Nov. 30, 1943. C. H. ELLABY ET AL 2,335,266

AUTOMATIC SPUD LOCKING DEVICE

Filed Jan. 23, 1942 3 Sheets-Sheet 1

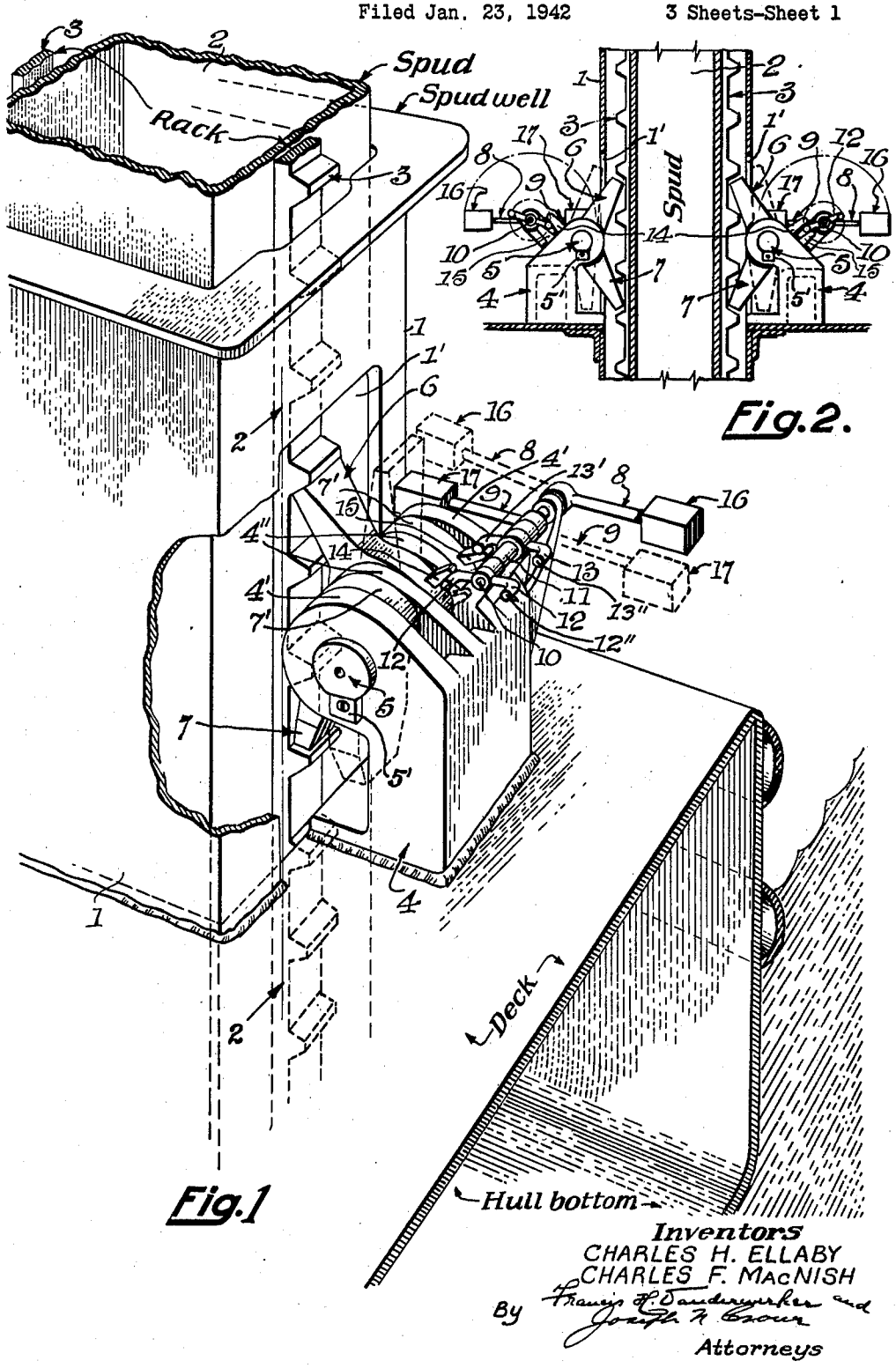


Fig. 1

Fig. 2.

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Fig. 3.

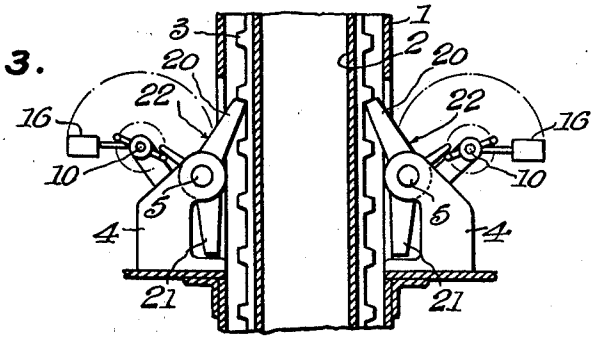


Fig. 4.

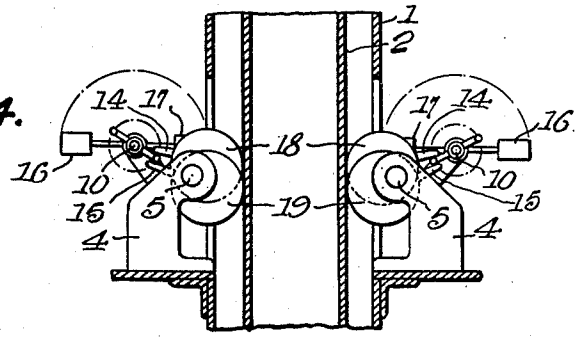
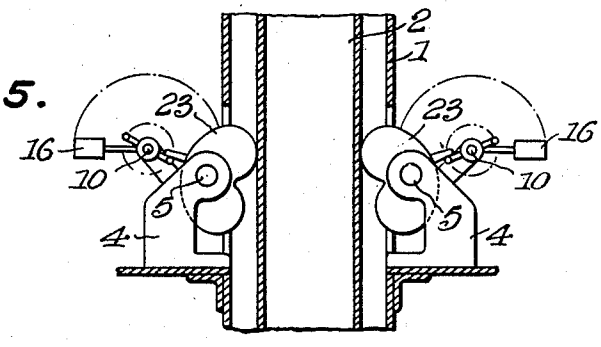


Fig. 5.



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AUTOMATIC SPUD LOCKING DEVICE

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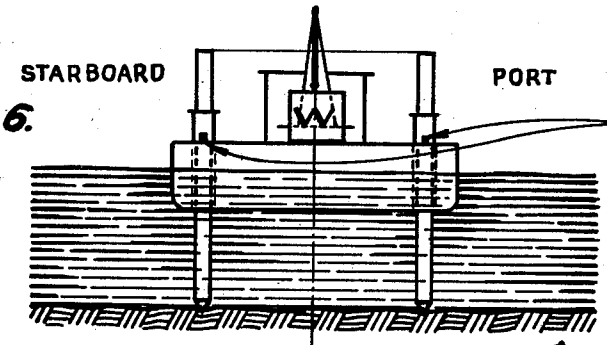


Fig. 6.

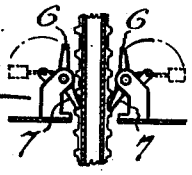


Fig. 7.

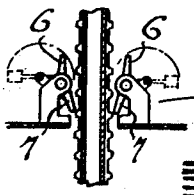
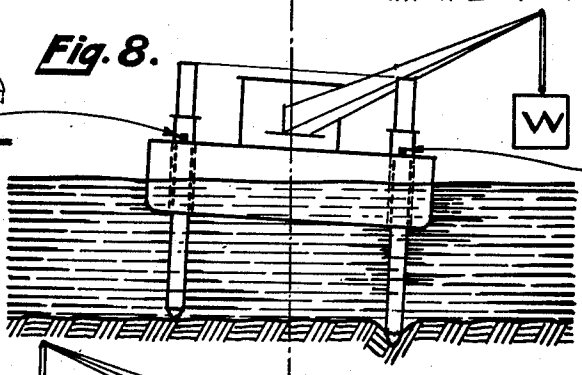


Fig. 8.



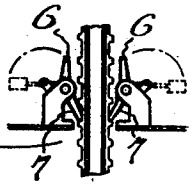


Fig. 10.

Fig. 9.

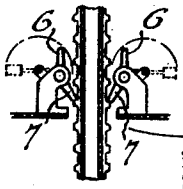
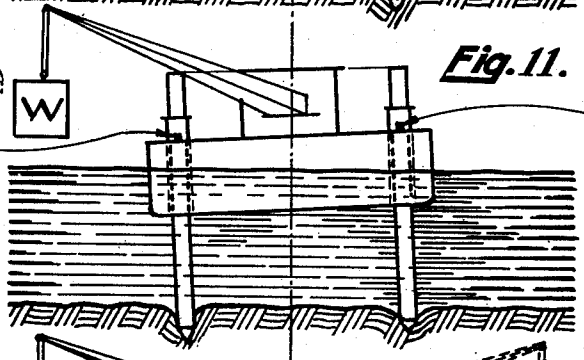


Fig. 11.



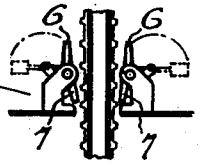
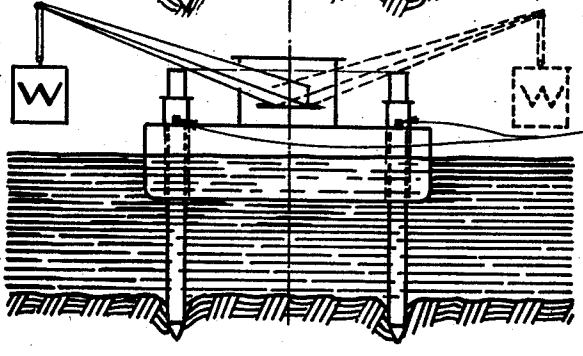


Fig. 12.

Fig. 13.



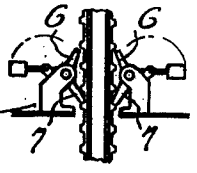


Fig. 15.

Fig. 14.

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UNITED STATES PATENT OFFICE

2,335,266

AUTOMATIC SPUD LOCKING DEVICE

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Application January 23, 1942, Serial No. 427,942

4 Claims. (Cl. 37—73)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to us of any royalty thereon.

This invention relates to a method and means for stabilizing floating vessels by means of an improved speed mechanism.

The general object of this invention is to provide a simple and easily operated automatic spud locking device for floating dredges or any other type of floating craft equipped with spuds, which will effectuate the lowering of the spuds into the river bottom, the anchoring of the hull and holding it in stable position during the dredging or hoisting operation.

The conception of the invention implies an utilization of the rolling and pitching motion of a dredge or floating craft effectuated by the weight of the loaded dredge-bucket, or other load swung between the port and starboard sides of the dredge or floating plant, whereby an automatic lowering and locking of the spuds for each stop of their operation will be achieved. The automatic locking of the spuds by a method as mentioned will resist transverse oscillating and more easily and more economically effectuate and control the position and stabilization of the craft during the dredging or hoisting operation than has heretofore been experienced with other types of dredges or floating crafts, usually held in position by means of anchor spuds, anchors or combination of spuds and anchors.

The operation of our spud locking device will be clear from a consideration of the following detailed description and the accompanying drawings in which—

Fig. 1 is a view in perspective, partly in cross section, of an embodiment of the invention as applied to a spud;

Fig. 2 is a cross section view along the line 2—2 of Fig. 1;

Fig. 3 is a modified form of locking device using a single bell crank pawl;

Fig. 4 is a modified form of locking device adapted for use in our improved system;

Fig. 5 is a modified form of locking device using a single cam, and

Figs. 6 through 15 are a series of operational views illustrating one method of utilizing the invention.

Referring to Figs. 1 and 2, a spud well 1 having apertures 1' in certain opposite sides thereof is mounted on the deck of a dredge or other floating craft and a vertically extending spud 2 is slidably mounted in the spud well 1, with racks 3 secured to the sides of the spud 2 adjacent to the apertured sides of the spud well. The locking devices are located on the deck of the dredge or floating craft adjacent to the apertured sides of the spud well 1, and each of the locking devices comprises a stand 4 mounted on the deck of the floating craft adjacent to an aperture 1' in the spud well 1. The stands 4 include an outer pair of ears 4' and a central pair of ears 4'' providing bearings for a main shaft 5 supporting vertically alined upper and lower locking pawls 6 and 7, respectively, which engage with a toothed rack 3 on one side of a spud 2 through an aperture 1' in one side of the spud well 1. The main shaft 5 is flattened at one side for engagement with a small block 5' suitably mounted on a stand 4, whereby the shaft 5 is held against rotation on the pairs of ears 4' and 4''. The upper locking pawl 6 is pivotally mounted on the main shaft 5 between the central pair of ears 4'' and the lower locking pawl 7 is provided with a U-shaped upper end, the legs 7' of which are pivotally mounted on the main shaft 5 between the central and outer pairs of ears 4' and 4'', respectively. Counter-balanced crank arms or levers 8 and 9 having the weights 16 and 17 on the outer ends thereof are mounted on separate auxiliary shafts 10 and 11, respectively, which separate shafts 10 and 11 may be coaxial as illustrated and carry cams 12 and 13 with turned ends 12', 12'' and 13', 13'', respectively, provided thereon. The turned end 12' of the cam 12 is adapted to abut against the inner surface of a projection member 14 provided on the pawl 6, for engaging said pawl 6 with a rack 3 on the spud 2 and the turned end 13' of the cam 13 is adapted to abut against the inner surface of the projection member 15 provided on one of the ears 7' of the U-shaped upper end of the lower pawl 7 for also engaging the pawl 7 with the rack 3. By manually throwing the weighted levers 8 and 9 through arcs of approximately 180° as illustrated in dotted outline in Fig. 1, the other turned ends 12'' and 13'' of the cams 12 and 13, respectively, are caused to engage with the other sides of the projection members 14 and 15, for releasing the pawls 6 and 7 from engagement with the rack 3, whereby upward and downward motion of the spud 2 in the spud well 1 is regulated. With the pawls 6 and 7 in the position shown, movement of the spud 2 in either direction is prevented.

The two pawls 6 and 7 of Figs. 1 and 2 may be replaced by a single bell crank pawl as shown in

Fig. 3. In this arrangement a single shaft 10 is used and rotation of the weighted lever 8 causes either the upper arm 20 or the lower arm 21 of the centrally-pivoted bell crank 22 to engage the rack 3. The operation of this modification is similar to that shown in Figs. 1 and 2 except that the spud can be locked against movement in one direction only.

It is possible to use eccentric cams rather than pawls to lock the spud. Such an arrangement is illustrated in Fig. 4. In this figure the pawls 6 and 7 of Fig. 1 are replaced by eccentric cams 18 and 19 respectively. It will be seen that movement of the spud 2 in a direction opposed to the weighted levers 8 or 9 will tend to rotate the cams 18 or 19 away from the bearing surface on the spud and reverse movement tends to rotate the cams 18 and 19 towards said bearing surface. In the position shown the spud 2 is locked against movement in either direction.

The dual cams 18 and 19 of Fig. 4 may be replaced, as is shown in Fig. 5, by a single double-acting cam 23. The cam 23 is mounted on a single shaft 10 and is operated by rotating the weighted lever 8. In this modification the spud 2 can be locked only against movement in one direction.

The lowering of the spuds into the bed material is effectuated by the rolling or pitching of the vessel. Should the wave motion be insufficient it may be effectuated by the weight of the loaded dredge bucket or any other load, sufficiently heavy to create a rolling or pitching motion of the dredge or floating craft, when swung between the port and starboard sides, as illustrated in Figs. 6 through 15.

Fig. 6 illustrates a dredge or floating craft with the lowered spuds resting on the bottom. When resting in this position the counterbalanced levers 8 and 9 are arranged in such a way that the upper pawls 6 are disengaged and the lower pawls 7 engaged with the teeth on the rack, as shown in Fig. 7.

Fig. 8 illustrates the boom swung to the port side where the load W is applied. When the load W is raised the state of equilibrium, as illustrated in Fig. 6 will be disturbed, due to the uneven loading, thus causing the dredge or floating craft to list toward the port side, as shown in Fig. 8. When in this position the starboard spud will drop down in the spud well and the lower pawls 7, on the starboard side will automatically engage and lock with the toothed spud racks at a point corresponding to the new position of the spud, thus preventing the spuds from moving upward, as shown in Figs. 9 and 10.

Fig. 11 illustrates the craft when the load has been swung toward the starboard side of the craft, thereby automatically causing the lower pawls on the port side to engage and lock with the teeth on the port side spud rack at a point corresponding to the new position of the port side spud, as shown in Figs. 12 and 13. This spud like the one on the opposite side of the draft is thereby also prevented from moving upward.

The operation of swinging the load between the port and starboard sides of the craft continues until the spuds have found sufficiently solid bearing to maintain a stable position, when the upper pawls at both sides of the dredge or floating craft are engaged, as illustrated in Figs. 14 and 15.

Fig. 14 illustrates a position at which the craft, due to the moving of the load between the port and starboard sides, effectuating the stable position of the spuds in the bottom of the body of water, will be in equilibrium for any position of the load.

When in this position the dredge or floating craft is ready for the dredging or hoisting operation.

When, after completed dredging or hoisting operation, the spuds, which have become more or less mired in the tenacious river bottom, are to be loosened and raised, the extrication of the spuds is automatically achieved by reversing the position of the pawls 6 and 7.

In raising the spuds, the load is again swung to the starboard side of the dredge, as illustrated in Fig. 14, thereby reducing the pressure on the lower pawls 7 at the port side of the dredge. These pawls 7 can now be released, the upper pawls 6, however, remaining engaged. The next procedure is to swing the load to the port side of the dredge at which position the lower pawls 7 on the starboard side are released. The starboard upper pawls 4 remain engaged. The swinging of the loaded bucket between port and starboard sides effectuating a pressure of the upper pawls against the teeth on the spud rack will thus loosen the spuds which have become mired in the bottom, and permit the dredge to float without any pressure on the spuds. If the spuds have become mired in the bed material to such an extent that difficulties are encountered in the loosening of the spuds, the thrust of the upper pawls against the teeth on the spud racks, achieved by the successive pitching or rolling motion of the craft, will effectuate the loosening of the spuds. The spuds are then lifted by means of a line from the boom, attached to the top of the spud or by means of a spud hoisting engine and the necessary lines and sheaves.

Although we have described our invention with respect to certain arrangements it is to be understood that we do not wish to be limited to the particular construction and adaptations shown, since various modifications within the spirit of the invention will suggest themselves to one skilled in the art.

Having described our invention, what we claim as new and wish to secure by Letters Patent is:

1. The combination with a floating craft, of spud wells having apertured opposite sides and mounted on said floating craft, spuds slidably mounted in said spud wells and including sides adjacent to the apertured sides of the spud wells, racks provided on said sides of the spuds, a plurality of stands, one of each of said stands mounted on a deck of said floating craft adjacent to one of each of the apertured sides of said spud wells, a main shaft mounted on each of said stands, vertically alined upper and lower pawls provided on said main shafts and adapted to be individually actuated into engagement with or out of engagement from said racks on the spuds through the apertured sides of said spud wells, and means adapted to independently control the engagement of said upper and lower pawls with said racks whereby upward or downward movement of said spuds in the spud wells may be controlled.

2. The combination with a floating craft, of spud wells having apertured opposite sides and mounted on said floating craft, spuds slidably mounted in said spud wells and including sides adjacent to the apertured sides of said spud wells, racks provided on said sides of the spuds, a plurality of stands, one of each of said stands mounted on a deck of the floating craft adjacent

to one of each of the apertured sides of the spud wells, a main shaft and auxiliary shafts mounted on each of said stands, vertically alined upper and lower pawls provided on said main shafts and adapted to be individually actuated into engagement with or out of engagement from said racks on the spuds through the apertured sides in said spud wells, and means including weighted levers mounted on said auxiliary shafts and adapted to independently control the engagement of said upper and lower pawls with said racks whereby upward and downward movement of said spuds in the spud wells may be controlled.

3. The combination with a floating craft, of spud wells having apertured opposite sides and mounted on said floating craft, spuds slidably mounted in said spud wells and including sides adjacent to the apertured sides of said spud wells, racks provided on said sides of the spuds, a plurality of stands, one of each of said stands mounted on a deck of the floating craft adjacent to one of each of the apertured sides of the spud wells, a main shaft and auxiliary shafts mounted on each of said stands, vertically alined upper and lower pawls mounted on said main shafts and adapted to be individually actuated into engagement with or out of engagement from said racks on the spuds through the apertures in said spud wells, said lower pawls having U-shaped upper ends pivotally mounted on said main shafts and means adapted to independently control the engagement of said pawls with said racks, said means including projections on said upper and lower pawls, and weighted levers and cams mounted on said auxiliary shafts, said weighted levers adapted to be manually actuated to actuate said auxiliary shafts to actuate said cams into engagement with said projections for actuating said upper and lower pawls into engagement with and out of engagement from said racks on the spuds whereby the upward and downward movement of said spuds in the spud wells may be controlled.

4. The combination with a floating craft, of vertically extending spud wells having apertured opposite sides and mounted on said floating craft, spuds slidably mounted in said spud wells and including sides adjacent to the apertured sides of said spud wells, vertically extending racks provided on said sides of the spuds, a plurality of stands including inwardly extending ears, one of each of said stands mounted on a deck of the floating craft adjacent to one of each of the apertured sides of the spud wells, a main shaft and auxiliary shafts mounted on each of said stands, said main shafts mounted on the ears of said stands and said auxiliary shafts being coaxial, upper and lower pawls arranged in the same vertical plane mounted on said main shafts and adapted to be individually actuated into engagement with or out of engagement from said racks on the spuds through the apertures in said spud wells, and means including a manually actuated weighted lever mounted on each of said auxiliary shafts and adapted to independently control the engagement of said upper and lower pawls with said racks whereby upward and downward movement of said spuds in the spud wells may be controlled.

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