July 27, 1954 H. B. DYER 2,684,653

TOW COUPLING

Filed Jan. 4, 1949

FIG. 1

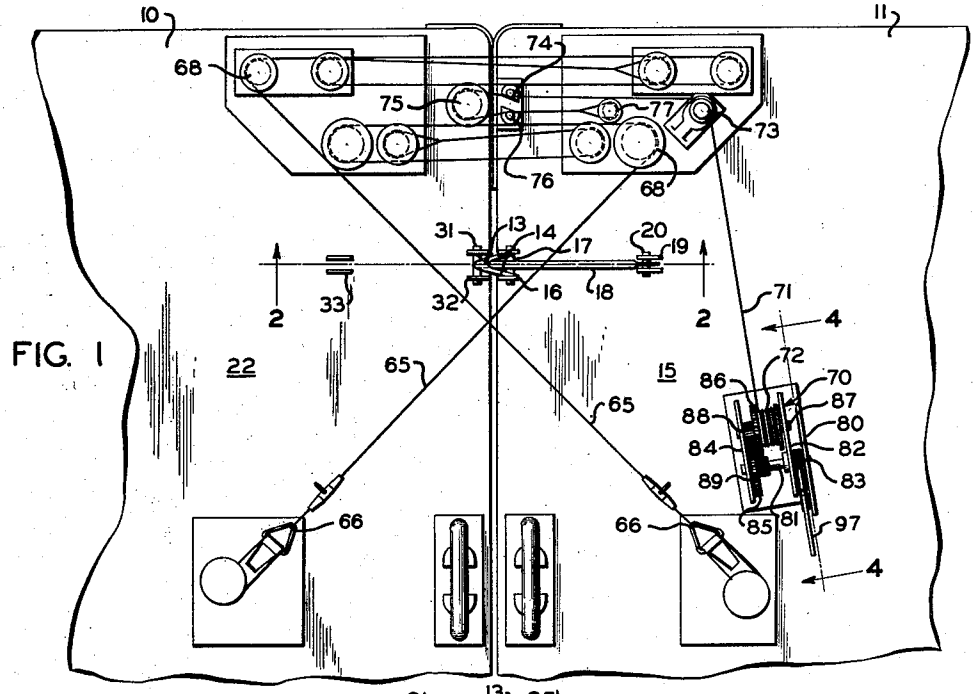


FIG. 2

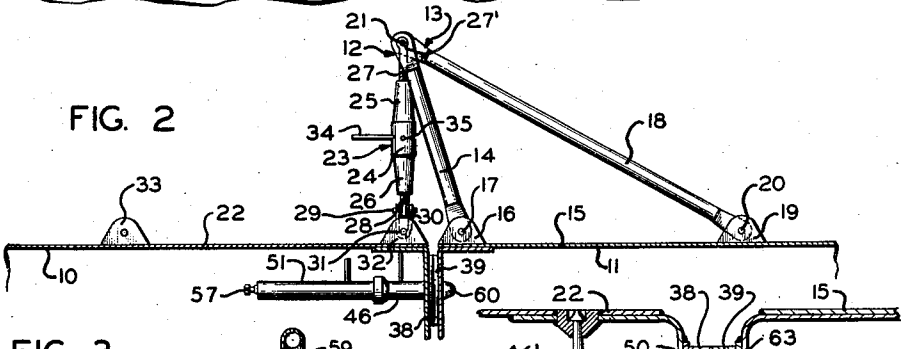


FIG. 3

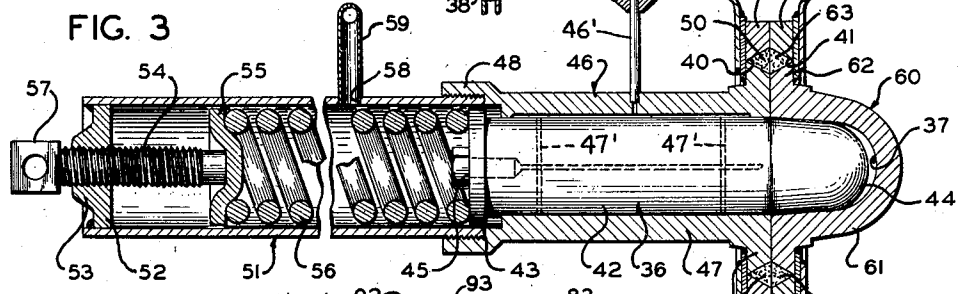
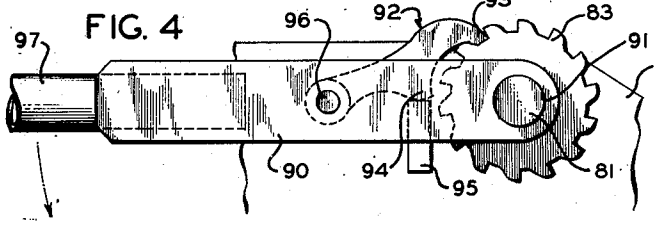


FIG. 4



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TOW COUPLING

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11 Claims. (Cl. 114—235)

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This invention relates to marine transportation and more particularly to that form of marine transportation in which vessels are supplied with auxiliary or additional propulsion means.

In inland waterway shipping, tows are employed which consist of a propulsion vessel and a cargo carrying vessel or vessels. In many rivers, more particularly in the south, where tows are employed, it has been the custom to lash together in two or three columns, the cargo carrying vessels or barges to be transported. The propulsion vessel is usually of the pusher type and of the same general configuration as the barge. In a tow of this type where there are more than one column of barges, the selection and placement of the barges in the tow must be critical in that some of the vessels may have a different displacement than others due to the type or amount of cargo carried as well as the nature, size and character, thereby forming an uneven general deck level throughout the tow making it very difficult to lash the barges together.

When a tow of this general description arrives at a lock in a waterway the tow must be broken up into one or two units, only one column wide, to allow the entry of the units through the lock. This is a long and tedious operation in that the barges have been carefully and laboriously lashed together. The operation of cutting out or separating the barges into these single or double units is a long and costly one.

Accordingly, it is an object of the present invention to provide a means whereby barges or other vessels may be attached together or detached from a tow quickly and efficiently, using a minimum of labor yet affording a positive foolproof lashing means.

Another object of the present invention is to provide a leveling means so that regardless of the displacement of a vessel to be placed in a tow this leveling means will adjust by a simple mechanism, the level of the deck of the tow to form a continuous and unbroken surface, thereby affording easy access of one barge to another, making the lashing operation easier and saving time in the assembly or disassembly of the same.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a partial top plan view of the decks of two adjoining barges illustrating the proposed method of lashing;

Fig. 2, a section on the line 2—2 of Fig. 1 with the background omitted for greater clarity;

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Fig. 3, a longitudinal section of the aligning device as shown in Fig. 2; and,

Fig. 4, a fragmentary sectional view illustrating the ratchet, taken substantially on the line 4—4 of Fig. 1.

Referring to the drawings, a pair of barges 10 and 11 are connected together in accordance with the present invention for the purpose of bringing the decks of the barges to the same level prior to lashing of the barges together in the tow. A leveling device 12 is provided which consists of a tripod 13 mounted on the deck 15 of the barge 11. The two shorter legs 14 of the tripod are pivotally mounted on the deck by means of brackets 16 secured to the deck and pins 17 passing through the brackets and the lower extremities of the legs. A third and longer leg 18 has an extremity pivotally attached to the barge and spaced from the side thereof by bracket 19 and pin 20. The other ends of the three leg members are connected by a pin 21.

Attached to the deck 22 of the barge 10 is a force multiplying device 23 commonly known as a steamboat ratchet and which is constructed and functions similarly to a turnbuckle. The device consists of a central body portion 24 having internal oppositely threaded end portions 25 and 26. End bolts 27 and 28 are adapted to be received by the internally threaded portions and the latter is connected by a pin 29 to a U-bolt 30, which is pivotally secured by pin 31 to a bracket 32 attached to the deck of the barge near its edge. The end bolt 27 has an ear 27′ which is adapted to receive the pin 21 passing through the ends of the tripod legs 14 and 18 which comprise the apex of the tripod.

A bracket 33 is attached to the deck 22 of the barge 10 in the same relative position as the bracket 19, in order that the tripod and force multiplying members may be used interchangeably on the various barges.

The lengths of the various legs 14 and 18 of the tripod and the relative position of the brackets securing their extremities is such that the apex 13 extends away from the plane of the side of the barge so that when another barge is adjacent, the apex extends over its deck. The bracket 32 carrying the lower portion of the member 23 is positioned on the barge 10 near its edge and such that it is substantially under the apex of the tripod when the barges are close together.

In the use of the leveling device, the barges are maneuvered so that the sides or ends of the barges which it is desired to join, are close to-

gether and that the barges are positioned with the tripod and force multiplying members substantially opposite each other. The member 23 is then engaged with the apex 13 of the tripod by means of the pin 21 which passes through the apex and the tripod. It is understood, of course, that the overall length of the member 23 may have to be shortened or extended by rotating the body member relative to the end bolts 27 and 28. After engagement of the member with the tripod, the decks of the two barges may be brought to the same level by the operation of the member. This may be readily accomplished by a handle 34 which is adapted to be received in a recess 35 in the member 24.

For maintaining the vessels at the same level and in about the same relative positions, a plunger or locking pin 36 is supported in the end of one of the vessels 10 and is adapted to be received by a recess or socket 37 which occupies a corresponding position in the end of the other craft 11. The craft are provided with rub rails 38 and 39 for protecting them from damage caused by contact with another barge or the like. The rub rails of the barges are provided with apertures 40 and 41 for receiving the plunger and the socket.

The locking pin consists of an elongated member having a substantially cylindrical body portion 42, a flanged base or bearing plate 43, and an end or head portion 44. The head portion has a curved or substantially spherical extremity 44 of a lesser diameter than that of the body 42. The spherical portion is joined to the body portion by tapering sides of substantially frusto-conical configuration. A tap screw 45 is received by an aperture in the base of the locking pin to secure the bearing plate 43 thereto.

The pin is positioned by and adapted to reciprocate in a housing 46 received in the end of the barge. The housing has a substantially cylindrical portion 47, an internally threaded end socket 48 at one end, and a flanged portion 49 at the other end. The housing is provided with oil through tube 46' carrying oil to grooves 47' on the interior of the plunger housing 46. The thickness of the flanged portion is equal to that of the rub rail so that the flange and the rub rail are substantially flush. The flange is secured to the rub rail by a suitable weld 50.

A cylindrical spring housing 51 has an end received by the threaded end 48 of the plunger housing and has an end plate 52 at its other end with an axial built up portion 53, the end plate and built up portion being provided with an internal thread. A screw 54 is in engagement with the thread and one end thereof is adapted to engage a keeper plate 55 between which and the bearing plate 43, a helical spring 56 is positioned in the housing 51. The screw 54 is provided with a head 57 by means of which a tool may be employed to turn the screw. It is apparent that by rotation of the screw, the keeper plate 55 may be positioned in order to regulate the force exerted by the spring on the locking pin 36.

The housing 51 of the spring is adapted to receive a hydraulic fluid to retard or brake inward movement of the pin against the spring, and a restricted aperture 58 is provided in the housing 51 for this purpose to which an overflow pipe 59 is attached. The overflow pipe may be connected to a suitable reservoir, not shown.

For receiving the head of the locking pin in the end of the adjacent barge, a socket 60 is provided which includes a concave dome 61 having a flange 62 of substantially the same thickness as the rub rail of the barge. The socket is positioned in the aperture 41 of the rub rail and secured by a suitable weld 63. The configuration of the internal surface of the socket is similar to that of the external surface of the pin head 44. It includes a substantially spherical end portion and converging side portions.

In operation, the craft are maneuvered into position and brought to the same level by the leveling procedure set forth above. When the same level of the two craft is reached, assuming that they have been placed in the correct end to end relationship, the pin 36 will be able to enter the socket 37.

By reason of the design of the pin and socket, relative motion between the two craft which may occur for various reasons such as wave action and the like, does not produce concentrated bending or other distortional stress in the pin and socket or the ends of the barges. Furthermore, the design of the two facilitates entrance of the pin into the socket. In the event that the pin contacts the end of the other barge, its rounded end will minimize damage. Furthermore, the pin may be retracted into the housing against the force of the spring 56 and the fluid within the housing, which can escape slowly through the aperture 58. When the pin is in position opposite the socket, the spring urges the same outwardly and thereinto.

Conventional means for lashing together the two barges is shown in Fig. 1 and includes cables 65 which have an end 66 anchored to the decks of the barges, and passing around roller chocks 68 locked on the barges.

In order to save time, however, it is often desirable to provide temporary means for lashing the barges together so that they may be gotten underway without waiting for the more permanent lashing which may be completed enroute. In order to accomplish this, an auxiliary lashing means is provided which includes a winch 70 which is fixed to the deck of the barge 11. The winch has a cable 71 wound around its drum 72 which passes around a fixed roller chock 73, by a wire rope chock 74, and then around a rope bitt 75 which is attached to the deck of the adjacent barge. From the rope bitt 75, the cable passes by the rope chock 76 to the rope bitt 77 over which it is looped. This lashing arrangement is effective and can be quickly applied and tightened by means of the winch. The rope bitt 75 on the barge 10 is positioned opposite the guiding chock 74 on the barge 11 in order that by tightening the winch cable, the barges are positioned in the correct end to end relationship and in substantial alignment. In other words, by connecting the cable as described, the barges are drawn into place as it is tightened.

In order to provide for flexible control and expedite the unwinding of the cable 71 from the drum, a quick release means is provided. From the drawings it is apparent that the winch drum 72 is adapted to be turned by a wheel 80 which is attached to a shaft 81 passing through a side 82 of the winch and which has a ratchet 83 positioned thereon between the side and the wheel. At its other extremity the shaft is supported in the other side 84 of the winch and has a gear 89 adapted to mesh with another gear 86 which is on the shaft 87 of the winch drum. For braking the unreeling of the winch, a relatively small gear 88 on the shaft 87 is adapted to mesh with a larger gear 85 on a shaft (not shown) which is

below the shaft 81, and a conventional brake is adapted to be applied by a conventional foot lever (not shown) positioned outside of the side 82 of the winch.

For releasably locking the shaft 81 a tubular handle 97 has elongated flat iron side pieces 90 attached to its sides and is provided with apertures 91 for pivotally receiving the shaft 81, the ratchet 83 being received between the ends of the side pieces. Pivotally attached by a pin 96 between the side pieces 90 behind the ratchet 83 is a pawl 92 having a locking detent portion 93 and a stop engaging portion 94 which is adapted to engage or rest on a stop 95 attached to the side 82 of the winch.

In the operation of the device when there is tension on the cable 71, the ratchet 83 tends to rotate counter-clockwise as viewed in the drawings, and in the position shown, the pawl 92 prevents such rotation. In order to release the pawl from engagement with the ratchet, it is merely necessary to rotate the handle 97 counter-clockwise (in the direction shown by the arrow) so that the stop 95 moves the pawl 92 counter-clockwise around its pivot pin 96 and thus out of engagement with the ratchet. In order to engage the pawl with the ratchet, the handle 97 is raised until the portion 93 of the pawl has dropped down into engagement with the teeth of the ratchet.

In the operation of the device, the two barges, which it is desired to tie together, are maneuvered to a position close together, the temporary lashing applied, the decks leveled, and the pin and socket engaged. This can be carried out in a relatively short time and provides a satisfactory means for coupling the craft in order that they may get under way shortly. After the craft have gotten underway, the permanent lashing may be secured and the temporary lashing released.

It is contemplated that after the decks of the vessels are level, the leveling device, consisting of the tripod and force multiplying members, will be disengaged in order that they not obstruct the deck. Furthermore, as the pin and socket remain engaged throughout the voyage, the leveling device is not required to maintain the vessels at the same level.

Often times, when a tow is to pass through a lock or other narrow waterway, it is necessary that the craft of which it is composed be rearranged in single columns or other desired ways. The time lost in rearranging craft in a tow when conventional means are used for securing the vessels together is usually very large. With this apparatus, however, the vessels may be moved through the lock or other short distance by the use of the temporary lashing arrangement, thus saving considerable time.

It will be apparent that the invention contemplates the provision of simple means for bringing adjacent craft to the same level, for coupling the craft by means of a simple pin and socket arrangement to maintain this level after the leveling device is disengaged, and for temporary means for lashing the craft together so that the tow may be gotten underway without delay.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A device for leveling and coupling waterborne craft, comprising a tripod mounted on one craft and having its apex over the other craft, a force multiplying device mounted on the other craft, means engaging the apex of the tripod with the force multiplying device, a socket mounted in the side of one craft, and a spring pressed plunger extending from the side of the other craft and adapted to enter the socket when the craft are on substantially the same level and in substantial alignment whereby adjacent craft may be leveled and coupled in such level position.

2. The structure recited in claim 1, a housing in which the spring pressed plunger reciprocates, and fluid within the housing to retard the inward movement of the plunger against the spring, the housing being provided with a restricted opening for the discharge of the fluid.

3. The structure recited in claim 1, the innermost portion of the surface of the socket being rounded and having sides which converge outwardly from the rounded portion, and the plunger having a body connected to a substantially rounded end of less diameter than the body by converging sides, whereby entrance of the plunger into the socket is facilitated and the possibility of concentrated stresses being set up due to relative movement between the plunger and socket is minimized.

4. In a coupling for vessels in a tow, rub rails for the sides of the vessels, a locking pin for mounting in the side of one vessel and having a housing with a flanged portion adapted to be mounted in an aperture in the rub rail with its outer surface substantially flush therewith, and a socket for the pin for mounting in the side of the adjacent vessel, the socket comprising a shell and having a peripheral flange adapted to be received in an aperture in its rub rail, the outer surface of the flange and that of the rub rail being substantially flush, whereby the flanged portions are adapted to be protected from substantial contact with the side of the adjacent vessel.

5. The structure recited in claim 4, the flanges being attached to the surfaces defining the rub rail apertures by welding.

6. The combination of a pair of vessels, means to connect said vessels to form a tow with the adjacent decks of the vessels at substantially the same height comprising rub rails mounted on each vessel at a location to contact when the vessels abut each other, a resiliently urged plunger mounted in one vessel at a predetermined distance from the deck thereof and normally projecting from the rub rail thereof, a socket having a plunger receiving opening at one end and mounted in the rub rail of the other vessel at substantially the same predetermined distance from the deck thereof, the plunger-receiving-opening end of said socket being substantially flush with the rub rail so that the plunger may be guided into the socket when said vessels are brought into abutting relation.

7. In the combination according to claim 6 means lashing the vessels together thereby preventing separation thereof.

8. In the combination according to claim 6 in which lashings secure the vessels together preventing separation, said lashings include a first run extending diagonally from one vessel at an acute angle to the rub rail portions of the vessels and fixed to the other vessel, tightening means in said diagonal run; and a second run extending diagonally from the said other vessel to the said first vessel at an obtuse angle to the rub rail

portions of said vessels and fixed to the said first vessel, and tightening means in said second diagonal run.

9. In a coupling for vessels in a tow, a plunger housing open at one end, a plunger mounted in said housing for projection of a portion thereof from the open end or complete encasement within the housing, a spring for urging said plunger to its projected position, said housing being mountable so the plunger may extend from the side of one vessel, a socket for the side of the other vessel to receive the plunger, the innermost portion of the surface of the socket being rounded and having sides which diverge outwardly from the rounded portion to the open end of the socket, the plunger including a generally cylindrical body and a rounded end, said rounded end being of substantially complementary configuration and size to the interior of the socket, whereby entrance of the plunger into the socket is facilitated.

10. The combination of a pair of vessels, means to connect said vessels to form a tow with the adjacent decks of the vessels at fixed predetermined heights comprising fixed portions of each vessel abutting a corresponding portion of the other vessel, a resiliently biased plunger mounted on said one vessel and projecting outwardly through said fixed portion for abutting the fixed portion of the other vessel, said fixed portion of the other vessel having a plunger receiving opening for snugly receiving the projecting end of the plunger, said opening being a continuation of the surface of said fixed portion of said other vessel whereby the vessels may be abutted and said plunger may be inserted into said opening by the resilient bias of said plunger.

11. A system for fastening two vessels together in abutting relation comprising a rubbing portion on each vessel adapted to engage the rubbing portion on the adjacent vessel, a plunger mounted in one vessel for movement through said rubbing portion and including a projecting end having a tapered configuration, the other vessel being provided with a socket fixed to said other vessel and having a recess of complemental shape to the projecting end of the plunger with the recess extending through the rubbing portion of said other vessel, means to secure the vessels in abutting relation so that said projecting end of said plunger may extend into said recess for preventing relative lateral movement of the vessels, a tripod mounted on one of said vessels with the apex thereof projecting outwardly beyond the rubbing portion of the said one of said vessels and over the other vessel, a force multiplying device having one end secured to the apex of said tripod and having its other end removably secured to the other of said vessels, said force multiplying device being arranged to produce a pushing and pulling action between the apex of said tripod and the other of said vessels for arranging the plunger in horizontal alignment with the recess.

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