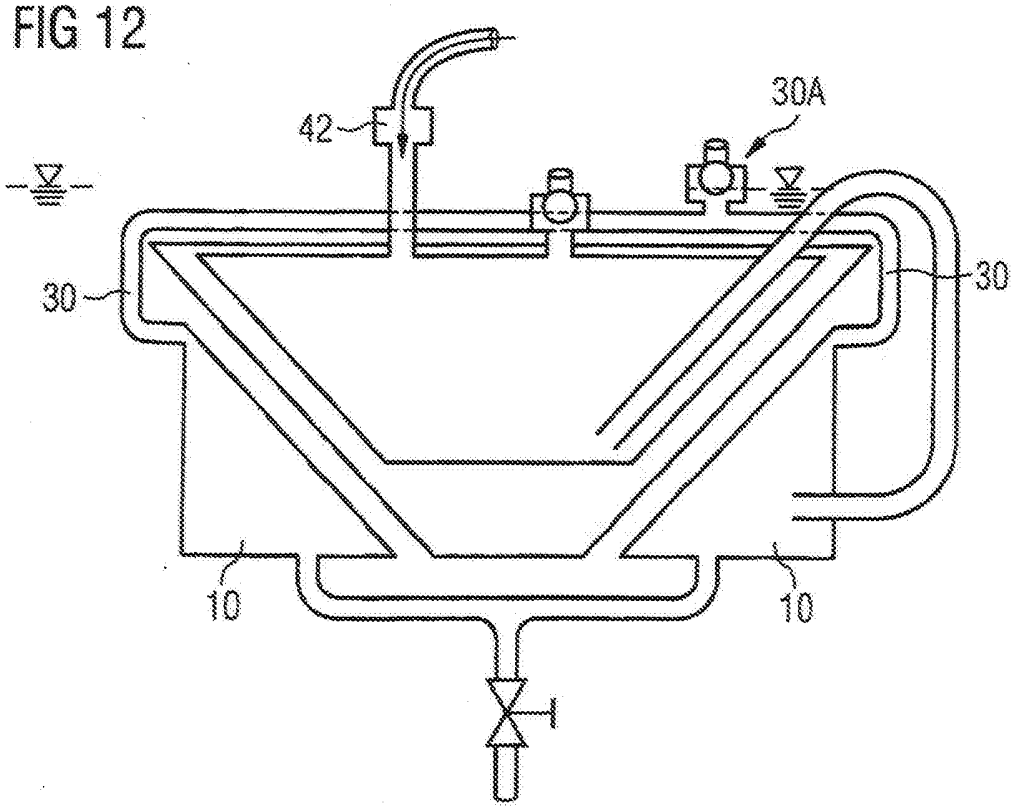


FIG 13

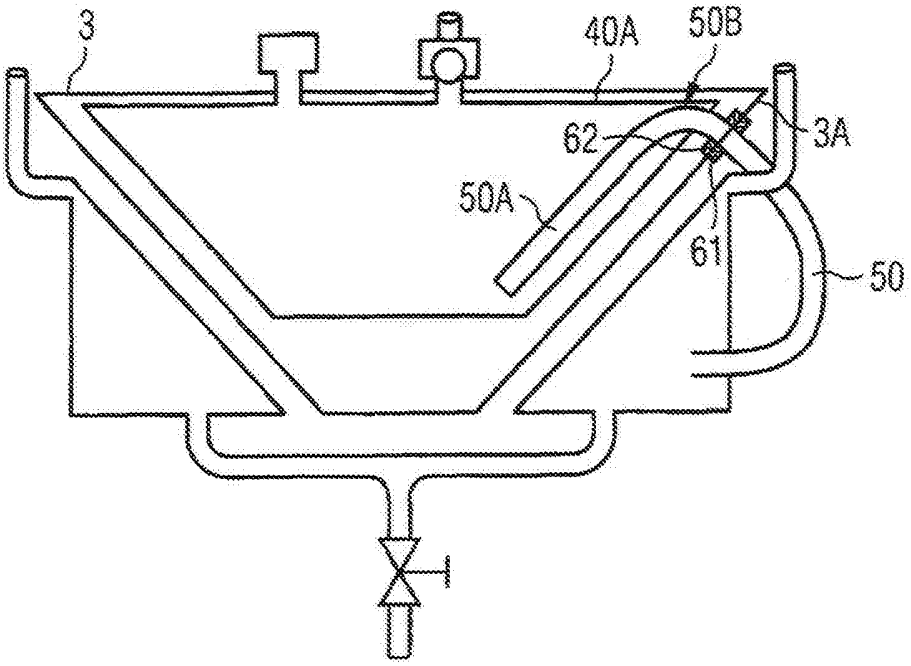


FIG 14

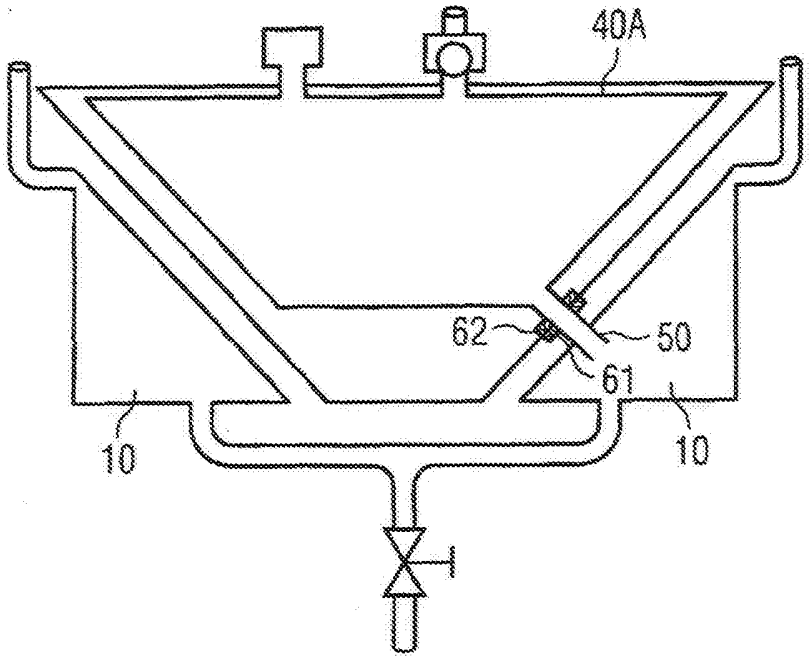


FIG 15

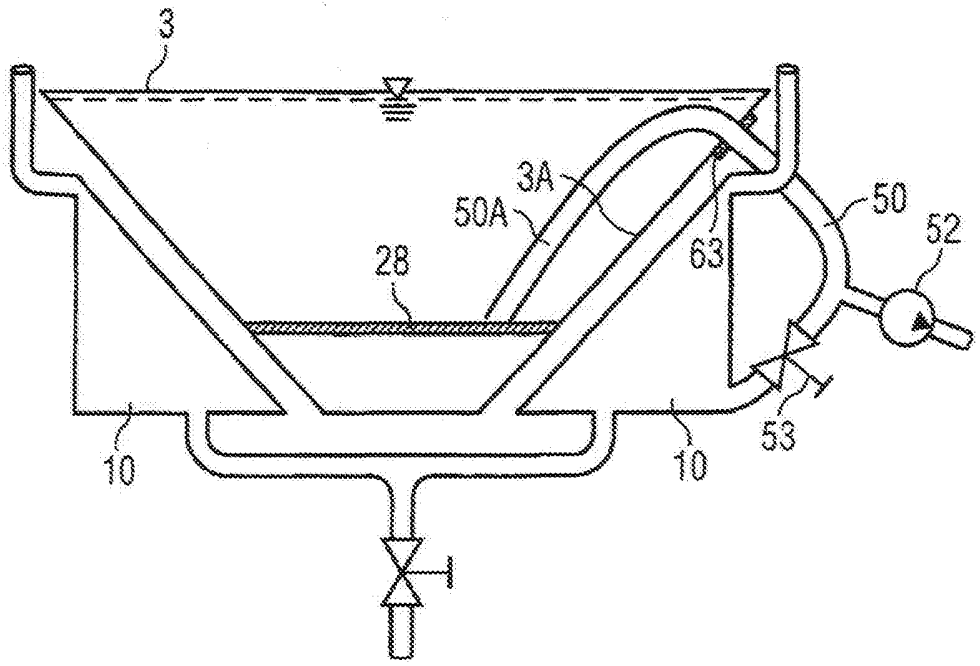


FIG 16

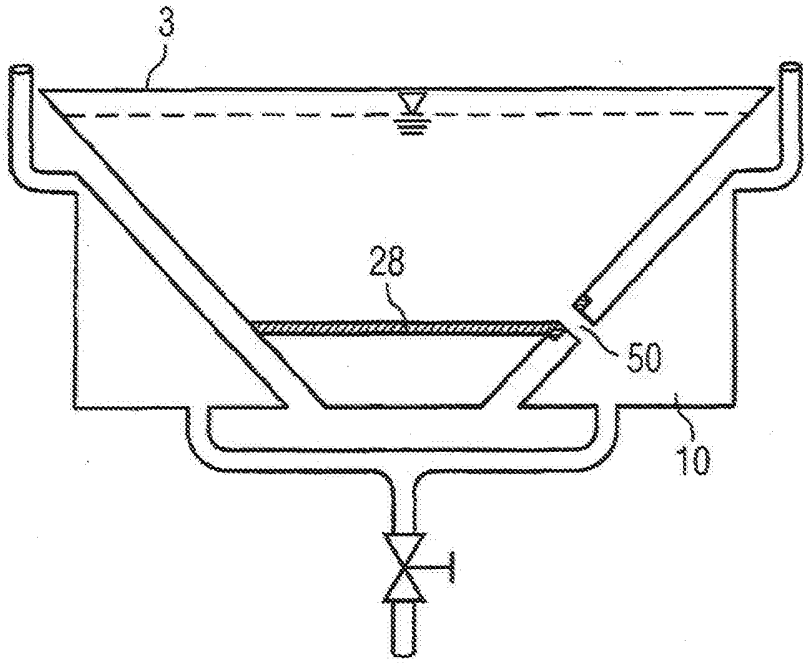


FIG 17 Prior Art

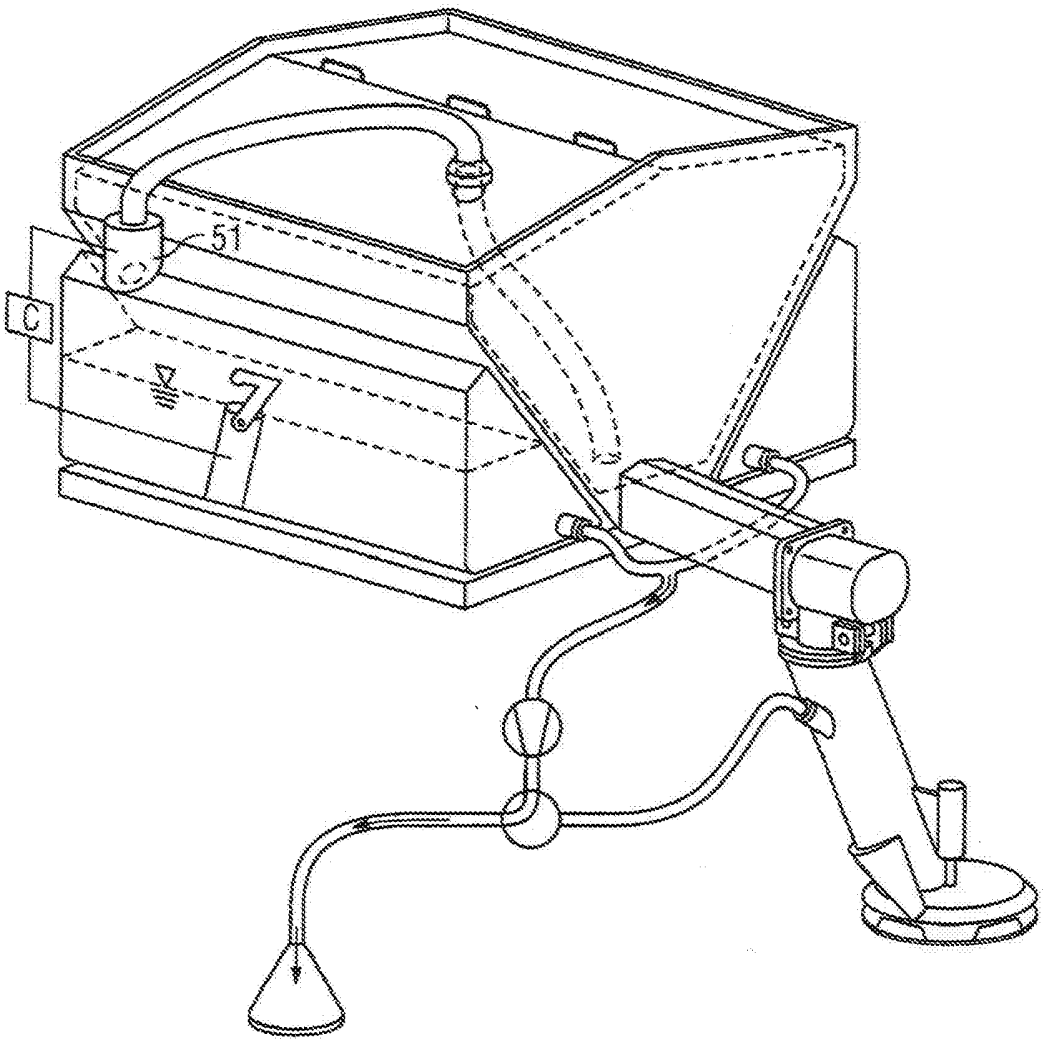


FIG 18 Prior Art