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Supply and waste disposal station for vehicles having sanitary equipment

The invention relates to a supply and waste disposal station for vehicles having sanitary equipment and a method for producing such a supply station for vehicles and a method for operating such a supply station.

Supply and waste disposal stations are needed wherever vehicles equipped with sanitary equipment, such as tour buses, railroad vehicles, motorhomes, or heavy trucks are maintained for removing wastewater from the sanitary equipment and for adding fresh water, typically drinking water, into the sanitary equipment.

Providing stationary supply and waste disposal stations for this purpose is known. Such stationary supply and waste disposal stations comprise a receiving device for removing the wastewater from the vehicle, for example implemented as a catch basin or extraction hose. The extracted wastewater is fed to the supply and waste disposal station via the extraction hose or an extraction line and from there into a wastewater ground line laid in the ground, and fed via said line to a public or private wastewater disposal and treatment network. The fresh water is fed in a frost-proof manner to the supply and waste disposal station in the same manner via a freshwater ground line laid at a sufficient depth, fed from there to the vehicle via a freshwater supply hose, often kept at hand as a wound-up hose and thus able to be pulled out and connected or inserted into a filling fitting, depending on the location of the freshwater supply connection of the vehicle relative to the supply and waste disposal station.

The supply and waste disposal of vehicles must be reliable and possible at both high and low outdoor temperatures, without unintentionally losing wastewater or fresh water to the surrounding soil. It is also necessary to be able to perform the supply and waste disposal quickly for the least possible downtime. Particularly for supplying and disposing of waste from railway vehicles, but also for supplying and disposing of waste from tour buses at locations having high traffic volume, it is therefore necessary to be able to perform supply and waste disposal simultaneously for a plurality of vehicles.

Providing mobile supply and waste disposal stations is known, wherein said stations are displaceable and therefore can be located flexibly. The storage capacity for fresh water and wastewater, however, is limited and is also in danger from frost when outdoor temperatures are low.

To prevent said problems, it is known to provide a plurality of stationary supply and disposal stations at locations spaced apart from each other and able to be operated simultaneously. This can fundamentally ensure rapid supply and waste disposal of a plurality of vehicles at the same time. For safe supply and waste disposal, however, particularly at cold temperatures, it is necessary in this case to cast a foundation for the supply and waste disposal station in order to lay the freshwater ground line and the wastewater ground line therein. Due to the typical design for wastewater removal as gravity drainage, the connection point of the wastewater ground line must be set individually from station to station, making it necessary to individually plan each foundation of a supply and waste disposal station and produce each foundation. This makes the installation expensive.

DE 20 2014 003 479 U1 discloses a water filling device for drinking water tanks in vehicles, comprising an underground shaft, a hose coiler for receiving a hose, a first end thereof being fluidically connected to the water infeed connection, and a second end thereof comprising a water outlet opening, the hose coiler being rotatably supported on a coiler frame, the coiler frame being guided such that said frame can be displaced out of an operating position into a maintenance position.

US 4 332 681 A discloses a connecting station between a drinking water network and a mobile sanitary unit. Said station also provides a connection between the mobile sanitary unit and a wastewater system. The station comprises a main part buried in the ground and flush with the ground surface. Another part protrudes out of the ground. The station comprises quick couplings for connecting to the sanitary unit. A wastewater system is provided in the bottom part of the station and a drinking water line in the top part.

DE 20 2006 012 003 U1 discloses a supply and waste disposal unit for camping sites and the like, comprising a foundation mounted in the ground and a superstructure comprising the connections for supplying various media and for disposing of process water, wherein the foundation and superstructure need not be implemented separately from each other, but rather can be implemented as a single part. The unit is lightweight, strong, easily adapted, largely preassembled, and easily accessible in design as a combination; enables simple, inexpensive, frost-proof infeeding and shutting off of fresh water; and provides a plurality of connections for fresh water, process water, power, telecommunications, and/or data, for example.

DE 100 18 711 A1 discloses a supply and waste disposal unit for camping sites having a column-shaped body on which a supply device for power and/or fresh water and a disposal device for grey water are provided. The supply and waste disposal unit is characterized in

that excrement can also be disposed of, wherein the supply device and the disposal device lead from a ground shaft into the column-shaped body, and wherein an insulating cover is disposed in the ground shaft and is closer to the ground surface than a main valve of the supply device and a siphon of the disposal device.

Against the above background, the object of the present invention is to provide a supply and waste disposal station making the simultaneous and safe supply and waste disposal of vehicles possible in a more economically efficient manner.

The object is achieved according to the invention by a method for producing a supply and waste disposal station of the type indicated above, characterized by the steps: producing a foundation base having a wastewater line leading into the foundation base, a freshwater line leading out of the foundation base, a connection interface comprising a connection for the wastewater line leading into the foundation base and a connection for the freshwater line leading out of the foundation base, a wastewater ground line leading out of the foundation base and having a wastewater ground line connection located outside of the foundation base, and a freshwater ground line leading into the foundation base and having a freshwater ground line connection located outside of the foundation base; placing the manufactured foundation base into an excavation in the ground; connecting a freshwater ground line opening into the excavation to the freshwater ground line connection; and connecting a wastewater ground line opening into the excavation to the wastewater ground line connection, the wastewater line leading into the foundation base being connected to the wastewater ground line leading out of the foundation base by means of a shut-off valve, the wastewater ground line leading out of the foundation base being connected to a vacuum line, and the wastewater ground line leading into the foundation base opening into an intermediate storage tank disposed in the foundation base and implemented as a buffer storage in order to be able to receive wastewater for a particular period of time or up to a particular filling volume, said wastewater then being able to be drained out of the intermediate storage tank via the vacuum-actuated wastewater ground line at a later point in time in a suction procedure to be performed for a limited period of time, and the connection between the wastewater line leading into the foundation base and the wastewater ground line leading out of the foundation base being made by means of a switchable two-way valve, particularly being switched as a function of a fill level in the intermediate storage tank.

According to the invention, a foundation base is prefabricated and said prefabricated foundation base is placed in a corresponding pit. The necessary connections for a wastewater ground line and a freshwater ground line are present at the foundation base. The foundation base further comprises corresponding connections for fresh water and wastewater of an above-ground component of a supply and waste disposal station to be built thereon or can be implemented integrally to such a component as a supply and waste disposal station. In the latter case, the foundation base and the above-ground component form a compact unit for placing in a prepared pit and being anchored therein and then protruding out of said pit.

The freshwater ground line leading into the foundation base and the wastewater ground line leading out of the foundation base are preferably disposed on a side wall of the foundation base. In addition, a service water ground line leading into the foundation base can also be provided and also disposed on the side wall.

By means of the method according to the invention, the foundation can be prefabricated, avoiding individual design and drying times, in that the foundation is produced as a prefabricated component, for example as a prefabricated concrete element or steel structure element or made of a material mixture, and can be transported to the installation site as a prefabricated component. The production of the foundation can thereby be performed more cost-effectively and the production time is also reduced, as production is no longer necessary at the site and the drying time does not delay construction at the site.

It is fundamentally possible to provide connections for the wastewater ground line at various heights on the prefabricated foundation base, in order to be able to connect a plurality of such identical, prefabricated foundation bases to each other such that drainage by means of a downward slope from station to station is made possible for the wastewater. It is further possible to prefabricate foundation bases of different types, differing by the height of the connection point for the wastewater ground line, in order to thereby implemented a downward slope for the wastewater in turn. According to the invention, the wastewater ground line is implemented as a line subjected to vacuum in order to thereby discharge the wastewater in a vacuum-driven manner, whereby a more flexible design for routing the wastewater ground line is made possible, as a constant down ward slope no longer needs to be provided, as is the case for a gravity line. In many applications, a wastewater line subjected to vacuum is provided and must be laid in the ground, for example in order to extract the wastewater out of the vehicle by means of said vacuum line. In addition to said vacuum-operated wastewater line, a wastewater line having a downward slope is often additionally provided in order to be able to receive and discharge wastewater occurring in the region of the supply and waste disposal station in a gravity line, for example having an open catch basin, but the prefabricated foundation base provided according to the invention

opens up the fundamental possibility of performing the discharge of all wastewater occurring at the supply and waste disposal station via the wastewater line operated by vacuum. All of the wastewater occurring in the foundation base can thereby be discharged via the vacuum wastewater ground line and there is no need for routing a gravity ground line.

A connection in the sense of the invention is fundamentally understood to mean that such can be a detachable or non-detachable connection, for example a connection for a pipe thread, a connection for a press fit by means of a corresponding fitting, a connection for a bayonet coupling, or a connection for a pipe by means of brazing or welding or adhesive.

By means of the method according to the invention, a connection is provided between the wastewater line leading into the foundation base (typically a gravity line) and the wastewater ground line leading out of the foundation base (typically a vacuum line) and can be shut off by means of a shutoff valve. This makes it possible to implement gravity-powered drainage of wastewater out of a wastewater line leading into the foundation base, for example from a catch basin, a gravity line, or a wastewater extraction line subjected to vacuum, or the like, and to discharge said wastewater out of the foundation base via the wastewater ground line by means of vacuum. In order to prevent permanent loss of the vacuum or a permanent air infeed into the wastewater ground line subjected to vacuum, a shut-off valve must be provided to this end, preventing a permanent connection between the wastewater ground line subjected to vacuum and an opening to the surrounding area. Said shut-off valve can always be opened for the purpose when the wastewater is discharged via the wastewater ground line subjected to vacuum, wherein said actuating of the shut-off valve is triggered automatically, for example by a fill level sensor, or manually by an operator when said operator wishes to perform an extraction.

In the method according to the invention, a wastewater tank is provided in the foundation base, in which wastewater fed in via the wastewater line leading into the foundation base can be intermediately stored. The wastewater tank can, for example, be provided by a pipe segment having an enlarged pipe cross section and comprising in this manner a sufficient holding volume for intermediate storage for a limited time. Said wastewater tank serves as buffer storage and receives wastewater over a particular period of time or up to a particular fill level, and said wastewater can then be discharged at a later time, in an extraction process to be performed in a limited time, out of the intermediate storage tank of the foundation base via a vacuum-actuated wastewater ground line. Said construction makes it possible to combine in a particularly inexpensive form the prefabricating of the foundation base and an additional functionality, in that a corresponding intermediate storage tank is provided during prefabricating, and the necessity of gravity-fed discharge of the wastewater via the foundation base can be entirely avoided. The intermediate storage tank in the foundation

base thereby makes it possible to perform the extraction of the wastewater out of the foundation base at time intervals by briefly applying a vacuum, so that permanently maintaining the vacuum or permanent loss of vacuum can be avoided.

The method according to the invention can be refined by the following steps: mounting an operating station to the foundation base, and connecting a freshwater line disposed within the operating station to the connection for the freshwater line leading out of the foundation base, and connecting a wastewater line disposed within the operating station to the connection for the wastewater line leading into the foundation base. According to the present embodiment, the implementation of the supply and waste disposal station has the design of a foundation base and an operating station mounted thereon. In this respect, the foundation base can first be installed in the ground and mounted therein in order to be able to perform the load-bearing function, and the operating station can then be mounted on or to the foundation base. In the course of said mounting, the necessary connections must also be produced, particularly the freshwater line and the wastewater line, optionally implemented as a wastewater line subjected to vacuum, or as a wastewater line subjected to vacuum in addition to a gravity line, that is, a wastewater line actuated by gravity. For this purpose, the foundation base provides corresponding connections implemented as detachable or non-detachable pipe connections, just as the connections for the corresponding ground lines. Said connections can fundamentally be provided in a defined connection field, a connection interface, for example disposed on the top side of the foundation base. The connections can also be provided at different locations and in different orientations, for example also on one side of the foundation base. This can be advantageous for particular arrangements and local restrictions.

It is further preferable that the method is refined in that the wastewater connection is connected to a vacuum wastewater line. Connecting the wastewater connection to a vacuum wastewater line makes it possible to discharge the wastewater by means of vacuum and therefore avoids the necessity to discharge the wastewater by means of gravity and to provide a corresponding downward grade, optionally additional lifting systems, or the like for this purpose. The vacuum wastewater line must be appropriately designed and approved for this purpose in order to provide a vacuum. The vacuum can be provided by a central vacuum source, for example a vacuum pump, by means of which a plurality of supply and waste disposal stations can be subjected to vacuum in order to extract the wastewater thereof.

According to a further preferred embodiment, the method is refined by the steps: connecting the freshwater line leading out of the foundation base to a first connection of a drainage valve, connecting a second connection of the drainage valve to a freshwater discharge

opening, connecting a third connection of the drainage valve to the wastewater line leading into the foundation base, wherein the drainage valve is implemented for switching back and forth between a first valve switch setting in which the first and the second connections are connected to each other and the third connection is blocked, and a second valve switch setting in which the second and third connections are connected to each other and the first connection is blocked. According to the present embodiment, the foundation base is produced such that complete emptying of the part of the freshwater line leading out of the foundation base and endangered by frost is made possible. This is generally advantageous when said freshwater line is not intended to retain water therein after use for the purpose of frost protection, but rather should be emptied, that is, ventilated. The residual water from the freshwater line, particularly comprising the part of the line downstream of the drainage valve, but optionally also comprising part of the line not in the frost-proof ground region, and the above-ground part of the line including any freshwater hose provided, is drained off to this end by means of a corresponding valve device. Said draining is done into the wastewater line and leads into the foundation base. The corresponding valve device can be implemented as a 3/2-way valve, for example, but can also be implemented by two separate 2/2-way valves or by other valve arrangements. A protective device (system cut-off) can also particularly be intermediately connected here, as is required in many countries between wastewater and drinking water, and must meet Category 5 of DIN EN 1717, for example.

A further consideration of the invention is a method for operating a stationary supply station for vehicles, having the features of the independent claim 5. Said method has the following steps: discharging, particularly extracting wastewater from a vehicle wastewater tank, draining the wastewater via a wastewater line leading into a foundation base, intermediately storing quantities of water from return feed water, purge water, or drip amounts within the foundation base, discharging the wastewater and the intermediately stored quantity of water via a wastewater ground line leading out of the foundation base. According to the present consideration of the invention, a specific operating manner of a supply and waste disposal station for vehicles having sanitary equipment is provided, characterized in that an intermediate storage tank is provided as an intermediate storage area in a prefabricated foundation base in an economically efficient manner, and it is thereby made possible that quantities of water from return feed water from the filling hose, from hygienic purging, and/or drip amounts in the region of the supply and waste disposal station are intermediately stored and consequently discharged at intervals via the wastewater ground line. According to the invention, the intermediately stored water is not discharged from the supply and waste disposal station under gravity but rather is extracted by applying a vacuum. To this end, the water or wastewater is intermediately stored in the intermediate storage tank in the foundation base and an extraction procedure by means of vacuum is initiated by a

fill level sensor at a particular fill level. By means of said vacuum, the wastewater is discharged out of the intermediate storage tank and away from the supply and waste disposal station via the wastewater ground line. The invention can be implemented, for example, so that wastewater fed into the foundation base via a gravity line or return feed water arising from drainage is temporarily intermediately stored in the intermediate storage tank, but wastewater fed into the foundation base via a vacuum wastewater line is not intermediately stored, but rather directly discharged out of the foundation base via a wastewater ground line subjected to vacuum. For such an extraction procedure via the vacuum wastewater ground line, wastewater intermediately stored in the intermediate storage tank or other water such as return feed water can also be extracted and discharged out of the foundation base via the wastewater ground line. Said extraction procedure can fundamentally be triggered by a single fill level sensor defining and capturing the maximum permissible level in the intermediate storage tank in order to then perform extraction controlled according to a time sequence, for example. However, refined solutions for extraction control can also be provided, for example an additional bottom fill level sensor detecting a low level in the intermediate storage tank and serving for terminating the extraction procedure, in order to thereby avoid potentially extracting under time control for too long a time and consequently extracting air, or extracting for too short a time and consequently insufficiently emptying the intermediate storage tank.

The method according to the present consideration can be further refined by the steps: feeding fresh water into the foundation base via a freshwater ground line, feeding the fresh water out of the foundation base to the vehicle via a freshwater line, draining fresh water remaining in the freshwater line out of the freshwater line into the intermediate storage tank in the foundation base after ending the feeding of fresh water to the vehicle. According to the present embodiment, complete emptying into the intermediate storage tank of the fresh water remaining in the freshwater line in the region at risk of frost after filling is performed, whereby the freshwater line in the region at risk of frost is automatically emptied, that is, ventilated, and then no water is present therein when the supply and waste disposal station is not in operation. Said fresh water is also collected in the intermediate storage tank and can therefore be discharged from the supply and waste disposal station under vacuum via the wastewater ground line.

Connecting the freshwater line to the intermediate storage tank can thereby be done using a corresponding valve device in order to interrupt the feeding of fresh water out of the freshwater ground line to the freshwater line when the complete emptying of the freshwater line into the intermediate storage tank is taking place. This can, in turn, as previously explained, be implemented as a 3/2-way valve or as two separate 2/2-way valves. Other embodiments are also possible, for example, by using a 3/3-way valve, a purging function of

the intermediate storage tank by means of the freshwater ground line can also be implemented in order to purge the intermediate storage tank in the foundation base with fresh water at regular intervals and thereby to swirl up and subsequently extract deposits therein.

The operating method is further refined by the steps: feeding wastewater into the foundation base under gravity, intermediately storing the wastewater in an intermediate storage tank in the foundation base, extracting the wastewater from the intermediate storage tank in the foundation base via an extraction line having vacuum applied thereto, and discharging the wastewater extracted from the intermediate storage tank via a wastewater ground line subjected to vacuum. According to the operating method, the wastewater is fed into the intermediate storage tank in the foundation base under gravity, whereby the wastewater can be captured by means of a trough or residual amounts can be received in a simple manner by means of a catch basin at the supply and waste disposal station. Said wastewater fed under gravity is intermediately stored within the foundation base in an intermediate storage tank and then fed out of the intermediate storage tank at regular or irregular time intervals via a wastewater ground line subjected to vacuum. Wastewater is understood here to also include any residual amounts of water.

A further consideration of the invention is a stationary supply station for vehicles, comprising: foundation base having a wastewater line leading into the foundation base, a freshwater line leading out of the foundation base, a connection interface comprising a connection for the wastewater line leading into the foundation base and a connection for the freshwater line leading out of the foundation base, a wastewater ground line leading out of the foundation base and having a wastewater ground line connection located outside of the foundation base, and a freshwater ground line leading into the foundation base and having a freshwater ground line connection located outside of the foundation base.

The supply station for vehicles according to the invention is implemented for performing fresh water supply procedures for the vehicle and/or waste disposal procedures for wastewater out of the vehicle, and consequently for completely supplying and disposing of waste for sanitary equipment installed on board the vehicle. The stationary supply station is characterized by a foundation base comprising a connection interface for a wastewater ground line leading into the foundation base and a freshwater line leading out of the foundation base. To this end, two separate connections are present on the foundation base and can be implemented as detachable or non-detachable connections, for example as a flange connection in the form of a threaded connection, bayonet connection, crimp connection, brazing connection flange to be brazed or welding connection flange to be welded, and the like.

Unlike previously known solutions, wherein an existing wastewater ground line and freshwater ground line are fed into a corresponding foundation base on site and cast therein, the foundation base according to the present invention is therefore a prefabricated foundation base and can therefore be produced of concrete or steel in advance, before being placed in the ground at the installation site. The foundation base can particularly be a transportable component and correspondingly have a weight of less than 2.5 t, particularly less than 1 t, for example weighing between 200 kg and 500 kg, in order to be correspondingly transportable and installable at site. The foundation base further comprises connections for a freshwater line leading out of the foundation base and a wastewater line leading into the foundation base. A corresponding part of the supply and waste disposal station installed above ground can be connected to said connections in order to feed wastewater line extracted from a vehicle into the foundation base via said above-ground part, and in order to feed fresh water to be supplied to the vehicle out of the foundation base into said above-ground part and from there into the vehicle. Said connections can also be implemented in the same manner as detachable or non-detachable connections, as described above.

The supply station is refined by an intermediate storage tank disposed in an interior space of the foundation base. By providing an intermediate storage tank in the foundation base, the prefabrication is combined in an advantageous manner with additional functionality and simplification of the installation of a supply station. To this end, reference is made to the above explanations with respect to intermediately storing wastewater or residual water in the foundation base, to discharging the wastewater or residual water by means of a wastewater ground line subjected to vacuum as is thereby made possible, and to eliminating gravity-powered discharge of the wastewater or residual water out of the foundation base as is thereby made possible.

The supply station is further refined in that the intermediate storage tank comprises a sensor device for capturing a level within the intermediate storage tank and triggering discharge of wastewater out of the intermediate storage tank via the wastewater ground line leading out of the foundation base when a predetermined level is reached in the intermediate storage tank. In this respect, as well, reference is made to the level control of the wastewater discharge out of the intermediate storage tank, as described above.

It is further preferable if the sensor device is implemented for interacting with a switching device and the switching device is implemented for actuating a valve fluidically connecting the intermediate storage tank to the wastewater ground line leading out of the foundation base, wherein the wastewater ground line leading out of the foundation base and the valve is implemented for extracting the wastewater from the intermediate storage tank under vacuum. According to the present embodiment, a corresponding switching device is present,

preferably implemented as an electronic switching device, in order to initiate automatic discharging of the wastewater out of the intermediate storage tank via the wastewater ground line by means of vacuum, and to prevent undesired air intake into the wastewater ground line and the associated loss of vacuum effect. To this end, a corresponding shut-off valve is actuated and opened automatically only when performing the extraction procedure.

The supply station can be further refined in that the freshwater line leading out of the foundation base is connected to a first connection of a drainage valve, a second connection of the drainage valve is connected to a freshwater discharge opening, and a third connection of the drainage valve is connected to the wastewater line leading into the foundation base via a drainage line, wherein the drainage valve is implemented for switching back and forth between a first valve switch setting in which the first and the second connections are connected to each other and the third connection is blocked, and a second valve switch setting in which the second and third connections are connected to each other and the first connection is blocked. According to the present embodiment, the supply station is refined such that a drainage valve is provided and can be disposed on the foundation base in order to thereby be able to drain a freshwater line running in the region at risk of frost and to feed said drained fresh water into the foundation base. The drained fresh water can be fed into a wastewater line running in the foundation base or can be intermediately stored in an intermediate storage tank in the foundation base, as described above. The connection between the drainage line and the wastewater line can be direct and can be implemented, for example, as a connection in the foundation base or outside of the foundation base. The connection can also be indirect, for example in that the drainage line and the wastewater line open into an intermediate storage tank thus indirectly producing the connection. With respect to said equipping of the supply station with a drainage valve and a corresponding drainage line routing, reference is made in turn to the above description of the corresponding functionality and the preferred embodiments thereof.

Finally, the supply station according to the invention can be further refined in that the wastewater line leading into the foundation base can be a wastewater line subjected to vacuum, the wastewater ground line leading out of the foundation base is a wastewater ground line subjected to vacuum, a second wastewater line leading into the foundation base is provided and implemented for guiding wastewater powered by gravity, and the wastewater ground line leading out of the foundation base is connected to the second wastewater line leading into the foundation base via a switchable shut-off valve for extracting wastewater fed into the foundation base via the second wastewater line leading into the foundation base. According to the present embodiment, the foundation base designed according to the invention makes it possible to extract wastewater from a vehicle under vacuum, that is, to operate the supply and waste disposal station for extracting wastewater

from a vehicle under vacuum. In addition to said wastewater extraction subject to vacuum, it is also made possible to drain wastewater from the supply and waste disposal station under gravity. To this end, a corresponding gravity-powered wastewater line is provided at the foundation base. The foundation base consequently comprises a total of at least three wastewater connections, a wastewater ground line connection on one hand for a wastewater line subjected to vacuum and a wastewater connection on the other hand for a wastewater line subjected to vacuum and able to be connected to the vehicle for extracting wastewater. Said wastewater line subjected to vacuum can be directly connected to the wastewater ground line connection and can be blocked or released by means of a corresponding valve in order to control the extraction procedure. A gravity-powered wastewater connection is further provided and enables gravity-powered feeding of wastewater into the foundation base. The connection between said wastewater line and the wastewater ground line subjected to vacuum can be implemented, for example, such that the gravity-powered wastewater connection opens into an intermediate storage tank within the foundation base and the wastewater can be extracted out of said intermediate storage tank by means of the wastewater ground line subjected to vacuum out of the foundation base.

A preferred embodiment is described using the attached figures. Shown are:

Fig. 1 a perspective view of a foundation base according to the invention of a supply and waste disposal station,

Fig. 2 a side view of the foundation base,

Fig. 3 a front end view of the foundation base according to Fig. 1,

Fig. 4 a rear end view of the foundation base according to Fig. 1, and

Fig. 5 a side section view of the foundation base having an operator control unit placed thereon.

With reference to Figures 1–4, a foundation base comprises a body formed by side walls 10, a front end wall 11, a rear end wall 12, and a top wall 13. The foundation base in the embodiment example does not comprise a bottom wall, and thus comprises an opening 14 facing toward the soil below in which said base is embedded. Penetrating rainwater can thereby seep away. In other embodiments, a bottom wall 14 can be provided in place of

the opening 14 and can be closed or have seeping openings. The side walls 10 are reinforced by a plurality of ribs. Said ribs are implemented in the embodiment example as ribs running vertically and ribs running horizontally.

The side walls, the end walls, and the top wall can be made of steel or cast of a mineral material, for example of concrete. Depending on the requirements for load-bearing capacity, said walls can also possibly be implemented of a polymer material.

Cable conduits 20a, b lead into the foundation base in the longitudinal direction at the end face. Cables can be routed through said cable conduits. The cable conduits have an opening in the interior of the foundation base or are two cable conduit segments inserted in the end faces, so that a cable introduced into the foundation base at the end face can be routed within the foundation base and routed out of the foundation base through corresponding cable conduits 20c, d, for example upwards, in order to supply energy to a device of the supply and waste disposal station mounted on the foundation base and to enable corresponding signal and data communications.

A front-side return line 30 and rear-side return line 31 are further provided on the top of the foundation base and lead into the foundation base. Said return lines are implemented at zero pressure and implement a connection at the top side to which a corresponding drainage line of a top component of the supply and waste disposal device can be connected. Said return lines can be connected to catch basins, for example, in order to drain wastewater by gravity and to be able to guide said water into the foundation base, or can be connected to valve devices in order to receive water from the lines routed at risk of frost, or to receive purge water arising in the course of purging said lines.

The non-pressurized return lines 30, 31 open into an intermediate storage tank 35a–d within the foundation base having a volume of about 50 liters. Said intermediate storage tank is formed, as is evident particularly from Figure 5, by a horizontal pipe segment 35a and three vertical pipe segments 35b–d opening therein and having large pipe cross sections. The intermediate storage tank can also receive, depending on the application, over 100 liters, preferably over 500 liters, and particularly more than 1000 liters in order to intermediately store wastewater, purge water, and water arising from drainage. The intermediate storage tank can also particularly be implemented as a tank container.

A vacuum wastewater line 40 having a corresponding vacuum wastewater line connection 41 is further present in the top side of the foundation base. A wastewater line subjected to vacuum by means of which wastewater can be extracted from a vehicle can be connected

to said vacuum line connection and fed into the foundation base via the vacuum wastewater line. Said vacuum wastewater line 40 is connected within the foundation base directly to a connection 100 disposed in the front end face for a wastewater ground line. The connection 100 for the wastewater ground line is implemented as a flange connection, for example for a pipeline connection by means of an electrically welded fitting or as a flexible pipe coupling, and enable a wastewater ground line subjected to vacuum to be connected in the frost-free region when the foundation base is placed in the ground.

The vacuum wastewater line 40 is connected to an extraction line 42 downstream of the vacuum line connection 41 in the flow direction by means of a 2/2-way valve 43. Said extraction line 42 is connected to the intermediate storage tank in the interior of the foundation base. Said connection is implemented in the embodiment example by introducing the extraction line 42 into a top side wastewater line. The extraction line 42 can particularly be implemented as a suction hose. By means of said connection, water intermediately stored in the intermediate storage tank in the foundation base can be extracted by performing an extraction procedure subjected to vacuum by opening the 2/2-way valve 43 and discharged out of the foundation base via the wastewater ground line subjected to vacuum.

A freshwater line 50 leading out of the foundation base at the top side of the foundation base is provided and comprises a freshwater line connection 51. An above-ground component of the supply and waste disposal station can be connected by means of said freshwater line such that a freshwater line or a freshwater hose there is supplied with fresh water and enables supplying a vehicle.

A non-pressurized freshwater return line 52 is connected to the freshwater line 50 upstream of the freshwater connection 51 in the flow direction. Said connection is implemented by a 3/2-way valve 53. The 3/2-way valve can feed fresh water out of the foundation base to the freshwater connection 51 in a first setting and thereby enable supplying a vehicle. In a second setting, the 3/2-way valve can drain fresh water out of the freshwater connection 51 into the freshwater return line 52 and thereby blocks the inflow of fresh water out of the foundation base. In said setting, the above-ground freshwater line can be drained and thereby made safe against frost. The 3/2-way valve can optionally provide a third setting in which fresh water is fed out of the freshwater inflow of the foundation base into the freshwater return line, and the inflow to the freshwater connection 51 is blocked. Said setting can be implemented as a purge setting.

The freshwater return line 52 opens into a return line 56 at the top of the foundation base. The return line 56 can be implemented just like the wastewater line connections 30, 31 and

open into the intermediate storage tank disposed in the interior of the foundation base. The fresh water needing to be discharged when draining is thereby intermediately stored in the intermediate storage tank and can be discharged out of said intermediate storage tank via the wastewater ground line subjected to vacuum at regular time intervals or depending on the level.

A sensor 55 is provided to this end, and is disposed as a symbol in the figure and captures the level in the intermediate storage tank. When capturing a high level, said sensor 55 triggers a sensor signal by means of which extraction of the wastewater out of the intermediate storage tank can be controlled.

In addition to the wastewater ground line 100 subjected to vacuum, a freshwater ground line connection 110 is disposed in the front end wall 11 and rests at the lowest point of the foundation base in the frost-proof ground when the foundation base is placed in the ground. Said freshwater ground line connection 110 is also implemented as a detachable or non-detachable pipe connection or pipe flange, as described above. Fresh water is fed into the foundation base via said freshwater ground line connection 110 in order to be able to feed said water out of the foundation base via the freshwater line 50.

The freshwater ground line connection 110 can be led onward to the rear end face by means of a T-branch in order to connect an opposite freshwater ground line connection thereto by means of which a further foundation base spaced apart can be supplied with fresh water. Finally, two conduits 20c, 20d are implemented at the top side and are connected to the cable conduits 20a, 20b and enable power, signal, or data cables to be led into or out of the top side of the foundation base.

According to the invention, a foundation base such as the foundation base according to the invention described above, can be produced in advance, remote from the installation site, and then transported to the installation site. The prefabricated foundation base is then placed in the ground and is connected by means of the connections provided thereon to the ground lines and to the lines of the above-ground component of the supply and waste disposal station leading upward. The above-ground component of the supply and waste disposal station is simultaneously mounted on the foundation base and thereby securely erected.

The foundation base having the intermediate storage tank present therein can thereby be operated particularly such that gravity-fed wastewater is intermediately stored in the foundation base in an intermediate storage tank and fresh water discharge from the freshwater

line by draining the freshwater line after a filling procedure in order to provide frost protection is also discharged into said intermediate storage tank. Said discharge is also gravity-powered. The level in the intermediate storage tank is then monitored by a sensor device, so that when a maximum level is reached, an extraction procedure via a wastewater line subjected to vacuum can be initiated. Said wastewater line subjected to vacuum can be the wastewater ground line subjected to vacuum, by means of which wastewater can also be extracted out of a vehicle through the foundation base by means of vacuum.

The fundamental structure of a supply device according to the invention can be seen in Figure 5. A top-side operator control unit O is mounted on the foundation shelf E placed in the ground and is supported by said foundation shelf E. The operator control unit O is installed on the foundation shelf E, typically detachably, by means of a screwed connection having a plurality of screws. The foundation shelf E and the operator control unit O are separated from each other along a terrain line T indicating the terrain surface.

The intermediate storage tank formed by the pipe segments 35a–d is disposed within the foundation shelf E The pipe segments 35b–d facing upward are disposed flush with the wastewater line connection 30, 31 and the return line 56 and are fluidically connected to the same.

Data and power lines are routed through the conduits 20a, b and supply a control unit S in the above-ground operator control unit.

P A T E N T K R A V

1. Fremgangsmåde til fremstilling af en stationær forsyningsstation til køretøjer, med trinene:

- at fremstille en fundamentsokkel med
  - en ind i fundamentsoklen førende spildevandsledning (40),
  - en ud af fundamentsoklen førende friskvandsledning (50),
  - en tilslutningsgrænseflade, som omfatter en tilslutning (41) til den ind i fundamentsoklen førende spildevandsledning (40) og en tilslutning (51) til den ud af fundamentsoklen førende friskvandsledning (50),
  - en ud af fundamentsoklen førende spildevandsjordledning med en uden for fundamentsoklen liggende spildevandsjordledningstilslutning (100),
  - en ind af fundamentsoklen førende friskvandsjordledning med en uden for fundamentsoklen liggende friskvandsjordledningstilslutning (110),
- at indsætte den fremstillede fundamentsokkel i en fordybning i jorden,
- at tilslutte en i fordybningen i jorden udmundende friskvandsjordledning til friskvandsjordledningstilslutningen (110), og
- at tilslutte en i fordybningen i jorden udmundende spildevandsjordledning til spildevandsjordledningstilslutningen (100), hvor
- den ind i fundamentsoklen førende spildevandsledning (40) er forbundet med den ud af fundamentsoklen førende spildevandsjordledning over en spærreventil, hvor den ud af fundamentsoklen førende spildevandsjordledning tilsluttes til en undertryksledning, og
- den ind i fundamentsoklen førende spildevandsledning (40) munder ud i en mellemlagertank (35a, 35b, 35c, 35d), som er anbragt i fundamentsoklen, og som er udformet som bufferlager, for over et bestemt tidsrum eller indtil et bestemt fyldvolumen at optage spildevand, hvilket så på et senere tidspunkt i en udsugningsproces, som skal udføres tidsligt begrænset, via den vakuumpåtrykte spildevandsledning kan føres ud af mellemlagertanken (35a, 35b, 35c, 35d) af fundamentsoklen, og forbindelsen mellem den ind i fundamentsoklen førende spildevandsledning (40) med den ud af fundamentsoklen førende spildevandsjordledning følger over en omskiftelig tovejsventil (43), som navnlig omskiftes i afhængighed af en fyldstand i mellemlagertanken (35a, 35b, 35c, 35d).

2. Fremgangsmåde ifølge krav 1, k e n d e t e g n e t ved de yderligere trin:

- at fastgøre en betjeningsstation til fundamentsoklen,
- at forbinde en inden for betjeningsstationen anbragt friskvandsledning med tilslutningen (51) til den ud af fundamentsoklen førende friskvandsledning (50), og
- at forbinde en inden for betjeningsstationen anbragt spildevandsledning med tilslutningen (41) til den ind i fundamentsoklen førende spildevandsledning (40).

3. Fremgangsmåde ifølge krav 1 eller 2, k e n d e t e g n e t ved trinet:

- at tilslutte spildevandstilslutningen til en undertrykspildevandsledning.

4. Fremgangsmåde ifølge ét af de foregående krav, k e n d e t e g n e t ved trinene:

- at tilslutte den ud af fundamentsoklen førende friskvandsledning (50) med en første tilslutning af en afvandingsventil (53),
- at forbinde en anden tilslutning af afvandingsventilen (53) med en friskvandsafgivelsesåbning,
- at forbinde en tredje tilslutning af afvandingsventilen (53) med den ind i fundamentsoklen førende spildevandsledning (40),
- hvor afvandingsventilen (53) er udformet til at kunne omskiftes frem og tilbage mellem en første ventilomskiftningsstilling, i hvilken den første og den anden tilslutning er forbundet med hinanden og den tredje tilslutning er spærret, og en anden ventilomskiftningsstilling, i hvilken den anden og den tredje tilslutning er forbundet med hinanden og den første tilslutning er spærret.

5. Fremgangsmåde til drift af en stationær forsyningsstation til køretøjer, med trinene:

- at lede, navnlig at suge, spildevand ud af en køretøjsspildevandstank,
- at udlede spildevandet via en ind i en fundamentsokkel førende spildvandsledning (40),
- at bortlede spildevandet via en ud af fundamentsoklen førende spildevandsjordledning, hvor
- spildevandet og/eller vandmængder dannet af tilbageløbsvand, skyllevand eller dråbemængder inden i fundamentsoklen mellemlagres i en mellemlagertank (35a, 35b, 35c, 35d),
- spildevandet og vandmængderne fra mellemlagertanken (35a, 35b, 35c, 35d) bortledes via spildevandsjordledningen i afhængighed af en væskestand af spildevandet og vandmængderne i mellemlagertanken (35a, 35b, 35c, 35d), og
- spildevandet og vandmængderne bortledes via spildevandsjordledningen ved hjælp af et i spildevandsjordledningen herskende undertryk,
- hvor spildevandet ledes til fundamentsoklen drevet af tyngdekraften,
- hvor spildevandet suges ud af mellemlagertanken (35a, 35b, 35c, 35d) i fundamentsoklen via en med undertryk påtrykt sugeledning, og
- hvor det ud af mellemlagertanken sugede spildevand bortledes via den med undertryk påtrykte spildevandsjordledning.

6. Fremgangsmåde ifølge krav 5, med trinene:

- at tilføre friskvand til fundamentsoklen via en friskvandsjordledning,
- at tilføre friskvandet fra fundamentsoklen via en friskvandsledning (50) til køretøjet,
- at bortlede det i friskvandsledningen (50) forblevne friskvand ud af friskvandsledningen til mellemlagertanken (35a, 35b, 35c, 35d) i fundamentsoklen efter afslutning af tilførslen af friskvand til køretøjet.

7. Fremgangsmåde ifølge ét af trinene 5 eller 6, med trinene:

- at skylle friskvandsledningen (50) med friskvand fra friskvandsjordledningen som skyllevand,
- at udføre skyllevandet fra friskvandsledningen (50) ind i mellemlagertanken (35a, 35b, 35c, 35d),

- at suge skyllevandet ud af mellemlagertanken (35a, 35b, 35c, 35d) i fundamentsoklen via en med undertryk påtrykt sugeledning, og
- at bortlede af den ud af mellemlagertanken (35a, 35b, 35c, 35d) sugede skyllevand via en med undertryk påtrykt spildevandsjordledning,
- hvor skylningen af friskvandsledningen (50) udføres som tidsligt begrænset skylleproces, og fortrinsvis udløses, når et der er forløbet forud bestemt tidsinterval siden den seneste friskvandspåfyldning ved hjælp af friskvandsledningen, eller siden den seneste skylleproces af friskvandsledningen (50).

8. Fremgangsmåde ifølge ét af kravene 5 – 7, k e n d e t e g n e t ved, at sugningen af skyllevandet ud af mellemlagertanken (35a, 35b, 35c, 35d)

udløses ved hjælp af en fyldstandssensor på mellemlagertanken (35a, 35b, 35c, 35d), eller

udløses ved hver skylning af friskvandsledningen (50).

9. Stationær forsyningsstation til køretøjer, omfattende:

- en fundamentsokkel med
  - en ind i fundamentsoklen førende spildevandsledning (40),
  - en ud af fundamentsoklen førende friskvandsledning (50),
  - en tilslutningsgrænseflade, som omfatter en tilslutning til den ind i fundamentsoklen førende spildevandsledning (40) og en tilslutning til den ud af fundamentsoklen førende friskvandsledning (50),
  - en ud af fundamentsoklen førende spildevandsledning med en uden for fundamentsoklen liggende spildevandstilslutning,
  - en ind af fundamentsoklen førende friskvandsledning med en uden for fundamentsoklen liggende friskvandstilslutning,

hvor forsyningsstationen desuden omfatter: en mellemlagertank (35a, 35b, 35c, 35d), som er anbragt i et indre rum af fundamentsoklen, hvor mellemlagertanken (35a, 35b, 35c, 35d) omfatter en sensorindretning, som registrerer en væskestand inde i mellemlagertanken (35a, 35b, 35c, 35d), og som ved opnåelse af en forud bestemt væskestand i mellemlagertanken (35a, 35b, 35c, 35d) udløser en udledning af spildevand ud af mellemlagertanken (35a, 35b, 35c, 35d) via den ud af fundamentsoklen førende spildevandsledning, og hvor sensorindretningen er indrettet til af samvirke med en koblingsindretning, og hvor koblingsindretningen er indrettet til at styre en ventil, som sætter mellemlagertanken (35a, 35b, 35c, 35d) i fluidforbindelse med den ud af fundamentsoklen førende spildevandsledning, hvor den ud af fundamentsoklen førende spildevandsledning og ventilen er udformede til en undertryksdrevet udsugning af spildevand ud af mellemlagertanken (35a, 35b, 35c, 35d).

10. Forsyningsstation ifølge krav 9, k e n d e t e g n e t ved, at

- den ud af fundamentsoklen førende friskvandsledning (50) er forbundet med en første tilslutning af en afvandingsventil (53),
- en anden tilslutning af afvandingsventilen (53) er forbundet med en friskvandsafgivelsesåb-

ning, og

- en tredje tilslutning af afvandingsventilen (53) via en friskvandstilbageløbsledning (52) over en afvandingsledning er forbundet med den ind i fundamentsoklen førende spildevandsledning (40), hvor afvandingsventilen (53) er indrettet til at kunne omskiftes frem og tilbage mellem en første ventilomskiftningsstilling, i hvilken den første og den anden tilslutning er forbundet med hinanden og den tredje tilslutning er spærret, og en anden ventilomskiftningsstilling, i hvilken den anden og den tredje tilslutning er forbundet med hinanden og den første tilslutning er spærret.

11. Forsyningsstation ifølge ét af de foregående krav 9 – 10, k e n d e t e g n e t ved, at

- den ind i fundamentsoklen førende spildevandsledning (40) er en spildevandsledning påtrykt undertryk,
- den ud af fundamentsoklen førende spildevandsledning er en spildvandsledning påtrykt undertryk,
- der er tilvejebragt en anden ind i fundamentsoklen førende spildevandsledning (30, 31), som er udformet til en tyngdekraftsdrevet spildevandsføring, og
- den ud af fundamentsoklen førende spildevandsledning er forbundet med den anden ind i fundamentsoklen førende spildevandsledning (30, 31) via en spærreventil, som kan kobles, til udsugning af spildevand, som tilførtes fundamentsoklen via den anden ind i fundamentsoklen førende spildevandsledning (30, 31).

Fig. 1

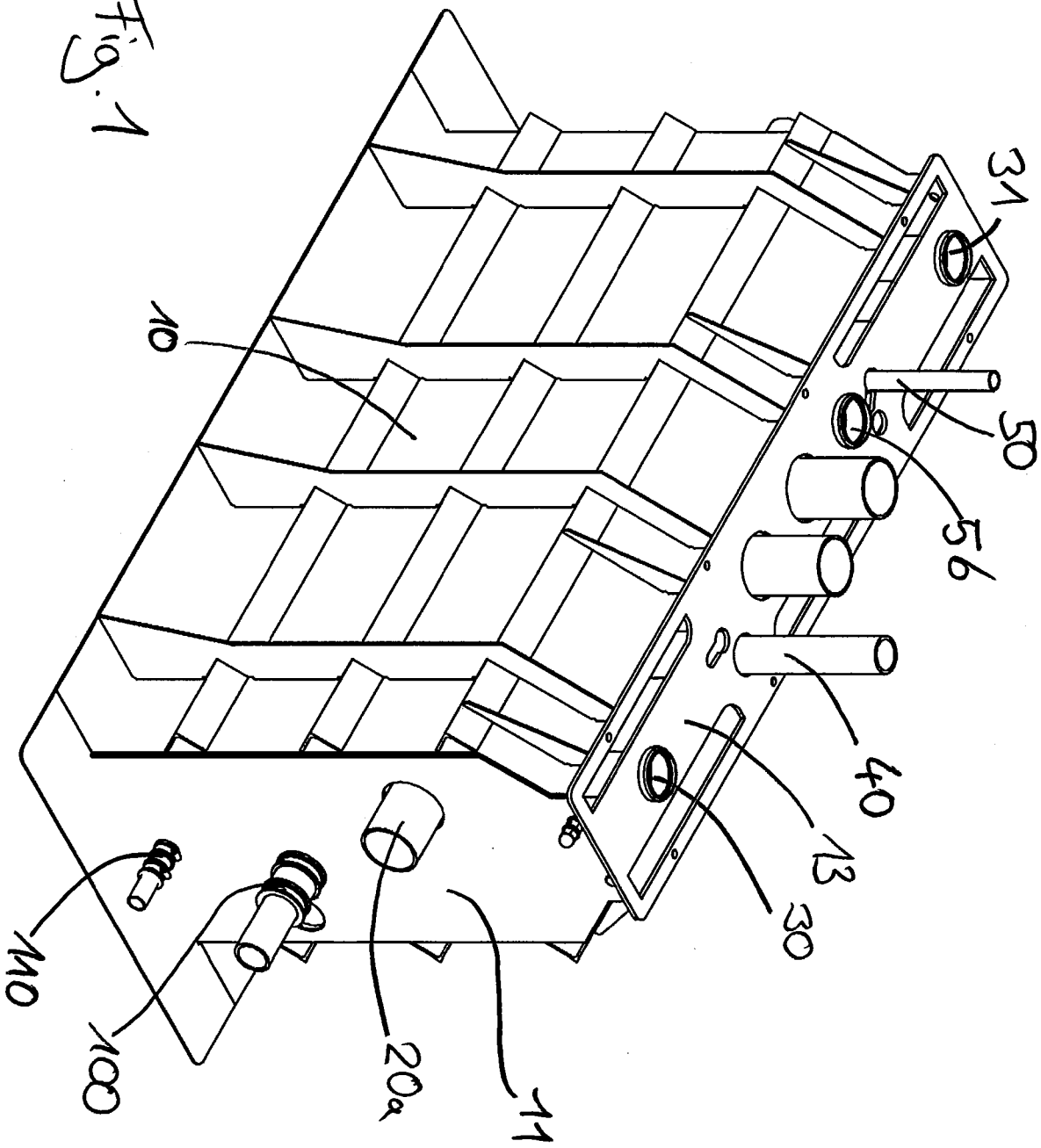
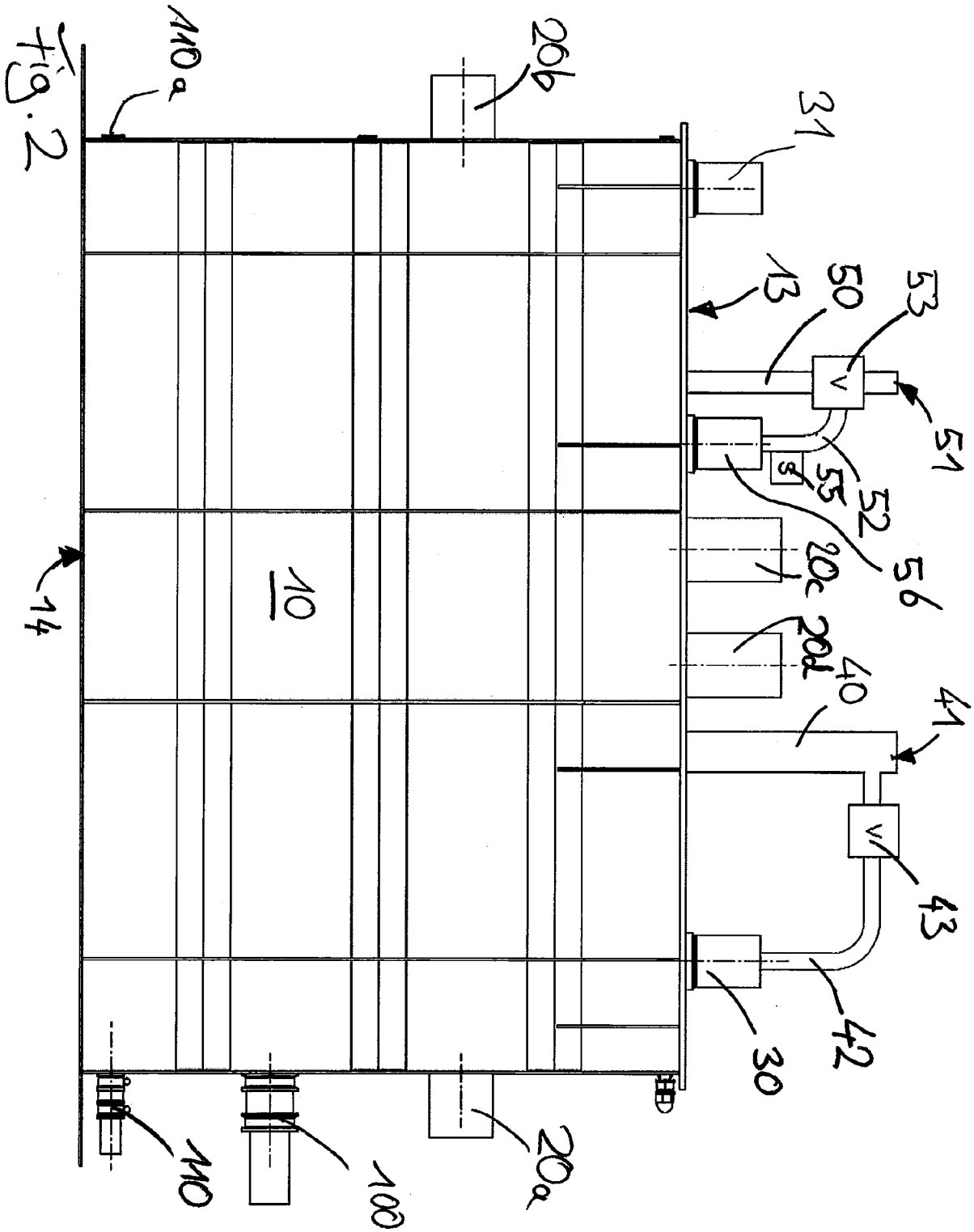


Fig. 2


110a
20b
31
13
50
53
V
51
S
55
52
56
20c
20d
40
41
V
43
42
30
14
10
110
100
20a

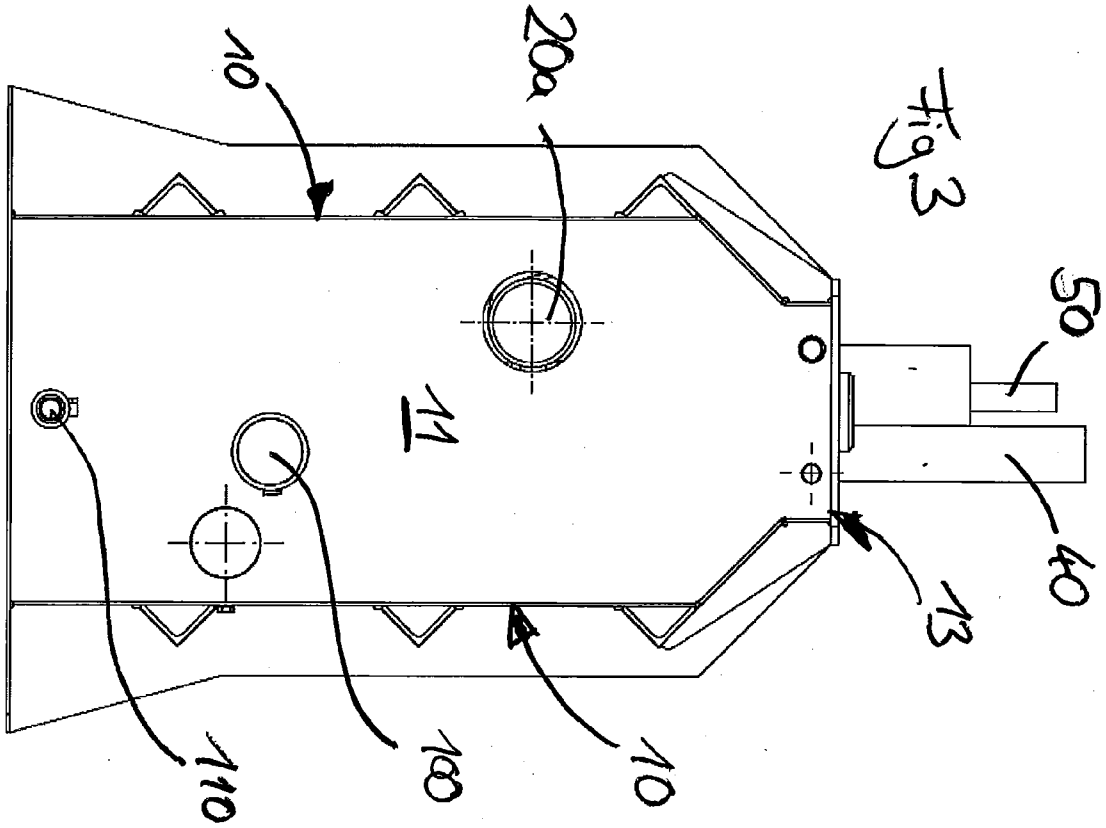


Fig.3

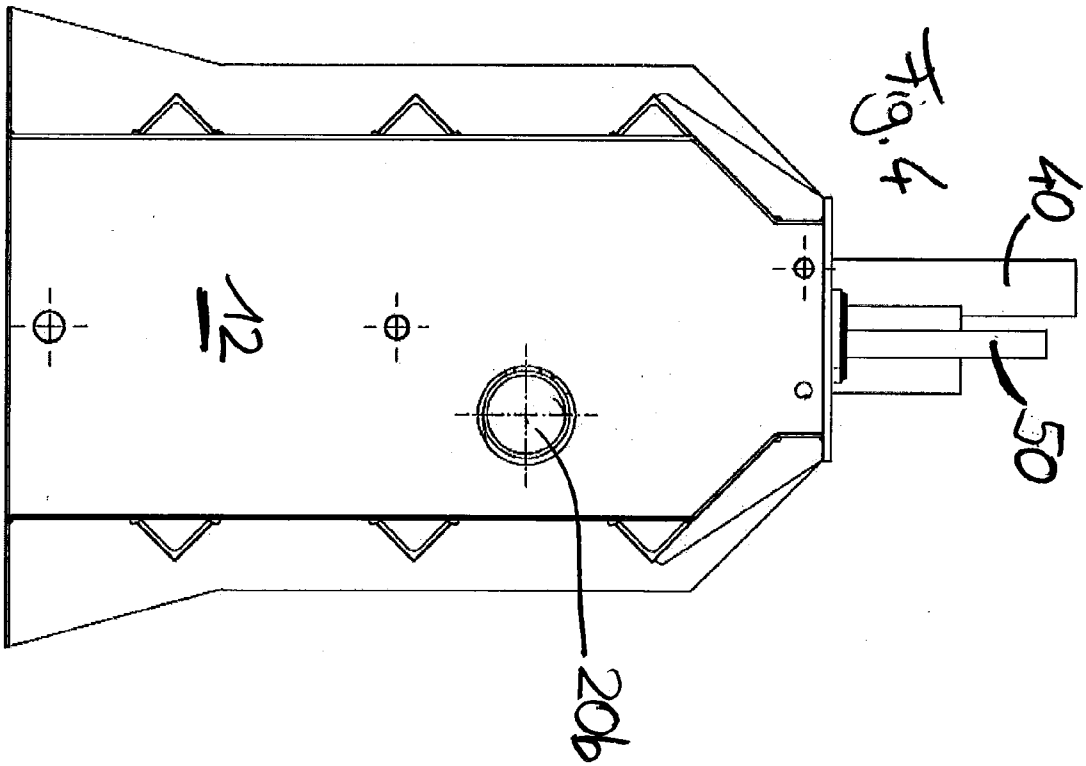


Fig.4

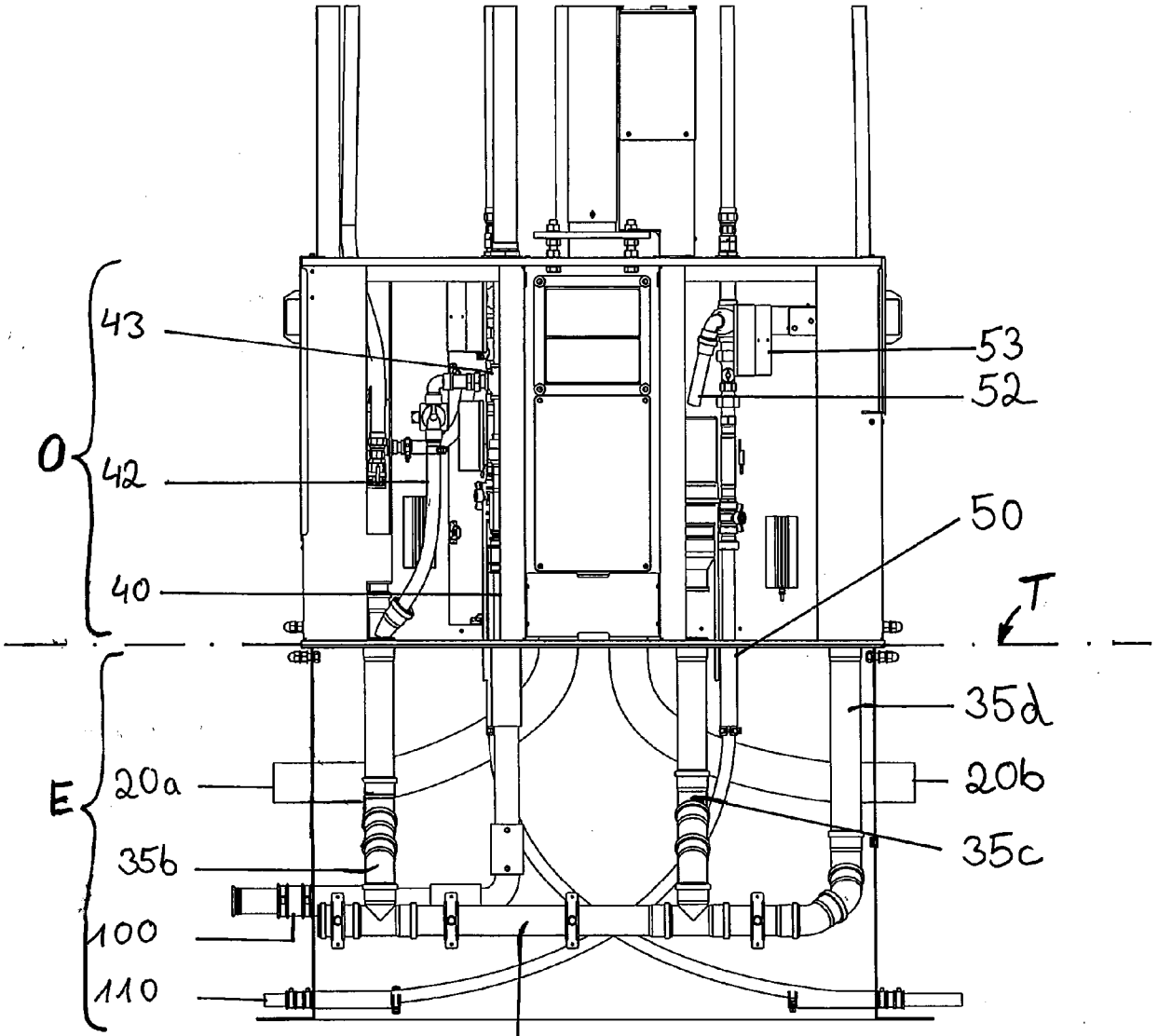


Fig. 5