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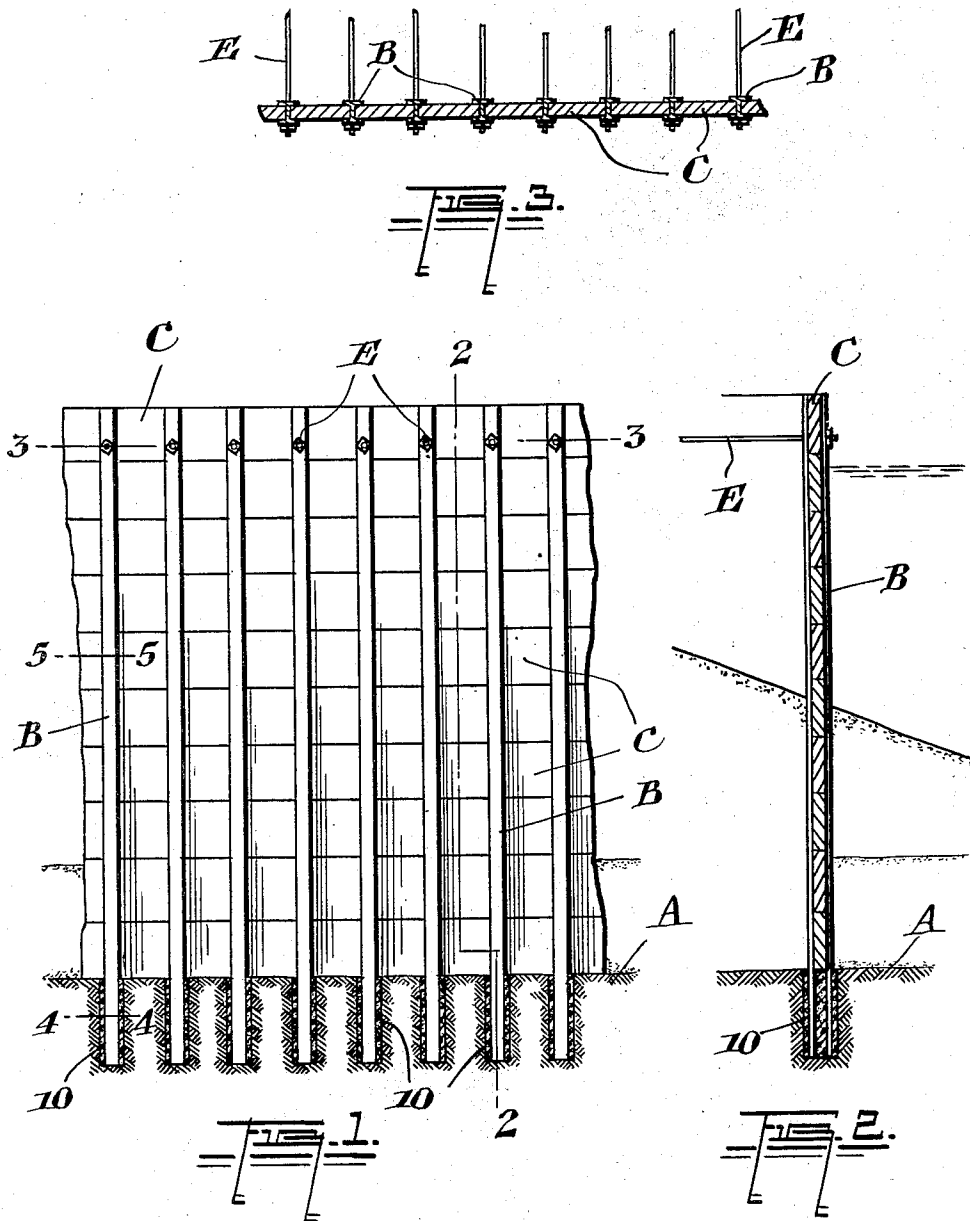
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RETAINING WALL AND METHOD OF CONSTRUCTING IT

Filed March 16, 1933

2 Sheets-Sheet 1



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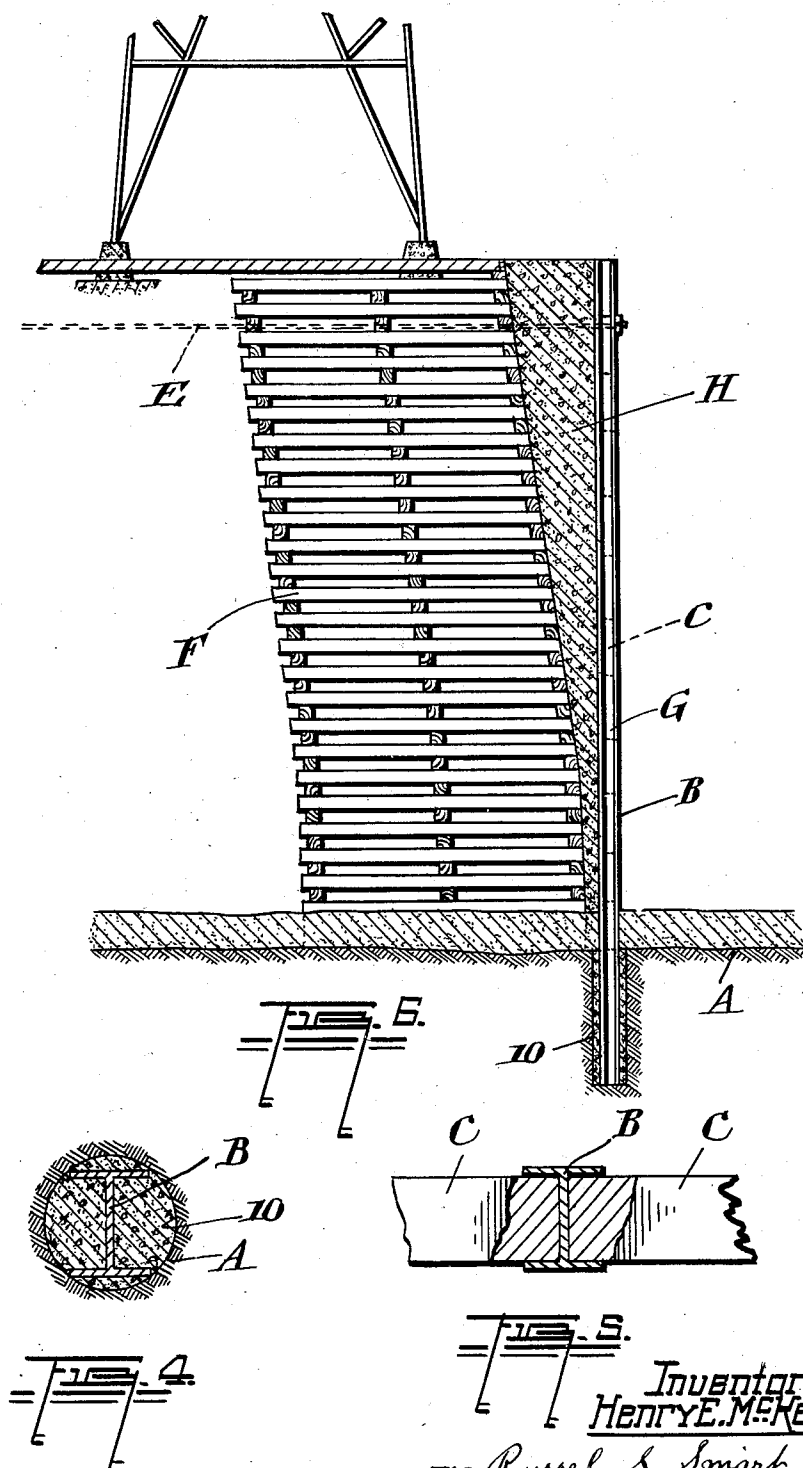
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UNITED STATES PATENT OFFICE

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RETAINING WALL AND METHOD OF
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5 Claims. (Cl. 61—39)

This invention relates to a method of anchoring structural members to a foundation bed, and particularly in connection with the construction and repair of wharves, quays, dams, coffer dams, groins, retaining walls and shore protection walls, and an object of the invention is to provide a simple method of securing a fixed and positive anchorage in the rock, shale, hard pan or the like which forms the foundation bed.

Further objects are to secure such an anchorage as will enable advantage to be taken of the negative bending moment of the structural elements, and generally to obtain greater structural strength without increased cost.

Further objects of the invention are to enable the method to be carried on without necessity of resorting to blasting or like operations, which, when the anchorage was near existing structures, would be attended with danger of undermining or other disturbance to them.

In the construction of wharves, quays, dams, coffer dams, groins, retaining walls and shore protection walls three practices have been resorted to; the first is that of the gravity type structures, which are entered into position by their own weight, and their resistance to horizontal pressure is due to the friction at the base, which is necessarily an indeterminate quantity; the second, sheet piling is driven into the bed and anchored at the bottom by the weight of the material in front of the wall, the effect of which is also indeterminate, and third, by sinking caissons into the rock and anchoring them by means of dowel pins, the effect of which is uncertain due to the possibility of bending. The difficulty of any of these forms of construction is increased where there is an overburden of softer material or where the foundation bed itself is not of sufficient hardness to enable a sufficient penetration to be obtained where sheet piling is used.

According to the present invention the structural members which are to be anchored are inserted in pre-formed pockets, conveniently formed by boring operations, of substantial depth in the foundation bed adapted to receive the ends of the structural members, in which such members are held by a suitable setting material, all as hereinafter more fully set forth and described in the accompanying specification and drawings.

In the drawings:—

Figure 1 is a sectional elevation of a retaining wall constructed in accordance with the present invention.

Figure 2 is a sectional elevation taken on the line 2—2 of Figure 1.

Figure 3 is a sectional plan taken on the line 3—3 of Figure 1.

Figure 4 is a sectional detail taken on the line 4—4 of Figure 1.

Figure 5 is a sectional detail taken on the line 5—5 of Figure 1.

Figure 6 is a sectional elevation showing the invention applied to the supports of an existing unsafe crib structure.

In the drawings like characters of reference indicate corresponding parts in all the figures.

Referring first to the forms shown in Figures 1-5, A indicates the foundation bed of rock, shale or hard pan in which are formed a series of pockets 10 of substantial depth and adapted to receive one end of each structural member B, sufficient space being left between the members and the pocket to receive a setting material, such as cement or concrete. These pockets may be conveniently formed by a boring operation, a rotary or other drill, and may be made of a depth sufficient to give the necessary rigidity to the structural member B, which normally extends vertically. This depth for any given structure can be readily calculated, since, owing to the manner of constructing the anchorage, the fixity of the structural members is assured and the negative bending moment at the foot of the wall may be taken advantage of and allowed in the calculations.

The structural members B, which extend parallel to each other, may be of any convenient shape, those shown being of H-shaped beams.

In forming the pockets 10, if there is an overburden, pipe casings may be used and forced through the overburden either by driving, jetting or boring. The pockets 10 are then bored to the required depth and the structure members B are inserted in the pockets as indicated on the drawings. The voids in the pockets 10 are then filled with concrete or other suitable setting material, and the pipe casings, if used, are removed. In some instances the pipe casings may be allowed to remain in position, the voids between them and the structural members being filled with concrete. To complete the wall stop log members C, of concrete, steel or wood, may be jetted, driven or dropped into place between the structural members B. If desired additional support may be given to the top of the structural members by tie-rods E.

Referring now to Figure 6, which shows the method and structure as applied to the support of an existing crib which is unsafe, F indicates the existing unsafe structure and G the retaining

5 wall constructed as already described, between which and the crib a back-fill H of concrete, sand or other suitable filling material may be inserted. In this case it will be observed that the anchorage can be effected without the use of explosives and therefore without danger of undermining or disturbing the existing structure.

10 According to the present invention, owing to the fixity of the anchorage in the foundation bed, a retaining wall or groin may be designed as a cantilever, and advantage may be taken of the negative bending moment, as already pointed out.

15 Various modifications may be made in the invention without departing from the spirit thereof or the scope of the claims and, therefore, the exact forms shown are to be taken as illustrative only and not in a limiting sense, and I desire that only such limitations shall be placed thereon as are imposed by the prior art or are specifically set forth in the appended claims.

20 What I claim as my invention is:

1. The method of building a retaining wall upon a bed of solid rock, which consists in drilling a series of vertical sockets in the rock, placing a beam as a simple beam vertically on end in each socket, reducing the bending moment of each beam by rigidly and structurally fixing its inserted end with respect to its socket, and connecting the upstanding portions of the beams by a bearing surface arranged to receive a horizontal load.

2. The method of building a retaining wall upon a bed of solid rock, which consists in drilling a series of vertical sockets in the rock to a uniform depth below the rock level, seating a beam as a simple beam vertically on end in each socket, reducing the bending moment of each beam by rigidly and structurally anchoring its inserted end against any movement within its socket, and connecting the upstanding portions of the beams by a bearing surface arranged to receive a horizontal load.

3. The method of building a retaining wall upon a bed of solid rock, which consists in drilling a series of vertical sockets in the rock to a depth below the ultimate rock level, seating a beam as a simple beam vertically on end in each socket, rigidly and structurally bonding the inserted end of each beam to the rock by disposing a plastic setting material in each socket whereby to reduce the bending moment of each beam, and connecting the upstanding portions of the beams by a bearing surface arranged to receive a horizontal load.

4. A retaining wall structure comprising in combination, a natural hard rock bed provided with a series of vertical sockets cut therein below the ultimate surface level, a support flanged beam vertically seated on end in each socket and extending as an integral unit to the top of the wall, the depth of each socket being only a small fraction of the length of its associated beam, a bond of plastic setting material in each socket rigidly uniting the inserted beam ends with the rock, and a bearing surface connecting the upstanding portions of the beams in position to receive a horizontal load.

5. A retaining wall structure comprising in combination, a natural hard rock bed provided with a series of parallel vertical cylindrical sockets uniformly spaced and cut therein below the ultimate surface level, a plurality of vertically extending parallel I-beams seated on end in each socket having their flanges adjacent to the walls of the sockets and extending as integral units to the top of the wall, the depth of each socket being only a small fraction of the length of its associated beam, a bond of plastic setting material in each socket rigidly uniting the inserted beam ends with the rock, bearing members connecting the upstanding portions of the beams to receive a horizontal load and supported by the beams.

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