March 10, 1959 A. P. ROBISHAW 2,876,726

BARGE

Filed June 29, 1956

Fig. 5

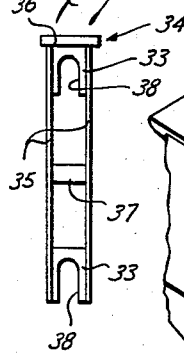


Fig. 1

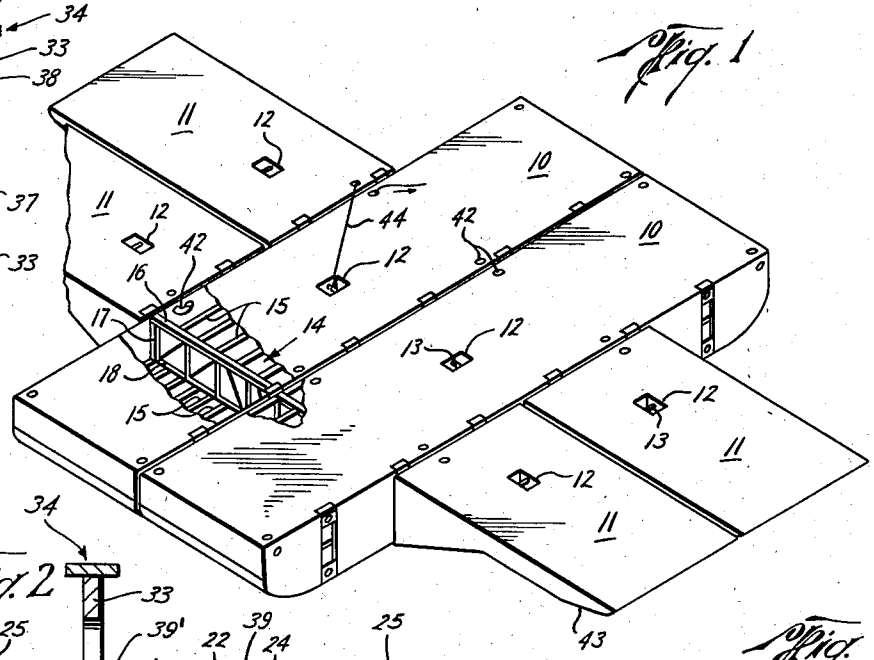


Fig. 2

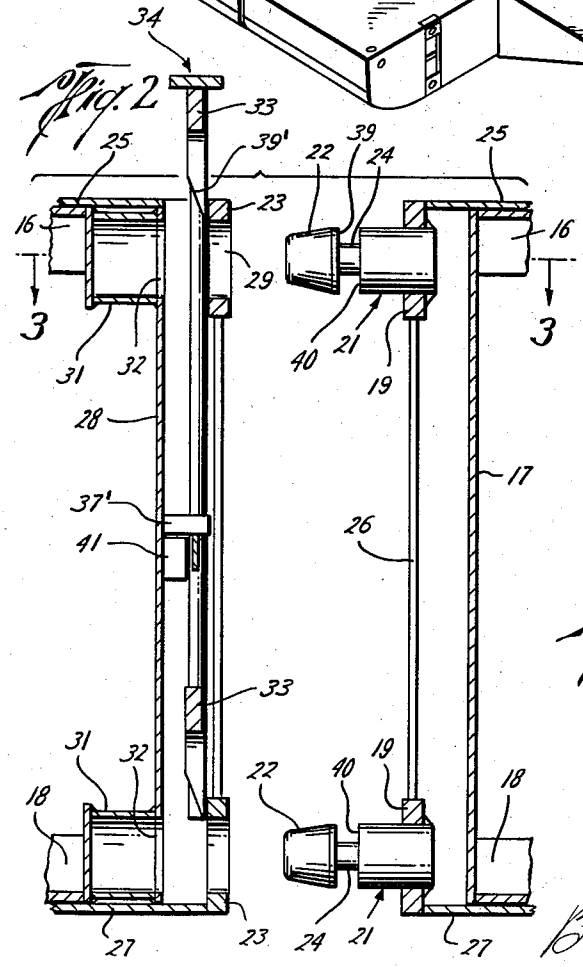


Fig. 3

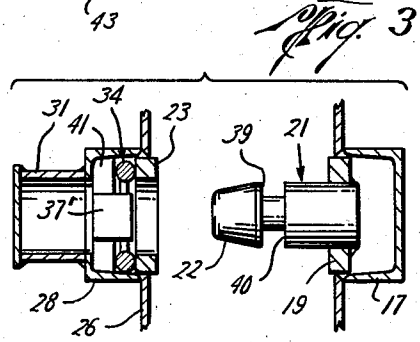
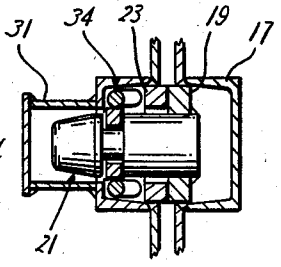


Fig. 4



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United States Patent Office 2,876,726
Patented Mar. 10, 1959

2,876,726

BARGE

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Application June 29, 1956, Serial No. 594,793

10 Claims. (Cl. 114—.5)

This invention relates to barges and more particularly to barges made-up of a plurality of float sections, and ramp sections where desired, which are releasably secured to each other.

It has long been recognized that sectionalized barges which may be easily transported overland provide a ready answer to the problem of fording streams with heavy machinery, laying submarine pipe lines, drilling wells in marshy areas, landing equipment on beaches, etc. Many different ways have been proposed for locking float sections together, but the undesirable features of the designs have been such that they have met with little or no commercial success.

The barge sections should be coupled together at vertically spaced points to prevent their jackknifing when unequally loaded or when vehicles are being driven onto the barge. Due to the weight of barge sections and their movement by currents, waves, etc., it is extremely dangerous to attempt to latch the barge sections from the underside. One solution proposed to permit locking barge sections together at vertically spaced points from the deck of the barge is the use of a chain link like member in which a pin is inserted from the deck of the barge through vertically spaced plates of the links. See the United States Letters Patent No. 2,518,091 to Stopkevyc. This form of latching means is subject to serious limitation in that the pins are placed in shear when the floats are unevenly loaded. Thus, the pins must be of very large diameter to withstand the loads imposed. Further, there is no working of the components of the latching structure and the pins tend to be frozen in place both by corrosion and marine deposits. The free pin is a loose part which may be easily lost overboard.

It is an object of this invention to provide a sectional barge with means for locking the sections together which is actuated from the deck of the barge and in which there is no small diameter pins in shear; the shearing forces being trannsmitted through large areas of material without unduly increasing the size of the latching mechanism.

Another object is to provide a barge made-up of a plurality of sections latched together by a means which guides adjacent float sections into proper relationship with each other as they are drawn together and which permits the use of a wedge to draw the barge sections completely together when necessary.

Another object is to provide a barge made-up of a plurality of sections having latching means which may be actuated from the deck of the barge and which permit the barge sections to be coupled together in rough water.

Another object is to provide a barge made-up of barge sections in which the latching means will not be frozen in place either by corrosion or marine deposits.

Another object is to provide a barge made-up of a plurality of float sections in which the sections are not permitted to jackknife an undesirable amount when unevenly loaded and yet which are not rigidly coupled together so that each barge section principally carries its own load and when the barge is evenly loaded, transmission of stresses between barge sections will be held to a minimum.

Another object is to provide a barge made-up of a plurality of barge sections and having a latching means carried by trusses extending across the barge sections so that the trusses of the barges are secured together and in which the latching means is not subject to the disadvantages of small diameter pins in shear or freezing of latching parts in position.

Another object is to provide a barge made-up of a plurality of barge sections in which the means for latching the sections together may be actuated with a sledge from the deck, and there is no danger to personnel coupling the sections together as they need not be close to the side of the barge sections when the sections are being coupled together.

Another object is to provide a barge in which float sections and ramp sections are provided with identical latching means to permit construction of the barge in any desired size and securing of ramps to one or more sides of the barge without special latching means for the ramp.

Other objects, features and advantages of this invention will be apparent from the drawing, specification and the claims.

In the drawing wherein there is shown by way of illustration, one embodiment of this invention:

Fig. 1 is an isometric view of a barge constructed of float sections and ramp sections in accordance with this invention, with parts of the deck broken away to show the framework of each section;

Fig. 2 is a fragmentary view in vertical cross section through two adjacent float sections illustrating the locking means with the spears or pins of one float in a position to enter sockets of the adjacent float;

Fig. 3 is a view taken generally along the lines 3—3 of Fig. 2 with the pin shown in elevation further illustrating the latching mechanism;

Fig. 4 is a view similar to Fig. 3 with the pin held in the socket by the latching means; and

Fig. 5 is an elevational view taken from the outboard side of the latching bar employed in latching the sections together.

Referring first to Fig. 1, there is shown a barge made-up of a plurality of float sections **10** and ramp sections **11**. The barge may include as many float and ramp sections as desired. By staggering the sections and having one float section with its side wall secured to one-half each of two adjacent sections as much length as desired may be provided.

Located at the center of gravity of each of the float sections and ramp sections is a well **12** which extends vertically through the ramp and float sections. These wells provide for ready suspension of objects below the barge such as pipe lines, or the like. They also provide a convenient position for a cross bar **13** to which a snatch block may be attached to lift the sections into and out of the water and to stack them on a flat bed truck. Preferably the sections are sized so that two float sections may be stacked onto a low bed truck and the over-all dimension and weight of the vehicle and load will be within permissible limits for travel on the public highways.

The float or barge sections are built up around a plurality of transversely extending trusses indicated generally at **14**. These trusses extend parallel to each other across the short dimension of the sections and angle iron stringers **15** are secured to the top and bottom of the trusses and extend in the lengthwise direction of the float. The skin of the float is made-up of steel sheets suitably secured to the framework such as by welding.

At the end of each truss, a latching means is supplied for latching the truss of one float to the truss of an adjacent float. This construction is preferred as stresses

transmitted between trusses do not tend to cause leakage through the skin of the floats.

The latching means for securing adjacent float and ramp sections together is best shown in Figs. 2 through 5. Referring first to the right hand portion of Fig. 2, the upper channel **16**, end chanel **17**, and lower channel **18** of a truss section **14** are shown. A plurality of locking pin plates **19** are welded across the open side of the channel as best shown in Fig. 3. Spears or pins indicated generally at **21** are carried by the locking pin plates and project outwardly from the side of the float. Preferably, the locking pins are two in number and are spaced vertically as illustrated. The locking pins are provided in sets at horizontally spaced points along one side of each float section of the barge.

The locking pins have frusto conically shaped heads or nose sections **22** to act as guides in inserting the pins into the complementary mating sockets **23** carried by an adjacent float section. The heads **22** are enlarged relative to an intermediate section **24** of each locking pin. In other words, each pin has a groove or reduced size intermediate section for receiving a locking means as will appear below. The root of the pin is preferably equal in transverse dimension to the head of the pin and resides within the socket when the sections are secured together. The preferred construction will provide a groove in the pin useful in providing for working of the latching mechanism as will appear below.

The skin of the float is provided by upper plate member **25**, end plate member **26** and lower plate member **27**. These plates are sealingly secured to the inner framework of the float and to each other to provide for flotation of the units.

Referring now to the fragment of the adjacent barge which appears to the left in Fig. 2, channel member **28** is the end of a truss section **14**. The sockets **23** are secured across the open side of channel **28** as by welding so that transmission of stresses between the barge sections will be transmitted from truss section to truss section.

Each socket **23** is provided with a bore **29** adapted to loosely receive a pin **21**. The sockets **23** are arranged in register with the pins **21**. Inasmuch as the pins have a greater length dimension than the depth of channel members **28**, pin sleeves **31** are provided and open into the web of channels **28** at **32**. The heads of pins **21** project into the sleeves when the floats are secured together. As the interior of the sleeves are exposed to the exterior of the float, they are made water-tight as by welding, as shown.

As best seen in Fig. 4, when the locking pin plate **19** is in engagement with the exterior surface of socket **23**, the head **22** of the pin is positioned inwardly of socket member **23** a substantial distance so as to position the reduced size portion **24** of the pin inboard of socket **23**.

In accordance with this invention, a latch member is provided for engaging the pin on the inboard side of the socket member **23** to maintain the pin within the socket. While a separate locking means could be provided for each of the pins and sockets, it is preferred to arrange the pins and sockets in vertical sets and to provide a single locking bar with a latching means to simultaneously engage the pins of a vertically arranged set. In the illustrative embodiment this means is provided by a pair of spaced locking means **33** carried by the locking bar indicated generally at **34**. Referring also to Fig. 5, it will be seen that the locking bar **34** comprises a pair of rods **35** to which the locking members **33** are secured as by welding. The locking bar is arranged with rods **35** secured to opposite sides of the locking means **33**. A head **36** is provided at the top of the bar and provides a surface which may be stepped upon or struck with a sledge to drive the locking bar home. A stop **37** is secured to rods **35** at an intermediate position of the locking bar to reinforce the locking bar and to engage a complementary stop **37'** secured within the channel and limit upward travel of the locking bar.

Each locking means **33** is provided with a downwardly opening slot **38** dimensioned to be received about the reduced diameter section **24** of the pins. The slots are smaller than the transverse dimension of heads **22** and engage the shoulder **39** between the head and reduced diameter section of the pin to prevent withdrawal of the pins from the sockets; the locking bar being held against outboard movement by abutment with the inboard surfaces of sockets **23**.

To permit forcing the pins completely into the sockets once a portion of the reduced diameter section **24** has cleared the sockets, a wedge surface is provided on each of the locking members **33**. This wedge surface is provided by beveling the lower section of each lock member **33** to provide an upwardly and inwardly extending surface **39'**.

Latching means for marine use tend to freeze up due to corrosion and deposits of marine life, particularly in areas where there is little or no circulation. To avoid this problem, it is preferred that the guideways provided by channels **28** permit limited movement inwardly and outwardly of locking means **33** to thereby permit pins **21** to work longitudinally. The thickness dimension of the locking means **33** is also preferably slightly less than the reduced diameter portion **24** of pins **21** to permit the pins to work longitudinally within the locking means **33**. This clearance will also permit engagement of the locking bar and pin with foreign matter therebetween.

To insure that the pins will constantly work within the sockets, it is preferred to bias the pins in one direction by a means wihch will be overcome by slight jackknifing action of adjacent float sections upon uneven loading of the sections. Thus, on each loading and unloading of each section, there will be some working of each pin in each socket to prevent freezing.

The means for urging the pins toward one extremity of their endwise movement within the sockets **23** may be provided by causing the locking bar to function as a spring. For this purpose, a block **41** is secured within the channel at a point intermediate the two sockets and bears against the inboard side of locking bars **34**. The relationship between block **41** and the two sockets **23** is such that these three elements will be in engagement with the locking bar when the locking bar is raised and thereby provide friction means for holding the bar in raised position against gravity. When the bars are lowered, they will be engaged by shoulder **40** at the inboard side of the reduced size portion **24** and the bars will tend to urge the pins outwardly of the sockets when the bars are flexed. Block **41** holds the locking bar against sockets **23** and if the action of current or shifting of load on the barge causes adjacent sections to jackknife or to move closer together, the upper and/or lower ends of locking bar **34** will flex inwardly in the manner of a spring anchored at block **41**, and permit movement of the pins further into the sockets. Upon removal of the condition causing flexure of bars **34**, they will return to an unstressed condition holding the pins at the outboard extremity of their range of reciprocation. As the slots **24** are of greater width than the thickness of locking wedges **33**, the loading and unloading of the barges and the action of the current on the barges will cause the pins to reciprocate within wedges **33**. This freedom for limited movement of the pins within the sockets is best shown in Fig. 4 where the latching means is shown in the position it will occupy when the locking pin plate is in abutment with the socket and the locking bar **34** flexed in the manner of a spring.

In use, a plurality of the barge sections are placed side-by-side on a body of water and a line such as shown at **44** passed through registering right angle tubes **42** in the side of each section. The tubes open into the deck of each section and into the side wall of each sec-

tion a slight distance below the deck. After the line is passed through two mating tube sections, one end of the line may be secured to a float in any desired manner as to the lifting bar in well 12. The free end of the line may then be taken in to pull the two sections together. The angle tubes 42 are arranged in register when the pins and sockets are engaged and therefore taking in the free end of a group of lines passing through these tubes will move the pins 21 into sockets 23. The locking bars 34 which will have been raised before the floats are brought together may then be driven downwardly with a sledge to draw the barge sections completely together and lock them in place.

The ramps 11 may be similarly secured to the floats, but some means must be provided for maintaining the outboard end of the ramps above the level of the surface to introduce the upper pins into the upper sockets. Preferably, a boom of some character is used in conjunction with ropes through the angle members 42 to secure the ramps to the floats.

The outboard end of each ramp is provided with an underneath surface 43 which slopes downwardly from the end of the ramp. By grading the bank of a stream to a similar slope, the ramp will always make firm contact with the bank and changes in the level of the body of water will not affect use of the ramp. As the ramp is secured to the float sections at vertically spaced points, it cannot jackknife into the underside of a vehicle being driven onto the barge and interfere with loading of the barge. If desired, the ramp sections may be provided with drawbridge sections for use under special circumstances as will be understood by those skilled in the art.

Horizontal spacing of the locking means will depend upon the number of attachments desired. For a general purpose float having a length dimension of approximately 30 feet, it is preferred that the locking means be provided at intervals of less than six feet.

From the above, it is clear that there has been provided a barge in which float sections may be secured together from the deck of the barge. A simple locking device has been provided which will simultaneously lock upper and lower pins and sockets together. This prevents jackknife action of barge sections except to the extent desired. The construction may be very rugged without use of locking parts of unnecessarily large size, such as necessary where hinge pins are placed in shear.

The arrangement is such that the pins will be constantly working in the sockets and in the locking means so that freezing of the parts together will not occur. When the barges are tied up and unloaded, the locking pin plates 19 will be held spaced from the sockets 23 so that water may circulate into sockets 23 and prevent formation of marine life due to stagnation.

The barge sections may be secured together in rough water as it is not necessary to reach between adjacent sections to couple them together, hence no physical danger is involved in operating the latching mechanism.

All parts of the latching mechanism are secured to and carried by the float sections and hence cannot jump out under stress while the sections are being latched together to endanger life of personnel. There is no alignment problem in driving the latching bars home and therefore if water conditions are such as to permit sufficient alignment of barge sections to insert the spears or pins 21 into the sockets the float sections may be latched together.

A further advantage of the pin and socket type of latching means as taught by this invention lies in its ability to transmit a substantial load between barge sections. It will be noted that when the latching mechanism is engaged, vertical loading of the latching mechanism is transmitted directly between the roots of the pins and the sockets. The vertical dimension of the sockets and pins may be substantial without unduly increasing the size of the latching mechanism. As the latching bars only resist endwise movement of the pins, they need not be beefed-up to withstand differences in vertical loading on the latching mechanism.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. A barge comprising, a plurality of float sections, mating pins and sockets carried by adjacent float sections to releasably lock the float sections together, said pins loosely fitting in the sockets and having enlarged heads extending through the sockets, and locking bars mounted for movement in guideways associated with the sockets, said bars having locking means with open ended slots therein of a size to receive the pins inboard of the heads and smaller than the heads of the pins to lock the pins in the sockets, said bars movable from a first position with the locking means clear of the sockets to a second position with the locking means between the head of the pins and the sockets to lock the float sections together.

2. A barge comprising, a plurality of float sections, mating pins and sockets carried by adjacent float sections to releasably lock the float sections together, said pins loosely fitting in the sockets and having enlarged heads extending through the sockets, and locking bars mounted for vertical movement in guideways associated with the sockets, said bars having locking means with downwardly opening slots therein of a size to receive the pins inboard of the heads and smaller than the heads of the pins to lock the pins in the sockets, said bars movable vertically from a position with the locking means elevated to clear the socket and the top of the bars above the decks of the floats to a position with the locking means locking the pins in the sockets and the top of the bars substantially flush with the deck of the floats.

3. A barge comprising, a plurality of float sections, vertically and horizontally spaced mating pins and sockets carried by adjacent float sections in substantially vertically arranged groups to releasably lock the float sections together, said pins loosely fitting in the sockets and having enlarged heads extending through the sockets, and locking bars mounted for vertical movement in guideways associated with each vertical group, said bars having vertically spaced locking means with downwardly opening slots therein of a size to receive the pins inboard of the heads and smaller than the heads of the pins to lock the pins in the sockets, said bars movable vertically from a position with the locking means elevated to clear the sockets and the top of the bars above the decks of the floats to a position with the locking means locking the pins in the sockets and the top of the bars substantially flush with the deck of the floats, whereby all pins of a vertically arranged set can be engaged by driving a locking bar downwardly from the deck of the float.

4. The barge of claim 3 wherein the lower section of each locking means is upwardly tapered on its inboard side to provide a wedge surface for drawing the pins through the sockets.

5. A barge comprising, a plurality of float sections, mating pins and sockets carried by adjacent float sections

to releasably lock the float sections together, said pins loosely fitting in the sockets and having enlarged heads extending through the sockets, locking bars mounted for vertical movement in guideways associated with the sockets, said bars having locking means with downwardly opening slots therein of a size to receive the pins inboard of the heads and smaller than the heads of the pins to lock the pins in the sockets, said bars movable vertically from a position with the locking means elevated to clear the sockets and the top of the bars above the decks of the floats to a position with the locking means locking the pins in the sockets and the top of the bars substantially flush with the deck of the floats, said pins and sockets dimensioned to permit limited endwise movement of the pins within the sockets when the pins are locked in the sockets, and resilient means operative when the locking means are engaged with the pins for maintaining the pins substantially at the outboard extremity of said endwise movement when the float sections are equally loaded.

6. A barge comprising, a plurality of float sections, mating pins and sockets carried by adjacent float sections to releasably lock the float sections together, said pins loosely fitting in the sockets and having reduced size intermediate portions, vertically extending guideways associated with the sockets, locking bars loosely mounted in the guideways for vertical movement therein, said bars having locking means with downwardly opening slots therein of a size to receive the reduced portions of the pins and smaller than the heads of the pins to lock the pins in the sockets, said pins and sockets dimensioned to permit limited endwise movement of the pins when the pins are locked in the sockets, said bars movable vertically from a position with the locking means elevated to clear the sockets and the top of the bars above the decks of the floats to a position with the locking means locking the pins in the sockets and the top of the bars substantially flush with the deck of the floats, friction blocks engaging the bars at points removed from the sockets and maintaining the engaged portions of the bars in the outboard portions of the guideways, said blocks maintaining the bars in raised position against gravity, said bars providing springs anchored at the friction blocks and permitting reciprocal movement of the pins inwardly of the sockets and returning the pins to their outboard position when the barges are equally loaded.

7. The barge of claim 6 wherein truss members extend across the barge sections and the pins and sockets are carried by the trusses.

8. The barge of claim 6 wherein there are two pins and sockets in each vertically arranged group, one adjacent the bottom of the barge and one adjacent the deck of the barge, and the friction block is positioned in the guideway intermediate the two sockets.

9. The barge of claim 6 wherein the reduced portion of the pins is slightly wider than the thickness of the locking means to permit limited endwise movement of the pins relative to the locking bars.

10. A barge comprising, a plurality of float sections and ramp sections, vertically and horizontally spaced mating pins and sockets carried by adjacent sections in substantially vertically arranged groups to releasably lock the sections together, said pins loosely fitting in the sockets and having enlarged heads extending through the sockets, and locking bars mounted for vertical movement in guideways associated with each vertical group, said bars having vertically spaced locking means with downwardly opening slots therein of a size to receive the pins inboard of the heads and smaller than the heads of the pins to lock the pins in the sockets, said bars movable vertically from a position with the locking means elevated to clear the sockets and the top of the bars above the decks of the barges to a position with the locking means locking the pins in the sockets and the top of the bars substantially flush with the deck of the barges, whereby all pins of a vertically arranged set can be engaged by driving a locking bar downwardly from the deck of the barge, and the float and ramp sections are secured together at vertically spaced points to provide a substantially rigid barge.

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