April 5, 1932. C. F. SHAFFER 1,852,338

BRIDGE CONSTRUCTION

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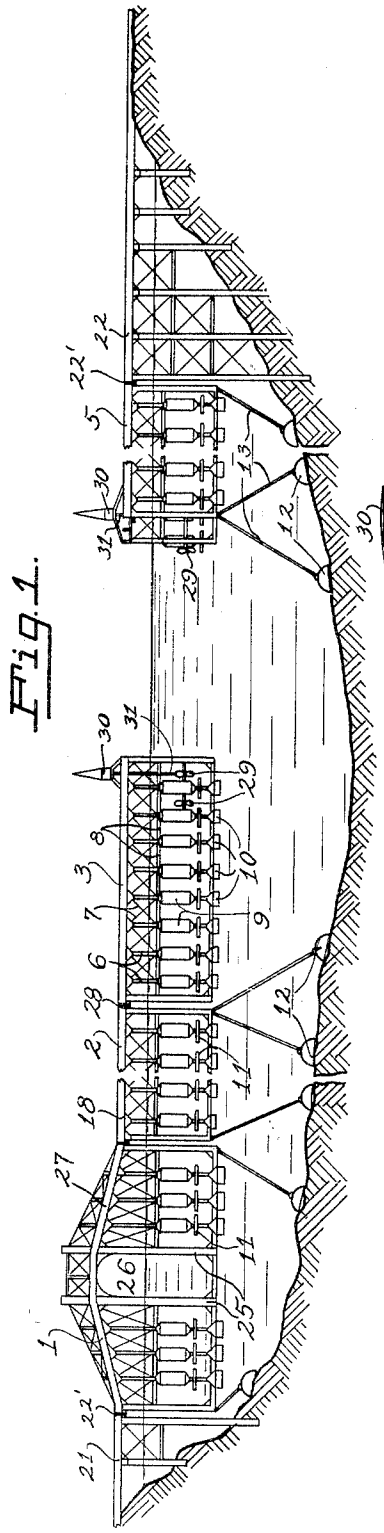

Fig. 1.

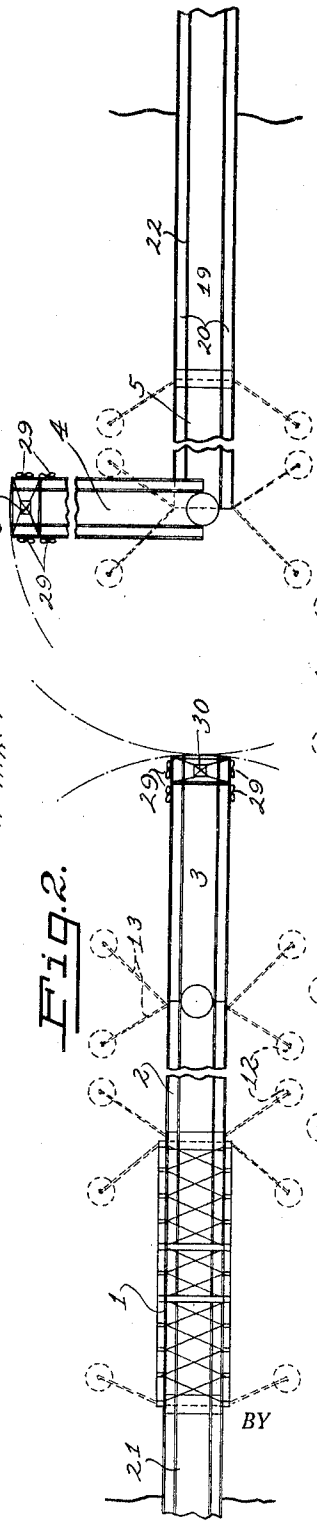

Fig. 2.

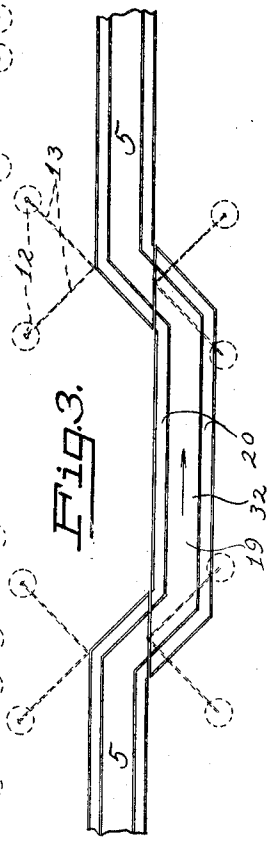

Fig. 3.

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Fig. 4.

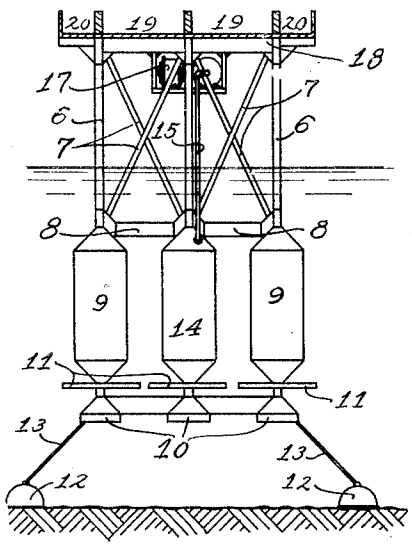


Fig. 5.

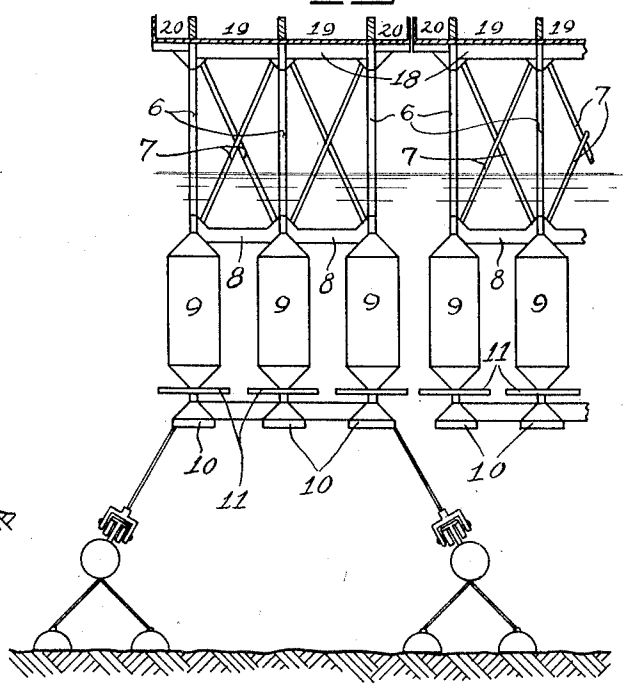


Fig. 6.

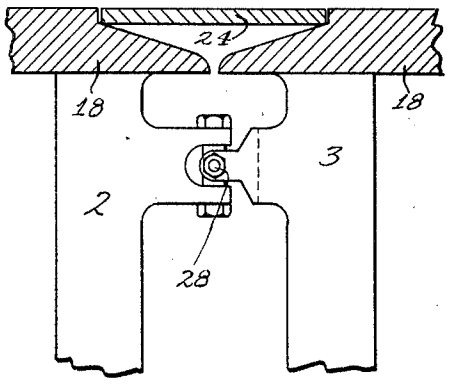
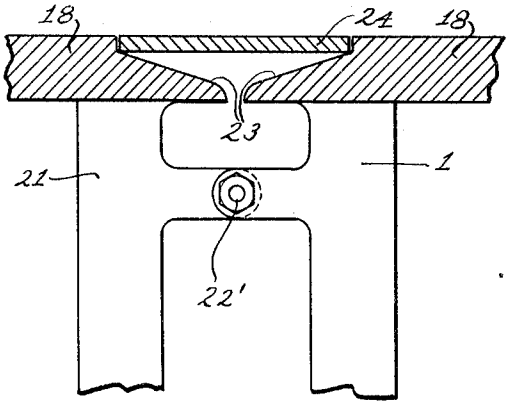


Fig. 7.



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UNITED STATES PATENT OFFICE

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BRIDGE CONSTRUCTION

Application filed September 17, 1927. Serial No. 220,094.

This invention relates to bridges and more particularly to a pontoon type of bridge.

Among its objects, the invention is to provide a pontoon type of bridge, particularly adapted for use in bodies of tide water which may or may not become rough at times; one of the sectional or unit type wherein one or more units provide draw facilities to admit the passage through the bridge of the larger vessels, and wherein one or more units provide passages for ships of relatively smaller sizes.

The invention has also among its objects to provide a pontoon bridge structure which remains relatively steady in rough water and which is capable of supporting great loads, and the units of which are adapted for being maintained relatively level and in the same horizontal plane, irrespective of the rise or fall of the tide.

A further object is to provide a pontoon bridge of the multiple unit type, which is adaptable for construction in any length, by the use of one or more of the desired individual unit structures and their interconnection in end to end relation, affording pivotal movement between the same.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and pointed out in the claim hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claim may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings disclosing one embodiment of my invention—

Fig. 1 is a view in side elevation, illustrating one of the draw members swung to open position.

Fig. 2 is a view in top plan of the structure illustrated in Fig. 1, showing more clearly the unit sections and the road and pedestrian ways.

Fig. 3 is a view in top plan illustrating a longitudinally slidable unit draw section.

Fig. 4 is a view in end elevation of one of the units, particularly illustrating the buoyancy pontoons, the center balancing pontoon, and the means to dampen the wave action on the unit.

Fig. 5 is a view in irregular section, through the structure, illustrated in Fig. 3.

Fig. 6 is a view in detail section of the preferred connection between one of the draw units and its pier forming unit.

Fig. 7 is a view in detail section of the preferred connection between other unit sections.

In the drawings, wherein like characters of reference designate corresponding parts, the numerals 1, 2, 3, 4 and 5, indicate respectively, the arch, flat, swinging draw, swinging draw and flat portion units employed in the construction of the bridge illustrated, it being understood that the relative number and position of these units may vary, dependent on the width of the water way to be bridged, the location of the channel and other conditions.

Each pontoon unit consists of a plurality of column members 6, united by cross braces 7 and frame members 8. The lever portion of each column is surrounded by a pontoon cylinder 9, preferably of elongated construction. At its lower end each column preferably mounts a steadying weight 10 and between the bottom of the cylinder and the weight each column mounts a disk 11 of relatively large diameter. The weights 10 serve to submerge the pontoon cylinders preferably below the surface of the water body, and the disks 11, disposed at right angles to the column 6, counteract the action of the submerged wave currents, to maintain the unit structure relatively steady under a condition of rough water and render the same non-responsive to wave action.

When in use and in position, the respective units are held in position by any suitable type and number of anchors 12 resting preferably on or submerged in the water way bottom, the anchors being connected with the units through guy cables 13. One or more cylinders 14 of each unit may serve as counter-balancing or depth stabilizing cylinders for the unit and each is provided

with a ballast pump connection 15, motor controlled at 17, whereby water may be delivered into or discharged from the cylinders to maintain the unit a uniform distance from the water way bed, regardless of the rise or fall of the tide.

Preferably at their upper ends, the columns 6 carry the tramway surface 18, illustrated in the present embodiment as consisting of the parallel center disposed vehicular portions 19 and the pedestrian lanes 20.

In Figs. 1 and 2, fixed approaches 21 and 22 are provided at opposite sides of the water way, the same jutting from the bank any desired distance.

As viewed from the left, Fig. 1 of the drawings, one end of the arch unit section 1 is pivotally connected to the outer end of the approach 21 by one or more horizontally aligned pivot connections 22′, Fig. 7, with adjacent edges of the tramway surface 18 thereof cut away as at 23, for reception of a filler plate 24 extending preferably the full width of the surface 18, thus allowing for a hinge movement of the section 1 relative to its approach 21. The arch unit section 1 is provided between the columns 25 with a passage 26 through which may pass relatively small ships of shallow draft, and the tramway surface 18 of this unit is arched as at 27 to clear its passage 26.

Adjoining the arch unit section 1 and connected at one end therewith by the pivotal connections 22′, Fig. 7, and with a filler plate 24 disposed between the adjacent ends of the tramway surface is a relatively flat unit section 2, the same affording an abutment or pier section to which is connected through one or more universal joint connections 28, Fig. 6, one end of a swinging draw section 3. Opposing the swinging draw section 3 is a complemental swinging draw unit 4 connected at one end, in a like manner, as is section 3, with one end of a flat pier forming section 5, which is in turn connected with the approach 22. The horizontal universal joint fulcrum connection between the swinging draw sections and the relatively flat pier forming sections 2 and 5, afford a means whereby said swinging draw sections may be swung to afford a passage therebetween through which ships of a size and draft greater than that capable of passing through the passage 26 may pass beyond the bridge.

Any suitable means may be provided for swinging the draw sections 3 and 4 into and from open and closed position, the form illustrated consisting of submerged propellers 29 positioned in pairs at the free end of each draw section and simultaneously operated from any well known power source 30, connected with the propellers through power transmitting means 31.

The swinging draw section 4 is connected to the end of the relatively flat pier forming section 5 by the universal joint connection 28, Fig. 6, and the relatively flat section 5 anchored by the members 12 and guy cables 13 is at its end connected with the approach 22, through the horizontal pivotal connection 22′—Fig. 7.

It will be observed that this present pontoon bridge construction is capable of being maintained level or in a fixed plane, regardless of the rise or fall of the tide, by the filling or emptying of the counterbalancing or depth stabilizing cylinders 14, also that the units are not subject to the wave action, due to the positioning of the disks 11 near the bottom or lower edge of each unit and submerged to a considerable depth below the water way surface.

While the propeller means has been illustrated and described as functioning to swing the draw sections, to and from open and closed position, it is to be understood that other suitable means, such as gear and pinion mechanism or cable mechanism may be employed.

In Fig. 3 is illustrated a modified form of draw unit which is adapted, when it is desired to open the same, to slide it longitudinally of its pier section 5, the means for accomplishing this operation being any of the well known types of mechanical structures, and it is not thought to be necessary to illustrate the same in detail in this present application.

In the structure illustrated in Fig. 3, the draw section 32 and the pier sections 5 are provided with angular offset portions, so that the tramway surfaces 18 thereof may interconnect when the draw is in closed position.

It is to be understood that any suitable form of releasable lock mechanism may be employed to interlock the two draw sections together when the same are moved to aligned or draw closing position, and it will also be apparent that the propeller units 29 may be duplicated in the other pontoon sections for operation to act against a switch current and tend to maintain the units in alignment under extraordinary conditions.

I claim:—

A floating bridge structure comprising a plurality of independent units arranged in end to end relation and each consisting of a plurality of vertically disposed pontoon structures, a counterbalancing weight at the lower end of each pontoon, a disk between each weight and the pontoon and disposed at right angles to the axis of the pontoon, a frame structure extending upwardly from the upper ends of the pontoons, means mounted on the frame whereby ballast material may be pumped selectively in and out of said pontoons, a tramway carried by the upper end of the frame structure, means for connecting the adjacent ends of said units for relative pivoting movement on a horizontal axis, one of said units mounted for pivotal movement in a ver-

tical axis relative to the other units to afford a draw in said bridge structure, and means for anchoring the other units and means to propel the draw unit on its pivotal mounting.

In testimony whereof I have signed my name to this specification.

CLEVE F. SHAFFER.