Oct. 25, 1966 W. B. WOSENITZ 3,280,569

GROIN

Filed Feb. 11, 1964 2 Sheets-Sheet 1

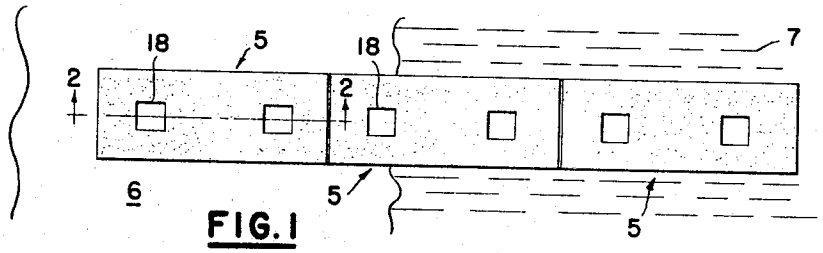


FIG. 1

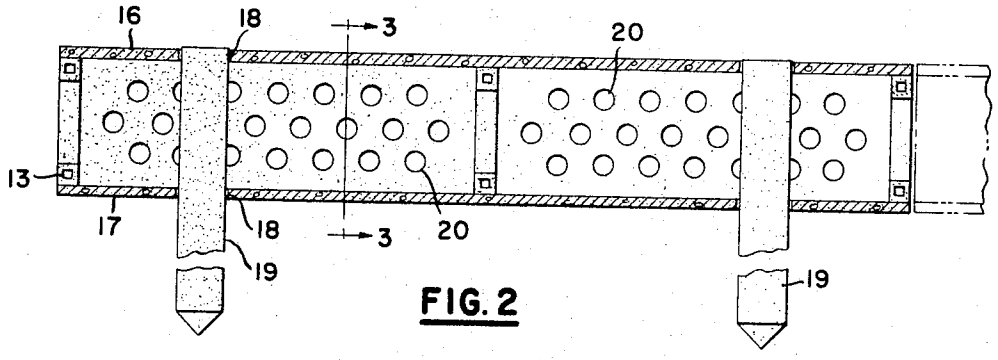


FIG. 2

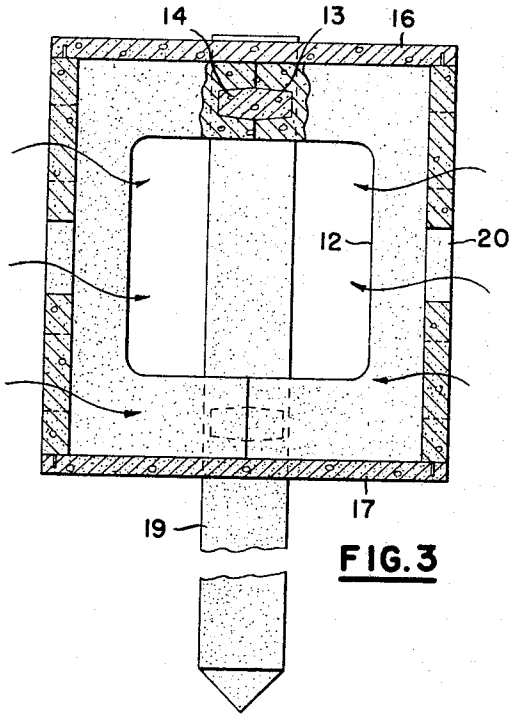


FIG. 3

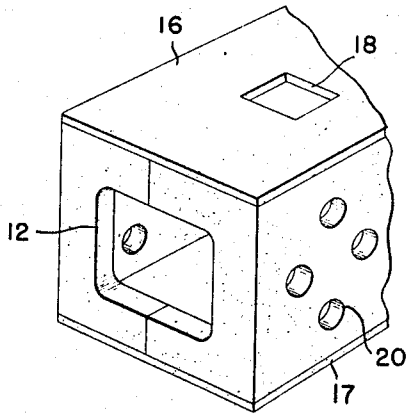


FIG. 4

INVENTOR.
WILLIAM B. WOSENITZ

BY

ATTORNEY

Oct. 25, 1966 W. B. WOSENITZ 3,280,569

GROIN

Filed Feb. 11, 1964 2 Sheets-Sheet 2

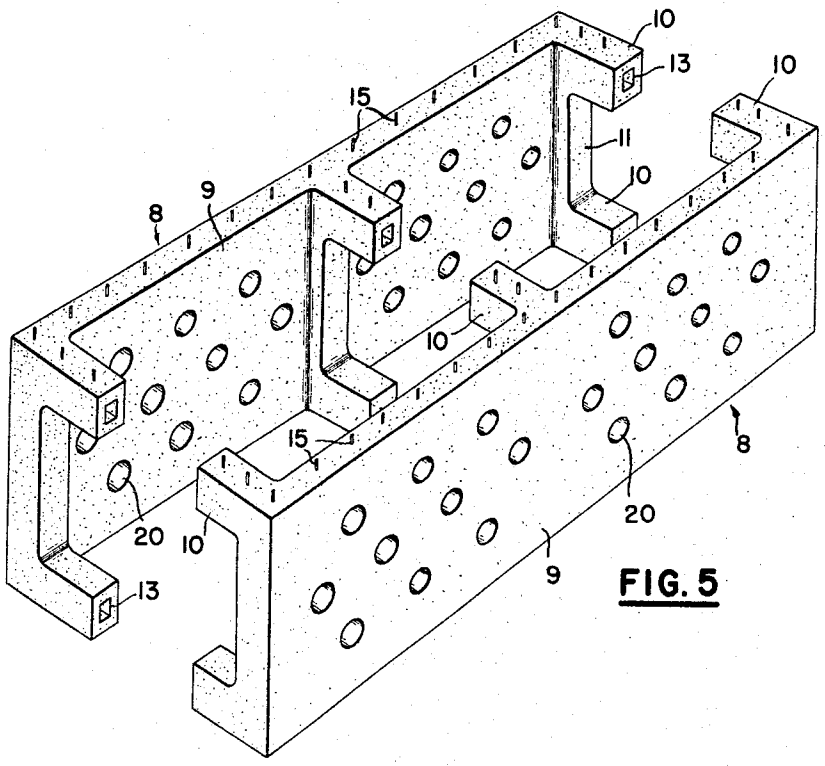


FIG. 5

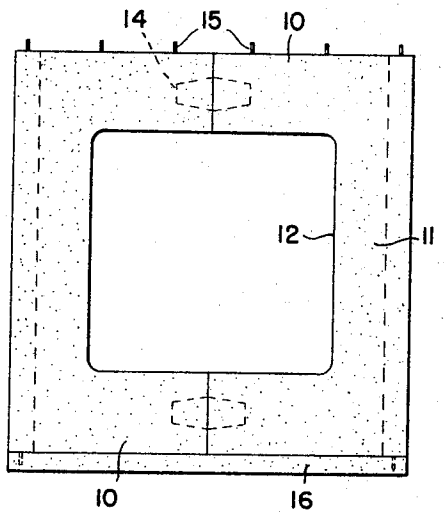


FIG. 6

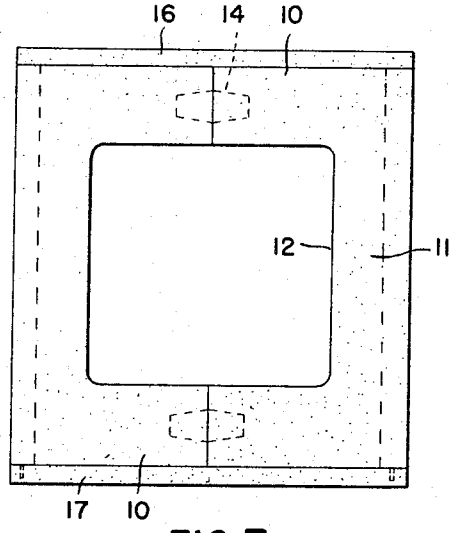


FIG. 7

INVENTOR.
WILLIAM B. WOSENITZ

BY

James H. Yeo

ATTORNEY

United States Patent Office

3,280,569

Patented Oct. 25, 1966

3,280,569

GROIN

William B. Wosenitz, Dania, Fla., assignor to Permagroin Company, Inc., Broward County, Fla., a corporation of Florida

Filed Feb. 11, 1964, Ser. No. 344,056

2 Claims. (Cl. 61—4)

This invention relates to beach erosion preventing apparatus primarily to prevent the washing away of beach areas such as sandy beaches or in exceptional storm conditions, could wash away gravel beaches.

It is well known that storms, and off-shore currents flowing past many beaches often work to eventually destroy the beaches. This depletion of a beach is caused by the sand being taken up therefrom and carried away with the current and subsequently deposited at some other point in the path of the flow of water.

An object of the invention is to provide a groin or break-water basically having the characteristics of a permeable structure through which the water will flow or be retarded in its movement and broken up to deposit sand that is normally carried in waves and to build up the beach to the desired level and with the groins being shiftable outwardly after the beach has been built up to further collect the sand and to extend the beach outwardly from a mainland area.

The invention further contemplates a precast permeable groin that is ideally suited for shallow sloping beaches, such as those particularly in the Florida area. The groins are formed by molding or casting a hollow tunnel-like groin that has its side walls perforated and with the ends of the groins being formed open and when connected in end to end relation constitute the tunnel through which water and sand will flow.

Novel features of construction and operation of the device will be more clearly apparent during the course of the following description, reference being had to the accompanying drawings wherein has been illustrated a preferred form of the device and wherein like characters of reference are employed to denote like parts throughout the several figures.

In the drawings:

FIGURE 1 is a plan view of a plurality of groins in end to end abutting relation and embodying the invention,

FIGURE 2 is a vertical longitudinal section taken substantially on line 2—2 of FIGURE 1,

FIGURE 3 is a transverse vertical section taken substantially on line 3—3 of FIGURE 2,

FIGURE 4 is a fragmentary end perspective view of one groin,

FIGURE 5 is a composite perspective view of elements embodied in the groins,

FIGURE 6 is a slightly enlarged end elevation of the groin members shown in FIGURE 5 and in assembled relation with respect to a lower covering slab, and

FIGURE 7 is a similar view showing the complete groin with both upper and lower covering slabs.

Referring specifically to the drawings and particularly to FIGURE 1, there has been provided a plurality of groins 5 arranged in end to end abutting relation and extending from the beach 6 and to a predeterimned distance into the water, indicated at 7.

The groin is preferably formed by two substantially identical sections 8 forming side walls 9. The side walls 9 are each provided with substantially identical U-shaped legs 10 all molded integral with the sides 9 and constituting spacers for the walls 9. The opening formed by the legs 10 and a connecting rib 11 form at assembly, an open end for each end of the groin, the opening being indicated in FIGURES 6 and 7, by the numeral 12. The openings

12 formed by the assembly of the members 8 provide an elongated tunnel and the tunnel is continuous through adjacent groin members for permitting a longitudinal flow of water.

The side members 8, see particularly FIGURES 6 and 7, show the legs 10 in abutting relation and each leg 10 may be recessed as indicated at 13 to receive concrete key elements 14 which at assembly, prevent twisting or otherwise shifting of the members 8 under the impact of handling or wave conditions. The members 8 are provided with reinforcing steel that projects above the marginal edges of the side walls 9 and the legs 10, as indicated at 15 and whereby to moldably anchor upper and lower slabs of concrete, indicated at 16 and 17, see FIGURES 6 and 7. Each of the slabs 16 and 17 are provided with preferably square openings 18 that are in vertical alignment at assembly and adapted to receive preferably concrete pile forming members 19, that are driven through the openings 18 to project below the slab 17 for embedment into the sand or bottom of the waterway. The piles 19 obviously will prevent either longitudinal or transverse movement of the groins. While the piles 19 and the openings 18 are shown as being square, they could obviously be round or any other shape.

Each of the side walls 9, are molded with a multiplicity of cylindrical apertures 20, such permitting the ready flow of water therethrough into the tunnel formed by the groin and the apertures may be varied in size and number and while the openings may be varied upon the wall facing windward and having a ratio of aperture to solid wall of approximately 75% and the aperture ratio on the lee side may vary according to location conditions but generally should be equal on both sides of the groin.

In the manufacture of the device, the members 8 are molded in a suitable form having members fixed thereto to form the openings 20. As will of course be understood, the reinforcing steel placed within the members 20 have portions thereof projecting above the upper and lower marginal edges to form the anchoring means for the slabs 16 and 17. After the members 8 have been molded, they are removed from the mold and placed together, with the legs 10 in abutting relation and with the keys 14 disposed within the apertures 13. The assembled members 8 are then disposed upon a suitable flat surface at a predetermined elevation and the top slab 16 then poured thereunder, being anchored to the extending reinforcing 15. After the slab 16 has suitably hardened, the entire body is then turned over and similarly engaged with a slab 17. The anchoring of the slabs 16 and 17 obviously will maintain the members 8 against shifting and upon complete hardening or curing of the device, it is then suitable to be installed as a groin. The groin may be moved into position at any desirable point or several of the groins may be arranged in end to end relation to extend from the beach into the water as the situation requires and anchored by the piling 19. When the groin is to be extended into relatively deep water outwardly from the beach, the sides and ends may be covered and the openings 18 also covered and the device floated to the required site of installation. After the groin reaches the predetermined point for installing, the covering is removed and the groin allowed to sink to the bottom of the waterway at which time of course the additional piling 19 is driven into place and the openings 12 provide a continuous tunnel through two or more groins.

Permeable box design with perforations will dissipate the kinetic wave energy within the box chamber formed by the groin. Since the wave is forced into a jet as it passes through the first wall, it bounces against the opposite wall and the upper slab end becomes aerated from the disturbance. As the wave flows through the aper-

tures, it creates an air cushion against the top slab tending to dampen the energy of the wave. The spacing and the hole pattern cause a face shift of energy between the maximum and the minimum wave elevations. This type of box design also causes an internal tunnel current extending seaward which further reduces kinetic energy. Water escaping back through the holes is aerated and reduces the clapotis effect of the next wave.

The aerated water and hole design reduces the scour action at the bottom. Since a specific gravity of aerated water is now less than normal it helps prevent the suspended sand from floating away. The same design permits the coupling of one section to another. As accreation occurs, sections may be extended with land based equipment. It has been estimated that the weight of the average 30 foot section is approximately 12–13 tons, this plus the suction effect of approximately 1500 pounds per square foot, the two pilings will be fixedly held in its lateral position. Any hurricane or tidal wave of such magnitude that would tend to shift or undermine any other design, would not effect this structure because it would merely settle to the new bottom level. If this should ever occur, the design is made in such a way that additional groins may be superposed upon the original groins and longer piling driven therethrough. It is also possible that after sand has built up and filled the tunnels of the units, they may be shifted further outwardly by breaking away the pilings and then to engage other pilings through the openings **18** at the new location.

It will be apparent from the foregoing that a permeable groin has been provided that is economically formed and assembled and that will be most effective for controlling wave movements and to most effectively build up the sand on the eroded beach areas. The device can be formed in sections as described or the body of the groin described as sections **8** can conceivably be molded as a unitary structure. The slabs **17** rest upon the bottom and constitute a support for the groin while the slab **16** overlies the groin for its full width and length and may constitute a pier walk-away, permitting persons to walk over the groin and, when the groin extends sufficiently far into the water, may constitute a very desirable fishing pier. The device is strong, durable and most effective as a permeable groin and may be easily and quickly assembled on the eroded beach areas at a minimum cost.

It is to be understood that the invention is not limited to the precise construction shown, but that changes are contemplated as readily fall within the spirit of the invention as shall be determined by the scope of the subjoined claims.

I claim:

1. A permeable groin of the character described comprising, an elongated box-like structure composed of a plurality of units placed in end-to-end relation and defining a tunnel through them, each unit consisting of a pair of substantially identical wall-forming sections of molded concrete, the side walls of said sections having a multiplicity of openings through them, the groin being closed at the top by a slab and also closed at the bottom by a similar slab, said slabs being anchored to the wall-forming sections, each of the wall-forming sections having U-shaped legs at its ends, the legs on one wall-forming section being in abutting relation with the legs on the opposite section to provide for spacing between the walls of the wall-forming sections, the slabs at the upper and lower ends of the side walls being apertured, the groin being positioned on a beach with the tunnel therethrough extending from the beach into the body of water on which the beach fronts, piling extending through the slabs and extending through the groin units and into the beach and the bed of the body of water.

2. A groin of the character described for preventing beach erosion, the groin being elongated and of hollow box-like construction, the groin being formed of a pair of spaced-apart reinforced concrete side walls with each side wall being provided with upper and lower leg extensions disposed at right angles to the side walls and with said leg extensions having abutting engagement and constituting spacing means to locate the side walls apart, means for anchoring the legs together in their abutting relation, an upper closure slab of concrete co-extensive with the groin, a lower reinforced concrete slab anchored to the reinforcing of the side walls and the legs, the legs at the opposite ends of the groin defining square openings at such ends and defining the ends of a tunnel extending through the groin, aligned openings formed in the top and bottom slabs for the passage of anchoring piles, each of the side walls being provided with a multiplicity of openings extending through them for the passage of water from waves that impinge against the side of the groin, said openings causing the waves to dissipate their kinetic energy within the groin, the waves in their passage through the openings in the side walls striking against the upper slab and causing the water to deposit any sand that has collected in the waterway and flows through the tunnel in the groin, the groin being positioned on a beach with the tunnel therethrough extending from the beach into the body of water on which the beach fronts, piling extending through the apertures in the slabs and extending through the groin and into the beach and the bed of the body of water.

References Cited by the Examiner

UNITED STATES PATENTS

954,283	4/1910	Hawkes	61—4
1,277,829	9/1918	Baum	52—303 X
2,135,337	11/1938	Herbest	61—4
2,474,786	6/1949	Humphrey	61—4
2,514,119	7/1950	Boccia	61—4
2,645,114	7/1953	Amirikian	52—259 X
3,100,953	8/1963	Johnson	52—603 X
3,195,266	7/1965	Onanian	52—585 X

FOREIGN PATENTS

730,189	5/1932	France.

EARL J. WITMER, *Primary Examiner.*