

(No Model.)

G. VILLA.  
MEANS FOR PROTECTING BANKS OF RIVERS, STREAMS, OR SEA  
FROM EROSION.

No. 554,354.

Patented Feb. 11, 1896.

Fig. 1.

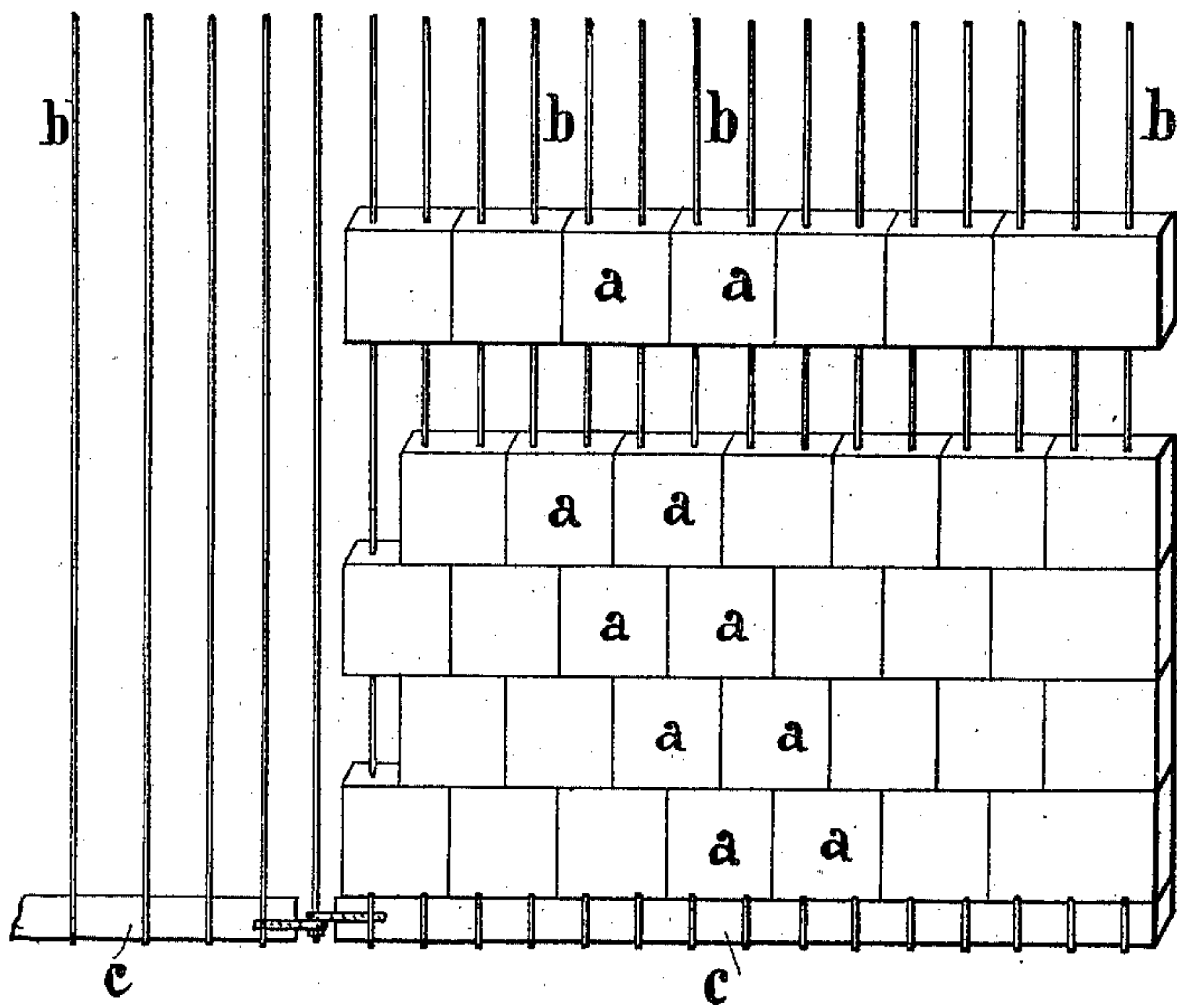


Fig. 2.

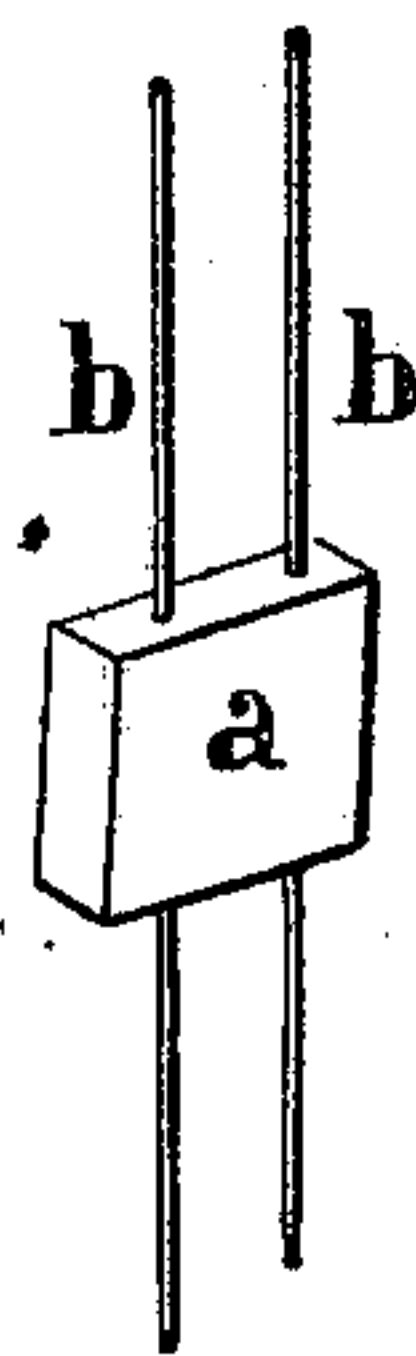
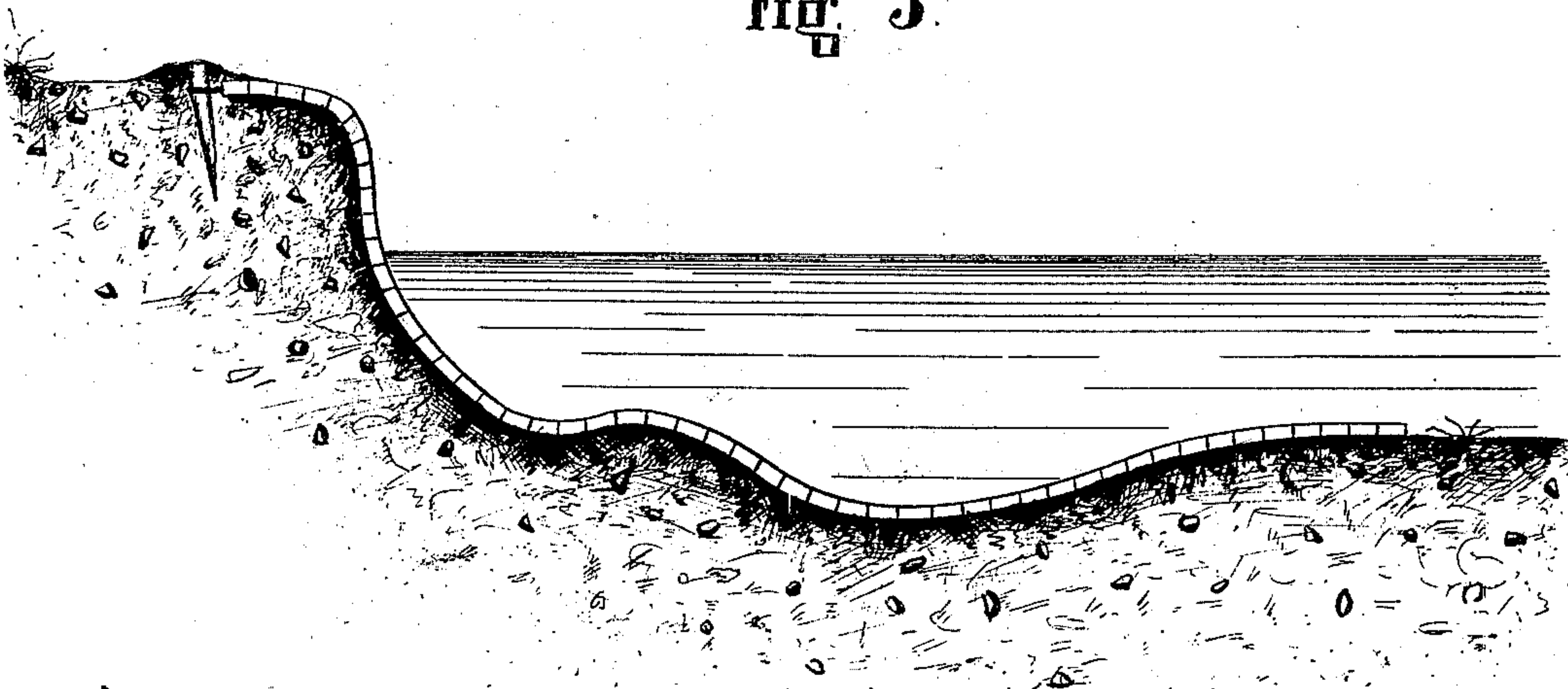


Fig. 3.



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# UNITED STATES PATENT OFFICE.

GIOVANNI VILLA, OF MILAN, ITALY.

MEANS FOR PROTECTING BANKS OF RIVERS, STREAMS, OR SEA FROM EROSION.

SPECIFICATION forming part of Letters Patent No. 554,354, dated February 11, 1896.

Application filed November 8, 1895. Serial No. 568,648. (No model.) Patented in Italy March 19, 1892, No. 31,376; in France November 23, 1892, No. 223,712; in Austria-Hungary January 29, 1893, No. 42,151 and No. 73,436; in Belgium January 31, 1893, No. 102,884; in Spain February 18, 1893, No. 14,098; in Germany March 28, 1893, No. 67,674; in Switzerland July 15, 1893, No. 6,178; in Turkey October 10, 1893, No. 357; in Denmark December 7, 1893, No. 4,792; in Norway January 11, 1894, No. 3,132, and in England February 10, 1894, No. 3,013.

*To all whom it may concern:*

Be it known that I, GIOVANNI VILLA, a subject of the King of Italy, and a resident of the city of Milan, Italy, have invented certain new and useful Improved Means for Protecting the Banks of Rivers, Streams, or Sea Against Erosion, (for which patents have been obtained in Italy March 19, 1892, No. 31,376; in Spain February 18, 1893, No. 14,098; in Switzerland July 15, 1893, No. 6,178; in Austria-Hungary January 29, 1893, No. 42,151 and No. 73,436; in Great Britain February 10, 1894, No. 3,013; in Turkey October 10, 1893, No. 357; in Denmark December 7, 1893, No. 4,792; in Norway January 11, 1894, No. 3,132; in Belgium January 31, 1893, No. 102,884; in France November 23, 1892, No. 223,712, and in Germany March 28, 1893, No. 67,674,) of which the following is a full, clear, and exact specification.

This invention relates to means for protecting banks of rivers, streams or sea against the erosion caused by the water. The improved means are more practical and insure greater durability than those which have heretofore been employed—such as, for instance, the jetties and gabions consisting of fagots or of wire filled up with pebbles, systems which necessitate a great expense and which fulfill their object for a limited period, apart from the fact that the result in the case of jetties is never certain.

The improved means comprise a resistant and flexible covering or shield sunk into the bed of the river, streams or sea and fixed against the bank, so that it offers a great resistance to the water, being very solidly constructed. Moreover, the side exposed to the water constituting a practically smooth surface facilitates the flow to the water and thus shields the banks of the river, stream, or sea against erosive action. This covering has usually a width of two or three meters and is of suitable length and extends from the bed of the river, stream or sea to the top of the bank.

In the accompanying drawings, Figure 1 is a front elevation of a shield; Fig. 2, a transverse section of one of the prismatic pieces, and Fig. 3 a transversal section of a bank protected by the shield.

The cover or shield is composed of a number of superposed rows of prismatic pieces *a*, of terra-cotta, cement or other suitable material, the dimensions of which vary according to circumstances, the said rows being traversed each by two or more wires *b b*. In this manner a flexible shield or covering is formed, which is secured to the top of the bank by means of wires fastened to trees or to piles or the like driven into the ground. The laying of this covering or shield is effected from a barge or boat at the point which is to be protected. When a length of about one meter has been made, it is put in the water and sunk, being held against the bank of the river, stream or sea to be protected. The wires being always fixed against the barge or boat, the construction is continued by threading the prisms on the said wires so as to form a row, the covering or shield being made usually of a width of two to three meters and of a height extending from the bed of the river, stream or sea to the top of the bank, where the said wires *b b* are fixed to trees, piles or the like.

A series of coverings or shields arranged in the above-described manner may be united together at the lower end through wires or other suitable connection means and by a wooden (or like) cross piece or bar *c*, thus covering banks of any depth and length according to their natural contour without presenting any projecting points to the water, thus protecting the banks from any possible erosion.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

A cover or shield for the banks of rivers, streams, or sea, characterized by a series of

terra-cotta, or cement (or other suitable material) plates *a*, connected with each other by means of wires *b*, the longitudinal layers of which are held together at the bottom of the  
5 river by a wooden (or like) bar *c*, while they are fixed at the top of the bank by wires fastened to trees, piles, or the like, driven into the bank.

In witness whereof I have hereunto set my hand in presence of four witnesses.  
GIOVANNI VILLA.

## Witnesses:

GOFFREDO RICCI,  
VALENTINO RAVIERE,  
SYLVESTER N. D. SPAGNOLI,  
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