

- [54] **APPARATUS FOR OPENING THE SAND  
DISCHARGING DOOR FOR HOPPER  
BARGES**
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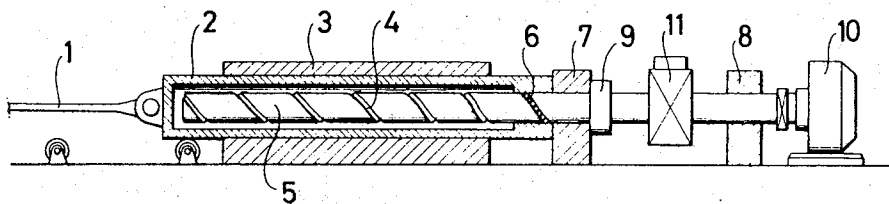
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[57] **ABSTRACT**

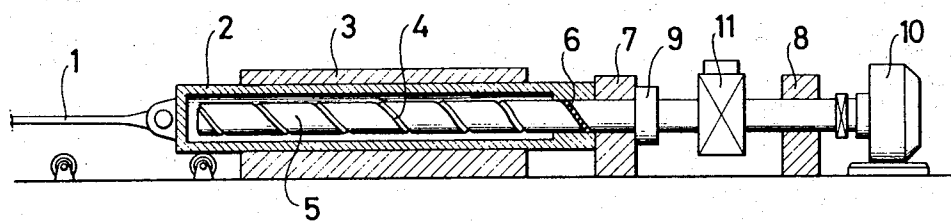
Apparatus for opening the sand or soil discharging door for hopper barges in which the door is slowly opened to discharge the sand or soil little by little, to this end a slidable cylindrical body connected to the door is engaged with rotary shaft by helical groove means, so that the shaft is rotated by movement of the cylindrical body in opening operation.

**1 Claim, 1 Drawing Figure**



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1

# APPARATUS FOR OPENING THE SAND DISCHARGING DOOR FOR HOPPER BARGES

The present invention relates to apparatus for opening sand discharging doors for hopper barges.

The conventional sand or soil discharging door is rapidly opened by gravity of sand or soil when the locking mechanism for the door is released. According to the conventional apparatus all amount of sand or soil in a hopper is rapidly discharged in a short time. If sand or soil is dropped on the sludge deposit layer in the conventional manner, the dropped sand or soil sinks in the sludge deposit layer and the surface of deposited sand layer is covered by sludge. Consequently there is formed again a sludge deposit layer.

Therefore in order to reclaim land from the sea a large amount of sand or soil is deposited or the sludge deposit layer must be removed or other special constructions must be employed. These workings entail considerable cost.

The object of the present invention is to provide apparatus for opening the sand discharging door for hopper barges which may discharge the sand little by little to form a sand sheet on the surface of the sludge deposit layer. If weight of the sand sheet is less than the pressure endurance limit of the sludge deposit layer, the above difficulties do not arise.

The present invention will now be described herein-after in more detail with reference to the accompanying drawing, which is a sectional view of an embodiment of the present invention.

Referring to the drawing, numeral 1 designates a tension bar joined to the sand discharging door. The end of the tension bar is joined to a prismatic cylinder 2 which is supported to be slidable and not rotatable by a guide 3, and a shaft 5 having a helical groove 4 is inserted into the cylinder 2. Balls 6 are rotatably engaged with the helical groove 4 and the groove provided inside wall of the cylinder 2. The shaft 5 is supported by bearings 7, 8 and has a flange 9 abutting on the side wall of the bearing 7. The end of the shaft 5 is connected to an oil motor 10 for rotating it. It is also provided with a brake means 11.

Figure shows a condition where the sand discharging

2

door is closed, with the brake 11 working to lock the shaft 5. For opening the door, the brake 11 is loosened, whereby the tension bar 1 and cylinder 2 are forced to move to the left by the weight of the sand. The movement of the cylinder 2 causes to rotate the shaft 5 because of engagement of its helical groove 4 with the balls 6, thereby the cylinder 2 and the tension bar 1 is very slowly moved, so that the door is slowly and gradually opened. The door opening speed can be controlled by adjusting the brake 11.

For closing the door, the oil motor 10 is operated to rotate the shaft 5 in the opposite direction to the said rotation in opening operation, whereby the cylinder 2 is moved to the right to close the door.

As described above, there is provided according to the present invention a simple mechanism capable of opening the sand discharging door little by little.

What is claimed is:

1. The method of operating a sand or soil discharging door for a hopper barge in which said door is positioned and mounted to be urged open by the weight of said sand or soil, comprising:

providing a mechanism comprising a slidable body connected to said door so as to be slid in one direction when said door is opening and in the opposite direction when said door is closing, a rotary shaft having helical groove means engaging said body and providing a conversion between rotary motion of said shaft and linear motion of said body, motor means for rotating said shaft, and braking means for locking said shaft against rotation;

releasing said braking means and deactuating said motor means when said sand or soil is to be discharged, whereby the weight of said sand or soil urging said door open causes it to open gradually against the resistance produced by said helical groove means acting on said slidable body;

operating said motor means to close said door when said discharging has been effected; and

operating said braking means when said door is to be held closed.

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