T. DAVIES.

GROIN.

APPLICATION FILED OCT. 29, 1914.

1,166,580.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

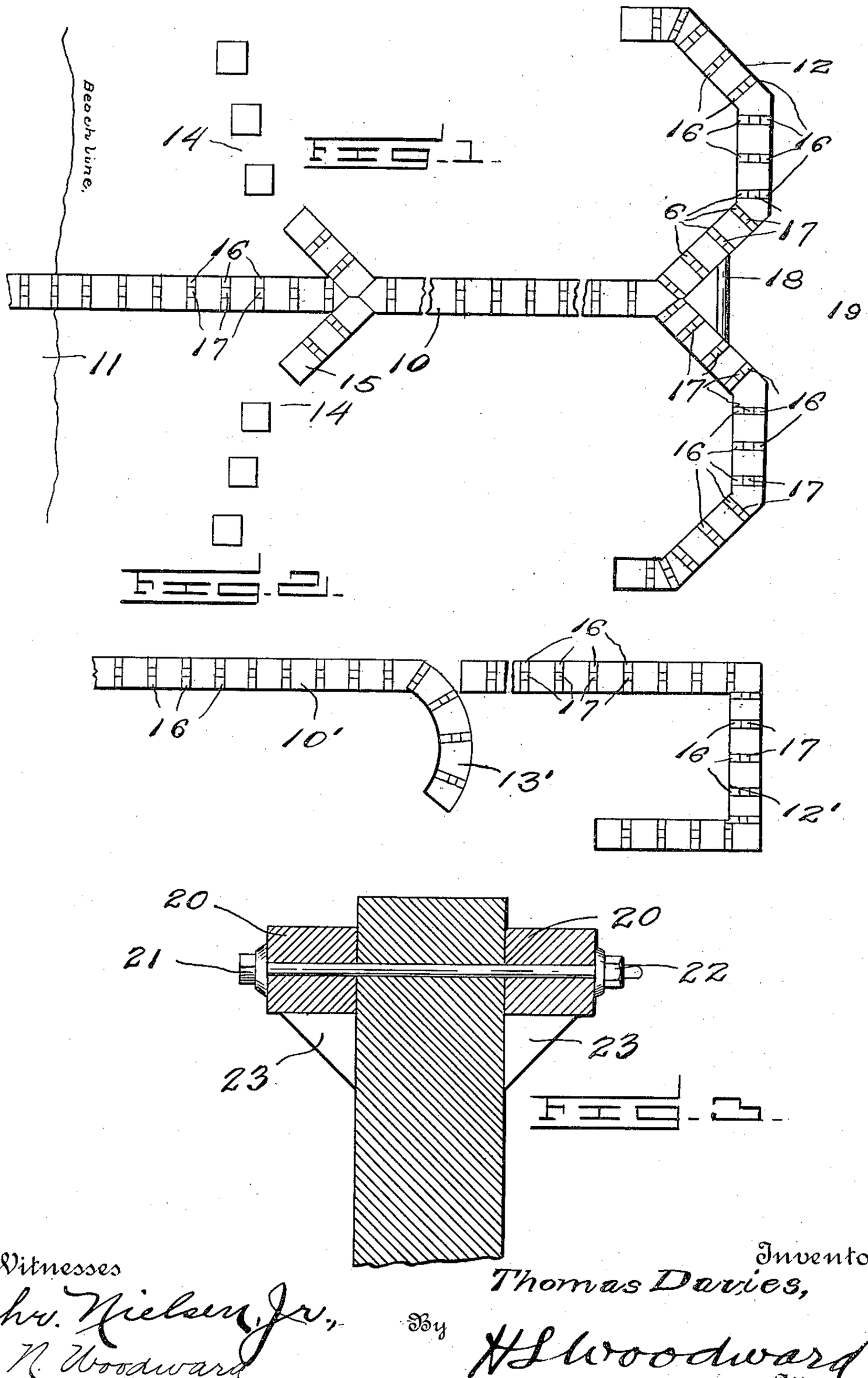

FIG. 1.

FIG. 2.

FIG. 3.

Witnesses
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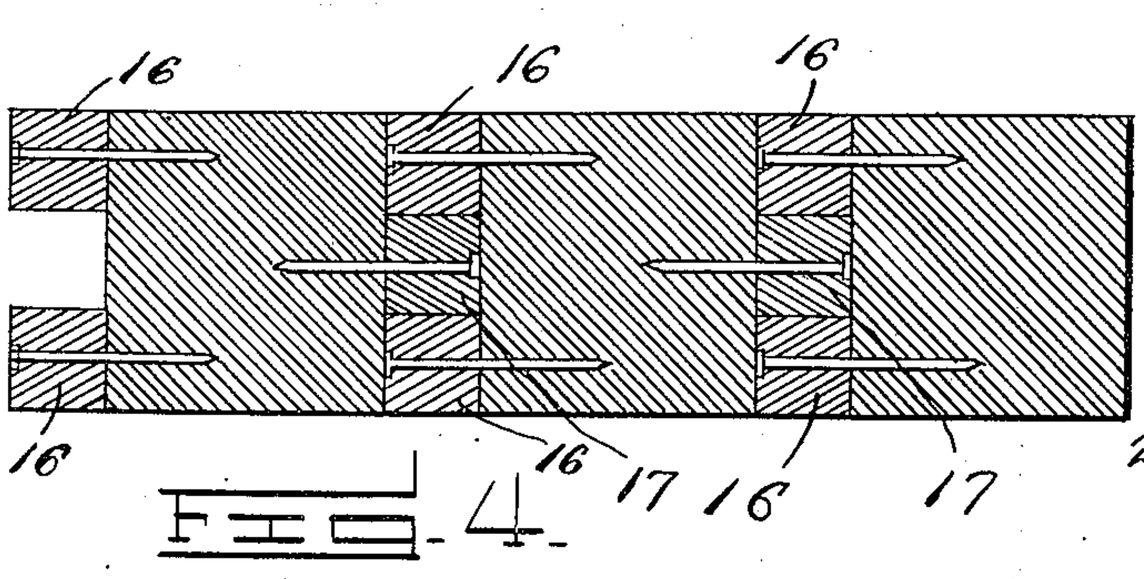

FIG. 4.

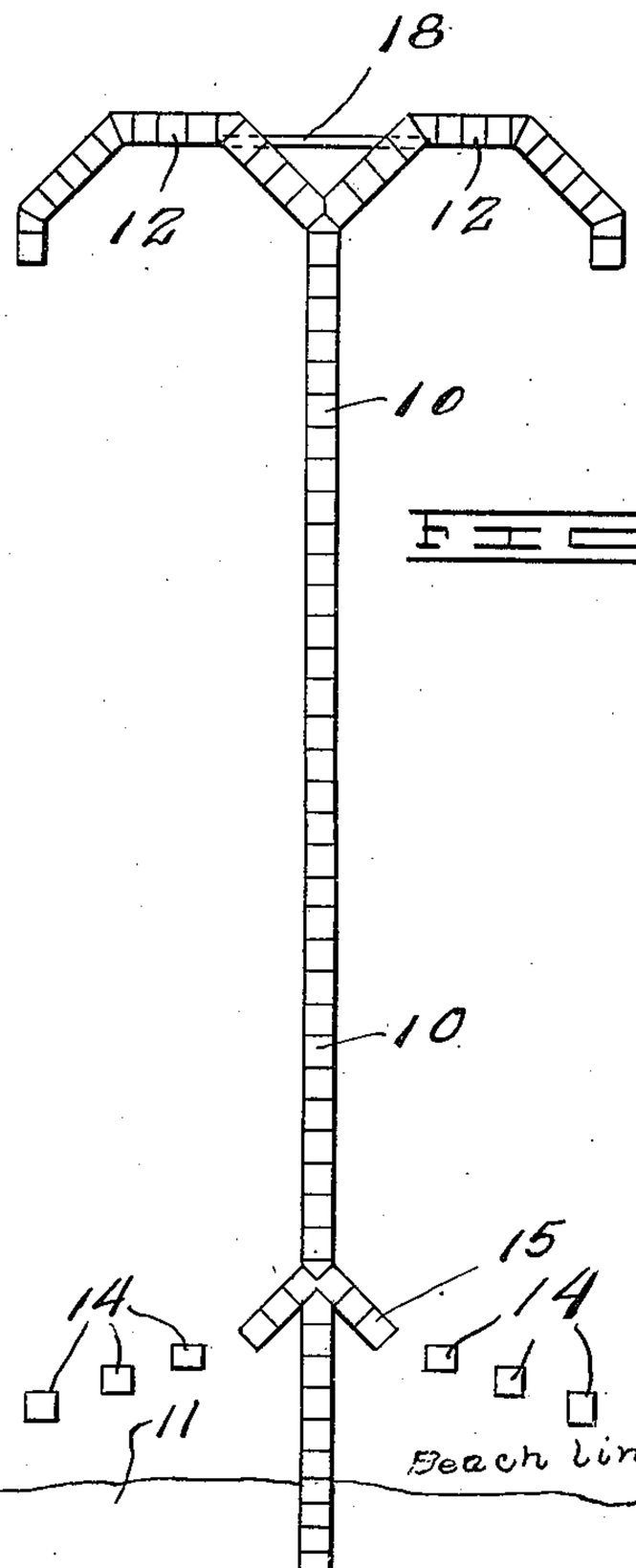

FIG. 7.

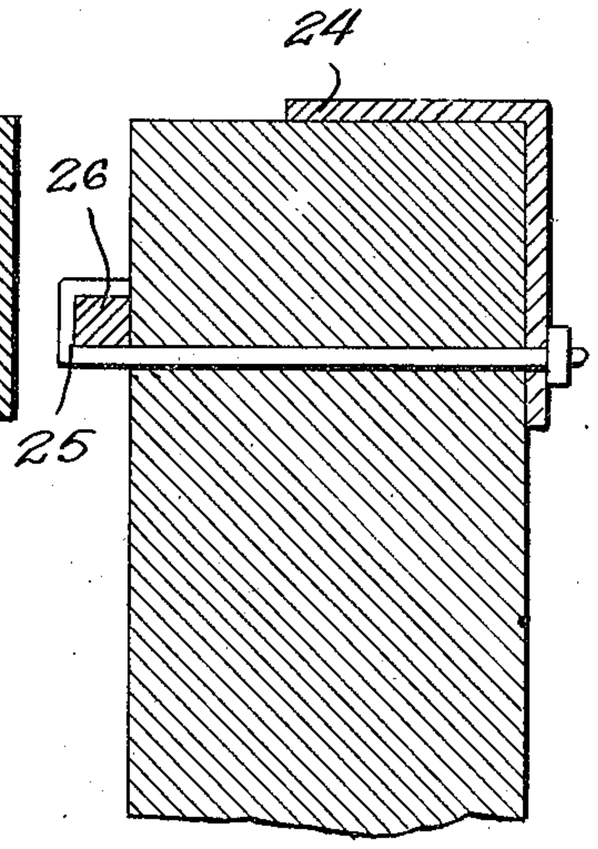

FIG. 5.

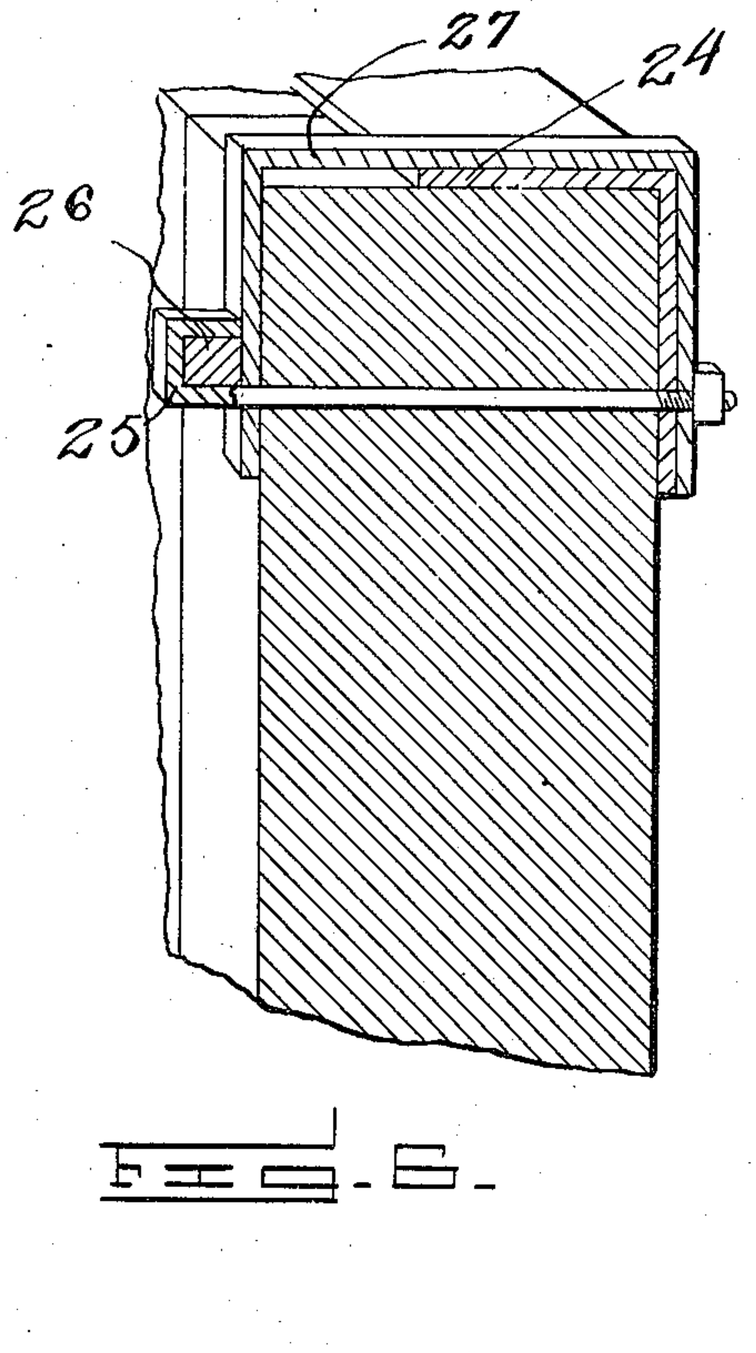

FIG. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

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GROIN.

1,166,580. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed October 29, 1914. Serial No. 869,297.

To all whom it may concern:

Be it known that I, THOMAS DAVIES, a subject of the King of England, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented certain new and useful Improvements in Groins, of which the following is a specification.

The invention has for an object to effect an improvement in groins or other structures for building up shores, and especially sea beaches, although it is also applicable on the shores of lakes and rivers.

It is an important object to provide a device of this character which may be constructed in a simple manner and will not require the direction or special plans of an engineer.

It is an object to provide a groin which may always be erected upon a sea beach in a simple relation thereto, operative regardless of variance in tidal or wave action, so that persons without special knowledge may erect the groin with the certainty of its efficient action.

An additional aim is to give a form of piling which will enable the rapid building of piling which will enable the rapid construction of the groins in an economical manner.

Additional objects and advantages will appear from the construction and arrangement of parts hereinafter set forth, and shown in the drawings, in which,

Figure 1 is a detail plan view of a groin constructed in accordance with my invention, Fig. 2 is a fragmentary plan showing a modified form of the outer end, Fig. 3 is a fragmentary vertical cross section of the groin, Fig. 4 is a fragmentary horizontal section, Fig. 5 is a fragmentary vertical section of a modified structure, Fig. 6 is a similar view of another modification of structure, Fig. 7 is a plan of a groin indicating approximately the proportions of the parts.

There is illustrated a groin or bulk head wall 10 substantially rectilinear in plan, disposed approximately at right angles to the beach line, indicated at 11, by an irregular line, the wall 10 extending from a short distance inshore, to a point of maximum depth of water, or to such distance as it may be desired to extend the beach. In shallow water, the groin may of course be extended farther than would be possible in deep water. It is not essential that the groin be extended above the surface in order that it may function, although this is desirable, and where extension is desired in deep water the groin may be built under water to induce initial deposits, but when the bottom is built up to the upper part of the groin an additional structure would be required, which could be erected upon the made bottom.

One or more laterals 12 are formed as integral extensions of the groin, and as the shore is built up by wave action the wall 10 may be extended and new laterals formed at the outer end of the groin, being similar to the laterals 12. Immediately adjacent the initial beach line it is desirable to provide broken extensions 14 consisting of detached piles spaced a suitable distance apart arranged in series extending a short distance laterally from the wall 10. As shown in Fig. 1, the laterals 12 extend at an angle at about forty-five degrees to the line of the wall 10 a short distance, being continued then a short distance in a plane at right angles to the line of the wall 10, then a farther distance inwardly at an angle of forty-five degrees, the extremity of the lateral being formed in a plane parallel to the wall 10. It is not essential, however, that these particular angles be observed as the laterals may be formed as shown at 12′ in Fig. 2, where the major portion is at right angles to the wall 10′ and the extremity is extended parallel to the wall 10′. Or, the laterals may comprise curved extensions as shown at 13′ in the last named figure, where, the groin is represented as having been extended after a certain amount of accretion.

The groin is built up with interlocking piles driven side by side, and to enable the ready building of the groin in the form shown by the use of interlocking piles, I have built up piles from stock lumber in the manner shown. The wall 10 may be formed of, say, 10x10 timbers on one side of which two 3″x3″ battens 16 are spiked or otherwise secured, adjacent respective edges of the timber and in parallel relation. On the opposite side a batten 17 is similarly secured, adapted to fit snugly between the battens 16 of an opposed pile. In the angles of the laterals, the sides of the main timbers are suitably trimmed and faced before the battens are secured, and where oppositely extending laterals are formed the battens may be omitted on the timbers immediately adjacent the bases of the laterals, and the

laterals mutually connected by transverse ties 18, whereby water pressure in the bay 19 outwardly of the laterals will not tend to spring the piles apart.

The spaced piling in the groin extensions 14 is extended only for a short distance from the wall 10 and the base of each extension is preferably formed with a series of abutting piles 15, joined to each other, and the inner one joined to the wall 10, whereby an action is produced which will be subsequently explained. These piles in the extensions 14 do not require to be very long and may be moved outwardly from time to time as the beach is built up therearound.

In order to prevent any of the piling from working loose, and to make the groin unitary, I form a longitudinal connection therebetween consisting of either stringers of lumber or suitably formed metal beams secured to the tops of the piles in a suitable manner.

As shown in Fig. 3, 6x6 timbers 20 are arranged along each side of the groin and secured thereto by bolts 21 engaged commonly through the two stringers and intermediate piling, and held by nuts 22. If desired, a fillet piece 23 may be secured beneath the stringers and against the groin. These will minimize the lifting action of waves on the piling, which would be exerted on the stringers and need only be placed where the impact of the waves will occur with greatest force.

In Fig. 5 I show the use of ordinary angle iron 24, one side of which is disposed over the piles and the other against the sides thereof, where it is secured by suitable bolts. It may be found desirable to provide these bolts with hooped heads 25 engaged over a longitudinally disposed bar 26 at the side of the piling opposite the angle iron 24. This will serve to hold the piling more rigidly and require the use of fewer bolts. It may also be found desirable to engage yokes 27 over the angle iron, the yokes having arms extending downwardly on each side of the piling and engaged with the bolts, whereby the upper side of the angle iron is held down firmly and buckling thereof prevented, further increasing the mutual support and rigidity of the piles. Where the angle iron alone is used at the top of the groin, any suitable means may be used for securing it.

The form of groin presented will be effective under the ordinary ground swell and also under wave action from either side, and is particularly desirable because it will protect a beach built up under normal conditions from destruction by storms from various directions. In fact, the beach will further accrete during unusual storms.

Where the contour of the coast is such that eroding wave action may be anticipated only from one side and accretion on the opposite side would be negligible the laterals 12 and 12′ need be extended only on the exposed side. The groin may be extended from time to time and new laterals added in the necessary directions, as the beach is built up.

The form of the groin is such that a very rapid deposit of material will occur around the outer laterals, and the wall 10 will prevent movement of waves longitudinally of the beach, which is the most damaging action, and at the same time, guide the water so that it will carry suspended material inwardly encountering successively the laterals 13′ and extensions 14. At each of these and intermediately, owing to the eddies formed further accumulation will occur, and the effect of the extensions 14 is to cause deposit of sand to an unusual height, as may be readily understood. Thus, as the waves move inwardly along the wall 10 toward the extensions 14 the water rapidly shoals, and there is a marked increase in the proportion of suspended matter in the translative waves. The water finally encounters the portion 15 of the extensions, where it is dashed laterally across the path of the adjacent incoming water and the combined currents are precipitated through the spaced piling with greatly diminished movement, resulting in a stilling of the water for a few moments, long enough for a very rapid precipitation of the matter in suspension. The small combers or waves of translation in their undisturbed action also have the effect of greatly disturbing and loosening the surface material of the beach which had previously become settled and firm, with the result that the water tends to carry out as much material as is brought in by the wave, these two effects being sometimes balanced and at others unbalanced, if uncontrolled, resulting in erosion. It will be observed that the extension so affects the water that inwardly of the portion 15 the disturbing action of the inrushing water will not be manifest on the beach therebehind, and as the water loses its momentum at the spaced piles and is dammed by the impetus of the following water, it covers the beach within the portion 15 without disturbing it, while a large quantity of material is precipitated, building the beach to a greater height than the waves naturally tend to lift the material. A considerable deposit will also occur laterally of the portion 15 behind the spaced piles. The effect of the laterals 12 is somewhat similar, and as the inner part of the beach is built up, spaced piles may be put in place adjacent the extremities of the laterals to increase the rapidity of deposit at the outer part of the beach. The value of the wall portion 10 in producing the same effect from waves approaching from in front

or either side will be apparent, and also its efficiency in protecting the beach during storms.

As before stated, movement of current longitudinally of the beach is most damaging, and, as it will be noted, my groin is to be extended into water of considerable depth, whereby these longitudinal currents are checked, and large deposits are caused, not only along the shore line, but in comparatively deep water, so that upbuilding will occur over a very large area.

It will be understood that in checking the movement of longitudinal current, or coastwise current, my groin coöperates with the shore line to form a large pocket or bay, in which conservation of shore material is effected. Also, where there is a considerable under current moving outwardly from the beach, erosion at lower depths is prevented, and the laterals at the end of the groin create cross currents which will check the outward movement of water and prevent carrying of material to a considerable distance seaward.

What is claimed:

1. A device of the class described comprising a bulkhead wall, lateral extensions formed thereon projected obliquely toward the shore adjacent its inner part, and including each a terminal openwork portion.

2. In a device of the class described a bulkhead wall comprising a multiplicity of piles driven in close parallel relation, their tops being alined, an angle iron extended transversely thereof having one side disposed closely over the tops of the piles and another side engaged against the sides of the piles, means to secure the iron to the piles including bolts, and yoke members having an intermediate portion engaged over the first named side of the iron, and arms at each side of the wall engaged with the bolts.

In testimony whereof I have affixed my signature in presence of two witnesses.

THOMAS DAVIES.

Witnesses:
F. J. Davies,
Gordon A. Davies.