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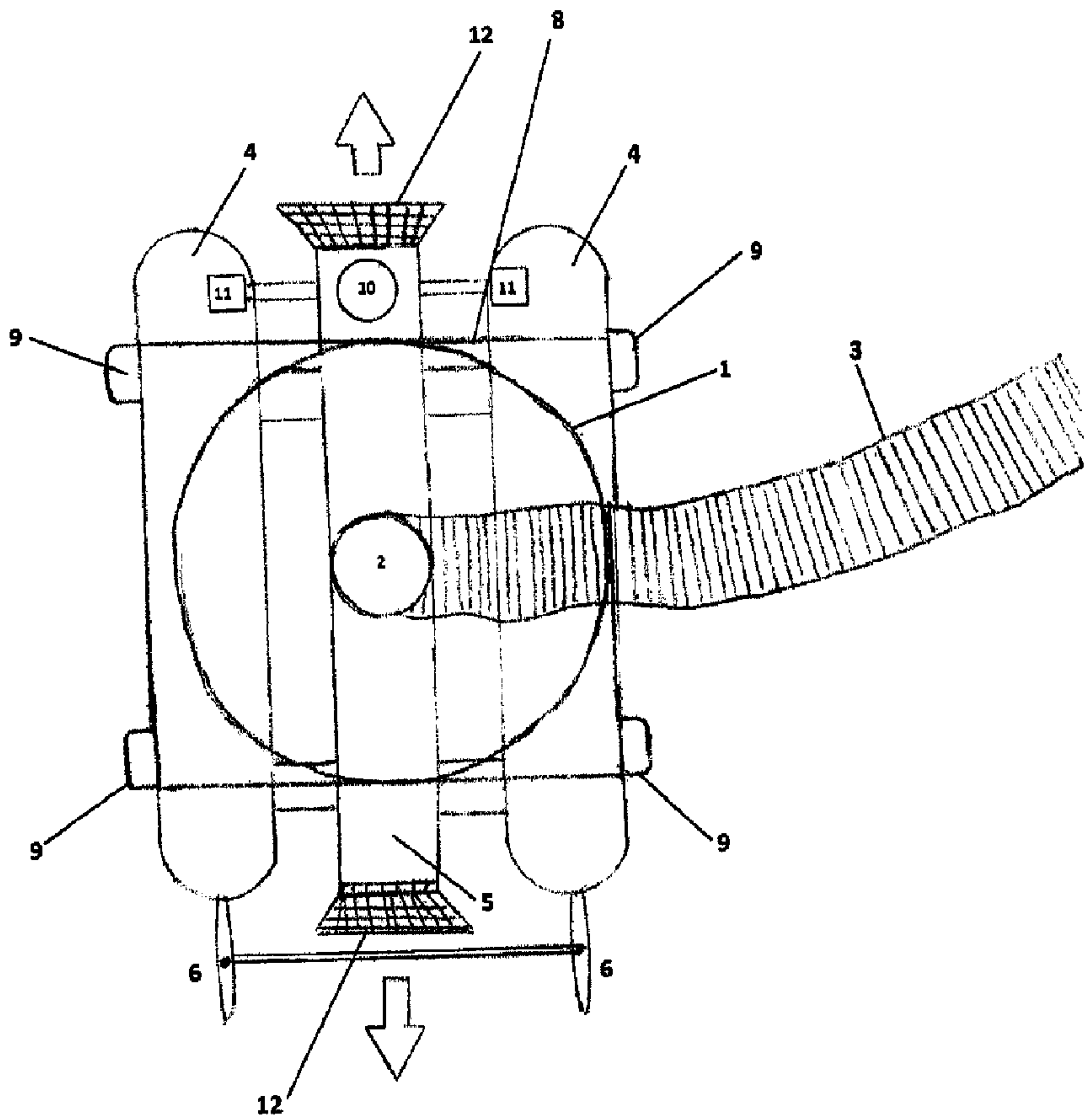
(54) **Titre : PROCEDE ET APPAREIL VISANT A RETIRER DU VARECH DE L'OCEAN ET DES PLAGES**
(54) **Title: METHOD AND APPARATUS FOR REMOVING SEAWEED FROM THE OCEAN AND BEACH**



Method and Apparatus for Removing Seaweed from the Ocean and Beach

When seaweed is projected onto a beach after a storm, there may be times where there is so much detached seaweed that it cannot all be pushed onto the beach. The surf and its oscillation from high to low tide, slowly reveals substantial amounts of seaweed as the ocean withdrawals. Also, the tides move the seaweed from one beach to the next.

Description

There may be times during seaweed harvesting where running a vacuum hose and seaweed receiver along the beach may be very difficult to impossible. Examples include a rocky beach and during a high tide with no beach present. In certain circumstances, the floating funnel vessel will have many advantages over the seaweed receiver.

The floating funnel is a compact vacuum unit that is connected to a spool of floating vacuum hose (20) or similar vacuum hose and attached to a land-based or ocean vessel based vacuum system (21). It allows both close proximity of operation with the worker, who is using hip waders and is pitch forking seaweed into the top of the funnel.

The technique involves working with the tidal rhythms, where the floating funnel and/or the hose move themselves in sync, either away or towards the shoreline, which may be as much as 500 to 1000 foot distance over a period of 12 hours. The hose length itself may stay relatively consistent throughout a continued 24 hour harvest operation, as both the small funnel vessel and larger vacuum vessel would move to maintain a relatively consistent distance from one another.

Although a floating funnel can be used by itself in calm weather, the harvest operations often take place during periods of rough weather where maneuvering through currents, waves and tides is difficult. The propulsion system, buoyancy controls and anchoring systems are vital to positioning the floating funnel especially during rough stormy weather.

The funnel vessel can use its hose in any direction with a 360 degree swivel. This allows for movement along coastlines and the ability to drag the hose during land based operations, as well as the floating funnel vessel's ability to create propulsion directly against the hose.

Both a buoyancy control by means of flooding and evacuating ballast tanks, which is well known in the field of submarines and scuba diving, as well as an automatically deployable anchoring system, is used to position the vehicle in shallow water around windrows of seaweed.

An onboard operator may control the funnel vessel. Alternatively electrical or wireless remote control to decrease funnel vessel weight may be used.

As daily harvesting continues, the vessel is maneuverable laterally along the shore, and from high tide to low tide.

Figure 1 and Figure 2 are overhead and side views respectively of the floating funnel craft, where funnel (1) is a large enough funnel to allow surrounding personnel to deposit seaweed into said funnel from all sides of the craft, by use of hand tool such as a pitchfork. The base of the funnel has a gradual 90 degree bend to point horizontal, and is then connected to floating hose (3), which is commonly in the range of 7 to 9 inches in diameter and sometimes several hundred feet in length. Below the 90 degree bend is a 360 degree swivel joint (2) which connects to a detachable plate (8), so that the funnel, hose, and plate can be removed from the water craft and placed on a solid surface such as sand or rock. Handles (9) located in all four corners of the detachable plate allow ease of movement by personnel. The water craft is stabilized by two pontoons (4), where the reversible propulsion system (5) is located in the center of the craft, between and parallel to the two pontoons. Steering of the vessel is performed with a rudder system (6). Mesh filters (12) will be placed over the intake and exhaust of the propulsion systems to keep windrow and loose seaweed out of the propulsion system. Outside of the perimeter of the funnel is a snorkel (10), which connects by tubing to bilge pumps (11) which have the ability to pump air or water in either direction. Additional bilge pumps (13) are connected to the bottom outside of the craft and to the inside of the pontoons, so that water or air can be pumped in either direction. An anchoring system (7) may also be deployed to help stabilize the floating funnel in the surf.

Figure 3(a) depicts a utilization of the vacuum barge whereby hose is deployed to an already positioned funnel vessel during high tide. During this time, there may be very little beach at high tide and workers will be working in the surf. The workers both depicted are pitch forking into an anchored floating funnel. However a worker may also be available to stabilize the funnel by pole (16) if necessary or hold the floating funnel by handles (9).

Figure 3(b) depicts a variation of the floating funnel whereby hose is deployed to an already positioned funnel hopper during high tide. The funnel may be transported by its own propulsion system or by a worker manoeuvring the funnel on a pole (16) or handles (9).

Figure 3(c) depicts another scenario where the funnel has been detached from the propulsion vehicle and connected directly to a landed vacuum hose to be attached to a land-based vacuum system. The funnel may be transported by the workers by handles (9) and moved along the beach.

Figure 3(d) and 3(e) depicts another method of vacuum hose placement from a land-based vacuum system during high tide. In this scenario the high tide has prevented vacuum hose placement efficiently on the land. Here the floating funnel and hose would be fed onto the site (i) depicted in figure 3(d) at the closest distance between the vacuum unit to the sea. The floating funnel would then uncoil the vacuum hose by moving directly away from the vacuum unit out to sea, swing around in a "U" shape and deposit the funnel closest to the windrow depicted for harvesting. As the tide withdrawals from high to low tide, the floating funnel will follow the tide out. By having the hose floating on the sea and not laying on the beach this would minimize the amount of vacuum hose that would be needed to transport over the beach, not only minimizing damage but also making it easier for a worker. In Figure 3(e) the tide withdraws from high to low revealing seaweed windrows. As the tide withdrawals, the floating funnel may be manoeuvred by pole (16), handles (9), or by propulsion such that vacuum hose may pass over these windrows and harvesting continues with the funnel. Then at low tide, the funnel may be detached and vacuum hose disconnected such that the funnel is placed on top of windrows and harvesting continues. This method presents a distinct advantage over dragging hose over ground. The vacuum truck when full will dump its load into any type of receiving vehicle so that the vac truck may return to harvest operations, usually within a minute.

Figure 4 is a variation of the invention where a long pole (16) is connected to the floatation device (4) and is held by a worker to maintain its position. This allows us to circumvent buoyancy and anchor systems to stabilize the floating funnel. Alternatively handles (9) may be used as well by workers in the surf to hold the floating funnel in position. Workers can choose to pitchfork seaweed into the floating funnel either from the beach, from the windrow, or from the surf.

Figure 5 depicts a seaweed receiver mounted to the same flotation device by swivel (2). The seaweed receiver is detachable

Figure 6 depicts the floating seaweed receiver . An anchoring system (7) is depicted holding the floating seaweed receiver in place in the surf.

Even more beneficial results would employ the floating funnel on a simple hovercraft system with or without vacuum hose attached. The hovercraft is well known to anyone skilled in the prior art. The hovercraft may be driven by remote control or by a driver on the hovercraft. This variation of the floating funnel would allow it to approach the windrow either by land or by sea or both if necessary. The propulsion of the funnel would then be above the water instead of a propeller system below it.

As the tide withdraws from high tide to low tide and revealing more shore and beach, the hovercraft funnel can remain in the same position. The floating funnel can then be detached from the hovercraft for easy manoeuvrability. The connecting hose (3) may also be disconnected from the funnel hovercraft system and the funnel hovercraft system can then be transported wherever it will be required, either on the land, the surf, or to a dock.

Figure 7 and 8 when viewed together provide a top plan view and side elevation view of the hovercraft floating funnel system. The detachable floating funnel (1) is attached to the body board (13) of the hovercraft. Handles (9) will help with stabilization and detaching the funnel by personnel. The skirt (14) will be elevated above the ground above water or beach. Propulsion will be provided by the engines and propeller (15). Rudders (6) will allow manoeuvrability. The hose (3) may be attached to the funnel and at the other end be attached to a land-based or ocean-based vacuum system. The hose is also detachable in the event the funnel-hovercraft system is to be moved without dragging hose.

Figure 9 illustrates an even more beneficial result by workers wearing a garment or equipment around their lower legs and/or waist that allow floatation or a decrease in buoyancy while in the water. Any known floatation material such as but not limited to neoprene is worn around the legs, or any air cavity such as a waist floatation system well known in the prior art. A floatation boot (17) with a wide base in relation to the worker's foot, will produce less pressure per square inch on both the beach and in the water.

Figure 10, Figure 11, and Figure 12, all illustrate an inventive component that provides additional benefit of both longer range and smaller hose diameter over the prior art, but in particular is a long range vacuum system designed to operate over, or in and out of water. An unexpected benefit of multiple leaks along a vacuum system has the effect of accelerating the speed of material as the air speed increases over each joint, allowing a significant increase in both distance and smaller hose diameter.

Figure 10 is an overhead view of the entire apparatus over water, where vacuum unit (21) has deployed hose from spool (20) and pontoons (4) have been attached to detachable joints (23). In Figures 10, 11, and 12, the hoses (3) have been put together in pieces by personnel and connected to cylinder body (24) by way of air/water tight joint (22). The snorkel apparatus (19) is attached by threading or otherwise air tight attached by joint (25) and the amount of air bleed is controlled by air flow valve (18), where the valve is controlled by manual, electrical, or any other known means. Detachable anchor line (26) assists in keeping individual components of apparatus in position.

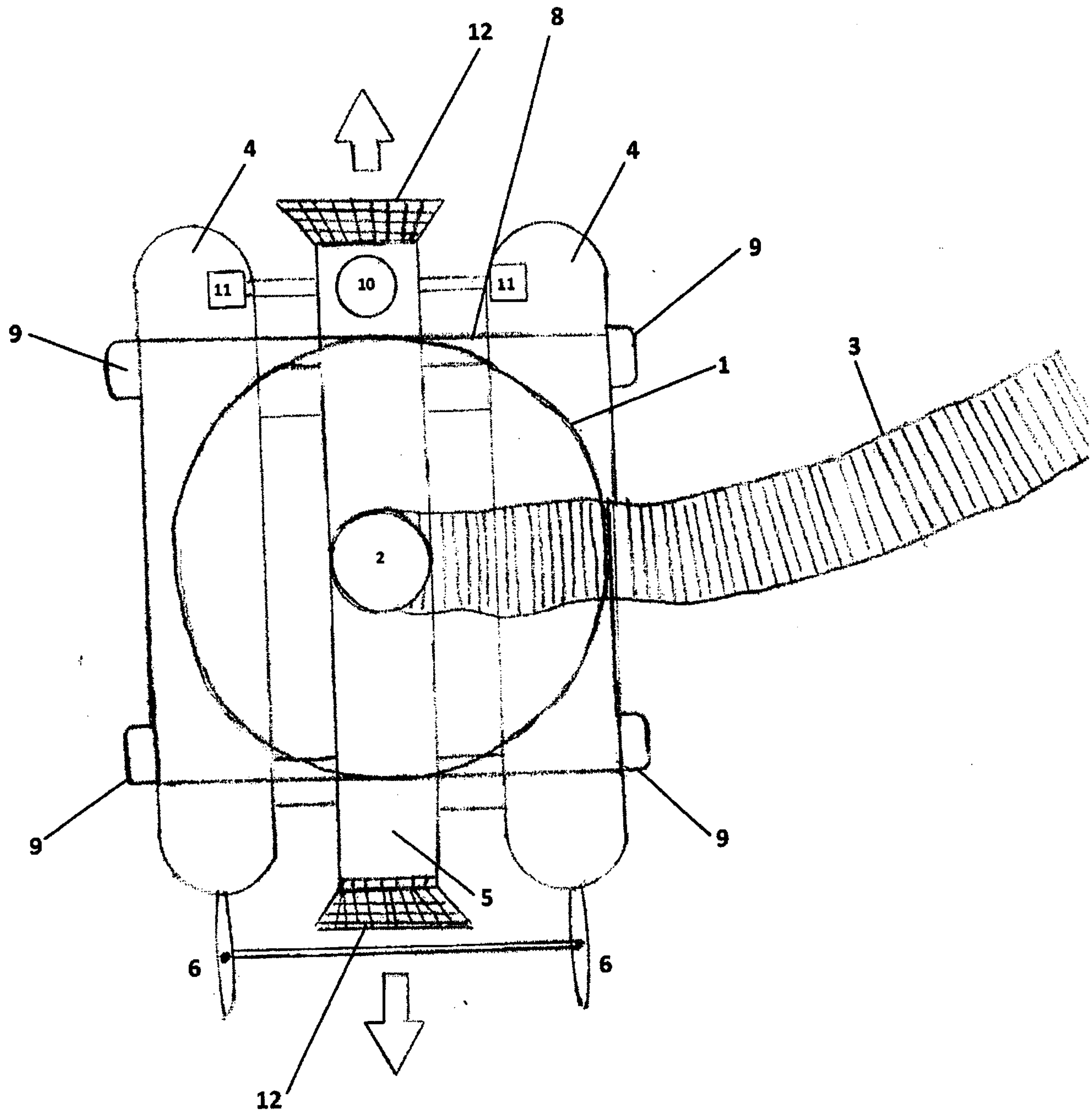
Figure 13 is a variation of the air bleeding system, where hose (3) is encapsulated air tight by outer hose (26), which also has the added benefit of providing buoyancy without pontoons. Air flow valve's (10), which are either fixed or variable, provides controlled bleed of air to increase air speed of the system. Either end is used for bleeding air into the system, as depicted in Figure 14.

Figure 15 is a variation of the air bleed system, where conventional vacuum excavator truck hose (27) is placed inside water tight hose (26) instead of a valve system. Conventional hydrovac hose does not have water/air tight seals in its connectors, so leakage occurs at each joint (28).

Figure 16 is a variation of the air bleed system. Floatation cylinder device (29) is of sufficient volume to keep the leaking connection (28) or alternatively valve (18) above the water level. The floatational end caps (30) are connected to the floatation cylinder device (29) by slim joints (31), so that much airflow can pass through, but but the end caps and cylinder insulate the joint from crashing waves.

Figure 17 is a variation of the floating air bleeding system where leaking joint (28) or alternatively air valve (18) is encapsulated in floating bouy (32). Air bleed holes (33) also ensures the leaking joint (28) always has access to air and does not uptake water. As well, the bouy protects the valve or joint from waves crashing in by not being directly in line.

Figure 1



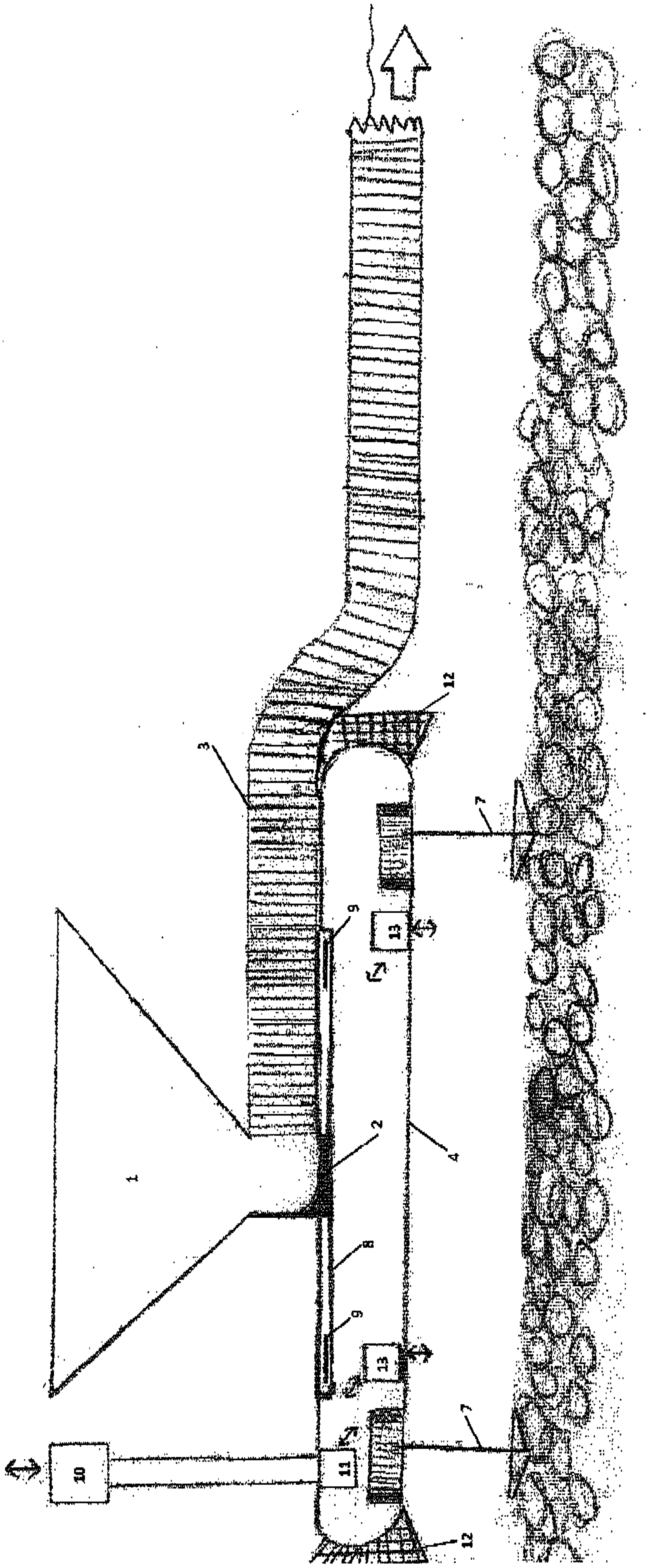


Figure 2

Figure 3a

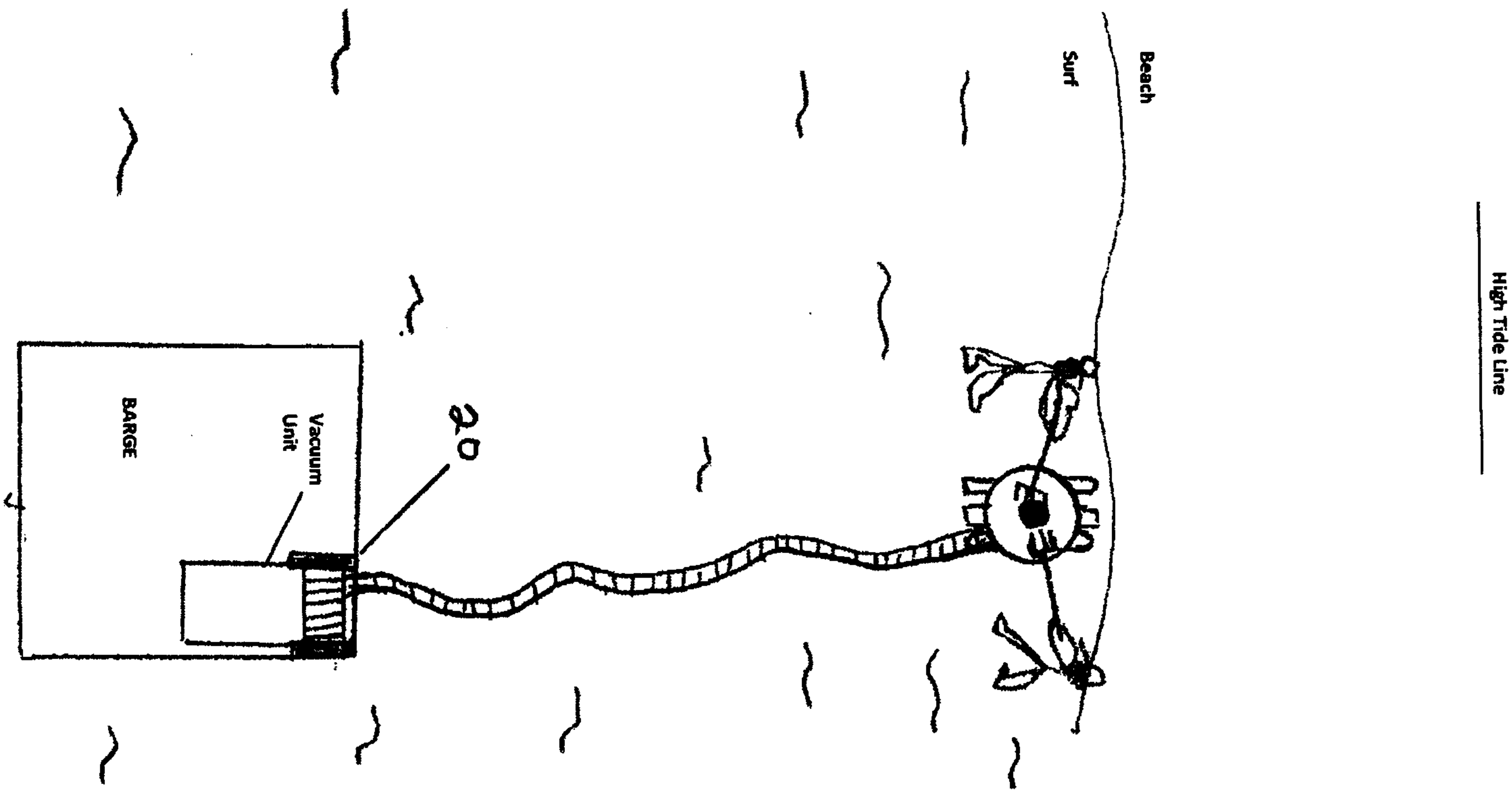


Figure 3b

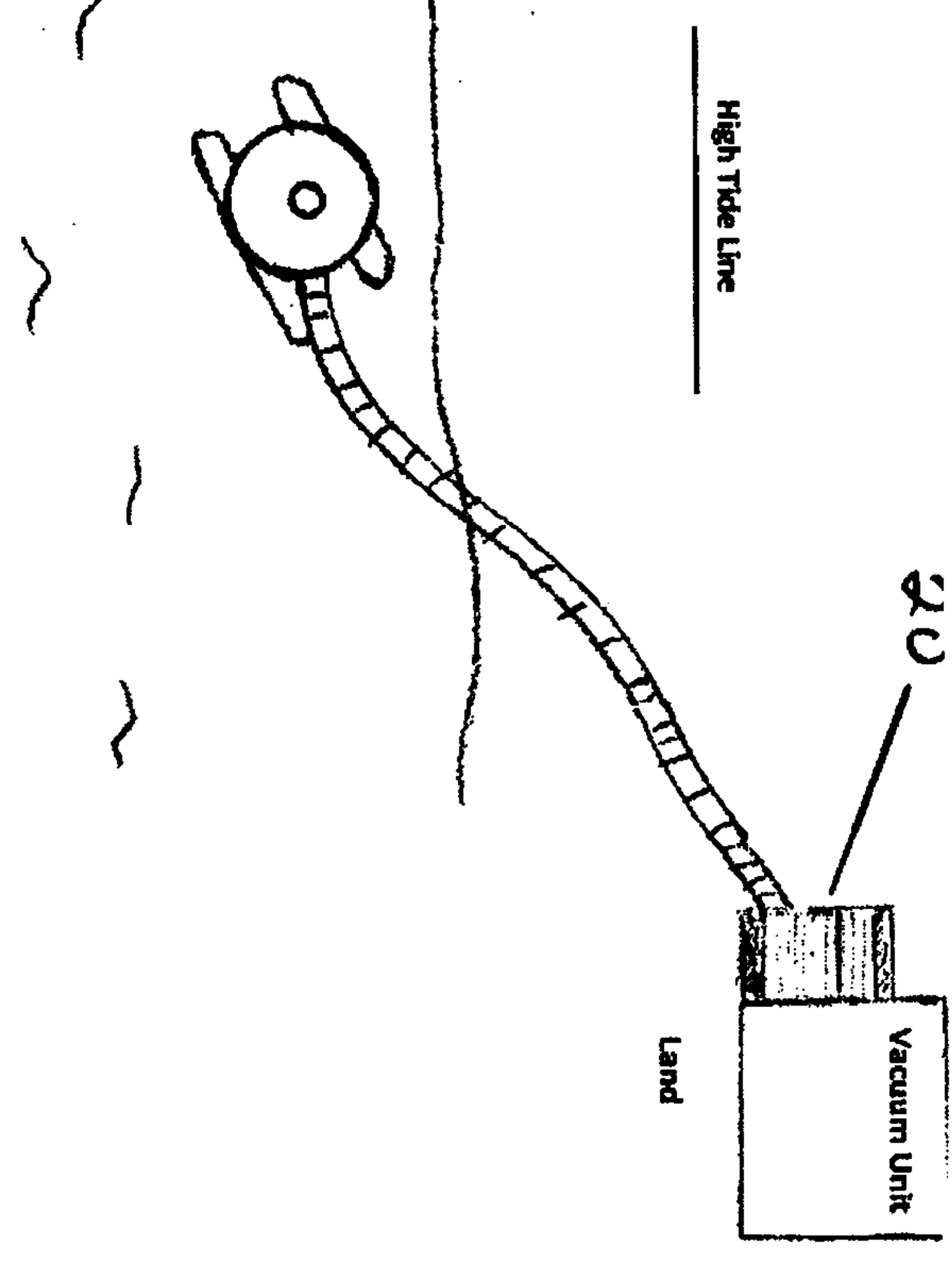


Figure 3c

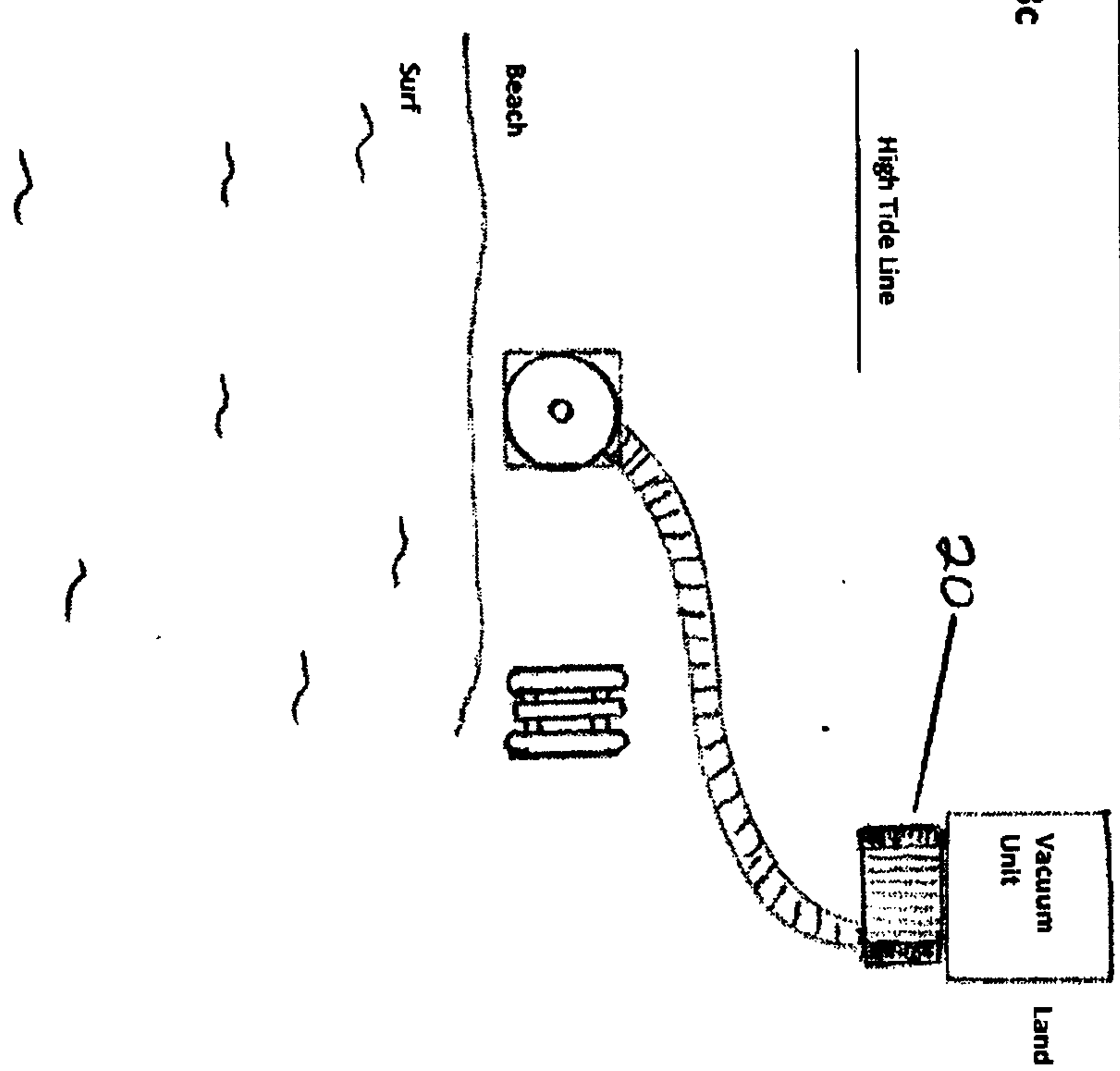


Figure 3d

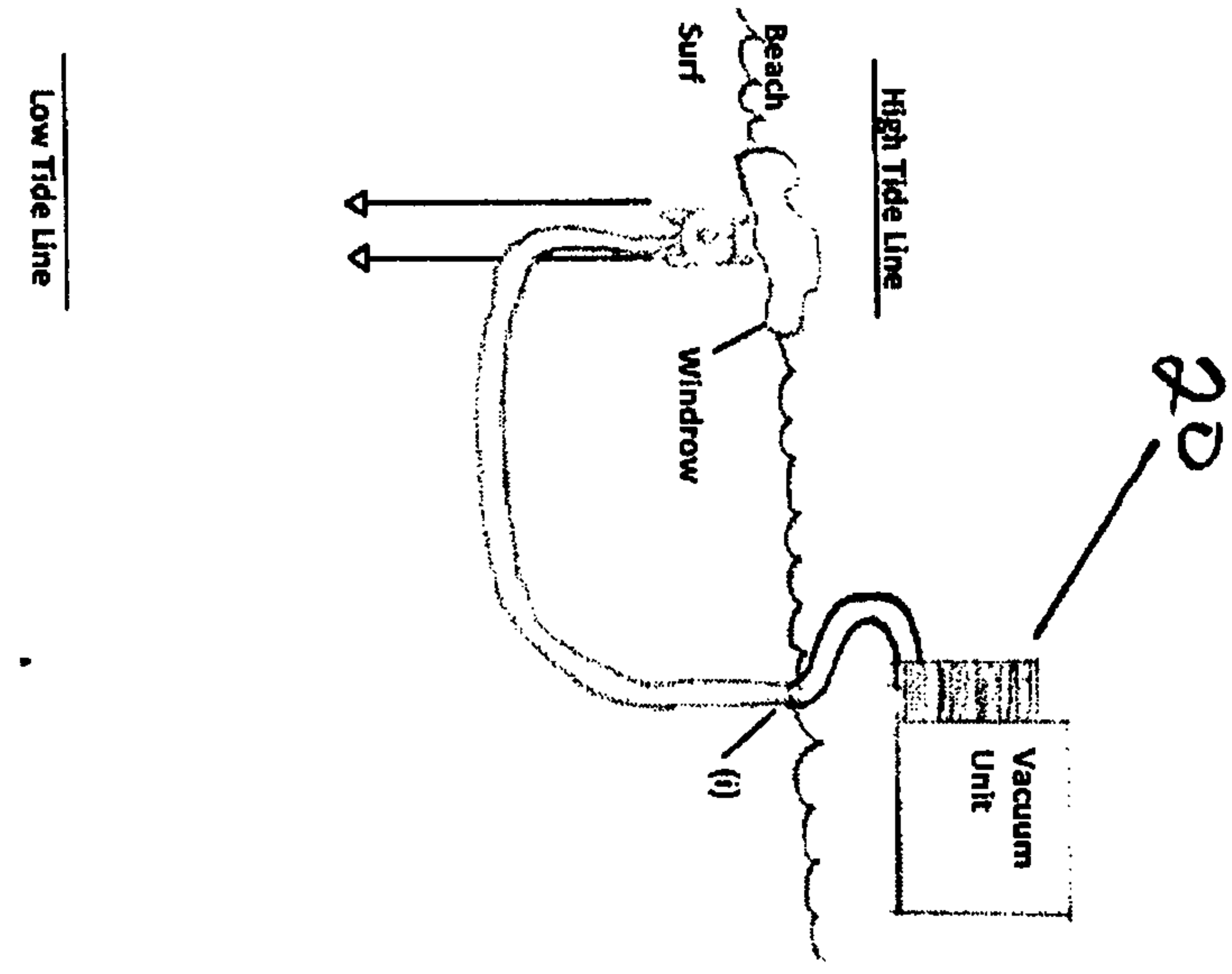
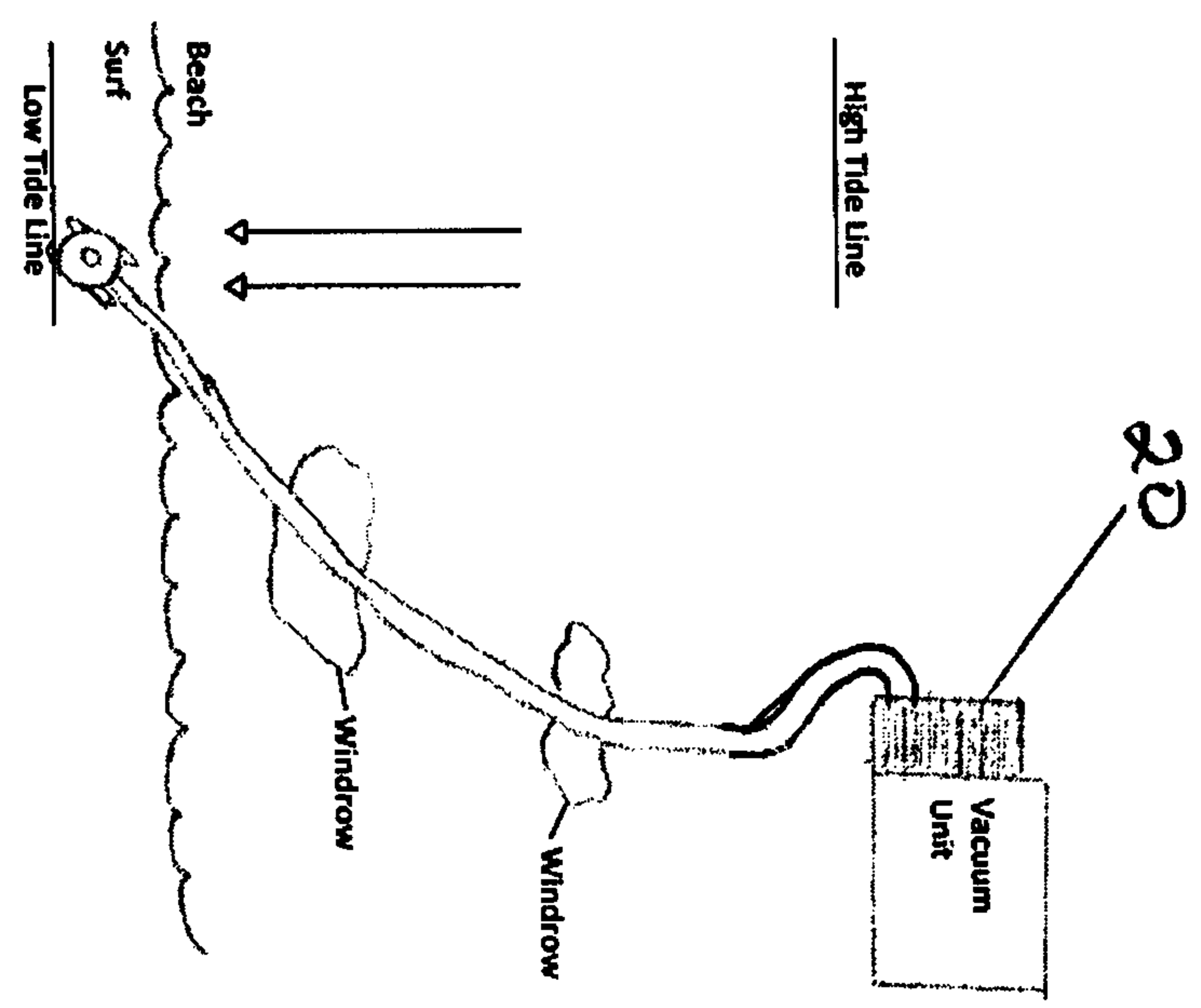


Figure 3e



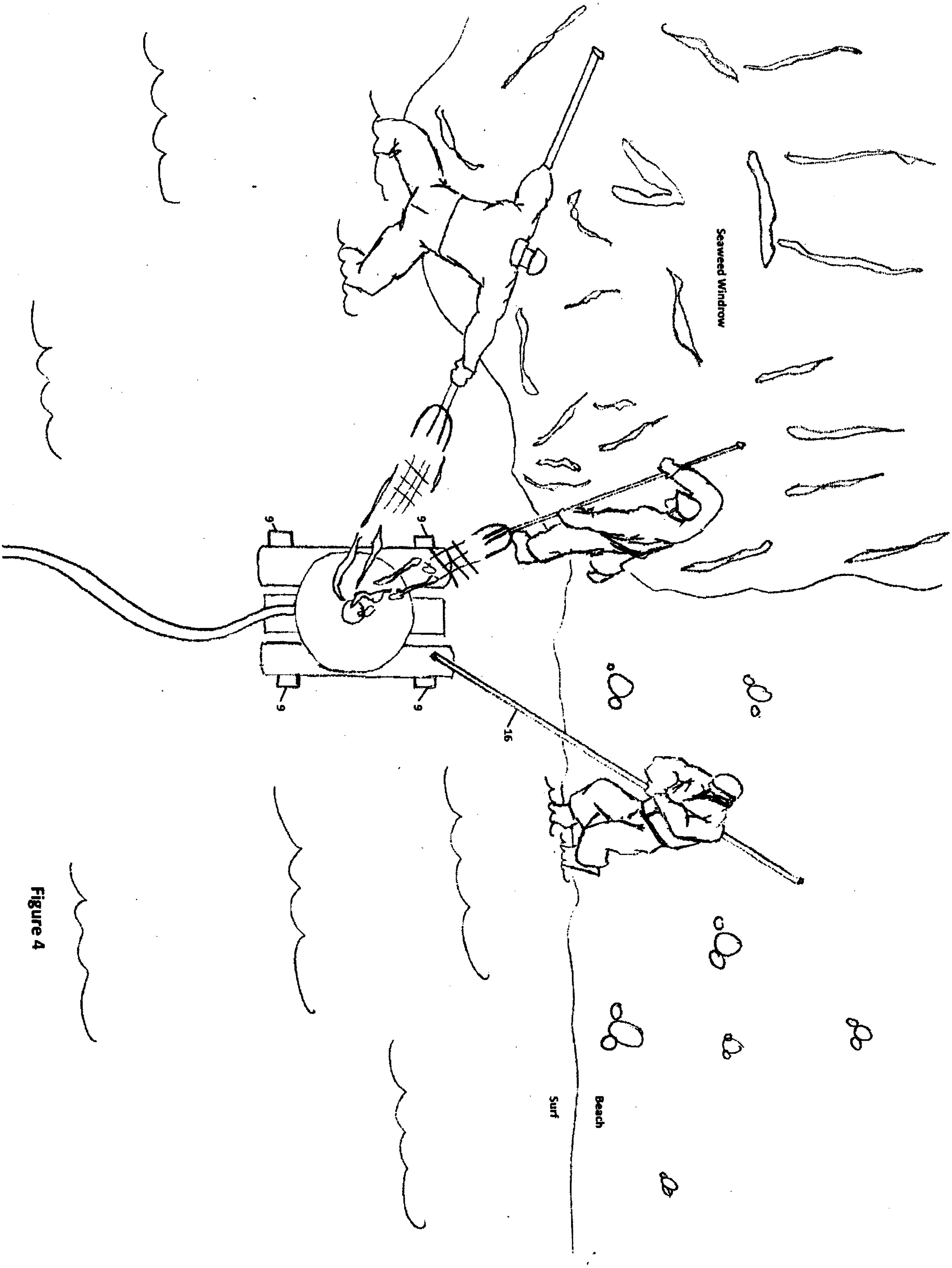
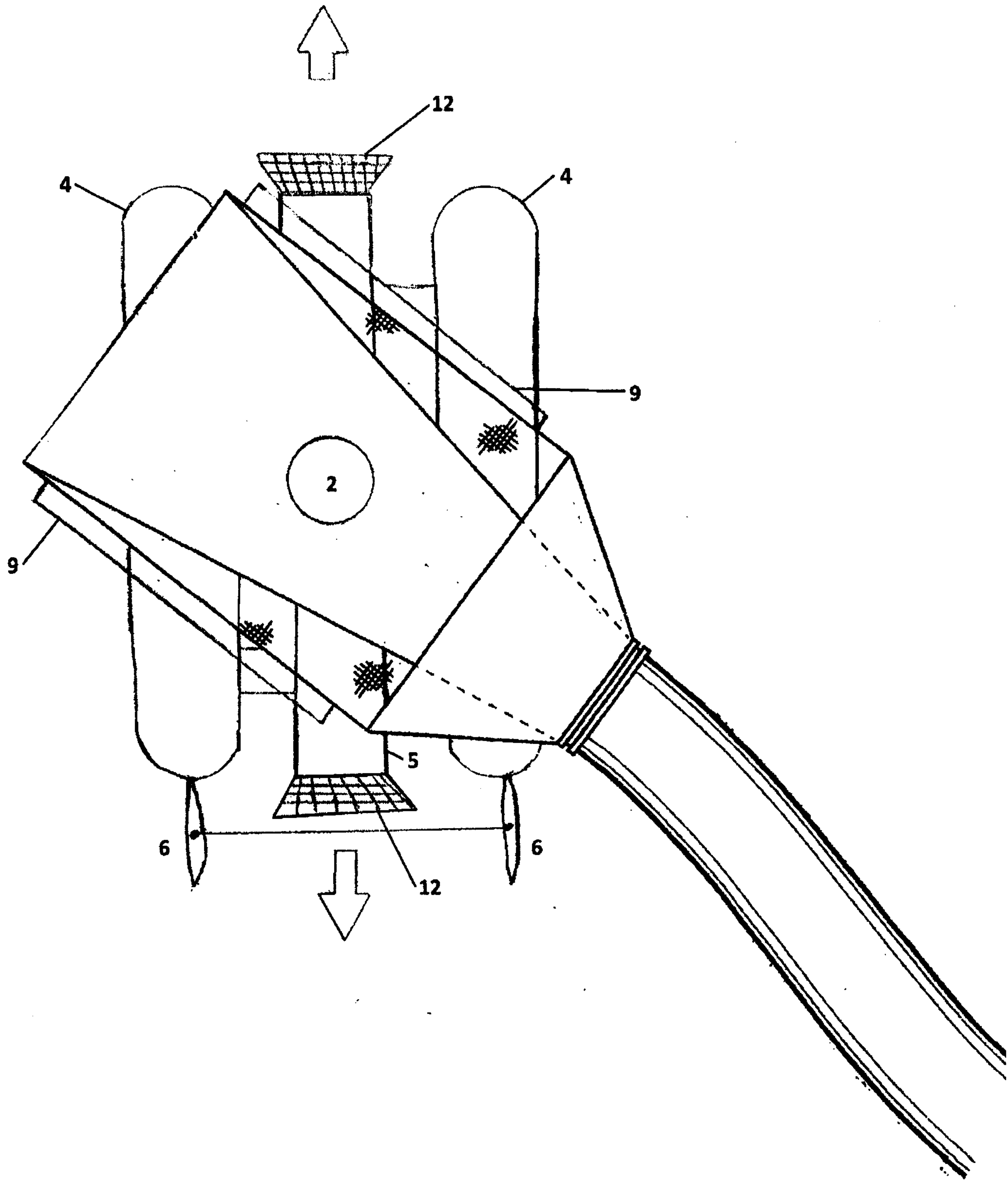


Figure 4

Figure 5



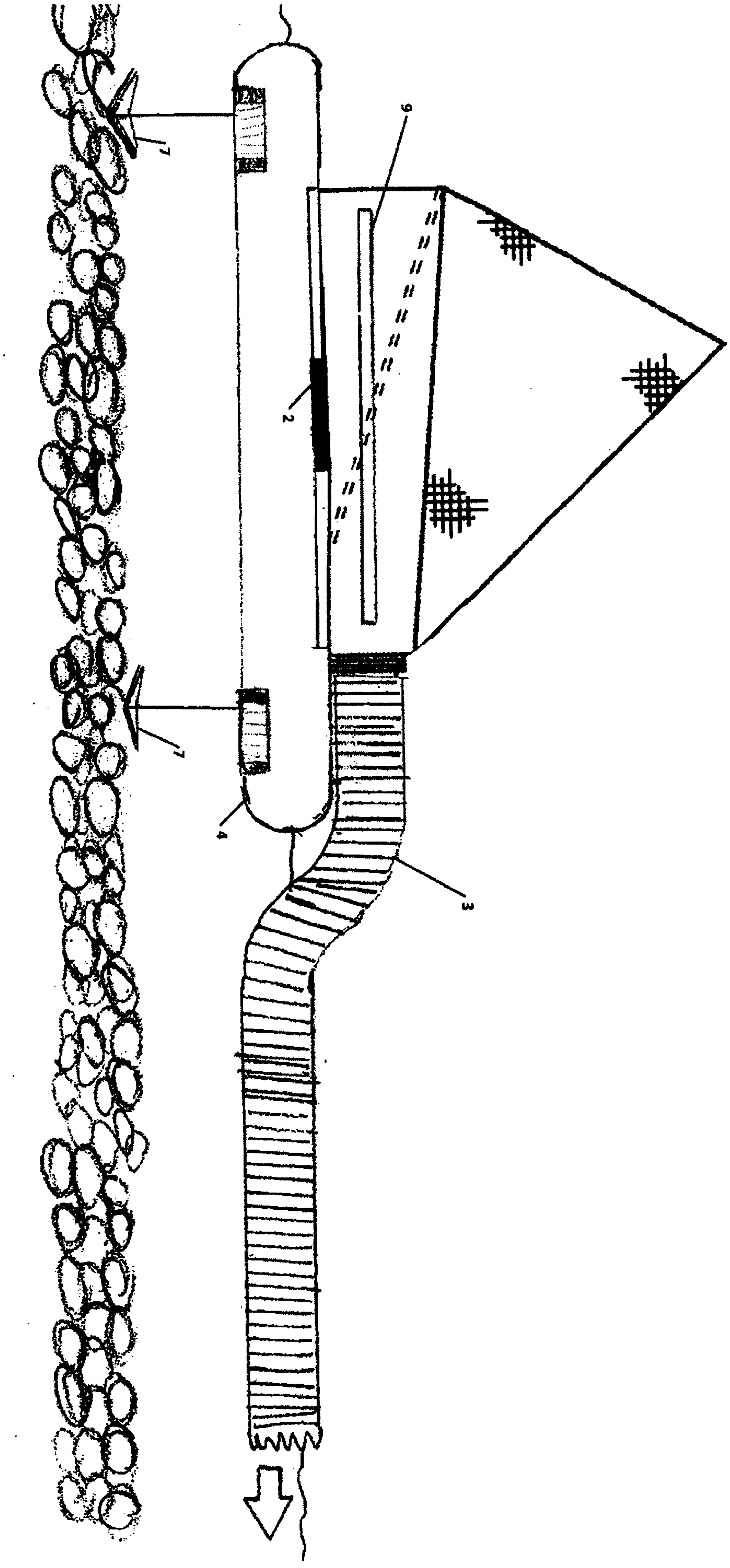


Figure 6

Figure 7

Figure 8

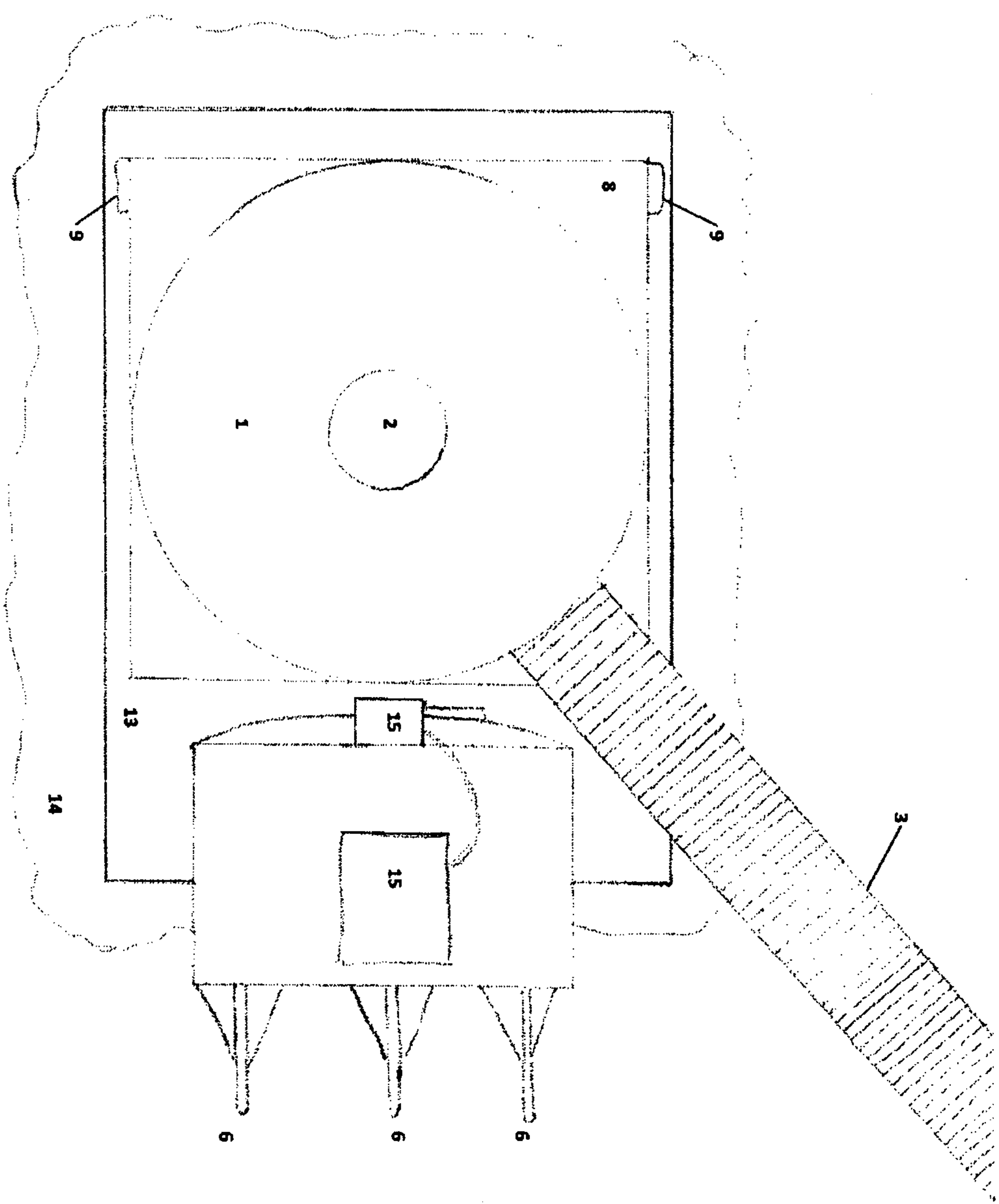


Figure 9

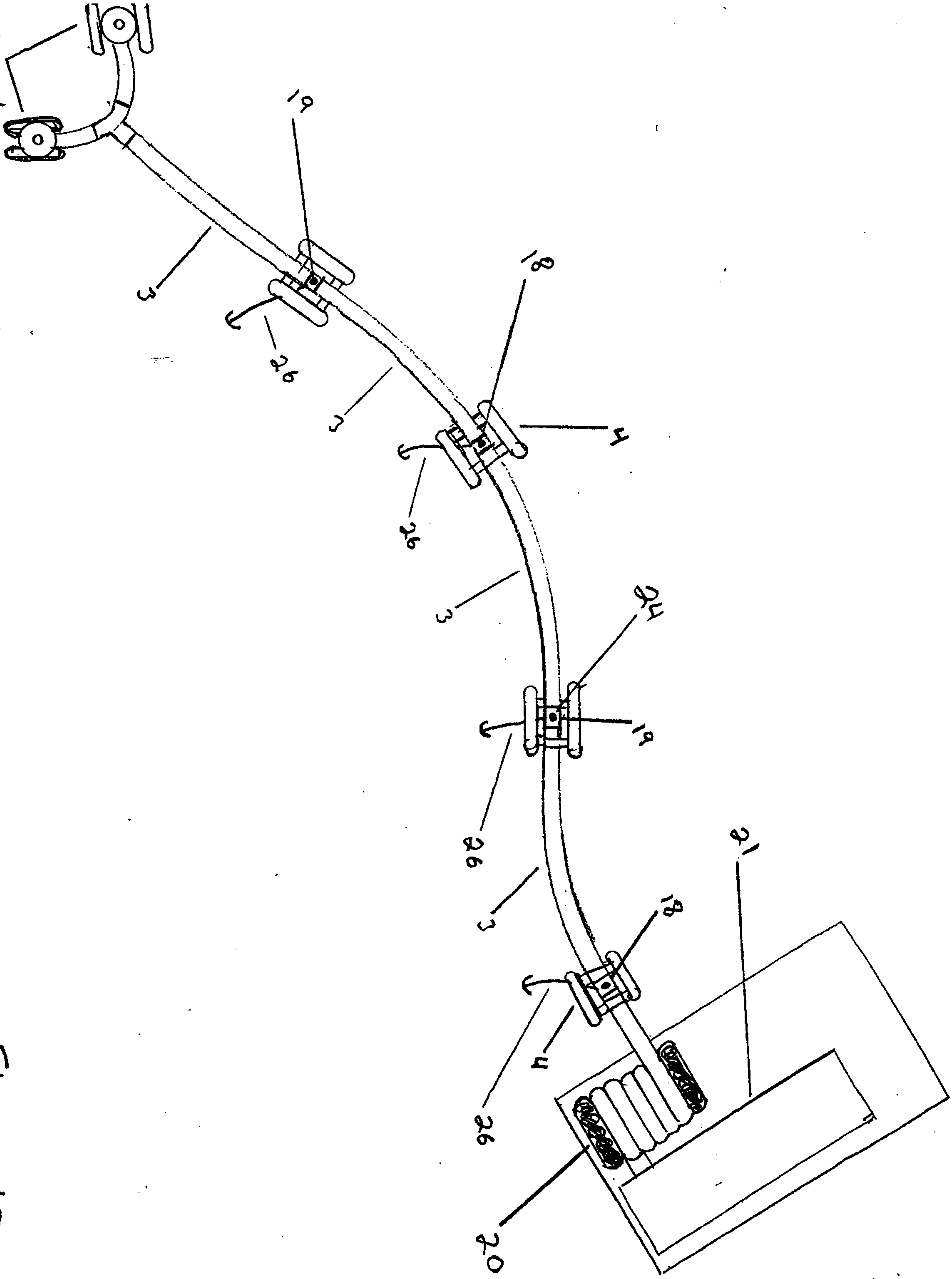


Figure 10

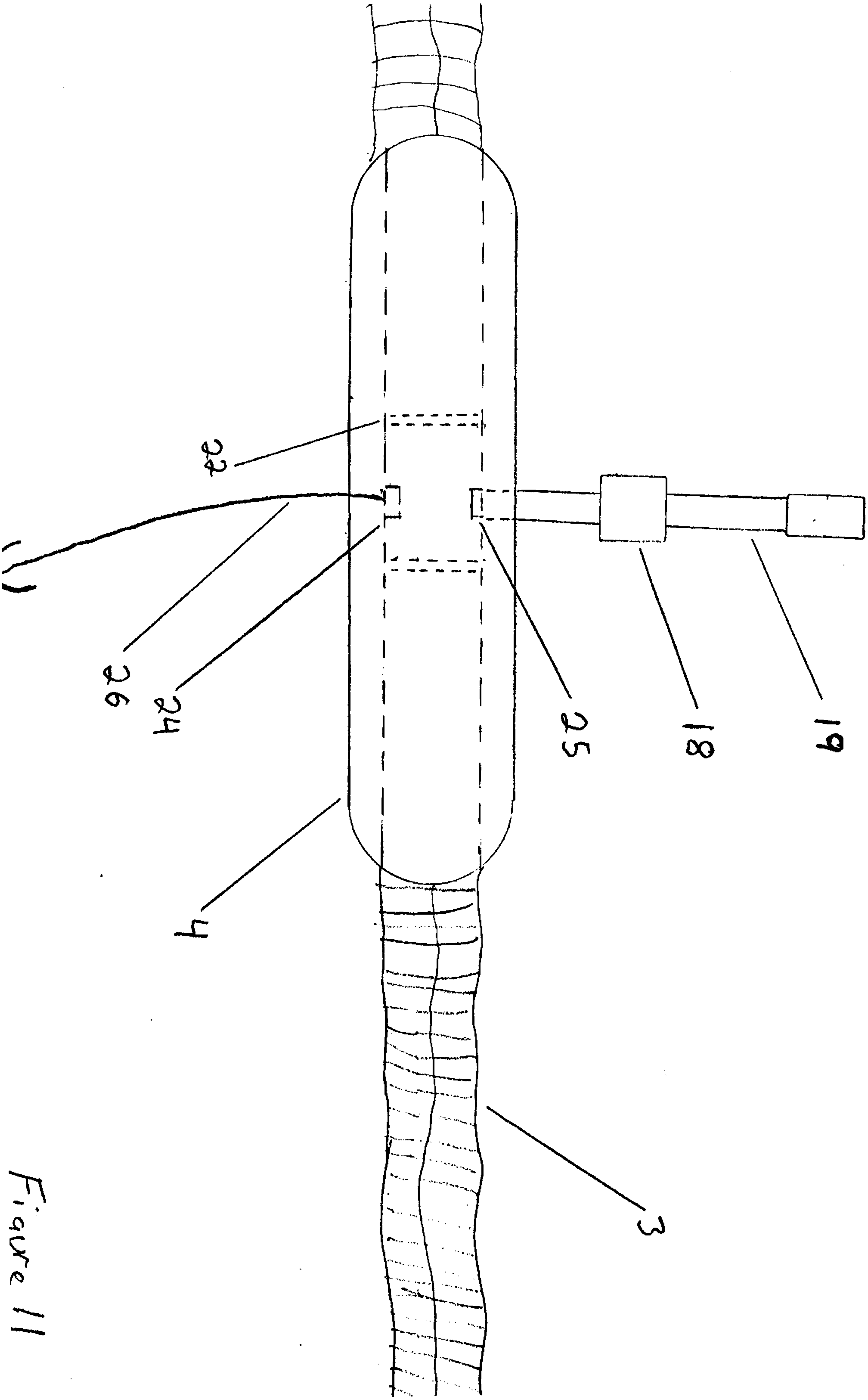


Figure 11

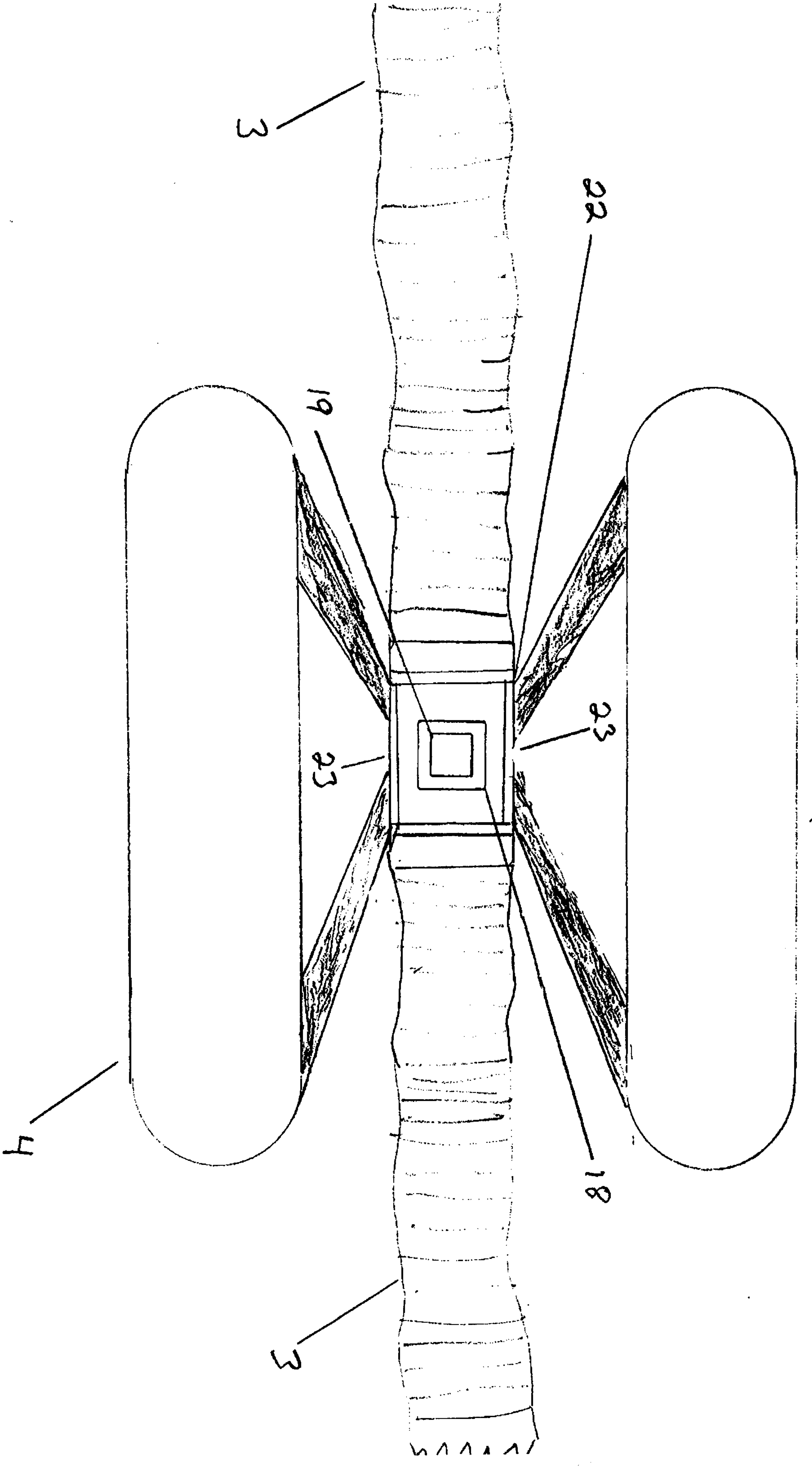


Figure 12

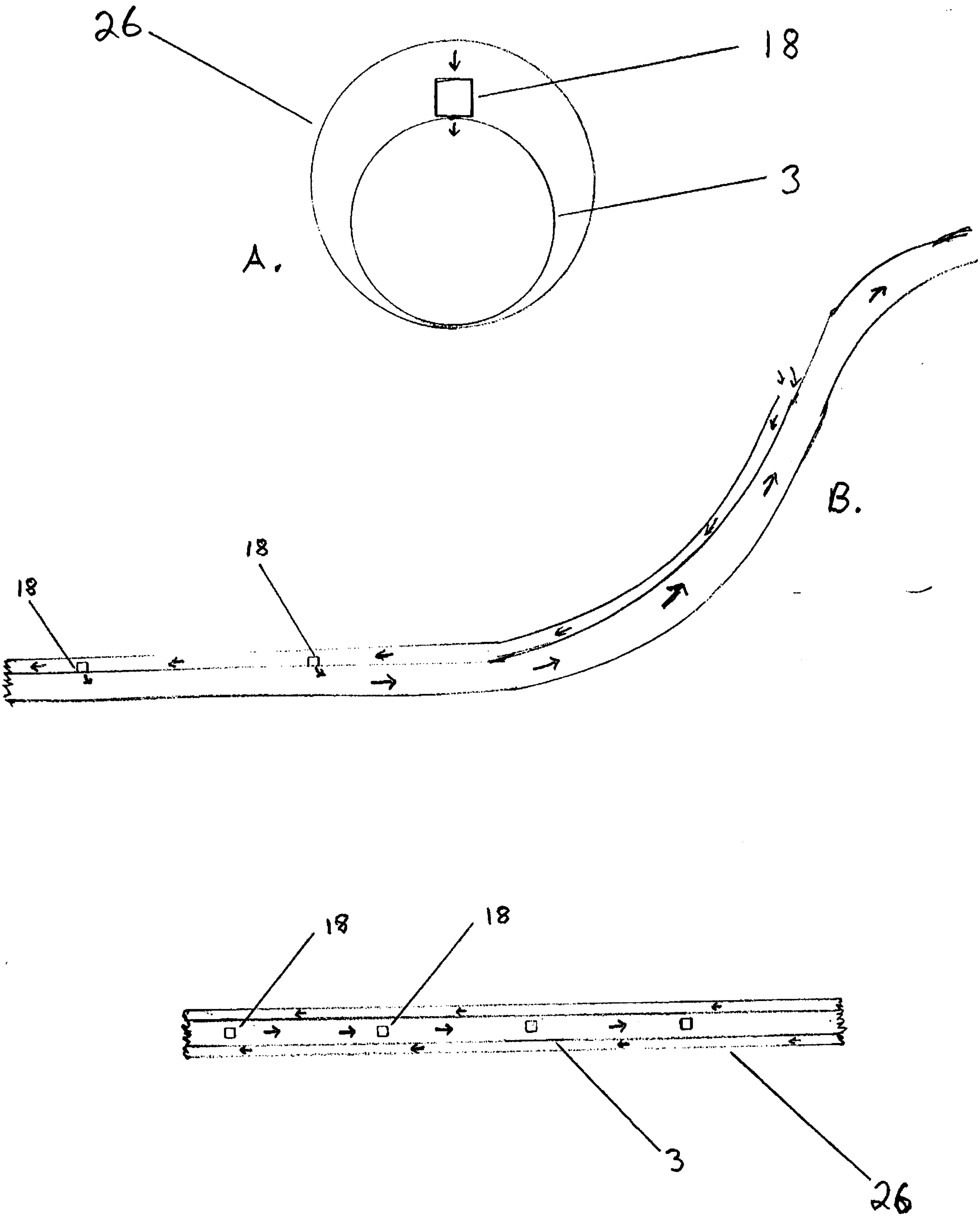


Figure 13

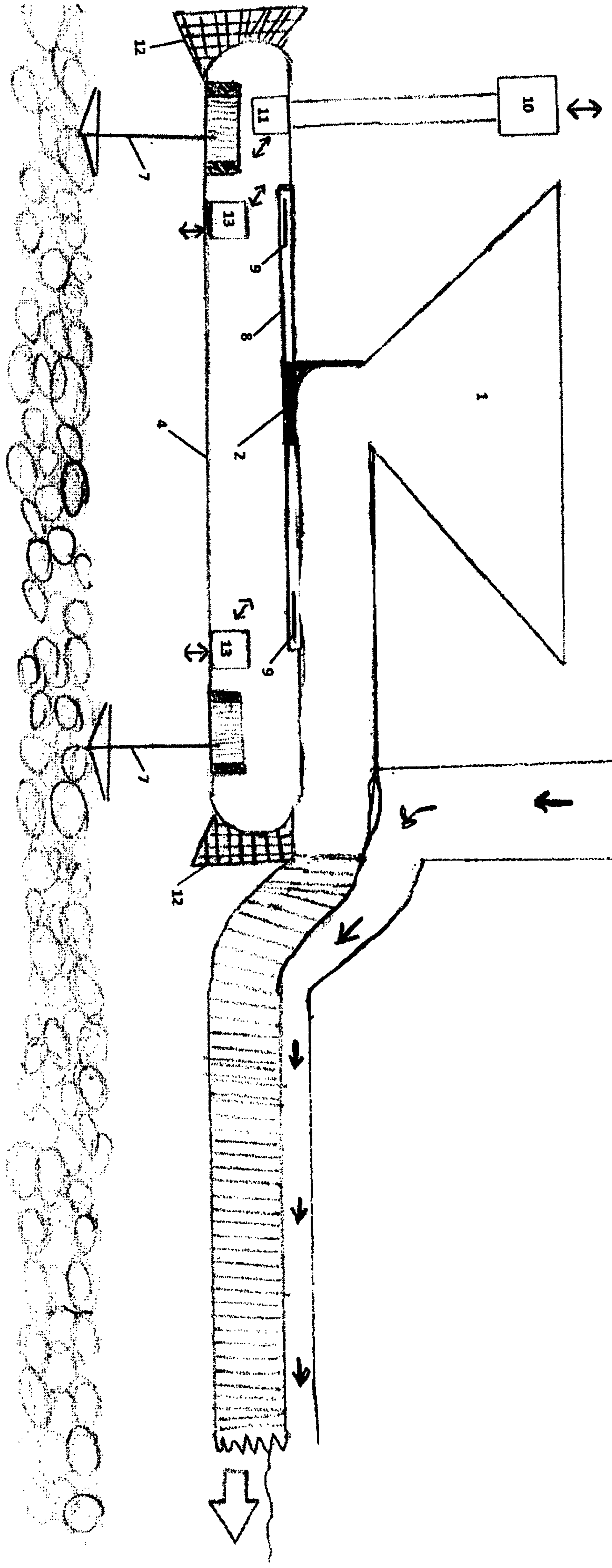


Figure 14

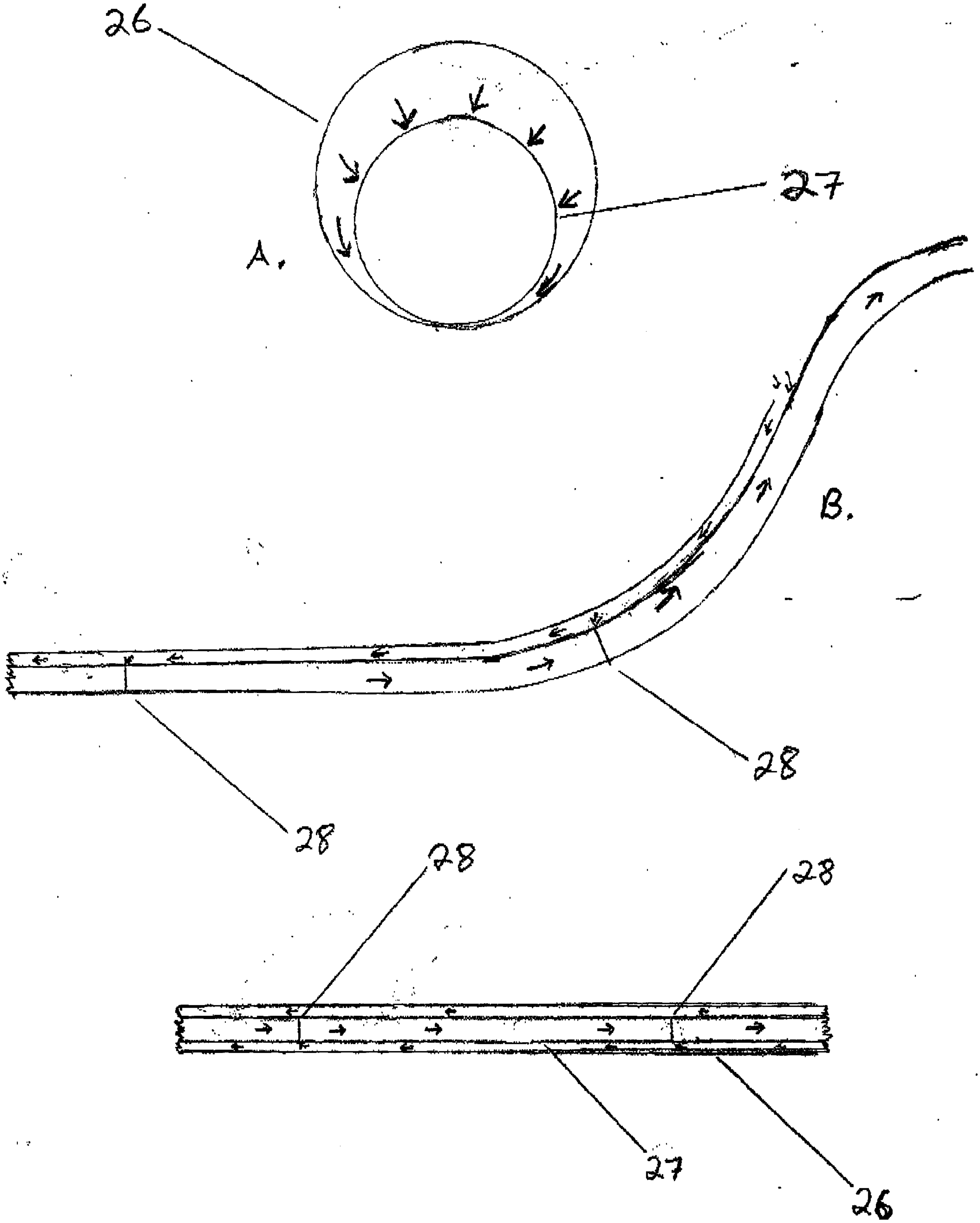


Figure 15

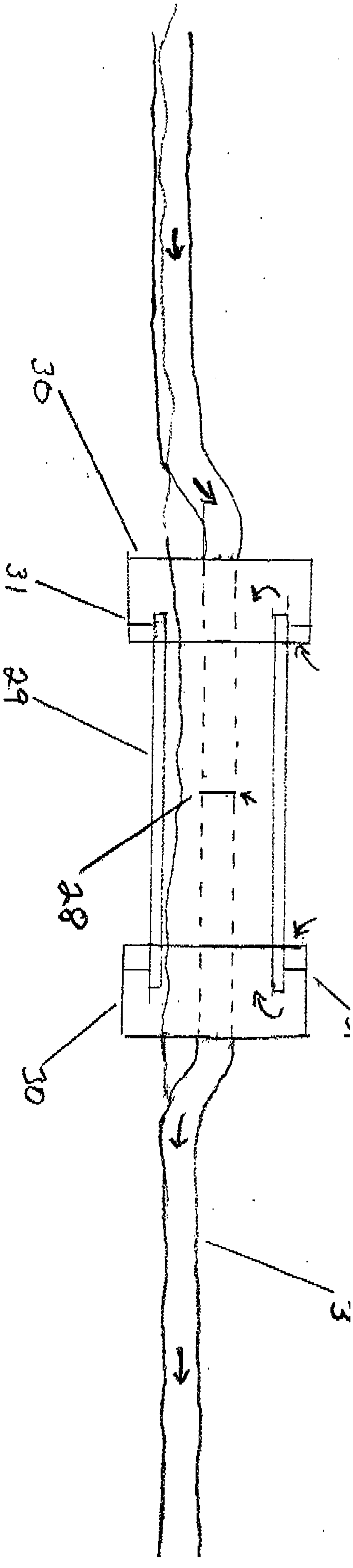


Figure 16

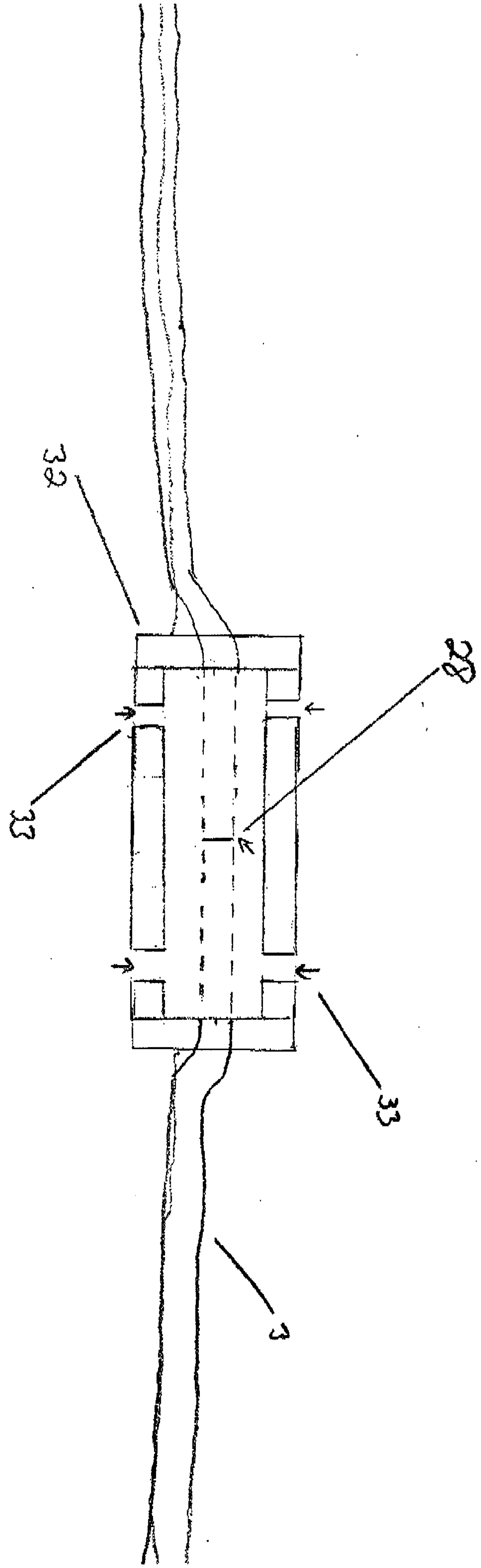
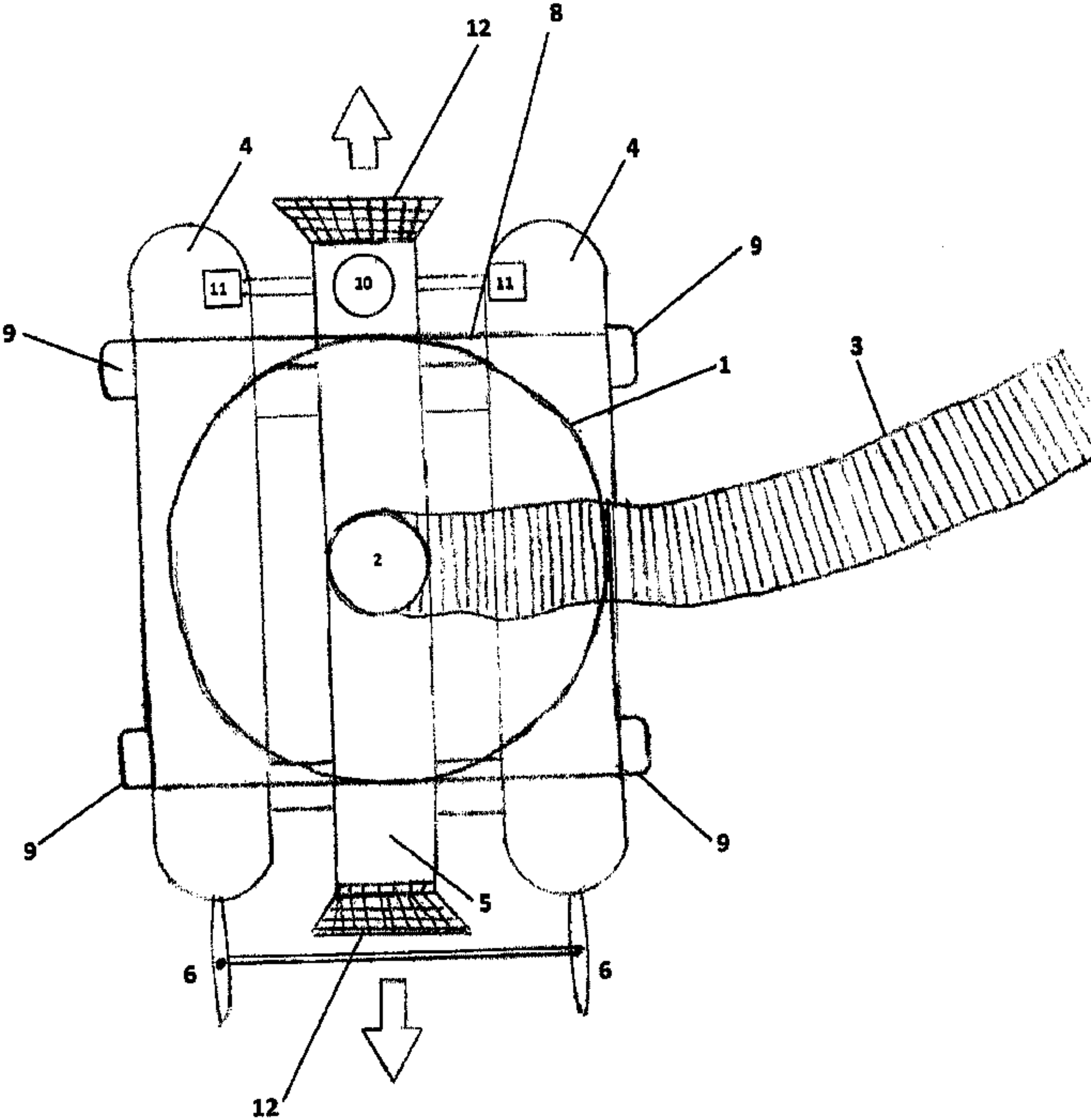


Figure 17



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