Feb. 18, 1969 R. A. MILLER 3,428,193

BOAT UNLOADING ASSEMBLY

Filed July 5, 1966

Sheet 1 of 2

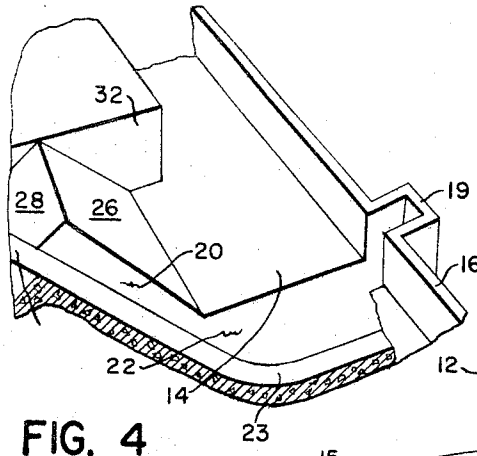


FIG. 4

FIG. 1

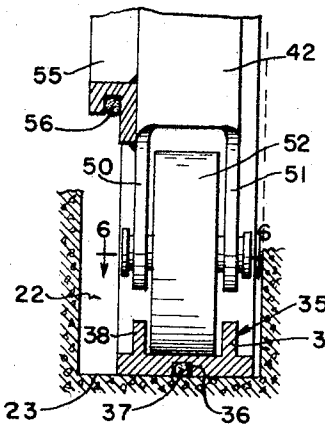


FIG. 5

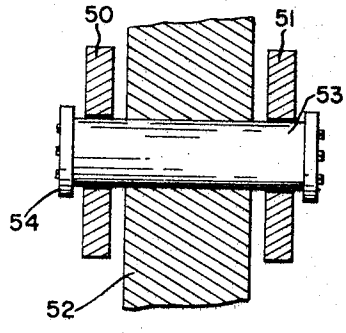


FIG. 6

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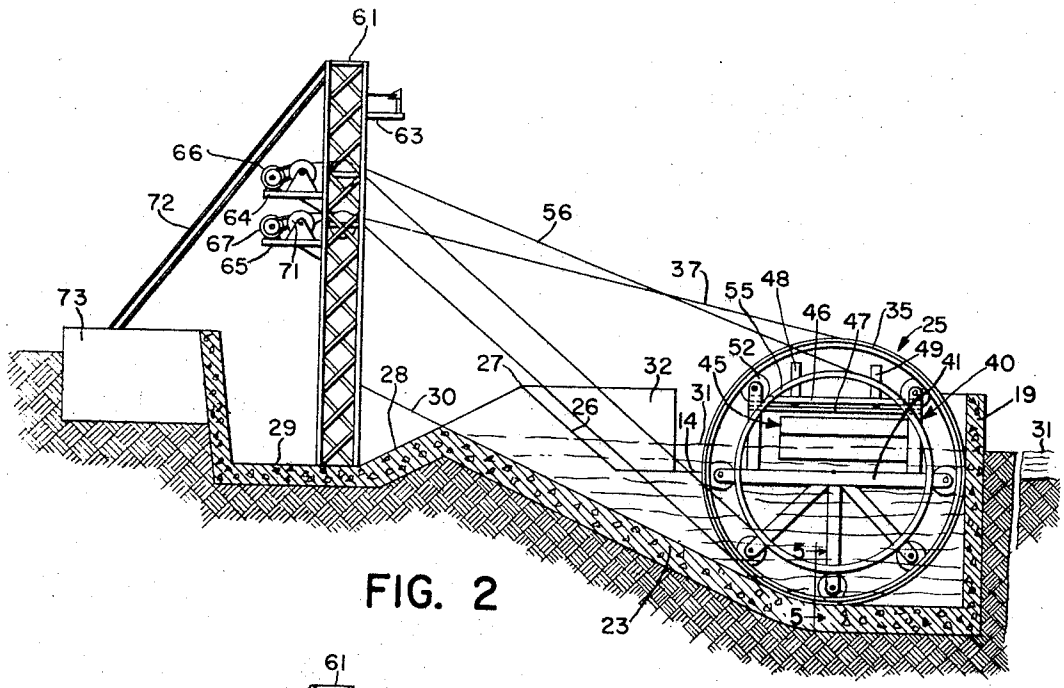


FIG. 2

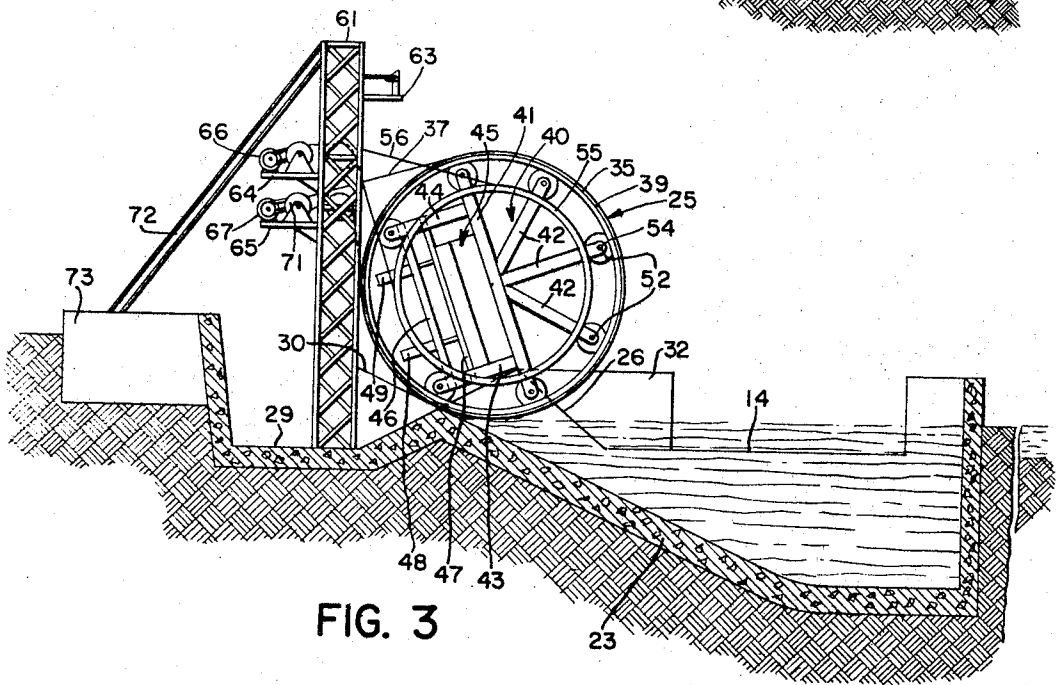


FIG. 3

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BOAT UNLOADING ASSEMBLY

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U.S. Cl. 214—12 6 Claims

Int. Cl. B63b 27/02; B65g 63/00, 67/50

ABSTRACT OF THE DISCLOSURE

A boat unloading structure that includes base structure having a plurality of parallel upwardly opening grooves that extend from the water toward and onto the shore, and a plurality of large wheels, each of which supports a part of a boat resting internally thereof, with each wheel being adapted to roll in the grooves for carrying the boat onto and off of the shore.

This invention relates to a structure utilized for unloading a boat. More particularly the invention relates to a structure that moves a barge or boat from a water channel to the shore and then may be adjusted to tilt the boat until material flows out of the hatches on the top side of the boat.

It is an object of the invention to provide a boat support that extends down into the water or channel and has a cradle section that receives a barge moving into the channel. Track or ramp means is provided under the boat support and extends to the shore. Complementary guides are provided between the support and track means for guiding the support and barge upwardly and alongside the shore. The support further has tilting mechanism thereon so that upon reaching the shore, the barge may be tilted to cause material in the barge to gravitate out of the hatches.

Specifically it is an object of the invention to provide spaced apart wheels or annular members that are axially aligned. Inclined ground borne reinforced tracks or ramps extend from the shore outwardly to lower ends in the bottom of the channel. The wheel structures have horizontal beams extending across the respective wheel structures and each has a pair of upright end beams extending upwardly from the horizontal beam so as to define a cradle. The wheels are normally within the water with the horizontal beams being beneath the water so that a barge may be moved into the cradles of the respective wheel structures. Horizontal overhead beams are slidably carried on the end beams. Hydraulic units are utilized to cause the overhead beams to bear against the top of the boat and to clamp the boat on the cradles. Power units in the form of cables and winches are based on the shore and are connected to the wheel structures. The cables may be retracted to move the wheel structures shoreward and to then tilt the cradle portions of the wheel structures until the grain flows from the hatches. A bunk or trench is provided on the shore to receive the material flowing from the barge.

Other objects and advantages will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is an overhead view of a side of a stream, a channel dug alongside with entrance from the stream, the boat unloading structure of the present invention, and a barge on the unloading structure.

FIG. 2 is a vertical sectional view taken along the line 2—2 of FIG. 1.

FIG. 3 is a view similar to FIG. 2, but showing the structure in a different position.

FIG. 4 is a perspective view of one end of the concrete base of the boat unloading assembly.

FIG. 5 is an enlarged sectional view taken substantially along the line 5—5 of FIG. 2.

FIG. 6 is a sectional view taken substantially along the line 6—6 of FIG. 5.

The term "boat" hereafter referred to in the specification and claims is meant to include any and all waterborne vessels whether they be moved on oceans or rivers or whether they be self-driven, self-propelled, towed or pulled. In the present illustration the boat is an open top barge **45**.

The boat unloading assembly is normally positioned alongside a river or ocean **10** and preferably an auxiliary channel or inlet **11** is provided. The latter is preferable from a construction standpoint since the boat unloading structure may be built prior to opening the channel.

The boat unloading structure is composed of a reinforced concrete base **12** extending from the shore into the channel **11**. The base **12** includes a floor **14** serving as the bottom of the channel and left and right hand upright walls **15**, **16** defining opposite sides of the channel. The walls **15**, **16** curve into the stream **10** and wall **16** has a section parallel to the stream with three recessed portions **17**, **18**, **19**. The entire base is large being in the particular instance about two hundred feet on each side.

The floor **14** has three large transverse slots **20**, **21**, **22** formed in its base that extends transversely from the recessed sections **17**, **18**, **19**. An inclined concrete slab **23** underlies each of the slots **20–22** and forms therewith inclined tracks or ramps extending from the channel to the shore on which boat supporting structures, indicated by the reference numerals **25**, may move.

The surface of the floor **14** between the ramps **23** is inclined upwardly at **26** to a peak **27** adjacent the shore **13** from where it has a downwardly inclined surface at **28** that terminates in a material bunk or trench **29**. The ramp **23** of the slots extends upwardly at **30** above the downwardly inclined walls **28** substantially midway of their length. The water level **31**, as is clearly apparent from viewing FIGS. 2 and 3, is beneath this point of intersection and consequently water will never pass over the point and onto surface **28**. The actual unloading area is terminated by upright end walls **32**, **33**.

Three boat supporting structures **25** are provided and are positioned to rest in the respective recesses **17–19** and slots or grooves **20–22**. The boat supporting structures are identical and each is composed of an annular structural wheel or ring **35** having therein an outer annular groove or recess **36** that receives a cable **37**. The ring **35** is further provided with a pair of radially inwardly extending flanges **38**, **39** that define an internal groove on the ring **35**.

A wheel structure **40** is supported concentrically within the outer ring **35** and is composed of an upper boat cradle portion and a lower structural portion. The structural portion has a diametric structural beam **41** and a series

of equally spaced radial beams **42**. A pair of beams **43, 44** extends perpendicularly at opposite end portions respectively of the structural beam **41** and form therewith a cradle for receiving the hull of a barge **45**. A pair of beams **46, 47** extends across and interconnects the outer upper ends of the end beams **43, 44**. The lower beam **47** is slidably supported on the end beams **43, 44**. The upper beam **46** is rigid with the end beams **43, 44** and carries a pair of hydraulic cylinders **48, 49** that are connected to the lower beam **47** and operates to force the beam **47** into and out of engagement with the barge **45**.

The beams **41, 42, 43** and **44** form spoke structures for the inner wheel and are bifurcated at their outer ends into two outer radial sections, such as at **50, 51**, that embrace from opposite sides rollers **52** that ride in the annular groove between the flanges **38, 39**. Each roller **52** is rotatably supported on a horizontal pin **53** that extends through the ends **50, 51**, suitable end plates **54** being bolted to the ends thereof to restrict axial movement of the pins **53**. The inner wheel rotates in ring **35**. The beams **41–44** also support on one of their sides an annular cable track **55** on which is wound a cable **56**.

Extending upwardly through the floor of the bunk or trench **29** are three structural towers **60, 61, 62** that are identical except for an operator's station **63** on the center tower **61** and positioned at the top of the tower for visual operation of the entire operation. A suitable control mechanism, not shown in detail, is provided on the platform to control the entire unloading operation.

Each tower **60–62** is provided with upper and lower platforms **64, 65** respectively that carries electric motors **66, 67**. The upper platform **64** supports a pair of axially aligned winches **68, 69** driven by the motor **66** through a chain drive and a suitable transmission indicated by its housing **70**. An operator may control the operation of the winches **68, 69** in any combination of directions desired and from the operator's station **63** by suitably shifting the transmission **70**. Opposite ends of the cable **56** are played over the respective winches **68, 69**. A similar winch arrangement **71** is provided on each of the lower platforms **65** and receives opposite ends of the cable **37**.

The lower ends of the towers **60–62** are anchored deep in the earth and bear against the outer upright ends of the ramp parts **30**. The upper ends of the towers **60–62** are rigidly connected to diagonal structural elements **72** that extend downwardly and outwardly to huge concrete anchor blocks **73** in the ground.

It should be recognized that the present structure is very large. For example, the towers **60–62** are approximately one hundred feet from the base to the top. The diameter of the outer wheel or ring **35** is about sixty feet. The rollers **52** are about five feet in diameter. The entire structure is of such size that it is capable of unloading barges of forty foot width and several hundred feet in length.

The structure operates in the following manner. A barge **45** is towed or pushed into the channel **11** and in a position in which it is above the horizontally disposed beams **41** and between the upright end beams **43, 44**. Initially the three structures **25** are positioned so as to lie in the base of the channel with their outer sides in the respective recesses **17, 18** and **19**. The structural beams **41** are also beneath the water level **31** sufficiently to permit the barge **45** to float above them. Such position is best shown in FIG. 2.

The winch structures **71** are operated to cause the cables **37** to retract and roll the outer wheels **35** upwardly and shoreward until the outer annular structures **35** are at the outer upper ends of the base ramps **23** or as shown in FIG. 3. During the latter operation the winches **68, 69** are operated to draw in the cable to retain the boat in a substantially level position. By proper manipulation of the winches **71, 68, 69**, the barge may be made to shift against the beam **45** and the hydraulic cylinders **48, 49** are extended to clamp the barge in a position between the lower beams **47** and the structural beams **41**. Upon the outer rings being rotated up their respective ramps or tracks to the uppermost position, as shown in FIG. 3, the winches **68, 69** are operated to cause the inner wheel structures to rotate and tilt the barge **35** into an inclined position. At this time the grain, coal, or other material will gravitate out of the open top of the barge **45** onto the inclined surface **28** to be guided into the bunk or trench **29**. A mechanical conveyor may be installed on the floor of the bunk **29** to automatically move material as it enters or bulldozers and power loaders may move into the bunks to remove the material.

Following discharge, the cables **37, 56** may be manipulated by their respective winches to cause the outer rolls or rings to move down the ramps to the opposite side of the channel and to come to rest in the respective recesses **17, 18** and **19**, and to place the unloaded barge **45** in the floating position. The clamping beam **47** is raised upon the barge approaching a horizontal position. The barge may then be floated out of the channel **11** by a suitable tow boat.

While only one form of the invention has been shown, it is recognized that other forms and variations may occur to those skilled in the art.

What is claimed is:

1. An assembly for unloading a boat comprising: a concrete structure part of which is in the water adjacent the shore and having parallel upwardly opening transverse grooves spaced longitudinally along the shore and extending from the shore into the water, with each groove having opposed longitudinally spaced upright walls extending upwardly from a base ramp, the concrete structure further having a longitudinal upright wall spaced from and in opposed relation to the shore with upright recessed portions in alignment with the grooves; a plurality of longitudinally spaced upright boat-supporting structures supported in the grooves and on the respective ramps, with each boat-supporting structure having a first part with a lower transverse portion adapted to be guided in a groove and to move up and down the ramp of the respective groove, the first part further having an outer side thereof adapted to be received in the respective recessed portion aligned with the groove, said boat-supporting structure further having upwardly opening cradle portions supported for tilting movement in the first parts and adapted to receive longitudinally spaced portions of a boat whereby a boat cradled in the cradle portions may be inclined for purposes of discharging material from the boat; and power means on the shore connected to the boat supporting structures for moving the structures in unison along the ramps.

2. The structure as set forth in claim **1** further characterized by each of the cradle portions being composed of a transverse horizontally disposed structural member adapted to underlie and engage the hull of the boat and a pair of upright structural members adapted for disposition alongside opposite sides of the boat.

3. The structure as set forth in claim **1** in which each cradle portion is disposed beneath the boat, and further characterized by structure positioned above the boat and adapted to engage the boat to cause it to be clamped in the cradle portion of the boat-supporting structure.

4. The structure as set forth in claim **3** in which the structure above the boat is in the form of a beam supported for vertical movement and adapted to engage the top of the boat and the beam is moved by hydraulic means between the boat-supporting structure and the beam.

5. The structure as set forth in claim **1** in which the first part of the boat-supporting structures is an outer annular structure adapted to roll up and down the respective ramp and to be guided in the respective groove.

6. The structure as set forth in claim **5** in which the outer annular structures have internal radial grooves, and each cradle portion is composed of a spokelike

structure having rollers riding in the groove of its annular structure to permit the cradle portion to tilt within its annular structure.

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U.S. Cl. X.R.

214—1, 46.32