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[54] **INFLUENCING SEDIMENTATION**

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[52] **U.S. Cl.** **61/3**

[51] **Int. Cl.** **E02b 3/04**

[58] **Field of Search** 61/1, 2, 3, 4, 5; 139/391; 57/149

[56] **References Cited**

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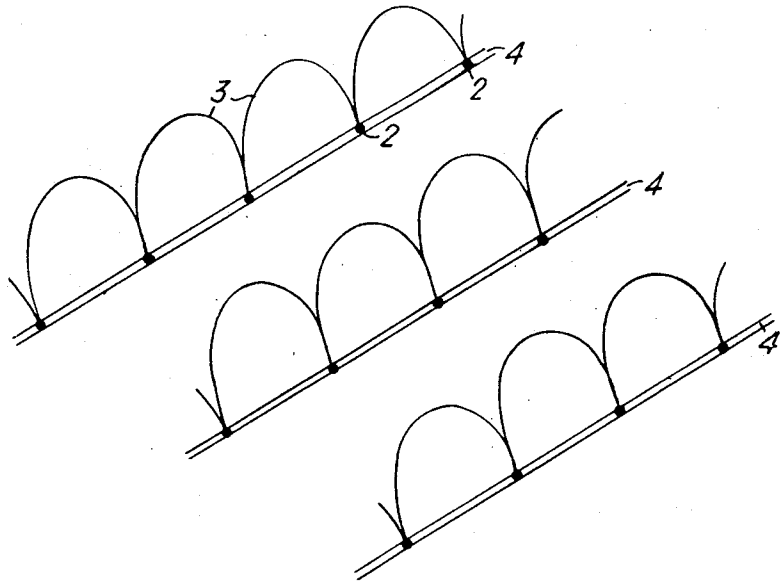
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[57] **ABSTRACT**

Means for influencing the sedimentation and movement of solid particles of material in seas, lakes and other bodies of water comprising an array of threads, tapes or filaments attached in loops to anchoring means.

7 Claims, 3 Drawing Figures



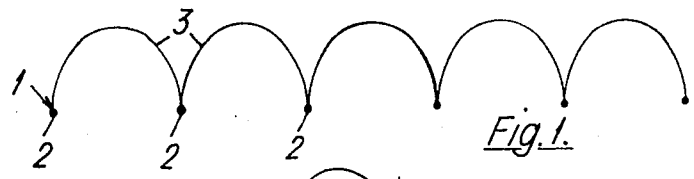


Fig. 1.

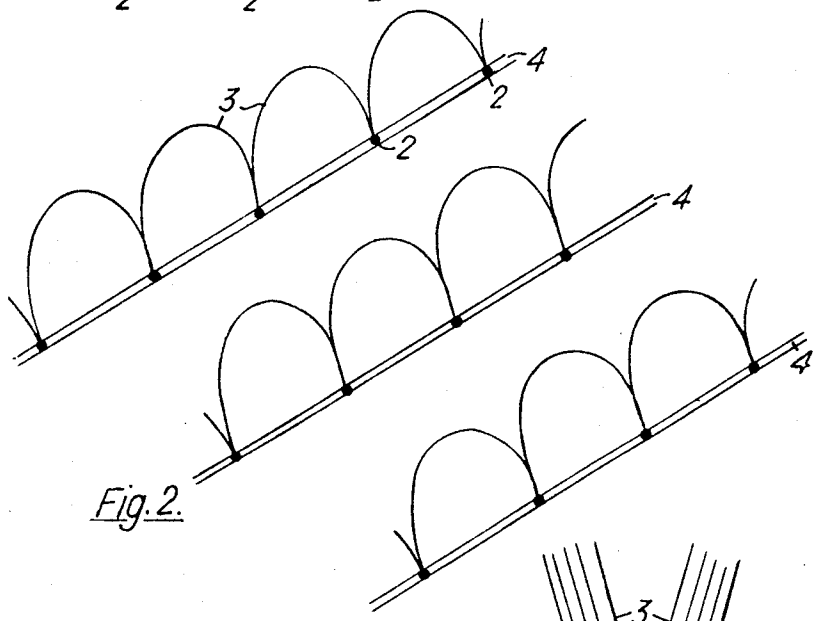


Fig. 2.

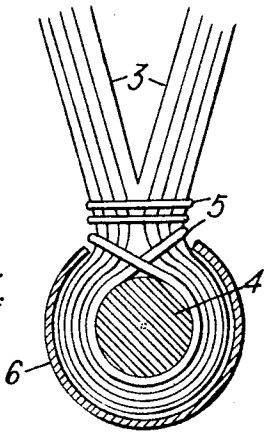


Fig. 3.

INFLUENCING SEDIMENTATION

This invention relates to a means for influencing the sedimentation and movement of solid particles of material in seas, lakes and other bodies of water. The invention relates in particular, but not exclusively to the prevention or reduction of erosion at coasts and shores and in the vicinity of underwater structures.

The use of wooden or concrete groynes arranged perpendicular to the shore to reduce coastal erosion is well-known and various alternative forms of groynes have been proposed, as for example concrete blocks with a plurality of vertical rods embedded therein. These methods are expensive to erect and maintain and are only partially effective, influencing primarily the drift of material parallel to the shore and having little effect on seaward movement.

More recently the use of self buoyant threads, tapes or filaments, the lower ends only of which are anchored to the sea bed, has been proposed. If sufficient quantities of these threads, etc., are grouped together in an array, rapid build up of sand or other suspended material in or near the array may be obtained under suitable conditions. Deposition of suspended material is thought to be due primarily to the wave energy absorbing effect of the floating threads etc.

We have now found that an improved wave energy absorption and hence an improved deposition of suspended material may be obtained by using threads, tapes or filaments anchored to the seabed in loops. These threads, tapes or filaments can be herein referred to simply as strands, which can be anchored to the sealed in loops floating freely in water.

Thus according to the present invention we provide means for influencing the sedimentation and movement of solid particles of material in seas, lakes and other bodies of water comprising tapes or filaments attached in loops to anchoring means.

Also according to this invention we provide a method for influencing the sedimentation and movement of solid particles of material in seas, lakes and other bodies of water wherein bunches of threads, tapes or filaments are attached in loops to anchoring means affixed to the bottom of a body of water, said bunches being arranged in a group or groups to form an array.

Threads, tapes or filaments for use in this invention should be of low water absorptivity and are preferably composed of synthetic polymeric materials. These materials may have a specific gravity less than the water into which the threads, etc., will be placed or they may have a higher specific gravity. In one form of the invention the threads, etc., comprising the loops are self buoyant and float above their attachment means when placed in water. Materials having a specific gravity higher than the water into which they are to be placed may be rendered self buoyant by enclosing air within the material during the production of the threads etc. as for example by incorporating a blowing agent which produces a multi-cellular extrudate or by producing the filaments etc. in hollow form with the hollows closed at the ends. In another form of the invention the material comprising the loops is of higher density than the water into which it is laid. In this case the loops are attached to buoyant means which is anchored to the bottom of the body of water with sufficient slack to allow the loops to hang below the buoyant means above the bottom.

Suitable synthetic polymeric materials for use in the invention are, for example, polyolefines, such as polyethylene and polypropylene or polymers such as polyamides and polyesters which may also be produced in multicellular form by known extrusion methods. Exemplary of the latter polymers are polyhexamethylene adipamide and polyethylene terephthalate.

Anchoring means which may be used are quite varied. For example when the threads etc. are self-buoyant, the ends of the looped bunches of threads etc. either individually or in groups of bunches may be attached to lead or iron weights or to concrete blocks. Alternatively the loop ends may be attached at intervals along a rigid or flexible member or along two parallel such members. Attachment is this way allows various orientations of successive loops to be employed as for example as a series of inverted or upright U's with adjacent ends touching, separated or in overlapping arrangement or, when the ends are attached to two parallel members the planes of all the loops may be substantially parallel and a tunnel-like arrangement is produced. The latter arrangement using self buoyant threads is particularly adapted to the protection of under-water structures, such as pipelines, from the scouring effects of ocean currents. In all cases the members used for attaching the loops are either anchored at the ends or at intervals along their length. Another possible arrangement is to use a bunch of threads etc. in a long continuous length and to attach this at intervals to an anchoring means leaving a sufficiently greater length of the bunch between anchoring points so that when immersed in water the buoyancy or otherwise of the bunches will cause loops to form above or below the anchoring means.

Two embodiments of the invention are illustrated by way of example in the attached drawings wherein:

FIG. 1 is a side view of part of an array of loops wherein the ends of the loops are individually anchored.

FIG. 2 is a perspective view of part of an array of loops attached successively along ropes, and

FIG. 3 is an end view of a detail of one means for attaching the ends of loops to a rope.

In these drawings like numerals refer to like parts.

Referring to FIG. 1, one end 1 of a bundle of self buoyant filaments is attached to an anchor weight 2 and further weights 2 are attached at intervals along the length of the bundle which is then positioned on the bottom of a body of water so that the weights 2 are spaced apart a distance such that loops 3 of the self buoyant filaments float above the weights 2. Successive lengths of filament bundles are then positioned beside the first to build up a full array. Alternatively to using a continuous length of filament bundle, which is the preferred method individual lengths of bundle sufficient to form a single loop may be used.

In FIG. 2 an alternative and preferred method of constructing an array of loops is illustrated. A continuous bundle of self buoyant filaments is attached to a rope 4 at intervals such that loops 3 of about 4 meters height are formed between attachment points 2. The ends of rope 4 (not shown) are anchored by suitable means such as an 85 lb. Meon anchor. Any number of ropes 4 may be laid side by side and spaced apart about 1 meter to make an array of the required size.

In FIG. 3 is illustrated one method of attaching either an end 1 or a segment of a bundle of continuous filaments to a rope 4. The portion of the filament bundle which is to be attached is taken around the rope 4 and secured thereto by binding 5. Also shown in FIG. 3 is a covering shoe 6, conveniently moulded of nylon or other abrasion resistant material, which is fitted over the portion of a bundle of filaments and binding 5 below the rope 4 which are exposed to the effect of wear against the bottom of a body of water when the rope 4 and its attached self buoyant loops 3 is laid in place.

Steel ropes or chains or natural or synthetic fiber ropes may be used as the ropes 4 but it is preferred to use cables made of a bundle of parallel filaments encased in a thermoplastic sheath.

In general a preferred orientation of the loops in an array is with the planes of the loops transverse to the predominating direction of a current.

Arrays of looped bunches of threads etc. may be set out parallel to a shore or at right angles to it, in the fashion of a groyne or a combination of both arrangements may be used depending upon the prevailing conditions.

What we claim is:

1. An installation for influencing the sedimentation and movement of particles of materials in seas, lakes, and other bodies of water comprising anchoring means anchored to the submerged bottom and secured to said anchoring means are threads, tapes or filaments arranged in the form of a plurality of loops lying in generally vertical planes, the apexes and the legs of each loop being horizontally spaced apart linearly along the length of said anchoring means, wherein said loop arrangement comprises a series of interconnecting U-shaped loops with adjacent legs touching each other.

2. An installation as in claim 1 wherein the anchoring means is a flexible member.

3. An installation as in claim 1 wherein the threads, tapes or filaments are self-buoyant in water.

4. An installation as in claim 1 wherein the threads, tapes or filaments are denser than water and wherein the anchoring means is flexible and buoyant in water.

5. An installation as in claim 1 wherein the threads, tapes or filaments are constructed of synthetic polymeric material.

6. An installation as in claim 5 wherein polymeric material is selected from the group consisting of polyolefines, polyamides and polyesters.

7. An installation as in claim 5 wherein the polymeric material is selected from the group consisting of polyethylene, polypropylene, polyheramethylene adipamide and polyethylene terephthalate.

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