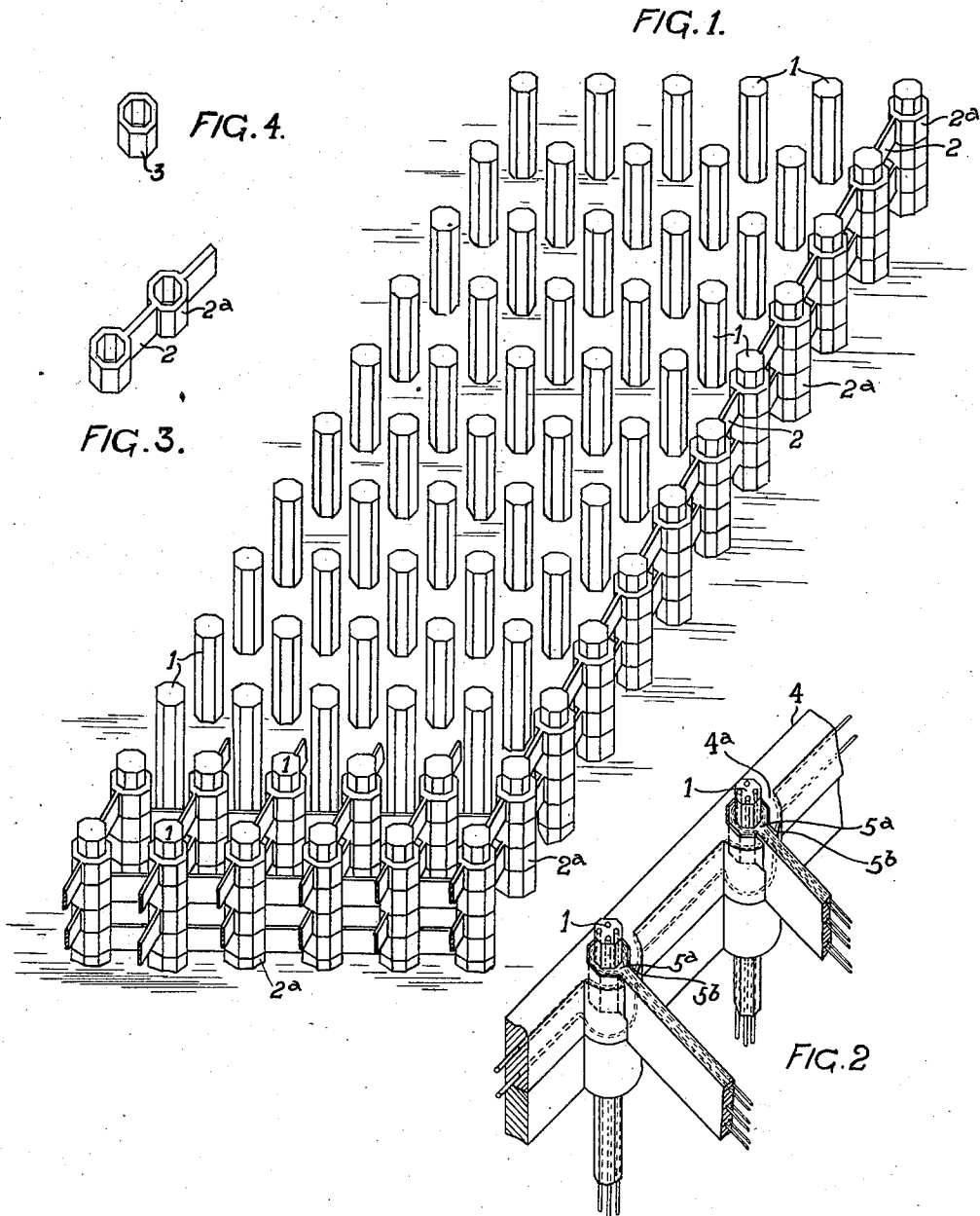


C. F. FRANCISCO.  
SEA WALL OR WHARF CONSTRUCTION.  
APPLICATION FILED SEPT. 19, 1910.

996,843.

Patented July 4, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

FIG. 5.

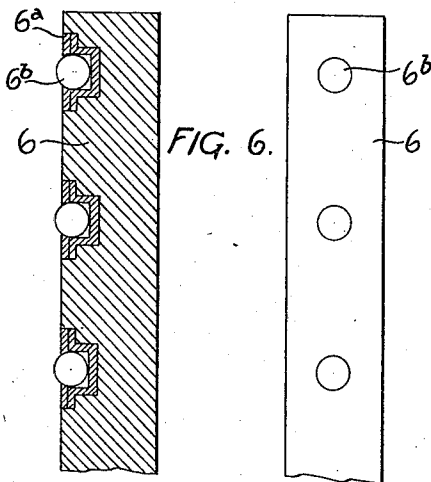
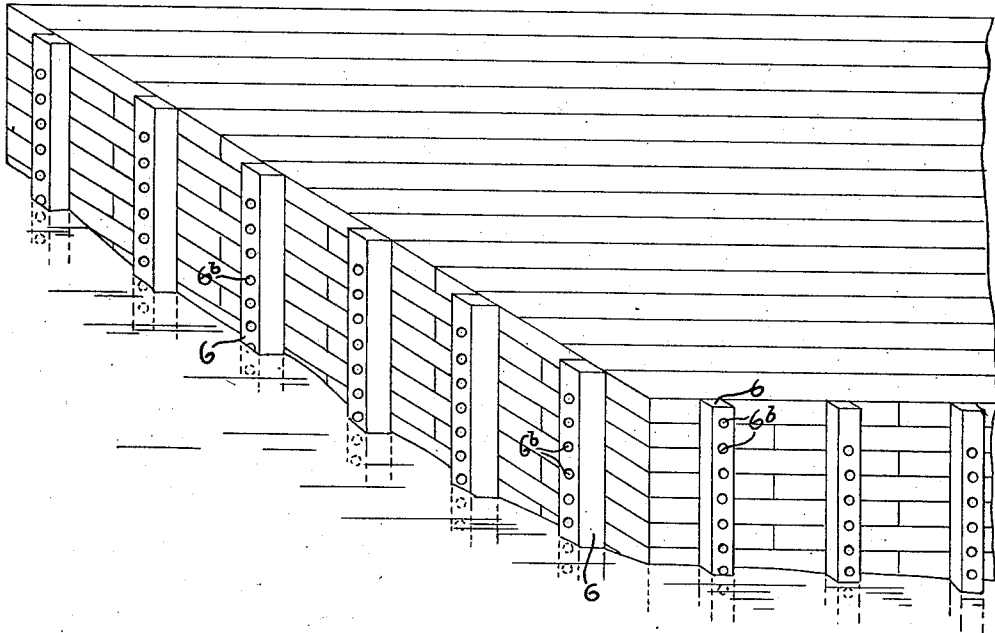


FIG. 6.

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# UNITED STATES PATENT OFFICE.

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## SEA-WALL OR WHARF CONSTRUCTION.

996,843.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed September 19, 1910. Serial No. 582,604.

*To all whom it may concern:*

Be it known that I, CHARLES F. FRANCISCO, a citizen of the United States, and a resident of San Diego, in the county of San Diego and State of California, have invented a certain new and useful Improvement in Sea-Wall and Wharf Construction, of which the following is a specification.

This invention relates to sea-walls and wharves composed of piles in connection with a plurality of longitudinal and transverse collar beams, and more particularly those of concrete material, and the objects are—First. To provide a sea wall or wharf of simple economical, safe, substantial and durable construction. Second. To provide a construction that may be built of concrete material throughout, and the parts of which may be made at any desirable place, and afterward be assembled at the place of construction. Third. To provide a means for reducing the friction and wear on wharves at the places where vessels come in contact therewith.

With these and other objects in view as will appear this invention consists of certain novel features of construction, combination and arrangement of parts, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and characters of reference thereon, which form a part of this specification, in which:—

Figure 1 is a perspective view of this construction, Fig. 2 is a perspective view of a detail showing a modified form of the face construction in connection with the transverse collar beams and showing the reinforcing to be used in the various parts, Fig. 3 is a perspective detail view of one of the collar beams, Fig. 4 is a filler collar, Fig. 5 is a perspective view of a wharf showing the face construction containing the means for reducing friction thereon, and Fig. 6 is a sectional and front elevational view of a portion of a pile showing my device for reducing the friction on wharves.

Similar characters of reference refer to similar parts throughout the several views.

In the drawing numeral 1 represents piles which are driven in a series of longitudinal and transverse rows, and which are connected by means of collar beams 2. These collar beams are of a suitable size and strength and are provided with collars 2<sup>a</sup>,

which are adapted to fit on the piles 1. The collars 2<sup>a</sup> are located a suitable distance apart on said beams to fit the spacing of the piles. The longitudinal collar beams are placed in alternate planes to the transverse collar beams which are located between the longitudinal collar beams on the piles 1. These collar beams are made of suitable lengths to allow them to overlap and thus break the joints at their different joints of connection. In cases where it is not necessary to have a solid beam construction there is provided a filler collar 3, which is placed on the pile, and which spaces these collar beams apart as described.

In Fig. 2 is shown a modified face construction, which shows the collar beam 4 to have a practically plane surface. These collar beams 4 are provided with collars 4<sup>a</sup> which are adapted to fit over the piles 1. They are each provided with a recess extending into their top surfaces and with slots in the sides adapted to accommodate a collar 5<sup>a</sup> which is narrower than the collar beam, to fit into said recesses around the pile 1, the beam portion thereof fitting in the slot 5<sup>b</sup> in said collar 4<sup>a</sup>. The construction of these transverse collar beams and the longitudinal face collar beams are slightly modified to those of the general construction. All the parts are preferably composed of concrete and reinforced by means of annular and longitudinal bars, as shown in Fig. 2. It will be readily seen that with this kind of a face collar beam there is provided a smooth surface and substantial collar beam connections therewith.

In Figs. 5 and 6 are shown a plurality of piles 6 in the face surfaces of which are provided a plurality of ball retainers 6<sup>a</sup> which are provided with balls 6<sup>b</sup>. These balls are for the purpose of providing suitable bearing surfaces for vessels which are anchored against the wharf, and they are so located as to provide suitable bearings at all times with the rise and fall of the tide. It will be readily seen that with this construction, the piles 1 being driven sufficiently into the earth properly spaced and guided by means of the collar beams 2, and afterward sufficiently locked and interlocked longitudinally and transversely with said collar beams, and with the pile bearings reducing the friction and wear on the face of the structure there is provided a good and substantial sea-wall or wharf.

Although I have shown and described a particular sea-wall or wharf construction I do not wish to be limited to this particular construction, but I desire to include in my invention substantially the principles involved and the combination and arrangement of parts therein.

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

1. A sea-wall or wharf construction, comprising a plurality of piles spaced apart and a plurality of locking and interlocking collar-beams in connection therewith, all substantially as set forth.

2. A sea-wall or wharf construction, comprising a plurality of piles spaced apart, a plurality of locking and interlocking collar bearings in connection with said piles, and means for reducing the friction of vessels against said piles, all substantially as set forth.

3. A sea-wall or wharf construction comprising a plurality of piles spaced apart, a plurality of locking and interlocking collar beams, collars on said piles, and means for reducing the friction of vessels against said piles, all substantially as set forth.

4. A sea-wall or wharf construction comprising a plurality of piles, a plurality of collar beams in connection with said piles, a plurality of spacing collars on said piles, means on said collar beams for providing a plane face surface, and a plurality of ball

bearing means for reducing friction in connection with vessels, all substantially as set forth.

5. A sea-wall or wharf construction comprising, a plurality of reinforced concrete piles spaced apart, a plurality of reinforced concrete locking and interlocking collar beams, and a plurality of ball bearings adapted to reduce the friction of vessels in contact with said piles, all substantially as set forth.

6. A sea-wall or wharf construction, comprising a plurality of reinforced concrete piles, spaced apart in longitudinal and transverse rows, a plurality of reinforced concrete collar beams adapted for connecting and spacing apart said piles, a plurality of reinforced concrete spacing or filling collars, a plurality of reinforced concrete collar beams, adapted to provide a plane surface, means for transverse interlocking with the last mentioned collar beams, and ball bearings provided with separable retainers for reducing the friction, of vessels in contact with a wharf or sea-wall, all substantially as set forth.

In testimony whereof, I hereunto subscribe my name in the presence of two subscribing witnesses.

CHARLES F. FRANCISCO.

Witnesses:

ABRAM B. BOWMAN,  
CHARLES N. ANDREWS.