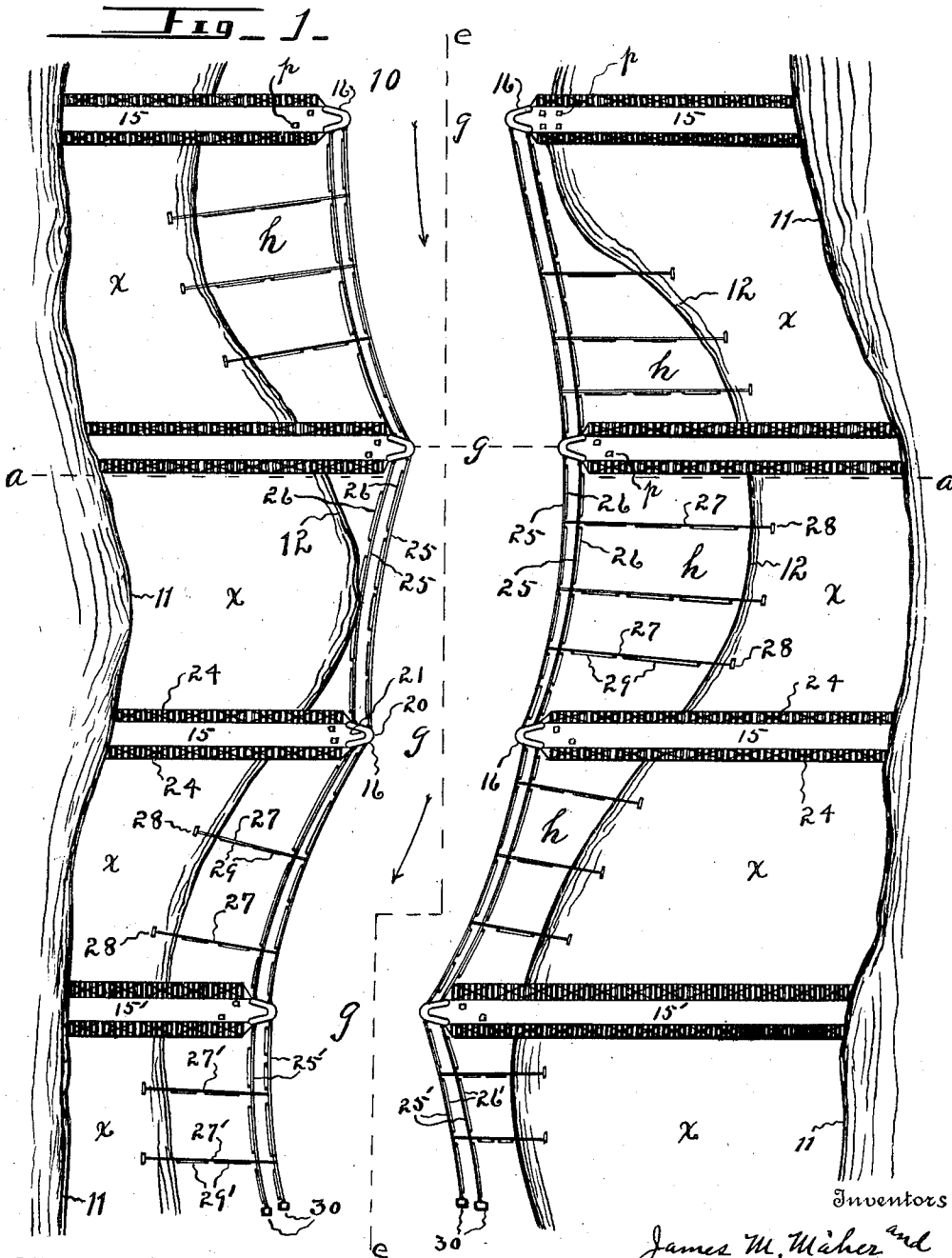


J. M. MAHER & E. BIGNELL.
 COMBINATION LAND RECLAIMING AND CURRENT CONTROLLING MEANS FOR SILT BEARING STREAMS.
 APPLICATION FILED AUG. 24, 1911. RENEWED MAY 13, 1912.

1,031,077.

Patented July 2, 1912.

3 SHEETS-SHEET 1.



Witnesses

Raymond E. Borkenkamp

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By

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Hiram A. Sturges Attorney

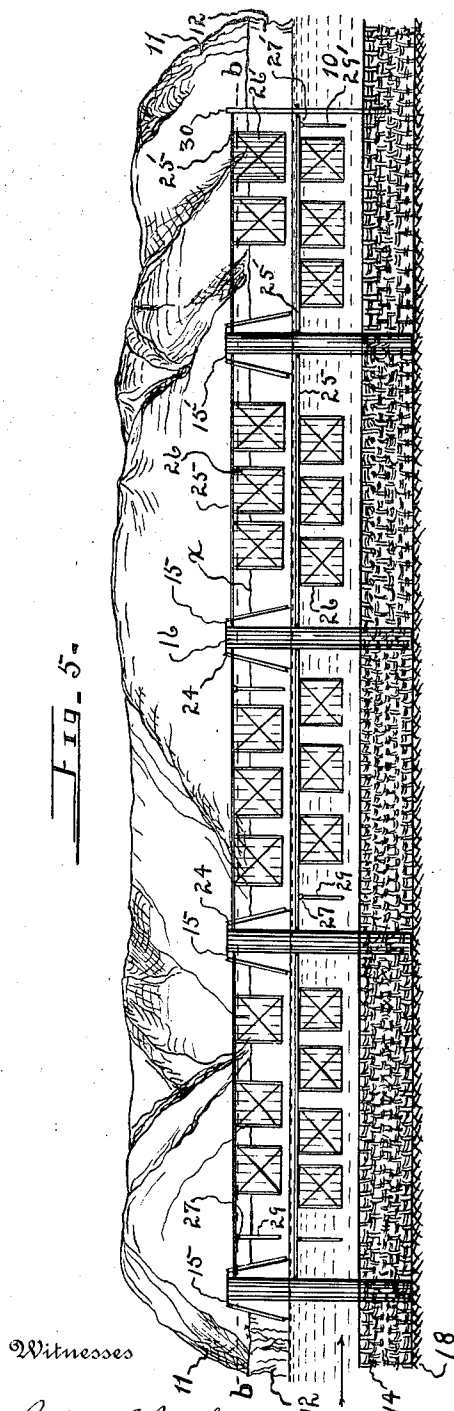
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3 SHEETS-SHEET 3.

Fig. 5.



Witnesses

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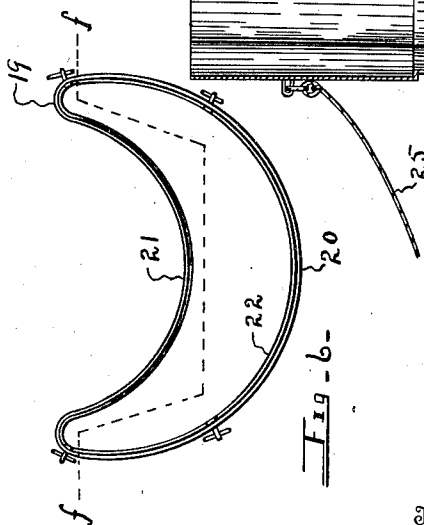


Fig. 6.

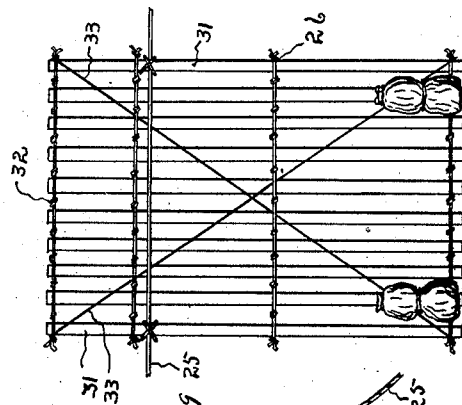


Fig. 8.

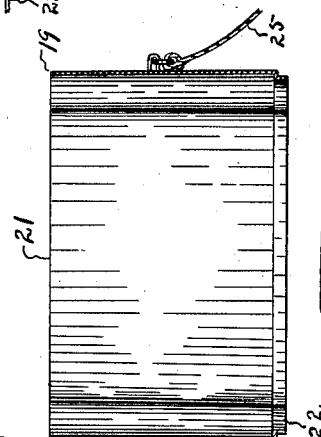


Fig. 7.

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UNITED STATES PATENT OFFICE.

JAMES M. MAHER, OF FREMONT, AND EDWARD BIGNELL, OF LINCOLN, NEBRASKA.

COMBINATION LAND-RECLAIMING AND CURRENT-CONTROLLING MEANS FOR SILT-BEARING STREAMS.

1,031,077.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed August 24, 1911, Serial No. 645,870. Renewed May 13, 1912. Serial No. 697,082.

To all whom it may concern:

Be it known that we, JAMES M. MAHER and EDWARD BIGNELL, citizens of the United States, residing, respectively, at Fremont, in the county of Dodge, State of Nebraska, and at Lincoln, in the county of Lancaster and State of Nebraska, have invented certain new and useful Improvements in Combination Land-Reclaiming and Current-Controlling Means for Silt-Bearing Streams, of which the following is a specification.

This invention relates to a combination land-reclaiming means and current-control for silt-bearing streams, and has for its object to provide a system by means of which the bed of silt-bearing streams may be narrowed and maintained within a channel of well defined limits, the silt being deposited to fill that part of the bed not occupied by the channel, and to fill the low lands adjacent to the stream, thereby reclaiming the low lands so that they will not be subject to overflow.

Some of the larger silt-bearing streams carry volumes of water during all parts of the year sufficient for purposes of navigation, but on account of the formation of sand bars and changes in the course of the main current of the stream, navigation has not been practical; also large areas of land along the course of these streams are subject to periodical overflows, which renders them unfit for cultivation. By use of the herein described system, the stream may be narrowed and confined to a channel of substantially uniform width, so that navigation will be practical, the silt, at times of overflow, being deposited upon the low lands to cause their reclamation.

The invention consists of the novel construction, combination and arrangement of parts as described herein and claimed, and as illustrated in the drawings, it being understood that changes in form, size, proportion and minor details may be made within the scope of the claims without departing from the spirit of the invention, or sacrificing any of its advantages.

In the drawings, Figure 1 is a plan view of a silt-bearing stream and an arrangement of levees, barriers or dikes, and parts supported by the dikes. Fig. 2 is a vertical section on line *a a* of Fig. 1. Fig. 3 is a vertical section on line *c c* of Fig. 2. Fig. 4 is a vertical section on line *d d* of Fig. 2. Fig.

5 is a vertical section on line *e e* of Fig. 1 a part of the fascines and cables being omitted. Fig. 6 is a plan view of one of the metallic sections for the piers or caissons. Fig. 7 is a vertical section on line *f f* of Fig. 6; and Fig. 8 is a vertical, side view of a fascine.

Referring now to the drawing for a more particular description, numeral 10 indicates a silt-bearing stream with permanent, high banks 11, and temporary banks 12; and land areas, indicated at *x*, between these banks and known as "bottom lands" are usually subject to overflow, and therefore have but a limited value, comparatively. The bed of streams of this class is usually of sand or light alluvial soil, and as is well known, it is readily moved by the force of the current, and the depth of the channels of the streams are subject to frequent changes and sand bars are often formed, so that navigation is not practical. Also the temporary banks 12 are often eroded or partly removed by changes of the water current and vast areas of bottom land *x*, between the main body of the stream and the permanent banks 11, are often submerged or removed by the changing current.

In order that deposits of silt may be made upon the bottom land *x*, and erosion of the temporary banks 12 may be prevented, and to the end that the main water current may be confined in a permanent channel so that navigation will be practical, we provide barriers, levees or dikes 15 arranged opposite to each other in pairs and parallel; they may be formed of soil or other similar material, and may be reinforced with piling *p* if desired, and each is disposed substantially at right angles to the stream and extends at a uniform altitude from the permanent banks 11 to terminate in said stream, the terminals being provided with upright standards, piers or caissons 16 adapted to withstand the force of a water current. The barriers or dikes 15 and caissons or piers 16 have an equal height, substantially, and their upper surfaces are a suitable distance above "high water mark" *b b*. At the lower part of Fig. 1 and in Fig. 5 a terminal pair of levees or dikes are indicated at 15' for convenience of description. They are the same in all respects, however, at levees or dikes 15.

The caissons or piers may be of any pre-

ferred form or material and may consist of any desired number of parts, and may be sunk to bed rock 18 or other permanent hard bottom by any preferred means, and they are disposed substantially vertical. They may be constructed to advantage of metallic sheets formed into sections 19, each having a convexed front surface 20 and a concaved rear surface 21 to form a crescent-shaped casing, each section or casing having, at one of its ends, a reduced part to form a flange 22. The sections, if formed in this manner, may be disposed one upon the other, the flange of each upper section being disposed upon the inner side of the next lower section to provide the complete caisson or pier 16, the hollow crescent-shaped sections being filled with cement or other heavy filling material. Before the piers or caissons have been sunk, sand bars may be formed at the desired points as foundations for the parallel dikes or levees. These sand bars are preferably formed in the stream by use of the riprapping system described in Letters Patent to James M. Maher, No. 975,551, dated Nov. 15, 1910, or by any other suitable means. The dikes are preferably formed with flat upper surfaces and upwardly-convergent side walls, and upon their sides may be supported, by flexible strands or cables 23 passing transversely through the dikes, the fascines 24; and fascines 24 may have bearing upon either or both sides of the dikes and may be used to substantially cover the sides of the dikes from the piers to the permanent banks of the stream, the function of the fascines, in this instance, being to prevent disintegration or erosion of said dikes from action of the water at times of an overflow of the areas x of the land. Fascines 24 and other fascines hereinafter mentioned may be of any suitable construction, but, preferably, they consist of a plurality of slats 31, disposed side-by-side in a single plane, wire 32, or other strong, flexible material being used to secure the slats together; and diagonal braces or wires 33 may be employed to maintain the frame, thus provided, in rectangular form, and, as shown in Fig. 8, the lower part of the fascines should be weighted at or near their bottoms, so that by operation of gravity, they will remain, normally, in an upright position, when suspended in a water current, as hereafter explained.

At 25 are indicated primary cables extending between and secured to the piers or caissons at the same side of the stream, and upon these primary cables, at longitudinal intervals thereof, and by any suitable means, may be secured fascines 26; and secondary or cross-cables 27 may be employed, these being secured upon and at longitudinal intervals of the primary cables at one of their ends, their opposite ends being anchored at

28 in areas X of the land, and bearing, at longitudinal intervals, fascines 29.

Posts or piling 30, preferably of metal, may be driven in the bed of the stream at points below or down-stream from the terminal pair 15' of levees, for the support of one terminal of primary cables 25', their opposite ends being supported by the piers of levees 15', and secondary or cross-cables 27' may be employed, these primary and cross-cables bearing fascines indicated, respectively at 26' and 29', the arrangement of the cables and fascines last described being substantially the same and for the same purposes as those mentioned in the preceding paragraph.

By the arrangement of parts as described each fascine is disposed substantially parallel with the cable by which it is supported, and the primary and secondary fascines are disposed at, substantially, right angles to each other; and each pair of dikes or levees form, between their adjacent piers, a passageway g . This passageway may have any desired width, and there will be a tendency for the water to move in a channel or current directly from one passageway g to another. Silt carried by the current will, of course, be moved down stream to points below each caisson or pier, and on account of the usual formation of eddies the silt will be moved toward the shore, resulting in the formation of sand bars upon areas h , said areas being between fascines 26 and the temporary shore line 12, fascines 29 aiding in these formations or deposits. This is desirable, since it limits the width of the main channel. After sand bars have been formed to fill areas h , the fascines and cables remain buried in the soil to thereafter prevent erosion. During periods of high water, areas x and h may be covered with water, but fascines 24 tend to prevent erosion of the dikes, and the operation of fascines 26 and 29 will cause additional deposits to be formed upon these areas, and by reason of repeated overflows, said areas will be gradually covered with soil to a height substantially equal to the high water mark $b\ b$, and these areas will therefore be reclaimed, and will be transformed to valuable land. As described, a channel will be formed to include each of the passageways g , and since the current will be confined to this channel, the carrying force of the water will cause a comparatively deep channel to be maintained, the stream thereupon being available and practical for purposes of navigation.

While we have shown the pairs of levees at substantially uniform distances apart, longitudinally of the stream, we do not limit ourselves to this feature, for the course and fall of the stream must be considered.

While we have shown both primary and secondary cables, with fascines, in many in-

stances the secondary cables and fascines supported thereby may be dispensed with, and we do not limit ourselves in this respect. Also, while we have shown a plurality of pairs of levees, and prefer to employ the same, a single pair of levees with fascines maintained as described would be fully operative and useful, and we do not limit ourselves to a plurality of levees. Also, a single levee, if maintained in a position to extend partly across a silt-bearing stream substantially at right angles to the current, would operate in a measure to control the current and to cause deposits of silt at points down-stream therefrom, and would be especially effective for these purposes, if fascines are used and are supported as illustrated in the drawings.

In addition to the advantages thus enumerated of the herein described system, it may be stated that the channel maintained will be of less length than formerly, this feature being of especial importance when distance for navigation is considered. Also fascines 26 and 29 during local storms and rains, tend to prevent the "wash" of soil from the permanent banks into the stream.

Having fully described the several parts and their uses, a further explanation relating to operation is not required.

What we claim and desire to secure by Letters Patent is,—

1. In a land-reclaiming means and current control for silt-bearing streams, a levee disposed substantially at right angles to and extending into the stream from one of the banks thereof, and a fascine disposed in the stream while supported by said levee.

2. In a land-reclaiming means and current control for silt-bearing streams, a levee disposed substantially at right angles to and extending into the stream from one of the banks thereof, a cable supported by the levee, and a plurality of fascines disposed in the stream while supported by and at longitudinal intervals of said cable.

3. A combination land-reclaiming means and current control for silt-bearing streams, comprising a levee disposed substantially at right angles to and extending into the stream from one of the banks thereof, a primary cable supported by the levee, secondary cables disposed in angular relation to and supported by said primary cable, and a plurality of fascines disposed in the stream while mounted upon said primary cable and secondary cables.

4. A land-reclaiming means and current control for silt-bearing streams, comprising a pair of levees disposed adjacent to each other upon opposite sides of and extending partly across the stream and forming a passageway therebetween, and a plurality of fascines supported by the levees while disposed in the stream.

5. In a land-reclaiming means and current control for silt-bearing streams, the combination with a pair of levees disposed adjacent to each other upon opposite sides of and extending partly across the stream to form a passageway therebetween, of a plurality of cables supported by the levees, and a plurality of fascines disposed in the stream while mounted upon and at longitudinal intervals of said cables.

6. In a land-reclaiming means and current control for silt-bearing streams, the combination with a pair of levees disposed adjacent to each other upon opposite sides of and extending partly across the stream to form a passageway therebetween; primary cables disposed longitudinally of the stream while supported by the levees; secondary cables disposed in angular relation to and connected with said primary cables; a plurality of fascines disposed in the stream while mounted upon and at longitudinal intervals of said primary and secondary cables.

7. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a levee formed at its terminal with a vertically-disposed pier, said levee being disposed at substantially right angles to the stream, with said pier intermediate the banks thereof.

8. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a levee formed at its terminal with a vertically-disposed pier, said levee being disposed in angular relation with reference to and with its pier intermediate the banks of the stream, and a plurality of fascines supported by said pier while disposed in said stream.

9. In a combination land-reclaiming and current controlling means for silt-bearing streams, a pair of levees having upwardly-convergent sides, each levee being provided with a vertically-disposed, metallic terminal, said levees being disposed substantially in alinement with reference to each other and in angular relation with reference to and extending within the stream to form a water way between said metallic terminals; cables traversing the levees; fascines having bearings upon the sides of the levees and connected with the cables, and a plurality of fascines disposed in the stream and supported by the metallic terminals of said levees.

10. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a pair of levees formed with upwardly-convergent sides, each levee being provided with a metallic, upright terminal with a convexed outer wall; said levees being disposed substantially in alinement with their metallic terminals within the stream to provide a water way therebetween; cables

traversing the levees; fascines having bearings upon the sides of the levees and secured to the cables; primary cables extending longitudinally of the stream and supported by said metallic terminals; secondary cables connected with the primary cables and with the shore of the stream, and a plurality of fascines disposed at longitudinal intervals of and connected with said primary and secondary cables.

11. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a plurality of levees arranged in pairs at longitudinal intervals of the stream, the levees of each pair being provided with a terminal pier and disposed in alinement upon the opposite sides of and extending within said stream to dispose their piers adjacent to each other; cables extending between and supported by the piers of the adjacent levees at the same side of the stream and a plurality of fascines disposed at longitudinal intervals of and supported by said cables.

12. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a plurality of levees arranged in pairs at longitudinal intervals of the stream, the levees of each pair being disposed upon opposite sides of the stream and each levee being provided with a pier at one of its terminals, the piers of each pair of levees being disposed substantially in alinement with the levees of said pair and adjacent to each other within the stream to form therebetween a water passageway; primary cables

extending between and connected with the piers at the same side of the stream; secondary cables connected with the primary cables and with the shores of the stream; and a plurality of fascines disposed at longitudinal intervals of and secured to said primary and secondary cables.

13. In a combination land-reclaiming and current-controlling means for silt-bearing streams, a plurality of levees arranged in pairs at longitudinal intervals of the stream, each being formed with upwardly-convergent sides and provided with a pier at one of its terminals, the levees of each pair being disposed at opposite sides of and extending within the stream to dispose the piers thereof opposite to each other; flexible members traversing the levees; fascines having bearings upon the upwardly-convergent sides of the levees while connected with said flexible members; primary cables extending between and connected with the piers of the levees; secondary cables connected with the primary cables and with the shores of the stream; and a plurality of fascines disposed at longitudinal intervals of and secured respectively to said primary and secondary cables.

In testimony whereof we have affixed our signatures in presence of two witnesses.

JAMES M. MAHER.
EDWARD BIGNELL.

Witnesses:

OSCAR G. STUTHEIT,
GEO. J. WOOD.