United States Patent

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[33] **Great Britain**
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[54] **FLEXIBLE WALL MEANS**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **61/29,** 61/1, 61/30
[51] **Int. Cl.** **E02b 7/20**
[50] **Field of Search** ..... 61/29, 30, 1; 180/127, 128; 220/(Inquired); 150/(Inquired)

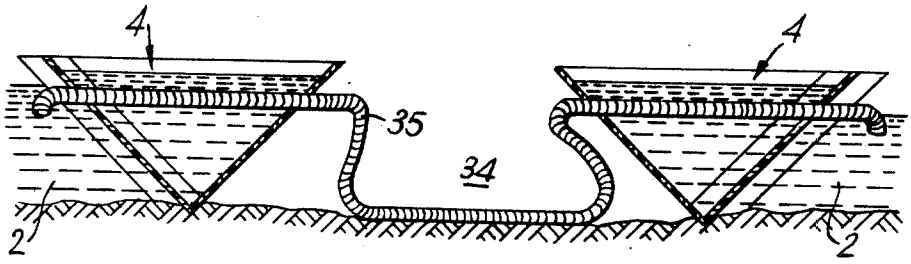
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Attorney—Cameron, Kerkam & Sutton

ABSTRACT: A water dam is formed by a succession of flexible wall members in the form of upwardly open watertight bags. By filling the bags with water their adjacent sides are urged into sealing contact with each other and they are caused to sink into sealing engagement with the bed of the water basin being dammed.



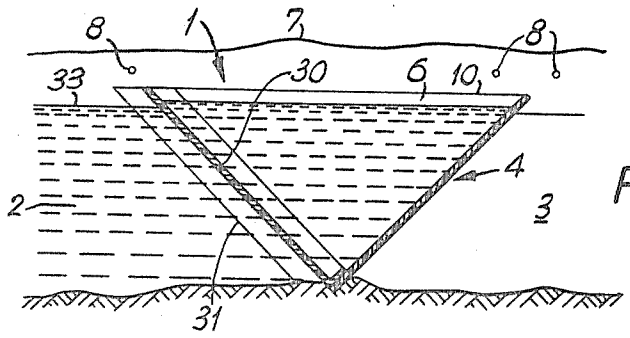


FIG. 1.

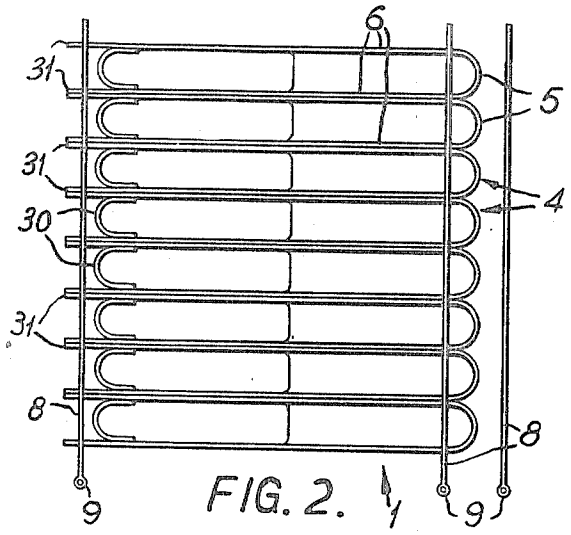


FIG. 2.

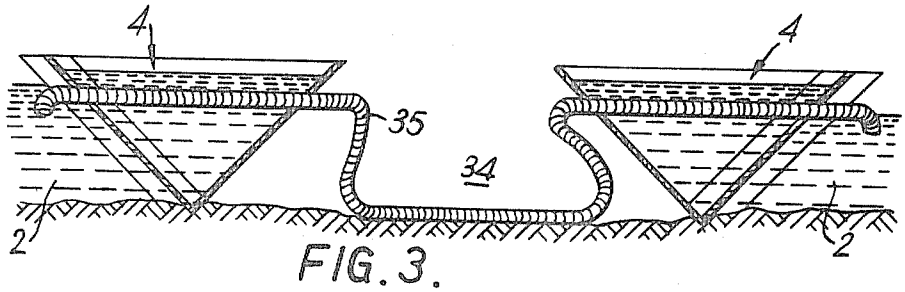


FIG. 3.

FLEXIBLE WALL MEANS

This invention relates to flexible wall means for forming water dams.

Flexible wall means principally of use for this purpose have been proposed in the commonly owned, copending U.S. Pat. application Ser. No. 4,349, which is a continuation-in-part of now abandoned application Ser. No. 680,167. According to that application the flexible wall means may comprise a succession of independently deflectable flexible wall members, each having a middle or outer portion to form a boundary surface of the dam and a pair of side portions to define with the outer portion a concavity open to the water to be retained, adjacent side portions of neighboring wall members being contiguously arranged, and means being provided to constrain the wall members against deflection by the pressure exerted thereon by the head of water retained thereby, whereby distension of the wall members by the said pressure urges the contiguous side portions of neighboring wall members towards each other.

If it is desired to dam a body of static water, with a view, for example, to pumping part of its basin dry, difficulty may be encountered in arranging for the required differential pressure to be set up between opposite sides of the dam, so as to bring the wall members into sealing relationship with each other and the bed of the water basin. Also, while with running water courses no difficulty is presented in this regard, control of the wall means during establishment or removal of a dam to ensure that they adopt the right position and are not swept away, can present problems.

It is the object of this invention to overcome these difficulties.

According to the present invention a water dam comprises a succession of independently deflectable flexible wall members each having a middle portion to form a boundary surface of the dam, and a pair of side portions extending away from the said surface towards the body of water to be retained by the dam, the middle portion in use being downwardly inclined towards the said body of water, further wall means being provided extending between the side portions of the wall members so as to define a succession of upwardly open substantially watertight bags, adjacent side portions of neighboring wall members being contiguously arranged, provision being made to constrain the wall members against deflection away from the body of water to be dammed, so that upon filling the said bags with water, the adjacent side portions of neighboring wall members are urged together and the wall members are caused to sink into sealing engagement with the bed of the water basin to be dammed.

With such an arrangement it will be seen that the wall members do not have to be arranged so that their interiors are in direct communication with the body of water to be dammed, and the differential pressure on opposite sides, required both to effect a seal between successive wall members and between the wall members and the bed of the water basin to be dammed, can be provided solely by filling the upwardly open bags with water. Apart from the fact that this arrangement removes any difficulty in establishing the required differential pressure across the dam, establishment and removal of the dam with flexible wall means of this invention is greatly facilitated. Thus, the succession of upwardly open bags which the wall members comprise may readily be floated across a river or stream, either in an empty or partially filled condition and anchored at each end in the positions required. Subsequent filling of the bags will then establish the dam without difficulty or any danger of the wall members being disorientated or it being swept away. To remove the dam the wall members may readily be refloated by pumping water from the bags they define.

To augment the seal provided between adjacent side portions of neighboring wall members, the additional wall means are preferably arranged inwardly of the edges of the side portions, so as to leave strips of free material. Adjacent strips of the side portions of neighboring wall members will then be urged together by the pressure created by the head of water retained by the dam.

With a dam formed by flexible wall means in accordance with this invention, it will be seen that by making the wall members of appropriate depth it is possible to create within them a pressure greater than that which was possible with flexible wall means as disclosed in the above-mentioned application Ser. No. 4,349, at least insofar as with the latter the static pressure within the wall members could not be greater than that provided by the head of water dammed thereby. Thus wall members of a dam in accordance with the present invention can be made of substantially greater height than the depth of water to be dammed thereby and filled to a level well above the level of the water being dammed. Apart from this making it possible generally to ensure that adequate seals are formed between the side portions of neighboring wall members and between the wall members and the bed of the water basin, the head of water within the bags defined by the wall members will ensure that a sealing pressure is present to urge their side portions together up to and above the level of the water retained by the dam.

The invention is further described below with reference to the accompanying drawings in which:

FIG. 1 is a sectional side elevation of a wall member for a water dam in accordance with the present invention;

FIG. 2 is a diagrammatic plan view of a dam in accordance with the invention; and

FIG. 3 shows a pair of dams in accordance with FIGS. 1 and 2 arranged to define a dry area between them.

Referring to FIGS. 1 and 2 a water dam 1 comprises a succession of independently deflectable flexible wall members 4. The members are formed of water-impervious flexible sheet material and each comprises a middle portion 5 which, in operation, is arranged to be downwardly inclined towards the body of water 2 to be dammed, and a pair of substantially triangular side portions 6, which extend away from the portion 5, that is away from the space 3 defined by the dam. As shown in FIG. 2, adjacent side portions 6 of neighboring wall members 4 are arranged to be contiguous.

The dam may be arranged to be supported, and anchored at each end, in any desired manner, such as, for example, by means of elongated support members 8, which may be in the form of ropes, cables, rods or the like, which are attached by stakes 9, driven into opposite banks 7 of the river, or other body of water, to be dammed. The upper ends of the wall members will be supported above the surface 33 of the water to be dammed by, for example, securing the upper edges 10 of the side portions 6 to the support members 8, in any convenient manner, e.g. by lacing (not shown).

In accordance with this invention additional wall means 30, formed, for example, of the same flexible sheet material as the remainder of the wall members, are arranged to extend between the side portions 6 of the wall members, in effect to define a succession of upwardly open substantially triangular fluidtight bags. Preferably, as shown, the further wall means 30 are downwardly inclined so as to form an angle of substantially 90° with the middle portions 5 of the wall members, and are located a short distance in from the downwardly inclined edges 31 of the side portions, to leave strips of free material at those edges.

In use, these bags will be filled with water to a level at least equal to the level 33 of the water to be dammed. Filling the bags with water, as mentioned at the outset, results in the adjacent side portions 6 of the neighboring wall members 4 being urged together to provide a seal between neighboring wall members and further, the dam when sufficiently filled with water will sink to form a seal with the bed of the water basin being dammed.

The side portions 6 effectively serve as constraining means which constrain the middle portions 5 of the wall members 4 against deflection towards the space 3.

The strips of free material at the edges 31 of the side portions of the wall members provide an additional seal, the strips of adjacent side portions of neighboring wall members being urged together by pressure exerted by the head of water being retained by the dam.

If it is desired to define a dry space, across, for example, the bed of a stream, then two dams may be provided arranged as indicated in FIG. 3. It is desirable to cater for overflow by the provision of a pipe or conduit 35 interposed between a pair of wall members of each dam and extending across the space 34. The wall members will effectively seal around the pipe 35. Arranging the pipe 35 in this manner avoids scouring of the bed of a stream which might make the establishment of a seal between it and the dam difficult.

In certain circumstances it may be found desirable to attach the wall members 4 to each other by, for example, stitching the downwardly inclined edges 31 of their side portions together. Alternatively, or in addition, the upper edges 10 of the side portions may be secured together.

To establish the dam in position, as mentioned at the outset, the flexible wall means may readily be spread across the surface of the water to be dammed, since the upwardly open bags, that the wall members define in combination with the additional wall means 30, can be floated without difficulty, either in an empty or partially filled condition.

It may be found convenient to stretch cables or the like across the water to be dammed to which the flexible wall means may then be slidably secured, so that they may be located thereby as they are pulled across the water. The precise manner in which the dam is positioned and the upper edges 10 of the side portions of the wall members are supported above the level of the water being dammed, is largely a matter of choice. Once the ends of the dam have been anchored as required water will be pumped into the bags to sink the dam into position, as previously described. To cater for any leakages which may occur it may be arranged to continuously supply water to the bags. To remove the dam, water will simply be evacuated from the bags so that they rise to float on the water and can then readily be withdrawn.

I claim:

1. A water dam comprising a succession of independently deflectable flexible wall members of a depth at least equal to the depth of the water to be dammed, each wall member having a middle portion to form a boundary surface of the dam, and a pair of side portions extending away from the said surface towards the body of water to be retained by the dam, the middle portion in use being downwardly inclined towards the said body of water, further wall means extending between the side portions of the wall members and being downwardly inclined away from the said body of water so as to define a succession of upwardly open substantially triangular watertight bags, and means for supporting at least the upper edges of the said middle portions and said further wall means at a level not less than the level of the water to be dammed, so as to hold the wall members against deflection away from the body of water to be dammed, adjacent side portions of neighboring wall members being contiguously arranged, so that upon filling the said bags with water, the adjacent side portions of neighboring wall members are urged together and the wall members are urged downwardly into sealing engagement with the bed of the water basin to be dammed.

2. A water dam comprising a succession of independently deflectable flexible wall members of a depth at least equal to the depth of the water to be dammed, each wall member having a middle portion to form a boundary surface of the dam, and a pair of substantially triangular side portions extending away from the said surface towards the body of water to be retained by the dam, the middle portion in use being downwardly inclined towards the said body of water and each side portion having a free edge downwardly inclined away from the said body of water, further wall means extending between the side portions of the wall members and being downwardly inclined away from the said body of water so as to define a succession of upwardly open substantially triangular watertight bags, and means for supporting at least the upper edges of the said middle portions of the wall members and said further wall means at a level not less than the level of the water to be dammed, so as to hold the wall members against deflection away from the body of water to be dammed, adjacent side portions of neighboring wall members being contiguously arranged, so that upon filling the said bags with water, the adjacent side portions of neighboring wall members are urged together and the wall members are urged downwardly into sealing engagement with the bed of the water basin to be dammed, the said further wall means being arranged inwardly of the downwardly inclined free edges of the side portions, so as to leave strips of free material, adjacent strips of the side portions of neighboring wall members, when the dam is in use, being urged together by the pressure created by the head of water retained by the dam.

3. A dam as claimed in claim 1 in which the wall members and further wall means are of a height substantially exceeding the depth of the water to be dammed.

4. A dam as claimed in claim 1 in which the further wall means form an angle of substantially 90° with the middle portions of the wall members.

5. A method of forming a dam across a water basin comprising the steps of spreading across the water basin a succession of flexible upwardly open substantially triangular watertight bags, each bag having substantially parallel side portions, securing the bags with adjacent side portions of neighboring bags in contiguous relationship to support means at a level not less than the level of the water to be dammed, so as to hold the said bags against deflection away from the body of water to be dammed, and filling the bags with water, so as to urge adjacent side portions of neighboring bags into sealing contact with each other and to cause the bags to be urged downwardly into sealing engagement with the bed of the water basin.