This invention relates to a waterproof covering for flat roofs and other flat surfaces, such as playground areas, terraces, basement floors, patios, etc.

It is among the objects of the present invention to provide a waterproof covering which is light in weight, being lighter than the well known slag or gravel roof coverings and which does not require extra reinforcement of the building structure to carry the weight of the roof in those cases where this invention is applied to the construction of roofs; that is, the roof is of resilient and thus provides springy walking surfaces; which provides a durable wearing surface, one that is tough and tenacious; which provides for expansion and contraction of the parts and yet has the corners of the blocks or tiles forming the covering firmly anchored, so that they cannot rise or otherwise be displaced with consequent damage to the covering; which provides a safe covering eliminating the need for "catwalks" which are recognized fire and accident hazards; and which is relatively inexpensive to construct and maintain, much less so than the masonry slate or other inorganic tile roofs.

Other objects and advantages of the invention will be apparent from the following detailed description thereof.

United States Patent 2,196,807 of April 9, 1940, discloses a waterproof covering composed of individual fiber boards having rabbeted edges extending the full length of the top, bottom and sides of each board and laid with the base portions of the boards in abutting relation forming longitudinally and transverse extending surface grooves in which strips of felt and fibrous filler board strips are cemented by a waterproof adhesive to fill these grooves and form a flat surface. The present invention is an improvement in the waterproof covering of this patent. The improvement resides chiefly in the construction of the individual fiber boards and the manner in which they are secured in place to obtain the above noted objects of the present invention.

More specifically, the present invention insures that the corners of the fiber boards are securely anchored so that they cannot work free and rise with consequent damage to the waterproof covering, an objection frequently encountered in the construction of United States Patent 2,196,807. Moreover, the present invention insures proper disposition of the individual boards with expansion joints or spaces therebetween on all sides thereof to accommodate expansion and contraction of the parts with consequent improvement in the durability and increase in the effective life of the waterproof covering. Furthermore, the present invention provides for quicker laying or formation in place of the waterproof covering, and tends to insure that the boards are properly laid.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawing, in which

Figure 1 is a fragmentary plan view, parts being broken away to show the underlying structure, of a waterproof covering embodying this invention;

Figure 2 is a fragmentary plan view on a greatly enlarged scale, as compared with the scale of Figure 1, showing the relative position of four blocks, associated guide plate and seal-cap filler in the construction of the roof covering of this invention, this figure shows these parts in an incomplete stage of construction;

Figure 3 is a fragmentary vertical section taken in a plane passing through line 3-3 of Figure 1;

Figure 4 is a fragmentary vertical section taken in a plane passing through line 4-4 of Figure 2;

Figure 5 is a fragmentary vertical section taken in a plane passing through line 5-5 of Figure 1, the scale of Figures 3, 4 and 5 is substantially larger than that of Figure 1;

Figure 6 is a perspective view of an individual fibrous block employed in making the waterproof covering embodying this invention; and

Figure 7 is a perspective view of one of the guide plates employed in forming the waterproof covering of this invention.

Referring to the drawing, 10 indicates a waterproof membrane support on which the waterproof covering embodying this invention is laid. This support may be a flat roof, a terrace, patio, basement floor, etc., involving the usual deck or other base on which is superimposed any well known waterproof membrane comprising, for example, four plies of saturated felt, each ply being coated with waterproofing material, such as asphalt or coal tar pitch before the next ply is laid thereon to form alternate layers of saturated felt and waterproofing material. As the construction of such waterproof membrane supports is well known, further description thereof is not necessary.

Trowelled on to the waterproof membrane support 10 is a layer of waterproof adhesive mastic 11, completely covering support 10. Layer 11 may be any suitable mastic which may be laid cold, i.e., at atmospheric temperatures, and upon evaporation of its solvent content sets to form a solid layer firmly bonding overlying fibrous blocks 12 to the underlying membrane support 10. A suitable adhesive mastic is a fast-back asphalt containing fillers, such as asbestos fibers, slate flour or both and having a consistency such that it can be trowelled to form the layer 11. Desirably, this layer is from 3/16" to 1/4" thick, preferably about 1/8" thick.

While layer 11 is still tacky, the waterproof fibrous blocks 12 are laid thereon. Blocks 12 are waterproof fiber boards which are resilient, relatively light in weight, comparatively inexpensive, and protected against attacks by termites, dry rot and fungi by the incorporation of a suitable fungicide in the waterproofing saturant. Suitable boards are the fiber boards made from wood pulp, paper pulp or sugar cane including bagasse, saturated with a bituminous saturant, such as asphalt or coal tar pitch, which saturant, as noted, desirably contains a fungicide. While rectangular boards are preferred having a dimension of any from about 24" by 48" so that twelve boards cover a square, boards of other shapes and dimensions may be employed. The boards preferably are of a thickness of from about 5/16" to 1/2", preferably about 3/16", and are rabbeted at the corners to produce an anchoring flange 13 at each corner, which in the embodiment shown in the drawing, is triangular in shape. The depth of the rabbeted portion may be from 1/4" to 3/8", preferably 1/4". Thus, in the preferred embodiment a rectangular base portion 14 of the board is approximately 1/4" thick, and the upper octagonal portion 15 formed by rabbeting the corners is of the same thickness. Portions 14 and 15 of the board may be integrally formed or an octagonal shaped fiber board of the desired thickness bonded to a
rectangular shaped board base by a suitable cement to produce the waterproof fibrous boards 12. Preferably, the upper surfaces of the blocks are bevelled, as indicated by the reference character 16. To facilitate the proper application of the boards to form the waterproof covering of this invention with narrow expansion joints 17 and 18, e.g., about ½" wide, surrounding all marginal edges of each board, these rectangular guide plates 19 (Figure 7) are employed. These guide plates may be of metal, such as galvanized iron, copper or other suitable material of construction. In the embodiment shown in the drawing, they are square shaped and have a side length of about 4". It will be understood the invention is not limited to this particular shape or size guide plate. The guide plate is formed with expansion joint guide members 23, 24, 25 and 26, each positioned approximately mid-way between the ends of a side and having a width of approximately ½", where, as in the embodiment of the invention shown in the drawing, the expansion joints are approximately ½" wide. A prong 22 having a pointed or penetrating end is struck from the center of the guide plate, the function of which prong will be hereinafter explained.

The waterproof coating of the fibrous boards 12 is first positioned on the tacky mastic layer 11 and thereafter the guide plate 19 is positioned beneath the corner of this board, so that the upper edge and the side edge about the sides of expansion joint spaces 23, 25. When thus positioned, the guide plate 19 automatically indicates the correct positions of three other adjacent blocks B, C and D (Figure 1). These blocks are disposed with their corners registering with the side edges of the expansion joint guides 25, 26 for block B, 24, 25 for block C and 24, 23 for block D and are thus properly aligned and form the expansion joint spaces 17, 18. Thereafter the guide plate 19 is disposed under the corners of blocks C and D with the guide 25 in the expansion joint space 18 and the guides 26, 23 in the expansion joint space 17, plate 19 thus automatically indicates the proper position of the next pair of blocks E and F on Figure 1. The placement of the guide plates and the blocks, as hereinbefore described, is continued until the membrane support 10 has been completely covered by the blocks. It will be understood that the guide plates 19 facilitate proper spacing of the blocks with formation of the expansion joints 17 and 18 and the blocks and guide plates can be laid in any desired sequence which the applicator finds most expedient.

After the blocks have been laid a mastic cement, preferably similar to that employed in forming the layer 11, is travailed into the expansion joints 17 and 18 substantially completely filling these joints and in the rectangular openings 27 formed by each group of four blocks where the anchoring flanges 13 are positioned diagonally opposite each other. Each opening 27 extends downward from the face of the blocks towards the back of the blocks and terminates short of the back of the block; the back of each opening 27 is defined by the upper surface of the anchoring flanges 13. Adhesive mastic 28 thus travailed covers the upper surface of the anchoring flanges 13 as well as the rabbeted edges 29.

While the adhesive mastic 28 is still tacky, seal-cap fillers 31 are fitted in place. These caps 31 may be waterproof fibrous boards similar to board 12 but having a thickness equal to the depth of the rabbeted edges 29. Alternatively, a waterproof heavy felt seal-cap may be used to properly position of the seal-caps; it is only necessary to place each cap over a prong with the center of the cap just above the point of the prong and then press the cap downward, thus positioning it in opening 27 with a small clearance separating the marginal edges of the seal-cap from the sides defining the rectangular opening 27. This small clearance is filled with waterproof mastic. When the adhesive 28 sets, the caps 31 are held in place not only by the prongs 22 but also by the adhesive 28. The upper surfaces of the caps 31 are flush with the upper surfaces of the blocks 12, i.e., lie in the final horizontal plane. The caps 31, it will be noted from Figure 2, rest on the anchoring flanges 13 and firmly anchor these flanges, and, hence, the corners of blocks 12 so that they cannot rise or be displaced.

After the seal-caps have been applied as described, all joints including those surrounding the seal-caps are caulked. For this purpose a mastic cement, similar to that used in forming layer 11, is pressure travailed into these joints.

Preferably, a wearing surface 32 is applied to the resultant covering. This wearing surface may be produced by painting the surface of the blocks and the seal-caps, or by partially embedding mineral granules 33 in a waterproof coating layer 34, such as asphalt or coal tar pitch, applied to the surface of blocks 12 and seal-caps 31, as well as all joints between these parts.

The resultant waterproof covering is attractive in appearance and can be laid quickly. It is light in weight being substantially lighter than the well known slag or gravel roof coverings, and, hence, does not require extra reinforcing to carry its weight. The covering due to the resilient incombustible fibrous blocks provides a springy walking surface which is durable and unusually tough and tenacious. The expansion joints 17 and 18, which, it will be noted, completely surround the marginal edges of each block and the expansion joints surrounding the seal-caps 31, provide for expansion and contraction. The seal-caps 31 firmly anchor the corners of the block in place so that they cannot rise or otherwise become displaced.

Since different embodiments of the waterproof covering of this invention can be made without departing from the scope of the invention, it is intended that all matters contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:
1. A waterproof covering for flat surfaces comprising a flat waterproof membrane support, a layer of waterproof cement covering said support, rectangular water-proof fibrous blocks bonded to said support by said layer of waterproof cement, said blocks being arranged in rows with the individual blocks in each row spaced from each other by narrow expansion joints and all the blocks of each row spaced from those of an adjacent row by a narrow expansion joint separating said adjacent rows, each block having its four corners rabbed to form an anchoring flange at each corner substantially triangular in shape, thin rectangular guide plates each having upstanding guide members on the four sides thereof, and the anchoring flanges of each said group of four blocks defining a rectangular opening extending downwardly from the faces of the blocks and terminating above the backs of the blocks, a layer of waterproof cement filling said expansion joints and covering the base and sides of each of said rectangular openings, and rectangular fibrous block inserting each of a thickness substantially equal to that of said rectangular opening and each dimension so as to completely fill said rectangular opening leaving a small clearance between its marginal edges and the sides of said opening, secured in place in said opening.
2. A waterproof covering for flat surfaces comprising a flat waterproof membrane support, a layer of waterproof cement covering said support, rectangular water-proof fibrous blocks bonded to said support by said layer of waterproof cement, said blocks being arranged in rows with the individual blocks in each row spaced from each other by narrow expansion joints and all the blocks of each row spaced from those of an adjacent row by a narrow expansion joint separating said adjacent rows, each block having its four corners rabbed to form an anchoring flange at each corner substantially triangular in shape, thin rectangular guide plates each having upstanding guide members on the four sides thereof, and the anchoring flanges of each said group of four blocks defining a rectangular opening extending downwardly from the faces of the blocks and terminating above the backs of the blocks, a layer of waterproof cement filling said expansion joints and covering the base and sides of each of said rectangular openings, and rectangular fibrous block inserting each of a thickness substantially equal to that of said rectangular opening and each dimension so as to completely fill said rectangular opening leaving a small clearance between its marginal edges and the sides of said opening, secured in place in said opening.
from each other by narrow expansion joints and all the blocks of each row spaced from those of an adjacent row by a narrow expansion joint separating said adjacent rows, each block having its four corners rabbeted to form an anchoring flange at each corner substantially triangular in shape, thin substantially square guide plates each having at each of its four sides substantially mid way between the ends thereof upstanding guide members each of a width equal to the width of said expansion joints and also having a central prong, one such guide plate being positioned beneath the four corners of each group of four said blocks with said upstanding guide members separating adjacent blocks of the group to define said expansion joints and the upstanding prong positioned substantially at the center of the intersection of the two intersecting joints separating said four blocks of said group, the said anchoring flange of each group of four blocks in two adjacent rows defining a rectangular opening extending downwardly from the faces of the blocks and terminating above the backs of the blocks, a layer of waterproof cement filling said expansion joints and covering the base and sides of each of said rectangular openings, and rectangular fibrous block inserts, each of a thickness substantially equal to that of said rectangular opening and dimensioned so as to completely fill said rectangular opening leaving a small clearance between its marginal edges and the marginal edges of said opening secured in place in said opening by said prong and said cement, said prong serving to center said insert, the surface of said inserts and of said blocks lying in the same horizontal plane.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,929,871</td>
<td>Jones</td>
<td>Oct. 10, 1933</td>
</tr>
<tr>
<td>2,045,936</td>
<td>Weiger</td>
<td>June 30, 1936</td>
</tr>
<tr>
<td>2,196,807</td>
<td>Eckert</td>
<td>Apr. 9, 1940</td>
</tr>
<tr>
<td>2,201,129</td>
<td>Weiland</td>
<td>May 14, 1940</td>
</tr>
<tr>
<td>2,231,780</td>
<td>Swenson</td>
<td>Feb. 11, 1941</td>
</tr>
<tr>
<td>2,293,331</td>
<td>Dahilberg</td>
<td>Aug. 18, 1942</td>
</tr>
<tr>
<td>2,300,258</td>
<td>Kublanow</td>
<td>Oct. 27, 1942</td>
</tr>
<tr>
<td>2,339,865</td>
<td>Larmour</td>
<td>Jan. 25, 1944</td>
</tr>
</tbody>
</table>