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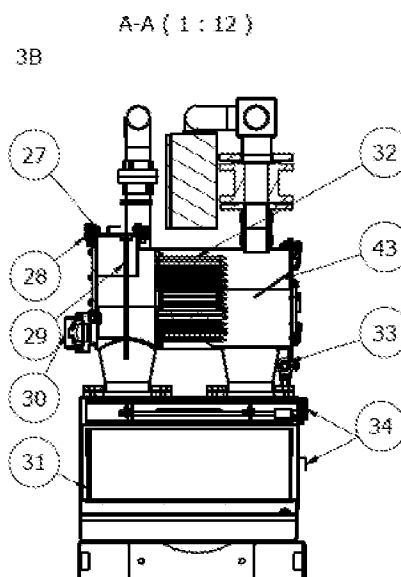
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| (54) | Title      | <b>SEPARATOR FOR WASTEWATER SYSTEM</b> |
| (56) | References |                                        |
|      | Cited:     | CN 208071462 U, CN 209554909 U         |
| (57) | Abstract   |                                        |

A separator for separating objects from a liquid flow in a pipe system is disclosed. The separator has a separator housing (4) and at least one filter in the form of a plurality of filter structures (29, 32) extending into the separator housing. The separator may be used in e.g. a vacuum sewage system, a water supply system, or a pipe system for wastewater.



## SEPARATOR FOR WASTEWATER SYSTEM

### INTRODUCTION

The invention concerns a separator, in particular for sewage from toilets,  
5 preventing small and large objects from these toilets of causing malfunction,  
damage or interruption to pumps in a sewage system. The separator may also be  
used in other pump systems e.g. in sewage treatment systems or water supply  
systems where clogging of pumps by objects in the flow causes problems.

### 10 BACKGROUND

Sewage from toilets may contain small and large objects that are thrown into the  
toilets and flushed down into the toilet sewage pipes with the flushing water. These  
objects may cause damage or breakdown to the pumps or clogging of pumps  
causing system failure resulting in malfunction or stop of the pump and thereby  
15 shut-down of the transport of sewage through the pipelines. During shut-down of  
black water transport through the pipelines, the toilets may not be used which may  
result in unpleasant and critical sanitary situations e.g. in particular when many  
people are confined within a limited space such as onboard ships. The objects  
often thrown into the toilets may e.g. be napkins, tampons, sanitary towels, any  
20 kind of small or large sanitary articles, towels, food items, boxes, keys or any other  
item that could fit into the toilet sewage pipes. Existing solutions for preventing  
objects from causing damage or clogging to pumps may e.g. include some form of  
a grid arranged before the pump inlet in the sewage pipe. After some time, the  
pump or sewage pipe must be opened and the plugs, caused by these objects and  
25 biological material in the black water, manually removed e.g. using a spade.  
Opening, removing these plugs and cleaning the pump/pipe is a dirty and heavy  
work with considerable health risks involved.

The utility model CN 208071462 U relates to a hierarchical sewage advanced  
treatment device to meet water quality requirements. Utility model CN 209554909  
30 U relates to sewage treatment device after down feather cleaning.

### SUMMARY OF THE INVENTION

The invention provides a separator for separating objects from a liquid flow in a  
pipe system as stated in the independent claims 1 and 14. The separator

comprises a separator housing and at least one filter in the form of a plurality of filter structures extending into the separator housing. The separator further comprises at least one cleaning device provided with cleaning structures corresponding to the filter structures whereby a relative movement between the at least one cleaning device and the filter structures effectuate cleaning of the filter structures.

The at least one cleaning device for cleaning the filter structures is provided with holes corresponding to the filter structures and adapted for sliding along the filter structures. The filter structures may be projecting into the separator housing at an angle in view of a longitudinal direction of the separator housing. The filter structures may be facing the fluid flow. In an embodiment, the filter structures may be projecting substantially along and facing the fluid flow. The filter structures may be pointed. The at least one cleaning device may be attached to a lid, whereby withdrawal of the lid effectuates movement of the at least one cleaning device along the filter structures. The filter structures may be projecting into the separator housing at an angle in view of a transversal direction of the separator housing. The filter structures may be projecting substantially across the liquid flow. The at least one cleaning device may be attached to a further lid, whereby withdrawal of the further lid effectuates movement of the filter structures through the corresponding holes in the at least one cleaning device. The at least one cleaning device may be provided with openings for throughflow of the liquid flow through the separator. A The cleaning device may further be provided with a scraping edge for cleaning an inside of the separator housing. The separator housing may be provided with at least one opening for objects separated from the liquid flow. The at least one opening may be further be leading into a container for the objects separated from the liquid flow. The container may further be arranged beneath the separator housing. The lids may be provided with handles for manual operation.

In further aspect, the invention provides a separator for separating objects from a liquid flow in a pipe system, the separator comprising a separator housing with an inlet and an outlet for the liquid flow, at least one filter for filtering out objects from the liquid flow, and at least one outlet for objects separated from the liquid flow. The at least one opening may lead into a container for the objects separated from the liquid flow. The separator further includes a sealing and opening device with

holes corresponding to the at least one opening for objects separated from the liquid flow and at least one sealing part for liquid-tight sealing of the at least one opening for the objects separated from the liquid flow. The sealing and opening device may be movable between an open position where the at least one hole is  
5 arranged under the at least one opening for the objects, and a closed position where the at least one sealing part is arranged under the at least one opening for the objects. The container may include a cardboard box. The cardboard box may be single use and provided with a cardboard lid.

The separator may e.g. be used in a vacuum sewage system, a water supply  
10 system, or a pipe system for wastewater.

Use of filter structures and cleaning devices with corresponding holes for the filter structures provide a filter system that may be easily and efficiently cleaned for objects and dirty mass. The dirty mass and objects collected by the filter structures  
15 inside the separator housing fall down into a waste container that is easily removed from the separator unit. Any use of hands, spades or other tools for digging out the dirty mass from inside the separator is avoided. Avoiding direct handling of the waste by use of hands also reduces the risk of being infected with viruses, bacteria and other contagious substances contained in the organic waste  
20 from the wastewater. The ability to clean the inside of the separator housing for objects and dirty mass by pulling out lids on the separator housing and then emptying the separator housing for the objects and dirty mass by simply pulling out drawer-like units under the separator housing provides a clean and efficient cleaning process reducing the time the separator is out of operation. The use of a  
25 cardboard box with lid for the transport and disposal of cleaned out objects and dirty mass is also an environmentally friendly solution.

## BRIEF DESCRIPTION OF DRAWINGS

Example embodiments of the invention will be described with reference to the  
30 following drawings, where:

Figure 1 illustrates a sewage pipe system with manifold and separator units and vacuum pump units transporting wastewater away from a number of toilets, sinks etc to a collector and discharge pump unit;

Figures 2a-c shows a separator system according to an embodiment of the invention seen from the side in Figure 2a, in front view in Figure 2b and in rear view in Figure 2c;

Figure 3a shows a front view and Figure 3b a section view along A-A from the side of a separator system for separating objects from a liquid flow according to an embodiment of the invention;

Figure 3c shows the separator system from Figures 3a and 3b showing a lid with filter structures, a waste container and a sealing and opening device in a withdrawn position for illustration purposes;

Figure 4 is a partly exploded view of a separator with filter structures exposed in a withdrawn position according to an embodiment of the invention;

Figure 5 shows the separator from Figure 4 in partly front view with a fine filter structure in a withdrawn position;

Figure 6 shows the separator from Figure 5 partly from above illustrating the fine filter structure and interaction with a plate for removal of objects from the fine filter structure;

Figure 7a is a front view of Figure 6; and

Figure 7b a view through section B-B of Figure 7a showing coarse filter structures inside the separator; and

Figure 8 shows a separator system with a withdrawn waste container with a removable cardboard box inside.

## DETAILED DESCRIPTION

Example embodiments are described with reference to the drawings. The same reference numerals are used for the same or similar features in all the drawings and throughout the description.

A vacuum toilet system with a sewage pipe system and with separator units and vacuum pump units for transport of the sewage to e.g. storage tanks, a municipal sewage system or a wastewater treating system is shown in Figure 1. The vacuum toilets and sinks 100 receive water from the water supply 101 and the sewage from the toilets and sinks passes through a separator system 102 where objects are filtered from the sewage before the sewage reaches a vacuum pump unit 103. The sewage is transported further on to a collector and discharge pump unit 106.

Pressure relief units 105 may be connected to the sewage pipe system either after the vacuum pump unit or connected to the collector and discharge pump unit. The separator units and vacuum pump units are preferably redundant to avoid shut down of the sanitary system due to system failure and therefore are at least two  
5 separator units and pump units connected in parallel. If a pump and/or a separator shuts down, the sewage flow may flow through the other remaining connected separator and pump and further on in the pipe system.

A separator system for separating objects from the liquid flow is shown in Figures  
10 2a-c; seen from the side in Figure 2b, in front view in Figure 2b and in rear view in Figure 2c. The separator system in Figures 2a-c shows a manifold 18 leading liquid into two separator units 24, 26 arranged in parallel. The liquid flows through the manifold 18 and into a separator housing 4 through an inlet 25 and flows further on through the separator housing where objects are separated out from the  
15 liquid flow. The liquid flow flows out from the separator housing through an outlet 30 on the rear side of the separator housing 4. The outlet is provided with couplings 11 for connecting to pipes further on to the vacuum pump unit. The inlet and outlet of the separator housing is provided with a valve 7 (outlet valve not shown). Before cleaning of the separator, the valves on each side of the separator  
20 housing are closed. Other configurations of the inlet, outlet and valves may be envisaged. The manifold 18 may be attached to a frame structure (not shown) with manifold hangers 15, 16 and connected to the separator unit through flanges 9 and compensators 8. The manifold is provided with a drain plug 17. An electrical cabinet 5 for control of the valves is attached to a frame 6. The separator housings  
25 4 may be drained for liquid through drainpipes 22, 23 attached to the structure via pipe clamps 19, 20, 21.

The separator housing 4 may be provided with a front lid 10 for inspecting and cleaning the inside of the separator housing. The lid may be attached to the  
30 separator housing with quick-release clamps 37 (Figure 5) and provided with handles, facilitating manual handling. The lid may however also be mounted to the separator with bolts and nuts. A gasket 33 ensures a watertight connection between the separator housing and a flange of the lid 10. The lid 10, but also the rear part of the separator housing 4 may be provided with a transparent part 45 for

visual inspection of the inside of the separator housing. Objects filtered out from the liquid flow in the separator housing fall down into a container 31 provided beneath the separator housing. The container 31 for objects, may be arranged under the separator housing 4 as shown in Figures 2a-c, but the container 31 may  
5 also be arranged in other positions beneath the separator housing 4.

Figure 3a shows a front view and Figure 3b a view from the side of a separator system for separating objects from the liquid flow. The inlet structures 25 with valves leading into the separator housings are shown in Figure 3a. The liquid flow  
10 flows into the separator housing 4 in the front upper part of the separator, continue downwards into the separator housing and then flows along and through the separator housing in the longitudinal direction of the housing and out of the outlet 30 in the rear part of the separator. The separator housing in the embodiment shown in Figures 3a, b, c have a cylindrical shape. The separator housing may  
15 however also have other shapes e.g. oval, rectangular; quadratic etc depending on the actual use and environment where the separator unit is to be placed.

Figure 3b is a side view of the separator unit through sections A-A of Figure 3a. The inside of the separator housing has filters 29, 32 for catching objects in the liquid flow. The filters extend into the separator housing. A first filter in the form of  
20 filter structures 32 extend into the separator housing. The filter structures 32 are in Figure 3b arranged along a longitudinal direction of the separator housing facing the liquid flow. When liquid flows through the inside of the separator housing, objects in the liquid flow are caught by the filter structures 32. The first filter structures may also be arranged at an angle to the liquid flow. The angle may vary  
25 depending upon the separator construction and the liquid flow path through the separator and liquid flow parameters as e.g. speed and flow rate. The first filter structures are preferably pointed to enable piercing of the large objects in the liquid flow. The first filter serves as a coarse filter filtering out larger objects from  
30 the liquid flow as e.g. diapers, sanitary articles, tampons, towels etc. The first filter structures 32 are arranged in a pattern covering the longitudinal internal cross section of the separator housing 4 to ensure that as much as possible of the liquid flow passes these filter structures. The first filter structures 32 are attached to a cleaning device, e.g. a base plate 35 (Figure 4), provided with openings for

throughflow of the liquid flow. In Figure 4, the base plate 35 is attached to the inside of the separator housing. The objects that are stopped, but not pierced by the filter structures, may fall into the bottom of the separator housing.

A guiding plate 43 for the liquid flow may be arranged inside the separator housing under the inlet 25 for steering the liquid flow from the downwards direction and into the longitudinal direction towards the filter structures. The combination of the free fall of the liquid flow into the separator housing through the inlet 25 and the guiding plate 43, results in the liquid flow hitting the first filter structures 32 at higher speed increasing the chance of larger objects to be pierced by the first filter structures 32.

The liquid flow with objects small enough to pass the first filter structures 32 are caught by a second filter structure 29 behind the first filter structure 32. In the embodiment shown in Figures 3a, b, c, the second filter structures 29 extend down into the separator housing across the liquid flow in the rear part of the separator housing. Smaller objects as keys, rings etc. in the liquid flow hit the second filter structure 29 and fall down into the bottom part of the separator housing. Small lighter objects may also stick to the second filter structure without falling down. The second filter structures may also be arranged at an angle to the liquid flow and/or an angle in view of a transversal direction of the separator housing. The angle may vary depending upon the separator construction and the liquid flow path through the separator and liquid flow parameters as e.g. speed and flow rate.

The first 32 and second 28 filter structures are attached to respective lids 10, 27 for cleaning of objects and dirty mass from the filter structures by movement of the lids. The first filter structures 32 interact with a cleaning device 36 provided with holes corresponding to the size and shape of the first filter structures as shown in Figure 4. As can be seen from Figures 4, 5, 6 and 7 the second filter structures 29 interacts with a second cleaning plate 38 provided with holes corresponding to the size and shape of the second filter structures. A relative motion between the filter structures 29, 32 and the respective cleaning devices 36, 38 effectuates cleaning of the filter structures 29, 32. The first and second filter structures may be elongated filter structures in the form of e.g. needle-, rod-, stick- or finger-like structures, extending into the interior volume of the separator housing. The filter structures may be parallel with each other. The first 32 and second 29 filter

structures may be arranged substantially perpendicular to each other as shown in Figures 7a, b.

A gasket 28 ensures a watertight connection between the separator housing and the lid 27. The lid 27 may be attached to the separator housing with e.g. quick-  
5 release clamps 37 and provided with handles, facilitating manual handling.

The first 32 and second 29 filter structures are shown in Figure 4 in a partly exploded view. In Figure 4, the withdrawable lid 10 for the first filter structure 32 is attached to a front of a half-pipe structure which has at its rear end the cleaning  
10 device 36 in the form of a plate with holes corresponding to the filter structures. The half-pipe structure and the outer shape of the cleaning device 36 corresponds to the size and shape of at least the lower half of the inside of the separator housing. The cleaning device 36 is provided with openings for throughflow of liquid. When the separator is in use connected into the liquid flow, the cleaning  
15 device 36 bears against the base plate 35 to which the filter structures are attached. In Figure 4 the cleaning device 36 has been pulled out sliding over the filter structures by an outward pulling movement of the lid 10 from the separator housing. The cleaning device 36 may be provided with a scraping edge for scraping along an inside of the separator housing for cleaning of the separator  
20 housing. The lid 10 may be provided with guides 44 guiding along the outside of the separator housing to ease sliding and steering of the half-pipe structure and cleaning device without causing too much load on the filter structures, cleaning device and half-pipe structure.

25 The objects cleaned from the first filter structures fall down and through an opening in the bottom of the half-pipe structure and further through an opening for objects in the separator housing in front of the first filter structure 32 and down into a first funnel 39. The bottom of the separator housing also has an outlet beneath the second filter structure leading into a second funnel 42 collecting the objects  
30 caught by the second filter 29. A sealing and opening device 40 with filter seals for liquid-tight sealing of the bottom of the funnels 39 and 42 when the separator is in use, is arranged under the separator housing. When the funnels 39, 42 are to be emptied for objects caught by the filters, the sealing and opening device is moved to an open position whereby corresponding through-going holes are positioned

under the outlets of the first and second funnel 39 and 42. Stoppers are provided for stopping the sealing and opening device in the correct position for opening and sealing of the funnels. A front through-going hole 40 is visible in the partly exploded view of Figure 3c. The funnels and through-going holes lead, when the  
5 sealing and opening device is in the open position, into a container 31 for the objects. The container 31 may include a removable box 12, e.g. a cardboard box 12. The cardboard box is provided with a layer on the inside to withstand liquid. Liquid/moisture in the objects and dirty mass inside the cardboard box may flow out through holes in the bottom of the cardboard box leaving a dry dirty mass with  
10 objects easier and more hygienic to handle. The liquid is collected in the bottom of the container 31 which may be provided with a drainpipe for the liquid. The cardboard box may also be provided with a lid 13 as shown in Figure 8 for easy closing and transport of the cardboard box and content to a waste station. The cardboard box is preferably single use and replaced by a new cardboard box when  
15 a full cardboard box is removed from the waste container 31.

The waste container 31 and the sealing and opening device 40 may be arranged in a drawer housing assembly 2, 3, where the sealing and opening device constitutes an upper drawer device and the waste container 31 constitutes a lower  
20 drawer device. The upper and lower drawer device may be provided with handles 34 for manual operation as shown in Figure 3b. When the funnels 39, 42 are to be emptied for objects caught by the filters, the upper drawer device is pulled out to an open position whereby corresponding through-going holes are positioned under the bottom of the first and second funnel 39 and 42. The waste container is pulled  
25 out and the cardboard box removed and replaced before the lower drawer device and upper drawer device are pushed back into the drawer housing assembly.

When the separator is to be emptied and cleaned, the inlet and outlet valves are closed off manually. When the valves are safely closed, the lids 10, 27 are opened  
30 and pulled out away from the separator housing. The cleaning devices 36, 38 with holes corresponding to the filter structures are then pulled over the filter structures and any waste including any objects, biological waste and dirty mass will be cleaned off the filters and fall into the bottom of the separator housing and further down into the funnels. The handles on the outside of the withdrawable lid enables

easy opening and cleaning of the filter structures attached to the inside of the lid, in one and the same movement. When the sealing and opening device is pulled out, the dirty mass and objects will fall down in the waste container 31 from the funnels and through-going holes 40. The container may be a single use cardboard box 12. The cardboard box is removed and closed by the cardboard lid 13. A new cardboard box is inserted in the lower drawer device and the lower drawer device and upper drawer device firmly pushed in. The withdrawable lids for the first and second filters are securely fastened before the valves are opened again for the liquid flow.

10 The cleaning of the filter structures and emptying of the separator housing and funnels may also be done automatically or semi-automatically.

The separator with filter structures and cleaning device for cleaning the filter structures enables easy cleaning of the filters by pulling the handles of the lids.

15 Also removing the objects and dirty mass cleaned from the filter structures are easily removed from the separator by pulling handles of a drawer like device opening the seals beneath the funnels. Collecting and removal of the objects and waste cleaned therefrom may be done without the need of using any tool and manually digging out the waste from inside the separator. Use of cardboard box with holes for outlet of liquid leaves a dry mass more hygienic and easy to handle.

20 The cardboard box with lid is easy to replace and transport to a waste station for disposal of both the waste and the box.

The separator may be used in e.g. a sewage pipe system, a vacuum sewage system, e.g. onboard boats, airplanes, trains, or in a water supply system, removing objects from the fluid flow avoiding clogging of the pipes and/or pumps and thus avoiding shutdown of the sewage system. If two separators are connected in parallel, one separator may be disconnected and cleaned at a time without shutting down the sewage system. Although the embodiments of the separator system shown in the drawings have two separator units arranged in parallel, sewage systems may only be provided with one separator unit, e.g. in sewage systems that are not so critical and/or where a shut-down may be tolerated. In case of only one separator unit, the manifold may be simplified as only one separator unit is connected to the pipeline. In case of only one separator

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unit, a bypass pipe may also be provided to pass the sewage flow passed the separator unit when the separator unit needs to be cleaned or serviced.

Having described preferred embodiments of the invention it will be apparent to  
5 those skilled in the art that other embodiments incorporating the concepts may be  
used. These and other examples of the invention illustrated above are intended by  
way of example only and the actual scope of the invention is to be determined  
from the following claims.

## CLAIMS

1. A separator (24, 26) for separating objects from a liquid flow in a pipe system, the separator comprising:
- 5 - a separator housing (4),
- at least one filter (29, 32) in the form of a plurality of filter structures extending into the separator housing (4) and
- at least one cleaning device (36, 38) provided with cleaning structures corresponding to the filter structures (29, 32), whereby a relative movement
- 10 between the at least one cleaning device and the filter structures effectuate cleaning of the filter structures;
- wherein the at least one cleaning device (36, 38) is provided with holes corresponding to the filter structures (29, 32) and adapted for sliding along the filter structures.
- 15
2. Separator according to claim 1, wherein the filter structures (29, 32) are projecting into the separator housing at an angle in view of a longitudinal direction of the separator housing.
- 20
3. Separator according to claim 1 or 2, wherein the filter structures (32) are facing the liquid flow.
4. Separator according to one of claims 1-3, wherein the filter structures (32) are pointed.
- 25
5. Separator according to one of claims 1-4, wherein the filter structures (29) are projecting into the separator housing at an angle in view of a transversal direction of the separator housing.
- 30
6. Separator according to claim 1, wherein the filter structures (29) are projecting substantially across the liquid flow.

7. Separator according to one of claims 1-5, wherein the at least one cleaning device (36) is attached to a first lid (10), whereby withdrawal of the lid effectuates movement of the at least one cleaning device along the filter structures (32).
- 5 8. Separator according to claim 1 or 6, wherein the at least one cleaning device (38) is attached to a second lid (27), whereby withdrawal of the second lid effectuates movement of the filter structures (29) through the corresponding holes in the at least one cleaning device.
- 10 9. Separator according to one of claims 1-8, wherein the at least one cleaning device (36, 38) is provided with openings for throughflow of the liquid flow through the separator.
- 15 10. Separator according to one of claims 1-6, wherein the at least one cleaning device is provided with a scraping edge for cleaning an inside of the separator housing (4).
- 20 11. Separator according to one of claims 1-10, wherein the separator housing is provided with at least one opening (39, 42) for objects separated from the liquid flow, the at least one opening (39, 42) leading into a container (31).
12. Separator according to one of claims 1-11, wherein the container (31) is arranged beneath the separator housing.
- 25 13. Separator according to one of claims 7 or 8, wherein the first (10) and second lids (27) are provided with handles for manual operation.
14. A separator (24, 26) for separating objects from a liquid flow in a pipe system, the separator comprising:
- 30 - a separator housing (4) with an inlet (25) and an outlet (30) for the liquid flow,  
- at least one filter (29, 32) for filtering out objects from the liquid flow,  
- at least one opening (39, 42) for objects separated from the liquid flow; and  
- a sealing and opening device (40) with at least one hole corresponding to the at least one opening for objects separated from the liquid flow and at least one

sealing part for liquid-tight sealing of the at least one opening for the objects separated from the liquid flow.

15. Separator according to claim 14, wherein the at least one opening (39, 42)  
5 leading into a container (31) for the objects separated from the liquid flow.

16. Separator according to claim 15, wherein the container (31) is arranged beneath the separator housing (4).

10 17. Separator according to one of claims 14-16, wherein the sealing and opening device (40) is movable between an open position where the at least one hole (40) is arranged under the at least one opening (39, 42) for the objects, and a closed position where the at least one sealing part is arranged under the at least one opening (39, 42) for the objects.

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18. Separator according to one of claims 16 or 17, wherein the container (31) comprises a cardboard box.

19. Use of the separator according to claims 1- 18, in at least one of a vacuum  
20 sewage system, a water supply system, or a pipe system for wastewater.

## PATENTKRAV

1. En separator (24, 26) for å separere objekter fra en væskestrøm i et rørsystem, hvor separatorens omfatter:
- 5     - et separatorhus (4),
- minst ett filter (29, 32) i form av en flerhet av filterstrukturer som strekker seg inn i separatorhuset (4) og
- minst én rengjøringsanordning (36, 38) utstyrt med rengjøringsstrukturer som tilsvarer filterstrukturene (29, 32), hvorved en relativ bevegelse mellom den minst
- 10    ene rengjøringsanordningen og filterstrukturene bevirker rengjøring av filterstrukturene;
- hvor den minst ene rengjøringsanordningen (36, 38) er utstyrt med hull som tilsvarer filterstrukturene (29, 32) og er tilpasset for glidning langs filterstrukturene.
- 15    2. Separator ifølge krav 1, hvor filterstrukturene (29, 32) rager inn i separatorhuset i en vinkel sett i retning av en lengderetning av separatorhuset.
3. Separator ifølge krav 1 eller 2, hvor filterstrukturene (32) vender mot væskestrømmen.
- 20    4. Separator ifølge et av kravene 1-3, hvor filterstrukturene (32) er spisse.
5. Separator ifølge et av kravene 1-4, hvor filterstrukturene (29) rager inn i separatorhuset i en vinkel med hensyn til tverrgående retning av separatorhuset.
- 25    6. Separator ifølge krav 1, hvor filterstrukturene (29) rager vesentlig utover væskestrømmen.
7. Separator ifølge et av kravene 1-5, hvor den minst ene rengjøringsanordningen
- 30    (36) er festet til et første lokk (10), hvorved tilbaketrekking av lokket bevirker bevegelse av den minst ene rengjøringsanordningen langs filterstrukturene (32).
8. Separator ifølge krav 1 eller 6, hvor den minst ene rengjøringsanordningen (38) er festet til et andre lokk (27), hvorved tilbaketrekking av det andre lokket bevirker
- 35    bevegelse av filterstrukturene (29) gjennom de tilsvarende hullene i den minst ene rengjøringsanordningen.

9. Separator ifølge et av kravene 1-8, hvori den minst ene rengjøringsanordningen (36, 38) er utstyrt med åpninger for gjennomstrømning av væskestrømmen gjennom separatorens.

5 10. Separator ifølge et av kravene 1-6, hvori den minst ene rengjøringsanordningen er utstyrt med en skrapekant for rengjøring av innsiden av separatorhuset (4).

11. Separator ifølge et av kravene 1-10, hvori separatorhuset er utstyrt med minst en åpning (39, 42) for objekter som er separert fra væskestrømmen, idet den minst ene  
10 åpningen (39, 42) leder inn i en beholder (31).

12. Separator ifølge et av kravene 1-11, hvori beholderen (31) er anordnet under separatorhuset.

15 13. Separator ifølge et av kravene 7 eller 8, hvori det første (10) og andre lokk (27) er utstyrt med håndtak for manuell betjening.

14. En separator (24, 26) for å skille objekter fra en væskestrøm i et rørsystem, idet separatorens omfatter:

- 20 - et separatorhus (4) med et innløp (25) og et utløp (30) for væskestrømmen,  
- minst ett filter (29, 32) for filtrering av objekter fra væskestrømmen,  
- minst én åpning (39, 42) for objekter separert fra væskestrømmen; og  
- en tetnings- og åpningsanordning (40) med minst ett hull som tilsvarer minst én  
åpning for objekter som er separert fra væskestrømmen og minst én tetningsdel for  
25 væsketett tetning av den minst ene åpningen for objektene separert fra  
væskestrømmen.

15. Separator ifølge krav 14, hvori den minst ene åpningen (39, 42) leder inn i en beholder (31) for objektene som er separert fra væskestrømmen.

30

16. Separator ifølge krav 15, hvori beholderen (31) er anordnet under separatorhuset (4).

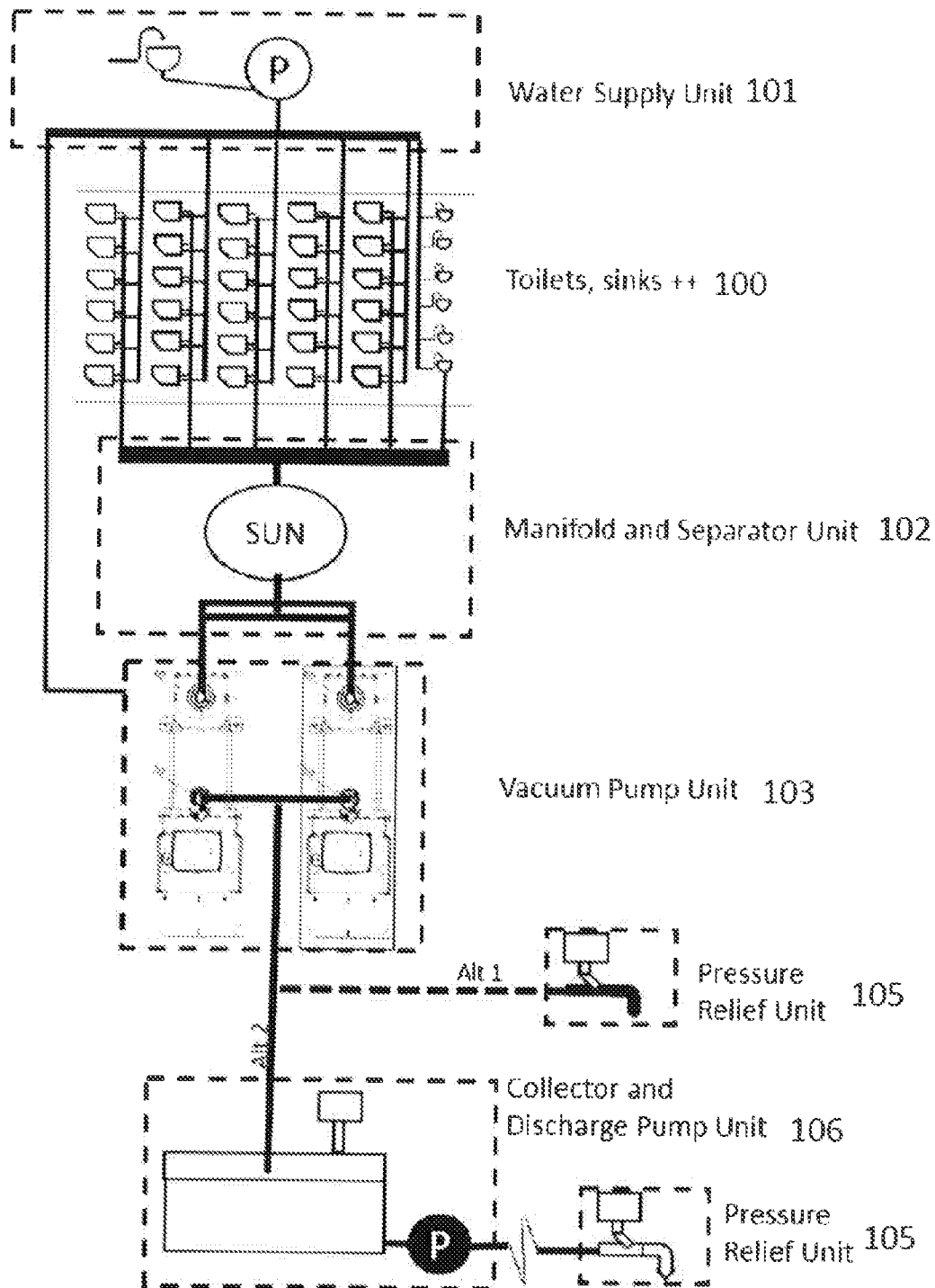
17. Separator ifølge et av kravene 14-16, hvori tetnings- og åpningsanordningen (40)  
35 er bevegelig mellom en åpen posisjon hvor det minst ene hullet (40) er anordnet under den minst ene åpningen (39, 42) for objektene, og en lukket posisjon der den

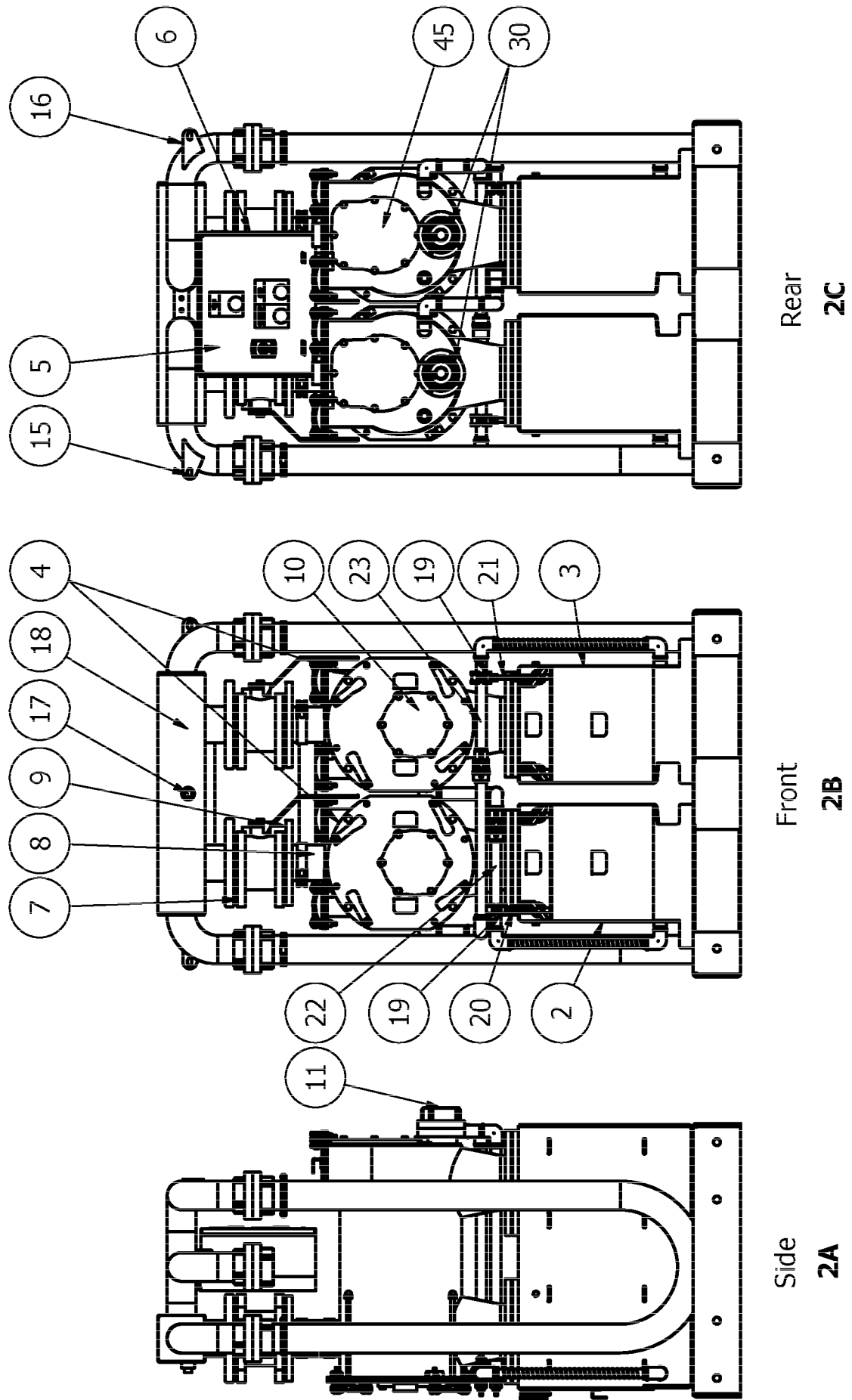
minst ene tetningsdelen er anordnet under den minst ene åpningen (39, 42) for objektene.

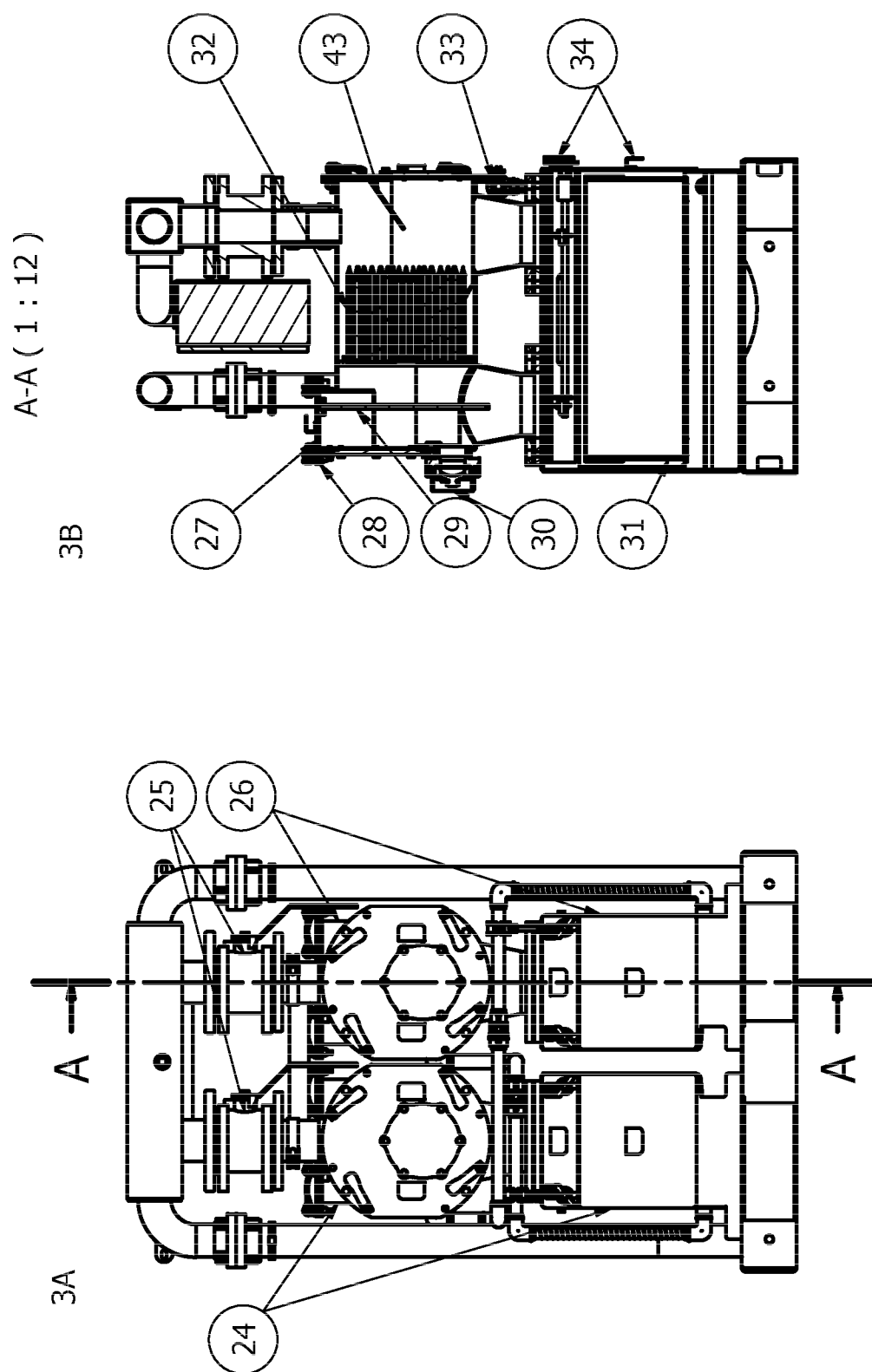
5 18. Separator ifølge et av kravene 16 eller 17, hvori beholderen (31) omfatter en pappeske.

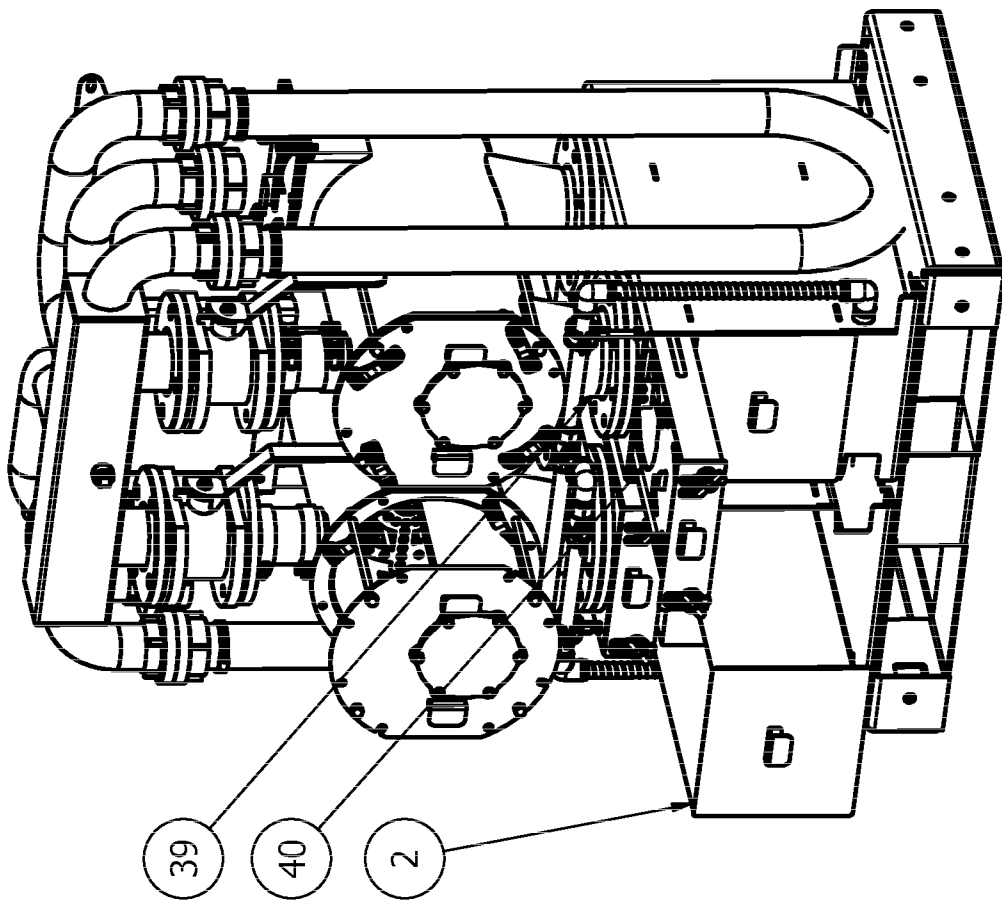
19. Bruk av separatorene ifølge krav 1 til 18, i minst ett av et vakuumkloakksystem, et vannforsyningssystem eller et rørsystem for avløpsvann.

Figure 1



**Figure 2**

**Figure 3A og 3B**



**Figure 3C**

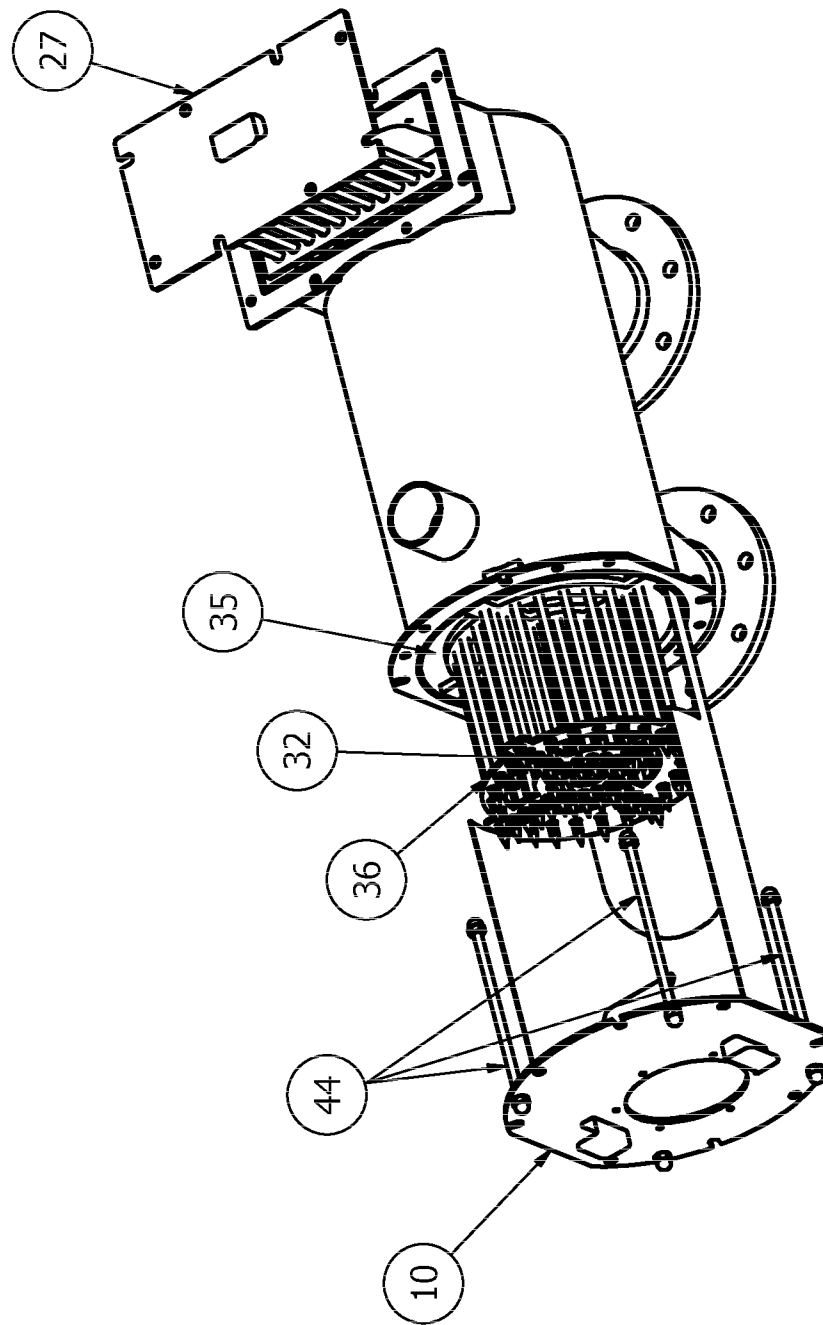
**Figure 4**

Fig. 5

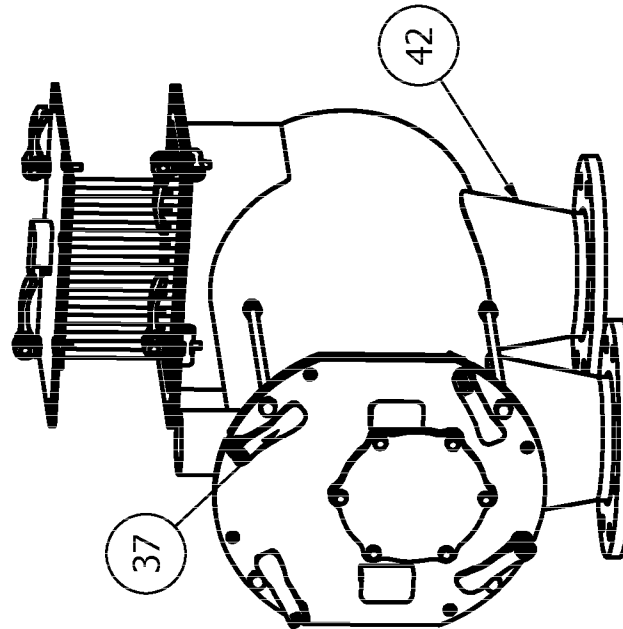


Fig. 6

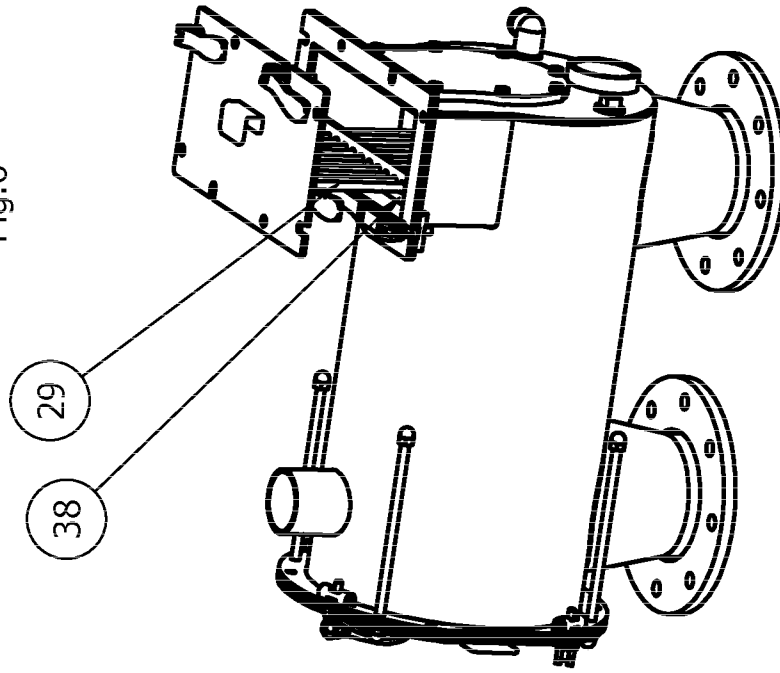
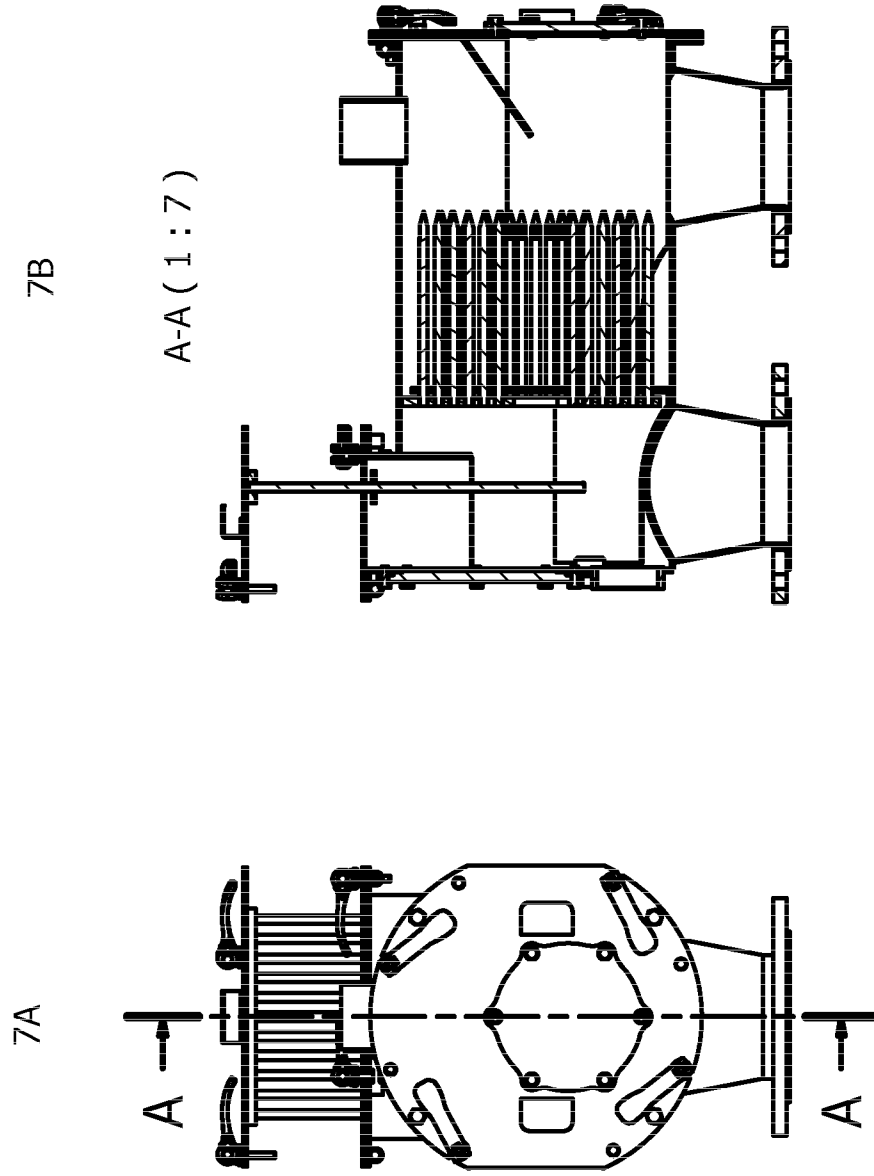
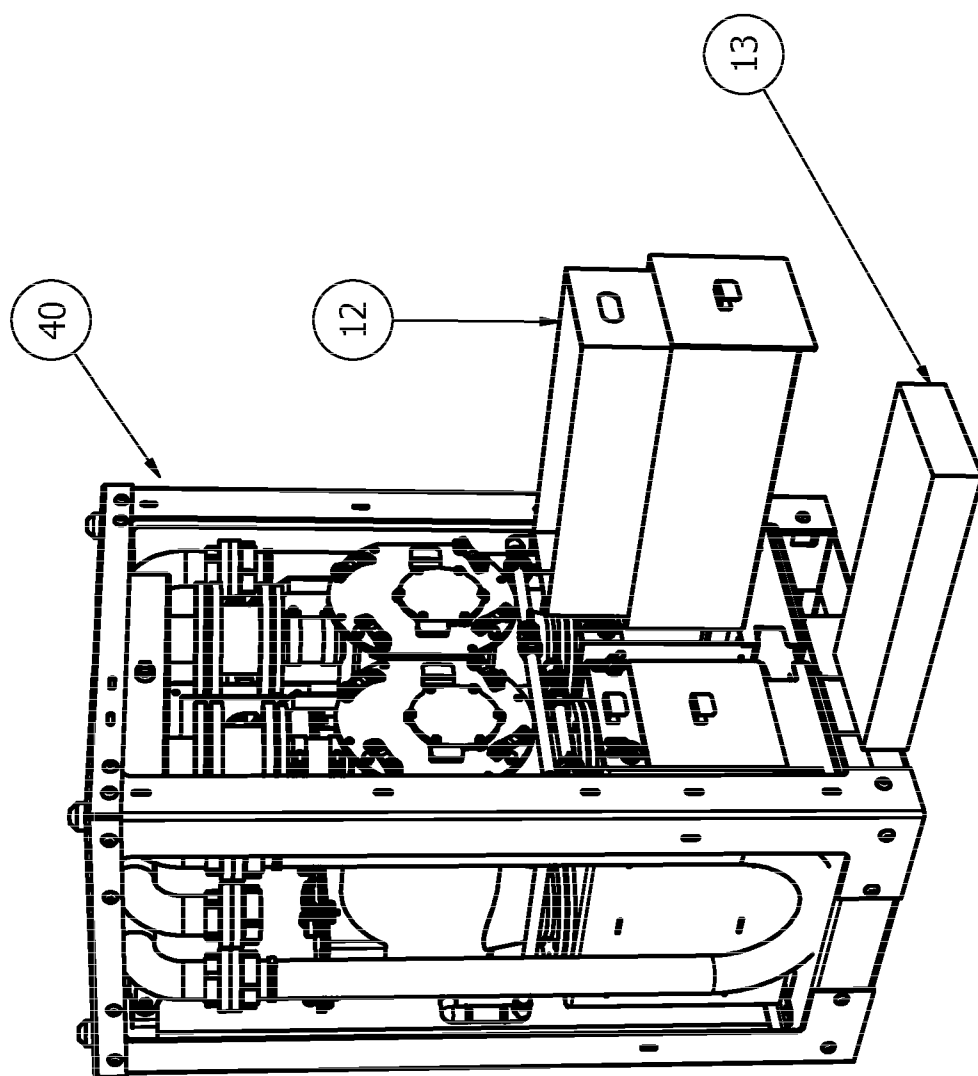


Figure 5 og 6

Figure 7



**Figure 8**