Aug. 8, 1944. H. N. SANDELL 2,355,333

REINFORCED WATERPROOFING SHEET MATERIAL

Filed June 17, 1943 2 Sheets-Sheet 1

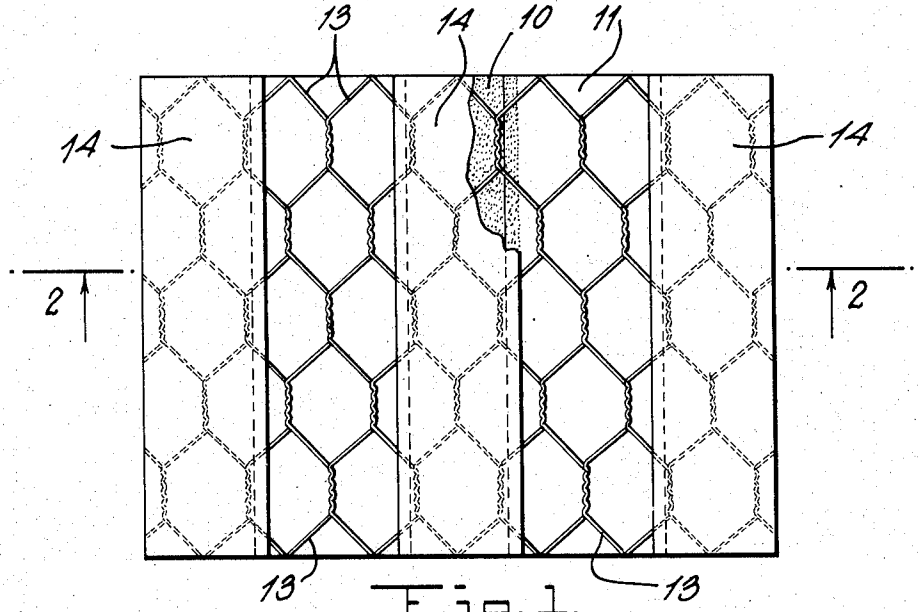


Fig. 1.

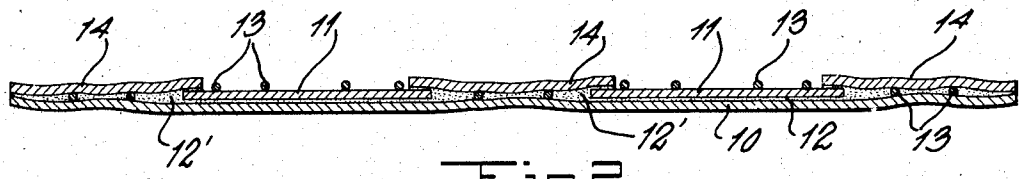
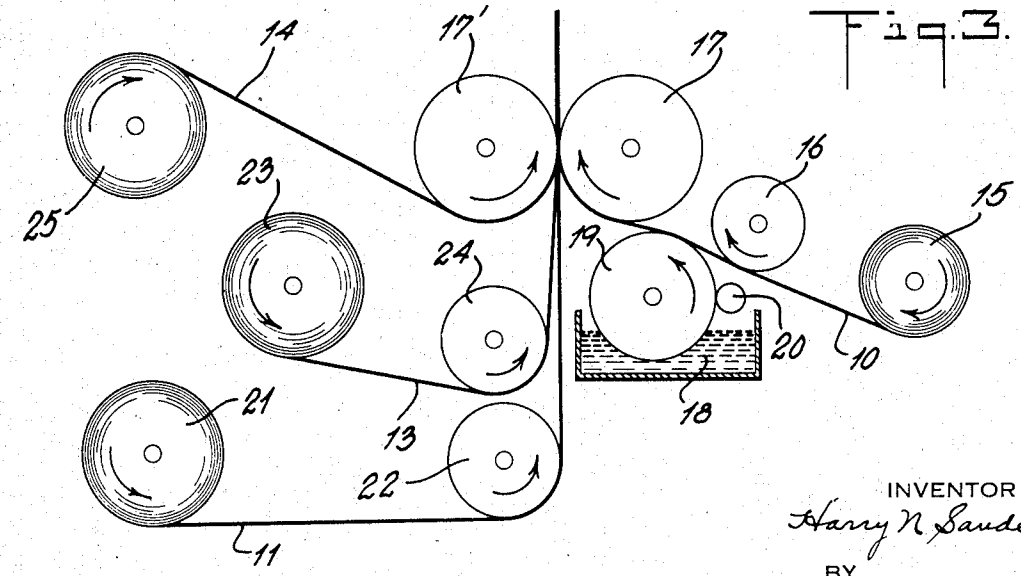


Fig. 2.

Fig. 3.



INVENTOR
Harry N. Sandell
BY
Kenyon & Kenyon
ATTORNEYS

Aug. 8, 1944. H. N. SANDELL 2,355,333

REINFORCED WATERPROOFING SHEET MATERIAL

Filed June 17, 1943 2 Sheets-Sheet 2

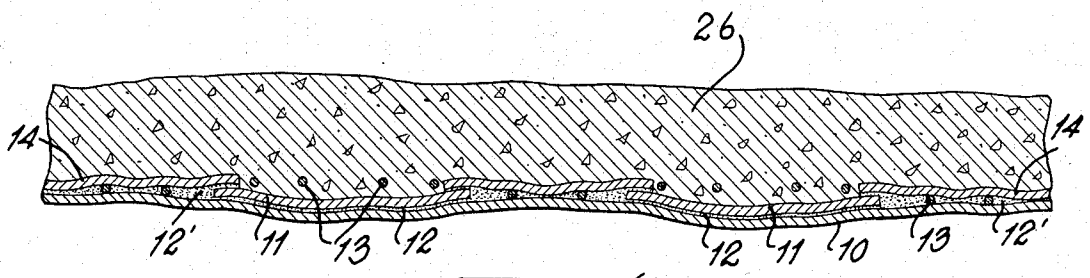


Fig. 4.

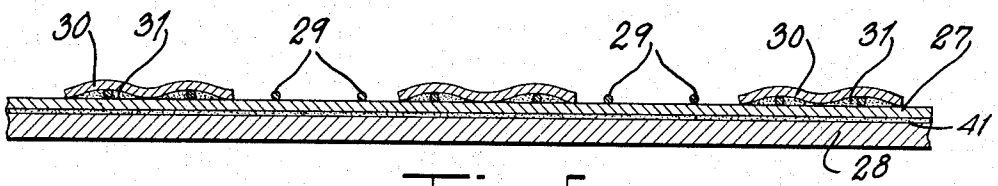


Fig. 5.

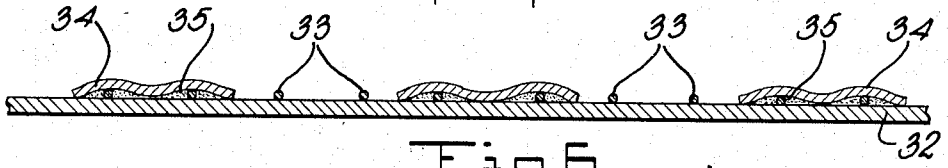


Fig. 6.

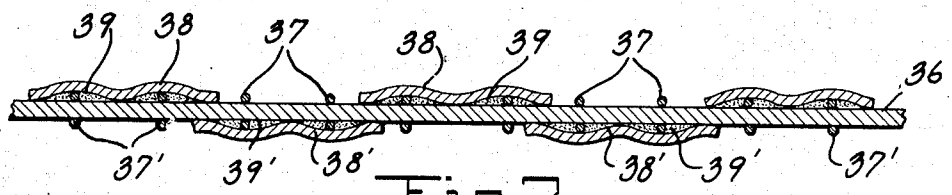


Fig. 7.

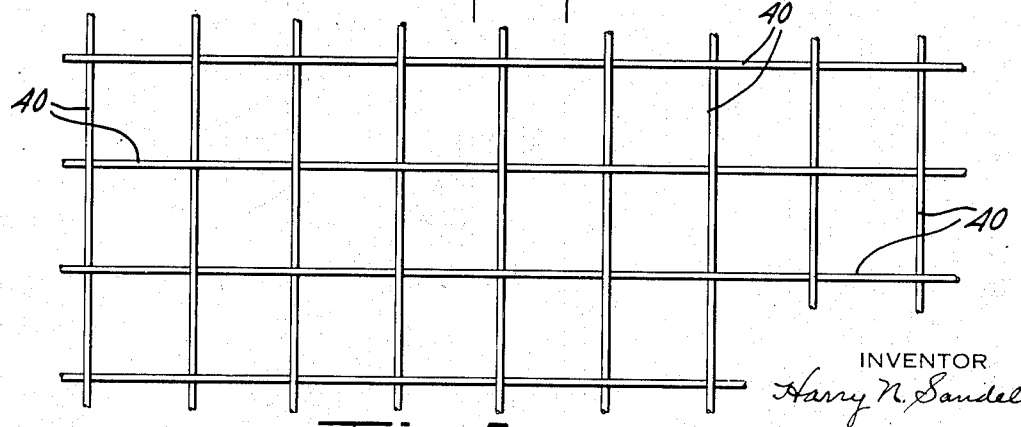


Fig. 8.

INVENTOR
Harry N. Sandell
BY
Kenyon & Kenyon
ATTORNEYS

Patented Aug. 8, 1944 2,355,333

UNITED STATES PATENT OFFICE

2,355,333

REINFORCED WATERPROOFING SHEET MATERIAL

Harry N. Sandell, Brookline, Mass., assignor to Sandell Manufacturing Company, Inc., Watertown, Mass., a corporation of Massachusetts

Application June 17, 1943, Serial No. 491,247

11 Claims. (Cl. 72—116)

This invention relates to reinforced waterproofing sheet material. It relates especially to reinforced waterproofing sheet material comprising impregnated fibrous sheet material.

It is a purpose of this invention to provide waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material such as cement, concrete, plaster and the like. It is a further purpose of this invention to provide a waterproofing sheet material that is reinforced with an apertured sheet-like metallic reinforcing member. It is a further purpose of this invention to provide a reinforced waterproofing sheet material that can be used as a form for the molding or shaping of bodies comprising hydraulically setting cementitious material. It is a further purpose of this invention to provide a reinforced waterproofing sheet material to which hydraulically setting cementitious material may be applied and to which it will adhere tenaciously. It is a further purpose of this invention to provide a reinforced waterproofing sheet material that will remain permanently adherent to or embedded in formed hydraulically setting cementitious material as a waterproofing membrane. It is a further purpose of this invention to provide a reinforced waterproofing sheet material to which an hydraulically setting cementitious material may be directly applied and which will serve to some extent to reinforce the formed hydraulically setting cementitious material.

It is a feature of the reinforced waterproofing sheet material of this invention that it comprises, combined in a novel way, a base sheet of fibrous sheet material and an apertured sheet-like reinforcing member, the fibrous base sheet being impregnated with a waterproofing material. According to this invention there is combined with the fibrous base sheet and the apertured metallic sheet-like reinforcement, a plurality of strips of fibrous sheet material which are spaced substantially from each other and which are impregnated with waterproofing material and which are bonded to the base sheet by waterproofing material through apertures in the apertured sheet-like metallic reinforcement. These spaced strips of impregnated sheet material in combination with the underlying apertured sheet-like metallic reinforcement and fibrous back sheet afford a combination having a number of advantages.

The overlying spaced strips of fibrous sheet material provide positive means for securely holding the apertured sheet-like metallic reinforcement in place in secured relation to the fibrous base sheet, while at the same time providing regions of substantial size wherein the apertured metallic sheet-like reinforcement may come into direct contact with and become embedded in hydraulically setting cementitious material formed in contact therewith. Preferably the apertured metallic reinforcing sheet material, in the regions between the spaced strips, is not secured or bonded to the base sheet so that in these regions the apertured sheet-like metallic reinforcement is free to partially or even completely become surrounded by and embedded in the hydraulically setting cementitious material.

It is a further feature of preferred embodiments of this invention that the reinforced waterproofing sheet material comprises essentially throughout the extent thereof a bituminous waterproofing layer that is protected on both sides thereof by bitumen impregnated fibrous sheet material. This bituminous waterproofing layer may be all in one plane or may be partly in one plane and partly in another plane. Thus advantageously the bituminous waterproofing that serves to bond the spaced strips to the underlying base sheet advantageously serves to provide such layer throughout the portion of the extent of the reinforced waterproofing sheet material occupied by said strips. The balance of the area of the reinforced waterproofing sheet material that is not occupied by the spaced strips may advantageously have applied thereto spaced strips of bituminized sheet material which underlie the apertured sheet-like metallic reinforcement in the regions between the strips and which are bonded to the underlying base sheet by bituminous waterproofing material, thereby providing a layer of bituminous waterproofing material that is between two bituminized sheets and that complement the areas of the reinforced waterproofing sheet material occupied by the spaced strips of bituminized sheet material overlying the apertured sheet-like metallic reinforcement. In this manner a layer of bituminous waterproofing material is provided throughout the extent of the reinforced waterproofing sheet material while leaving a substantial portion of the apertured sheet-like metallic reinforcement exposed for the purposes aforesaid and while utilizing a minimum of bituminized sheet material.

The reinforced waterproofing sheet material is useful for many purposes. Thus, for example, the reinforced waterproofing sheet material may be employed as a part of the forming surface of molds for making concrete bodies by securing

the same to a suitable temporary framework so that the side thereof presenting the exposed apertured sheet-like metallic reinforcement is disposed for direct contact with the freshly poured or otherwise applied cement. Upon removing the temporary framework the reinforced waterproofing sheet material is left integrally united with the set concrete so as to provide a waterproofing surface. One typical use of such reinforced waterproofing sheet material is in the construction of arched concrete shelters or buildings wherein the concrete is poured onto molds carried by an arched supporting frame. By securing the reinforced waterproofing sheet material to suitable spaced supports and applying the concrete to the upper side thereof which presents the regions of exposed portions of the apertured waterproofing sheet material, a convenient and inexpensive form can be had which comprises the reinforced waterproofing sheet material as part of the mold for the concrete. After removal of the framework, the waterproofing sheet material remains as a waterproofing lining for the interior of the structure. While the reinforced waterproofing sheet material may sag somewhat between supports when the concrete is poured thereon, the sagging tends to provide a slightly corrugated configuration which adds to the ruggedness of the structure as a whole. Also the concrete tends to push the backing sheet slightly away from the apertured sheet-like metallic reinforcement, so that parts of the metallic reinforcement become embedded in the concrete, thereby not only causing the reinforced waterproofing sheet material as a whole to be firmly attached and adherent to the concrete, but also reinforcing the concrete adjacent the surface thereof.

The reinforced waterproofing sheet material may likewise be used as part of the forms for pouring foundations for buildings, either on the inside or on the outside or both, thereby providing an economical type of form and at the same time, by a single operation, providing one or more bituminous waterproofing layers in the wall. In a similar way the reinforced waterproofing sheet material may be employed in other locations of buildings and other structures wherever it is desired to provide a waterproofing sheet material integral with hydraulically set cementitious material. If desired, the reinforced waterproofing sheet material of this invention may be utilized so that hydraulically set cementitious material is integral therewith on both sides thereof, thereby providing a waterproofing membrane within the cementitious body that is permanently and strongly affixed to the set cementitious material.

Further purposes, features and advantages of this invention will be apparent in connection with the following description of certain illustrative embodiments of this invention that are shown in the accompanying drawings, wherein

Fig. 1 is a plan view of a preferred embodiment of reinforced waterproofing sheet material constructed according to this invention.

Fig. 2 is a section of the reinforced waterproofing sheet material taken on the line 2—2 of Fig. 1, with the thickness of the layers somewhat exaggerated for purposes of clarity.

Fig. 3 is a diagrammatic side elevation of apparatus of the manufacture of the reinforced waterproofing sheet material shown in Figs. 1 and 2.

Fig. 4 is a side elevation of the reinforced waterproofing sheet material shown in Figs. 1 and 2 as carried by set cementitious material, the thickness of the layers being exaggerated for clarity.

Fig. 5 is a sectional elevation similar to Fig. 2, but of an alternative embodiment of reinforced waterproofing sheet material constructed according to this invention.

Fig. 6 is a sectional elevation similar to Fig. 2, but of another alternative embodiment of waterproofing sheet material constructed according to this invention.

Fig. 7 is a sectional elevation similar to Fig. 2, but of another alternative embodiment of waterproofing sheet material constructed according to this invention and adapted to become integrally united on both sides thereof with the set cementitious material, and

Fig. 8 is a plan view of an alternative apertured sheetlike metallic reinforcement for use in reinforced waterproofing sheet material embodying this invention.

Referring to Figs. 1 and 2, the fibrous sheet material preferably consists of a web of unspun cotton fibers, the web of fibers being impregnated with a bituminous waterproofing material as a binder. The web of cotton fibers is preferably composed of cotton fibers averaging about ½ inch in length, the web being typical of a web of fibers as produced by a conventional carding machine. Thin cotton batting or garnetting wadding may also be used. Ordinarily, the web material, considering the dry fibers by themselves, will weigh about 200 to about 400 grams per square yard. This sheet material of unspun cotton fibers may be initially impregnated with, for example, an asphalt having a softening point of about 135° F. to 145° F. and a penetration of about 24 to 28.

Asphalt impregnated fibrous sheet material of the character aforesaid is disposed in the reinforced waterproofing sheet material as a whole in different locations as follows. The reinforced waterproofing sheet material is provided with the continuous base sheet 10. Overlying the base sheet 10 are the strips 11 of the asphalt impregnated sheet material, the strips 11 being bonded to the base sheet by the layer 12 of the bituminous waterproofing material. Overlying the base sheet 10 and the strips 11 of the asphalt impregnated fibrous sheet material, is disposed the apertured sheet-like metallic reinforcement, which, in the embodiment shown, is in the form of hexagonal open mesh wire netting 13. Overlying the wire netting 13 are spaced strips 14. Between the strips 14 and the base sheet is disposed the layer 12' of bituminous waterproofing material in which the wires of the wire netting 13 are embedded and which serves to bond the strips 14 to the base sheet 10 through the apertures in the wire netting 13. Preferably the thickness of the sheet material in the structure as a whole conform to the contours of the wires of the wire netting in the regions of the spaced strips 14. Preferably also the wire netting 13 in the regions between the strips 14 is not bonded to the base sheet 10 for reasons that will be explained below.

In the structure above mentioned it is preferable that the strips 14 be of sufficient width to overlap slightly the underlying strips 11 which are in staggered relation with the spaced strips 14 as shown. Preferably also, and as shown, the regions between the spaced strips 14 where the apertured sheet-like metallic reinforcement is exposed, is substantially as wide as, or wider than,

the width of the strips 14. It is to be noted that in the structure above described, there is, throughout the extent of the reinforced metallic sheet material, a layer of bituminous waterproofing material between two layers of fibrous sheet material, this layer being provided by the layer 12 between the strips 11 and the base sheet 10 and the layer 12' between the strips 14 and the base sheet 10.

A convenient apparatus for the manufacture of a reinforced waterproofing sheet material of the type shown in Figs. 1 and 2 is shown in Fig. 3. The roll 15 is a supply of previously bituminized sheet material of the full width desired for the product. The sheet 10 is taken from the roll 15 and is passed over guide roll 16 to the surface of the combining roll 17 which carries the sheet material to the nip between the combining rolls 17 and 17'. The asphalt for the layers 12 and 12' of bituminous waterproofing binder material is contained in a heat-liquified condition in the tank 18 from which it is taken by the applicator roll 19 and is applied to the surface of the sheet 10 as the sheet 10 is passed from the guide roll 16 to the combining roll 17. Control of the amount of asphalt applied to the sheet 10 can be provided in any suitable way as by the doctor roll 20.

Strips 11 of bitumen impregnated sheet material are taken from the roll 21, over the guide roll 22 and thence to the nip between the combining rolls 17 and 17'. The apertured sheet-like metallic reinforcement, such as the wire netting 13, is taken from the roll 23, over the guide roll 24 and thence to the nip between the combining rolls 17 and 17'. The strips 14 of the bitumen impregnated sheet material are taken from the roll 25 and thence to the combining roll 17' which carries the strips 14 to the nip between the combining rolls 17 and 17'.

It is apparent that upon simultaneuosly feeding the base sheet 10, the strips 11 and 14 and the wire netting 13, while maintaining their relative lateral positions as shown in Figs. 1 and 2, the product as a whole is combined and made integral at the nip between the combining rolls 17 and 17' as one operation.

In Fig. 4, the embodiment of the reinforced waterproofing sheet material shown in Figs. 1 and 2 is shown as integrally combined with an hydraulically setting cementitious material such as cement, plaster or concrete. The component parts of the reinforced waterproofing sheet material are the same as shown in Fig. 2 and are indicated by like reference characters. Applied to the side of the reinforced waterproofing sheet material which has the apertured metallic reinforcement exposed is the cementitious layer 26. It is to be noted that the cementitious material of the layer 26 has caused the base sheet 10 and the strip 11 of sheet material to become bowed slightly outwardly away from the wires of the wire netting 13 so that the wires of the wire netting 13 become completely embedded and surrounded by the cementitious material of the layer 26. It is for this reason that in the regions between the strips 14 the apertured sheet-like metallic reinforcement is not bonded to the base sheet of the waterproofing sheet material but is free to become spaced therefrom and embedded in the cementitious material when the cementitious sheet material is applied to the surface of the waterproofing sheet material. It is apparent that the wires of the wire netting 13 become embedded in the cementitious material of the layer 26 in the manner shown, the waterproofing sheet material is made integral with the layer 26 and at the same time acts as a reinforcement for the surface of the layer 26 of cementitious material.

An alternative embodiment of this invention is shown in Fig. 5. The base sheet in this modification is composite in character and comprises a sheet 27 of unspun fibers which is bonded to another sheet or layer 28 by a layer 41 of waterproofing material such as a suitable bituminous material. An apertured sheet-like metallic reinforcement 29 overlies the sheet 27 and strips 30 overlie the metallic reinforcement 29 and are bonded to the sheet 27 as by a layer 31 of waterproofing material, such as bituminous material. The strips 30 are spaced substantially from each other so as to leave portions of the metallic reinforcement 29 exposed. It is to be noted that in the embodiment of this invention shown in Fig. 4, there is a continuous layer of waterproofing material throughout the lateral extent of the reinforced waterproofing sheet material. In the drawings, the layer or sheet 28 is shown of substantial thickness and may, for example, be a fibrous board-like sheet which acts as a sound or heat-insulating material. In this manner, a waterproofing sheet material is provided which is adapted to become integral with an hydraulically setting cementitious material in contact therewith and which provides a sound or heat-insulating layer as a permanent part of the molded body. If desired, a layer of heat-insulating material such as the layer 28 may be employed instead of the base layer 10 of the embodiment of this invention shown in Fig. 2 or if desired the embodiment of this invention shown in Fig. 2 may be made adherent, as by a bituminous binder material, to a sheet or layer of heat insulation material by bonding the sheet 10 to the sheet or layer of heat-insulating material.

It is ordinarily preferable for the reasons above mentioned that the base sheet be arranged with the other elements of the structure so that throughout the entire lateral extent of the reinforced waterproofing sheet material there will be a layer of waterproofing bituminous material or the like disposed between impregnated fibrous sheets. This construction while preferable is not essential. Thus, in Fig. 6, there is shown an embodiment of this invention wherein the base sheet consists of a single sheet 32 of relatively heavy fibrous sheet material such as a bituminized felt. An apertured sheet-like metallic reinforcement 33 overlies the sheet 32 and spaced strips 34 are bonded to the sheet 32 by a layer 35 of suitable waterproofing binder such as bituminous material.

If desired, the reinforced waterproofing sheet material may be made so that it may be integral with a hydraulically setting cementitious material disposed on both sides thereof. Such an embodiment of this invention is shown in Fig. 7 which comprises the base sheet 36 having an apertured metallic reinforcement 37 on one side thereof and another apertured metallic reinforcement 37' on the other side thereof. Overlying the apertured metallic reinforcement 37 are the spaced strips of bituminous fibrous sheet material 38 which is bonded to the base sheet through the apertures in the metallic reinforcement 37 by the waterproofing binder 39. Similarly, the spaced strips 38' are bonded to the base sheet through the apertures in the metallic reinforcement 37' by a waterproofing binder 39'. It is to

be noted that in this embodiment of this invention there is, throughout, a layer of waterproofing binder disposed between impregnated fibrous sheets throughout the entire extent of the reinforced waterproofing sheet material. For this reason, it is preferable to have the spaced strips 38 and 38' in staggered relation with respect to each other and to have the strips 38 and 38' sufficiently wide so that they will slightly overlap on opposite sides of the sheet 36.

It is apparent that the embodiment of this invention that has been described hereinabove by way of example is subject to variation without departing from the scope of this invention. Thus, various types of apertured metallic reinforcements may be used. One such alternative reinforcement is shown by way of example in Fig. 8 and consists of interwoven spaced wires 40. Instead of a network of interwoven wires one set of spaced wires may merely overlie another set of spaced wires extending in a different direction from the first set. Ordinarily, however, it is desirable to provide some sort of interwoven network since greater stability is achieved in this way. The wires that are used may be of any desired weight and may, for example, be about 10 to 30 thousandths of an inch in diameter. Instead of using a network of wires, it is also possible to utilize an apertured metallic reinforcement which is formed from sheet metal which may, for example, be about 10 to 30 thousandths of an inch in thickness. The apertures can be provided by punching the apertures out of the sheet metal or alternatively the apertures may be made so as to produce the type of apertured metallic sheet material which is commonly referred to as expanded metal. Ordinarily, the apertures in the apertured metallic reinforcement are about ¼ inch to 1 inch across although these limits are not essential in reinforced waterproofing sheet materials embodying this invention.

With regard to the sheet material, other fabrics and web structures may be utilized. For example, instead of using a web or sheet of carded fibers, unspun fibers such as long cotton may be combed or drawn so as to lie predominantly in one direction in a more or less parallel and straightened condition. By superposing web materials of this character with fiber direction in one web disposed at an angle to the fiber direction in another web, sheet materials of high tensile strength and low stretchability can be obtained. Ordinarily, however, fibrous webs of unspun long fibers as disposed by carding or the like, are preferable. Whether the fibers in the web or sheet material are carded, combed, drawn or the like, they are arranged in unspun relation so as to afford sheet material that has the capacity of conforming readily to the wires or other solid portions of the apertured metallic reinforcement. It is preferable, therefore, to use throughout the entire reinforced waterproofing sheet material of this invention bituminized sheets composed of unspun fibers such as cotton fibers. It is especially desirable that the spaced strips which overlie the apertured metallic reinforcement and which are bonded to the base sheet by a waterproofing binder be composed of the unspun fibrous sheet material.

While cotton fibers have been mentioned as desirable for use in the practice of this invention, it is apparent that other fibers may be used, namely, animal, vegetable, mineral or synthetic, such as hair, wool, bast fibers, musa fibers, asbestos, glass, rock wool, cellulosic synthetic fibers, proteinous synthetic fibers, etc. When the sheet material comprises unspun fibers, it is desirable that the fibers be long fibers, namely, averaging ⅜" or more in length, it being preferable to employ fibers ½" or more in length. It is to be understood that any fiber whether of cotton or other material that averages ⅜" or more in length is "long" fiber as this term is used herein.

When the sheet material comprises unspun fibers and a waterproofing binder, the web material of unspun fiber usually runs to about 200 to 600 grains per sq. yd., and depending upon the type of fiber employed the web usually runs about 2 to 6 diameters in thickness. However, fibrous web materials of unspun fibers may be lighter or heavier. Moreover, the web materials may be unitary or may be composite, namely, composed of a plurality of laminations of the same or different materials. The amount of waterproofing material that is employed in the webs of unspun fibers preferably is of the order of 300% and even as high as 750% of the weight of the fibers.

In ordinary practice asphaltic waterproofing materials are preferred. Usually the softening point of a suitable asphaltic waterproofing material runs from about 125° F. to about 175° F., the penetration running from about 20 to 30. In addition to asphaltic waterproofing materials, other bituminous waterproofing materials may be employed, such as tars, pitches, etc. Moreover, other waterproofing materials may be employed, such as natural or synthetic rubber, paraffin and other waxes, hydrogenated rosin, and other naval stores, etc.

While it is preferable to employ sheet material composed of unspun fibers and a waterproofing binder, other sheet materials may be employed such as felt, paper, woven fabrics and the like. As aforesaid, and especially for the base sheet, the sheet material may be relatively thick, and may be composed of fibrous material which acts as a heat or sound insulation material. It is not essential that the sheet material be as highly impregnated with waterproofing binder as has been mentioned above in connection with sheets comprising unspun long fibers. Thus, for example, sheet material in the form of a fabric made from spun strands cannot be impregnated to as great extent as can a web of unspun long fibers. Accordingly, for effecting a high degree of waterproofness both from the point of view of transmission of water through the waterproofing sheet material as a whole and from the point of view of protecting the fibers of the fibrous sheet material, it is desirable to employ web or sheet material wherein unspun long fibers are impregnated to a relatively high degree with a waterproofing binder.

In the reinforced waterproofing sheet material it is usually desirable that the spaced strips of impregnated fibrous sheet material be about 1 to 3 inches in width, strips about 1¼ to 1¾ inches in width ordinarily being preferable. As aforesaid the regions between the spaced strips wherein the apertured sheet-like metallic reinforcement is exposed, are desirably at least as wide as the width of the overlying strips and may, for example, be about 1 to 4 inches in width, with preferred construction being of the order of 1½ to 3 inches in width. As compared with the width of the strips, the width of the regions between the strips usually is from 1 to 3 times the width of the strips.

It is to be understood that the embodiments of

this invention that have been described herein have been set forth for exemplary purposes only and that the embodiments of this invention herein particularly described may be varied without departing from the scope of this invention as defined by the language of the following claims.

I claim:

1. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material, which comprises a base sheet of fibrous sheet material impregnated with a waterproofing material, an apertured sheet-like metallic reinforcement overlying said base sheet, and a plurality of spaced strips of fibrous sheet material impregnated with a waterproofing material and overlying said sheet-like metallic reinforcement and bonded to said base sheet by waterproofing binder material through apertures in said metallic reinforcement, said apertured metallic reinforcement between said strips being exposed in regions of substantial area for direct contact with hydraulically setting cementitious material.

2. A reinforced waterproofing sheet material according to claim 1 wherein said apertured sheet-like metallic reinforcement is essentially unbonded to said base sheet in said regions between said spaced strips.

3. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material which comprises a base sheet of bituminized fibrous sheet material, an apertured sheet-like metallic reinforcement overlying said base sheet, and a plurality of spaced strips of bituminized fibrous sheet material overlying said metallic reinforcement and bonded to said base sheet by bituminous waterproofing material through apertures in said metallic reinforcement, said apertured metallic reinforcement in the regions between said spaced strips being exposed for direct contact with hydraulically setting cementitious material and being essentially unbonded in said regions to said base sheet, said regions between said spaced strips being at least substantially as wide as the width of said strips.

4. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting comentitious material, which comprises a base sheet of fibrous sheet material impregnated with a bituminous waterproofing material, a first set of spaced strips of bituminized fibrous sheet material overlying said base sheet and bonded thereto by bituminous waterproofing material, and wire netting that overlies said base sheet and said first set of strips of bituminized fibrous sheet material, and a second set of spaced strips of bituminized fibrous sheet material overlying said wire netting and in staggered relation to said first set of strips underlying said wire netting, said second set of spaced strips of btiuminized fibrous sheet material being bonded to said base sheet by bituminous waterproofing material through the apertures in said wire netting, and said wire netting being exposed in the regions between the second set of spaced strips of bituminized sheet material for direct contact with hydraulically setting cementitious material.

5. A cementitious body integrally surface covered with waterproofing sheet material comprising spaced strips of apertured sheet-like metallic reinforcement embedded in the surface of said cementitious body, alternate strips of said apertured sheet-like metallic reinforcement being embedded in bituminous waterproofing material that bonds a plurality of strips of bituminized sheet material located between said cementitious body and said apertured sheet-like metallic reinforcement with a bituminized fibrous base sheet on the opposite side of said apertured sheet-like metallic reinforcement, said base sheet covering said apertured sheet-like metallic reinforcement in the regions between said spaced strips of bituminized sheet material.

6. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material, which comprises a base sheet of fibrous sheet material impregnated with a waterproofing material, an apertured sheet-like metallic reinforcement overlying said base sheet, and a plurality of spaced strips of fibrous sheet material impregnated with a waterproofing material and overlying said sheet-like metallic reinforcement and bonded to said base sheet by waterproofing binder material through apertures in said metallic reinforcement, said apertured metallic reinforcement between said strips being exposed in regions of substantial area for direct contact with hydraulically setting cementitious material, and said base sheet being in the form of a web of unspun long fibers that is impregnated with a waterproofing material.

7. Reinforced waterproofing sheet material according to claim 1 wherein said reinforced waterproofing sheet material comprises fibrous sheet material in the form of a web of unspun long cotton fibers impregnated to the extent of at least about 300% on the weight of the fibers with a bituminous waterproofing material.

8. Reinforced waterproofing sheet material adapted for contact application to both sides thereof of hydraulically setting cementitious material, which comprises a base sheet of fibrous sheet material impregnated with a waterproofing material, an apertured sheet-like metallic reinforcement overlying each side of said base sheet, and a plurality of spaced strips of fibrous sheet material impregnated with a waterproofing material overlying each of said sheet-like metallic reinforcements and bonded to said base sheet by waterproofing binder material through apertures in said metallic reinforcements, each of said apertured metallic reinforcements between said strips being exposed in regions of substantial area on both sides of said base sheet for direct contact with hydraulically setting cementitious material.

9. Reinforced waterproofing sheet material according to claim 8 wherein said strips on opposite sides of said base sheet are disposed in staggered relation to each other.

10. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material, which comprises a base sheet of fibrous sheet material impregnated with a waterproofing material, an apertured sheet-like metallic reinforcement overlying said base sheet, and a plurality of spaced strips of fibrous sheet material impregnated with a waterproofing material and overlying said sheet-like metallic reinforcement and bonded to said base sheet by waterproofing binder material through apertures in said metallic reinforcement, said apertured metallic reinforcement between said strips being exposed in regions of substantial area for direct contact with hydraulically setting cementitious material, and said fibrous sheet material of said spaced strips

being in the form of a web of unspun long cotton fibers that is impregnated with a bituminous waterproofing material.

11. Reinforced waterproofing sheet material adapted for contact application thereto of hydraulically setting cementitious material, which comprises a base sheet of bituminous fibrous sheet material, an apertured sheet-like metallic reinforcement overlying said base sheet, a plurality of spaced strips of bituminized fibrous sheet material overlying said sheet-like metallic reinforcement and bonded to said base sheet through apertures in said metallic reinforcement by bituminous waterproofing material, said apertured reinforcement being exposed between said spaced strips, and further bituminized fibrous sheet material underlying said metallic reinforcement and bonded to said base sheet by bituminous waterproofing material throughout the areas of said waterproofing sheet material between said spaced strips thereby providing increased impermeability of said waterproofing sheet material in said areas between said spaced strips as compared with the impermeability of said base sheet by itself in said areas.

HARRY N. SANDELL.