

[54] HOPPER BARGE DRIVABLE WITH A
DRIVING MEANS

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[22] Filed: Sept. 16, 1969
[21] Appl. No.: 858,315

[30] Foreign Application Priority Data
June 13, 1969 Germany.....P 17 81 296.3
[52] U.S. Cl.....114/29
[51] Int. Cl.....B63b 35/30
[58] Field of Search.....114/29, 30

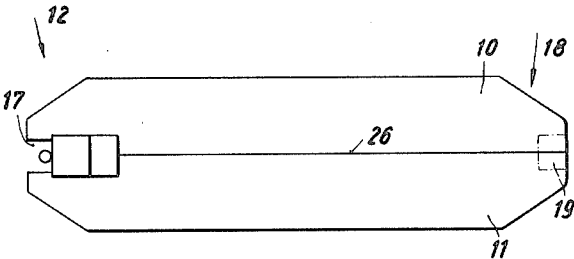
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[57] ABSTRACT

A hopper barge with a driving and control means supporting platform mounted thereon for constant horizontal orientation in any position of the barge sections. A hopper barge arranged with lengthwise hinged sections for opening and closing thereof is provided with a deck-mounted platform for the support of drive, steering and other control mechanism. Linkages are arranged between the platform and the adjacent portions of the barge deck so that the platform remains in horizontal orientation at all times regardless of whether the barge sections are in closed or open relationship with respect to each other. Further, the linkage systems used are mounted pivotally but nontranslatably with respect to each section of the barge and the platform, or other supported means, is likewise mounted pivotally but substantially nontranslatably with respect to the barge sections whereby, regardless of the open or closed relationship of the barge sections with respect to each other, the platform for the engine, steering or other control mechanism remains at least substantially centered at all times over the centerline of the barge.

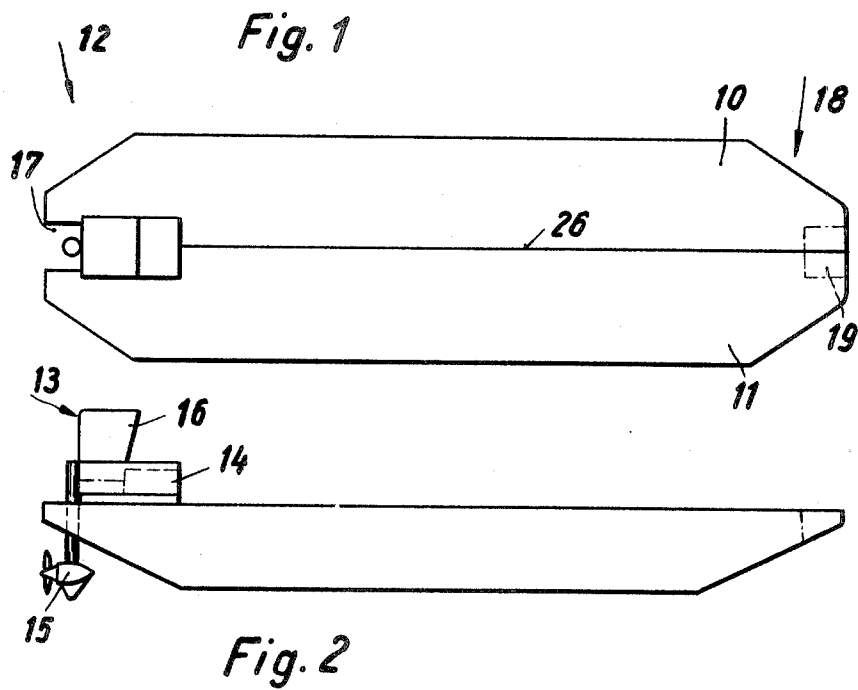
10 Claims, 8 Drawing Figures



Patented March 14, 1972

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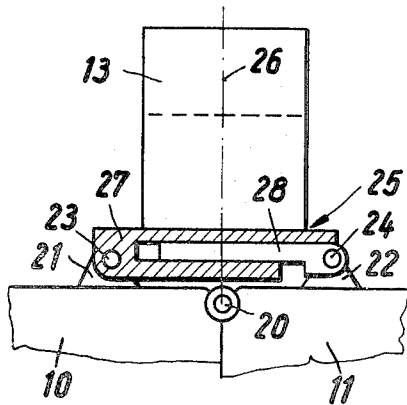


Fig. 3

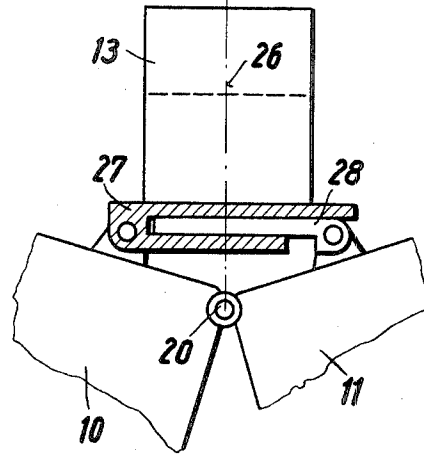


Fig. 4

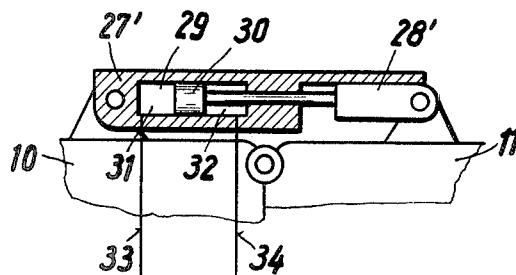


Fig. 5

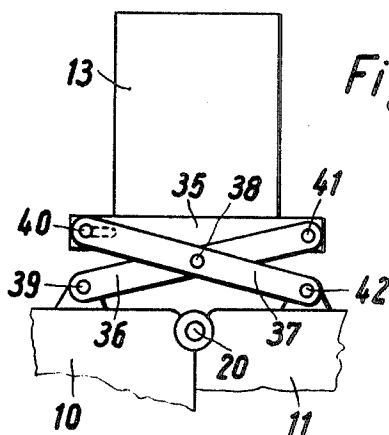


Fig. 6

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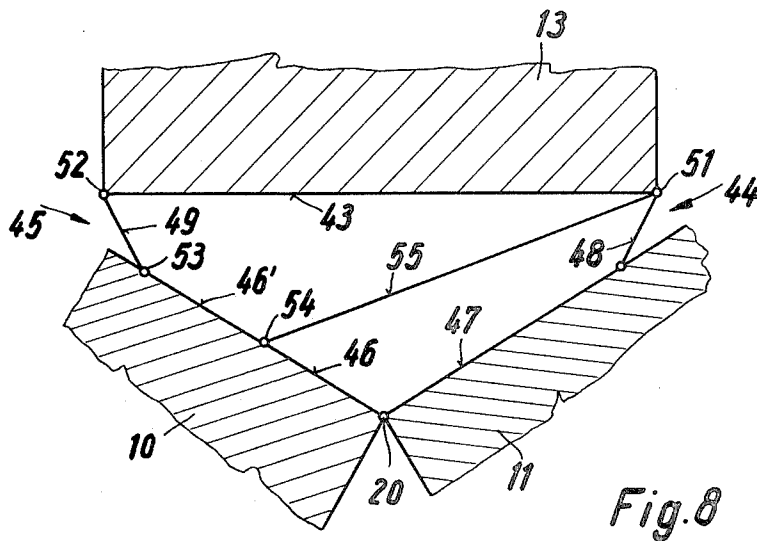
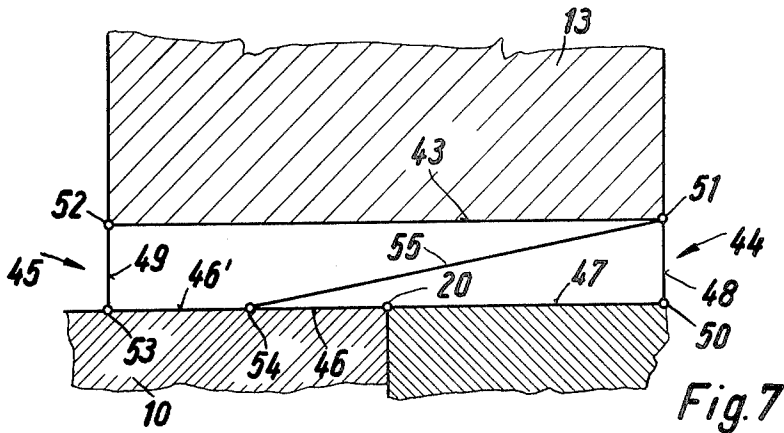
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HOPPER BARGE DRIVABLE WITH A DRIVING MEANS

The invention relates to a hopper barge and particularly to a hopper barge for the transporting of dredged material or the like which barge can be driven by driving means preferably consisting substantially of a motor and a steerable propeller with longitudinally pivotable barge halves which support the driving means by means of a movable device, such as a platform, or the like connected to the barge halves.

The barge halves will be called "floating body elements" hereinafter.

The purpose of such a support for the driving means is to maintain the driving means and, if necessary, the platform for the helmsman during the pivoting process in a substantially horizontal position.

A type of hopper barge is already known in which the driving means is pivoted onto one of the floating body elements by means of a rigidly mounted joint, consisting of pivot pin and bearing support, and to the other floating body element by means which are transversely movable. The platform is not maintained in a horizontal position by this system.

Also, a hopper barge is presently known in which the platform which, of course, does not support a driving means, is maintained in a horizontal orientation by means of a vertical, columnlike sliding bar which is connected to the floating body elements by means of a linkage system. Another known hopper barge also uses a vertical sliding bar for supporting the platform, but in this case the unit comprising the sliding bar and platform is connected to the floating body elements by a pair of straight guide rails instead of by links or rods. In particular, a vertical bar or column acting at the side of the driving means or the platform does not well follow a straight guiding relationship.

The basic purpose of the invention is to make possible the separation of the floating body elements with the driving means or platform maintained in a horizontal position but without the need for a special guiding means, such as a vertical rod or the like.

To attain this basic purpose, the invention provides that the device supporting the driving means is connected to both barge halves by means of joints consisting of pivot pins and bearing supports or the like. It is thus assured that the central vertical plane of the driving means, if said plane coincides before the pivoting with the central vertical plane of the barge, remains during pivoting at all times on, or at least parallel to, the angle bisector of the pivoting barge halves.

There are several specific means available for carrying out the invention. A device embodying the invention can be constructed by mounting the driving means on a support which is in turn connected to both floating body elements by means of pivot means and is in itself telescopically longitudinally variable. This embodiment results in a very simple device.

A further embodiment of the invention contemplates supporting the driving means by at least one pair of rods which consists substantially of two intersecting linkages which are pivotally connected at the platform and at the floating body elements and are themselves connected scissorlike at the point of intersection.

A very advantageous embodiment of the invention is obtained if the driving means is supported by at least one pivotally connected linkage consisting of two four-hinge connections. It is advantageous to further develop this construction of the invention so that both four-hinge connections share at least one member acting as a rod, whereby three joints of both four-hinge connections can be mounted to one floating body element.

It is advantageous to further develop the above-described embodiment with the telescopically longitudinally variable member in such a manner that the telescopic variation in length can be driven mechanically, electrically, pneumatically or hydraulically, for example, by a piston guided in a cylinder. Thus, it is possible to use the device for supporting the driving means simultaneously for opening of the floating body elements.

Further advantages and characteristics of the invention can be understood by reading the following description and inspecting the accompanying drawings, in which:

FIG. 1 schematically illustrates a top view of one embodiment of a hopper barge.

FIG. 2 schematically illustrates a side-elevational view of the hopper barge according to FIG. 1.

FIG. 3 schematically illustrates a device of the invention with the floating body elements in closed position.

FIG. 4 illustrates the device according to FIG. 3 with floating body elements in open position.

FIG. 5 schematically illustrates the embodiment of the invention according to FIGS. 3 and 4 with the addition of a driving means.

FIG. 6 schematically illustrates a further embodiment of the invention.

FIG. 7 schematically illustrates a further embodiment of the invention with closed floating body elements. The control means and tie rods are indicated only schematically by lines and the joints by points.

FIG. 8 illustrates also schematically the embodiment of FIG. 7 with open floating body elements.

FIG. 1 schematically illustrates a hopper barge in a top view. The hull is lengthwise divided along its center so that it consists of two halves 10 and 11. Both halves are hingedly connected in a known manner near the deck so that they can open downwardly. The halves are therefore to be identified hereinafter as floating body elements. The construction of these elements including the air chambers, hinge and driving means for the pivoting movement is already well known and therefore not described with the exception of one embodiment in which the mechanism for supporting the driving means is used according to the invention as a driving means for the floating body elements. A driving means 13 is installed on the deck at the stern 12 of the watercraft, which driving means 13 consists substantially of a motor 13, power transmitting means, a fuel supply system, a steerable propeller 15 and a piloting position 16. The hopper barge can also, if desired, be driven by a conventional propeller, for example, through a so-called Z-drive, and can be steered by a conventional rudder. However, steerable propellers are particularly advantageous; therefore, the invention in combination with a steerable propeller or with a unit identified as a navigator (containing substantially a frame, driving means, transmission means, control means and steerable propeller means) is of particular importance. In order to advantageously mount the steerable propeller 15, or the Z-drive, the stern of the barge is provided with a recess 17. In case a steerable propeller 18 is also to be provided at the bow, a recess (illustrated in dashed-dotted lines) can also be appropriately there provided.

FIGS. 3 and 4 illustrate one embodiment of the invention. The two hingedly connected floating body elements 10 and 11 support a platform 25 with hinges consisting of bearing supports 21, 22 and pivot pins 23, 24. The platform supports the driving means 13. Both halves of the platform are joined together in such a manner that they are telescopically variable in width. Thus, if as schematically illustrated in FIG. 4, when the two floating body elements open in order to discharge the dredged material, the two halves of the platform can telescope to take up the change of distance between the hinges. The central vertical plane of the driving means which, before pivoting, coincides with the central vertical plane of the hopper barge remains, as a result of the invention, during such pivoting in, or at least parallel to, the bisector of the angle which is formed by the decks of the floating body elements. Thus, the platform remains horizontal at all times.

FIG. 5 illustrates a development of the embodiment of FIGS. 3 and 4 in which the one platform half 27' is provided with a cylinder 29 and the other half 28' with a piston 30. By supplying pressure means to the cylinder chambers 32 and by emptying the other chamber 31 by means of conduits 33, 34, the floating body elements can be opened or such opening can be maintained. In place of a hydraulic or pneumatic driving means, a mechanical or electrical drive can also be used.

FIG. 6 illustrates a further advantageous embodiment of the invention in which the driving means 13 or the supporting platform 35 is supported with respect to the two floating body elements 10 and 11 by at least one pair of links 36, 37 which intersect scissorlike and are pivotally connected at the point of intersection by means of a pivot pin 38 or the like. The links are connected according to the invention to the floating body elements and the platform by pivots 39, 40, 41, 42 consisting of suitable pivot pins and bearings or the like. When the floating body elements 10, 11 are being opened, at least one of the joints 40 or 41 will move along a guide 40' or 41' of the platform similar to that shown in FIG. 4.

A further very advantageous embodiment of the invention is illustrated in FIGS. 7 and 8. The device is illustrated only schematically by illustrating the rod-shaped members as lines and the joints as points. The driving means 13 or the supporting platform 43 is connected to the floating body elements 10, 11 by means of a system which consists of two four-hinge connections 44, 45. The platform 43 and the decks 46, 47 of the floating body elements are considered for purposes of constructing a force diagram as rods. The hinge 20 between the floating body elements is considered one of the joints. One of the link quadrangles consists of the deck of the floating body element 10 (rod 46), the hinge (joint 20), the deck of the floating body element 11 (rod 47), the joint 50 provided on the deck, the rod 48, the joint 51, the rod 55 which is pivotally secured to the joint 54 on the deck of the floating body element 10. The other link quadrangle consists of the joint 54, the rod 55, the joint 51, the platform (rod 43), the joint 52, the rod 49 which is secured on the deck of the floating body element 10 with the joint 53 and the portion of the deck of the floating body element 10 (rod 46') which lies between the joints 53 and 54. The lengths of the common rod 55 and its point of engagement 54 at the deck of the part 10 are chosen according to the invention in such a manner that during rotation of the rods 46, 47 on the joint 20 the rod 48 is pivoted outwardly sufficiently that, due to the connection by the rod 43, the rod 49 is pivoted outwardly to the other side to the same extent. In this manner, the rod 43 (platform) remains horizontal. This principle can also be used with other rod lengths. Also, the rods 48, 49 do not need to be in a vertical position but can also be inclined. It is important that the length of the rod 55 and the position of the joints 54 are chosen accordingly.

In general, two systems according to FIGS. 7 and 8 are provided for supporting the platform, namely one such system adjacent the stern end and one adjacent the bow end of the driving means or the platform. In this case, it is advantageous to permit both rods 55 to cross each other.

In the above statement that at least one member, for example the rod 55, is shared by both four-hinge connections, this statement refers to the ideal system. In an actual construction, the members 46, 47, 48, 55 can, for example, be positioned in another plane with respect to the members 43, 49, 46' so that the common element is not immediately apparent. However, it is important to the invention that the rod 55 is pivoted to a joint 54 on one side, which joint is positioned on a floating body element and is pivoted on the other side to a rod 48 which is arranged on the other floating body element so that when the floating body elements pivot to open, the rod 48 is pivoted outwardly.

The drive for opening and closing the floating body elements is not illustrated and described inasmuch as any of many known devices will be readily apparent and applicable to all exemplary embodiments. This drive can consist, for example, of at least one hydraulic cylinder which is suitably arranged between the floating body elements, for example, with a horizontal lateral axis.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a barge having first and second floating body elements, means pivotally connecting said first and second body elements together adjacent their upper interior corners and permitting their lower interior corners to abut whereby said first and second floating body elements are adapted to pivot out-

wardly about said pivot means for opening said barge and propulsion means, the improvement comprising:

first bearing means secured to said first floating body element to define a first pivot axis stationary with respect to said first floating body element;

second bearing means secured to said second floating body element to define a second pivot axis stationary with respect to said second floating body element;

means defining a support for said propulsion means, said support means including coupling means for pivotally securing said support means to said first and second bearing means;

variable means positioned between said first and second

bearing means to automatically compensate for the variance in the spacing between said first and second bearing means during a pivotal movement of said first and second floating body elements about said pivot means to maintain said propulsion means in a substantially upright position.

2. A barge according to claim 1, wherein said propulsion means includes an engine mounted on said support means, a propeller housing rotatably supporting a propeller and second support means (1) for securing said propeller housing to said engine, (2) for locating said propeller housing below the surface of the water, and (3) for supporting said propeller housing for pivotal movement about a generally vertical axis, and drive transfer means for transferring the power output from said engine to said propeller housing to drive said propeller.

3. A barge according to claim 1,

wherein said support means comprises first and second platform halves; and

wherein said variable means includes means defining a recess on the remote end of one of said first and second platform halves, said recess means slidably receiving the remote end of the other of said first and second platform halves to compensate for a change in the spacing between said first and second bearing support means when said first and second body elements are pivoted about said pivot means.

4. A barge according to claim 3, wherein said recess means includes conduit means adapted to supply pressurized fluid to opposite ends of said recess and said remote end of said other of said first and second platform halves includes a piston slidably received in said recess means whereby said piston may be driven by said pressurized fluid longitudinally of said recess means.

5. A barge according to claim 1, wherein said variable means includes first and second levers and a pivot pin interconnecting said first and second levers intermediate the ends of said first and second levers;

wherein said remote ends of said first and second levers are pivotally secured to opposite edges of said support means; and

including guide means to accommodate a change in the spacing between said remote ends of said first and second levers when said first and second floating body elements are moved to the opened position.

6. A barge according to claim 1, wherein said variable means includes first and second levers and means for pivotally connecting said first and second levers to said support means; and

wherein said variable means further includes third bearing means secured to said first floating body element and a third lever pivotally secured thereto, the end of said third lever remote from said third bearing means being pivotally secured to said support means at a location coincident with the axis of said pivotal connection between said second lever and said support means.

7. A barge according to claim 6, wherein the pivotal joints between said first lever, said support means, said third lever and said first floating body element define a first four jointed articulated figure; and

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wherein the pivotal joints between said second lever, said second floating body element, said first floating body element and said third lever define a second four jointed articulated figure, said first and second four jointed articulated figures maintaining said propulsion means in a substantially upright position.

8. A barge according to claim 7, wherein said first and second four jointed articulated figures are provided adjacent both the stern end of said support means and said bow end of said platform.

9. A barge according to claim 7, wherein the length of said

first and second levers is equal; and

wherein the distance between said remote ends of said first and second levers secured to said support means is equal to the distance between said first and second bearing support means when said lower interior corners of said first and second floating body elements are abutting.

10. A barge according to claim 3, including drive means for controlling the amount that said remote end of the other of said first and second platform halves is received in said recess means.

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