March 7, 1933. S. D. HENRY 1,900,341

MEANS FOR PROTECTING EARTHEN DAMS, RIVER LEVEES, ETC

Filed Aug. 31, 1931

Fig. 1.

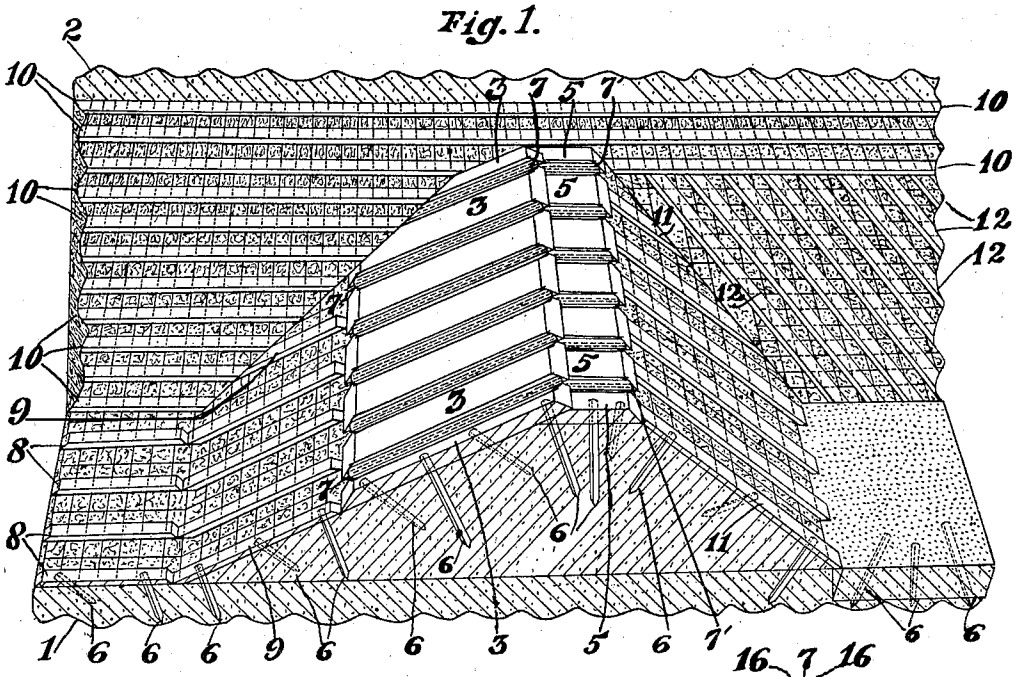


Fig. 2.

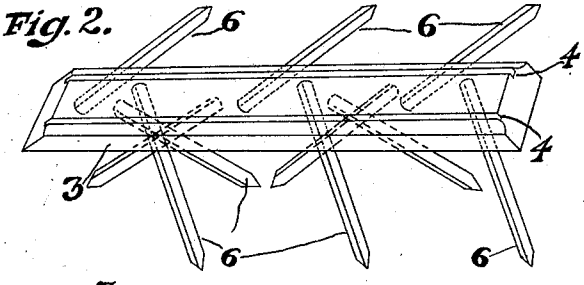
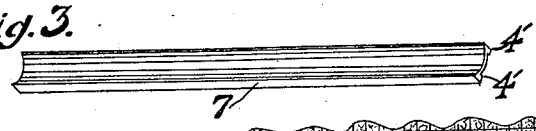


Fig. 3.



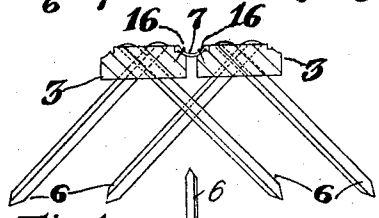


Fig. 4

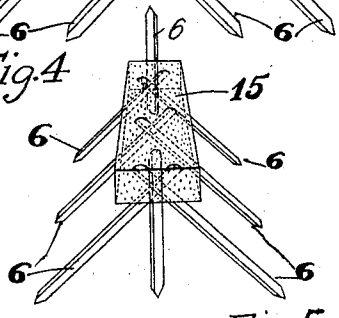
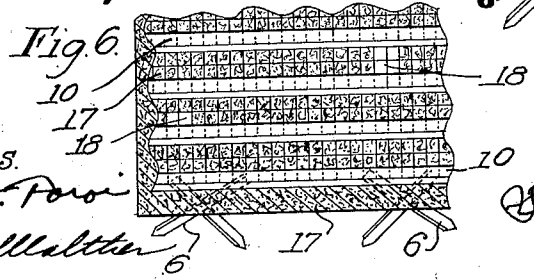


Fig. 5

Fig. 6.



WITNESSES.

Chas. O. Parsi

Frank Allen Letter

INVENTOR.

Skelton D. Henry

Patented Mar. 7, 1933 1,900,341

UNITED STATES PATENT OFFICE

SKELTON D. HENRY, OF HOUSTON, TEXAS

MEANS FOR PROTECTING EARTHEN DAMS, RIVER LEVEES, ETC.

Application filed August 31, 1931. Serial No. 560,403.

Reference is made to the accompanying drawing for explaining the invention in detail. Figure 1 is a transverse vertical section of the usual form of an earthen dam, its end abutting a sloping side-hill or earthen embankment. The side-hill, the apron and part of the dam on the water side, and the overflow side of the dam, each being overlaid with a matting of excelsior in a combination with a flexible metallic netting, superposed by a series of plain beams, are also shown in Fig. 1.

Figure 2 is an enlargement of a beam in combination with stakes or piles attached thereto.

Figure 3 is an enlargement of a metal gutter 7.

Figure 4 is a cross section of two of the adjacent beams and the metal gutter and stakes attached thereto.

Figure 5 is a concrete beam 15 with stakes attached thereto. Fig. 6 is a fragmentary horizontal section of the side-hill in Fig. 1 showing the matting of excelsior 17, the flexible metallic netting, 18 being meshes of the same, and the plain beams 10 and the disclosed stakes 6.

In Figure 1, number 1 is a transverse vertical section of the dam's reservoir floor, and 2 is a section of the top surface of the earthen embankment. Numbers 3 and 5 are beams lying longitudinally with the flow of the water on the upper part of the reservoir face and the crest of the dam, secured thereto by the stakes 6 passing through slots or holes in the beams and driven into the earth at oblique angles from each other. Those beams may be made of wood, concrete, or metal. It will not be necessary to slope their ends. The stakes or piles may be of any suitable material, preferably of metal. Numbers 7 and 7′ are the sheet metal gutters extending the lengths of the beams 3 and 5, the dotted hidden lines in them indicating the gaps between the said two adjacent beams.

In Figure 2, the enlarged beam 3 shows its upper corners chamfered and two small grooves 4 extending its length in order to receive the concaved metal gutter 7 with its flanges 4′ shown in Figure 3.

In the cross sections in Figure 4, the metal gutter 7 is attached and fastened to the beams 3 by small spikes or nails 16. The cross sections of the beams 3 and 5 are similar and they are secured to the dam in the same way.

In Figure 1, the beams 8 lie horizontally on the apron of the dam on the reservoir side; the beams 9 lie inclined on a part of the dam's face; the beams 10 lie horizontally on the face of the sloping side-hill; the beams 11 lie inclined on the overflow side of the dam's face; the beams 12 are in a slanting position on the remainder of the face of the sloping side-hill. At the end of the dam, the ends of some of the numbers 3, 5, 7, 9, 10, 11, are sloped to fit the incline of the side-hill. In dam-building practice it will not be necessary to slope the said numbers.

If the beams 3 and 5 be made of wood, their upper corners may be chamfered and the grooves for the reception of the gutters 7 cut in them at the lumber factory furnishing them; or they may be anchored in their permanent positions on the dam and a small portable machine employed to chamfer their upper corners and to cut those small grooves in them. If they be of concrete they may be made on the dam, first by driving those stakes into the earth at the desired places, their upper ends projecting to a suitable height and a form similar to number 15 in Figure 5 used to give the beams 3 and 5 their proper shapes, the concrete then to be poured around the projecting ends of those stakes 6. While those concrete beams 3 are in the plastic state the gutters 7 may be impressed into them to cover the gaps between any two adjacent beams to prevent the leakage of water therethrough. The gutters 7 may then be fastened to the beams 3 and 5 by small spikes or nails 16 in the same way as in Figure 4. The said beams 3 and 5, as well as any of the other beams mentioned herein, may be made of concrete at a distance from the dam, of proper shape and with the slots or holes made in them to admit the stakes 6 and ready to be placed on the dam. Narrow strips of wood may then fill the gaps between any two adjacent beams and the gutters 7 fastened to them by nails.

I have demonstrated by actual tests by us-

ing the same number and size of piles and on the same soil that those driven into the ground at a 45-degree angle from a perpendicular had far greater anchoring and supporting strength than those driven vertically.

The principles of the anchoring and supporting strength of a series of those stakes or piles for securing bodies to the earth as I have illustrated herein may be compared to those of the roots of a tree or the fangs of a molar tooth.

In Figure 1, beams 8 to 12 inclusive superpose a system of wire netting which, if laid over a mass of excelsior or other sort of fibrous material, and the combination applied to the exposed earth of a dam, dike, or levee, it will prevent sloughing and protect against erosion by flowing water. It will further be a protection against crawfish, eels, gophers, muskrats and other aquatic animals,

It is a good practice in building earthen dams to treat its reservoir face with a thin puddle of clay. A mass of excelsior in combination with a wire netting held in place by those beams already explained will be a good retainer for the puddled clay and silt.

What I claim therefore and desire to secure by Letters Patent is:

1. A water-retaining earthen dam having a series of beams overlying its crest and the upper part of its water face, the said beams being in a combination with metallic gutters, the said beams having their upper longitudinal corners chamfered and two narrow vertical grooves (one adjacent to each chamfered corner) extending the length of the face of the beam, the metallic gutters being concaved and their margins flanged downward, the flanges fitting into the aforesaid grooves, the gutters covering the gaps between any two adjacent beams and secured thereto by nails to prevent the leakage of water therethrough.

2. A water-retaining earthen embankment having its surface covered by a matting of fibrous material and the same overlaid with a flexible metallic netting and the combination anchored to the surface of the embankment by a series of beams superposed on the mass of the said matting and netting, the said beams having slanting apertures through them in various directions through which stakes are driven into the embankment in divergent directions from each other and from a perpendicular to the plane of the surface.

SKELTON D. HENRY.