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(71) Applicant(s):
Bobby Premarajan Amarasingam
Sunny Croft, 67 Portway, WELLS, Somerset, BA5 2BQ, United Kingdom

(72) Inventor(s):
Bobby Premarajan Amarasingam

(74) Agent and/or Address for Service:
Bobby Premarajan Amarasingam
Sunny Croft, 67 Portway, WELLS, Somerset, BA5 2BQ, United Kingdom

(51) INT CL:
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(56) Documents Cited:
GB 0431442 A **WO 2008/024077 A1**
DE 003902367 A1 **US 3971330 A**
GB191129184A

(58) Field of Search:
UK CL (Edition X) **B7V**
INT CL **B63H**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Bow rove**
Abstract Title: **Water displacement drive system**

(57) A water displacement drive system which produces jet flows of water as a result of forwards and reverse motion of a piston member 2 is disclosed. The drive system is fixed on a water vessel below the water line and comprises a forward fixed domed member 1, a rear fixed domed member 3 and a movable piston domed member 2, movable between a position where it lies within the forward domed member and a position where it surrounds the rearward domed member. Movement of the moveable piston member between the two positions producing the jet flows to provide a thrust to the vessel. The drive system may be powered manually, by use of a pendulum motion weight system (Fig 2), by use of a vertical moving dynamic piston weight system (Fig 5) or by the use of a flickable flywheel (Fig 7). The application also discloses a water displacement pump apparatus.

FIGURE 1

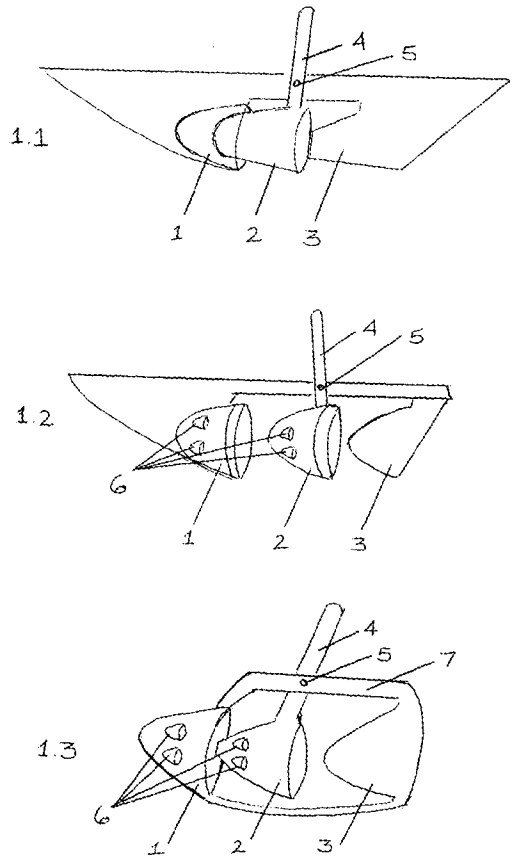

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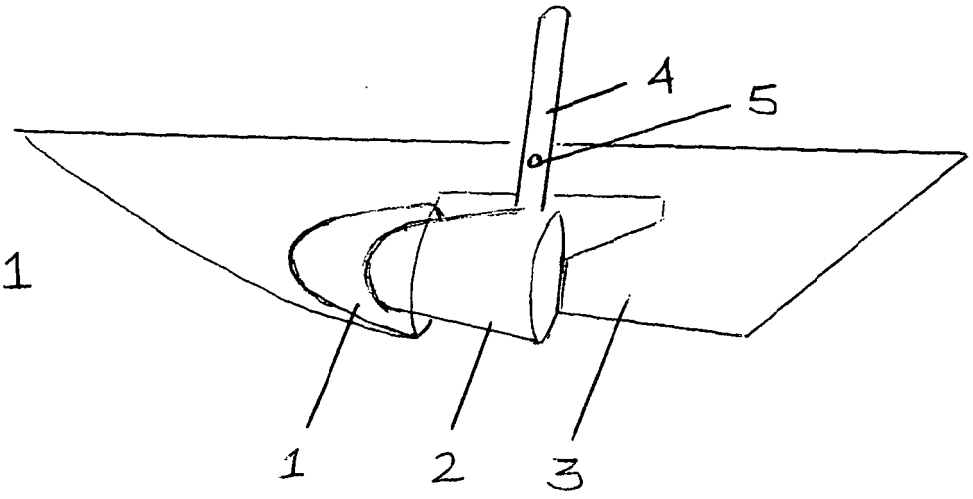
FIGURE 1

1.1



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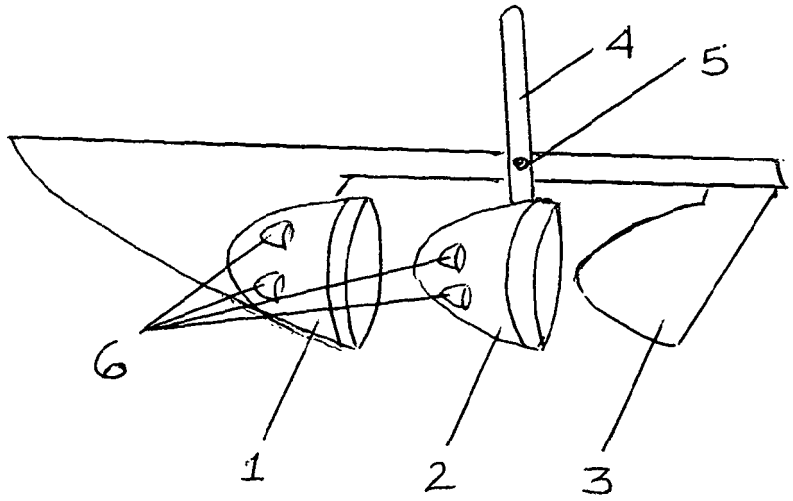

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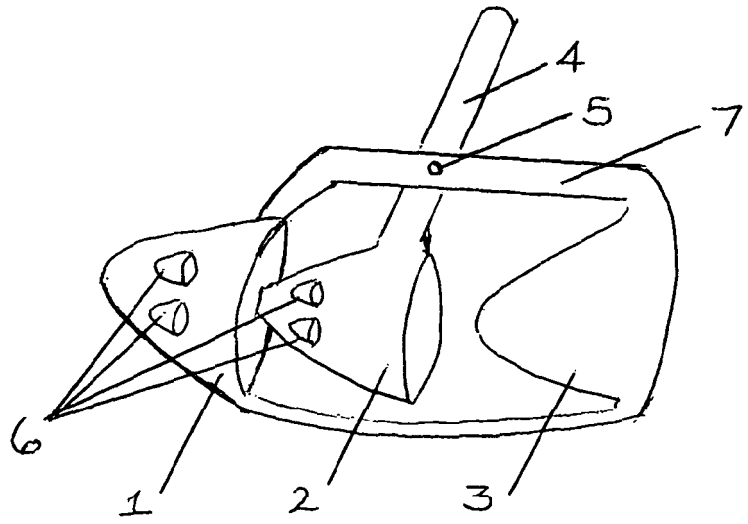


FIGURE 2.

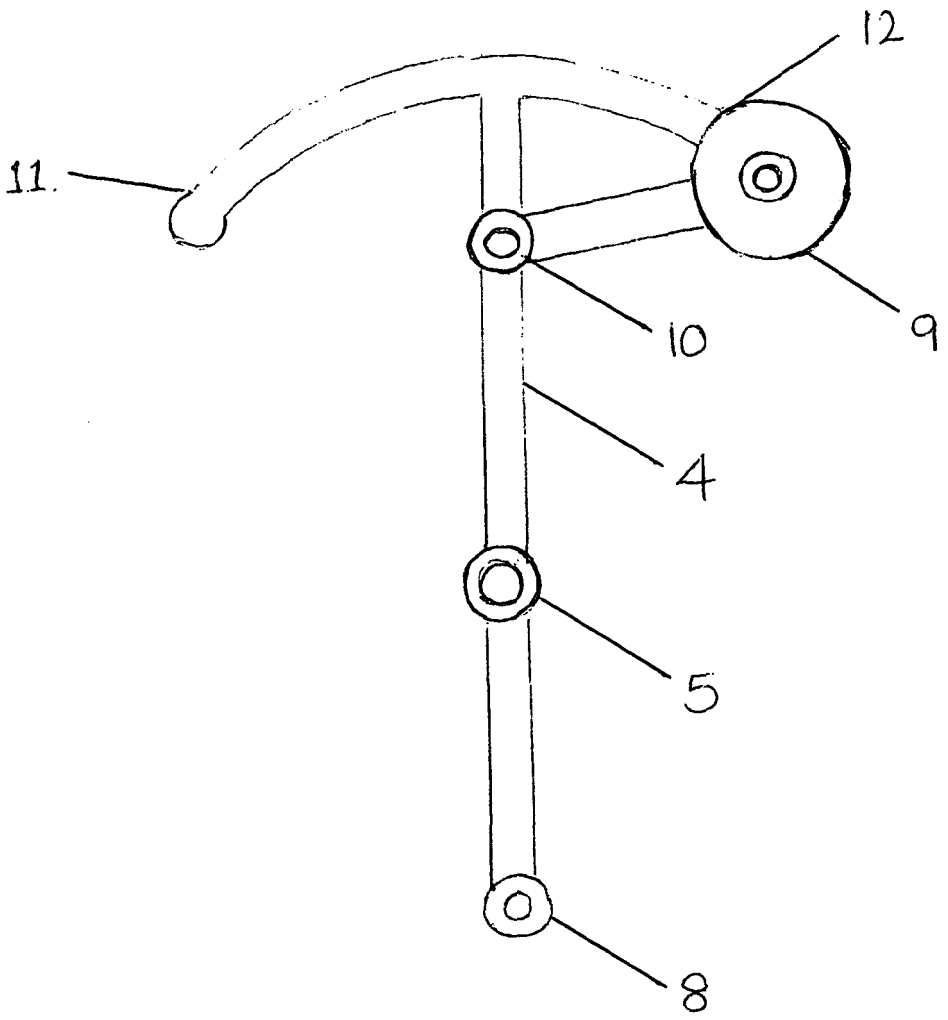


FIGURE 3.

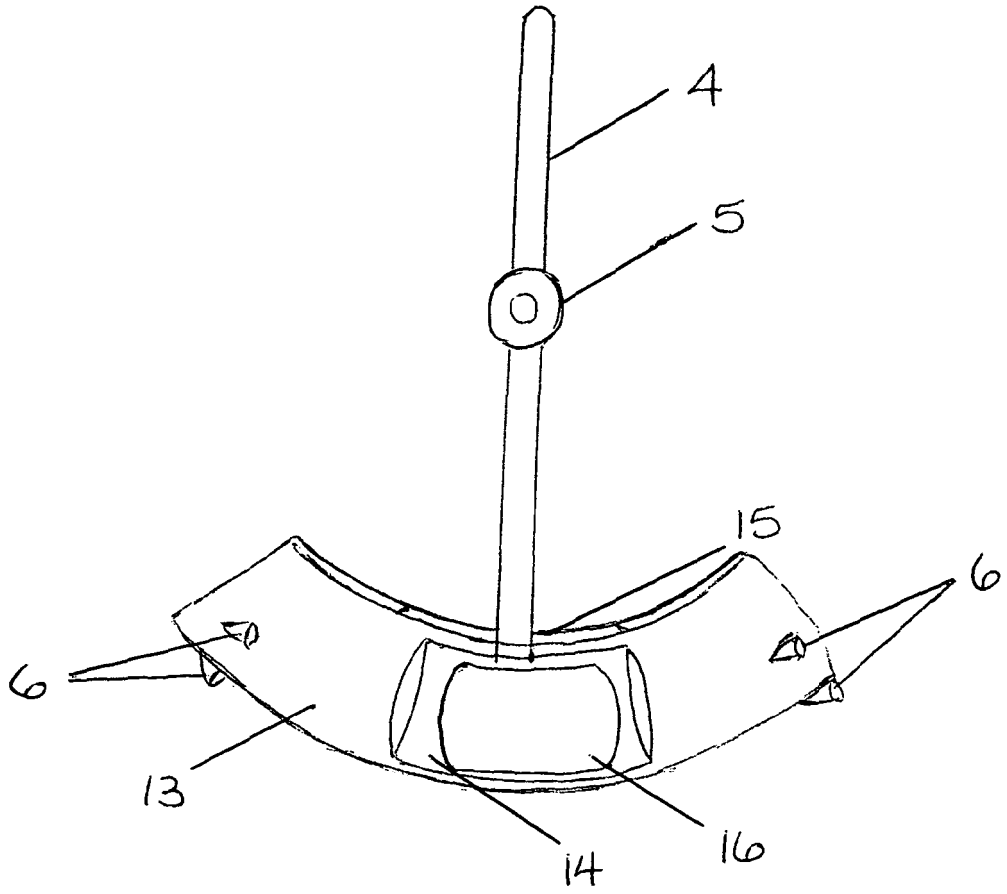


FIGURE 4.1

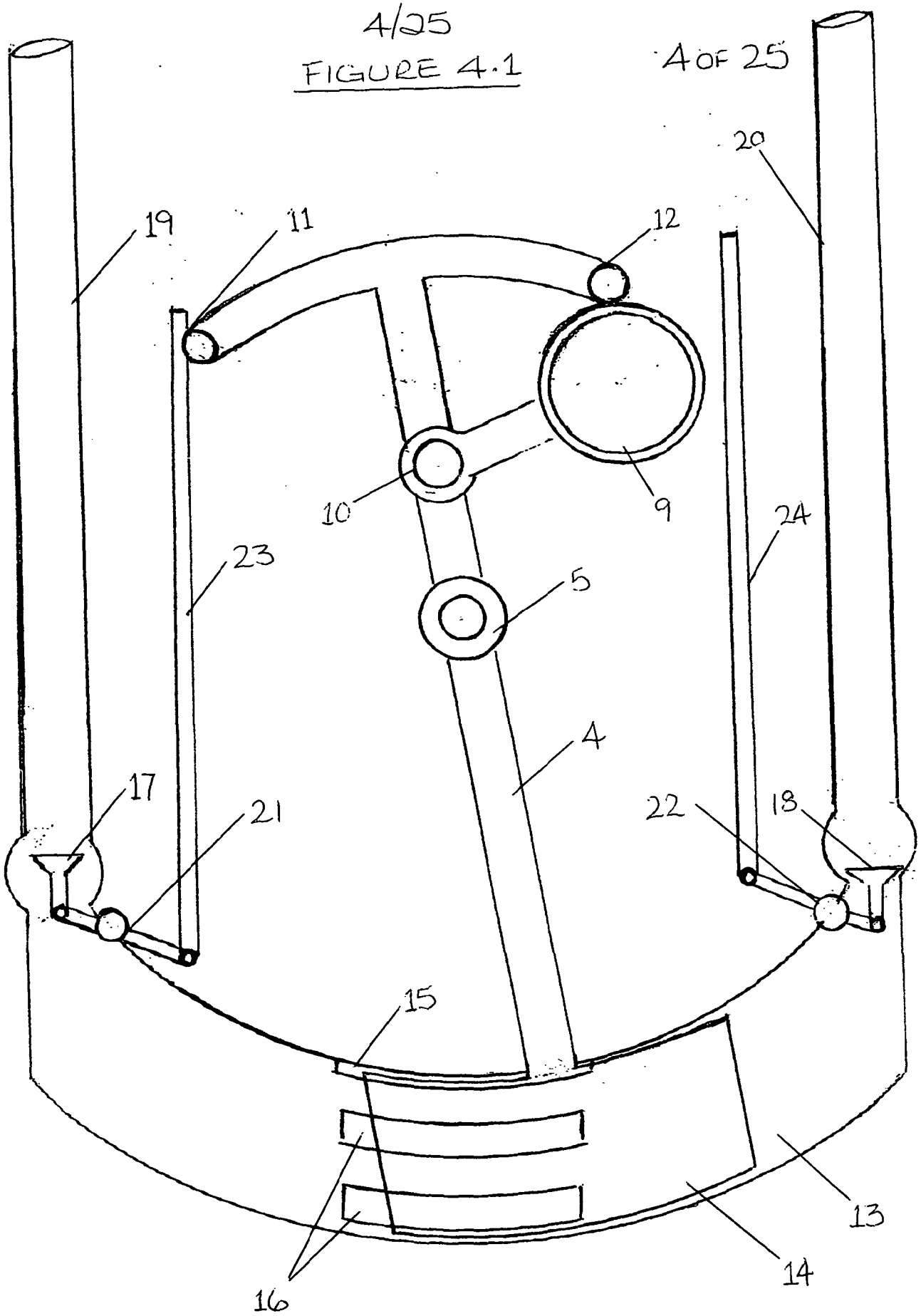


FIGURE 4.2

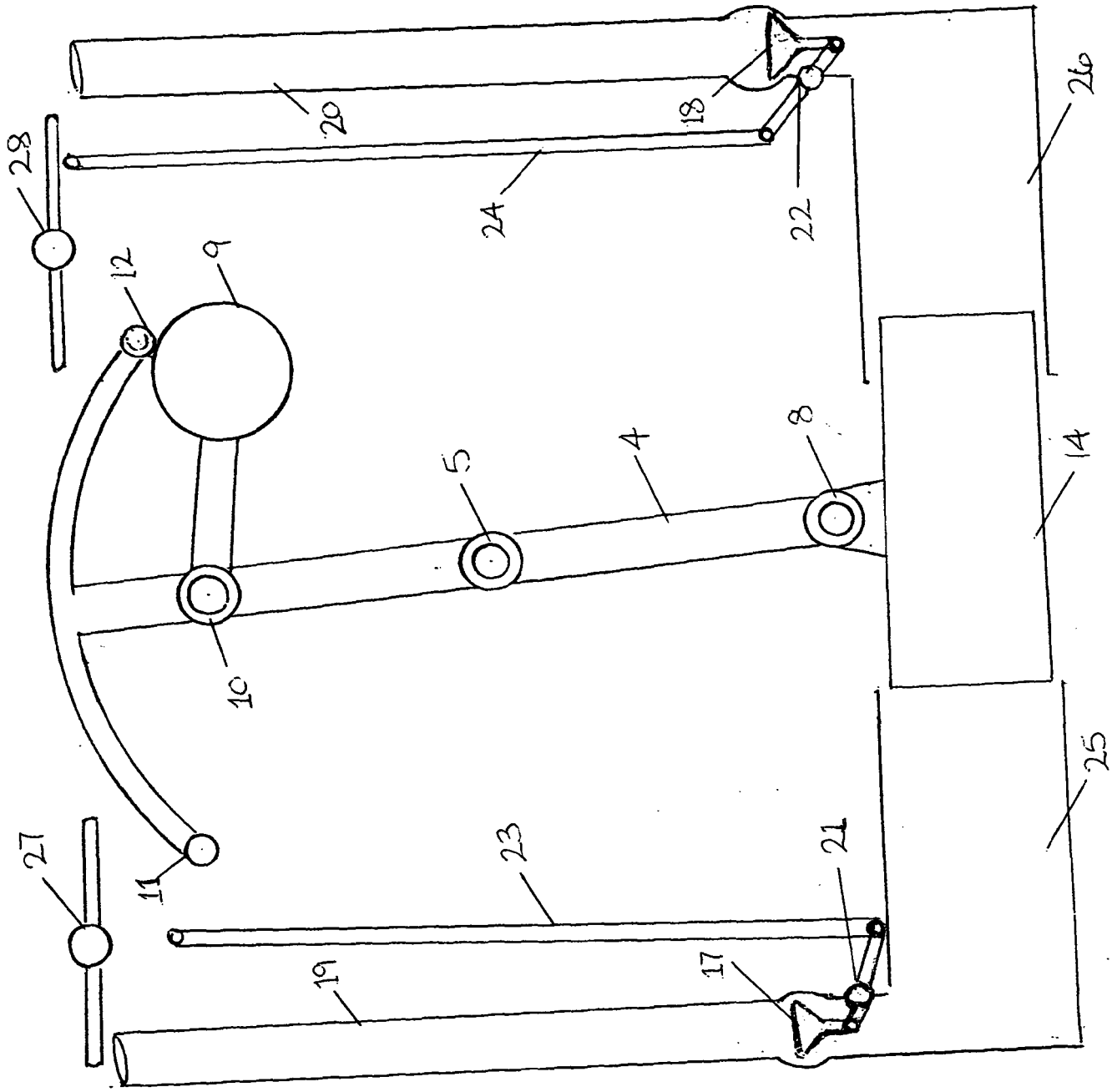


FIGURE 4.3

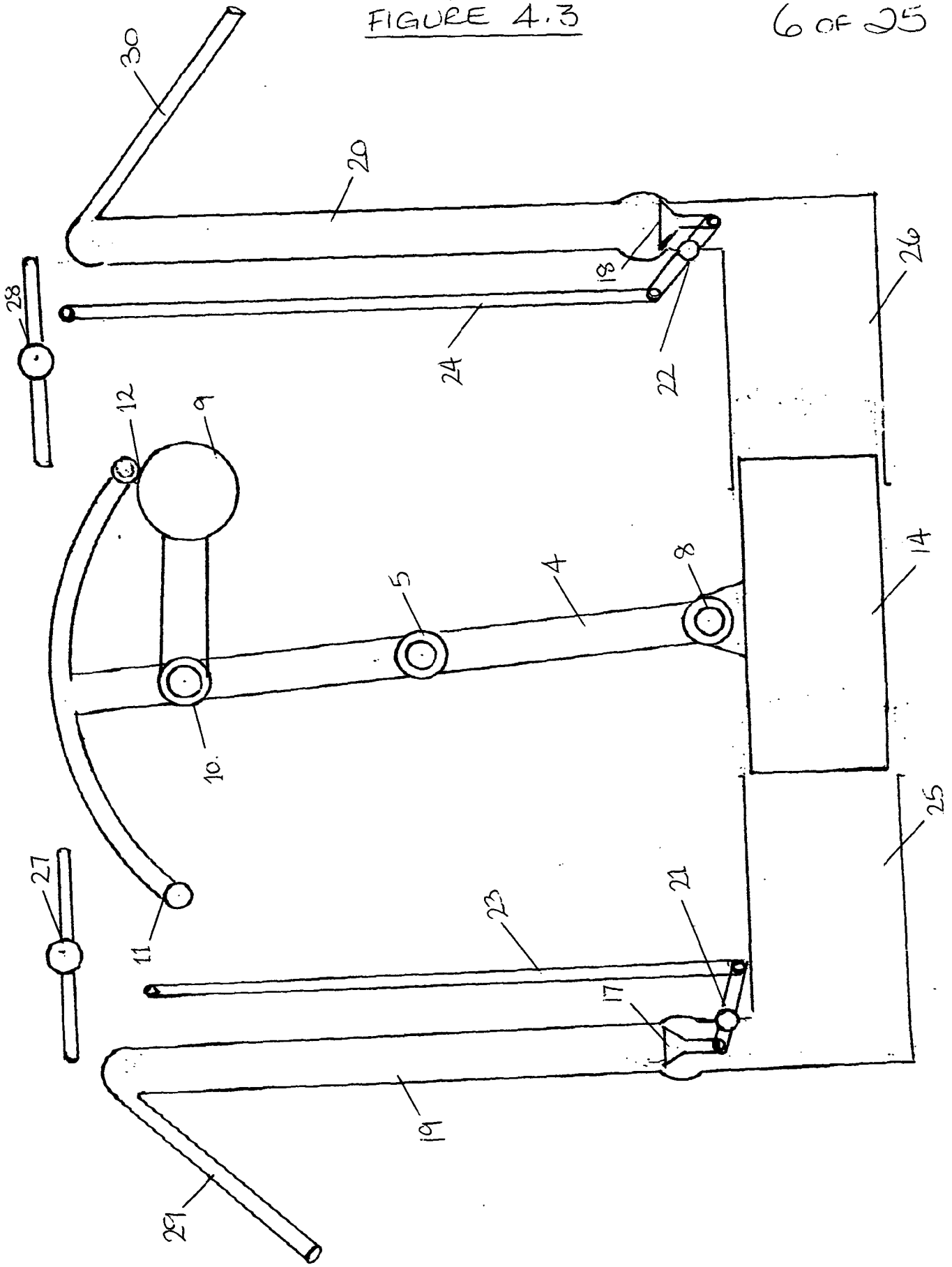
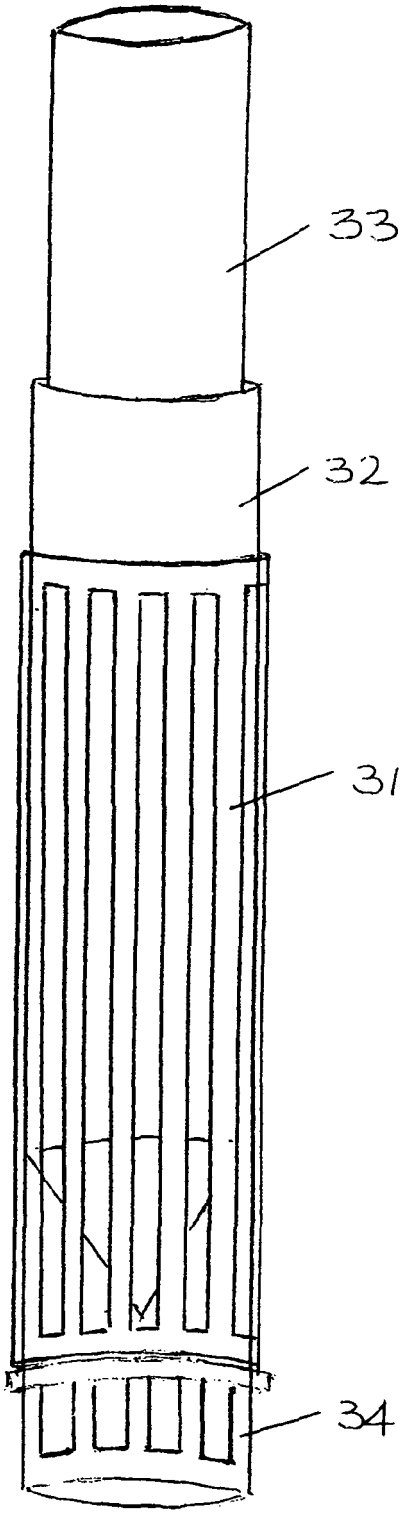


FIGURE 5·1



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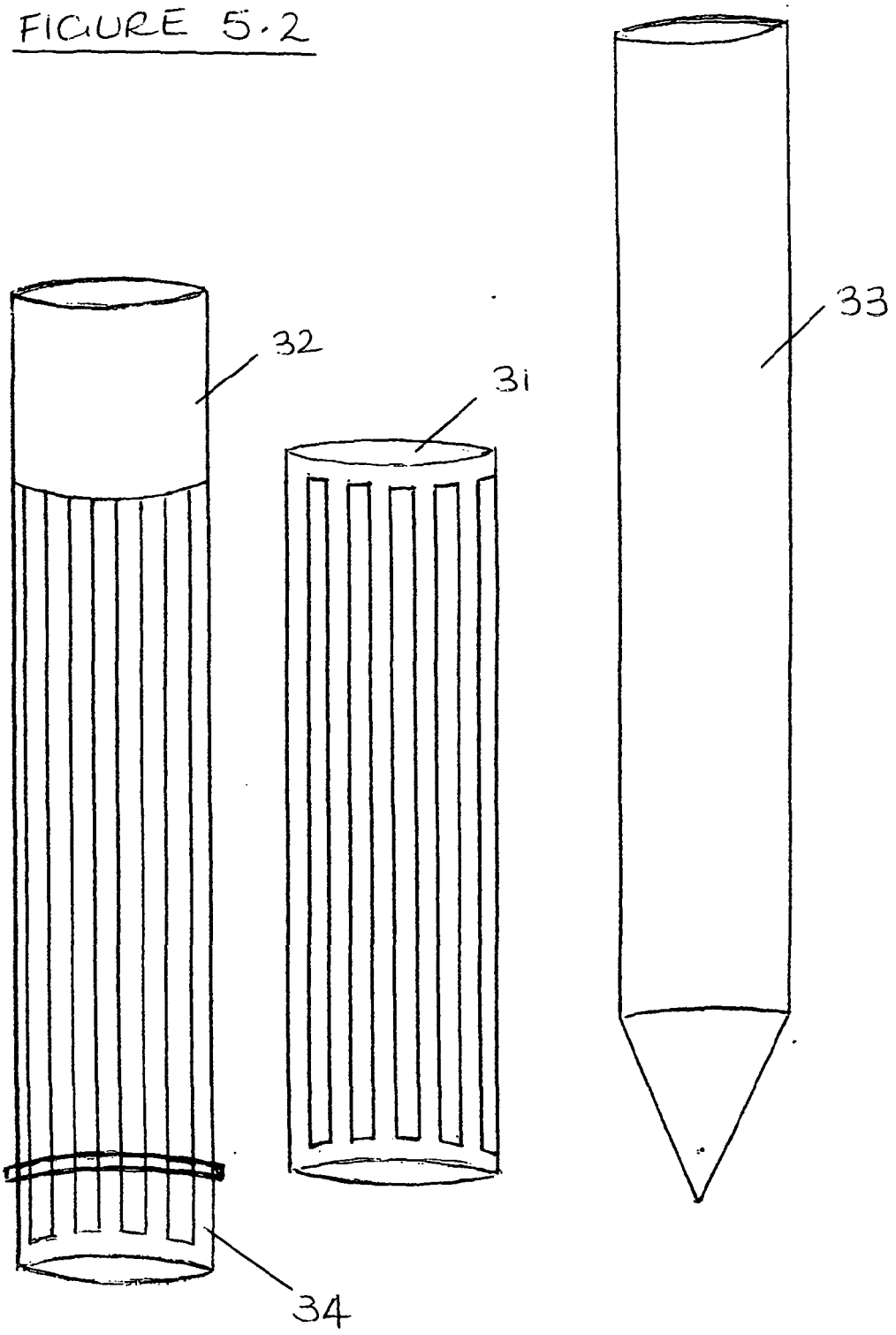


FIGURE 5.3

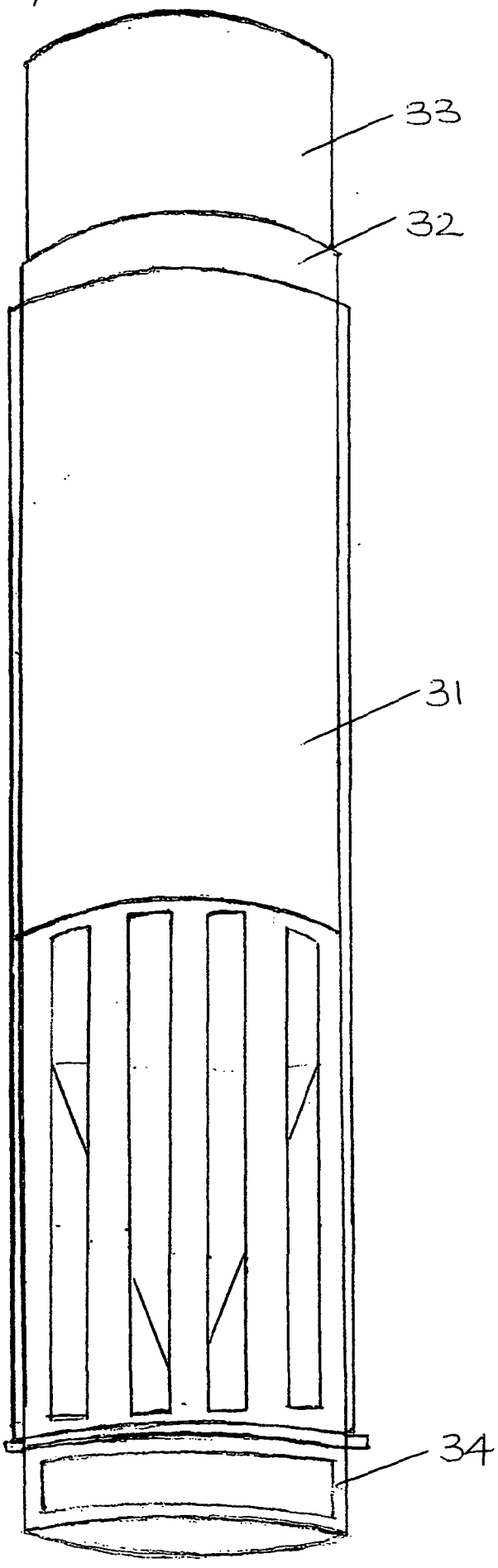


FIGURE 6-1

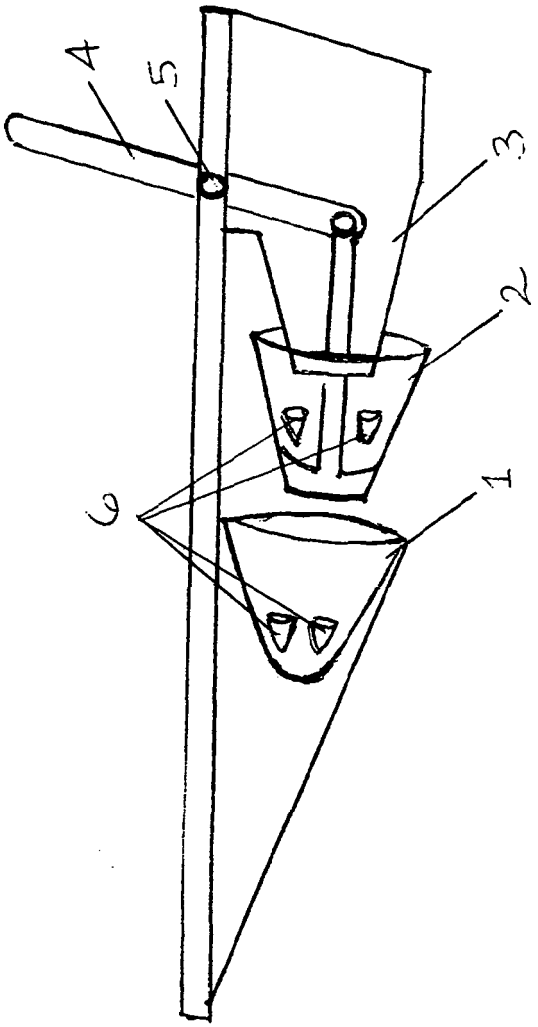


FIGURE 6.2

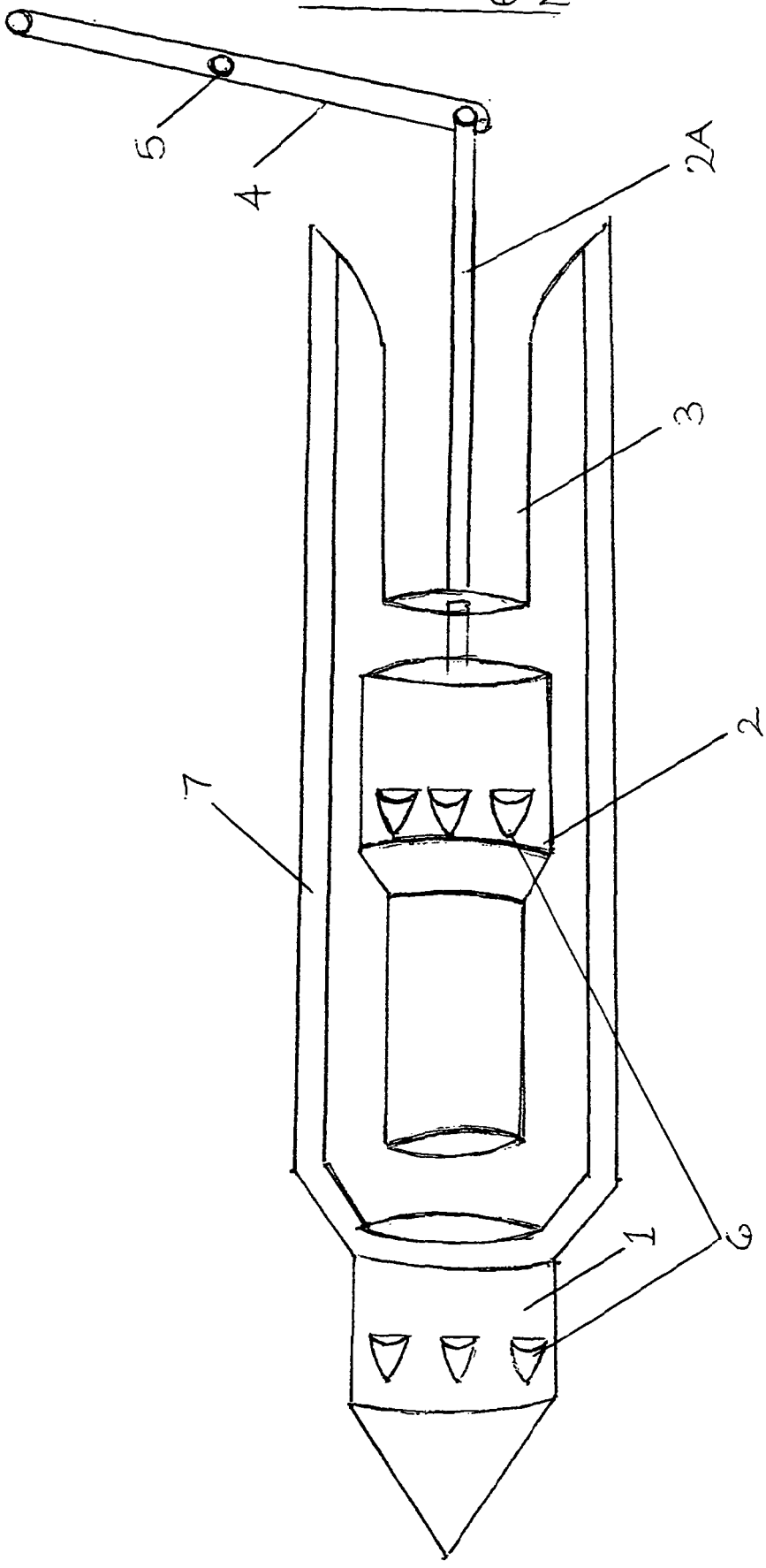


FIGURE 6.3

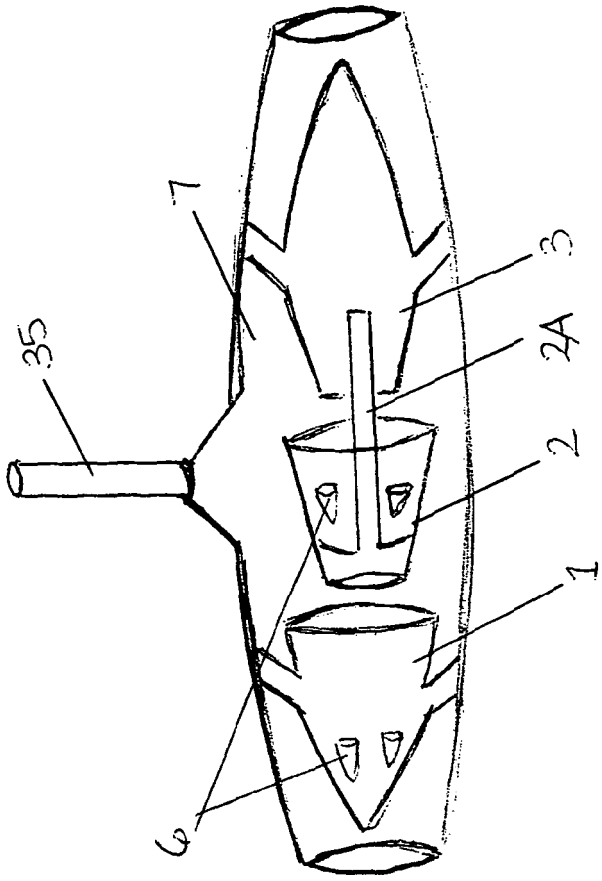


FIGURE 7.1

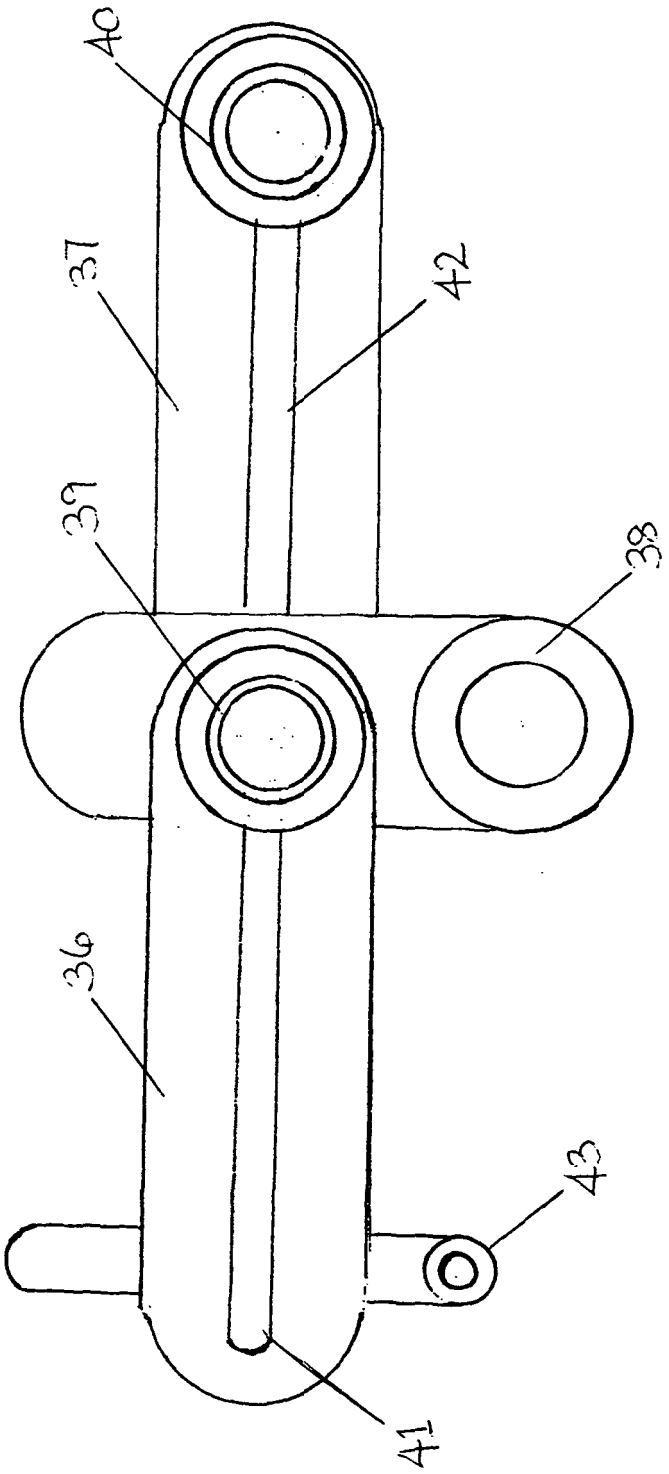


FIGURE 7.2

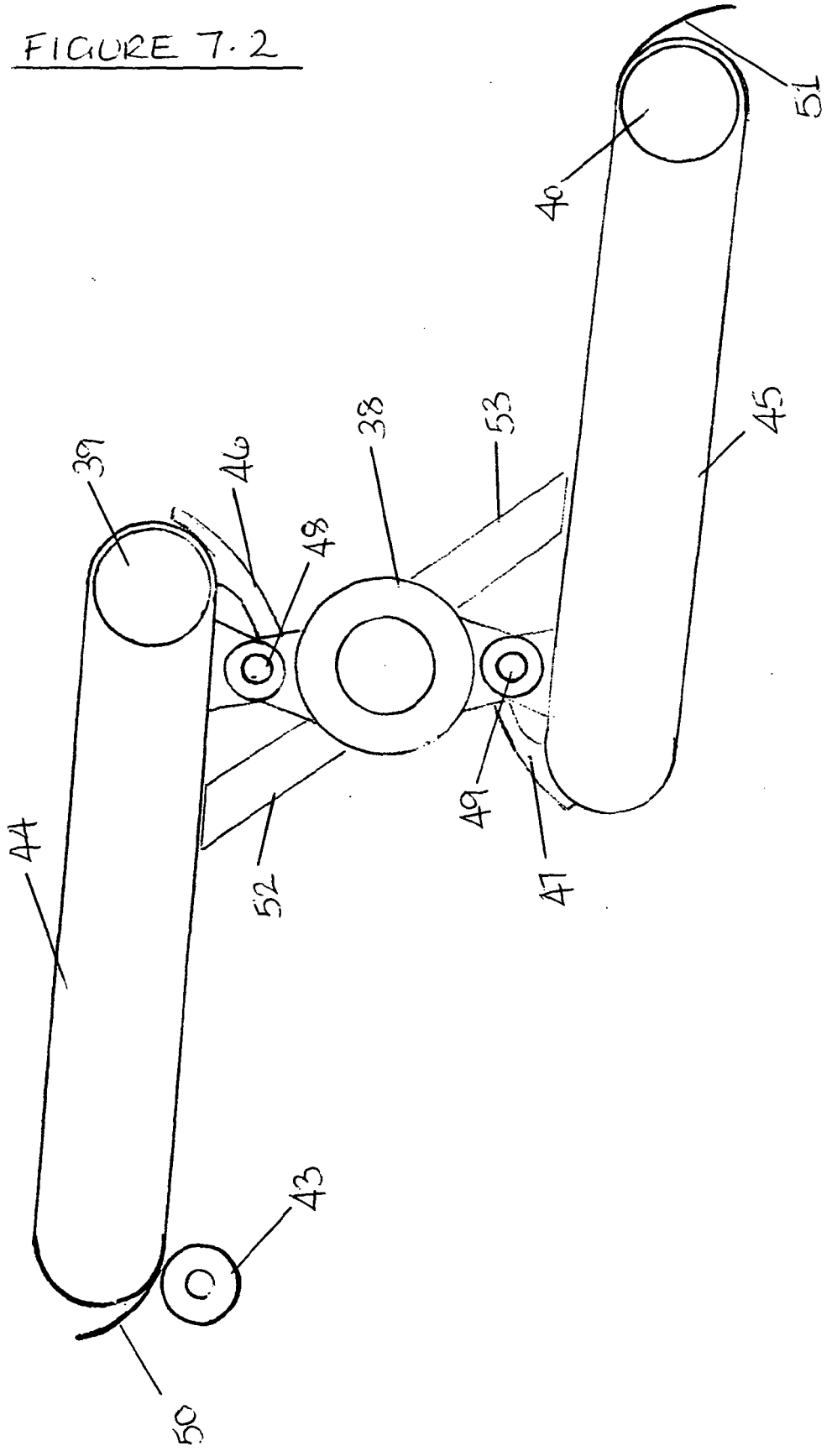


FIGURE 7.3

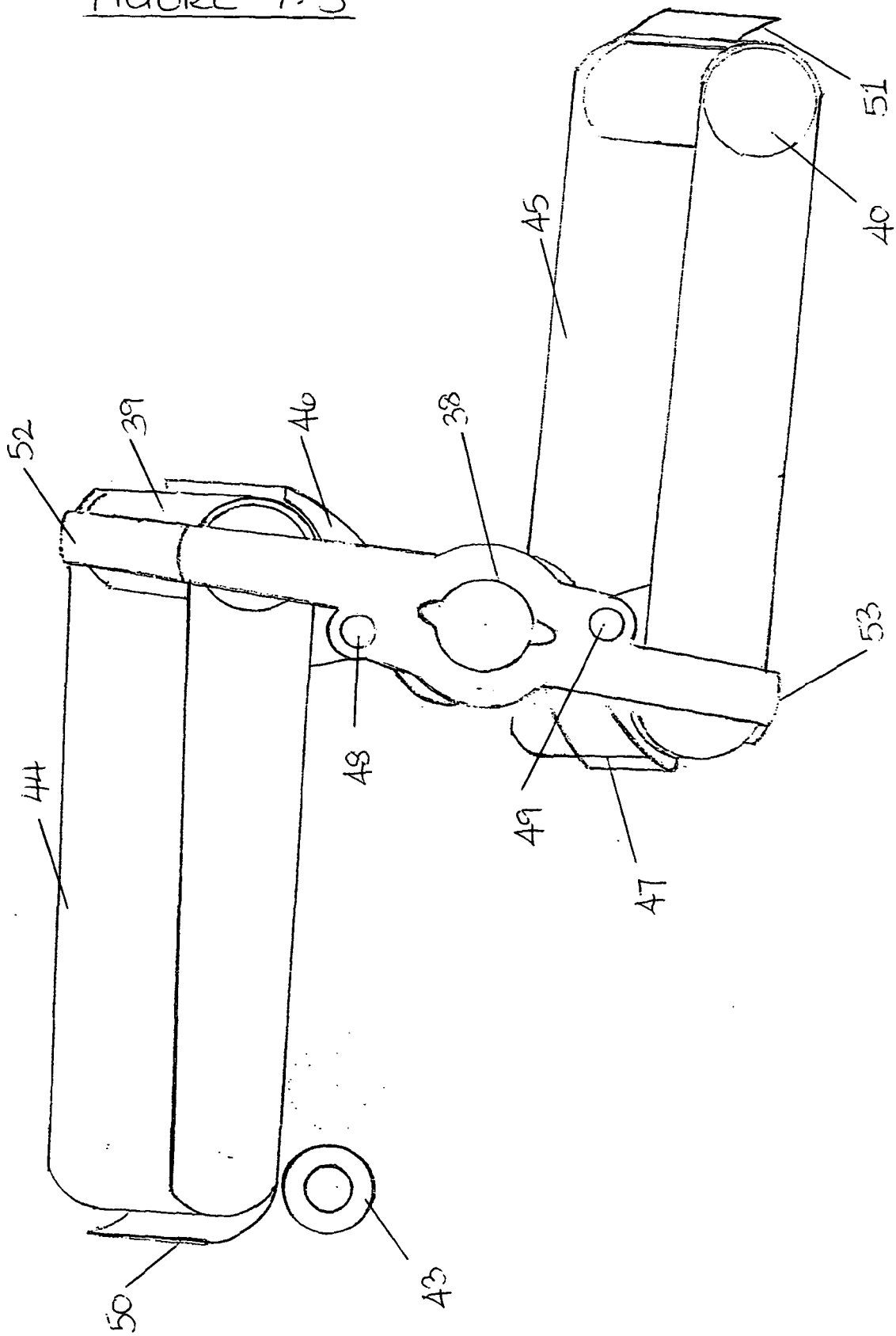


FIGURE 7.4

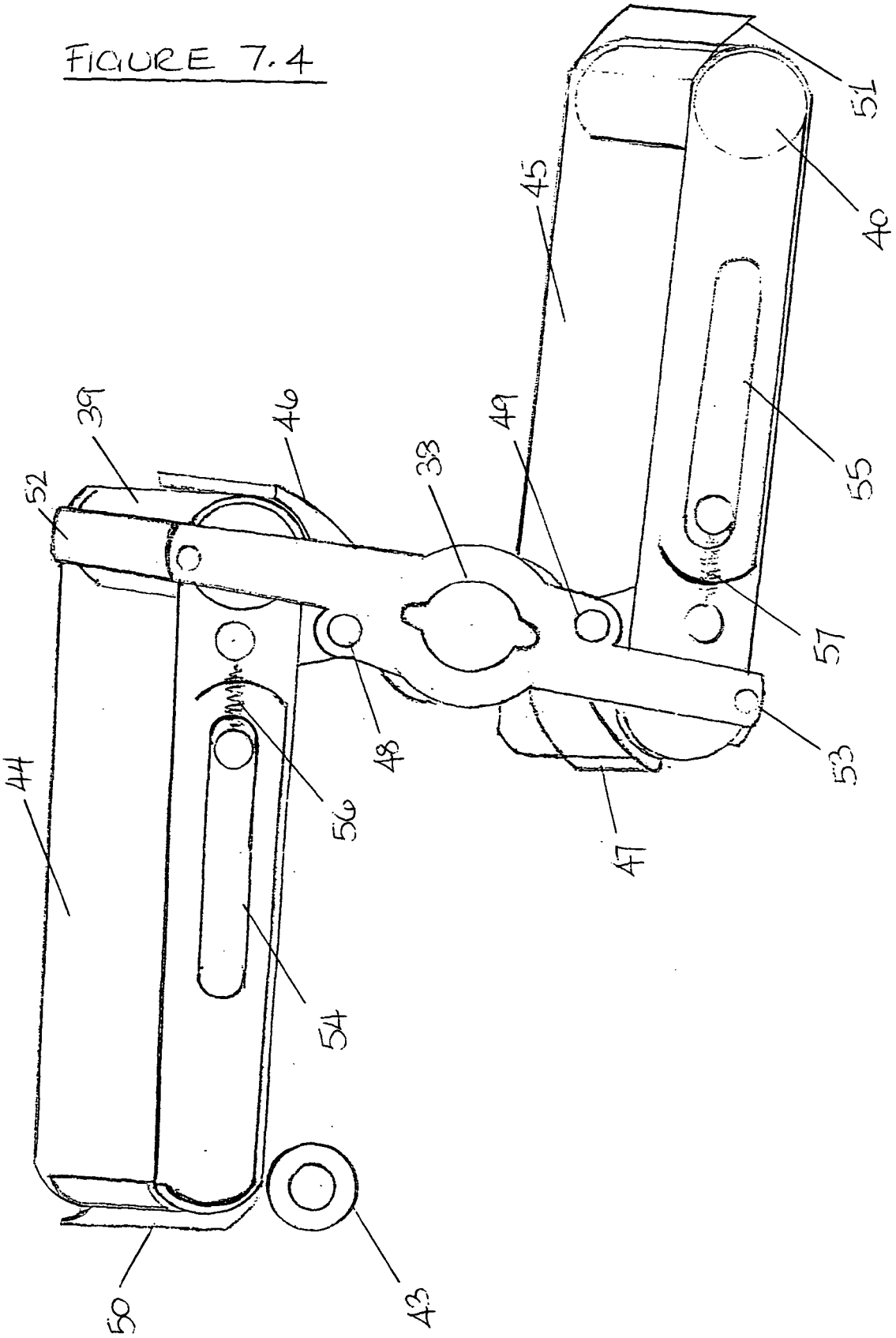
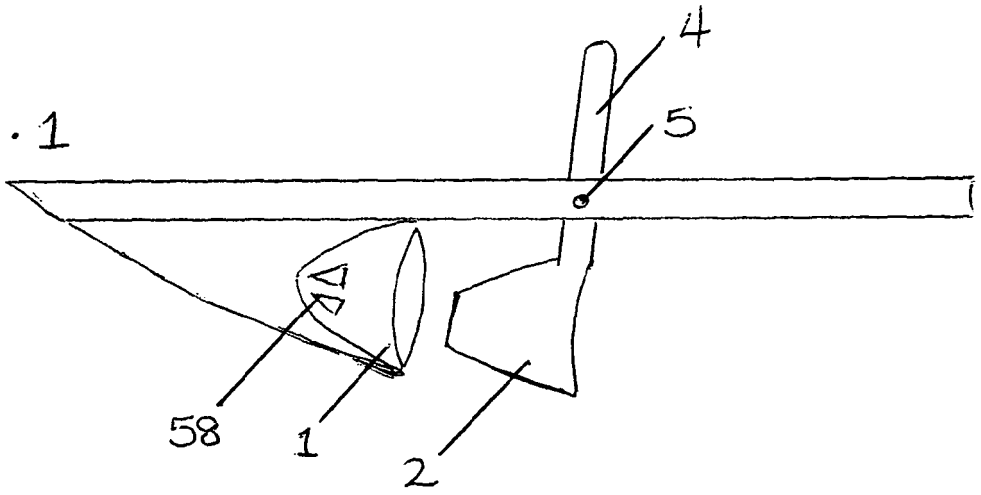


FIGURE 8

8.1



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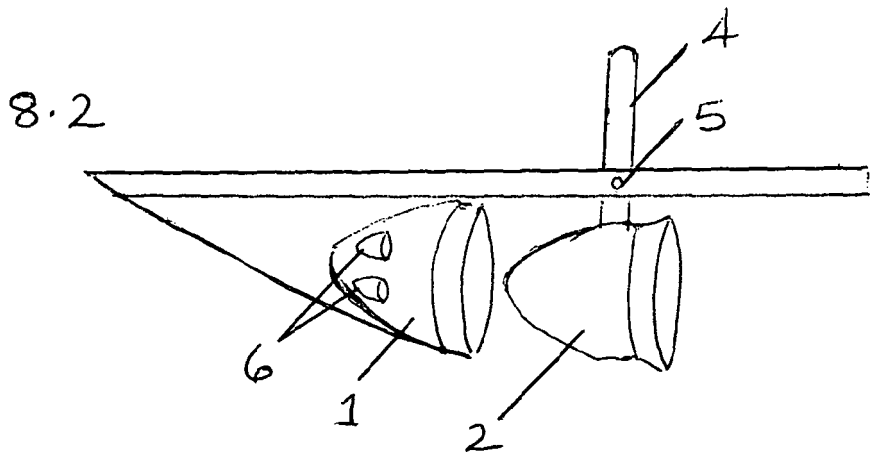

FIGURE 9.1

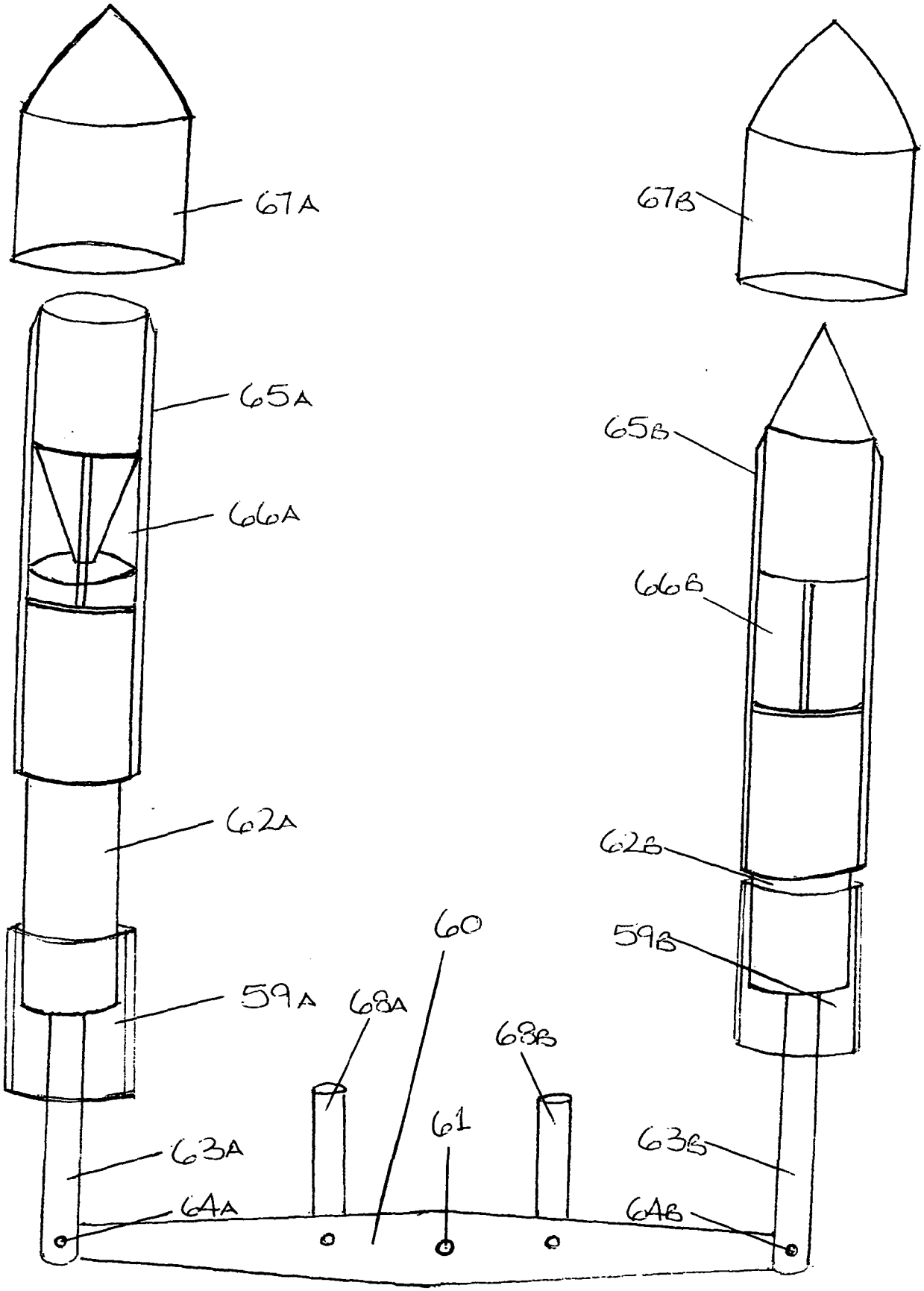
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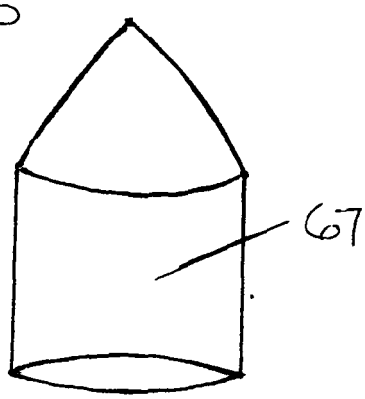
FIGURE 9.2



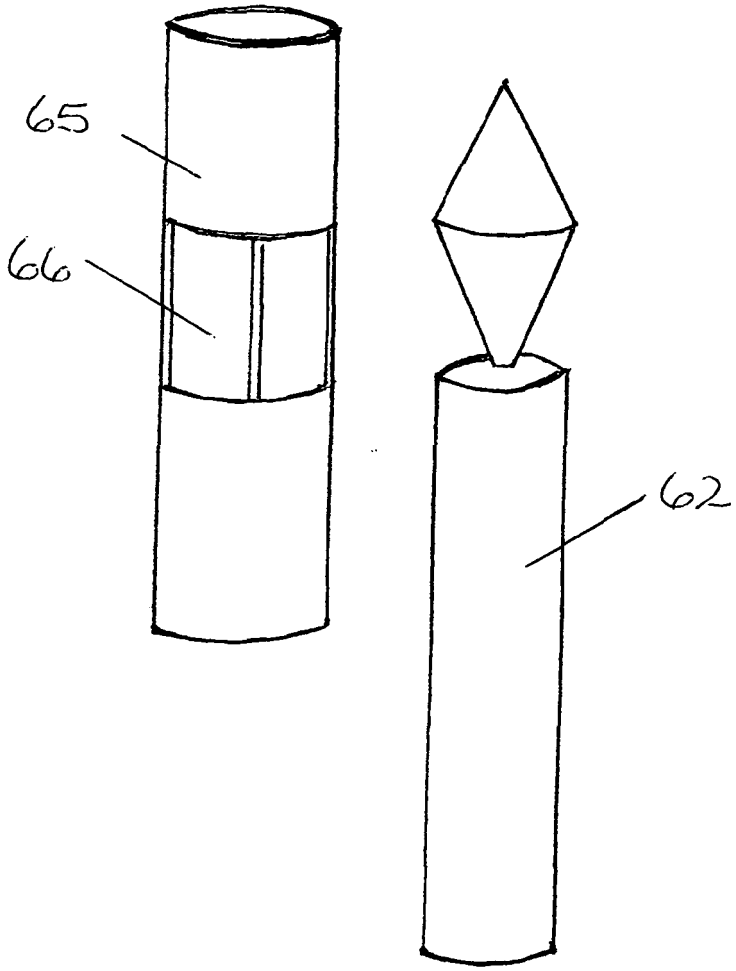


FIGURE 9.3

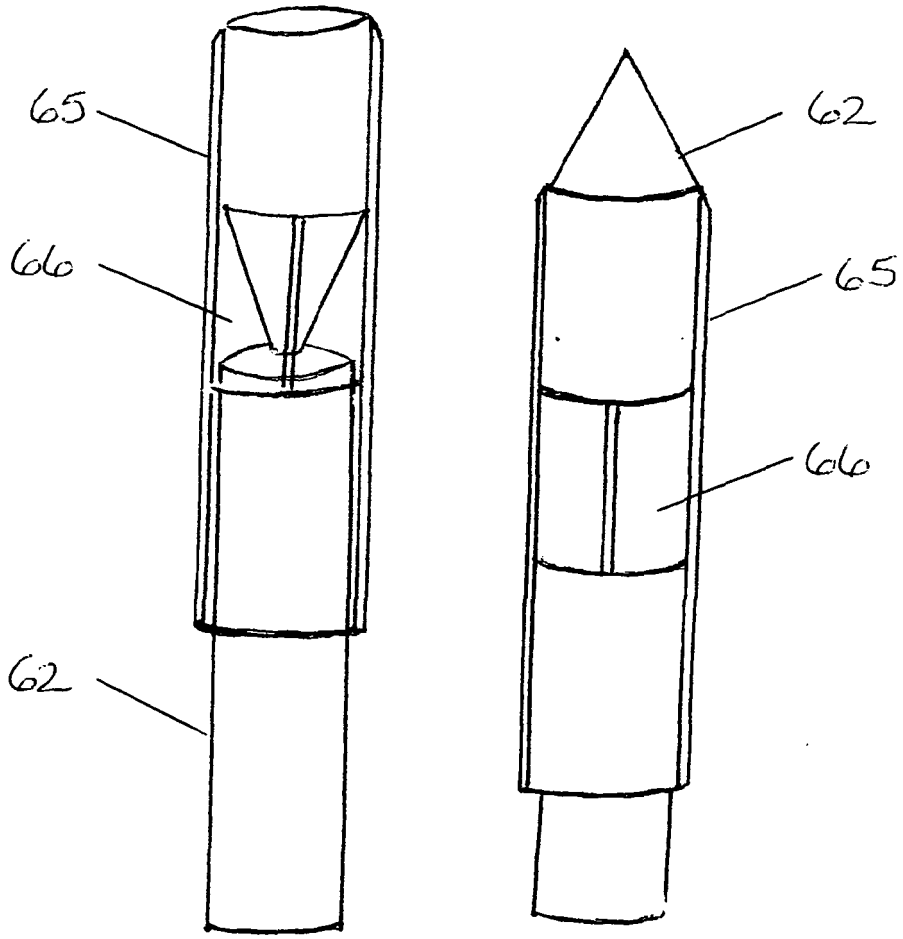


FIGURE 9.4

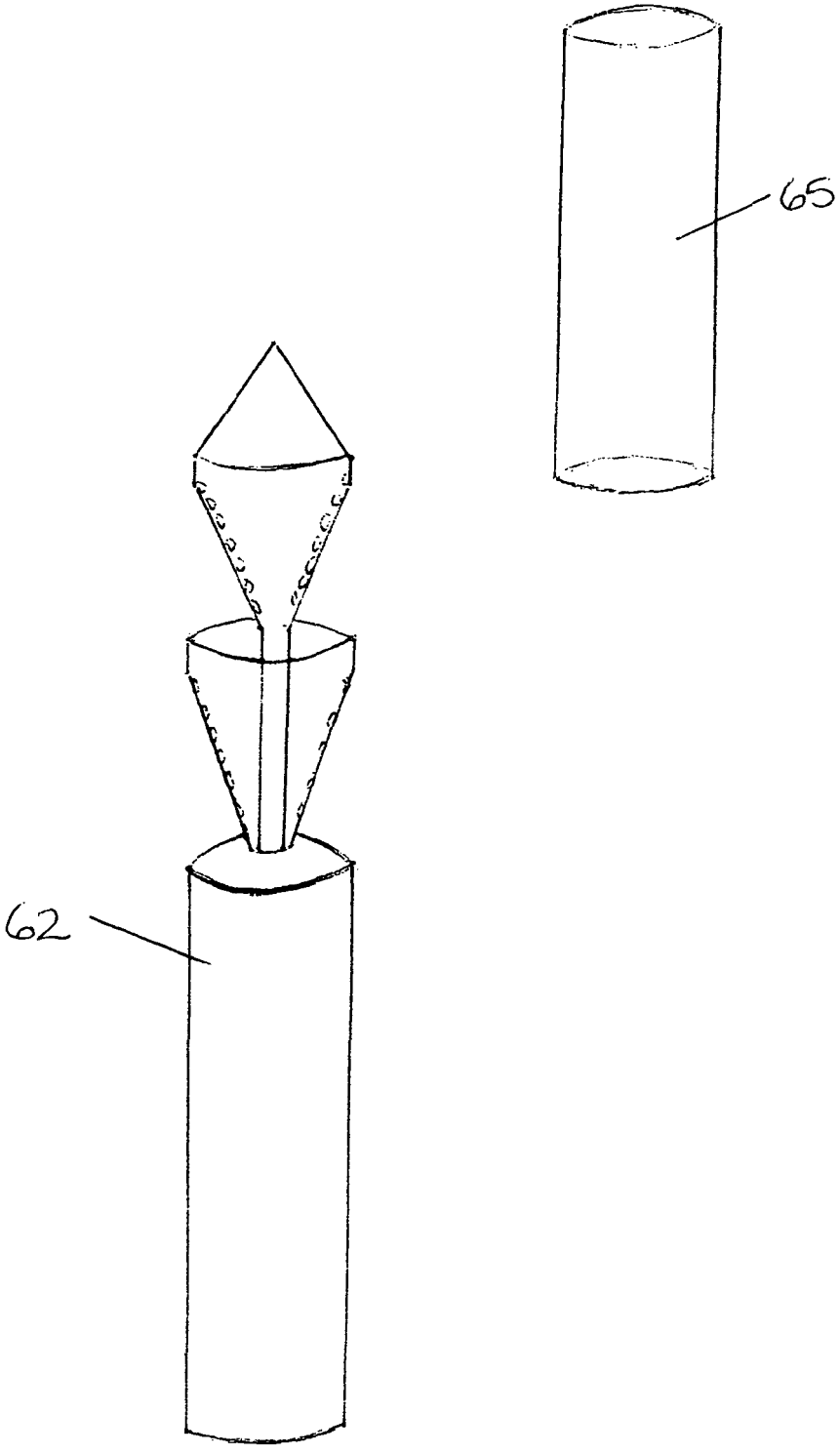


FIGURE 9-5

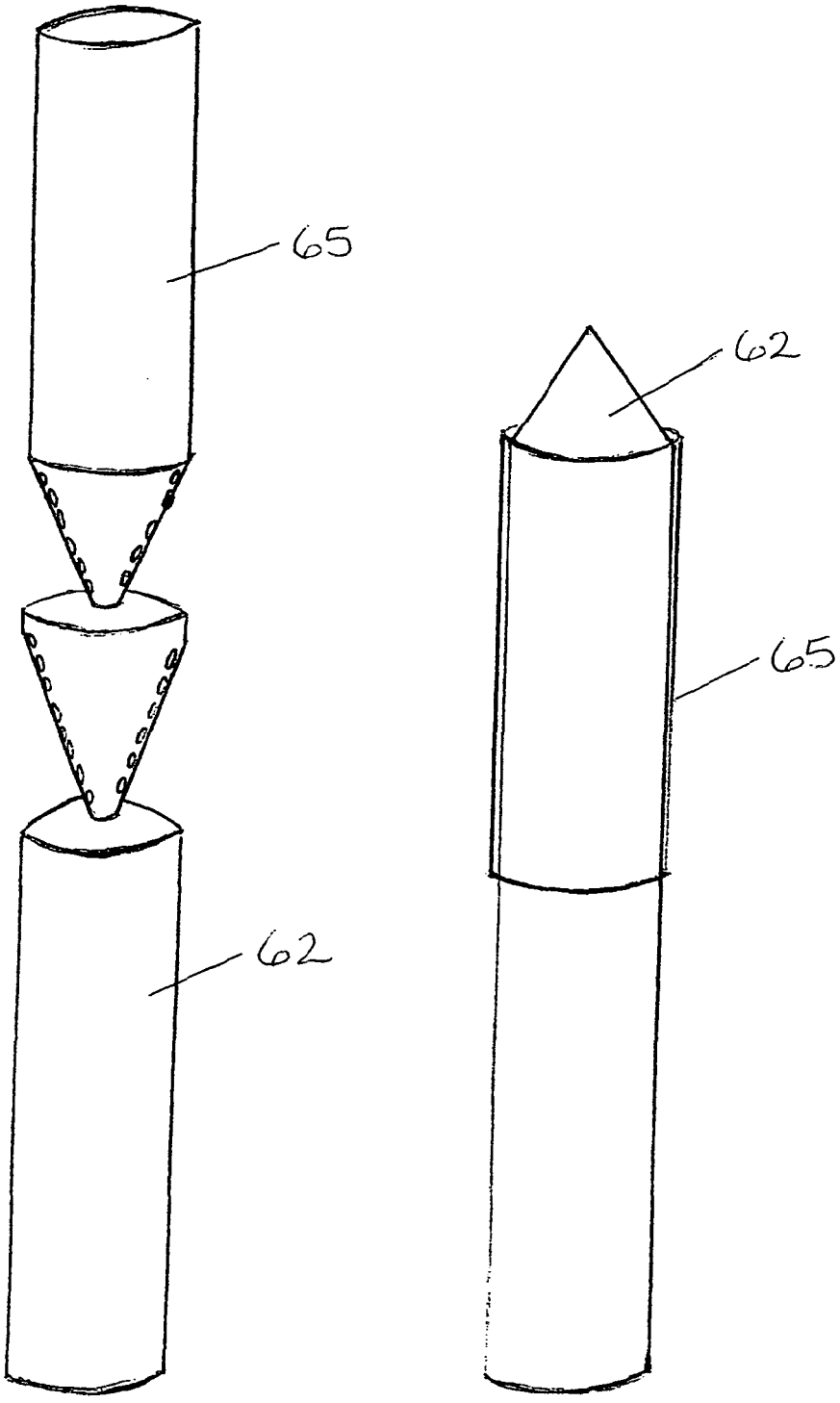


FIGURE 10.1

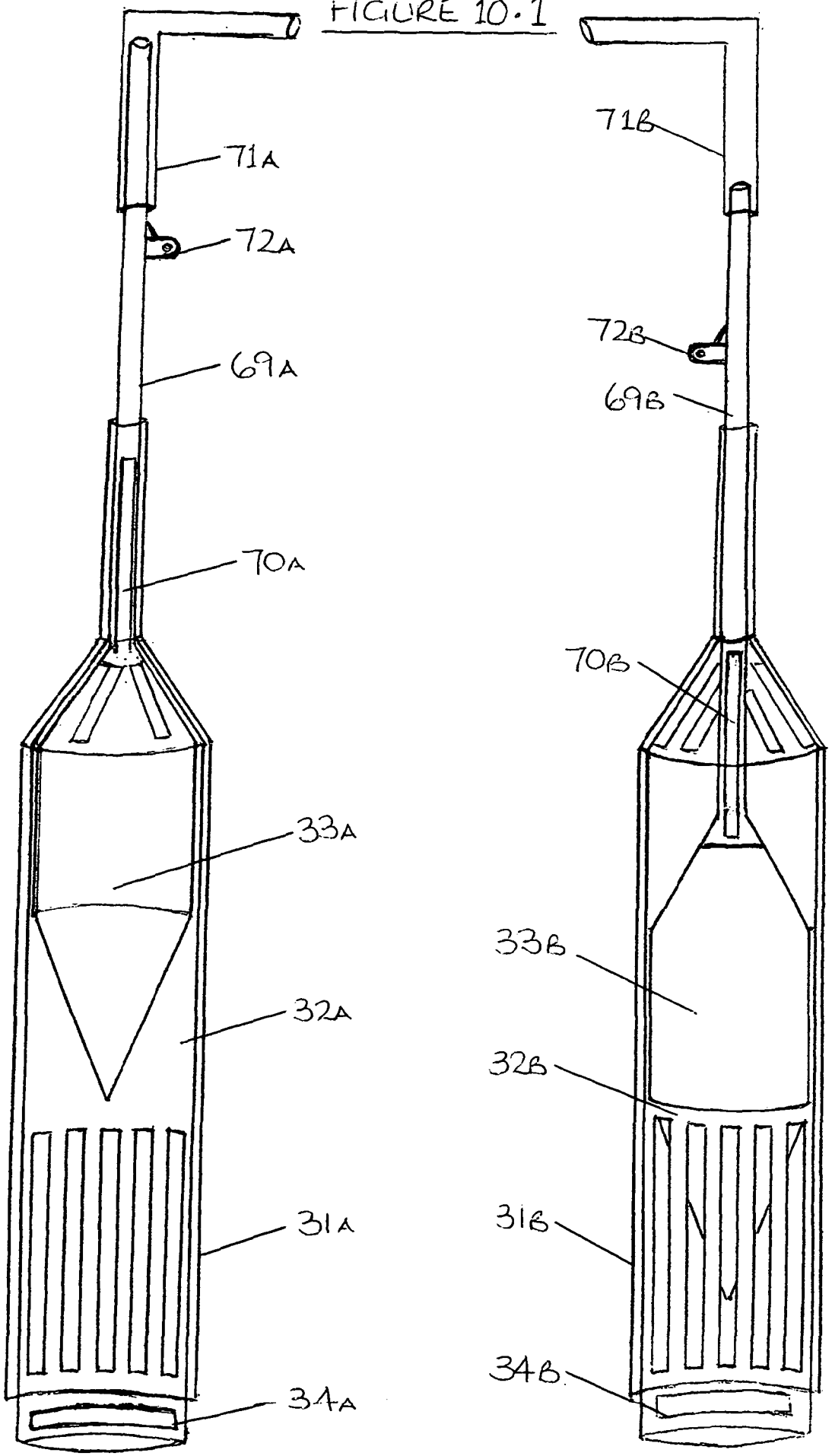


FIGURE 10·2

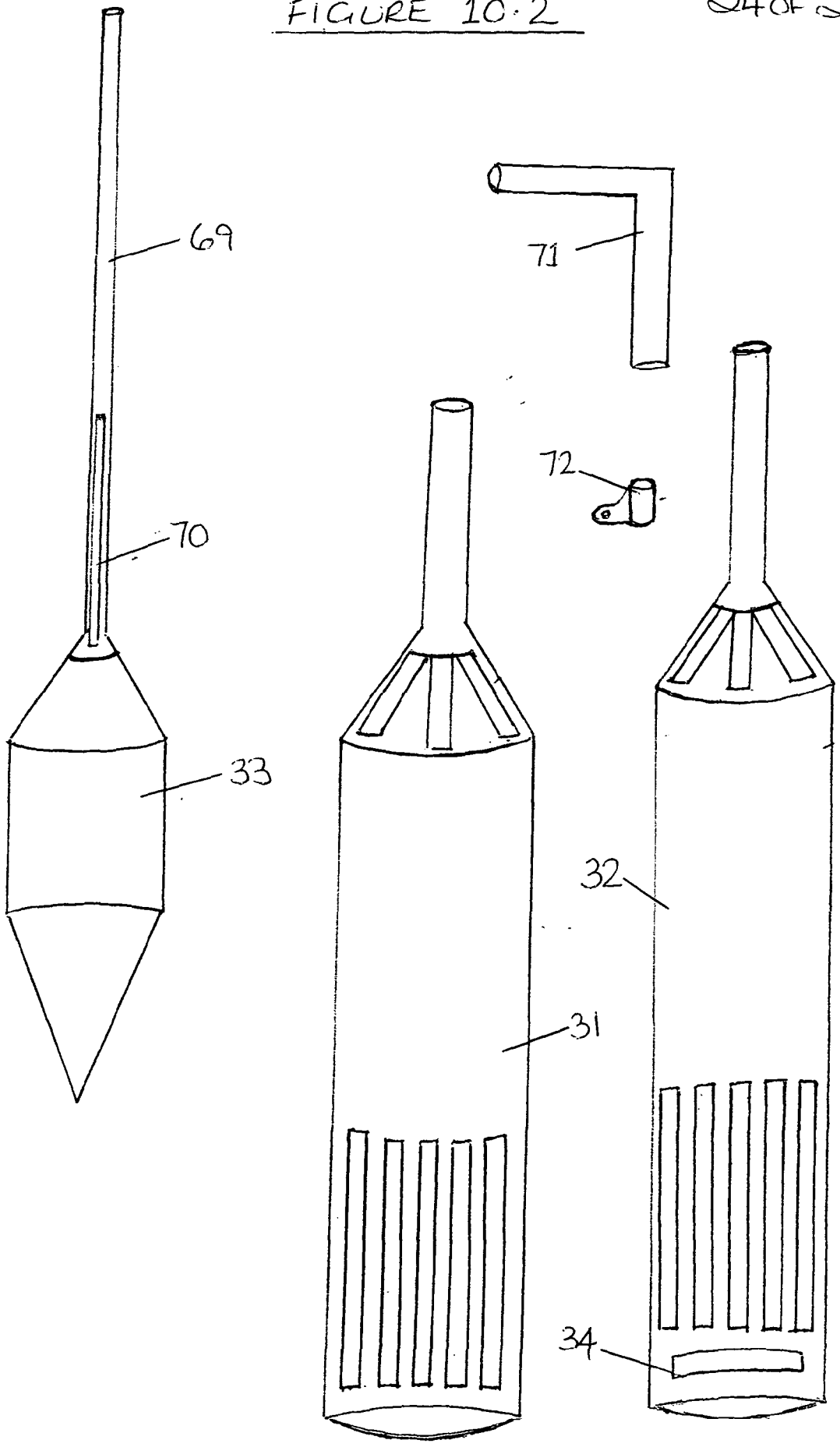
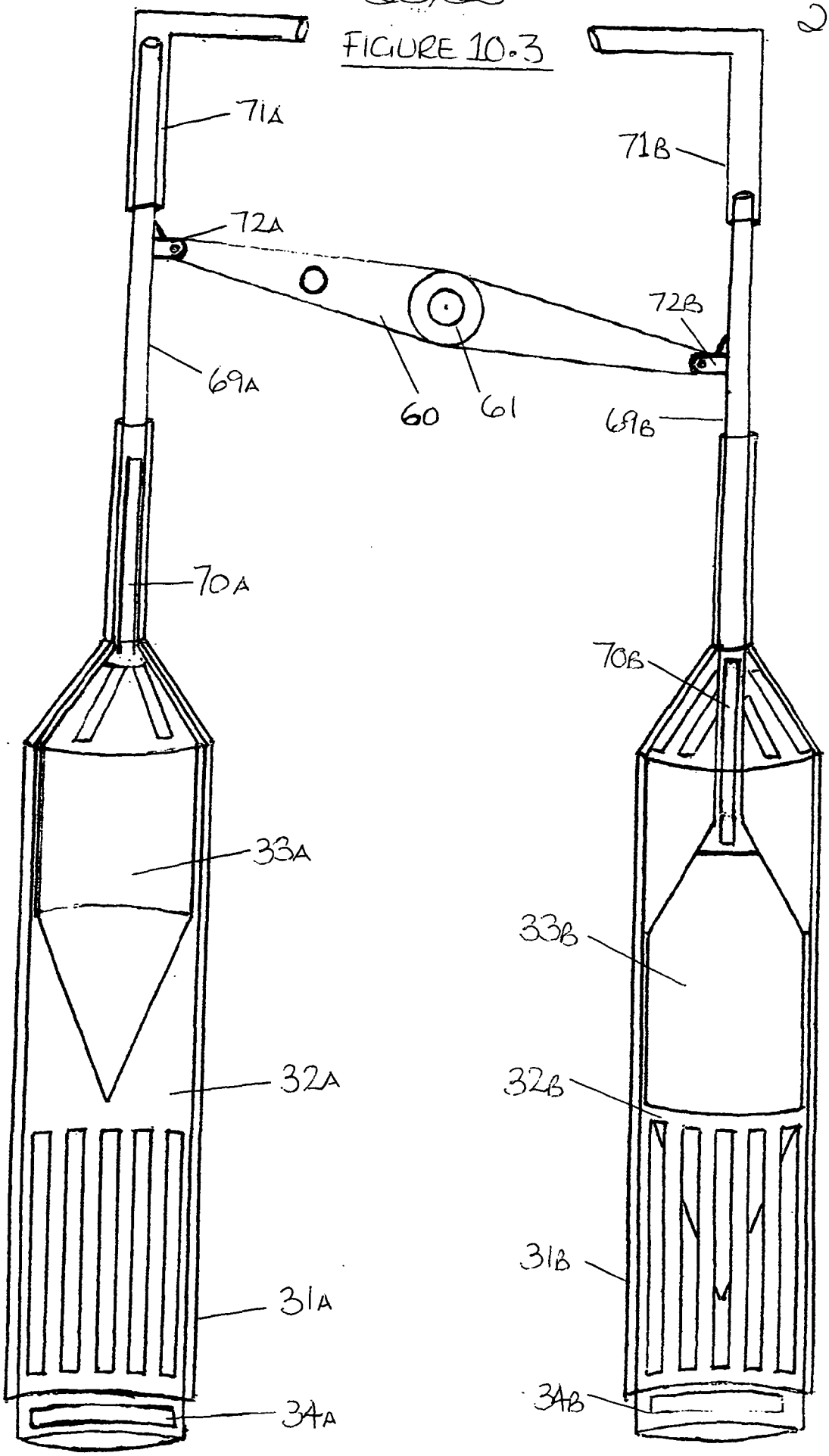


FIGURE 10.3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Background

- We are constantly being reminded of climate change and global warming threats heavily due to carbon emissions.

- Water vessels can entrain large volumes of water through the propellers. Fish that pass through these propellers may be maimed or even killed. Manatee, dolphins, seals, turtles, indeed most marine wildlife are at risk.

- Propellers can also cause scar damage to seagrasses and corals; critical feeding areas and sheltering areas for wading birds juvenile fish and shellfish etc.. The effects of decreasing productive habitat for wildlife to use may affect the condition of wildlife populations

- Propellers are also frequently involved in boating accidents resulting in injuries or deaths.

- There are many flood prone areas of the world and areas at risk from flooding. Floods cause devastation worldwide.

- Too many areas of the world are struggling to obtain a supply of clean drinkable water.

Statement of Invention

- Bow Rove is a water displacement drive system (for any water vessel) with huge eco-friendly benefits. Due to the low input needed from other mechanical devices to enable it to function, carbon emissions are vastly lower than other drive systems currently available.

- On occasion, this device is fully self-functional relying solely on nature's forces to enable use.

- Unlike a propeller, the moving parts of Bow Rove water displacement drive system do not have sharp elements. The forwards and backwards movements are kinder to plant life and less hazardous to marine life.

- Added benefits from additions and/or adaptations to Bow Rove include a multi-purpose water pump which can be of immense use e.g. in flood-prone areas, or any situation where a water pump is required.

- Bow Rove can also be adapted for use as a valuable water recycling and filtering device, useful in many parts of the world.

- Bow Rove can also be utilised as a combination water pump/drive system for any water vessel.

Bow Rove

Water Displacement Drive Systems and Pumps

Description – examples of the invention are referred to in accompanying drawings.

Bow Rove Device 1 (Fig 1. 1-3)
Radius Angle Movement
Bowe Rove Device 1 is a *Water Displacement Drive System* which produces a jet-flow of water as a result of forwards and reverse motion. This system attaches to a water vessel below the water line.

Fig 1.1
A cone or similar bucket-shaped water holding cylinder (#1) and a piston of the same or any dynamic shape (#3) are fixed in position on the water vessel on a radius angle. A moveable piston/water holder of the same shape (#2) is connected to a motion shaft (#4) mounted on a central pivot (bearing)(#5). This piston/water holder moves forward towards the (#1) water holding cylinder, pressurising the water and forcing it out of the #1 holder. The (#2) piston/water holder then moves backwards towards the fixed piston (#3), again pressurising the water which is then forced out of the (#2) piston/water holder. By forming all parts radiusly it allows free movement without them touching one another.

This motion moves the water vessel forwards. A counter-balance weight can be added to the motion shaft (#4) above the central pivot, allowing for ease of movement. The movement of piston/water holder (#2) means that water is pressurised between the cylinder water holder (#1) and the fixed piston (#3) which creates the jet-flow of water which can be used as a drive system for any water vessels with added safety and eco-friendly benefits.

Fig 1.2 shows Device 1 with the addition of water inlet/outlet holes around water holding cylinder (#1) and piston/water holding cylinder (#2), with half cone-shaped covers (#6) formed to flank these holes and direct water backwards.

Fig 1.3 shows a portable version of device 1, with the various parts contained within a radiusly formed frame (#7). This device could be used e.g. on a rowing boat or other recreational vessel.

Bow Rove Device 2 (Fig. 2)
Pendulum Motion Weight System
This device can be used to operate Device 1:-
The motion shaft (#4) is mounted on a central pivot (#5) (bearing) with an additional bearing (#8) connecting to the piston (if required). A weight mounted on a pendulum shaft (#9) attaches to the motion shaft via pivot (bearing (#10)). This weight locks in place automatically when it is approximately in a horizontal position (#11, #12). By applying a small amount of force on top of the weight to release it from its locked position, the weight swings as a pendulum to the opposite side, where once again it automatically locks into place in a near horizontal position. The process of again applying a minimum amount of force to release the lock sends it back to the opposite side. The force needed to operate this system can be applied manually or by a motorised mechanism.

Bow Rove Device 3 (Fig.3)
Pendular Drive
An adaptation to Device 1.
In this instance, bow shaped pipe/s (#13) are used as cylinder/s and fixed on the water vessel below the water line on a radius angle. The front half of the pipe being the (No.1) Water Holding Cylinder and the rear half of the pipe being the (No.2) Water Holding Cylinder. A ball-shaped piston (#14) (or a piston of any shape) is located inside the pipe and fixed to a motion shaft (#4), mounted on a central pivot (bearing (#5)) on the water vessel. This allows the piston (attached to the motion shaft) to move forwards and backwards through a guiding movement slot (#15). Around the centre of the pipe, a number of large, long holes are made (#16). The front and back ends of the pipe are blocked. On the front half of the pipe (No.1 Cylinder) at any point past the forward-most possible position of the Piston, water inlet/outlet jet holes (#6) are made around the perimeter and half cone-shaped or any similar shaped covers are formed to flank these holes. Thus the force of the water caused by the forward piston movement inside the pipe is directed backwards through these jet holes. Inserting one or more inlet/outlet jet holes/valves at the back end of (No.2) water holding cylinder allows a jet-flow of water to be created at the rear by the backwards movement of the piston.

As before, this motion shaft can be counter-balanced with the addition of a weight above the central pivot (bearing), or can be adapted with the addition of the afore-mentioned pendulum motion weight system (Device 2). The movement of the motion shaft can be produced either manually or by any type of mechanism.

Bow Rove Device 4 (Fig.4 1-3)
Multi-Purpose Pump
As an alternative to being an operating device for the drive systems, Device 2 can be adapted to be used as a water pump either for the water vessel it is attached to or for any other situation where a water pump is required. A minimal amount of extra energy would be needed to operate this system by using the pendulum weighted motion shaft:-

(Fig.4.1) Outlet valves (#17, #18) would be located at each end of the cylinder/pipe (#13) leading to outlet pipes or containers (#19, #20). The outlet valves are connected to a shaft with water proof ball joints (#21, #22), which in turn are connected to movement shafts (#23, #24). As water pumps upwards from the advancing movement of the piston (#14) attached to the t-shaped motion shaft (#4), the respective valve is forced open and water is forced into the outlet pipe. When the piston moves to the opposite side, away from the open valve, the water pressure above the valve forces it to close and the opposite valve will open, once again forcing water into the outlet pipe. With the addition of any type of mechanical device, the energy produced from this small movement of the valves can be harnessed to provide the downward force needed to operate the pendulum weight system via the connected movement shafts. This device can also be attached to a generator to produce electricity.

Fig 4.2 shows a variation allowing the piston to move horizontally. This drawing shows horizontal water cylinders (#25, #26) and the addition of moveable shafts (#27, #28) mounted on a central pivot (bearing) connecting to movement shafts (#23, #24). The use of a timing device would control the movement of the pendulum as necessary

Fig 4.3 shows the addition of water diversion pipes (#29, #30) to the water outlet pipes (#19, #20) which can be added to any version of Device 4 to enable use as an independent drive system.

Bow Rove Device 5 (Fig.5 1-3)
Vertical Moving Dynamic Piston Weights
This device can be used to add gravity force into any of the Bow Rove water drive systems.

Fig. 5.1 A long pipe/cylinder with water inlet slots (or holes) all around (#31) surrounds a longer pipe/cylinder of similar design (#32). One of these pipes/cylinders is fixed, the other rotatable. By rotating one of the pipes/cylinders, the piston (#33) moves freely vertically, forced upwards from focused water pressure as a result of closing the slots and downwards with the force of gravity by opening the slots. The lower portion of the inner cylinder (#34) remains constantly open for water cancellation.

Fig 5.2 shows the independent parts of this system.

Fig 5.3 shows an adaptation to the device that can be used in higher water pressure conditions.

Bow Rove Device 6 (Fig.6 1-3)
Horizontal Movement
Fig 6.1 This is the same type of *Water Displacement Drive System* as device 1, with the addition of water inlet/outlet holes (#6) made around the water holding cylinder (#1) and piston/water holding cylinder (#2). Half cone-shaped covers are formed to flank these holes and direct water backwards.
In this device, piston/water holder cylinder (#2) has a horizontal movement shaft (#2A) which is guided through fixed piston (#3) and attached to a vertical motion shaft (#4). The movement of piston/water holding cylinder (#2) between the cylinder water holder (#1) and the fixed piston (#3) forces water backwards and moves the vessel forwards. The holes around the water holding cylinders enable water to refill the cylinders rapidly from the outside pressure; the half cone-shaped covers direct the force of the water towards the rear of the vessel.

Figs 6.2 shows the addition of a supporting frame (#7) which enables this device to become portable.

Fig 6.3 shows another portable version of this device, this time with the frame (#7) being a surrounding case with brackets or holders attached, and space within rear piston (#3) for the addition of a motor or any powering system, and the addition of a rotatable steering shaft (#35).

Bowe Rove Device 7 (Fig.7 1-4)
A flickable Fly Wheel
Fig 7.1 To add Gravity Force to this system, a flexible or 'flickable' Fly Wheel can be used to replace a normal Fly Wheel. A flick weight Fly Wheel would consist of a minimum of one flexible blade. The accompanying drawing (Fig 7.1) shows a device with two flexible blades (#36, #37) attached to a central shaft (#38) (which in turn is attached to a rotary crank). Slideable weights (#39, #40) slide freely within the accommodating slots (#41, #42) along the length of the flexible blades. A roller bar (#43) is placed in position to block and control the blades. The central shaft turns with a minimum amount of energy needed to load the blade. The loading energy can be, for example, 10 neuton kilos and the slideable weight 30 neuton kilos or more. By loading and releasing the flexible blade it will allow the extra weight to move from the central shaft to the top of the blade and accelerate the system.

Fig 7.2 shows the use of non-flexible blades (#44, #45) fixed on spring-loaded hinges (#46, #47) attached by a central pin (#48, #49). The addition of fixed spring blades (#50, #51) act as shock absorbers when the blades come into contact with the roller bar. Automatically adjustable blocking plates (#52, #53) control the repositioning of the blades.

Fig 7.3 shows the use of pipes or cylinders as non-flexible blades (#44, #45) with fixed spring blades (#50, #51) to act as shock absorbers. Slideable/rollable weights (#39, #40) are contained within the cylinders.

Fig. 7.4
Leverage can be increased by the addition of inner slideable cases (#54, #55) attached to strong holding springs (#56, #57) within the cylinders/tubes which, by the operation of the flicking motion, project the cases through the end of the cylinders to a controlled point enabling the slideable/rolling weight to propel to a further point. The cases are retracted into position by the holding springs.

Bowe Rove Device 8 (Fig.8.1)
Simple Water Displacement Drive System
A water inlet valve (#58),(or more than one) is placed at the front of the fixed Water Holding Cylinder (#1) A cone-shaped or dynamic-shaped Water Displacement Piston (now with a flat rear-side) (#2) is attached to a motion shaft (#4) mounted on a central pivot (bearing)(#5) on the water vessel. The movement of the Water Displacement Piston (#2) towards (#1) cylinder pressurises the water and forces it backwards. The piston is dynamically shaped so that it directs the water at an angle which allows movement of the water vessel without the interference of back pressure on the piston. The backwards movement of piston (#2) forces the water backwards and syphons the water through the front inlet valve/s (#58) at the front of Water Holding Cylinder (#1). This enables movement of the water vessel. Once again, the motion shaft can be additionally counter-balanced or the pendulum motion weight system (Device 2) can be used. This simpler device could probably be more suitable for use, for example, on a recreational sports or leisure vessel.

Fig 8.2 shows the same device with the substitution of water inlet/outlet holes with cone-shaped covers (#6) in place of the water inlet valve/s.

Bow Rove Device 9 (Fig.9 1-5)
Water Displacement Drive System with Dynamic Changing Pistons
which allows water pressure to be harnessed.

1. Two cylinders (59A, 59B) are placed in position on the lowest part of a water vessel the rear part inside in atmosphere and the front part outside in water.
2. A crank or beam (#60) with a central pivot (bearing)(#61) is fixed in position on the inside of the vessel at the rear of the cylinders.
3. Two Dynamic Changing Pistons (#62A, #62B) are placed in position inside the cylinders and both pistons connect to the crank or beam via shafts (#63A, #63B) attached with a central pin or pivot (#64A, #64B). Movement of the crank allows simultaneous movement of both pistons alternating forwards and backwards.
4. Slideable sleeves (#65A, #65B) with pressure inlet holes (#66A, #66B) are placed over the pistons and, with a forward and backward motion, change the dynamics of the piston.

5. A water displacement cylinder (#67A, #67B) (with or without front inlet valves (of any type) are placed in position outside of the water vessel in front of the pistons in either a fixed or adjustable position – (forwards and backwards or horizontally, sidewards in and sidewards out).
   - The forward movement of the piston displaces the water backwards and creates momentum for the water vessel.
   - The backward movement of the piston creates a syphon from the front inlet of the cylinder again creating momentum for the vessel.
6. By placing an adjustable water displacement cylinder at the furthest possible distance from the piston that it is still able to function and displace water, enables the system to be highly efficient.
7. The slideable sleeve around the cone-shaped or dynamic-shaped piston, (which allows the dynamics of the piston to alter), can be operated automatically (in its forward-most position as a dynamic shape, backwards as a flat shape, or any other way to change the dynamics), by attaching it to a crank or an independent device.
8. The operation of the slideable sleeve by means of a second device allows the dynamics of the piston to change without interference to the movement of the crank. The function of this device can:-
   (i) be used as a Drive System.
   (ii) by moving the adjustable water displacement cylinder with inlet valves higher or further away from the pistons, it will not create displacement of water. Therefore moving the pistons forwards as a flat front and backwards to reveal a cone or dynamic shaped front this will create the opposite movement of the water which will stop the vessel, then reverse the vessel.
9. During the stationary, anchored position of the vessel, the position of the adjustable water displacement cylinder being higher or further away from the piston, or by moving it horizontally sideways (in or out), will not displace the water. The dynamics of the two pistons can be altered by sliding the sleeves forwards and backwards alternately. Sliding the sleeve forwards creates a 'flat fronted' piston and backwards creates a cone-shaped or dynamic-shaped piston. The piston moves forward as cone-shaped or dynamic-shaped in the water and backwards as flat-shaped. By repeating this process, the water pressure can be harnessed from the depth of the water and be used to produce electricity or to power any other system. The system can be powered, or water pressure can be harnessed via connection points (#68A, #68B).
10. The pistons are connected using a beam (#60) with a central pivot (#61) which allows the pistons to move forwards and backwards simultaneously. A vertical motion shaft with a central pivot can be added to this system to counter-balance the water resistance.
11. Using a rotary crank to move the dynamic changing piston (with the addition of a Flick-weight Flywheel) would allow the system to be supported by Gravity force.
12. This device can be used in any environment where both water pressure and atmospheric pressure is present, or where both have been created.
13. Once again, the motion shaft can be additionally counter-balanced or the pendulum motion weight system (Device 2) can be used.

Fig 9.2 shows individual parts (in this instance, the piston has one step).

Fig 9.3 shows the dynamic pistons (with one step), the slideable sleeves in both forward and backward positions.

Fig 9.4 shows the dynamic pistons formed with three steps, the hydro-dynamic steps have cone shaped or similar small holes integrated to enable water pressure to be harnessed without turbulence. The steps can be either hollow or solid.

Fig 9.5 shows the same piston as Fig 9.4 with the slideable sleeves in most forward and backward positions to change the dynamics.

The addition of any of the **devices 2, 5,** or **7** can add even more extra efficiency to this system.

Device 10
***Gravity Pump* (Fig 10)**
Device 5 can be adapted for use as a water pump or water displacement drive system:

In this instance, both the cylinders (#31 & #32) are shaped at the top to accommodate the dynamic shaped Pistons (#33). The shaped portions of the cylinders also have water inlet slots as do the bottom parts of the cylinders. The pistons are attached to central movement shaft pipes (#69A, 69B) which have water directing slots within the shaft (#70A, 70B).

By rotating either the outer or inner cylinder (but not both) by any type of mechanical device, the water slots open and close; By closing the slots, water pressure is directed onto the bottom part of the piston which forces the piston upwards. Opening the slots releases the pressure and allows the piston to drop and water to refill through the slots in the upper pump section.
Slideable water diversion pipes (#71A,71B) are attached to the central movement shaft pipes (#69A, 69B) to direct any excess water gathered through water directing slots (#70A, 70B).

(#72A, 72B) show connecting points to connect the pistons to a powering system.

Fig 10.2 shows the individual parts to this device.

Fig 10.3 shows the device with a pump connected to a beam or rotary crank.

Components Key (to accompany drawings)

1. Water Holding Cylinder
2. Moveable Piston

2A. Horizontal Movement Shaft

3. Rear Piston
4. Vertical Motion Shaft
5. Central Pivot (bearing)
6. Water Inlet/Outlet Holes with cone shaped covers
7. Radiusly formed frame for portable version of Device 1
8. Bearing (for connection to piston)
9. Weight attached to pendulum shaft
10. Pivot (bearing)
11.)
12.)Locking positions for pendulum weight
13. Bow shaped pipe/s / cylinder/s
14. Piston
15. Movement slot to guide piston
16. Water Inlet Holes around centre of cylinder
17.)
18.)Water Outlet Valve
19.)
20.)Water Outlet pipe or container
21.)
22.)Shaft with waterproof ball joint
23.)
24.)Movement Shaft.
25.)
26.)Water Displacement Cylinder
27.)
28.)Moveable Shaft mounted on a central pivot (bearing)
29.)
30.)Water Diversion Pipe
31. Outer Cylinder with water inlet slots
32. Inner Cylinder with water inlet slots
33. Piston Weight
34. Lowest area of inner cylinder (proportion remains constantly open)
35. Rotatable Steering Shaft
36.)
37.)Flexible Blade
38. Central Shaft

39.)
40.)Slideable/Rollable Weight
41.)
42.)Slot for slideable weights
43. Roller Bar
44.)
45.)Non-flexible Blade
46.)
47.)Spring-loaded hinge
48.)
49.)Central pin to attach spring-loaded hinge
50.)
51.)Spring Blade (shock absorber)
52.)
53.)Automatically adjustable blocking plate
54.)
55.)Inner slideable case
56.)
57.)Strong holding spring
58. Water inlet valve
59. Cylinder
60. Crank or Beam
61. Central pivot (bearing)
62. Dynamic changing piston
63. Shaft
64. Central pin or pivot
65. Slideable sleeve
66. Pressure inlet holes
67. Water displacement cylinder
68. Connection point
69. Central movement shaft pipe
70. Water directing slots
71. Slideable water diversion pipe
72. Connection point

Claims
Bow Rove

1. (*Device 1*) is a water displacement drive system fixed on a water vessel below the water-line, which produces a jet-flow of water as a result of forwards and reverse motion of a piston/water holding cylinder (#2) pressurising water between it and both water holding cylinder (#1) and piston (#3), all three parts being radiusly formed.

2. The piston/water holding cylinder (#2) as mentioned in claim 1 should be attached to a vertical motion shaft above a central pivot (#4).

3. (*Device 2*) A pendulum motion weight system attached to the vertical motion shaft (according to claim 2) with an automatic locking system either side at a horizontal (or any angle above horizontal) position, released by downward force applied manually or by a motorised mechanism.

4. The motion shaft according to claim 2 can be either counter-balanced with a weight, or a pendulum motion weight system according to claim 3 can be used in conjunction with claim 1 to allow for ease of movement.

5. Water displacement drive system as according to claim 1 with the addition of water inlet holes made in water holding cylinder (#1) and piston/water holding cylinder (#2) flanked by any appropriately shaped covers that will direct water backwards.

6. Water displacement drive system as according to claim 1 (with or without the additions in claim 5) contained within a portable frame.

7. (*Device 3*) A radiusly formed bow-shaped pipe with blocked ends consisting of two halves, being two separate water holding cylinders with large holes in the centre, water directing holes in the front and rear areas (past the furthermost position of the piston) and with any shaped piston inside connected to a motion shaft mounted on a central pivot (bearing).

8. The addition of a counter balance weight or a pendulum motion weight system (as in claim 3) to the motion shaft on device 3 according to claim 7 would allow for ease of movement.

9. (*Device 4*) Device 3 according to claim 7 without water directing holes in front and rear areas, instead with valves located at each end of the cylinder which is connected to water outlet pipes and the piston powered by a pendulum motion weight system according to claim 3.

10. Device 4 according to claim 9 with the pendulum motion weight system being self-powered or operated by any mechanical device.

11. Device 4 according to both claims 9 and 10 for the use as a water pump and/or attached to a generator to produce electricity.

12. Device 4 according to claims 9, 10 and 11 with the addition of water diversion pipes to enable additional use as a drive-system.

13. Device 4 according to claims 7, 8, 9, 10 and 11 with the components not formed radiusly, but able to operate horizontally.

14. (*Device 5*) A vertical piston freely moving within two outer cylinders (one fixed, one rotatable, both with water inlet slots formed around the lower parts), the movement of the rotatable cylinder opening and closing the slots providing focused water pressure on the piston.

15. The lowest portion of the inner cylinder according to claim 14 should remain open for water cancellation (fig 5.1 #34)

16. (*Device 6*) Water displacement drive system as in claim 5 with the addition of a horizontal movement shaft (#2A) attached to piston (#2) and guided through piston (#3), attached to a vertical motion shaft (#4).

17. Water displacement drive system according to claim 16 with the addition of a supporting frame to enable the device to become portable.

18. Water displacement drive system according to claim 16 with the addition of a surrounding case with brackets or holders attached to enable portablility, a steering shaft and with space within the rear piston for a motor or powering system.

19. (*Device 7*) A flickable weight flywheel consisting of a minimum of one flexible blade produced from any strong, flexible material with slideable weights attached to a rotary crank working in conjunction with a roller bar or similar block.

20. A flickable flywheel as described in claim 19, but produced from any non-flexible material with shock absorbing blade/s attached, connected to strong spring-loaded hinges to achieve a 'flickable' effect.

21. A flickable flywheel as described in claim 19, but produced from a pipe or cylinder with both ends sealed, containing a slideable or rollable weight of any type within it.

22. A flickable flywheel according to claim 21, with the outer edge of the pipe or cylinder open to allow an inner sleeve attached to a strong holding spring, to project outside of the pipe to a controlled point, enabling the slideable or rollable weight to propel to a further position for extra leverage.

23. (*Device 8*) A water displacement drive system using water holding cylinder (#1) with front inlet valve (#50) and dynamically shaped water displacement piston with a flat rear (to direct water at an angle without the interference of back-pressure) attached to a motion shaft on a central pivot (bearing).

24. Device 8 according to claim 23 with a counter-balance on the motion shaft.

25. Device 8 according to claim 23 with a pendulum motion weight system (as in claim 3) attached to the motion shaft.

26. (*Device 9*) A water displacement drive system with dynamic changing pistons which are surrounded by slideable sleeves (automatically controlled by an independent device) – the pistons being connected to cylinders one part placed inside (in atmosphere) and one part outside (in water) fixed to a crank or beam with a central pivot, and with a water displacement cylinder with optional front inlet valves (of any type) fixed or adjustable, placed on the outside of the water vessel in front of the piston.

27. Using a rotary crank to move the dynamic changing pistons according to claim 26 and the addition of flickable weight flywheel according to claim 19, 20 or 21 would allow the system to be supported by gravity force.

28. Device 9 according to claim 26 with a counter-balanced motion shaft.

29. Device 9 according to claim 26 with a pendulum motion weight system (as in claim 3).

30. Device 9 according to claim 26 with the addition of small holes to the hydro-dynamic step/s of the pistons to enable water pressure to be harnessed without turbulence

31. (*Device 10*) Device 5 according to claims 14 & 15 with shaped cylinders (with water inlet slots) to accommodate the dynamic shaped pistons which are attached to central movement shaft pipes with water directing slots that direct any excess water gathered into slideable water diversion pipes.

32. Device 10 according to claim 31 with the pump connected to a rotary crank or beam.

33. Device 10 according to claim 31 and/or 32 for use as any water displacement drive system or water pump.

34. Device 2 can also be adapted to operate by replacing the pendulum motion weight system with a moveable bow-shaped pipe or cylinder above the motion shaft attached to a central pivot, housing a rollable or slideable weight.

35. Any adaptations or additions to any of the preceding devices or individual parts of devices already claimed.

36. Use of any of these devices or adaptations of these devices used in conjunction with any other devices (manual, mechanical or electrical, e.g digital timing devices, combustion engine, compressed air, steam, electro-magnet, etc.) for the achievement of any other purpose, e.g. producing electricity, pumping water, powering other systems or devices or any liquid hydraulic devices.

Application No:	GB0920410.8	**Examiner:**	Richard Collins
Claims searched:	1,2 & 4-6	**Date of search:**	2 February 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB431442 A (LE CLEZIO) see figures 1 to 3 especially.
A	-	WO2008/024077 A1 (CHUA) see figures 1a, 1b, 3 and 4 especially.
A	-	DE3902367 A1 (WOELKY) see figures 1 to 3 especially.
A	-	US3971330 A (FRENCH) see the figures.
A	-	GB191129184A (ZELTER) see figures 1 to 3.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

B7V

Worldwide search of patent documents classified in the following areas of the IPC

B63H

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
B63H	0001/32	01/01/2006
B63H	0011/06	01/01/2006
F04B	0001/053	01/01/2006
F04B	0009/02	01/01/2006