United States Patent

Draper et al.

[15] **3,680,319**

[45] **Aug. 1, 1972**

[54] **LIQUID IMPOUNDING STRUCTURE**

[72] Inventors: **Homer L. Draper; Duane W. Gagle,** both of Bartlesville, Okla.

[73] Assignee: **Phillips Petroleum Company**

[22] Filed: **Sept. 18, 1970**

[21] Appl. No.: **73,361**

[52] **U.S. Cl.** **61/30**

[51] **Int. Cl.** **E02b 7/02**

[58] **Field of Search** 61/36, 30, 7, 37, 63

[56] **References Cited**

UNITED STATES PATENTS

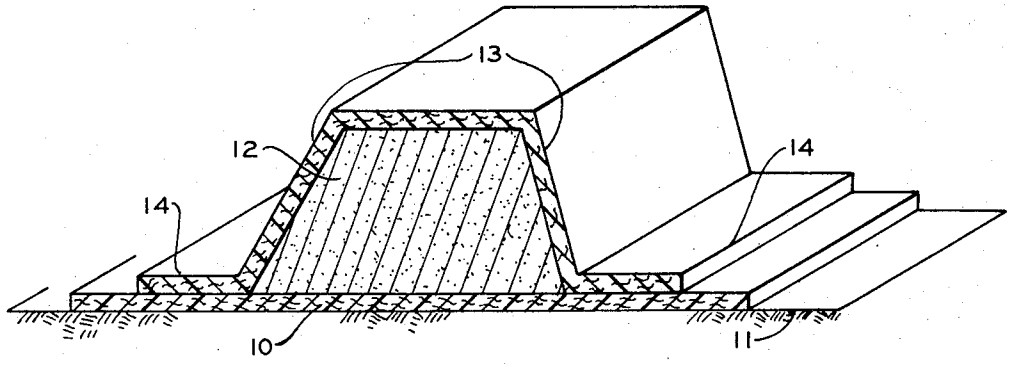
2,771,745	11/1956	Bramble	61/7
3,331,209	7/1967	Sensibar et al.	61/63 X
3,474,625	10/1969	Draper et al.	61/7 X
980,982	1/1911	Medveczky	61/37 UX
1,879,430	9/1932	Noetzli	61/30
2,413,867	1/1947	Easterday	61/30 X
3,286,475	11/1966	Adams	61/36 R

Primary Examiner—David J. Williamowsky
Assistant Examiner—Philip C. Kannan
Attorney—Young and Quigg

[57] **ABSTRACT**

A liquid impounding structure is constructed comprising a compacted particulate wall completely enclosed by a protective incasement of a nonwoven fabric coated with asphaltic material.

9 Claims, 2 Drawing Figures



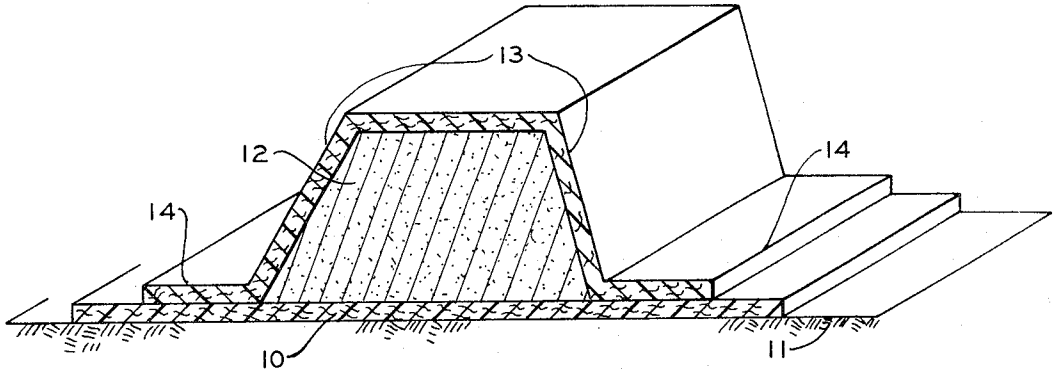


FIG. 1

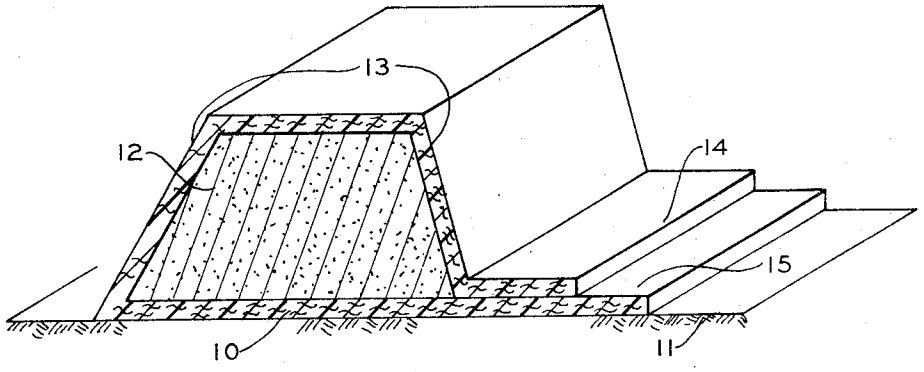


FIG. 2

INVENTORS
H. L. DRAPER
D. W. GAGLE

BY Young and Quigg

ATTORNEYS

LIQUID IMPOUNDING STRUCTURE

BACKGROUND OF THE INVENTION

This invention is related to structures made of particulate material. In one of its aspects, this invention relates to a method of constructing a liquid impounding structure of particulate material. In another of its aspects, this invention relates to the structural composition of a liquid impounding structure. In yet another of its aspects, this invention relates to a protective covering for the surface of a liquid impounding structure.

In one of its concepts this invention provides a method for increasing the structural integrity of a dike by compositing the particulate matter of which it is composed with an asphaltic material. In another of its concepts this invention provides a method for protecting the surface of an earthen dike by covering the surface with a fabric impregnated with an asphaltic material. In still another concept of this invention, it provides structurally sound liquid impounding structure by shaping an asphalt impregnated particulate core in an impregnated fabric.

The problem of structural stability at a reasonable construction cost often arises in the construction of liquid impounding facilities. This is particularly true in constructing dikes of the low divided wall type. The structures must be water impervious, must be structurally stable to prevent shifting and breaking of the walls, and usually must be strong enough to carry the weight of at least pedestrian traffic. A liquid impounding structure made of earthen material is cheaply constructed, but lacks all of the attributes above unless built to substantial dimensions. It is economically essential that a liquid impounding structure be of as small dimensions as will perform adequately. Dikes or walls for liquid impounding facilities with good structural characteristics can be economically constructed using a particulate core, but, particularly in small structures, this core must be treated to obtain additional structural strength and to protect the exposed surface of the wall.

The addition of asphalt or asphaltic material to construction material is an economical way to improve the structural stability of an earthwork construction. Asphaltic material has been used as a binder for various particulate aggregates. Laminates of asphalt included in impregnated fabric have been used to repair cracks in roadways, to line pits and ponds, to cover plank and tank materials so that these surfaces are rendered impervious to water and made less susceptible to erosion.

It is an object of this invention to provide an economical and easily built dike wall. It is a further object of this invention to provide a method for constructing a structurally stable dike wall of particulate matter base material. It is a still further object of this invention to provide a method for constructing a low, curb-type liquid impounding wall.

Other aspects, concepts and objects of the invention are apparent from a study of this disclosure, the drawing and the appended claims.

SUMMARY OF THE INVENTION

According to the present invention there is provided a method for constructing a liquid impounding wall comprising (1) laying a base of fabric impregnated with asphaltic material, (2) constructing on this base a structurally stable wall of particulate material, and (3) wrapping the exposed surfaces of the dike wall in a porous fabric impregnated with asphaltic material.

In one embodiment of the invention the particulate material used in constructing the dike wall is mixed with asphaltic material and compacted to form the structure. This mixing of asphaltic material yields a stronger structure and permits the building of smaller structures without the loss of physical integrity.

In another embodiment of the invention the porous fabric used for the base of the dike structure and the fabric used to wrap the exposed surfaces of the dike walls are one continuous piece of material. This allows the core material to be totally incased with a protective layer of asphalt impregnated porous fabric.

In another embodiment with a liquid impounding wall that is built in conjunction with a surface that is to be treated to prevent water absorption the impregnated wrapping fabric is overlapped on the treated surface to form a liquid-type tight seal with the treated surface. This is particularly advantageous in building a low curb-type structure as a retaining rim of a liquid impounding facility or as a dividing wall within the facility.

In a further embodiment the exposed face of the impregnated fabric can be treated to make this surface specifically resistant to a liquid or a class of liquids. Such a treatment can prevent leaching of the asphaltic surface where the liquid impounded is brine, liquid fertilizer, or various chemicals.

DESCRIPTION OF THE DRAWING

In the drawing FIG. 1 shows a typical liquid impounding wall of this invention with the base of impregnated porous fabric on which is constructed a particulate wall which is then covered with an impregnated porous fabric sealed to the base sheet.

FIG. 2 shows a wall construction wherein the base sheet and wrapping sheet are a continuous fabric and wherein a surface is further treated to be specifically resistant to the liquid impounded.

Referring now to the drawing, in FIG. 1 the base of porous fabric impregnated with an asphaltic material **10** is placed in position on a surface prepared for construction **11**. On top of this fabric is constructed a dike wall of compacted particulate material **12** which can contain an asphaltic material to increase the structural cohesion. This wall is covered with a porous fabric impregnated with an asphaltic material **13** which is sealed to the base material **14** to enclose the wall totally.

In FIG. 2, another embodiment shows a single sheet of the asphalt impregnated fabric **10** laid on the prepared surface **11** thereafter the exposed surface of the wall **12** is sealed to the base material **14** then an exposed surface **15** is further treated for resistance to a specific impounded liquid.

Any porous fabric can be used as a base into which the asphaltic material is impregnated. Cellulosic, siliceous, synthetic fabric fibers, and the like, either woven or nonwoven can be used. At present, nonwoven fabric of polyolefin fiber are the preferred materials. Petromat (a trademark), a nonwoven fabric of polyolefin fiber as disclosed in U.S. Pat. No. 3,474,625, is especially preferred, because it has light weight, durability, the necessary strength, and the abili-

ty to hold up to four times as much asphaltic material as burlap or cotton fiber fabric.

The asphaltic materials useful in this invention both as impregnant for the fabric and as adhesive in compacting the particulate wall are well known to those skilled in the asphaltic field and elaboration here is only to the effect that asphalt emulsions are the preferred impregnants because of ease of application. The method of applying the asphaltic material can be by spraying, painting, or otherwise coating the fabric and then laying the fabric into place. Alternatively, the area to be treated can be coated with the impregnant and the fabric pressed onto the treated area and than overcoated with more asphaltic material. The amount of impregnant is not critical except that sufficient material must be used to consolidate the earth and properly to impregnate the fabric.

The method of construction of this invention is applicable to liquid impounding structures of any size, but it is especially applicable to low curb-type structures that can be formed. The forming of the curb-type structures is performed by compacting the core material within forms made of wood or other materials and then removing the forms or the construction is more easily carried out with a curbing machine.

Any type of particulate material is suitable for construction of the dike core. Usually, soil native to the construction site can be used. Of course, particulate matter above medium gravel size will become increasingly hard to compact so that the compacted shape is retained. Therefore, particulate material of less than medium gravel size such as used in asphaltic premixes is preferred as the construction material, and sand, because of its well known compacting quality, is at present the most preferred material.

Use of the method of this invention to construct liquid impounding walls would usually be in conjunction with a method for rendering pits, pools, settling basins and the like impervious to liquid contamination of the ground around the liquid impounding system. Impervious covering fabric of this invention will, therefore, usually be of sufficient dimensions to be adequately sealed to the adjacent surface of the liquid impounding system covering.

Liquid exposed surfaces of the impounding wall of this invention can be further treated as by additional coating with epoxy material, asphalt treating agents on the surface layer, or the like, to render this surface less susceptible to reaction with specific liquids. This can become important when the liquid impounded can leach the asphaltic material.

The following are specific examples showing the construction of a low dividing wall within a liquid impounding facility.

EXAMPLE I

An asphalt impregnated porous nonwoven material was laid on a prepared soil base overlapping a water impervious surface already constructed for a liquid waste treatment basin. An open topped form 18 inches wide at its base 12 inches high and 6 inches wide at its top was constructed. Within the form a mixture of sand and asphalt was compacted using approximately 15 gallons of asphalt and 1 ton of sand for 15 linear feet of construction. After compacting the form was removed and the structure was covered with an asphalt impregnated porous nonwoven material about 45 inches wide to give sufficient width to seal the covering to the basin floor on either side of the wall. A stable, liquid impervious dividing wall was produced.

EXAMPLE II

A wall was constructed at the edge of the liquid waste treatment basin of Example I using the same construction technique except that the asphalt impregnated base mat on which the wall was constructed was sealed to the basin floor on the basin side of the dike, the dike was compacted on the base mat, and the asphalt impregnated mat was wrapped over the wall and sealed to the basin floor forming a continuous sheet incasing the dike. The construction of this example would also be appropriate for the divider wall of Example I since the asphalt impregnated covering of the compacted core would seal with the basin floor beneath the dike without being specifically overlapped to form a sealed area.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawing and the appended claims of the invention, the essence of which is that there has been provided a method of rendering liquid impounding walls of particulate material structurally stable and liquid resistant by totally incasing the structure in a fabric impregnated with an asphaltic material.

We claim:

1. A method for constructing a liquid impounding wall comprising (1) laying a base comprising a porous fabric impregnated with an asphaltic material, (2) constructing on said base a structurally stable wall of particulate material, (3) covering the exposed surface of said wall with porous fabric impregnated with an asphaltic material, and (4) sealing the impregnated porous fabric covering the wall to the impregnated porous fabric base to enclose the wall in a material resistant to the liquid impounded.

2. The method of claim 1 wherein said porous fabric impregnated with an asphaltic material comprises a continuous sheet for said base and covering said exposed surface.

3. The method of claim 1 wherein said porous fabric impregnated with an asphaltic material covering the exposed surfaces of the wall is treated to create a surface resistant to the liquid impounded.

4. The method of claim 1 wherein said particulate material is composited with an asphaltic material.

5. The method of claim 4 wherein said particulate material is sand and said porous fabric is a nonwoven polyolefin fabric.

6. A liquid impounding wall comprising (1) a base of porous fabric impregnated with an asphaltic material, (2) resting on said base a structurally stable wall constructed of particulate material, and (3) a porous fabric impregnated with asphaltic material covering the exposed surface of said wall and sealed to the impregnated porous fabric base.

7. The impounding wall of claim 6 wherein the porous fabric impregnated with an asphaltic material covering the surfaces of the wall exposed to the impounded liquid is treated to create a surface specifically resistant to the impounded liquid.

8. The liquid impounding wall of claim 6 wherein said particulate material as sand and said porous fabric is a nonwoven polyolefin fabric.

9. The liquid impounding wall of claim 6 wherein said particulate material is composited with an asphaltic material.

* * * * *