

[54] **METHOD OF PROTECTION FOR SLOPES AND CRESTS OF RIVERS, CHANNELS, AND THE LIKE**

189,791 6/1972 Argentina 61/38

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[57] **ABSTRACT**

[30] **Foreign Application Priority Data**
Nov. 9, 1972 Argentina 245070

[52] U.S. Cl. 61/38

[51] Int. Cl. E02b 3/12

[58] Field of Search 61/37, 38, 4, 5, 6, 3, 61/46

A method is disclosed for protecting slopes and crests of rivers, channels, and the like by mooring flexible and permeable tubular casings filled with fresh concrete. Those tubular casings may be made of synthetic fibers, burlap, canvas, etc., and are simultaneously filled with fresh concrete while being placed at the foot of surfaces which must be protected. The tubular casing is lowered by gravity to its position by means of a series of ropes tied to the tubular casing at one of their ends with the other end of the ropes being secured to an element placed at the surface of the water. The ropes provide guides for the mooring of other casings similar to the above-mentioned one with the rolls, loops or rings or any other element being used for aligning purposes through which ropes of the first casing may pass so that the following casing necessarily are placed one over the other until the rolls appear at the surface of the water.

[56] **References Cited**

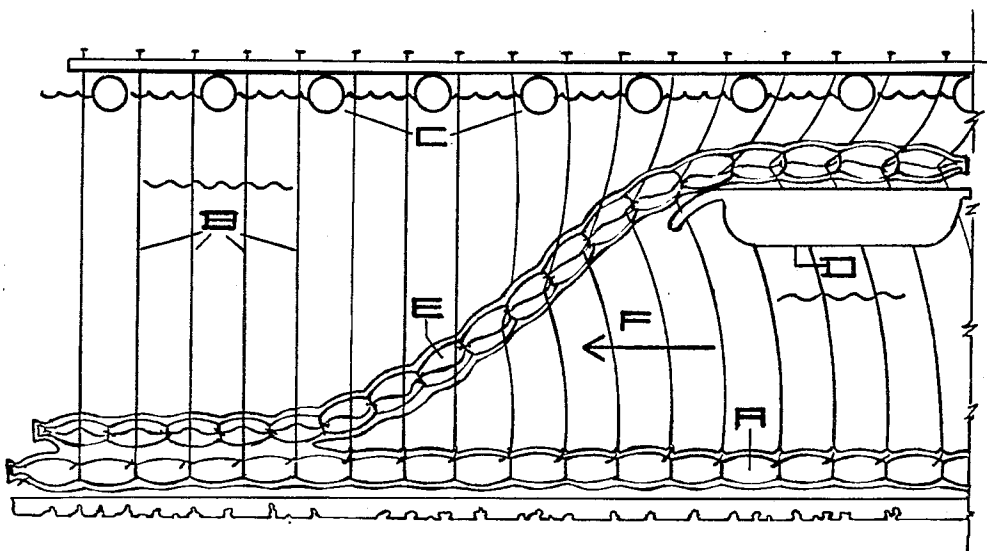
UNITED STATES PATENTS

776,898	12/1904	Fichefet.....	61/38
1,691,848	11/1928	Johnson.....	61/38
1,892,701	1/1933	Hoffman.....	61/38
3,234,741	2/1966	Ionides.....	61/38

FOREIGN PATENTS OR APPLICATIONS

789,795	2/1958	Great Britain.....	61/38
186,239	10/1971	Argentina.....	61/38

1 Claim, 2 Drawing Figures



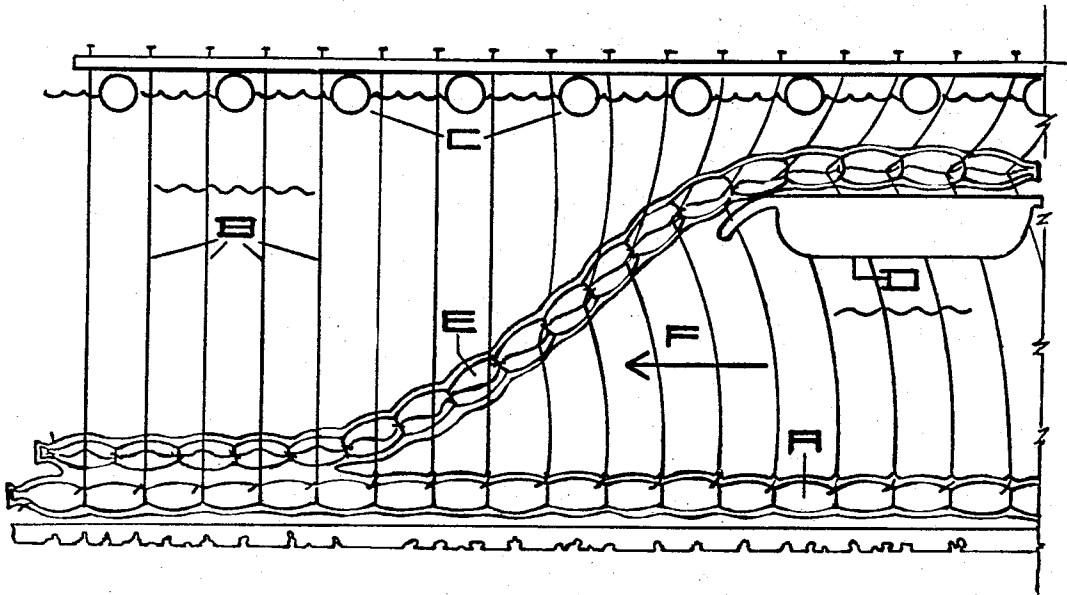


FIG 1

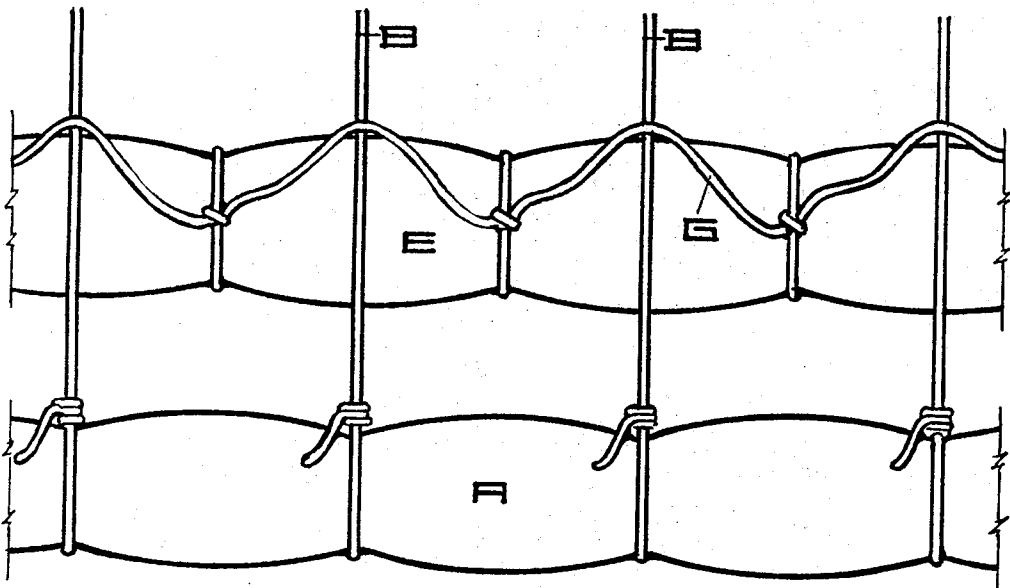


FIG 2

METHOD OF PROTECTION FOR SLOPES AND CRESTS OF RIVERS, CHANNELS, AND THE LIKE

This invention relates to protective slope covering techniques and constitutes an improvement which enlarges the possibilities of a protective system described in Argentine Patent No. 186239 by which new problems may be solved and by which the construction procedure may be simplified therefore decreasing costs.

Described in Argentine Pat. No. 186239 is a slope protection technique which generally comprises the use of ropes to guide, under water, the constitutive elements of the protective slope covering in such a manner that the elements may be placed one after the other in a convenient position. An improvement on the technique disclosed in Argentine Pat. No. 186239 can be found in Argentine Additional Pat. No. 189,791, which improved technique comprised the use of bags or sacs in the manufacture of said elements of the protective slope covering, thus eliminating forms and providing an advantage mainly of an economic nature. Both these prior techniques require mooring of a large amount of elements and special attention must be rendered in the placing of the elements so that they may finally be adequately interlocked.

The improved technique of the present patent application simplifies these prior operations and therefore attains a decrease in costs and, in addition, an increase in technical possibilities so as to solve new situations. The technique consists in mooring successively (one above the other) guided into place by means of ropes, flexible and permeable tubular casings filled with fresh concrete thus attaining a perfect fitting between each other, such that once set, a truly continuous concrete armour is attained.

Coastal defenses wherever piling works exist may be adequately solved by means of these tubular casings filled with fresh cement which may be easily adjusted avoiding piles and joining in clear spaces. Furthermore, another advantage obtained by the inventive technique is the better adjustment of the casings to warped or tapered surfaces.

The novel technical concept of the instant invention which obtains these results comprises mooring flexible and permeable tubular casings filled with fresh cement instead of blocks such as is disclosed in Argentine Pat. No. 186,239. The diameter and length of these casings will vary depending on the circumstances, and they can be manufactured of synthetic fiber, burlap, etc. As happens in the case of blocks, these tubular casings are guided to their position by means of ropes tied to the first moored casing. Separation of these ropes may be larger than in the case of blocks and this is another point which increases savings and simplifies construction.

The tubular casings filled with cement moored successively over the first one have loops or rings which

constitute the aligning bond with the above-mentioned ropes and which are those which serve as a guide.

It is necessary to make clear that elements similar to these tubular casings made with sheaves of willow branches and stone nucleus, wire covers also filled with stone, etc., have been long used in constructions of this type and have received names such as gabions, fascines, or mud walls, etc. The innovation of this application is the tubular casings filled with fresh cement as an element of protection and the relation of which is covered by the Argentine Pat. No. 186,239 is the presence of the ropes which guide and carry these elements to their correct position beneath the water.

The invention will be better understood by reference to the appended sheets of drawings wherein:

FIG. 1 depicts the mooring process of the invention; and

FIG. 2 depicts a detail of a part of the tubular casings shown in FIG. 1.

Reference is now made to FIG. 1 of the enclosed drawings which shows the mooring process of the instant invention. Reference letter A indicates the first casing filled with fresh cement which has been moored from the pontoon or vessel D in which the concrete equipment is installed. This first mooring has been done by means of the ropes indicated by B, one of the ends thereof being tied to the tubular casing A, while the other ends are fixed to a floating body C. A second tubular casing E is moored while being filled with fresh concrete from the pontoon D. The ropes B guide the descent of casing E, which forms the basis for placing in sequence those passing along the ropes B in a similar manner. The direction of the arrow F indicates the direction of the current.

FIG. 2 depicts a detail of a part of the rolls A and E, guiding ropes B being joined to the first roll and ropes G which articulate and loop the second roll thus leaving a space through which ropes B are aligned or threaded.

What is claimed is:

1. A method for the protection of slopes and crests of rivers, channels, and the like by guided mooring of flexible and permeable tubular casings of great length, filled with fresh concrete, said method comprising the steps of filling a first tubular casing with fresh concrete, mooring it by gravity to the desired position, simultaneously as it is being filled, by means of a series of ropes attached thereto leaving the ends of said ropes free subject to a floating element on the surface of the water, using said ropes as guides for other casings similar to said first casing which are also moored by gravity while simultaneously being filled with fresh concrete, holding subsequently filled tubular casings to the first, the basis for alignment of said subsequently placed casings being ropes held by said first casing and said floating element on the surface of the water, whereby each of said tubular casings may be placed in the desired position.

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