E. E. SANDS.

BULKHEAD.

APPLICATION FILED MAY 20, 1918.

1,298,101.

Patented Mar. 25, 1919.

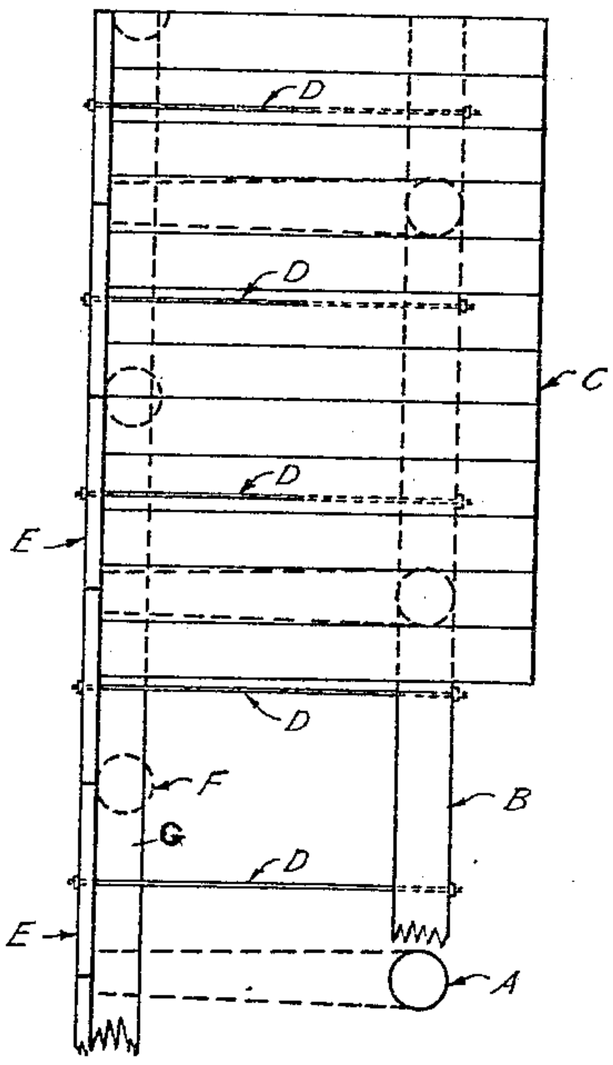

Fig. 1

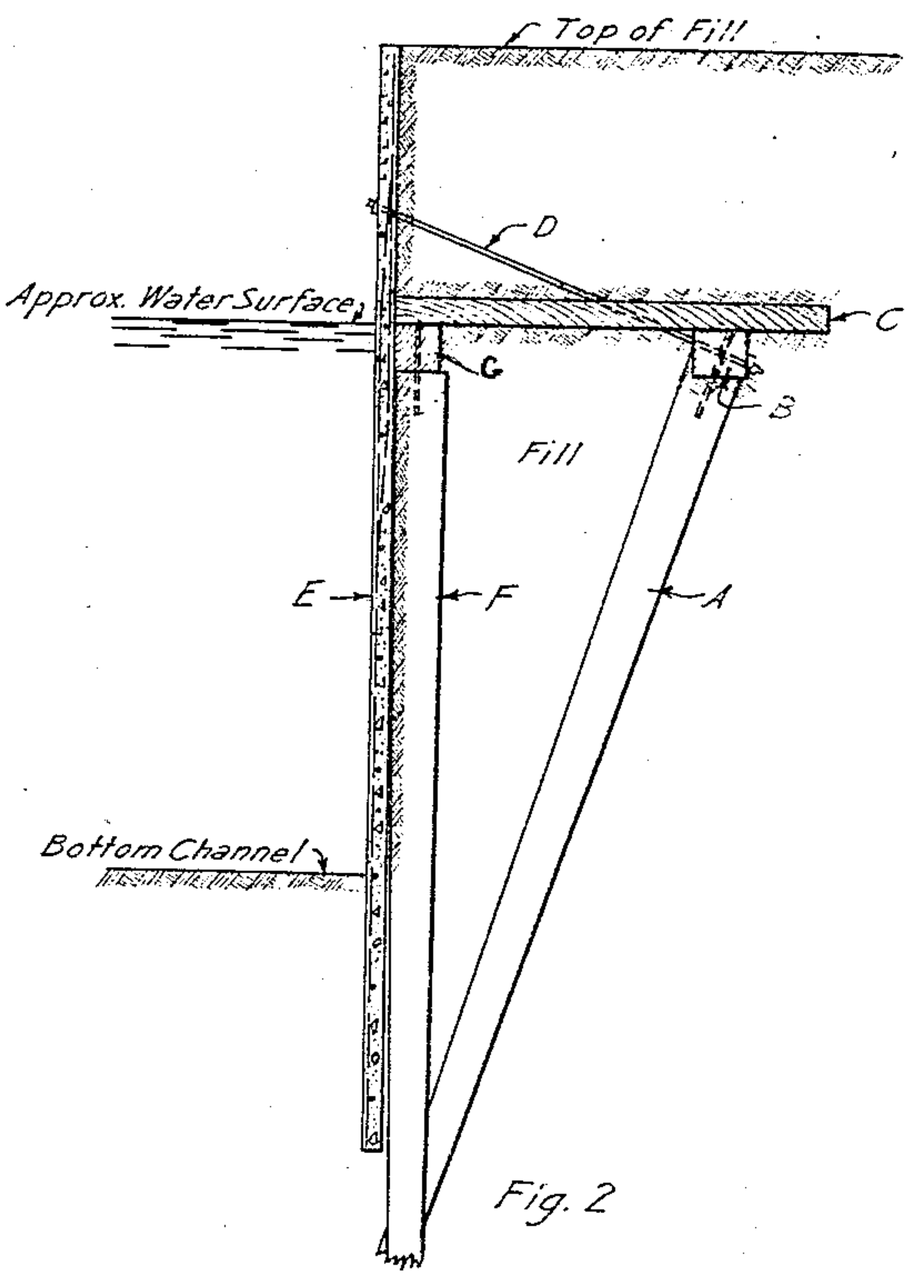

Fig. 2

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BULKHEAD.

1,298,101. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed May 20, 1918. Serial No. 235,446.

To all whom it may concern:

Be it known that EDWARD E. SANDS, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, has invented certain new and useful Improvements in Bulkheads, of which the following is a specification.

This invention relates to new and useful improvements in a bulkhead, the construction being also adapted for use as a sea wall or quay wall.

The object of the invention is to provide a construction of the character described, having a front wall, preferably formed of reinforced concrete, and anchored to the back side of which is a load sustaining platform, provided to carry a load, whose weight tends to sustain the wall, and to enable it to resist a horizontal force.

Another object of the invention is to produce a structure of the character described, which includes a supporting framework, formed of piling, which may be constructed of untreated wood, said piling being shielded by an impervious curtain wall of reinforced concrete, interposed between the sea water and the wood, thus protecting the wood from the action of the *Teredo* and other forms of marine wood-borers.

A further feature of the invention resides in the provision of a structure of the character described which will be of ample strength, and which may be constructed at a minimum of cost.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, arrangement of parts and use, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1, is a plan view of the structure, and

Fig. 2, is a vertical, sectional view, thereof.

Referring now more particularly to the drawings wherein like reference characters refer to corresponding parts in each of the figures, the letter A refers to piling which inclines from the water, and whose upper end is spaced back the required distance from the water's edge, said piling being driven into the ground until it is entirely below the normal water level. These piling are spaced the required distance apart, throughout the length of the structure, and supported upon their upper ends is the beam B.

Adjacent the water's edge are the vertical piling F, which are preferably arranged in staggered relation, with respect to the piling A, and which are also driven into the ground until they are entirely below the water level.

In front of the piling F, there is arranged a vertical reinforced concrete curtain wall, formed of plates or beams E, which are either constructed in place or pre-cast, as may be found more convenient or economical. Each plate is reinforced with steel tension rods, placed so as to sustain all tensile stresses, the concrete sustaining the compressive stresses. The bottom of this wall is supported by the bottom of the channel, and tie rods are provided which are secured at their outer ends to the respective plates E, at a point between water level and the top thereof, and whose inner ends are secured to the upper ends of the respective piling A, or to the beam B.

Supported by the upper end of the piling F, is a transverse beam G, which may be independent or may be formed of concrete cast integral with the plates E. The beams B. and G support a platform C, the edge of the platform adjacent the water being supported by the latter beam, and said platform extending back to or beyond, and resting upon the beam B. The space underneath the platform C, is filled with earth, forming an embankment, and the top of the fill is supported upon said platform, the weight being sustained principally by the piling A. The load sustained by this platform forms a counter-weight, which resists any horizontal force acting toward the channel, or water, and tends to prevent the structure from falling forward.

The front wall E, being of reinforced concrete, will not be affected by wood-borers, and the piling framework, as well as the platform, supported thereon, can be built of untreated wood, creosoted wood, or any other material found accessible, convenient or economical.

What I claim is:

1. A seawall or bulkhead, including a plurality of piling driven into the ground, entirely below the normal water level, said piling being spaced apart and inclining upwardly from the water, and whose upper

ends are spaced back from the water's edge, a transverse beam secured on the upper ends of said piling, vertical piling driven into the ground adjacent the water's edge located below the water level, a transverse beam supported by and secured to the upper ends of said vertical piling, a series of vertical beams arranged in front of the piling, extending from the top of the fill down into the bottom of the channel, said beams extending above the normal water level, tie rods secured at their outer ends to said vertical beams near the tops thereof, and above the water level, and whose inner ends are secured to the upper ends of the inclined piling, a platform supported by said transverse beams and extending back from the water's edge and filling materials supported by said platform and extending to the top of the curtain wall.

2. A structure of the character described, forming a sea wall and including a plurality of piling driven into the ground and located below the normal water level, said piling inclining from the water, a plurality of vertical piling arranged in staggered relation with respect to the inclined piling, and being driven into the ground adjacent the water's edge, and located beneath the normal water level, transverse beams supported by and secured to the respective sets of piling, a platform supported by said beams and extending back from the water's edge beyond the upper ends of the inclined piling, a plurality of vertical beams forming a wall arranged in front of vertical piling, and driven into the bottom of the water channel and extending up above the water level, tie rods whose outer ends are attached to said vertical beams above the water level, and near the top thereof, and whose inner ends are secured to the beams supported by the inclined piling, and a fill carried by said platform and extending to the top of the vertical beam, said fill forming a counterweight provided to resist any horizontal force acting toward the channel and preventing the structure from falling or moving forward.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD E. SANDS.

Witnesses:

IRENE BRUNS,

WM. A. CATHEY.