May 14, 1940. N. F. HELMERS 2,200,550

WHARF

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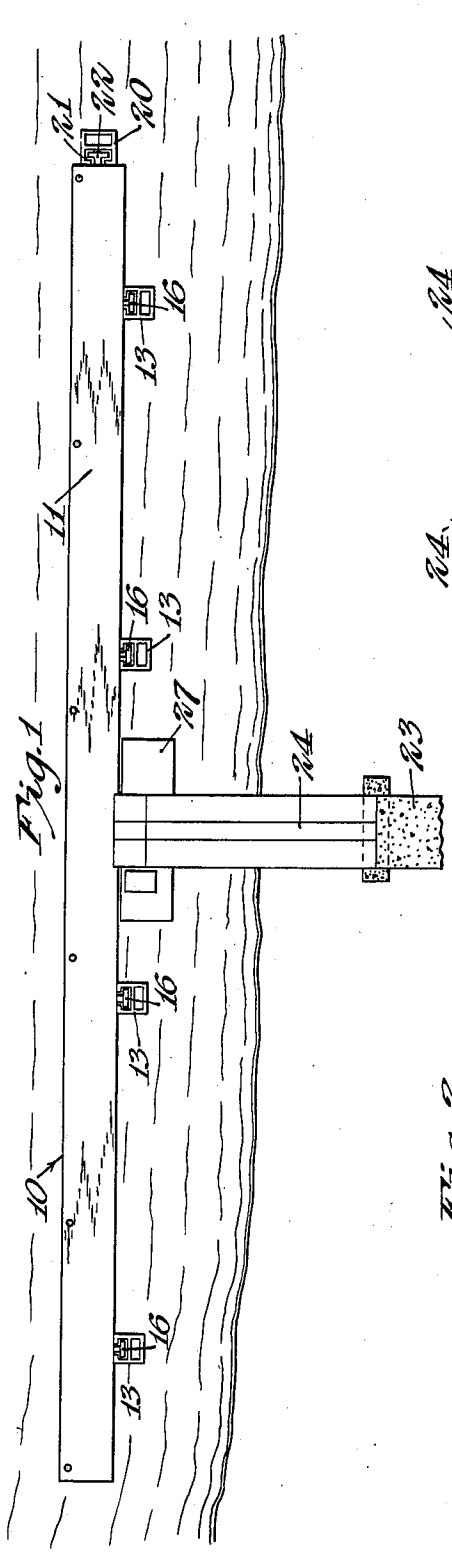


Fig. 1

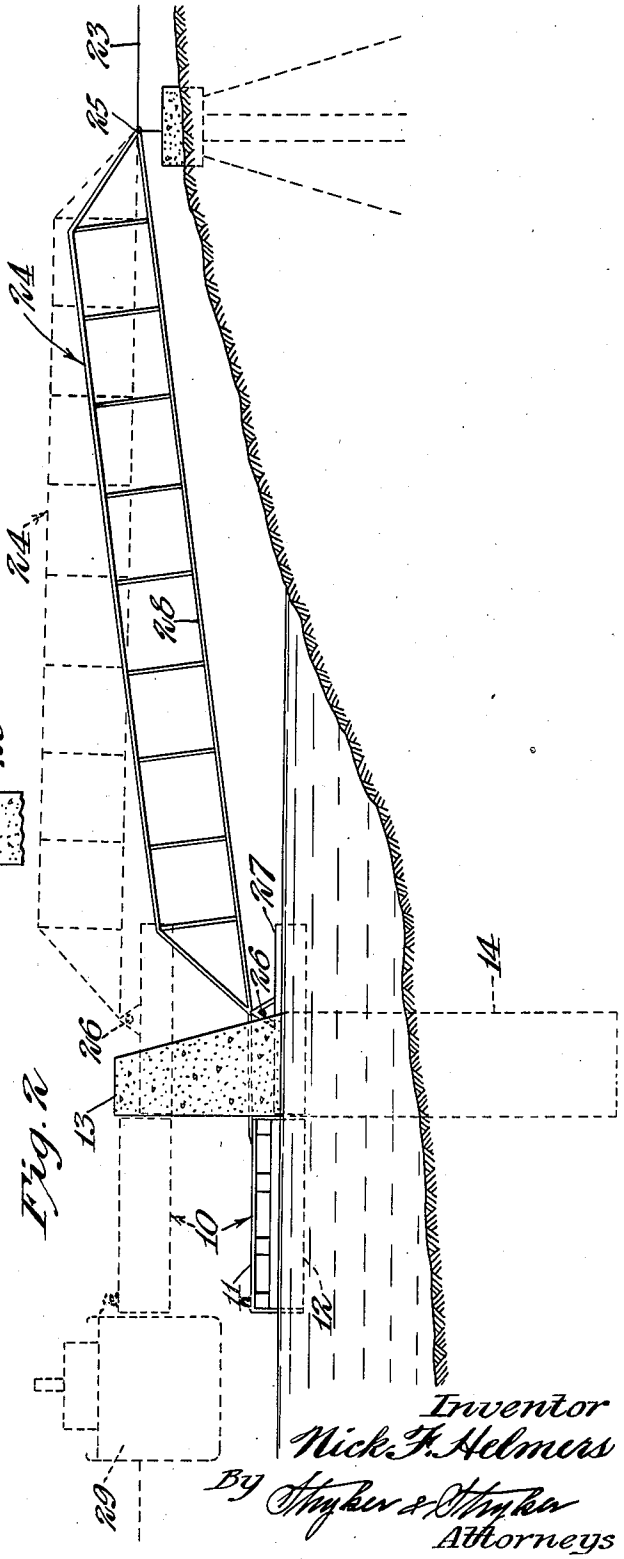


Fig. 2

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Fig. 3

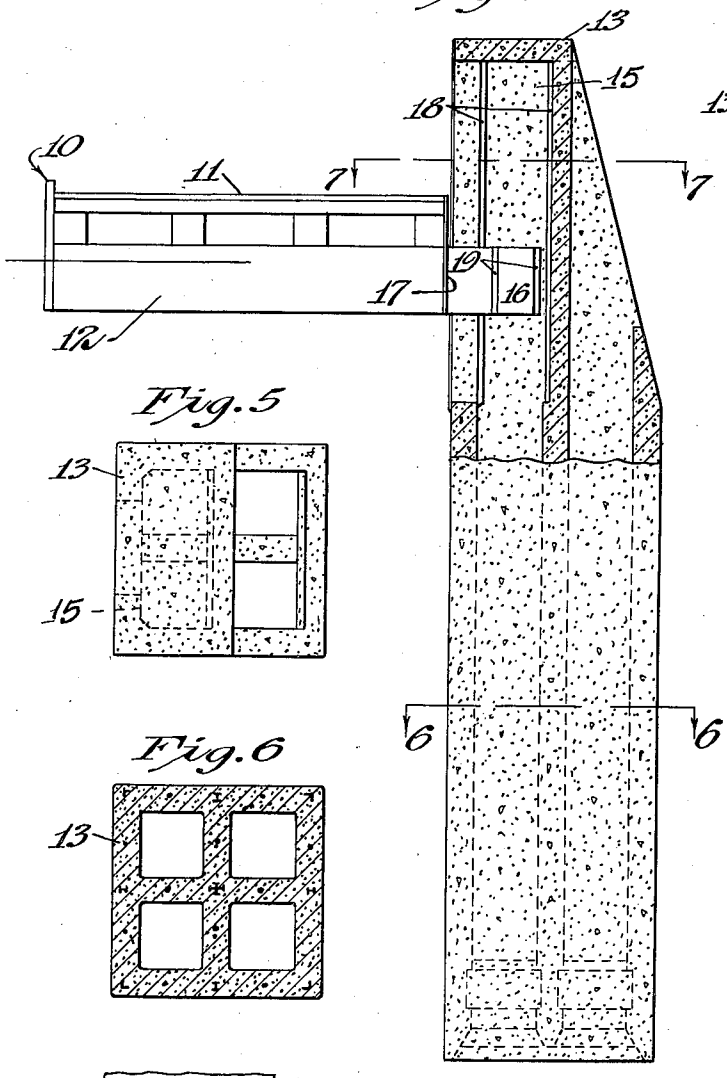


Fig. 4

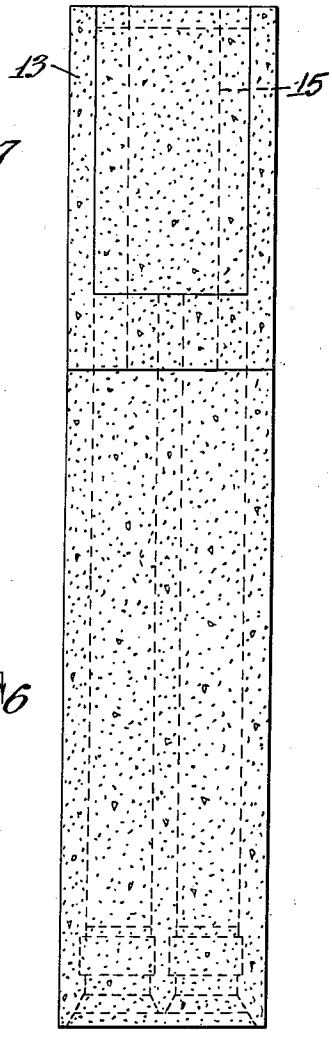
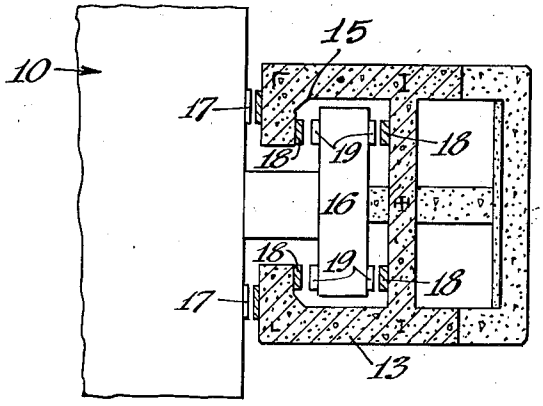


Fig. 5

Fig. 6

Fig. 7



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UNITED STATES PATENT OFFICE

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WHARF

Nick Frederic Helmers, New York, N. Y.

Application December 21, 1938, Serial No. 247,027

2 Claims. (Cl. 61—48)

My invention relates to improvements in wharves and particularly to wharves provided with a floating dock or landing stage. It is particularly adapted for use in rivers and harbors in which the tide or floods cause great variations in water level.

My object is to provide a stable dock substantially rigid horizontally but susceptible of free movement vertically.

A further object is to furnish to ships of heavy draft a dock securely fixed with reference to the shore but conforming in elevation to varying water levels.

Referring to the accompanying drawings:

Figures 1 and 2 are diagrammatic plan and end views respectively showing my improved wharf and a suitable bridge connecting it to the shore, Fig. 2 illustrating the structure on a larger scale than Fig. 1;

Fig. 3 is an end view showing one of the piers and the floating dock portion of the wharf on a still larger scale, and with the upper portion of a pier in vertical section;

Fig. 4 is an elevation of one of the piers as viewed from the land or rear side;

Fig. 5 is a plan view of one of the piers, and

Figs. 6 and 7 are horizontal sections taken respectively on the lines 6—6 and 7—7 of Fig. 3.

I provide a floating dock portion indicated generally by the numeral 10. This is preferably a long and relatively narrow barge-like structure having a suitable deck 11 and hull 12. As the wharf is designed to accommodate large ships or vessels the dock portion 10 has one free or unobstructed longitudinal side, several hundred feet in length and is provided with means for mooring vessels to it. At suitable intervals along the side of the dock 10, on the shore side, are piers 13. These piers have their lower portions 14 founded in the subaqueous soil and preferably have footings on bed rock to afford strong and rigid lateral abutments for the dock 10. The piers are preferably though not necessarily constructed from reinforced concrete and have the cellular structure commonly employed in large piers. Each of the piers 13 projects sufficiently above the high water level to afford a continuous vertical guide and abutment for the dock 10 throughout the entire range of vertical movement caused by the rise and fall of the water level. Extending vertically in the face of the pier adjoining the dock is a keyway 15 for guiding an interlocking head 16 which projects from the dock 10 and is rigidly secured thereto. Heavy abutment plates 17 are fixed on the hull 12 to slidably engage wear plates on the pier. Clearance is allowed between the head 16 and keyway 15 to permit such tilting of the dock as may be caused by wave action and uneven loading, as binding between the head and way, must be guarded against. Heavy bronze strips 18 extend vertically in the keyway 15 to make sliding contact with shoes 19 or similar material secured to the head 16. In this manner the head 16 is made freely movable vertically in the keyway 15 so that the dock is retained against movement away from the pier. A head 16 and keyway 15, with the guiding and wear plates are preferably duplicated at each of the piers 13 but it will be evident that under some conditions a pair of such keys and keyways may afford sufficient connection between the dock and pier abutments along one side.

At an end of the dock, preferably at the upstream or shore end thereof, I provide a pier 20 of construction similar to that of the piers 13 but of greater weight and horizontal extent, as indicated in Fig. 1. The pier 20 has a keyway 21, similar to the keyways 15, and a head 22, like the head 16, slidable vertically in the way and rigidly connected to an end of the dock hull 12. The pier 20, like the piers 13, allows for the rise and fall of the dock with the rise and fall of the body of water and also affords a strong longitudinal abutment for the floating dock to resist the impact of ships docking below the pier 20.

A roadway or apron 23 on the shore adjacent to the wharf may be connected to the floating dock 10 by a bridge indicated generally by the numeral 24. At one end this bridge has a pivotal connection 25 with the apron 23 and a sliding or roller bracket 26 at its opposite end is movable with the dock. This bracket 26 may be supported directly on the dock or on an adjoining float 27 projecting shoreward between piers 13. The bridge has a roadway 28 and a suitable truss structure supporting it as its span may be several hundred feet long. As indicated in Fig. 2, one or more large vessels 29 may be moored along the outer or free edge of the floating dock 12 which is free to rise and fall with the wharfed vessels between the limits of low water indicated in full lines and high water indicated in dotted lines.

It will be noted that my invention provides open and unobstructed wharfage for vessels of heavy tonnage and that the massive end pier 20, equipped as described, not only resists constant stresses due to current or tide and the intermittent impact of docking ships, but also

modifies the tendency of the dock to tilt or rock as a result of movements of the water on which it floats.

By the coaction between the side piers **13** and the end pier **20**, all forces directed longitudinally of the dock are resisted by the heavy end pier **20** while the forces directed crossways of the dock are resisted by the side piers **13**. This is an important feature of the invention because the force applied to each pier is directed perpendicularly to the sliding contact surfaces and there is no obliquely directed, horizontal resultant force which would have a tendency to cause the heads to jam in the guideways. By my arrangement of side and end piers I am also enabled to space the piers along the side of the dock at considerable distances apart and at the same time allow ample clearance between the end surfaces of the key heads and guideways to compensate for the expansion and contraction of the steel dock without danger of binding.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A wharf comprising a floating dock, a plurality of piers abutting against one side and end of said dock, vertical guides on said piers, means secured to said dock and slidably engaging said guides to hold said dock in contact with the piers, while permitting movement of said dock vertically.

2. A wharf comprising a long, relatively narrow floating dock, having one side unobstructed for the docking of vessels, a plurality of piers abutting against the other side and one end of said dock, vertical guides for said dock on said piers and means secured to said dock and slidably engaging said guides respectively to confine said dock against movement away from the piers, while permitting a wide range of movement of said dock vertically, the guides on the side abutment piers being disposed at right angles to the guides on the end abutment pier so that all forces directed longitudinally of the dock are resisted by the end pier and forces directed crosswise of the dock are resisted by the side piers.

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