

Oct. 30, 1962

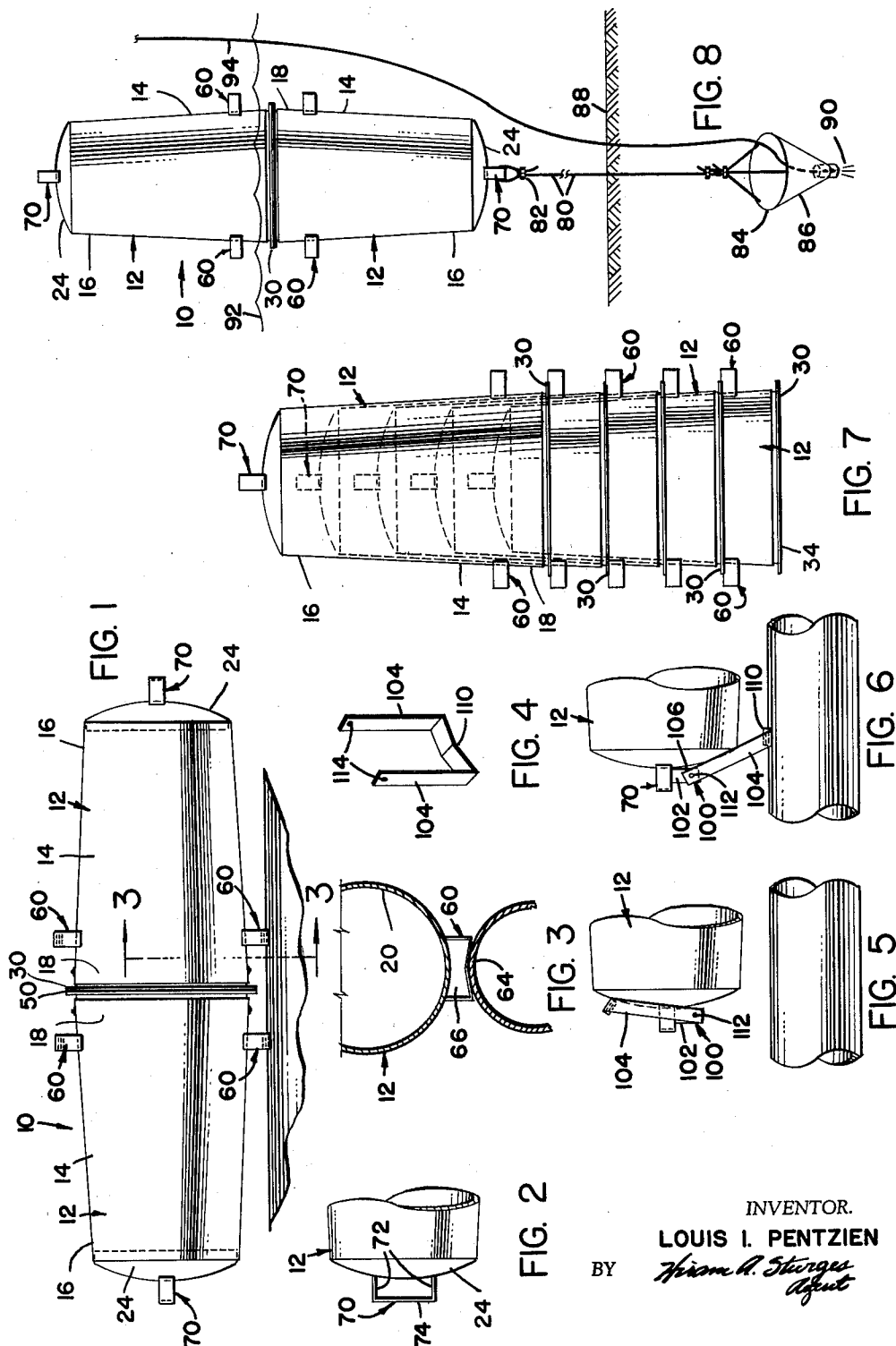
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3,060,463

SEGMENTAL PONTON-BUOY

Filed Feb. 16, 1959

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SEGMENTAL PONTOON-BUOY

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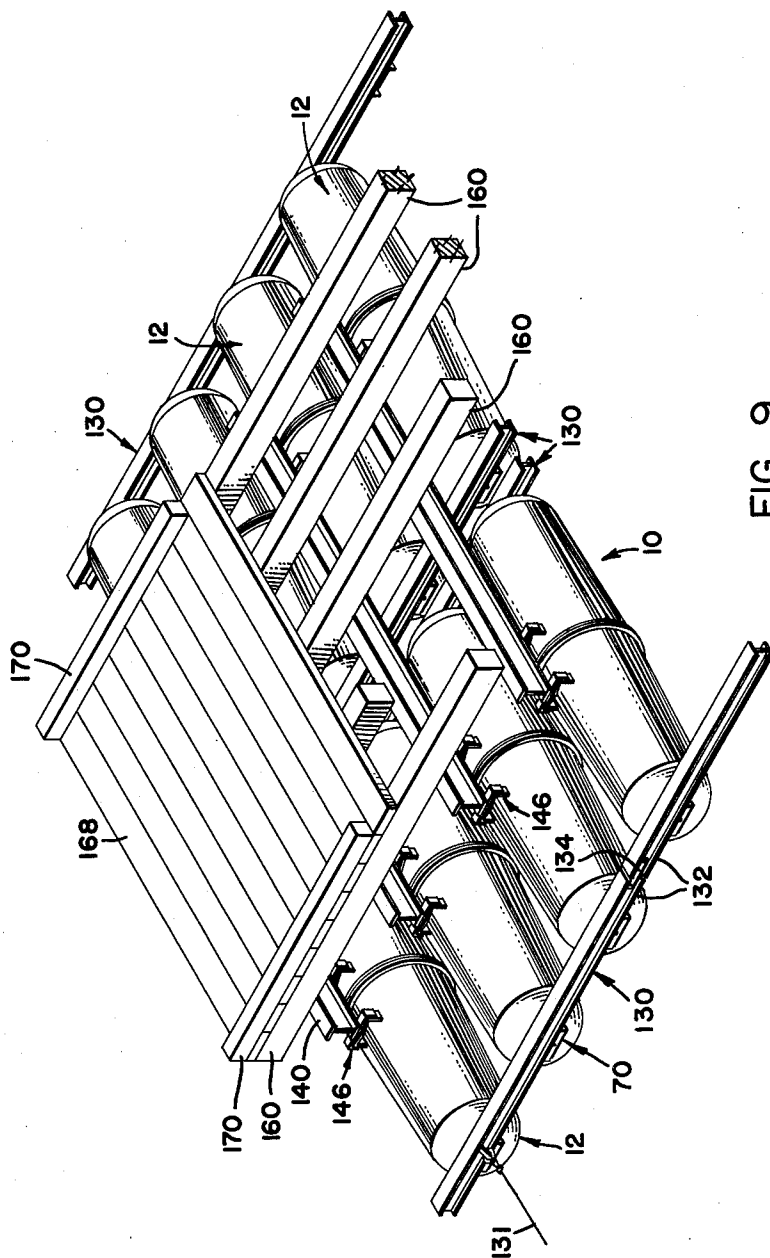


FIG. 9

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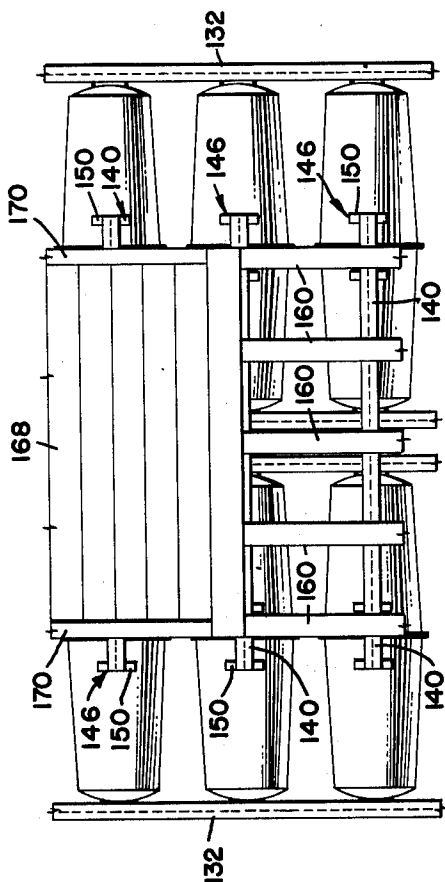
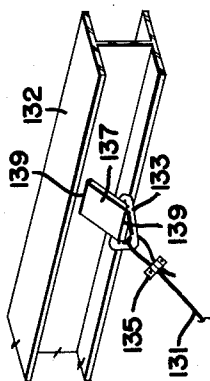
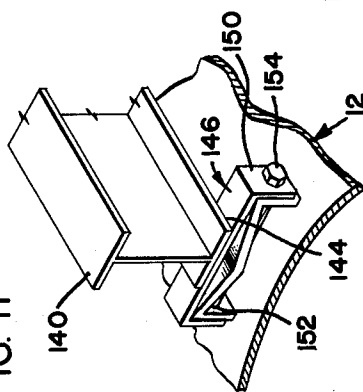
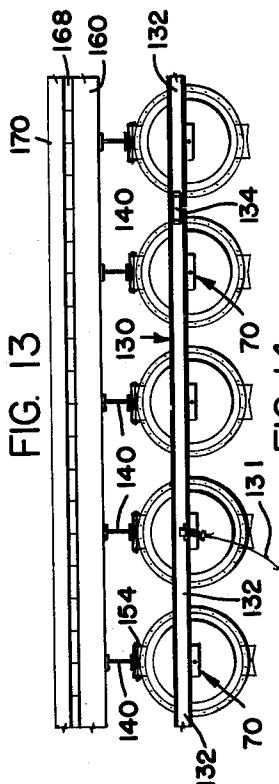
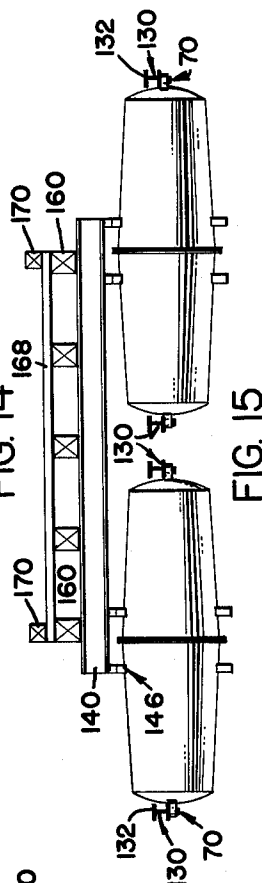
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SEGMENTAL PONTOON-BUOY

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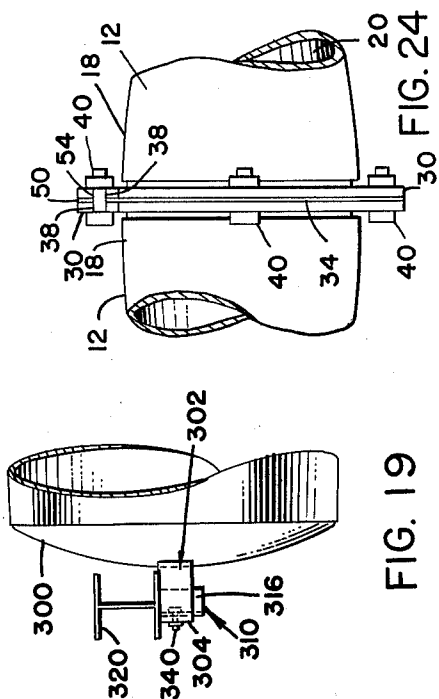


FIG. 17

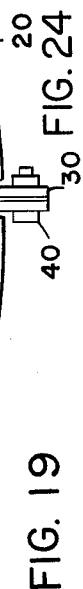


FIG. 19

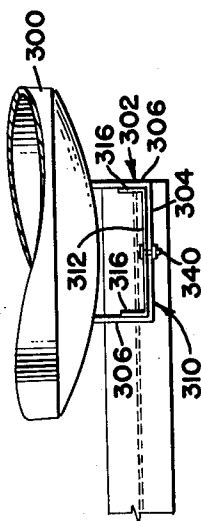


FIG. 18

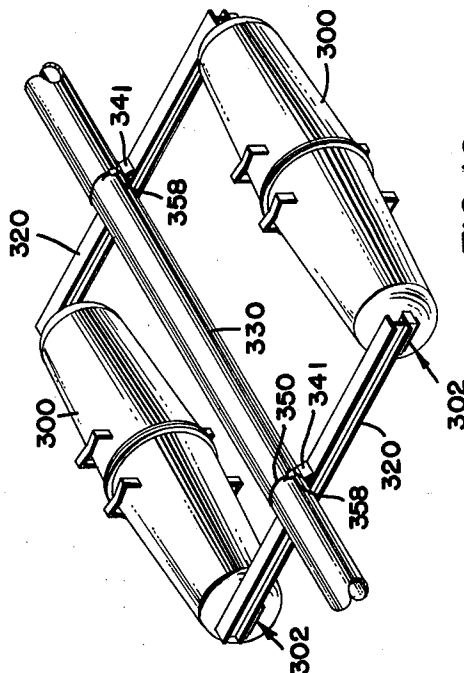


FIG. 16

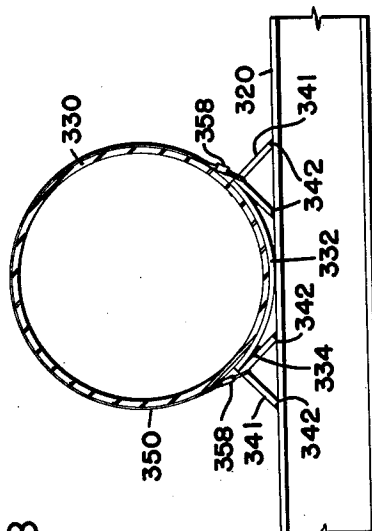


FIG. 20

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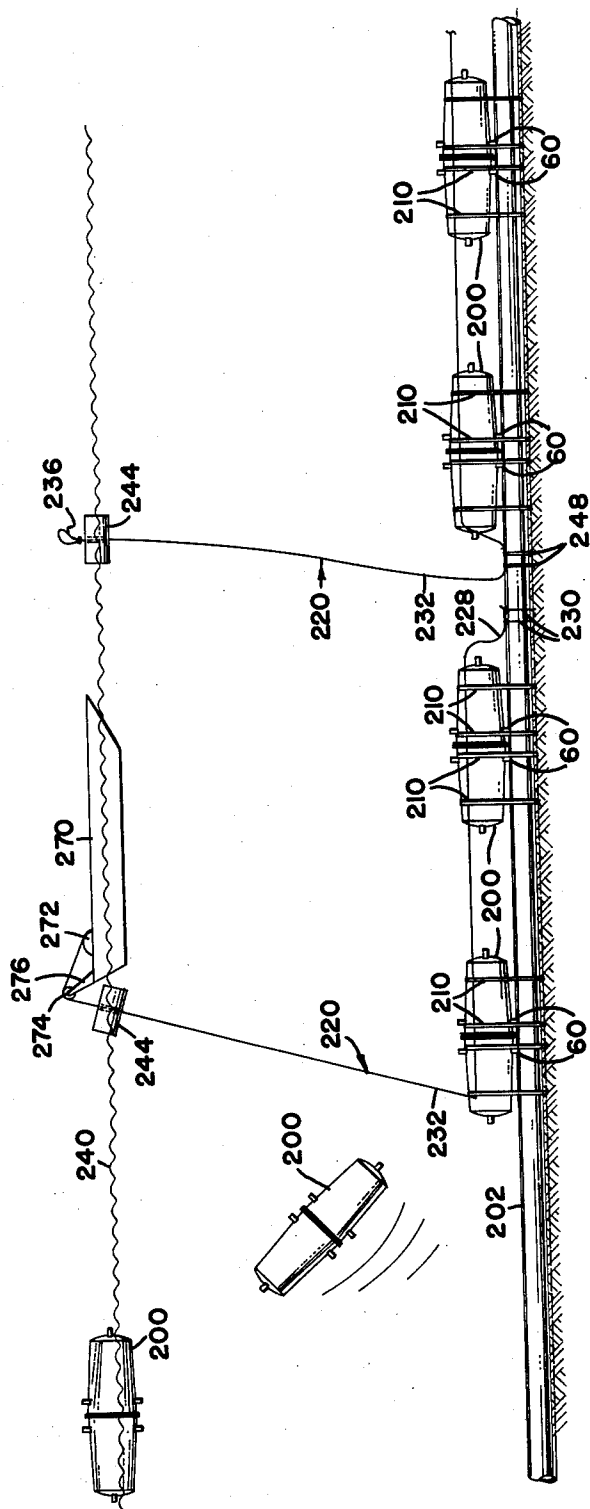


FIG. 21

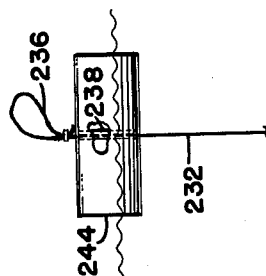


FIG. 23

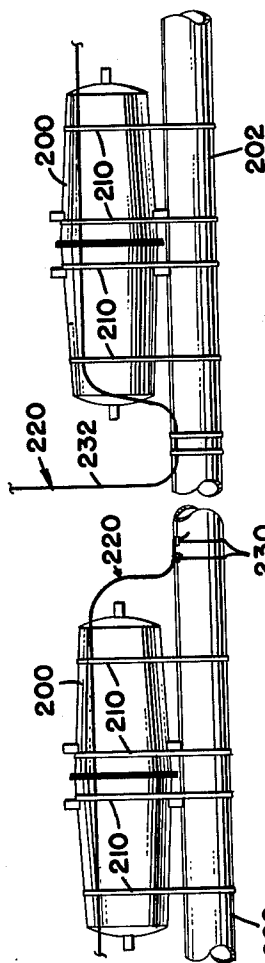


FIG. 22

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SEGMENTAL PONTOON-BUOY

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1 Claim. (Cl. 9-1)

This invention relates to pontoon-buoys, and more particularly it is an object to provide a combination pontoon-buoy which is useful in peace time for attachment to pipe lines to reduce and negative buoyancy so they are more easily dragged across the bottom of a river or other body of water, the combination pontoon-buoy having nestable sections for compact transport for rapid availability to use as a pontoon to support military pontoon bridges in national emergency, and also useful as a buoy.

Heretofore pontoons have been designed for use in supporting pontoon bridges. They have, however, in no special way been adapted for attachment to an underwater pipe line.

It is an object to provide a pontoon-buoy which is provided with concave brackets for receiving a pipe line in the concavity, whereby the new pontoon-buoys are economically useful during peace time.

Heretofore nesting of sectional pontoons has been proposed. It is an object of this invention to provide nesting in combination with rigid attachment of pontoon-buoy sections, the attachment and detachment all being done by persons working entirely from the exterior of the pontoon-buoy, making possible pontoon-buoys of minimum cost and uniformity of buoy sections with respect to each other. This uniformity makes possible ease of manufacture and eliminates classification problems that are a nuisance in an emergency.

It is, therefore, the object that any one section of the pontoon-buoy can be used with any section of any of the other of the pontoon-buoys for versatility.

It is a further objective to make use of the same brackets to which a pipe or bridge work can be attached for the further purpose of preventing excessive nesting of sections whereby sections do not become jammed into each other and whereby a vacuum is not formed between two nested sections as they are being separated to the end that they can be removed from each other with maximum speed.

A particular object is to provide a pontoon-buoy each section of which has at least one of said saddle-like brackets whereby they are, in operation, spaced apart desirable distances for engaging a pipe or bridge work.

A further object is to provide a pontoon-buoy the sections of which can be nested without the necessity of removing any interior parts of either section with the advantage of a maximum of speed of nesting and assembly per strength of attachment.

Another object is to provide a segmental pontoon-buoy which can be manufactured of any suitable materials.

Still another object is to provide a segmental pontoon-buoy which is versatile because of above described brackets and which can be stored without disconnected specialized parts, the only parts removed during storage and shipping being bolts, which even though they should become lost do not pose a problem because they are not specialized and are commonly available.

This application is a continuation-in-part of the applicant's co-pending patent application, Serial No. 780,036, filed December 12, 1958, now abandoned.

In the drawings:

FIGURE 1 is a side elevation of a pontoon-buoy of this invention;

FIGURE 2 is a top plan view of an end section of the pontoon-buoy of FIGURE 1;

FIGURE 3 is a section taken along the line 3-3 of FIG. 1;

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FIGURE 4 is a detail showing a leg of a modification of the invention shown in FIGURE 5;

FIGURE 5 is a side elevation of an end of a modification of the pontoon-buoy of FIGURE 1 in which the leg of FIGURE 4 is shown in a folded position;

FIGURE 6 is a side elevation similar to FIGURE 5 but with the leg in an extended supporting position;

FIGURE 7 is a detail showing a plurality of half sections of the pontoon-buoy of FIGURE 1, shown in a nested and stacked relationship for shipping and storage;

FIGURE 8 is a detail showing the use of the pontoon-buoy of FIGURE 1 as a common buoy with anchoring means attached thereto;

FIGURE 9 is a perspective view showing a group of pontoon-buoys of FIGURE 1 used in a pontoon bridge structure, an end portion of which is shown;

FIGURE 10 is a detail of the interconnection between the frame sections which extend longitudinally of the bridge for connection to the pontoons.

FIGURE 11 is a fragmentary detail view of one of the bridge frame sections showing a cleat to which a mooring cable is secured;

FIGURE 12 is a detail showing how a longitudinal frame member is rested on a bracket, the latter to be attached to a support of a pontoon-buoy;

FIGURES 13, 14 and 15 are top, side and end views of the bridge portion of FIGURE 9;

FIGURE 16 is a perspective view of a pontoon-buoy pipe supporting assembly;

FIGURE 17 is an end view detail of a portion of the pontoon-buoy pipe supporting assembly;

FIGURE 18 is a bottom plan view of the detail of FIGURE 17;

FIGURE 19 is a side view of the detail of FIGURE 17;

FIGURE 20 is a detail of the pipe supporting portions of the pontoon-buoy assembly of FIGURE 16.

FIGURE 21 is a schematic view showing several pontoons releasably secured to a pipe, illustrating a method of placing a pipe line across the bottom of a body of water in accordance with this invention.

FIGURE 22 is an enlarged elevational view of a pair of pontoons showing one method by which the pontoons may be releasably secured to the pipe line; and

FIGURE 23 is a detail view of a float construction for positioning the end of the release cable on the surface of the water for easy pick-up.

FIGURE 24 is a side elevational view showing the large ends of two adjoining sections of a pontoon illustrating the means for connecting the sections to provide a sealed pontoon.

Referring to the drawings, we find that the basic unit of the invention is a pontoon-buoy generally indicated at 10 and comprising two main sections 12, each having an elongated central portion 14 of a shape smaller at one end 16 thereof than at the other end 18 thereof, whereby the central portions 14 can be nested one with its major portion inside the other during shipping and storage of each main section, as best seen in FIGURE 7.

For this purpose it is preferred that the central portions 14 be formed of substantially frusto-conical shape although other shapes can serve this purpose.

The interior of each central portion 14 is preferably hollow and empty to facilitate "nesting" of one main section inside of the other, as best seen in FIGURE 2.

The interior wall 20 of each main section 12 is preferably of frusto-conical shape also so that the two sections can be placed one inside of the other rapidly and with ease as no special interfitting is necessary.

Each main section 12 has an end portion 24 attached to and closing the smaller end 16 of its central portion 14.

It will be seen that each main section 12 and each respective central portion 14 are preferably elongated between the smaller and larger ends 16 and 18 for reasons that will later be apparent.

Each main portion 14 has its larger end 18 terminating preferably in a plane transverse to the longitudinal axis thereof and each main section 12 has a peripheral flange 30 extending transversely outwardly from and attached to the larger end 18 of its central portion 14. Those sides 34 of each flange which face outwardly from the remainder of the respective main section 12 face toward each other in use as the sections 12 are arranged end-to-end in use, as best seen in FIGURE 1, with the outer surfaces 34 of the flanges 30 disposed adjacent each other.

For this reason the outer sides 34 of the flanges 30 are preferably complementarily shaped with respect to each other and for this reason and still more specifically are preferably flat and lie in planes at a right angle to the elongated dimension of the respective main sections 12.

Suitable means are provided for securing the flanges 30 of each section 12 together and this means preferably comprises provision of apertures 38 extending through each flange, with the apertures 38 of each flange being in alignment with the apertures 38 of the other flange, whereby the preferred means for attaching the flanges 30 together comprises bolt and nut assemblies 40 extending through the apertures 38.

Suitable means are provided for sealing the space between the flanges 30 in a water-tight manner. Such means generally comprises compressible sealing means of any suitable type disposed between the flanges 30 on all sides of the pontoon-buoy.

More specifically, an ideal sealing means is a compressible gasket 50 of annular shape formed of compressible material and provided with apertures 54 registering with the apertures 38 in the flanges 30.

As best seen in FIGURES 1 and 3, each main section 12 preferably has two supports or cradles 60 extending outwardly therefrom, one on its upper side and another on its lower side.

Each support 60 extends outwardly at a right angle to the horizontally elongated portion 14 of each main section. The supports 60 each have an outer surface 64 facing upward and downwardly respectively, the outer surfaces 64 being elongated in a horizontal direction, or in another sense elongated in a direction transverse to the respective main section 12. The outer surface 65 is preferably concave as seen axially of the respective main section 12, whereby the supports 60 are adapted to engage a cylindrical pipe of any size in two places for providing stability in mounting the pontoon on a pipe, as later described.

It is preferred that each support 60 be formed of a single piece of material whereby in overall appearance it is approximately U-shaped, as seen in end view, so as to provide an open center 66.

The sides of the U-shaped supports 60 are suitably secured to the main sections 12 in a suitably strong manner such as by welding.

Referring to FIGURES 1 and 2, it will be seen that the ends of the pontoon are provided with handles 70 extending axially from the main sections 12 at approximately the center of the end of each main section 12.

The handles 70 are preferably of U-shape, as seen in top plan of FIGURE 2, and the inner ends thereof are suitably fixed to the pontoon sections 12 such as by welding.

It is preferred that the support member 60 be disposed adjacent to the large, open ends 18 of the main sections 12 although spaced therefrom a substantial distance. The supports 60 are disposed closer to the large ends 18 so as to provide a maximum of nesting of any main section 12 in any other main section 12, as best seen in FIGURE 7.

Referring to FIGURE 7, it will be there seen that the main sections 12 can be sufficiently nested with their axes vertical and with the lowest main section 12 having its flange 30 resting on any suitable surface, not shown, such as a truck or railway car.

Each of the upper main sections 12 then has its flange 30 resting on the upper side of the supports 60 of whichever main section 12 is therebeneath.

The supports 60 are spaced from the closer end of the respective main section sufficiently little so as to provide a sufficiently loose fit during nesting that the main sections can be quickly removed one from another.

It is preferable that the handles 70 each have parallel legs 72 and an end 74 extending at a right angle to the legs 72.

It will be seen that the handle 70 also provides a closed eyelet to which an anchor chain or cable can be attached, as shown in FIGURE 8, in which a cable 80 extends through the handle or eyelet 70 and is then clamped at 82, whereby the cable can then support a suitable anchor 84. The anchor used for illustration is one of a type having a conical main portion 86 which can be buried under the surface 88 of the bottom of the river by a jet of water shooting out its lower end at 90 and delivered at the lower end of the main portion 86 from above water level 92 by means of a hose 94.

When used as a buoy, the handle 70 on the upper end serves to receive attachment of a boat hawser or the like.

Referring to FIGURES 5 and 6, a substitute for the support 60 is there shown and generally indicated at 100.

The support 100 has a pair of first fixed members or portions 102 which are adapted to be attached in any suitable way to the approximate center of the end of a main section 12, such as by attaching the members 102 to a handle 70. The support 100 further has a pair of parallel legs 104 which are pivoted to the member 102, as seen at 106, in a manner whereby the legs 104 can extend downwardly or can be swung upwardly into a storage position, as shown in FIGURE 5.

The length of the legs 104 are preferably such that a member 110 attached to and extending transversely across and between the ends of the legs 104 is disposed with its under surface extending lower than the under surfaces of the portions 64 of the supports 60.

The purpose of the support 100 is the same as the support 60 and its transverse member 110 is concave on its underside also and is adapted to rest on the top of a cylindrical pipe.

The advantage of the support 100 is found when the main section 12 is made of fiberglass or any other material of such a nature that attachment of supports to the middle of the main sections 12 could not be made strong enough.

The dimensions of the legs 104, the members 102, and the position of aligned pivots 106 are such that the legs, when in upper storage position, will be contained within and not overlap the sides of the main sections 12 so as not to interfere with nesting.

For this purpose the distance from the pivots 106 to the axis or vertical center of the pontoon is much less than the distance from the pivots 106 to the outer ends of the legs 104.

Referring to FIGURE 9, a perspective view of a pontoon bridge structure is there shown in which two rows of pontoon-buoys 10 are used.

Each row has a plurality of elongated pontoon-buoys preferably of the type described above, with the pontoon-buoy of a row disposed alongside each other in parallelism.

The buoys are preferably each spaced apart a slight distance and their ends are held together through attachment to a common spacer beam assembly generally indicated at 130.

The latter can be composed of a plurality of spacer beam sections 132 suitably connected together such as

by means of a connector strap 134, as best seen in FIGURE 10. The connector straps 134 have openings 136 therethrough to receive bolts 138 which connect the sections 132 to the strap 134.

It is preferred that the openings 136 be vertically elongated to permit a certain amount of flexibility and that the beam sections 132 be spaced apart slightly for the same reason.

As best seen in FIGURES 14 and 15, the beam sections 132 have flat undersurfaces which are adapted to rest on the upper surfaces of the handles 70, and a suitable connection is made between the handle 70 and the spacer beams 132.

It will be seen that the spacer beam assembly 130 is disposed on each side of each row of pontoons 10 to total four spacer beam assemblies 130 respectively, all parallel with each other.

Referring to FIGURE 14, it will be seen that transverse beams 140 are provided for connecting a pontoon-buoy of one row with the pontoon-buoy of another row, the buoys being in alignment with each other. The transverse beams 140 are welded as at 144 to brackets 145 which are U-shaped with elongated center portions disposed transversely of the beams 140 and with end portions 150 extending downwardly from the outer ends of the center portions 146, and provided with apertures 152 for receiving therethrough suitable bolts 154. The ends 150 are spaced apart sufficiently to overlap vertically disposed portions of the supports 60, and the latter are provided with apertures therethrough for receiving the bolts 154, whereby the bolts 154 attach the brackets 146 to the supports 60 on the upper sides of the pontoon-buoys.

The beams 140 extend lengthwise of the buoys which are aligned end to end, and each transverse beam 140 is thereby spaced apart from the next transverse beam 140 a considerable distance.

A plurality of stringers 160 are provided which extend longitudinally of the bridge and which are spaced apart with respect to each other and which rest on the transverse beams 140. The stringers 160 can be suitably secured to the transverse beams 140 in any suitable manner, not shown.

Above the stringers 160 are transverse bridge flooring members or boards 168, which latter are placed one against the other and are suitably fixed to the stringers 160 by means not shown.

Above the flooring boards 168 are end curbing members 170 which are elongated and extend longitudinally of the bridge down the sides of the flooring portion of the bridge to curb vehicles from wanted travel off the flooring boards 168.

The pontoon bridge, as thus described, may be made up of several sections to span a river or the like.

Mooring cables may be used to position the bridge and means for the attachment of such cables are provided at intervals along the beam sections 132.

With reference to FIGURES 9, 11 and 14, it will be seen that the end of a mooring cable 131 is passed through a D-ring 133 and fastened by a cable clamp 135.

The D-ring 133 is anchored to the beam section 132 by an elongated plate 137 which is inclinedly positioned extending through the D-ring and has its lower end secured to the edge of the lower flange of the beam section and its upper end secured to the vertical web thereof such as by welding 139.

Referring to FIGURES 21 and 22 it will be seen that a new method for placing a pipe line across at least a part of the bottom of a body of water is there shown.

The new method comprises attaching negative buoyancy reducing pontoons 200 to a pipe line 202 by suitable means.

It is preferred that the pontoons 200 be of the type described earlier and as shown in FIGURE 1 whereby the supports 60 engage the upper side of the pipe 202 re-

ceiving the pipe in the concave lower surface of the supports 60.

Alternately the supports 100 of FIGURES 5 and 6 can be used.

The pontoon 200 is preferably attached to the pipe by means of elongated breakable members or straps 210 which are disposed in loops extending under the pipe 202, and over the pontoon 200. A cable or other suitably strong elongated means 220 extends under the straps 210 lengthwise of each pontoon 200.

It is necessary to use at least one cable 220 for each pontoon although one cable can extend under the straps 210 of two or more pontoons as shown in FIGURE 21. When this is done one end 228 of the cable is anchored to the pipe by suitable means 230 and the other end 232 extends upwardly through the body of water 240 through a float 244.

The upper end of the end portion 232 of each cable preferably has a loop 236 formed in its upper end and of a size larger than an opening 238 through the float 244 whereby the cable 232 is free to move upwardly through the float 244 at desired times.

The end portion 232 of the cable is strapped or otherwise secured at 248 to the pipe 202 adjacent the closest end of a pontoon which is beneath the float 244.

In operation the pipe 202 is dragged across at least a part of a body of water until it is in a desired position. Such dragging is made much easier by the negative buoyancy reducing effect of the pontoons.

Thereafter operators in a barge, boat or the like 270 can use a winch 272 on the barge 270 for reeling in the cable 220 across the pulley 274 mounted on a boom 276.

During the reeling in of the cable 220 the cable passes freely through the opening 238 in the float 244.

Such reeling continues until tension is placed on the straps 248 whereupon they snap. Reeling is continued until tension is placed on the straps 210 of the first buoy along the cable 220 from the barge.

These straps 210 consecutively snap until the pontoon floats upwardly as best seen in FIGURE 21 to the surface of a body of water where it can be picked up by other operators for re-use.

Still further reeling snaps the straps 210 of the next pontoon and so forth until all pontoons on a given cable are freed for re-use.

Thereafter any cable that is not above the surface of the body of water can be thrown away as expendable in view of the tremendous savings in cost attained by this system.

Referring to FIGURES 16 to 20 a pontoon pipe supporting assembly is best seen in FIGURE 16.

The pipe supporting assembly 16 comprises two-spaced apart parallel elongated pontoons 300 which are preferably formed in the same manner as the pontoon buoy 12 of FIGURE 1. It will be seen however that the pontoons 300 can differ from the pontoon buoy 10 of FIGURE 1 in many respects.

However it will be seen that the ends of each pontoon 300 are provided for this purpose with handles or attaching devices 302 which are preferably of approximately U-shape with horizontally extending center portions 304, and portions 306 extending parallel to each other and at a right angle to the portion 304.

The end portions 306 are suitably attached to the respective end of the pontoon 300 at a point such that the handle or attaching member 302 spans symmetrically across the center horizontally and vertically of the end of a pontoon 300.

With this description it is well to say that the pontoons 300 are preferably symmetrical about a horizontal axis.

Inside each handle or connecting member 302 an engaging member 310 is arranged, the latter preferably having a U-shape also and with the center portion 312 disposed against the inner side of the center portion 304 and with end portions 316 disposed in parallelism and

at a right angle to the end portion 312 and against the inner sides of the portions 306 of the handle 302.

The lower side of each engaging member 310 is welded or otherwise suitably secured to the bottom of a horizontal beam 320 which latter extends from the handle 302 of one pontoon 300 to the handle 302 of another pontoon 300.

Two beams 320 are used one at each end of a pair of pontoons 300 each preferably secured at its ends to the pontoons in the same manner described.

Bolts 340 extend through the engaging members 310 and the respective handles 302 and removably connect these together.

As best seen in FIGURE 16 a pipe 330 is disposed across the tops of the beams 320. Between the pipe 330 and the beam 320 is an arcuate member 332 serving as a saddle to receive the pipe 330 in its concave upper side. Ends of the arcuate member 332 are supported by being welded as at 334 to one side of a V-shaped member 341 disposed in an inverted position with its ends 342 welded to the top of a beam 320.

A suitable securing means such as a cable 350 can be extended around the upper side of the pipe 330 and around the under side of each V-shaped member 341 in a loop and attached to itself again by any suitable means such as clamps 358. In place of the cable 350 a metal strap, iron or other suitable means could be used.

As thus described it will be seen that the assembly shown in FIGURE 16 is an excellent unit for the floatation of a section of the pipe 330 with all parts secured together.

The amount of flat surfaces in engagement with each other between the beams 320, the handles 306 and the connecting pieces 310 assure a desired rigidity.

As many double pontoon assemblies as are necessary would be used to support a long lengthy pipe line across a large body of water.

I claim:

An elongated pontoon adapted to be used in a horizontal position, said pontoon having support means at its respective ends, said support means each comprising: a pair of elongated horizontally spaced legs adapted to normally extend downwardly with upper ends near respective points disposed between the vertical center of a respective end of said pontoon and the lower surface

of said pontoon and with lower ends extending downwardly beyond the lower side of said pontoon, a transversely extending member positioned between and attached to the lower ends of said legs, said transversely extending member having a concave lower surface for receiving therein a cylindrical pipe, fixed portions each extending upwardly from a respective one of said points a distance shorter than the lengths of said legs, and means attaching the upper ends of said fixed portions to the respective end of said pontoon respectively, said points lying on a horizontal pivot axis, means at said points for pivotally connecting said legs to said fixed portions for rotation of said legs about said fixed portions, said points being disposed sufficiently far beneath the center of the ends of said pontoon respectively that when said legs are in a folded storage position with their normally lower ends disposed upwardly, the normally lower ends of said legs are not disposed beyond the upper surface of said pontoon whereby nesting of said sections is not substantially interfered with, said pontoon including two main sections each being elongated and of a larger size at one end than the other and each being closed at its smaller end and open at its larger end and each being substantially hollow whereby they can be nested one inside the other when not in use, and means for attaching the open ends of said sections together to form a floatable pontoon.

References Cited in the file of this patent

UNITED STATES PATENTS

649,258	Peacock	May 8, 1900
745,192	Kampmann	Nov. 24, 1903
1,640,980	Caroni	Aug. 30, 1927
1,821,320	Plummer	Sept. 1, 1931
2,394,764	Graulich	Feb. 12, 1946
2,397,844	Dewhurst	Apr. 2, 1946
2,666,934	Leifheit	Jan. 26, 1954
2,731,800	Collins	Jan. 24, 1956
2,759,201	McKinney	Aug. 21, 1956
2,770,950	Collins	Nov. 20, 1956
2,859,458	Calarco	Nov. 11, 1958

FOREIGN PATENTS

7,157	Great Britain	May 12, 1915
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