

TITLE OF INVENTION

Unloading System For Sand And The Method Thereof

BACKGROUND OF THE INVENTION

1. Field of the Invention

- 5 The present invention relates to an unloading system, and in particular, relates to an unloading system for sand or the like. The present invention also relates to a method of unloading sand or the like from a flat top barge (FTB).

2. Description of the Related Art

- 10 For land reclamation, the distance to transport sand or the like from the sand source to that area plays a determining role in choosing the types of vessels that can be economically used to achieve the project sand delivery objectives. Commonly, trailer suction hopper dredgers (TSHDs) provides the integrated functions for dredging, transport and discharge of sand. The hopper barges with no dredging function but fast dumping capability have also been heavily relied on solely for transporting and discharging sand. However, as the distance of the sand source gets further and further such
15 that the sailing thereof takes days, these hopper dredgers and hopper barges become too costly to operate.

Vessels of larger capacity, like the standard bulk carriers become the viable alternative as a more economical dedicated means of sand transport leaving the dredging and discharge functions to dedicated equipment at the load source and discharge site.

- 20 As an alternative to the bulk carriers where smaller carrying capacity with simpler operation may be preferred, the simple Flat Top Barge (FTB) is used. FTBs have long been widely used for transporting heavy equipment and materials in and out of harbours and even across sea voyages. Simple and fast construction, widely available, ease of loading and discharge, simple manning and relatively low cost have made the FTBs a popular choice as another alternative to the bulk carriers. With their
25 shallower drafts, they are also able to access the waters that are too shallow for the bulk carriers. And where sand carried by bulk carriers must be break-bulked the FTBs can also play the transshipment role.

- The FTB is very easy to load and can take sand in both the dry or wet form. It has been used for long time for nearby sand transportation and it is cheaper than the hopper barge, and today, it has made
30 its foray into transporting sand from afar. However, along with its low cost and simplicity comes a price to be paid in the form of slow unloading. There is no machinery on FTB save only mooring winches and ramp door control. It is practically a floating pontoon with sideboards on all four sides to contain the heap of sand. The conventional methods to unload sand from FTB are by mechanical means, such as excavators, wheel-loaders and the likes. These devices are lifted on board which
35 then are used to scoop out the sand. The sand is either thrown overboard directly into the water or transferred overboard to another vessel moored alongside. With this method, a dedicated stevedore gang is required, supported by a separate work barge with crane to hoist all these sand moving equipment on board the FTB for the unloading work and upon completion of which to hoist all these back again.

In practise, for example, a typical 10,000 DWT FTB can have up to 8 excavators working simultaneously and may take up to 10-12 hours to completely unload the sand cargo. One short-coming of the mechanical method of unloading involves the use of too many engine-driven machinery and a whole host of supporting facilities are required.

- 5 A recent development to unload sand or the like from a FTB involves the use of high pressure jetting water to flush the sand overboard and dump directly beneath the FTB. However, this operation requires that there is sufficient water depth for the FTB to operate. If this overboard discharge position is not the final dump point then a further re-handling operation is required to transfer this sand that has been flushed overboard to its final designated reclamation area. The re-handling
10 operation usually requires an expensive cutter suction dredger to transfer the sand.

US Patent Publication No. 20120237303 discloses a device of a bulk ship for sand transport and fluidized unloading, comprising an unloading pipe that communicates with at least one of the holds of the bulk ship, and where the unloading pipe is connected to a submerged pipe connector, wherein the unloading pipe passes through more than one hold and is connectable to each of the
15 holds by more than one valve.

US Patent Publication No. 20030194296 discloses a float including a pump station for moving a solid substance having a high degree of water content into and out of, a cargo hold of a bulk carrier, the pump station having a suction inlet and an outlet, wherein at least the suction inlet is moveable in a substantially vertical plane with respect to a surface of the float adjacent to a layer of water when
20 floating on the layer of water.

It is known to fluidize the mass before and during unloading. As such, U.S. Pat. No. 3,445,008 describes a method and device wherein the lower portion of the hold of the vessel is filled with water prior to pumping out water and mass.

US Pat. No. 4,033,470 discloses the use of nozzles and water under pressure to fluidize the cargo.

- 25 PCT Application No. PCT/NO2010/000424 discloses unloading equipment for a flat top barge and a method for unloading the same. The equipment is water supply outlet used for slurrification or flushing of sand on the barge. A pipe having a plurality of water supply outlets positioned on the deck of the barge is used to flush the sand for unloading. The flat top barge has a retaining wall that is tiltable or removable for unloading by fluidizing the sand.

30 SUMMARY OF THE INVENTION

It will be appreciated from the above that it is desirable to provide an unloading system for sand and the method thereof from flat top barges, wherein almost no machinery is on board of the barges in the course of unloading sand to a specific location.

- 35 An object of the present invention is to provide an unloading system for sand from flat top barges, wherein a hydraulic method is used to efficiently unload the sand from the barge, and wherein the sand is slurrified and pumped out via piping system and discharge the same to any location as required.

An object of the present invention is to provide an unloading system for sand from flat top barges, wherein the system is capable of unloading to shallow waters and which can also be unloaded quickly to a specific location.

Accordingly it is a main object of the present invention to provide an unloading system for flat top barge (FTB) for efficient unloading of sand, comprising:

a compartmentalized structure which partitions the platform of the FTB into a plurality of compartments for holding sand for off-loading to a specific area;

a plurality of jetting lines (jetwater line) for fluidization of sand at each of the compartments, pressurized water being introduced into any selected compartments via the piping lines with nozzles to produce slurrified sand for unloading by suction; a plurality of suction lines with a plurality of suction inlets formed at the base of each of the compartments allowing slurrified sand to be sucked out from a Jacuzzi sump built into the base of the compartments lined by pipes for localized agitation to keep the sand in suspension; and a pump barge comprising pumping means including a plurality of jetwater pumps and slurry pumps mounted thereon or a separated pump, wherein the jetting lines are connected to the jetwater pumps and the suction lines are connected to the slurry pumps.

According to another aspect of the present invention is to provide a method for unloading sand from a flat top barge, comprising the following steps:

(a) providing an unloading system for flat top barge (FTB) comprising a compartmentalized structure which partitions the platform of the FTB into a plurality of compartments for holding of sand for off-loading to a specific area; a plurality of jetting lines (jetwater lines) for fluidization of sand at each of the compartments, pressurized water being introduced into any selected compartments via the piping lines to produce slurrified sand for unloading; a plurality of suction lines with a plurality of suction inlets at one end of the suction branch, formed at the base of each of the compartments allowing slurrified sand to be sucked out via the suction line for unloading; and a pumping means comprising a plurality of jetwater pumps and slurry pumps mounted thereon, wherein the jetting lines are connected to the jetwater pumps and the suction lines are connected to the slurry pumps;

(b) fluidizing the sand within each of the components by jetting water stream to the sand in each of the compartments; and

(c) initiating suction pumps to suck fluidized sand from the Jacuzzi sump of the compartments for off-loading.

Still another object of the present invention is to provide an unloading system for flat top barge for efficient unloading of sand, wherein one pump barge is used to serve a plurality of compartmentalized flat top barges to handle sand-unloading.

A further object of the present invention is to provide an unloading system for flat top barge for efficient unloading of sand, wherein the operation is so simple by switching valves on the suction line and jetting water line to the desired compartments on the pump barge with minimum operators.

Still another object of the present invention is to provide an unloading system for flat top barge, wherein a Jacuzzi sump comprises a plurality of Jacuzzi nozzles mounted in strategic arrangement of jet pattern pipe connected to the jetwater line to further jet water to the sand within the Jacuzzi sump for the suction of the suction branch.

- 5 Another object of the present invention is to provide an unloading system for flat top barge, wherein the suction branch is connected to the suction line and fluidized or slurrified sand (sand slurry) is transported via the suction line to be discharged to a specific location.

Still another object of the present invention is to provide an unloading system for flat top barge, wherein a plurality of deck nozzles are formed on the jetwater ring which jets water onto the sand enclosed within the compartments to form slurrified sand to flow into the Jacuzzi sump.

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Yet a further object of the present invention is to provide an unloading system for flat top barge, wherein the pump barge is provided with a plurality of quick connections to the jetwater line, the suction line and make-up water line.

Still a further object of the present invention is to provide an unloading system for flat top barge, wherein the jet water pump, and make-up water pump draw water from the sea to be used in the jetwater line and make-up water line.

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A further object of the present invention is to provide a method for unloading sand from a flat top barge, wherein the sand is with water content which is capable to be transported in pipeline, the method comprising the steps of: (a) fluidizing the sand within each of the components formed on the flap top barge by jetting water stream to the sand in each of the compartments; and (b) initiating suction pumps to suck fluidized sand from a Jacuzzi sump located at the center of the compartment of the flat top barge for off-loading.

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Among those benefits and improvements that have been disclosed, other objects and advantages of this invention will become apparent from the following description taken in conjunction with the accompanying drawings. The drawings constitute a part of this application and include exemplary embodiments of the present invention and illustrate various objects and features thereof.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be further illustrated in the example and accompanying drawings in which:

30 FIG. 1 is a schematic of an unloading system for sand in accordance with the present invention, showing the compartmentalized structure mounted on a flat top barge.

FIG. 2 is a schematic of the pump barge of the unloading system for sand in accordance with the present invention.

FIG. 3 is a perspective view of the unloading system for sand in accordance with the present invention, showing the front end of the flat top barge with the compartmentalized structure thereon.

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FIG. 4 is a perspective view of the unloading system for sand in accordance with the present invention, showing the rear end of the flat top barge with the compartmentalized structure thereon.

FIG. 5 is a perspective view showing jetting and suction lines in the front section of the compartmentalized structure in accordance with the present invention.

5 FIG. 5a is a perspective view showing a plurality of jetting nozzles on the jetwater ring in accordance with the present invention.

FIG. 5b is a perspective view showing the Jacuzzi sump with Jacuzzi nozzle ring therein in accordance with the present invention.

10 FIG. 5c is a perspective view showing the pipe connection of the suction branch line to the suction main line of the unloading system in accordance with the present invention.

FIG. 6 is a perspective view showing the connections of the jetwater line, the suction line and the make-up water line at the aft of the flat top barge to be connected to the pump barge in accordance with the present invention.

15 FIG. 7 is a schematic view showing the use of the unloading system for sand for transporting sand from one place to a reclamation site in accordance with the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

20 The detailed embodiment of the present application is disclosed herein. It is to be understood that the disclosed embodiments are merely exemplary of the invention that may be embodied in various and alternative forms. The figures are not necessarily to scale, some features may be exaggerated to show details of particular components. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention.

25 Referring to the drawings, FIGS. 1-4 are views showing an unloading system for sand in accordance with the present invention. As illustrated, the unloading system comprises a compartmentalized structure 10 having a plurality of compartments 110, formed on a flat top barge (FTB) 200; jetting line including a jetwater line 12, and a plurality of jetwater nozzles 122 formed as a ring within each of the compartments 110; a suction line 14 comprising a plurality of suction branches 21 with a suction inlet 142; a Jacuzzi sump 20 positioned substantially at the center of the compartments 110; and a pump barge 400 comprising a plurality of pumps, for instance a jet water pump 128 for the jetwater line 12, a slurry pump 148 for suction line 14 and a make-up water pump 168 for make-up water line 16. In the present invention, while only eight compartments 110 are shown in FIG. 1, it is to be understood that the specific number of compartments are merely illustrative of the many possible specific embodiments which can represent applications of the principles of the invention.

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Referring now to FIG. 2, there is shown the schematic view of the pump barge 400 in accordance with the present invention. As illustrated, the pump barge 400 is a separate unit which floats on water and carries a plurality of pumps to provide water to the jetwater line 12 and to the make-up

water line 16 on the flat top barge 200. A slurry pump 148 is also provided on the pump barge 400 to be connected to the suction line 14 on the flat top barge 200 to suck out slurrified sand for unloading. It is to be understood that the components on the pump barge 400 can be mounted on the FTB if a split pump barge 400 not to be used.

As shown in FIGS. 3 and 4, which are perspective views of the unloading system for sand or the line in accordance with a preferred embodiment of the present invention. A flat top barge 200 is first portioned into a plurality of compartments 100 by sideboards 11. These compartments 100 provide stability of the barge as water is flooded in to slurrify the sand, increase the static head available for more effective slurry discharge pumping, and increase effectiveness of overall discharge by confining the sand to specific individual parcels to be discharged in the most efficient unloading sequence.

Within each of the compartments 100, a Jacuzzi sump 20 is constructed substantially at the center of the compartment 100 on the flat top barge 200. The sump 20 can be of any shapes such as square or circular which function to collect slurrified sand. Around the sump 20 of each compartment 110, a plurality of Jacuzzi nozzles 23 are arranged such that the Jacuzzi sump 20 provides localized agitation and the Jacuzzi effect to keep the sand always in suspension form, facilitating suction by the suction pump 148 via the suction line 14. The Jacuzzi sump 20 enhances the suction pick-up of the suction inlet 142 at the suction branch 21 (shown in FIG. 5b).

FIG. 3 is a perspective view of the unloading system for sand in accordance with the present invention, showing the front end of the flat top barge 200 with the compartmentalized structure thereon, while FIG. 4 is a perspective view of the unloading system for sand in accordance with the present invention, showing the rear end of the flat top barge 200 with the compartmentalized structure thereon.

Referring again to FIGS. 3 and 4, the fluidization or slurrification of sand requires piping network. That is, jetwater line 12 is installed to supply water to the deck of each compartment 110. The jetwater line 12 is provided with a plurality of jet water nozzles (Jacuzzi nozzles) 122, which are formed along the inner periphery of the compartment 110. By operation of a plurality of valves (not shown), high pressurized jet water is introduced into the selected compartments 110 through these strategically arranged nozzles to fluidize the sand and flood that specific compartment 110. An adequately slurrified state of sand is achieved at the bottom of the sand layer which facilitates to be pumped out via the suction line 14.

The suction line 14 having a plurality of suction branches 21 with a suction inlet 142 at the end of the branch 21. The suction line 14 sucks in the slurrified sand in the Jacuzzi sump 20 via the suction inlet 142, by a slurry pump 148 to be discharged out of the flat top barge 200.

In accordance with the present invention, the size, number and position of the suction inlets 142 in each of the compartments 100 are hydraulically calculated for each flat top barge 200. Similarly all the jet water lines installed within the compartments on the flat top barge 200 are hydraulically calculated.

FIG. 5 is a perspective view showing jetting 12 and suction lines 14 in the front section of the compartmentalized structure in accordance with the present invention. FIG. 5a is a perspective view showing a plurality of jetting (Jacuzzi) nozzles 122 on the jetwater line 12 in accordance with the

present invention. FIG. 5b is a perspective view showing the Jacuzzi sump 20 with Jacuzzi nozzle ring therein in accordance with the present invention. FIG. 5c is a perspective view showing the pipe connection of the suction branch line to the suction main line 14 of the unloading system in accordance with the present invention.

- 5 As illustrated in FIG. 5, the unloading system for flat top barge (FTB) 200 for efficient unloading of sand, comprises: a compartmentalized structure which partitions, using a plurality of sideboards 11, the platform of the FTB into a plurality of compartments 100 for holding sand for off-loading to a specific area, for instance, an area to be reclaimed; a jetwater ring 123 for fluidization of sand at each of the compartments 100, pressurized water being introduced into any selected compartments
- 10 100 via the jetwater main line 12 with a plurality of Jacuzzi nozzles 122 formed on the jetwater ring 123 to produce slurrified sand for unloading by suction; a suction line 14 or suction lines 14 with suction inlet 142 formed at the base of each of the compartments allowing slurrified sand to be sucked out via the suction lines 14 for unloading; a Jacuzzi sump 20 formed within the compartments 100 for localized agitation to keep the sand in suspension.
- 15 As shown in FIG. 5, slurrified sand is sucked out through the suction branch 21 connected to the suction main 14, and the make-up water line 16 provides initial priming of the slurry pump as well as balancing of the sand water mixture during pumping.

As shown in FIG. 5b, the Jacuzzi sump 20 comprises a plurality of Jacuzzi nozzles 23 mounted in substantially a ring-like pipe connected to the jetwater main 12 to further jet water to the sand

20 within the Jacuzzi sump 20 for the suction of the suction branch 21, which is connected to the suction main 14.

In accordance with the present invention, the pump barge 400 comprising pumping means including a plurality of jetwater pumps 128, slurry pumps 148 and make-up water pump 168 mounted on the pump barge 400. The jetwater line 12, the suction line 14 and the make-up water line 16 on the flat

25 top barge 200 are respectively connected to the jetwater pumps 128, the slurry pumps 148 and the make-up water pump 168 for the unloading of sand to a desired location. The pump barge 400 is provided with a plurality of quick connections to the plurality of lines on the flat top barge 200 so as to provide efficient and quick operation in unloading of sand. The jet water pumps 128, and the make-up water pumps 168 draw water from the sea to be used in the jetwater line 12 and make-up

30 water line 16 on the flat top barge 200. The pump barge 400 is moveable together with the compartmented flat top barge 200 in the course of off-loading sand at a specific area. The jetwater pumps 128 and the slurry pumps 148 can also be placed on board the FTB, which has been mentioned earlier. When these pumps are not on the FTP, as for the present preferred embodiment, standard connections allow ease of hooking up the pumps to the jetwater lines 12 and

35 the suction lines 14.

The jetwater pump 128 takes water from the sea and delivers high pressure jetwater to fluidize the sand and flood the compartments 100 in operation. The discharge of the fluidized sand is through a delivery hose (not shown). In order to assist balancing and initial priming of the suction line 14, a water makeup line 16 is fed into the suction head.

FIG. 6 is a perspective view showing the connections of the jetwater line 12, the suction line 14 and the make-up water line 16 at the aft of the flat top barge 200 to be connected to the various pumps on the pump barge 400 in accordance with the present invention.

In use, a method for unloading sand from a flat top barge 200, comprises the following steps:

- 5 a. providing an unloading system for flat top barge 200 comprising (i) a compartmentalized structure which partitions the platform of the flat top barge 200 into a plurality of compartments 110 for holding of sand to be off-loading to a specific area; (ii) a plurality of jetting lines including jetwater line 12 for fluidization of sand at each of the compartments 110, pressurized water being introduced into any selected compartment 110 via the jetwater line 12 to produce slurrified sand for unloading;
- 10 (iii) a plurality of suction lines 14 with a plurality of suction inlets 142 at one end of the suction branch 21, at the base of each of the compartments 100, allowing slurrified sand to be sucked out via the suction line 14 for unloading; and a pumping means comprising a plurality of jetwater pumps 128 and slurry pumps 148 mounted on board or a separated pump barge 400, wherein the jetwater lines 12 are connected to the jetwater pumps 128 and the suction lines 14 are connected to the
- 15 slurry pumps 148; and
- b. fluidizing the sand within each of the components 100 by jetting water stream to the sand in each of the compartments 100; and
- c. initiating slurry pumps 148 to suck fluidized sand from the Jacuzzi sump of the compartments 100 for off-loading.

- 20 In the preferred embodiment of the present invention, the method further comprises a step of providing a Jacuzzi sump 20 within the compartment 100, wherein a plurality of Jacuzzi nozzles 23 mounted in strategic arrangement of jet pattern substantially pipe connected to the jetwater line 12 to further jet water to the sand within the Jacuzzi sump 20 for the suction of the suction branch. The plurality of jetwater nozzles 23 are formed on the jetwater line 12 within the compartment 110
- 25 which jets water onto the sand to form slurrified sand to flow into the Jacuzzi sump 20.

- In accordance with the present invention, the method for unloading sand from a flat top barge 200, wherein the sand is with water content which is capable to be transported in pipeline, comprises the steps of: (a) fluidizing the sand within each of the components 110 formed on the flap top barge 200 by jetting water stream to the sand in each of the compartments 110; and (b) initiating suction
- 30 pumps 148 to suck fluidized sand from a Jacuzzi sump 20 located substantially at the center of the compartment 110 of the flat top barge 200 for off-loading.

- FIG. 7 is a schematic view showing the use of the unloading system for sand for transporting sand from one place to a reclamation site in accordance with the preferred embodiment of the present invention. In accordance with the present invention, the present invention can be used for sand
- 35 shipment from a distant source, a near source as well as from a designated break bulk point to the reclamation site, whereas for most of the conventional methods, sand is discharged to a temporary holding area and then re-handled to the specific reclamation site.

- The present invention as claimed, provides the unexpected and unpredictable benefits by providing an unloading system for sand or granular materials from a flat top barge which requires no
- 40 machinery on board and can be pre-fabricated for installation on any flat top barges. The system of

the present invention is easy to operate as it only involves activating the pumps on the pump barge and operating of valves. The system can be employed for shipment from a distant source, and a near source as well as from a designated break bulk point to the final discharge area. The unloading system of the present invention of the bulk carriers allows sailing right up closer to the reclamation site in shallower waters.

While the invention has been described with respect to a certain specific embodiment, it will be appreciated that various changes and modification may be made by those skilled in the art without departing from the spirit and scope of the invention. It is intended, therefore, by the appended claims to cover all such changes modifications as fall within the true spirit and scope of the invention.

In particular, with respect to the above description, it is to be realized that the optimum dimensional relationships for the components of the structure of the present invention may include variations in size, shape, form and manner of operation. The system and method of use thereof are deemed readily apparent and obvious to one skilled in the art.

WHAT IS CLAIMED IS:

1. An unloading system for flat top barge (FTB) for efficient unloading of sand, comprising:

(i) a compartmentalized structure which partitions the platform of the FTB into a plurality of compartments for holding sand for off-loading to a specific area;

(ii) jetwater line for fluidization of sand at each of the compartments, pressurized water being introduced into any selected compartment via the jetwater line having a plurality of jetwater nozzles to produce slurrified sand for unloading by suction, and a make-up water line for initial priming of the slurry pump as balancing sand water mixture during pumping.

(iii) suction line having a suction branch with suction inlets, the suction line being formed at each of the compartments, allowing slurrified sand to be sucked out via the suction lines for unloading;

(iv) a Jacuzzi sump formed within the compartments, a plurality of Jacuzzi nozzles formed around the Jacuzzi sump for localized agitation to keep the sand in suspension; and

(v) a pump barge comprising pumping means including a plurality of jetwater pumps, slurry pumps, and make-up water pumps mounted thereon, wherein the jetwater line is connected to the jetwater pumps, the suction line is connected to the slurry pumps, and the make-up water line is connected to the make-up water pumps .

2. The unloading system for flat top barge of Claim 1, wherein the Jacuzzi sump comprises a plurality of Jacuzzi nozzles mounted in substantially strategic arrangement of jet pattern pipe connected to the jetwater line to further jet water to the sand, such that the sand are always in suspension, within the Jacuzzi sump for the suction by the suction branch of the suction line.

3. The unloading system for flat top barge of Claim 2, wherein the suction branch is connected to the suction line, and positioned within the compartment.

4. The unloading system for flat top barge of Claim 1, wherein a plurality of deck (jetwater) nozzles are formed on the jetwater ring which jets water onto the sand enclosed within the compartment to form slurrified sand to flow into the Jacuzzi sump.

5. The unloading system for flat top barge of Claim 1, wherein the pump barge is provided with a plurality of quick connections to the jetwater line, the suction line and the make-up water line.

6. The unloading system for flat top barge of Claim 1, wherein the jet water pump, and make-up water pump draw water from the sea to be used in the jetwater line and make-up water line.

7. A method for unloading sand from a flat top barge, comprising the following steps:

a. providing an unloading system for flat top barge (FTB) comprising a compartmentalized structure which partitions the platform of the FTB into a plurality of compartments for holding of sand for off-loading to a specific area; a plurality of jetwater lines for fluidization of sand at each of the compartments, pressurized water being introduced into any selected compartment via the jetwater lines to produce slurrified sand for unloading; a suction line with a plurality of suction inlets formed

thereon and positioned at the base of each of the compartments allowing slurrified sand to be sucked out via the suction line for unloading; and a pumping means comprising a plurality of jetwater pumps and slurry pumps mounted thereon, wherein the jetwater line is connected to the jetwater pump and the suction lines are connected to the slurry pumps; and

- 5 b. fluidizing the sand within each of the components by jetting water stream to the sand or granular material in each of the compartments; and

- c. initiating suction pumps to suck fluidized sand from the compartments for off-loading.

8. The method for unloading sand from a flat top barge of Claim 7, wherein a plurality of Jacuzzi nozzles are mounted in substantially a ring-like pipe connected to the jetwater line to further jet
10 water to the sand within the Jacuzzi sump for the suction via the suction branch.

9. The method for unloading sand from a flat top barge of Claim 7, wherein a plurality of deck nozzles are formed on the jetwater ring which jets water onto the sand enclosed within the compartment to form slurrified sand to flow into the Jacuzzi sump.

10. The method for unloading sand from a flat top barge of Claim 7, wherein the jet water pump,
15 and make-up water pump draw water from the sea to be used in the jetwater line and make-up water line.

11. The method for unloading sand from a flat top barge of Claim 7, wherein the pump barge is provided with a plurality of quick connections to the jetwater line, the suction line and make-up water line.

- 20 12. A method for unloading sand from a flat top barge, wherein the sand contains a water content which is capable to be transported in pipeline, the method comprising the steps of: (a) fluidizing the sand within each of the components formed on the flap top barge by jetting water stream to the sand in each of the compartments; and (b) initiating suction pumps to suck fluidized sand from a Jacuzzi sump located substantially at the center of the compartment of the flat top barge for off-
25 loading.

13. The method for unloading sand from a flat top barge according to claim 12, wherein the suction inlet of the suction branch connected to the suction line is non-moveable with respect to the Jacuzzi sump, which enhances the efficiency of pumping the fluidized sand out from the Jacuzzi sump for off-loading.

- 30 14. The unloading system for flat top barge (FTB) for efficient unloading of sand of Claim 1, wherein the pump barge is moveable together with the compartmentalized flat top barge in the course of off-loading sand.

15. The method for unloading sand from a flat top barge of Claim 7, wherein the pump barge is moveable together with the compartmentalized flat top barge in the course of off-loading sand.