

(12) UK Patent Application (19) GB (11) 2464458 (13) A

(43) Date of A Publication

21.04.2010

(21) Application No: 0818791.6

(22) Date of Filing: 14.10.2008

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(51) INT CL:
B62B 5/02 (2006.01) B60F 3/00 (2006.01)
B60V 3/00 (2006.01) B62B 9/02 (2006.01)
B62B 9/06 (2006.01)

(56) Documents Cited:
GB 2325903 A GB 2182613 A
GB 1578742 A GB 1261947 A
GB 0424722 A JP 070002154 A
US 4709772 A

(58) Field of Search:
UK CL (Edition X) B7D
INT CL A61G, B60F, B60V, B62B
Other: Online: WPI, EPODOC

(54) Title of the Invention: Multi wheel drive pod
Abstract Title: Multi wheel driving unit

(57) A multi wheel driving unit 4 to be used on a hoverbarge 2 with an Archimedes screw 5 to give propulsion in water, shallow water, liquid mud, wet sand, floating broken ice, snow and grass land comprises a rotatable frame 13 pivoted on a main holding frame 15 to move vertically when it encounters an obstacle or trench so that it can pass over it within the limitations of the hoverbarge hover height.

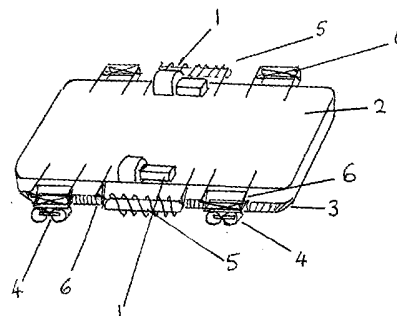


FIGURE 1

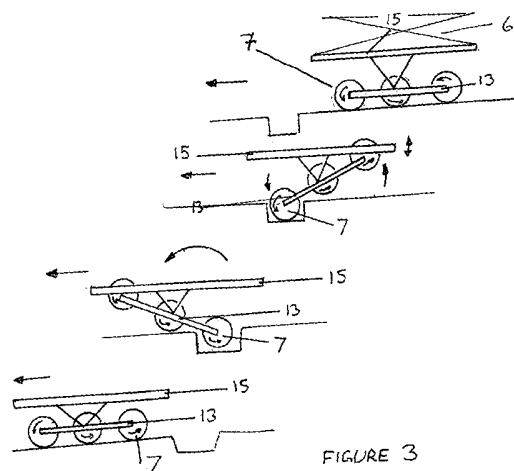


FIGURE 3

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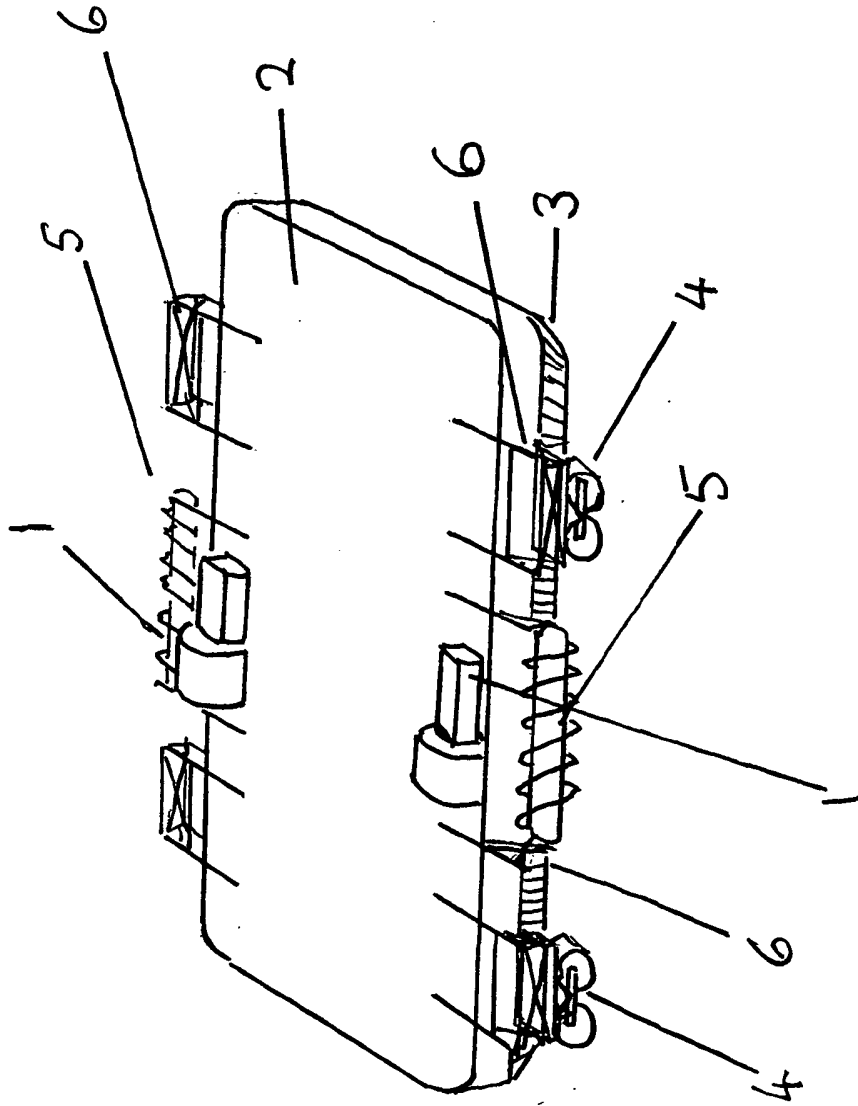


FIGURE 1

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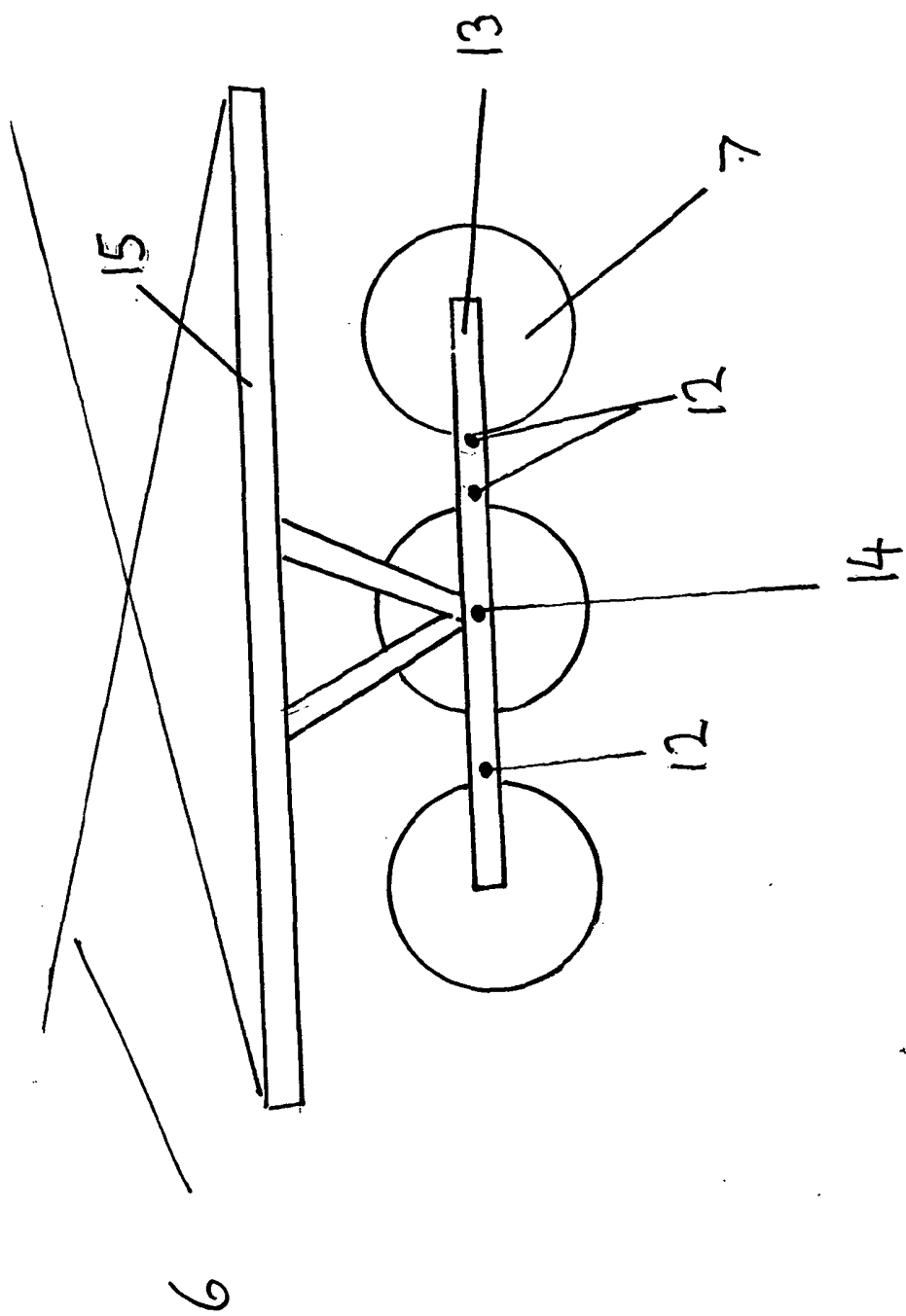


FIGURE 2

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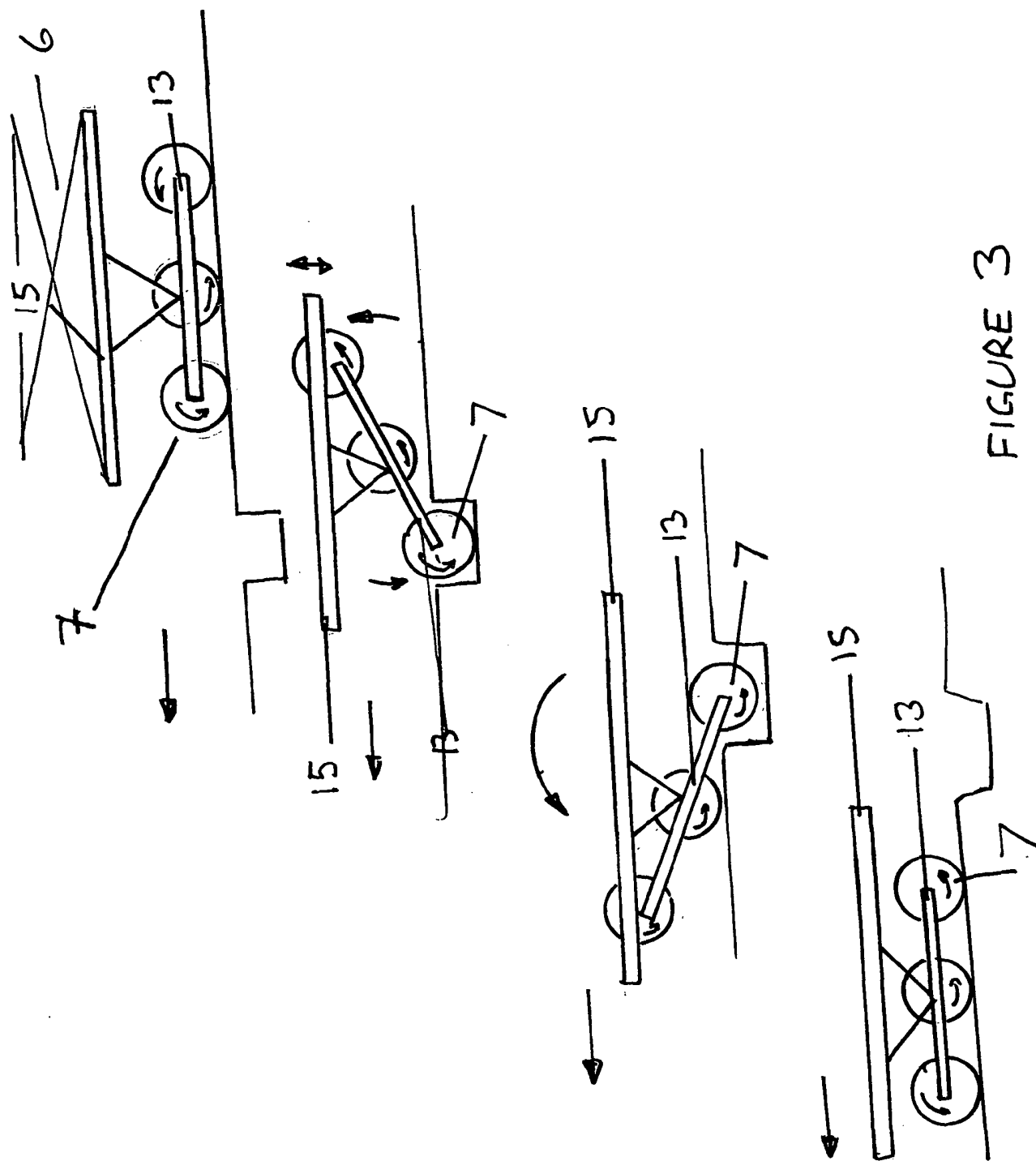


FIGURE 3

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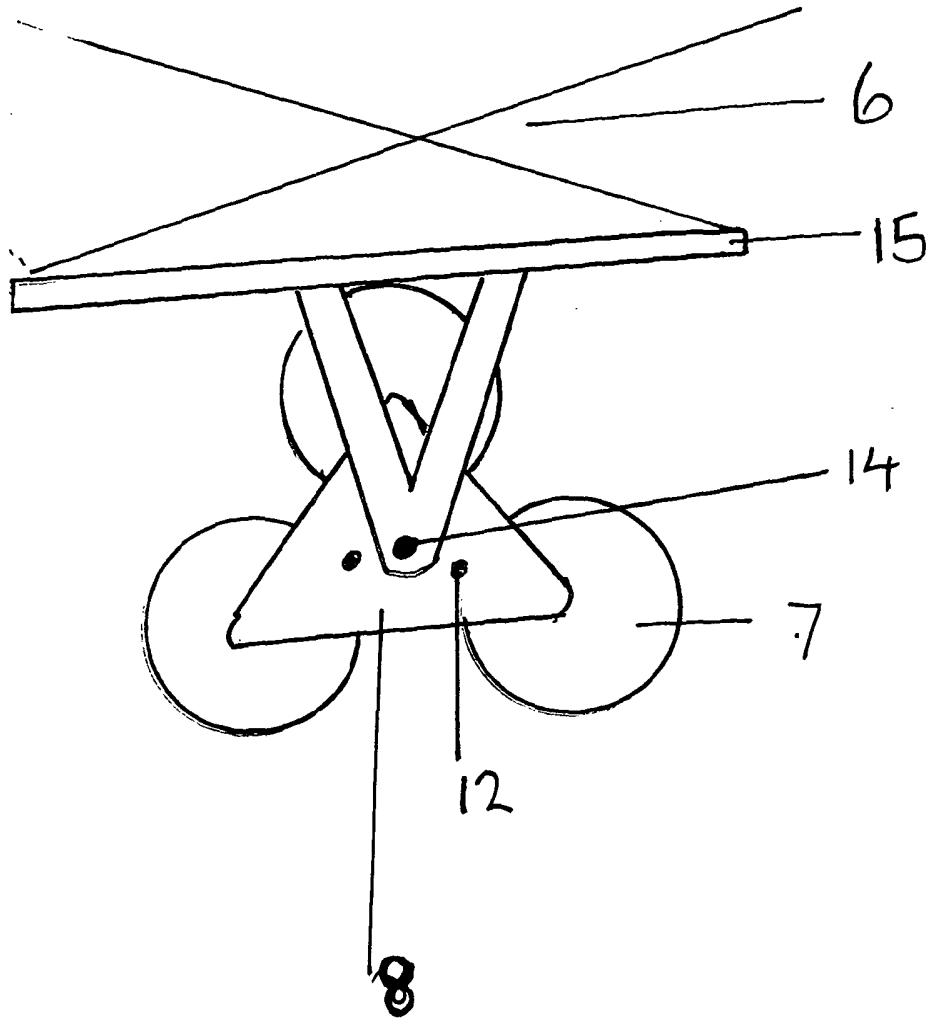


FIGURE 4

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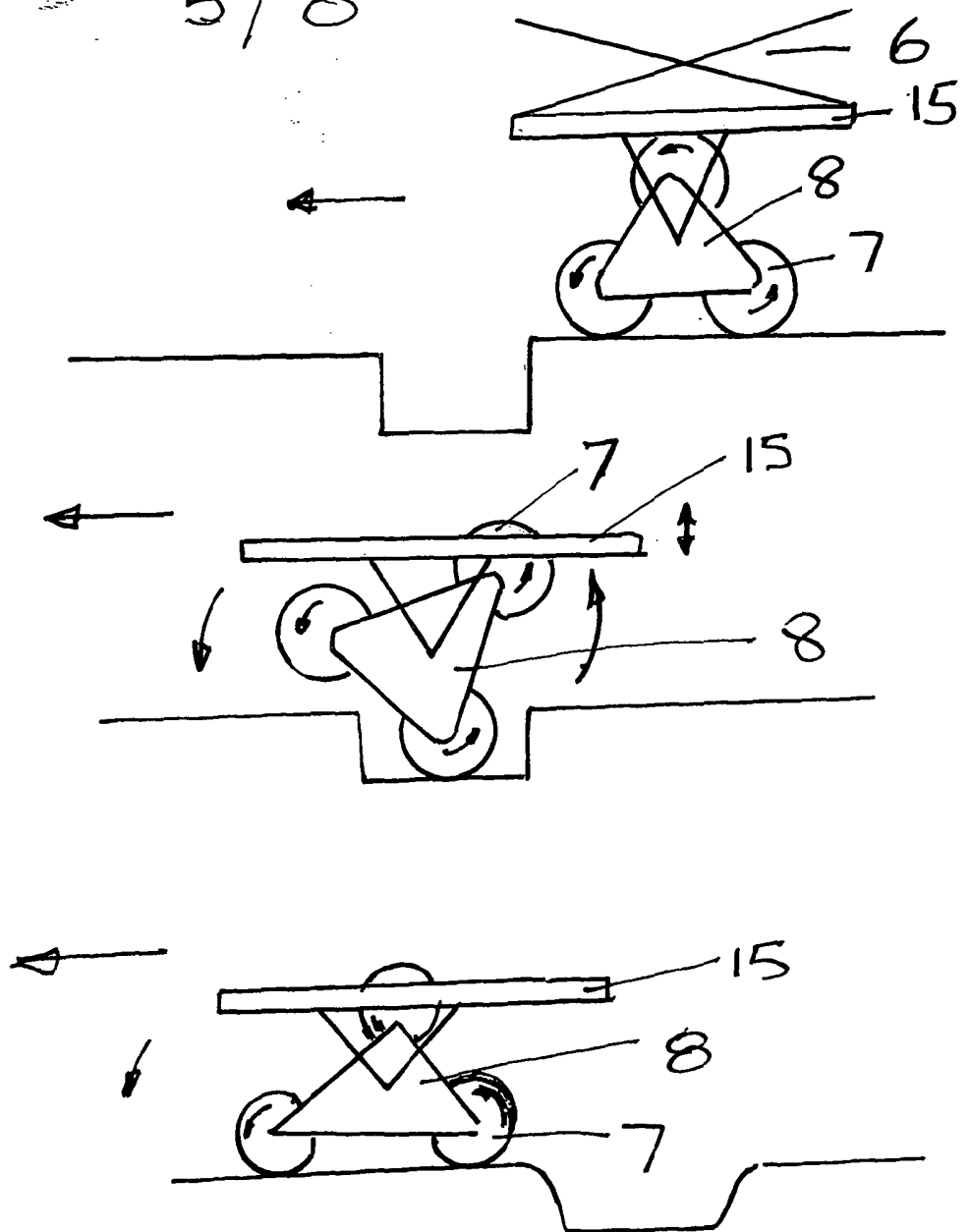


FIGURE 5

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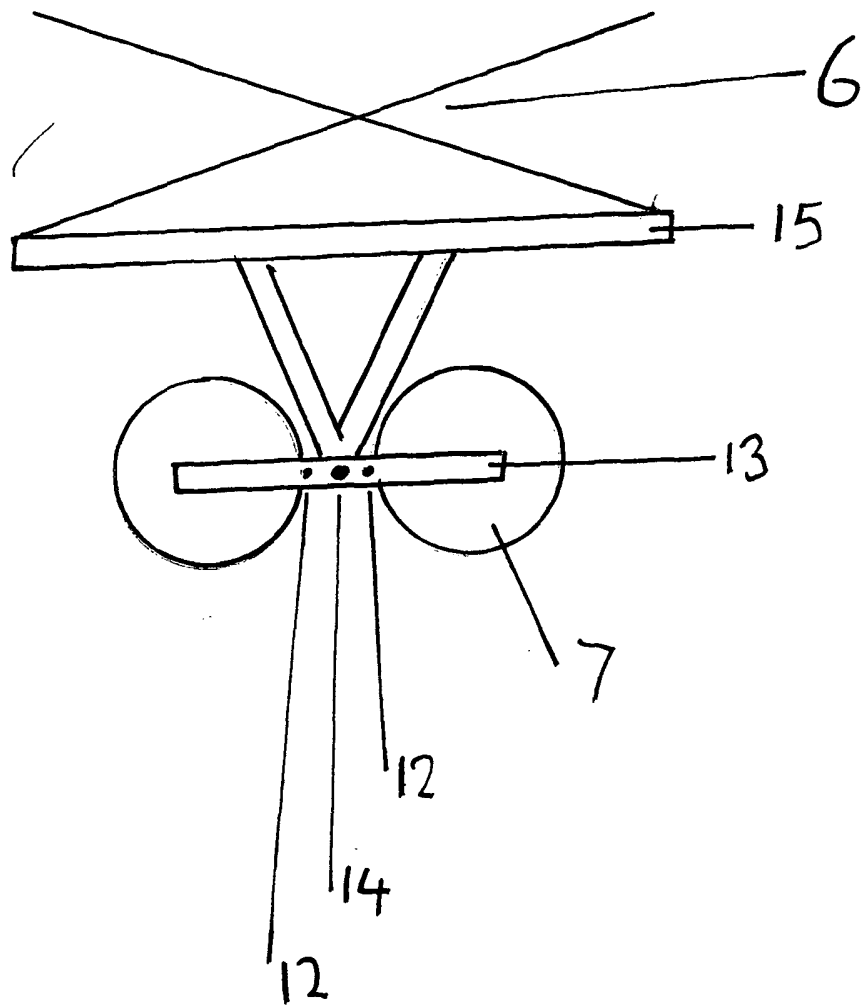


FIGURE 6

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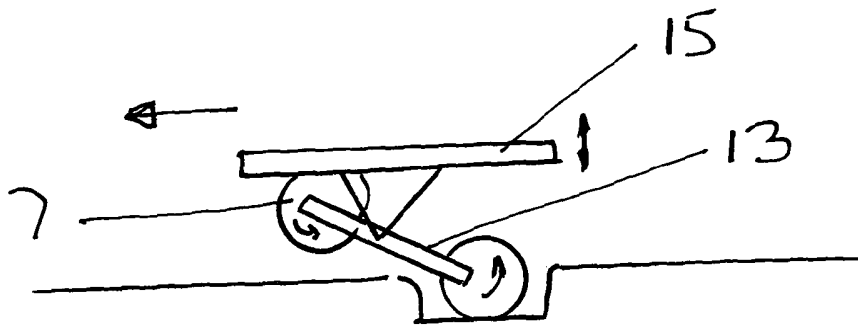
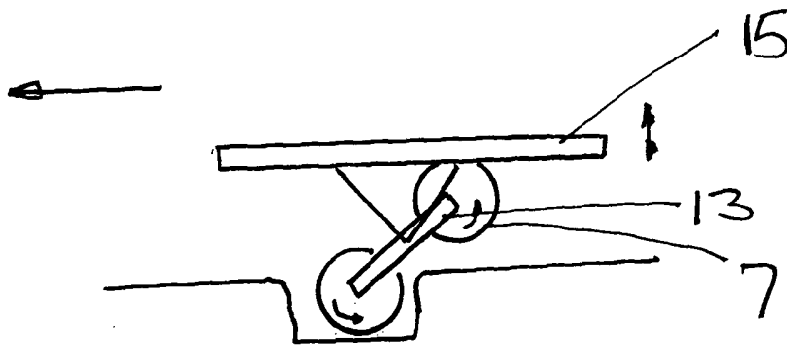
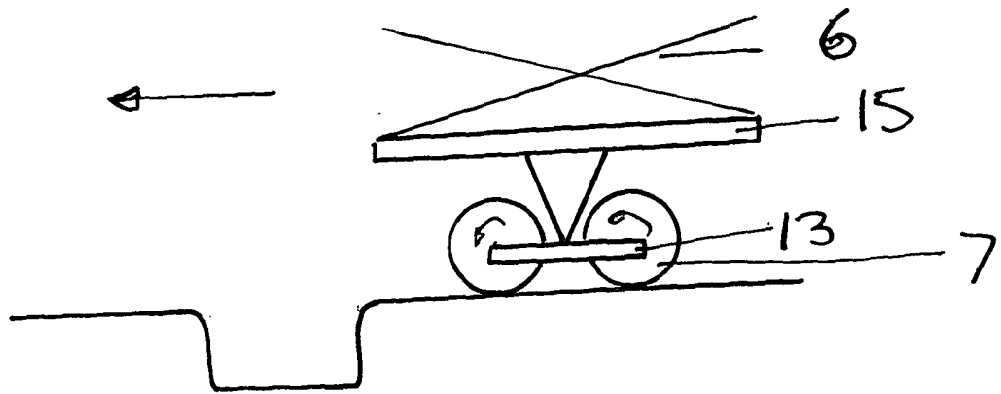


FIGURE 7

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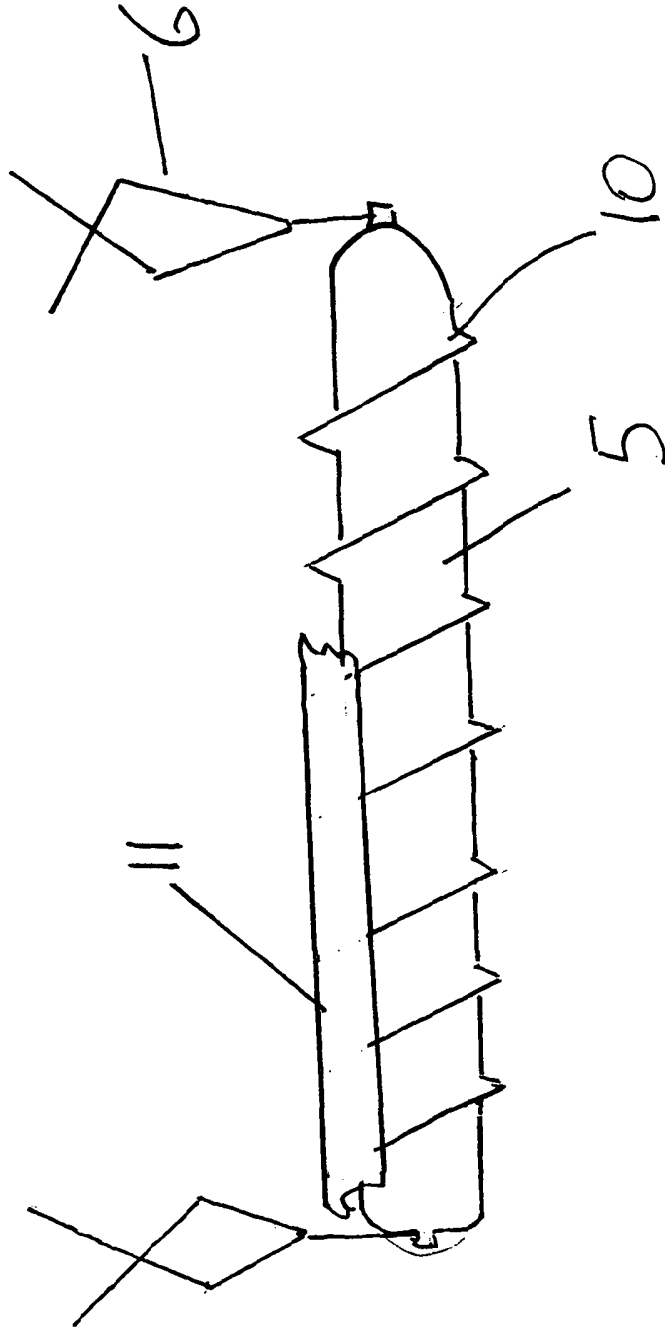


FIGURE 8

Multi Wheel Drive Pod

This invention relates to a propulsion system for a Hoverbarge. The Hoverbarge is particularly suited to operations that include marine transport of very heavy vehicles, equipment, and stores with loading and unloading either at sea or on shore. The Hoverbarge requires propulsion that provides low speed vessel characteristics in deep water and is totally amphibious for shallow or no water areas so that equipment and personnel can be placed on dry land. The Hoverbarge is capable of carrying loads over 2000 tonnes and also has semi submersible capabilities for maximum flexibility for loading and unloading at sea. The drive system must be flexible and capable of manoeuvring the Hoverbarge in various conditions.

BACKGROUND TO THE INVENTION

High speed hovercraft use ducted fans or propellers to give them a forward motion.

Hoverbarges are much heavier and therefore have traditionally been towed by a variety of vehicles but with longer journeys required over changing ground conditions a propulsion system is now required that is flexible and suits many types of soil conditions.

With the increase in oil exploration there is now an increasing requirement to move very large loads of over 2000 tonnes into remote areas on a temporary basis and the single journey may encounter shallow water or no water areas, swamp, liquid mud, through broken floating ice and snow, and this requires a cost effective solutions so that equipment and personnel can be placed on dry land.

This invention uses established methods of propulsion such as the wheel and Archimedes screw built into a driving unit so that the best suitable propulsion unit is available for those ground conditions.

The more efficient and less noisy soft tired wheel is used on wet sand, grasslands, and ice roads, but in water, liquid mud, floating ice flows and snows the Archimedes screw is used to drive the Hoverbarge forward.

In extreme conditions the soft tires can be replaced with metal wheels so they do not get punctured or torn to pieces by vegetation such as bamboo or broken rocks.

A typical route may encounter many of these variations so the system must be able to cope with the sudden variations. Additional devices to remove mud that may stick to the tires and fill the treads which creates a smooth tire that will not grip are included in the invention.

The amphibious capability allows the Hoverbarge to move over areas normally inaccessible to conventional vehicles.

When the Hoverbarge is on hover the cushion pressure means the load on the driving wheels can be regulated to be less than 5psi ground pressure to avoid environmental damage.

SUMMARY OF INVENTION

The object of the present invention is to provide a superior transport solution for taking loads of over 2000 tonnes into remote and unprepared areas and not to be reliant on purpose built docks, tides, water depths, roads or rail links.

Another object of the invention is to have self cleaning tires to stop mud build up between the tire treads.

It can do speeds of over 5 knots at sea and even on no water conditions this can be over 10 knots.

When in shallow water or no water the ground conditions are not going to effect the Hoverbarge operation.

The driving pods consisting of wheels and Archimedes screws can be fitted to the side of the Hoverbarge and are designed to retract if the forces are too large due to wind loads or large slope.

A mud remover is fitted to each wheel tire.

The wheels are mounted in groups of two or three and a spindle at their centre allows them to flip over should they hit a solid wall or fall into a ditch.

The barge structure can be built in steel or aluminium capable of carrying 2000 tonnes to 4000 tonnes payloads.

The hover height will be over 1m when on the air or gas cushion and allows the Hoverbarge to cross sensitive ground as it only exerts 1psi (0.07kg/cm²) at this point.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

FIG 1 presents a profile of the Hoverbarge with drive pods (4) and Archimedes Screw (5) on the side. Each of the drive pods can be retracted off the ground with hydraulic lifting mechanism (6)

FIG 2 shows a cross section of a three wheel drive pod crossing a ditch. Each of the wheels (7) is held on a frame (13) that has a spindle (14) in the centre wheel so the unit can rotate about the spindle (14) within the main holding frame (15) above. The soil is cleaned from the wheel while in rotation using a cleaning device (12) which maybe a combination of methods as various soils' act differently. The device (12) can be a series of water jets, a roller with flails on or a vibrating roller that would be contact with the tire surface. The whole unit can be raised and lowered with a lifting mechanism (6).

FIG 3 shows the above unit crossing a small trench. As it crossing the trench the leading wheel will fall in and the whole unit will lift as the frame (13) rotates within the main holding frame (15). The whole unit can rise to allow the change of level required. As the unit continues to move forward the frame (13) will rotate over so that other wheels take the lead. As the unit moves forward the wheel in the trench is lifted out.

FIG 4 shows the side elevation of a three wheel drive pod formed into a triangular shape so that when the lead wheel encounters an obstacle the unit rotates reducing the travel time for another wheel to come in contact with the ground and maintains a larger ground contact. A spindle (14) located in the centre of frame (8) allows the three wheels to rotate and a soil clearing device (12) is attached to each wheel. The three wheels rotate within the main holding frame (15).

FIG 5 shows a cross section of a three wheel triangular wheel drive pod crossing a ditch. Each of the wheels (7) is held on a frame (8) that has a spindle (14) in the centre wheel so the unit can rotate about the spindle (14) within the main holding frame (15) above. The soil is cleaned from the wheel while in rotation using a cleaning device (12) which maybe a combination of methods as various soils' act differently. The device (12) can be a series of water jets, a roller with flails on or a vibrating roller that would be contact with the tire surface. The whole unit can be raised and lowered with a lifting mechanism (6).

FIG 6 shows the side elevation of a two wheel drive pod with spindle (14) set in the middle of frame (13) which holds the wheels (7). A wheel cleaning device (12) is mounted on each wheel. The whole unit can rotate within the main holding frame (15)

FIG 7 shows a cross section of a two wheel drive pod crossing a ditch. Each of the wheels (7) is held on a frame (13) that has a spindle (14) in the centre wheel so the unit can rotate about the spindle (14) within the main holding frame (15) above. The soil is cleaned from the wheel while in rotation using a cleaning device (12) which maybe a combination of methods as various soils' act differently. The device (12) can be a series of water jets, a roller with flails on or a vibrating roller that would be contact with the tire surface. The whole unit can be raised and lowered with a lifting mechanism (6).

FIG 8 shows the side elevation of the Archimedes screw (5) which is partly clad with a cover (11) to increase water velocity. The unit can be retracted by lift mechanism (6)

DETAILED DESCRIPTION OF THE INVENTION

The invention will be described by way of example and with reference to the accompanying drawings in which:-

Fig 1 presents a profile of the Hoverbarge driving pods and the Archimedes screw (5) with side wheel pods (4) and lifting mechanisms (6).

Fig 2 presents a cross section of the three wheel drive pod (4), cross frame (13) and central spindle (14) that allows the whole pod to rotate within the main holding frame (15) if the lead wheels hit an obstacle such as a wall and or falls into a trench. The whole unit will rotate within the main holding frame (15). As the unit crossing an obstacle the main holding frame (15) can lift vertically whilst the cross frame (13) can rotate with the main frame. The whole unit can be lifted with a mechanism (6). Downward load is regulated via the lifting mechanism (6) to achieve the correct contact pressure. Soil cleaning devices are attached to each wheel (12) to remove material that builds up between the tire treads causing the wheel to lose its grip. Different soil materials require various methods of cleaning them. It maybe high pressure water jets, mechanical flails or a high level vibration.

Fig 3 shows the flow process of the wheels contained in the cross frame (13) rotating within the main holding frame (15) as it crosses a trench.

Fig 4 presents a side view of the three wheel drive pod (4) set in a triangular format with cross frame (8) and central spindle (14) that allows the whole pod to rotate within the main holding frame (15) if the lead wheels hit an obstacle such as a wall and or falls into a trench. The whole unit will rotate within the main holding frame (15). As the unit crossing an obstacle the main holding frame (15) can lift vertically whilst the cross frame (8) can rotate with the main frame. The whole unit can be lifted with a mechanism (6). Downward load is regulated via the lifting mechanism (6) to achieve the correct contact pressure. Soil cleaning devices are attached to each wheel (12) to remove material that builds up between the tire treads causing the wheel to lose its grip. Different soil materials require various methods of cleaning them. It maybe high pressure water jets, mechanical flails or a high level vibration.

Fig 5 shows the flow process of the wheels contained in the cross frame (8) rotating within the main holding frame (15) as it crosses a trench.

Fig 6 presents a cross section of the two wheel drive pod (4), cross frame (13) and central spindle (14) that allows the whole pod to rotate within the main holding frame (15) if the lead wheels hit

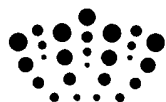
an obstacle such as a wall and or falls into a trench. The whole unit will rotate within the main holding frame (15). As the unit crossing an obstacle the main holding frame (15) can lift vertically whilst the cross frame (13) can rotate with the main frame. The whole unit can be lifted with a mechanism (6). Downward load is regulated via the lifting mechanism (6) to achieve the correct contact pressure. Soil cleaning devices are attached to each wheel (12) to remove material that builds up between the tire treads causing the wheel to lose its grip. Different soil materials require various methods of cleaning them. It maybe high pressure water jets, mechanical flails or a high level vibration.

Fig 7 shows the flow process of the wheels contained in the cross frame (13) rotating within the main holding frame (15) as it crosses a trench.

Fig 8 of the Archimedes screw (5) which is partly clad with a cover (11) to increase water velocity. The unit can be retracted by lift mechanism (6) and a downward load is applied through the lift mechanism (6).

CLAIM

1. A multi wheel unit held on a frame that can rotate within a holding frame which is capable of moving vertical when it encounters an obstacle so that it can pass over it . The holding frame can be raised or lowered to suit the ground conditions and hover height of the Hoverbarge.
2. The multi wheel unit of claim 1 above consisting of three wheels in line with the cross frame holding the wheels capable of rotating within the holding frame when they encounter an obstacle.
3. The multi wheel unit of claim 1 above consisting of three wheels in a triangular format with the cross frame holding the wheels capable of rotating within the holding frame when they encounter an obstacle.
4. The multi wheel unit of claim 1 above consisting of two wheels in line with the cross frame holding the wheels capable of rotating within the holding frame when they encounter an obstacle.
5. A supporting propulsion unit whereby Archimedes screws can provide propulsion in water and liquid mud, and floating broken ice.



Application No: GB0818791.6

Examiner: Mr Colin Thompson

Claims searched: 1-5

Date of search: 9 December 2008

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
X	1,4	GB 2325903 A (Hester) See whole document
X	1,4	GB 1578742 A (N.R.D.C.) See whole document
X	1,4	GB 424722 A (Gulley) See whole document
X	1,3	GB 2182613 A (Evans) See Fig 3
X	1,3	US 4709772 A (Brunet) See whole document
X	1,4	JP 07002154 A (Daikin Mfg Co Ltd) See especially Figs 4 & 5
X	1,2	GB 1261947 A (A Johnson & Co) See whole document

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:

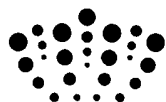
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X:

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

A61G; B60F; B60V; B62B

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



WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
B62B	0005/02	01/01/2006
B60F	0003/00	01/01/2006
B60V	0003/00	01/01/2006
B62B	0009/02	01/01/2006
B62B	0009/06	01/01/2006