A. O. CUNNINGHAM.

MATTRESS FOR SHORE PROTECTION.

APPLICATION FILED JAN. 17, 1916.

1,275,860.

Patented Aug. 13, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

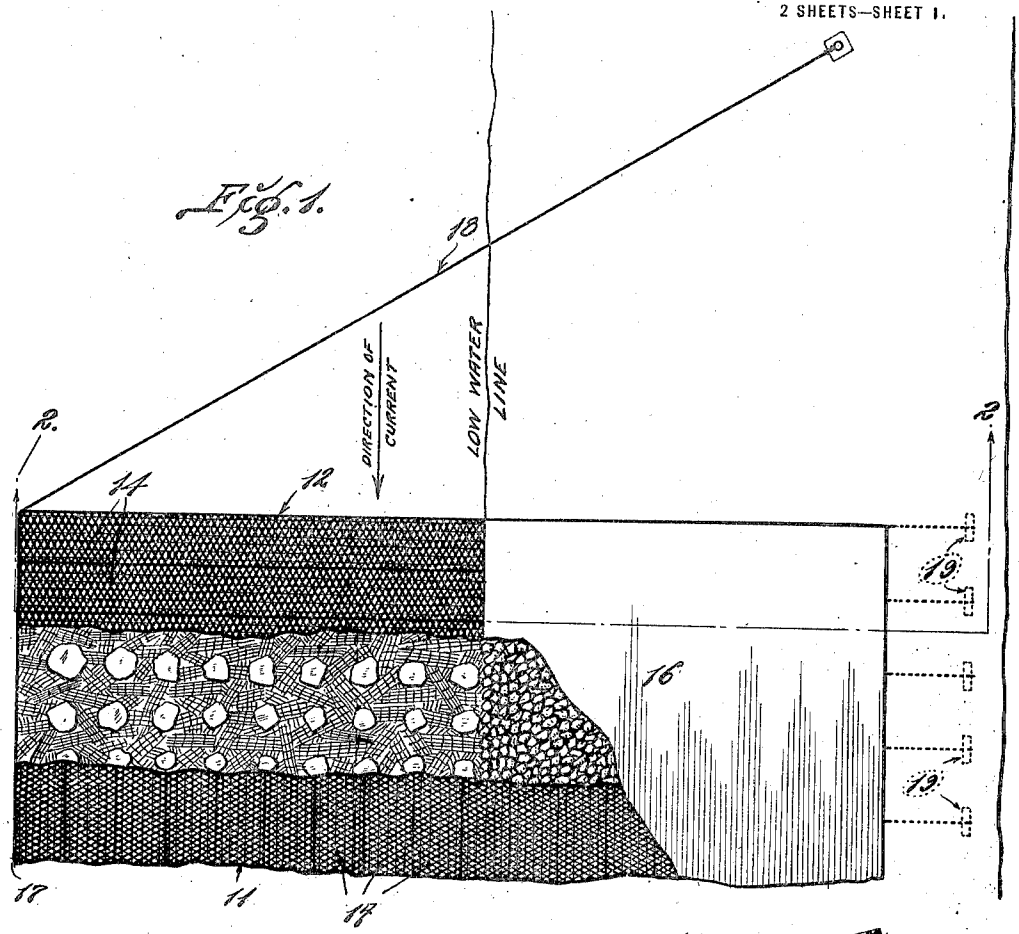


Fig. 2.

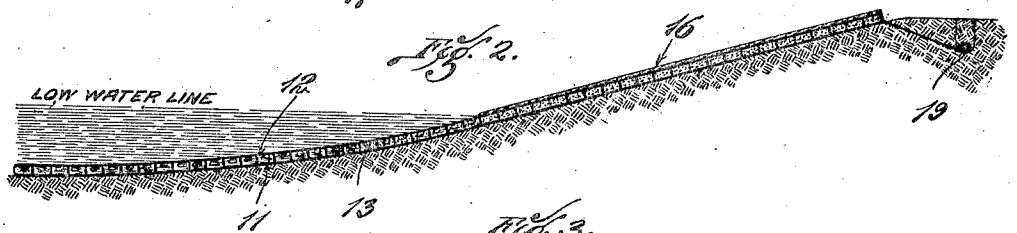
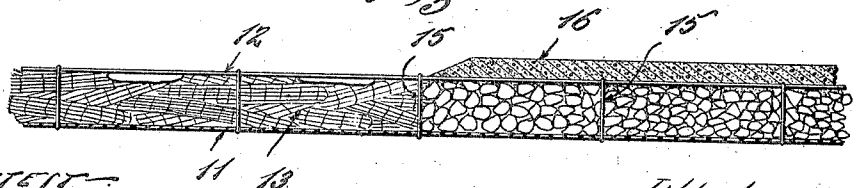


Fig. 3.



Attest—

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2 SHEETS—SHEET 2.

Fig. 4.

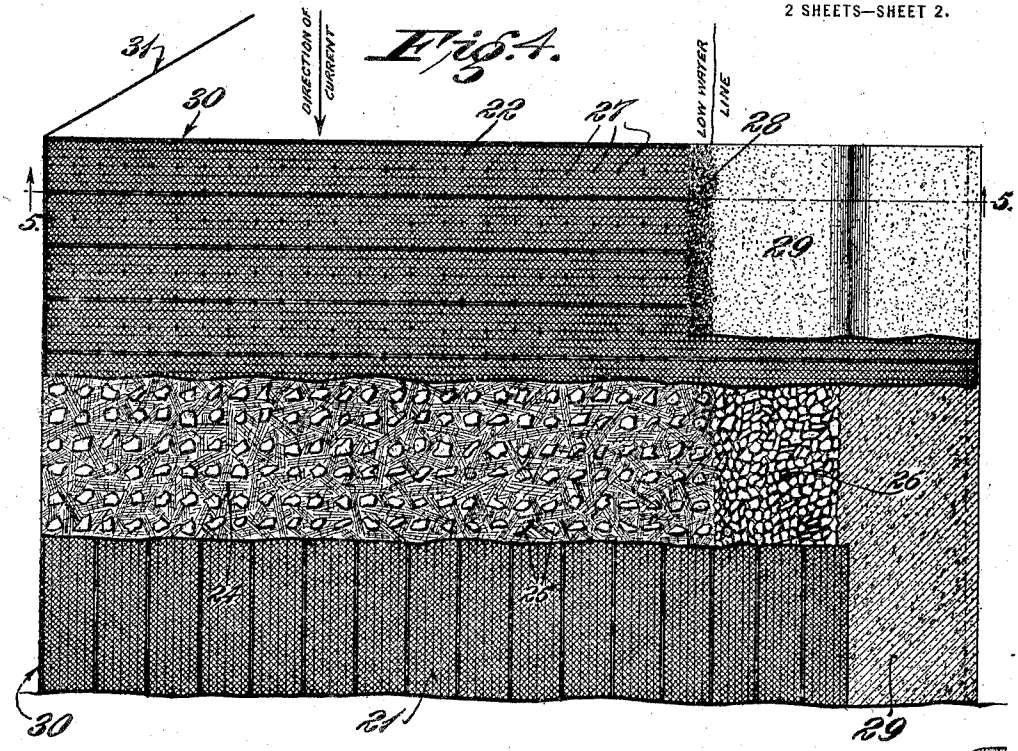


Fig. 5.

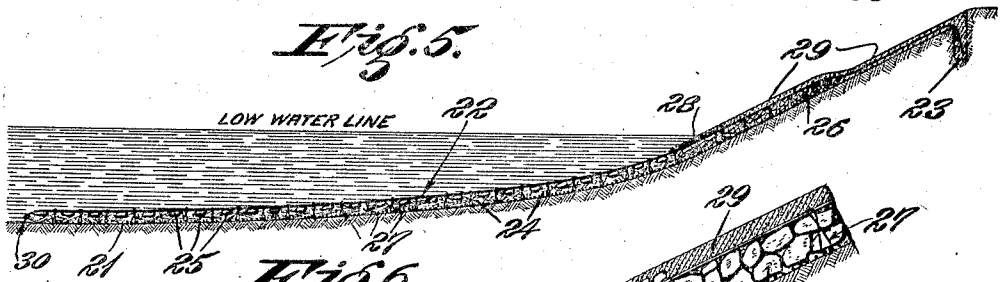


Fig. 6.

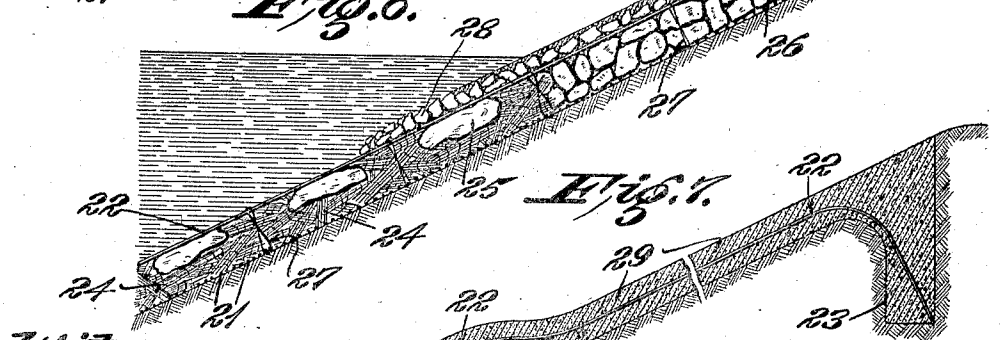


Fig. 7.

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UNITED STATES PATENT OFFICE.

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MATTRESS FOR SHORE PROTECTION.

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To all whom it may concern:

Be it known that I, ANDREW O. CUNNINGHAM, a citizen of the United States, and a resident of St. Louis county, Missouri, have invented a new and useful Improvement in Mattresses for Shore Protection, of which the following is a specification.

This invention relates particularly to means for protecting the bottoms and banks of rivers from the scour of the current; but it is applicable to any shores which need protection from currents or wave action. The invention consists of a mattress comprising a top layer and a bottom layer or covering of webbing of wire mesh or other suitable materials and filled with stones alone, or with brush and stones, and covered with a layer of concrete where it is exposed above the low water line of the river. It also consists in the character, form and arrangement of the materials of construction whereby they may be readily assembled and placed in the river. What the invention consists in is more particularly set forth hereinafter and claimed in the appended claims.

In the drawings, wherein the same reference characters designate like parts in the several views,

Figure 1 is a bird's-eye view of a river bank, showing a mattress embodying the invention in position, the upper layers being partly removed to disclose the lower layers;

Fig. 2 is a vertical cross-section of the same on the line 2—2 at right angles to the bank;

Fig. 3 is a similar cross-section of a portion of the mattress at the low water line, drawn to a larger scale;

Fig. 4 is a view similar to Fig. 1 of a modified form of the invention;

Fig. 5 is a vertical cross-section of the construction shown in Fig. 4, on the line 5—5 in Fig. 4, at right angles to the bank;

Fig. 6 is an enlarged vertical cross-section of a portion of the mattress shown in Figs. 4 and 5; and

Fig. 7 is a similar vertical cross-section of the upper edge of the construction shown in Figs. 4 and 5, Figs. 6 and 7 being taken on the line 5—5 in Fig. 4.

Figs. 1 to 3 show a mattress arranged for protecting the bottom and shore of a stream or other body of water, the bed and banks of which are subject to erosion.

This mattress consists of a lower web 11 and an upper web 12 of woven wire, reticulated metal, or other material suitable for open-work, and a filling 13 of bundles of brush or loose rock, or of both brush and rock, between the two webs. Each web is composed of a number of strips 14 of webbing of metal or other material laid side by side, and made continuous in both directions by splicing them end to end and by lacing together the edges of contiguous strips. The longitudinal strands of the strips of the upper web are arranged at right angles to the longitudinal strands of those of the lower web. At short intervals throughout the mattress the two webs are bound against the brush and rock with binders or ties 15, which extend through the mattress from web to web.

Below the low water line enough brush is placed between the webs to give the mattress the desired thickness, and enough rock is embedded among the brush to properly sink the mattress, and to cause it to rest on the bottom of the river. Above the low water line the mattress is filled with rock only, and is thoroughly grouted with concrete, leaving a substantial thickness of solid concrete 16 on top of the mattress.

The portion of the mattress below the low water line is assembled on a barge or barges which are anchored in the stream over the proposed location of the mattress. The strips of webbing 11 in the bottom side of the mattress are wound on spools arranged side by side on the barges, and are unwound and covered with brush and stones as the work progresses. The crosswise arranged top strips of webbing 12 are applied one or two at a time, and are tied to the strips 11 at certain intervals. The mattress is assembled, beginning with its upstream edge, on the decks of the barges, and as the work progresses, the barges are dropped down stream and the finished part of the mattress is allowed to slide off the sides of the barge or barges into place on the bottom.

All the edges of the mattress are thoroughly laced together, and a cable 17 is run around the upper and outer edges of the mattress and secured thereto.

The mattress extends out on the bottom of the river or other body of water as far as is necessary or practicable, and its outer upper corner is anchored to the shore some distance up the stream by means of a long cable 18. The mattress is sufficiently flexible to enable it to accommodate itself to irregu-

larities in the bed of the stream, and to sink into holes scoured out by the current from time to time and thereby stop further undermining. The shore portion of the mattress extends to the top of the bank, and is anchored at its inner or upper edge to deadmen 19 on the bank, or to any other suitable anchorage, to retain the mattress in place.

The mattress shown in Figs. 4 to 7 is similar in its general form and construction to that shown in Fig. 3, and is especially adapted for steep banks. The lower web 21 stops about ten feet above the low water line, its top edge being laced to the upper web 22. The upper web is carried to the top of the bank and bent down into a trench 23 which is filled with concrete, thereby forming an anchor for the mattress.

The portion of the mattress below the low water line is filled with brush 24 and stones 25, there being enough stones to sink the mattress and hold it down on the bed of the river or other body of water. The portion of the mattress for about ten feet above the low water line is filled with stones 26. Binder ties 27 connect the two webs at frequent intervals to hold them securely together. A layer of stones 28 is spread on the upper webbing for a few feet above and below the low water line, and a layer of concrete 29 is spread over the top of the mattress from the low water line to the top of the bank. The upper web 22 is thoroughly embedded in the concrete 29 and protected from corrosion.

The upper and outer edges of the mattress shown in Figs. 4 to 7 are bound together and attached to a cable 30, and the outer upstream corner of the mattress is anchored to the shore upstream by a cable 31. The cables and webbing anchor the portion of the mattress below the low water line to the portion above the low water line and to the bank; and the ties and webbing effectually retain the brush and stones in place.

The invention is not restricted to the precise form or method of construction shown in the drawings and described above.

What I claim as my invention is the following:

1. A mattress for shore protection consisting of a flexible stream portion composed of a lower and an upper web of open-work and a filling comprising brush between said webs, said webs being held together at intervals by ties, the shore edges of said webs extending above the low water line and being secured to the bank, and a filling of stones between said webs above the low water line, said webs and filling being embedded in concrete to form a rigid bank portion of said mattress.

2. A mattress for shore protection consisting of a flexible stream portion composed of a lower and an upper web of open-work and a filling comprising brush between said webs, said webs being held together at intervals by ties, the shore edges of said webs extending above the low water line and being secured to the bank, the upper web being embedded in concrete above the low water line, to form a reinforced concrete pavement for the bank and to protect the bank portion of said mattress.

3. A mattress for shore protection consisting of a lower and an upper web of open-work and a filling comprising brush between said webs, said webs being held together at intervals by ties, the shore edges of said webs extending above the low water line and being secured to the bank, the web above the low water line being covered over with concrete to protect it from rust and the part below water being flexible whereby the mattress can accommodate itself to changes in the bed.

4. A mattress for shore protection consisting of a lower and an upper web of open-work and a filling comprising stones and brush between said webs, said webs being held together at intervals by ties, the shore edges of one of said webs extending above the low water line and being embedded in concrete to protect it and to form a solid protective covering for the bank, and the portion below water forming a yieldable protection for the bed.

5. A mattress for shore protection comprising strips of webbing of metal extending from the upper edge to the lower edge of the mattress and secured to the bank along their upper ends and a filling between said webs comprising brush and stones below low water and stones above low water, said strips of webbing being embedded in concrete above the low water line to form a rigid slab pavement, and loosely connected below the low water line to form a flexible mattress.

6. A mattress for shore protection comprising strips of webbing extending from the upper edge to the lower edge of the mattress and embedded in a concrete anchor wall along their upper ends, said webs being covered with concrete above the low water line to protect them and to form a rigid bank pavement and the lower portions of said strips being flexible to permit them to conform to changes in the bottom.

7. A mattress for shore protection consisting of a lower and an upper web of metal open-work, and a filling comprising stones and brush between said webs, said webs being held together at intervals by ties, one of said webs extending above the low water line and being embedded in concrete to form a shore pavement, the upper edge of said web being turned down into a trench and embedded in concrete to form an anchor.

8. The method of protecting banks and

shores which comprises placing sheets of webbing along the bank, extending down the bank and onto a barge, placing stones on said webbing from the shore edge thereof to the edge of the stream, placing stones and brush on the remaining portion of said webbing, covering the whole with a top layer of metal webbing, tying said webbing and top layer together to form a strong flexible mattress, anchoring the shore edge of said mattress to the bank, and dropping the barge downstream, thereby allowing said mattress to drop from the barge into the stream in position to protect the bank and bed from scour.

9. The method of protecting banks and shores which comprises placing sheets of webbing along the bank, extending down the bank and onto a barge, placing stones on said webbing from the shore edge thereof to the edge of the stream, placing stones and brush on the remaining portion of said webbing, covering the whole with a top layer of metal webbing, tying said webbing and top layer together to form a strong flexible mattress, covering the portion of the mattress above the low water line with concrete, anchoring the shore edge of said mattress to the bank, and dropping the barge downstream, thereby allowing said mattress to drop from the barge into position to protect the bank and bed from scour.

Signed at St. Louis, Missouri, this fifteenth of January, 1916.

ANDREW O. CUNNINGHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents Washington, D. C."