

United States Patent

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[54] SECURING DEVICE FOR A FLOTATION ASSEMBLY

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[51] Int. Cl. F21b 15/02, B63b 21/52

[58] Field of Search 9/8; 248/74, 230

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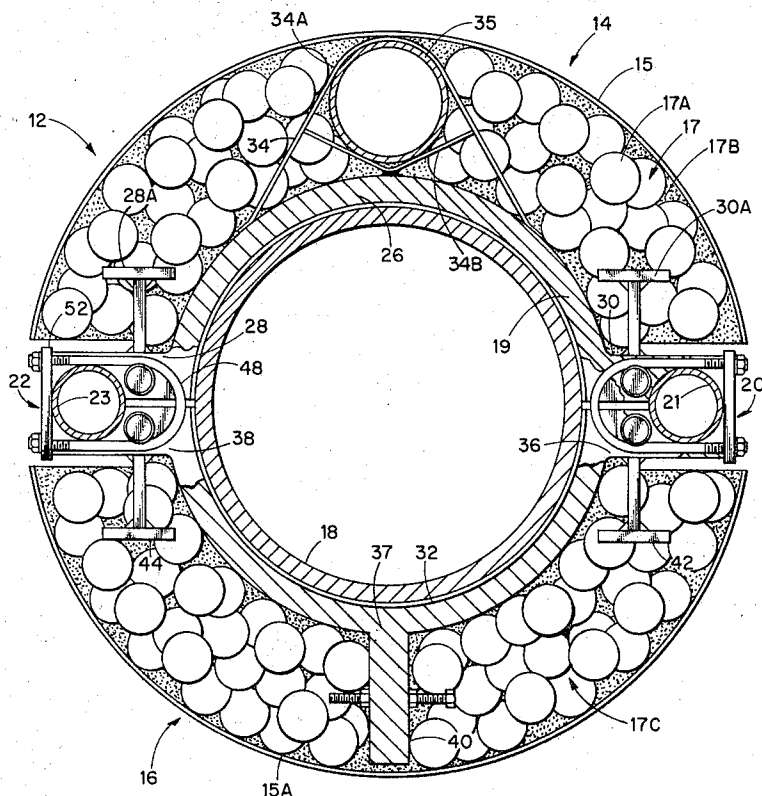
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[57] ABSTRACT

A flotation assembly for a riser pipe generally includes a pair of elongated semiannular flotation collars fabricated in part of a buoyant material and each including a pair of spaced clamps useful in attaching the collars about the riser pipe. These clamps are preferably imbedded within an inner surface of the collar. The present invention is directed to securing devices for retaining the clamps, and in turn the collars, in place tightly against the riser pipe. These securing devices also hold the choke and kill lines, conventionally associated with a riser pipe, in place adjacent the riser pipe.

5 Claims, 4 Drawing Figures



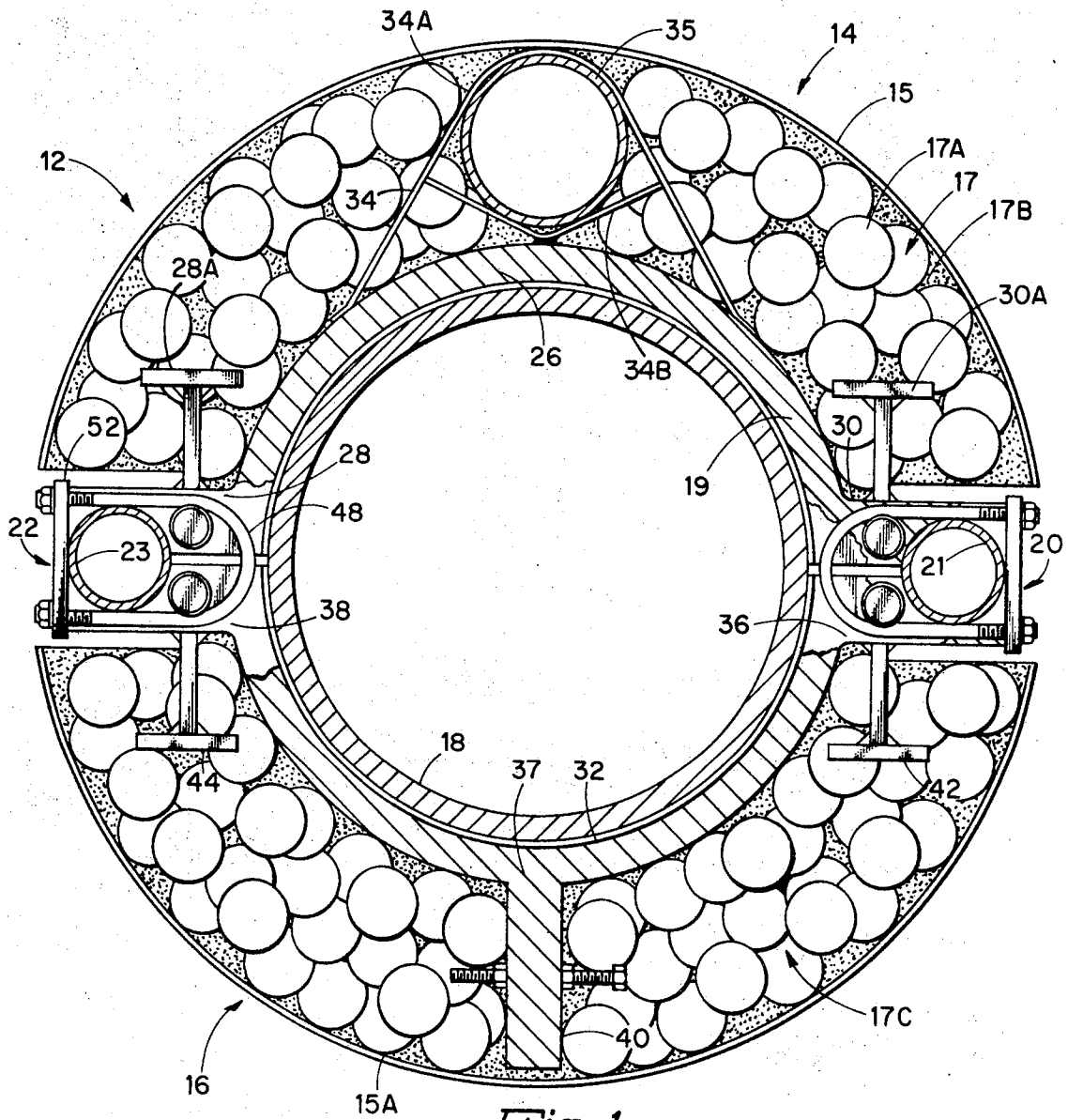


Fig. 1.

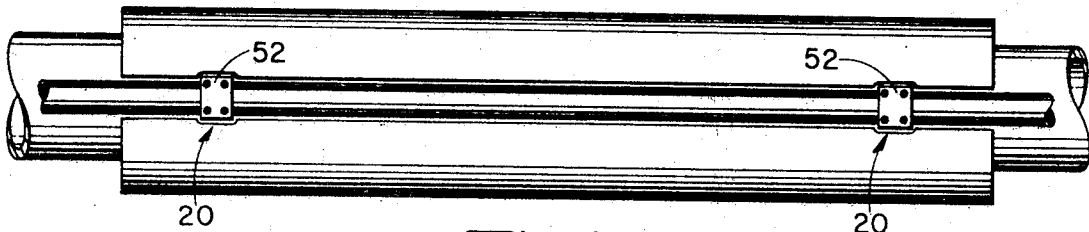


Fig. 4.

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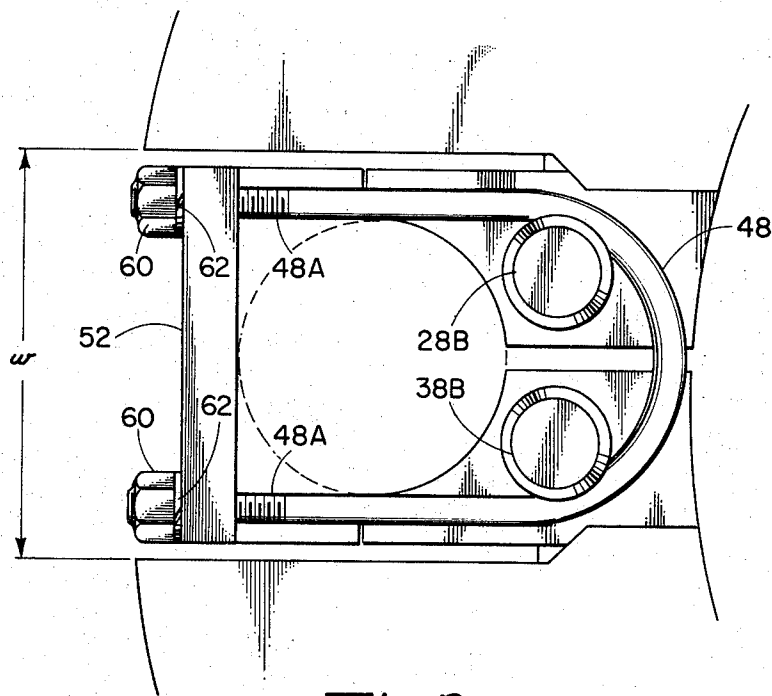


Fig. 2.

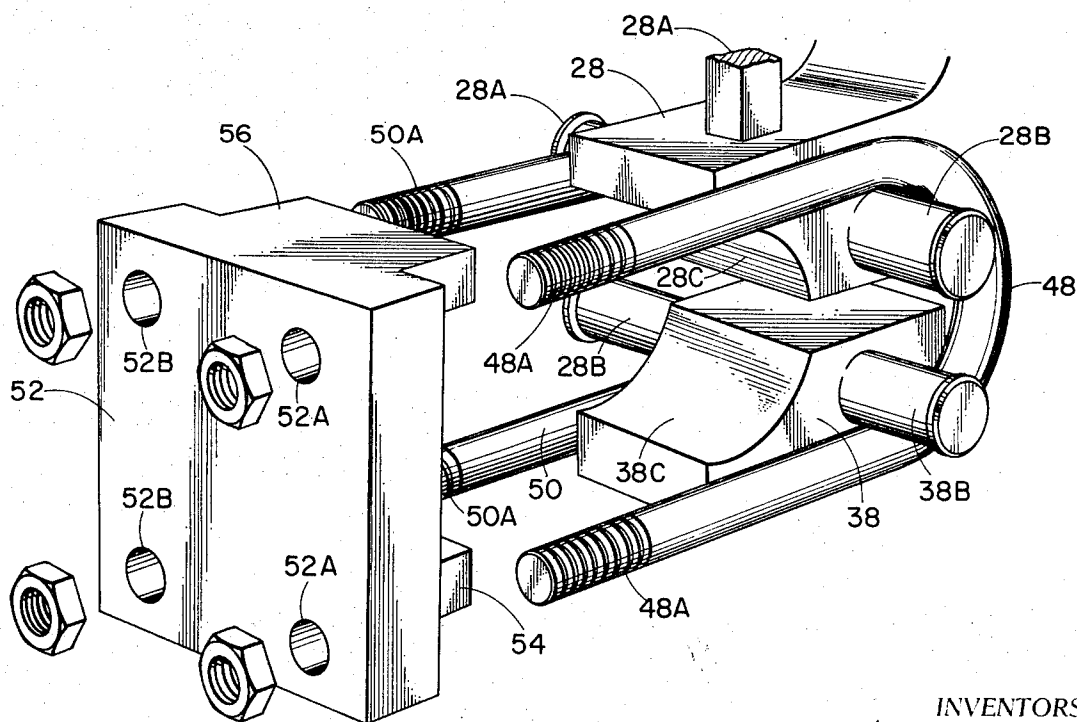


Fig. 3.

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SECURING DEVICE FOR A FLOTATION ASSEMBLY

FIELD OF THE INVENTION

The present invention relates in general to a flotation assembly for use about a riser pipe, or the like. More particularly, the present invention is concerned with securing devices for retaining the flotation assembly in place about the pipe.

BACKGROUND OF THE INVENTION

In the past, various ways have been devised for buoying up heavy objects such as a metal or ceramic pipe. When an oil deposit, for example, is located under a water filled area it is necessary to run a length of pipe from the surface of the water to the ocean bottom. To compensate for the weight of the pipe, a flotation assembly is usually necessary.

These flotation assemblies generally comprise a pair of elongated semiannular flotation collars each of which includes two or more clamp halves imbedded within the inner surface of the collars and useful in attaching the collars to the riser pipe. When the two collars are positioned about the pipe the corresponding clamp halves of each collar are secured together, preferably at both ends of each clamp, to in turn secure the collars to the pipe and prevent them from moving longitudinally thereof.

In one known arrangement, passages are provided in one of the semiannular collars to thereby provide access for a bolt or the like for securing the two clamp halves together against the pipe. As a consequence, the flotation collars are not identical and one must make sure that when assembling the collars at least one of them is provided with the appropriate passages. Also, with this known arrangement it is sometimes difficult and often time consuming to suitably attach the two collars about the pipe. This is due in part to the fact that the entrance to the access passage is not that close to the clamp half.

OBJECTIVES OF THE INVENTION

Accordingly, it is a primary objective of the present invention to provide securing devices for a flotation assembly wherein these devices are readily accessible and easily assembled to secure the assembly about the pipe.

Another objective of the present invention is to provide securing devices in accordance with the preceding object and wherein the flotation collars that comprise the flotation assembly may be identical and need not have passages extending therethrough.

A further objective of the present invention is to provide securing devices in accordance with the primary objective that are adapted to readily accommodate the conventional choke and kill lines associated with a riser pipe.

SUMMARY OF THE INVENTION

A flotation assembly for a riser pipe usually includes a pair of elongated semiannular flotation collars fabricated of a buoyant material and each including a pair of spaced semicircularly-shaped clamps, preferably imbedded in an inner surface of the collar and useful in attaching the collar to a riser pipe, or the like. In accordance with the present invention there are

provided securing devices for fastening the clamp halves, and in turn the collars, tightly against the riser pipe. In one arrangement a pair of securing devices is associated with each pair of mating clamp halves. Each securing device comprises a pair of U-bolts, each having threaded ends, and a keeper means having four holes therein for receiving the ends of the pair of U-bolts. The ends of each clamp half include a pair of posts protruding therefrom in opposite directions and extending in a direction substantially lengthwise of the pipe. Each of the U-bolts are receivable about aligned posts extending in the same direction of associated halves. The keeper means includes a butting extension in facing relationship to adjacent ends of the halves clamp and is adapted to be tightened against the ends thereby drawing the aligned posts toward one another and fastening the clamp to the pipe.

BRIEF DESCRIPTION OF THE DRAWINGS

Numerous other objects and advantages of the invention will now become apparent upon a reading of the following detailed description in conjunction with the drawings in which:

FIG. 1 is a transverse cross sectional view taken through an assembled flotation collar and pipe at the clamp showing the devices for securing the clamp halves together;

FIG. 2 is an enlarged view of one of the securing devices of FIG. 1;

FIG. 3 is an exploded perspective view of the securing device of FIG. 1; and

FIG. 4 is a plan view of the assembled flotation collars and indicating the position of two of the securing devices.

DETAILED DESCRIPTION

Referring now to FIG. 1, there is shown a cross sectional view taken at one of the clamps of a flotation assembly 12. Assembly 12 includes semiannular flotation collars 14 and 16 which are secured about riser pipe 18 by means of securing devices 20 and 22. Securing devices 20 and 22 are also used to retain the conventional choke and kill lines 21 and 23, respectively.

The general method of construction of the collars 14 and 16 is disclosed in copending application Ser. No. 116,031 filed Feb. 17, 1971 of which I am a co-inventor. The flotation collar 14 includes an outer semicircularly shaped shell 15, preferably constructed of fiberglass, an inner low density hardened foam core 17, and an arcuately shaped clamp half 19. Clamp half 19 includes a semicircular center portion 26 and protruding end flanges 28 and 30. Collar 14 is fabricated with clamp half 19 imbedded within the hardened foam core 17, and having its inner surface substantially flush with the inner surface of the core material which rests adjacent pipe 18. A generally A-shaped anchor strap 34 is welded to the outer surface of central portion 26 of clamp half 19. Three weld points are depicted in FIG. 1. The strap 34 includes pieces 34A and 34B which define a sleeve for holding a pipe 35. During the fabrication of collar 14 the pipe 35 is inserted between two such anchor straps 34 (one associated with each clamp and spaced as shown in FIG. 4) prior to the pouring of the hard foam core 17. The pipe 35 may be used for carrying electrical wires or other conduits, and may be

fabricated of fiberglass. For some applications pipe 35 may be eliminated. The anchor strap 34 which is imbedded within core 17 also aids in securing clamp half 19 to the hardened foam core. The flanges 28 and 30 have T-shaped brackets 28A and 30A, respectively, welded thereto and extending vertically, as shown. These brackets also aid in holding clamp half 19 to the foam core 17. Core 17 includes a plurality of circularly shaped balls 17A which are preferably fabricated of plastic, and a typical syntactic foam mixture 17B which surrounds the balls 17A. The balls and foam mixture provide a composite foam core that hardens to a relatively low density. The foam core 17C of collar member 16 is fabricated similarly.

Flotation collar 16 in FIG. 1 is similarly constructed to collar 14 but does not include pipe 35. Flotation collar 16 does include an outer semicircularly shaped shell 15A preferably constructed of fiberglass, an inner low density hardened foam core 17C substantially identical to core 17 of member 14, and an arcuately shaped clamp half 32. Clamp half 32 includes a semicircular center portion 37 and protruding end flanges 36 and 38. Clamp half 32 is imbedded within foam core 17C, and includes a T-shaped bracket 40 extending from center portion 34 and useful in holding the half 32 to the foam core 17C. T-shaped brackets 42 and 44 extending respectively from end flanges 36 and 38, are also used to hold the clamp half to the foam core.

The flotation collar 14, for example, may be fabricated in the following manner. The fiberglass shell 15 is positioned in a cradle in a liquid retaining position, and is provided with end caps as taught in the copending application Serial No. A pipe like pipe 18 is held within recesses in the end caps and has at least two clamp halves fixed thereabout. The pipe 35 is also appropriately positioned in holes in the end caps, for example. The foam material is then introduced into the shell to the proper level. Means are provided in the vicinity of each of the securing devices for providing a sufficient space W between the flotation collars, when assembled, to allow access to the securing devices. The plan view of FIG. 4 indicates the relative position of the securing devices 20 for example, and the widened portion about each device. One way of obtaining this widened portion is to make a channel in the fiberglass shell to accommodate the edge of a pan-shaped container. When the core is poured the container prevents any material from filling the area defined by the container and a configuration as depicted in FIG. 2 results having a width W between collars in the vicinity of each securing device.

Referring now to FIGS. 2 and 3, there is shown an enlarged and a perspective view of one of the securing devices depicted in FIG. 1. The securing device generally includes a pair of U-bolts 48, 50 and a keeper 52. Each of the protruding flanges 28 and 38, for example, of corresponding clamp halves 19 and 34, respectively, have pairs of posts extending horizontally from opposite sides of each flange. In FIG. 3 one pair of posts 28A, 28B are welded to and extend from opposite side surfaces of end flange 28. Similarly, posts 28B and 38B extend from opposite sides of end flange 38. The flanges 28 and 38 also include means defining arcuate surfaces 28C and 38C against which the choke line, for example, may rest when the securing device is fastened

in place. Each of the posts depicted in FIG. 3 includes an outer annular shoulder (see also FIG. 2) that prevents the two U-bolts from slipping off the posts once the U-bolt has been extended thereabout. The U-bolt may be extended about the posts by being slightly separated so as to fit over the posts. Thereafter the ends of the U-bolt may be drawn toward each other to the position shown in FIG. 2, for example.

The threaded ends 48A and 50A of U-bolts 48 and 50, respectively, may be positioned to align with and pass through passages 52A and 52B, respectively, of keeper 52. The keeper 52 includes a lower shoulder 54 and an upper shoulder 56 which are generally rectangular in cross section and extend toward flanges 38 and 28, respectively, when the keeper 52 is slid over the U-bolts 48 and 50. As depicted in FIG. 2, the threaded ends of each U-bolt have a conventional hexagonal nut 60 threaded onto it. A lock washer 62 may be inserted between the nut 60 and the keeper 62. By evenly tightening the two nuts 60 associated with U-bolt 48 and the two nuts 60 associated with U-bolt 50 it is possible to gradually pull the posts associated with flange 28 towards the posts associated with flange 38. In this manner the associated clamp halves 19 and 32 are drawn tightly against pipe 18.

In the embodiment illustrated in FIG. 1 two securing devices 20 and 22 are shown. With such an arrangement the bolts associated with each securing device would be evenly tightened to thereby tighten the clamp halves about the pipe 18. In another embodiment only one securing device is provided at one end of each clamp half, the other corresponding ends of the clamp halves being suitably fastened together in fixed relationship.

Referring now to FIG. 4 there is shown a plan view which illustrates that two such securing devices are used spaced at an appropriate distance along the pipe 18. In this embodiment the flotation collar may be on the order of 18 feet long and the securing devices may be arranged or placed about four feet in from each end of the flotation collar. With the arrangement illustrated in the drawings it is also possible to provide two flotation collars that are substantially identical. For example, two collars 16 may be provided when a pipe 35 is not needed in the assembly. Also, with the arrangement shown in the drawings there is no need for providing passages through either of the collars 14 or 16 in order to provide access to the securing device.

What is claimed is:

1. In a flotation assembly including at least a pair of generally semiannular flotation collars each having arcuate clamp half means associated therewith, a securing device for fastening corresponding clamp half means of separate collars about a pipe comprising:

a pair of U-bolts each having threaded ends,

said clamp half means each including at least a pair of posts protruding therefrom in opposite directions and extending in a direction substantially lengthwise of said pipe,

each of said U-bolts receivable about aligned posts extending in the same direction of corresponding clamp half means,

and a keeper means having four holes therein for receiving the ends of the pair of U-bolts,

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said keeper means including a butting extension in facing relationship to ends of said clamp half means and adapted to be tightened against said ends thereby drawings said aligned posts toward one another and fastening said clamp half means to said pipe.

2. A securing device as set forth in claim 1 wherein each said post has an outer shoulder that prevents the U-bolt from slipping thereoff.

3. A securing device as set forth in claim 1 wherein

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the ends of said clamp half means are at least partially curved to accommodate a second pipe.

4. A securing device as set forth in claim 1 and comprising a plurality of nuts threaded to said threaded ends of said U-bolts to tighten said keeper means against said clamp half means.

5. A securing device as set forth in claim 1 including a pair of butting extensions one tightening against an end of each clamp half means.

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