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Spillane et al.

[11] **3,849,229**

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[54] **METHOD OF JOINING AND SEALING ASPHALT PLANKS FOR A RESERVOIR OR THE LIKE**

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[52] **U.S. Cl.** **156/304,** 61/7, 156/304, 156/337

[51] **Int. Cl.** **C09j 3/30,** E02b 5/00

[58] **Field of Search** 61/2, 12, 14, 7, 23, 38; 52/459; 156/307, 304, 337

[56] **References Cited**

UNITED STATES PATENTS

1,578,663	3/1926	Innes	52/417
2,771,745	11/1956	Bramble	61/7
3,073,710	1/1963	Morrow	106/163
3,111,787	11/1963	Chamberlain	52/420

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[57] **ABSTRACT**

A method of joining and sealing asphalt planks in butting relationship, using a preformed bituminous strip having substantially permanent non-hardening, pliable, yieldable characteristics for enabling the planks to shift due to shrinkage of the planks themselves, shifting of the ground or other base thereunder, or shifting or change in dimensions for any other reasons.

6 Claims, 3 Drawing Figures

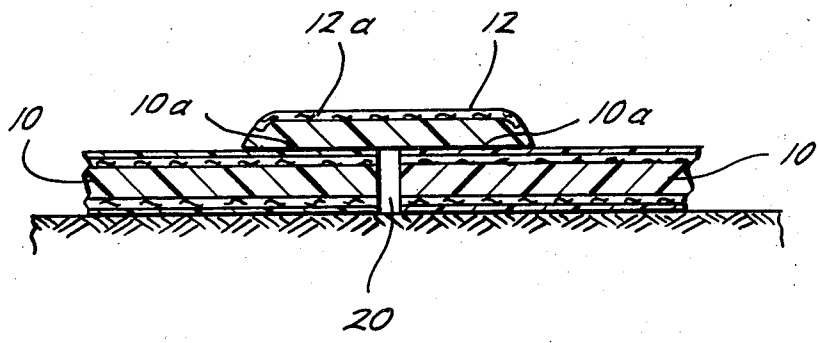
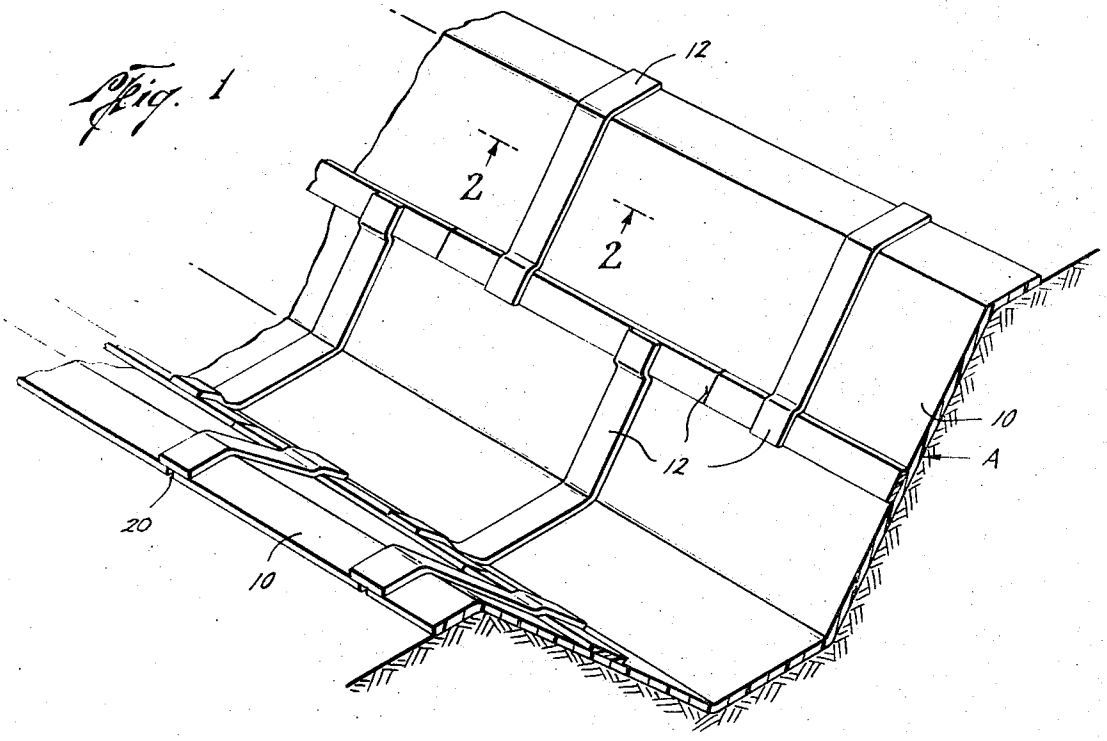


Fig. 1



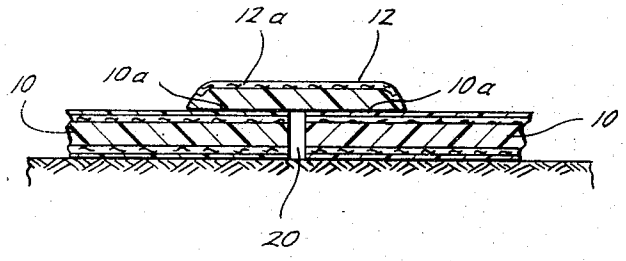
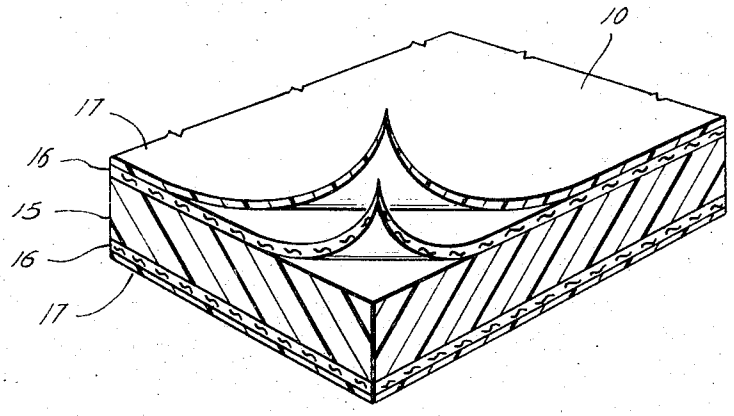


Fig. 2

Fig. 3



METHOD OF JOINING AND SEALING ASPHALT PLANKS FOR A RESERVOIR OR THE LIKE

BACKGROUND OF THE INVENTION

The field of this invention is methods of making reservoirs and the like.

Asphaltic planks or sheets as disclosed in U.S. Pat. No. 2,771,745 have been used for lining canals, reservoirs and similar areas. In the past, it has been customary to form the joint between the planks by overlapping the adjacent edges of the planks. Strips of the same or similar material as the planks have also been suggested, although usually not used. When making the prior joints, hot melt asphalt has been mopped on the edge or edges of the planks to be joined. The disadvantages of such procedure are: (1) melting pots have been required which emit noxious gases; (2) a great amount of labor is required; and (3) the hot material presents a safety hazard. Additionally, in service, the joints have had a tendency to crack where the two adjacent planks overlap or are joined, thereby destroying the watertight integrity of the lining.

SUMMARY OF THE INVENTION

The present invention relates to new and useful improvements in methods of joining and sealing asphalt planks for a canal, reservoir, ditch or the like. With the present invention, the joints are formed as butt joints with no overlapping, the edges of adjacent planks, both longitudinally and laterally, are initially primed with a solvent type primer, and then strips of substantially non-hardening, yieldable bituminous material of the type disclosed in U.S. Pat. No. 3,073,710 is applied to span the joint and bond to the adjacent edges, whereby sealed watertight joints are obtained which remain sealed and do not crack even though some shifting of the planks relative to each other occurs.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view illustrating a canal, ditch or other type of reservoir, wherein the method of this invention has been utilized;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1 to illustrate one joint using the method of this invention; and

FIG. 3 is an isometric view illustrating one form of the preferred form of the asphaltic plank or lining sheet used in carrying out the method of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the letter A designates generally a ditch, canal or reservoir formed in the soil or other base, which is to be lined or covered with a plurality of asphaltic planks or sheets **10,** using sealing joint strips **12** in accordance with the method of this invention as will be hereinafter described.

In the preferred form of this invention, each of the planks or sheets **10** is constructed as illustrated in FIG. **3** of the invention and as described in detail in U.S. Pat. No. 2,771,745. As shown in FIG. **3,** the plank or lining sheet **10** includes a central core **15** with a reinforcing sheet **16** on each side thereof and preferably with an outer coating **17** of asphalt on the outside of each of the sheets **16.** By way of example, and not limitation, the central asphalt layer **15** is preferably of the catalytically

blown asphalt of the type set forth in U.S. Pat. No. 2,450,756, although air blown or natural asphalt may be utilized. Such asphalt preferably has a melting point, B and R, within the range of 140°–200°F. and has a penetration at 77°F. of 10–90 and the penetration at 32°F. of 10–115. The asphalt has mixed therewith fillers in the amount of about 20–60 percent, which fillers are, by way of example, roofing felt which has been ground, shredded, pulverized or otherwise disintegrated to mix with the asphalt. The fibers may also be obtained from asbestos, paper or the like. Mineral fillers are also suitable and are used in addition to the fibers since they add to the further build-up of the cohesive strength, pliability and the plasticity when properly admixed, and examples of such mineral fillers are slate flour, limestone, talc, silica, and the like. Also, in addition to the fibers and the mineral fillers, it is preferable to use an organic binder or product such as sawdust, rice hulls, peanut hulls, or cork. In the preferred plank composition, the central core **15** has the following percentages: asphalt 70 percent; mineral fillers 20 percent; fibrous material (mixture of fibers and organic binder) 10 percent.

The reinforcing sheets **16** may consist of paper such as kraft paper, felt, metal wire, fiberglass fabric or fiberglass gauze, or polyester or polyolefin plastics, or the like. The asphalt layers **17** may be formed of the same asphalt heretofore described as used in the central core **15,** but preferably without any additives and, as such, asphalt layers **17** are caused to partially penetrate into the reinforcing layers **16** a sufficient distance to bond such layers **16** firmly and securely to the core **15.**

In carrying out the method of this invention, the planks or sheets **10** are preferably arranged in a staggered relationship as illustrated specifically in FIG. **1** so that the longitudinal seams are offset with respect to each other. Also, it is preferable to provide the planks or sheets in rectangular shapes, normally having dimensions of about **3** feet in width and **12** feet long. However, the dimensions may be varied so long as they are reasonably close to such dimensions given in the foregoing example so that there is a minimum of contraction and shifting at the joints between the various planks or sheets which can be sealed by the sealing strips **12.**

Before applying the sealing strips **12,** a standard asphaltic primer is applied by a brush or other suitable means to the upper surfaces **10***a* (FIG. **2**) adjacent to the longitudinal and lateral spaces **20** (FIG. **2**) between the abutting planks or sheets **10.** Such space **20** may be varied depending upon the installation conditions, but essentially, such sheets **10** are disposed so that they do not overlap but instead are positioned substantially in contact with each other, leaving a small space at each joint.

The primer may typically include an asphalt base with a softening point within the range of 180°–240°F., and a penetration at 77°F. of from about 10–35. The solvent which is used for obtaining a flowable solution with the asphalt is preferably mineral spirits having an initial boiling point of 240°F. and an end point boiling point of about 400°F. Typically, the solvent and the asphalt are mixed together so that they flow and have a Saybolt viscosity at 77°F. of from about 25–100 seconds. By way of further example, the primer may be one meeting the ASTM Specification D41–70.

Such primer is thus coated on the upper surfaces **10***a* opposite each of the lateral and longitudinal spaces or cracks **20** between the edges or the adjacent sheets of planks **10.**

Thereafter, the sealing joint strips **12** are applied on the surfaces **10**a which have been primed, in both the lateral and longitudinal directions as best seen in FIG. **1.** The composition of the sealing strips **12** is preferably as disclosed in U.S. Pat. No. 3,073,710 and in addition, a strip of fiberglass **12***a* is disposed along the upper surface of the asphalt strip **12,** approximately at the very top thereof so as to provide strength and protection to the asphalt therebelow. Each of the strips **12** is originally about 4 feet in length and about 6 inches wide with a ¼-inch thickness. The fiberglass strip **12***a* is preferably approximately 6 inches wide also so that it extends across the full width of each of the strips. The fiberglass is woven fabric with approximately 10 strands per inch in each direction and it is visible on the top of the strip **12.**

The composition of the strips **12** is preferably a petroleum derived bitumen residual which is the residual bitumen or product resulting from the distillation of petroleum. Such bitumen residual should have a Saybolt-Furol viscosity at 210°F. of from about 50 seconds to about 250 seconds. Such residual should also have a minimum flash point (Cleveland open cup) of about 475°F. as determined by the ASTM test D92–56, and the specific gravity as determined by ASTM test D71–52 should be between about 0.95 and 1.04, with the preferred range being 0.97 to 1.00. The preferred range for the Saybolt-Furol viscosity at 210°F. is from about 100 seconds to about 200 seconds. It will be understood by those skilled in the art that the Saybolt-Furol viscosity is determined by the ASTM D88–44 procedure. It will also be understood that the designation "ASTM" as used throughout this specification identifies the American Society for Testing Materials and the tests are those specified by such group. The bitumen residual which is used in the composition of this invention should also have a low temperature susceptibility factor. As is well known, the susceptibility factor is calculated by dividing the penetration of the asphalt or other material at 77°F. by the penetration at 32°F. Such penetrations are obtained by the standard ASTM test designated D217–48. Using such basis for calculating the susceptibility factor, the bitumen residual in the composition of this invention should have a susceptibility factor not greater than 6 and preferably from about 2 to about 4. Also, the bitumen residual should be adhesive rather than unctuous and that can be determined readily by observation and contact. In other words, an adhesive residual will tend to stick to the fingers when contacted by the fingers but an unctuous residual will have an oily feel and will not be adhesive or stick to the fingers.

The composition of this invention includes an additive which includes finely ground material and/or fibrous material so that the composition remains pliable or workable and also sag-resistant at temperatures at least as high as 300°F. There are a number of finely ground materials and fibrous materials which will serve as the additive or additives in the composition. By way of example, the finely ground material or materials may be bentonite, diatomaceous earth, colloidal clays, talc, slate flour and, silicates, each of which should be fine enough to pass standard mesh screens from 100 to 400 in size. Since the product of this invention has many uses and is often used in conjunction with the sealing of pipe joints where the composition is exposed to both acids and alkalies, it is desirable, and in some cases essential to provide a fibrous material such as asbestos, Wollastonite or other magnesium silicate which is chemically inert to the acid and alkali reactions. However, fibrous materials other than such acid and alkali resistant materials may be employed. For example, diatomaceous earth, ground vegetable or mineral fibers, cotton linters, rice hulls, jute, hemp, bagasse and other known organic or inorganic fibrous materials may be used.

It is improved to note that the components set forth above would not have a solvent therewith, and no portion of the composition is subject to evaporation or drying.

In practice, it is preferable to bring the sheets or planks **10** to the job site with a separator sheet between the planks which may be stacked upon each other. Each separator sheet is preferably made of kraft paper or similar material which has a silicone coating on at least one surface thereof in contact with the coating layer **17** of each sheet **10.** The silicone coating provides for a quick release of the kraft paper or separator strip when it is desired to install the sheets **10** in the ditch or reservoir A. Similarly, each of the joint sealing strips **12** may be protected on each side by such separator strips, an example of which is illustrated in U.S. Pat. No. 3,075,640.

By reason of the present invention, the handling of melting pots for hot mop-type asphalt is not required and thereby the noxious fumes are also eliminated. The amount of labor is reduced and the safety hazard of the hot melt asphalt is also obviated. Additionally, when the planks or sheets **10** shift or move relative to each other by reason of shrinkage of the sheets, shifting of the soil therebelow, or for any other reason, the aphalt strips **12** are yieldable without cracking so that the joints between the planks or sheets **10** remain sealed for an indefinite period of time. The strips **12,** as explained in said U.S. Pat. No. 3,073,710 are non-drying and non-hardening so that they remain flexible and continue to seal and bond to the sheets **10** on a substantially permanent basis. This further eliminates the cracks which developed in the prior methods of installing the asphalt lining of U.S. Pat. No. 2,771,745.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

We claim:

1. A method of joining asphaltic planks to form a substantially permanently watertight reservoir or the like, comprising the steps of:

positioning a plurality of asphaltic planks of relatively stiff material on a base, with the edges of the planks in substantially butting non-overlapping relationship to thereby form a plurality of longitudinal and lateral spaces between said edges;

placing a primer on the upper surfaces of the planks adjacent the longitudinal and lateral spaces between the edges of the planks; and

applying sealing strips of substantially permanently non-hardening, yieldable solvent-free bituminous

material, each of said strips having a strip of woven fiberglass on its upper surface, on said primed upper surfaces and extending across each of said longitudinal and lateral spaces to form a sealed watertight joint between each of the adjacent planks which does not crack and which yields to accommodate shifting or other relative movements of the planks while maintaining the sealed joint.

2. The method set forth in claim **1**, wherein:

said primer is an asphaltic base in a solvent.

3. The method set forth in claim **1**, wherein each of the planks comprises:

a central asphaltic core; and

upper and lower reinforcing layers on each side of said core.

4. The method set forth in claim **1**, wherein:

said asphaltic planks are staggered relative to each other.

5. The method set forth in claim **1**, wherein the composition of said sealing strips comprises:

from about 45 percent to about 95 percent of petroleum derived bitumen residual having a Saybolt-Furol viscosity at 210° Fahrenheit of from about 50 seconds to about 250 seconds; and

with essentially all of the remainder an additive selected from the group consisting of finely ground inorganic silicates, vegetable fibers, mineral fibers, rice hulls, and mixtures thereof.

6. The method set forth in claim **1**, wherein:

each of said asphaltic planks has its upper and lower surfaces protected by a releasable silicone coated sheet prior to installing same; and

said sheets are removed at the site for installation of said planks to form the reservoir or the like.

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