D. F. SHELDON.

CURRENT DEFLECTOR AND SYSTEM OF BANK PROTECTION.

APPLICATION FILED DEC. 2, 1915.

1,230,608. Patented June 19, 1917.

Fig. 1.

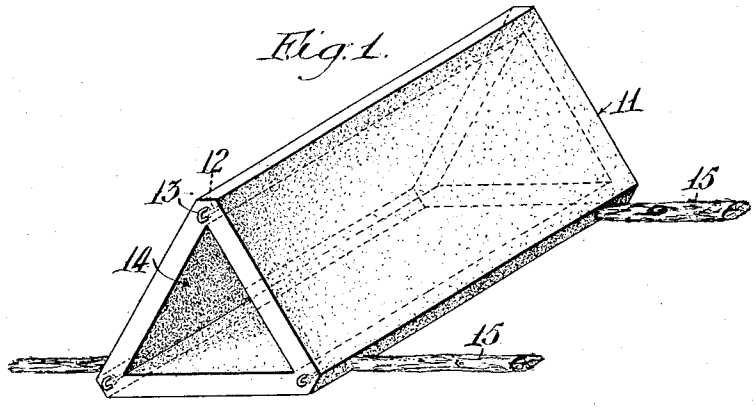


Fig. 2.

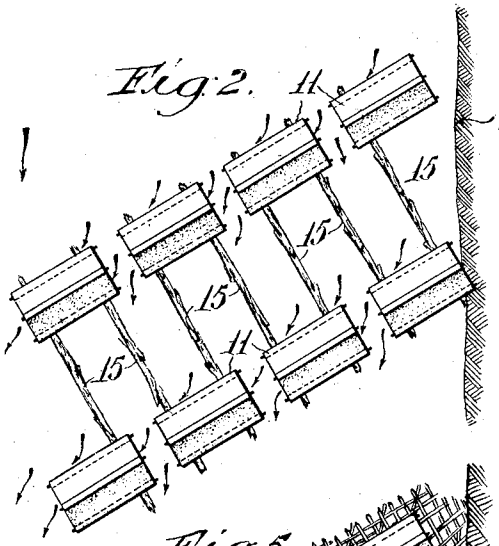


Fig. 3.

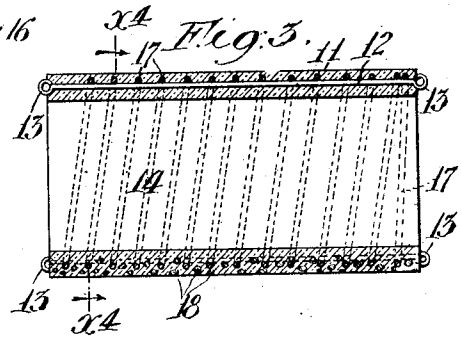


Fig. 5.

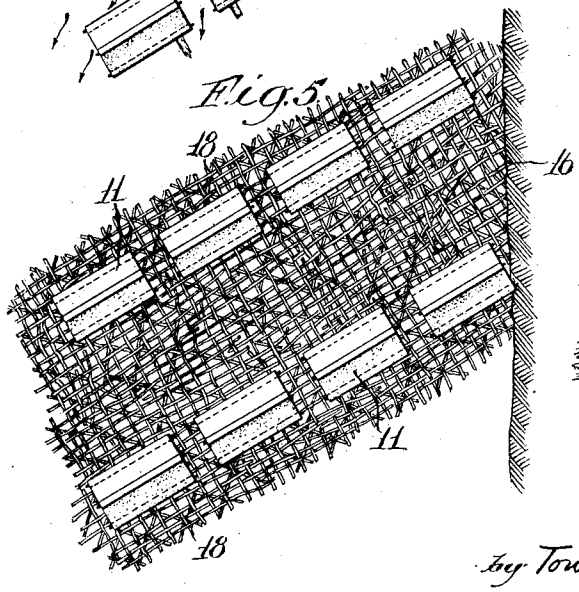
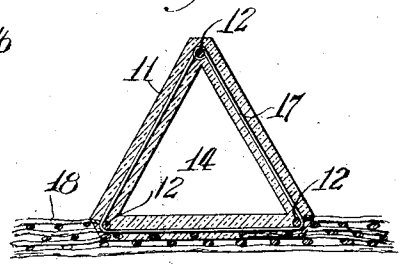


Fig. 4.



Inventor

Daniel F. Sheldon

by Townsend Graham & Kain

His Attorneys

THE NORRIS PETERS CO., PHOTO LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DANIEL F. SHELDON, OF VENTURA, CALIFORNIA.

CURRENT-DEFLECTOR AND SYSTEM OF BANK PROTECTION.

1,230,608. Specification of Letters Patent. Patented June 19, 1917.

Application filed December 2, 1915. Serial No. 64,781.

To all whom it may concern:

Be it known that I, DANIEL F. SHELDON, a citizen of the United States, residing at Ventura, in the county of Ventura and State of California, have invented a new and useful Current-Deflector and System of Bank Protection, of which the following is a specification.

My invention relates to the art of stream control. Rivers and streams when in a swollen condition due to flood water are often very destructive to property located on the banks, due to the scouring action of rapidly moving currents which cut into the banks and carry away the material of which the bank is formed. This material is carried in suspension by the water and flood waters ordinarily carry large amounts of such material which is hereinafter called silt, this term being used herein to denote sand, gravel, or any pulverulent material which may be carried by the water.

Such silt is introduced into the water by the action of heavy currents against the bottom or banks of the stream and is held in suspension only while the water is in rapid motion, settling out whenever the course of water is impeded so that its velocity is substantially reduced. At points where the current becomes sluggish, large deposits of silt will form bars, or, if properly controlled, will add materially to the extent of the bank of the stream.

The principal object of my invention is to provide means by which such bars may be formed for the purpose of increasing by accretion the land bordering on the stream and for the purpose of protecting this land against the eroding action of the stream.

I have found that it is not necessary to arrest the full flow of the stream to produce such accretions, and that where the current is strong it is not desirable to attempt it. It is sufficient if the layer of water directly adjacent to the banks and bottom of the stream is slowed down sufficiently to allow the silt carried therein to deposit, the remainder of the stream being allowed to flow on unimpeded.

By my invention I provide means by which a portion of the stream flow is made to give up its silt, the remainder of the stream being allowed to flow on unimpeded.

My invention consists broadly in utilizing concrete blocks for setting up cross currents and slowing down a portion of the stream so that the silt will settle out around the blocks.

My invention consists further in utilizing concrete blocks which have a wide base in proportion to their weight, so that they will be self-supporting, will not sink out of sight rapidly if placed on soft ground or quicksand, and will be securely locked in place by the deposition of silt around them.

My invention consists further in using a particular form of concrete block with a wide base, namely, the hollow prism. This hollow prism has, not only the advantage of a wide base combined with comparatively light weight, but in addition it has sloping sides so that the force of the river is divided into two compartments, one of which tends to turn the block over, and the other of which tends to force it downwardly against its base, and to resist the turning movement of the stream, so that such blocks will remain in place even in very heavy currents.

My invention consists further in the broad conception of concrete blocks arranged in series, these series being flexibly tied together. As a means of tying them together I use the flexible poles or mat as above mentioned. Obviously other forms of mat may be used, such as those which are formed of bundles of willows tied together with wire.

My invention still further consists in a combination of the hollow concrete prism with the flexible mat, and of tying these prisms either by the use of mats, poles, or otherwise.

By the use of such concrete prisms set in rows, I am able to set up cross currents and slow down the flow of water therearound to such a degree that silt is deposited which rapidly fills in around the prisms locking them securely in place and building up the bank so that it is protected from further erosion by the stream.

Referring to the drawings, which are for illustrative purposes only:—

Figure 1 is a view of one of the diversion units, together with portions of tie members which are cast therein.

Fig. 2 is a plan view on a reduced scale of a number of such units, this view also showing the method of securing the diversion units therein.

Fig. 3 is a sectional view of a unit similar to that shown in Fig. 1 as applied to a willow mat.

Fig. 4 is a sectional view on a plane indicated by the line x^4—x^4 of Fig. 3.

Fig. 5 is a plan view of the mat with the diversion units in place thereon.

In the embodiment of my invention shown in the drawings, I employ diversion units preferably formed of reinforced concrete, these units being in the form of hollow prisms. Such a prism is shown at 11 in Fig. 1, being equipped with longitudinal metal reinforcements 12 extending through the corners, and having eyes 13 formed in the extreme ends thereof, these eyes projecting from the body of the concrete so that the various units may be tied together by wire ropes, or the like, or may be anchored by wire ropes, or the like, if desired. An opening 14 may extend entirely through the interior of the unit, or cross walls may be formed therein to further strengthen the unit if desired. In the method of securing the units shown in Fig. 2 willow poles 15 are employed.

The method of using the invention to protect the bank 16, which it is desired to protect, is as follows:

The general direction of the current being that shown by the arrow in Fig. 2, the units are placed in two, or more, rows approximately eight feet apart, being cast in place as shown, the poles 15 extending across and tying alternate units in the two rows together. The units are further so placed that the open space between adjacent units in one row is opposite the center of the units in the other row. When so placed in the shallow water next to the shore, the units rest upon the bottom, being tied together by the poles 15.

In practice as used in ordinary streams I find it convenient to make a unit about six feet long and forty-two inches on a side, using green willow poles four to six inches in diameter, and of sufficient length to tie the two rows together as shown. In practice I cast the units in place erecting the reinforcement and tying it with wire to the poles, and then casting the concrete about the reinforcement. The units I have used weigh about three thousand pounds. As willow, especially when wet, is very flexible the various units find their own position on the bottom, being held together however against any great amount of deflection by the poles 15. By using green willow I provide an additional anchorage as the poles take root and throw out branches so that a closely woven thicket is soon formed. In practice the units are cast in place as explained above, and they tend to collect debris, sand, etc., which is brought down by the current gradually forming a projecting bar which protects the bank 16 against the erosion of the stream.

It is, of course, understood that a person skilled in the art, by the exercise of proper judgment can locate the units in such a position that they accomplish the above results for long stretches of bank, as silt tends to deposit in the slack water formed below such a bar. The triangular form is most suitable in that it has a broad base, with sloping sides against which the current cannot get a direct push. It is also desirable in that when it is partially sunk in the ground it is securely locked in place, the ground overlapping on the sides so that the broad base cannot be easily dislodged. The hollow form is desirable in that the weight of the unit must bear a definite proportion to the area of its base so that it will not sink rapidly out of sight on soft ground. When prisms having an uninterrupted central opening are used, there is a considerable flow therethrough, this cross current assisting in setting up eddies in which the silt deposits.

The reinforcing method used is well illustrated in Fig. 3 in which the bars 12 are shown, and in which wire reinforcements 17 are shown passing around the walls of the unit, and connecting the reinforcing bars 12 together also shown in Fig. 4.

An alternate method of using my invention is shown is Fig. 5, in which a mat 18 formed of willow is first laid in the selected position projecting outwardly from the bank 16, the members 11 then being cast directly on the mat so that portions of the mat project into the concrete of the unit, locking the units securely to the mat. The units then serve the double purpose of loading down the mat, and deflecting the current therefrom.

In either form shown in Figs. 2 or 5, it will be noted that there is considerable flexibility between the units, this flexibility being provided by the poles 15 in Fig. 2, and by the mat 18 in Fig. 3. Such a flexibility is highly desirable as the bottom is rarely stable and it is very desirable that each unit find its own seat.

In especially exposed locations it may be desirable to anchor the units by wire ropes secured to piling set in the stream, or to trees on the bank thereof. It may also be desirable to connect the eyes 13 of the units together by wire, or wire rope.

While I have illustrated and described certain embodiments of my invention, I do not wish to be understood as limiting myself to these specific forms.

I claim as my invention:—

1. A diversion unit for bank protection comprising a hollow concrete prism having longitudinal reinforcement rods in the corners thereof, eyes formed on said rods projecting from the body of the concrete at either end of the prism, and reinforcement tying said longitudinal rods together.

2. A system of bank protection compris-

ing a series of hollow concrete prisms, and a willow mat on which said prisms are cast, the concrete partially surrounding said mat so that the prisms are flexibly connected together.

3. A diversion unit for bank protection comprising a concrete prism having longitudinal rods in the corners thereof, said prism having a prismatic hole extending longitudinally through the center thereof, eyes formed on said rods projecting from the body of the concrete at either end of the prism, and reinforcement tying said longitudinal rods together.

4. A system of bank protection comprising a series of diversion units arranged in rows with wide spaces between the rows and spaces between the units in any row; and a series of flexible poles connecting the units in one row with the units in another row.

5. A system of bank protection comprising a series of diversion units arranged in rows with wide spaces between the rows and spaces between the units in any row, the spaces between units in one row being opposite the center of a unit in another row; and a series of flexible poles connecting the units in one row with the units in another row.

6. A system of bank protection comprising a series of diversion units arranged in rows with wide spaces between the rows and spaces between the units in any row; and a series of flexible poles connecting the units in one row with the units in another row, said units having water channels extending longitudinally through the center thereof in the direction of the row.

7. A system of bank protection comprising a series of diversion units arranged in rows with wide spaces between the rows and spaces between the units in any row, the spaces between units in one row being opposite the center of a unit in another row; and a series of flexible poles connecting the units in one row with the units in another row, said units having water channels extending longitudinally through the center thereof in the direction of the row.

In testimony whereof, I have hereunto set my hand at Ventura, California, this 22nd day of Nov., 1915.

DANIEL F. SHELDON.

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