March 13, 1951 W. E. ROWND 2,545,046

PAVING BLOCK

Filed Sept. 11, 1945 2 Sheets-Sheet 1

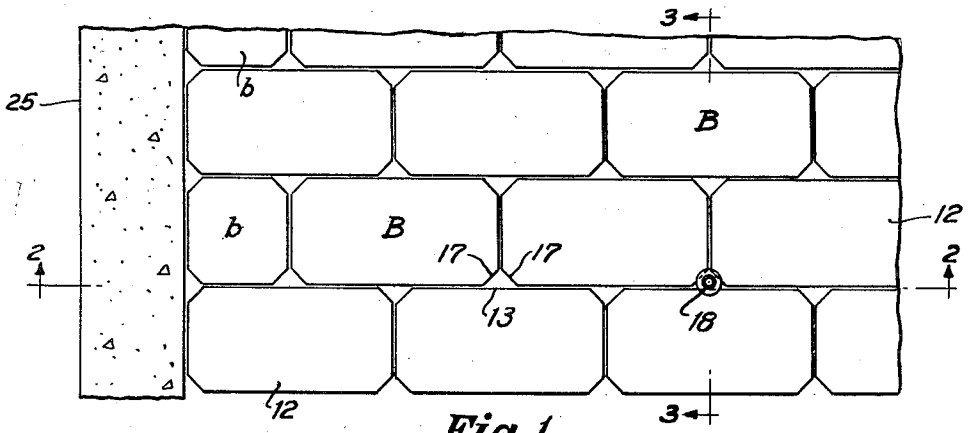


Fig. 1

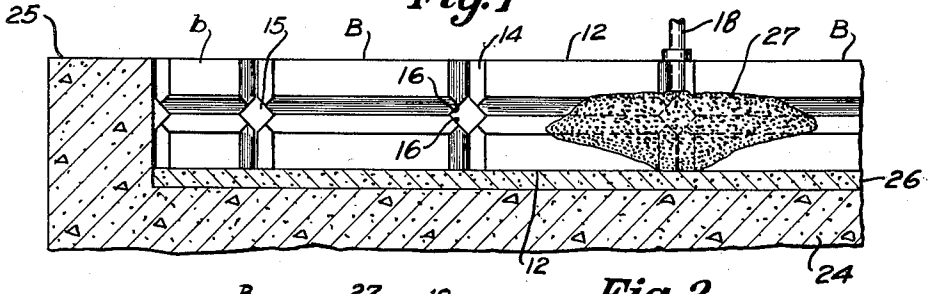


Fig. 2

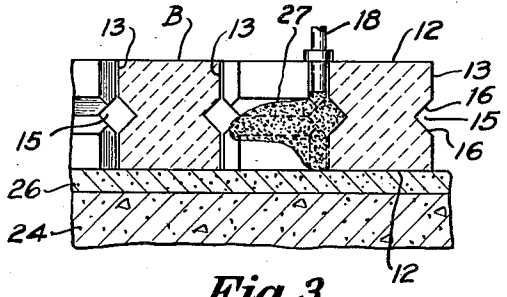


Fig. 3

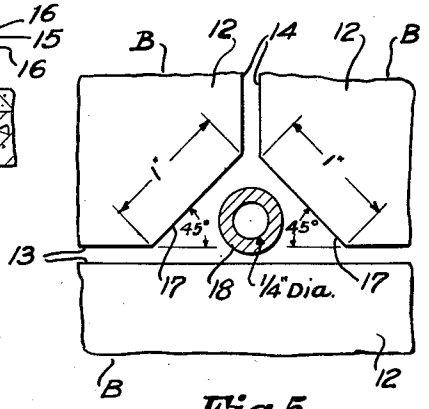


Fig. 5

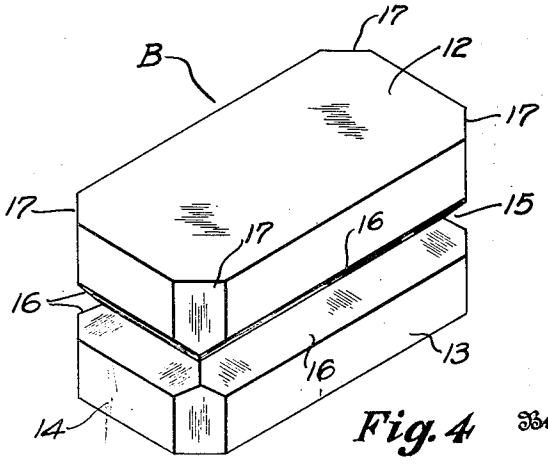


Fig. 4

Inventor

Wilbur E. Rownd

By Frease and Bishop

Attorneys

March 13, 1951 W. E. ROWND 2,545,046

PAVING BLOCK

Filed Sept. 11, 1945 2 Sheets-Sheet 2

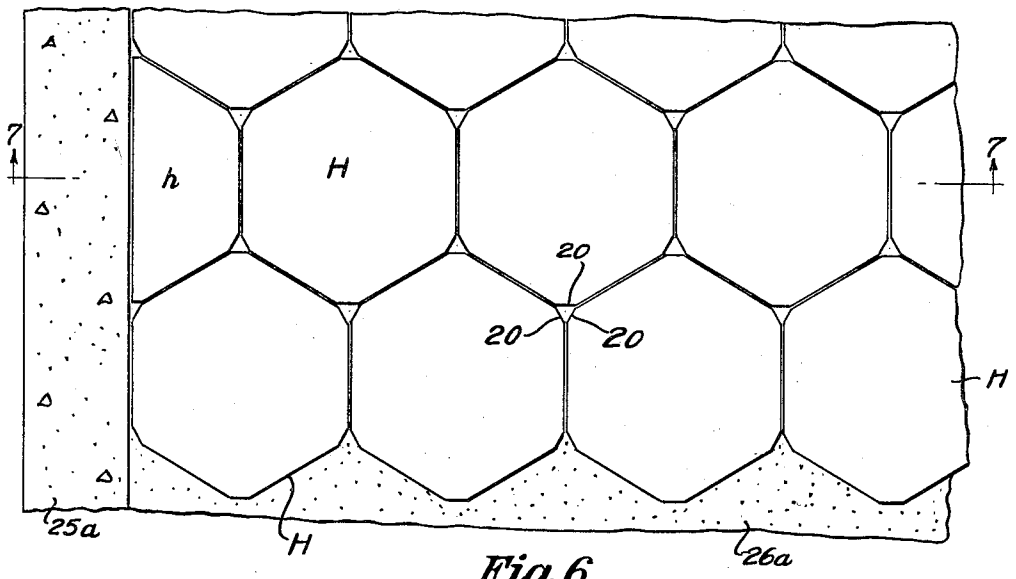


Fig. 6

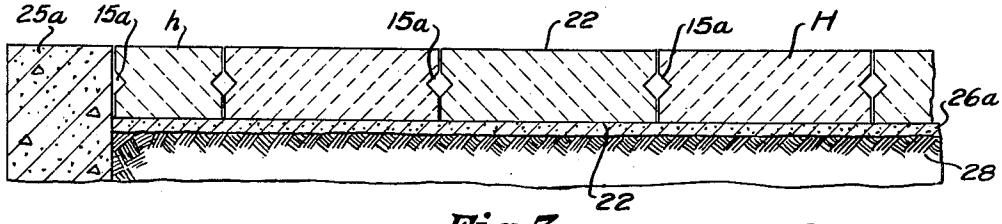


Fig. 7

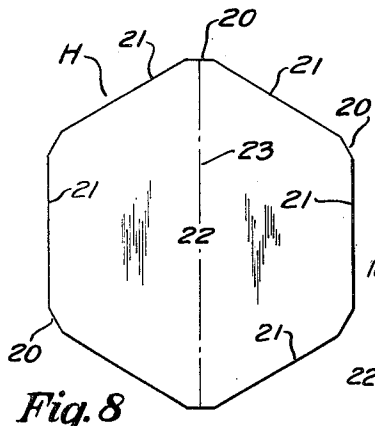


Fig. 8

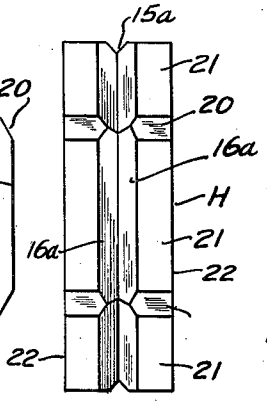


Fig. 9

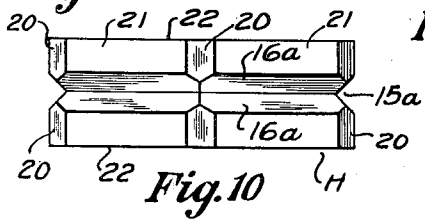


Fig. 10

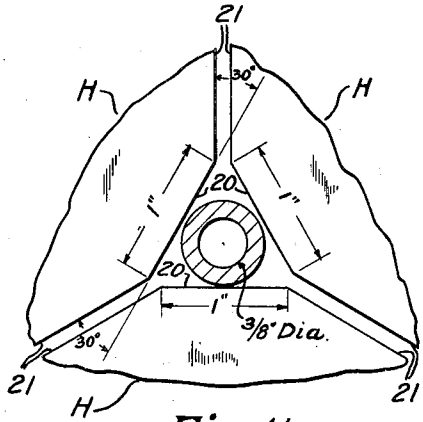


Fig. 11

Inventor

Wilbur E. Rownd

By Frease and Bishop

Attorneys

Patented Mar. 13, 1951 2,545,046

UNITED STATES PATENT OFFICE

2,545,046

PAVING BLOCK

Wilbur E. Rownd, Canton, Ohio

Application September 11, 1945, Serial No. 615,651

5 Claims. (Cl. 94—11)

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The invention relates generally to paving blocks or bricks, and more particularly to an improved paving block adapted for providing a monolithic pavement with all of the blocks securely interlocked.

Brick pavement for highways or streets has many advantages over other types of pavement, including ease of laying, the provision of a multitude of joints to take care of expansion and contraction due to temperature changes, the ability to withstand heavy, high speed traffic with a minimum of maintenance, and the provision of a durable, non-skid surface which is impervious to moisture and resistant to the action of salt, calcium chloride and other chemicals used to remove ice and snow.

The present standard paving brick is a rectangular clay block with sharp corners, about 4 inches wide, 4 inches deep and 8 inches long, and usually having two spacing lugs on one side for abutting an adjoining brick to provide a space or joint into which a filler material is poured. Such lugs require all the bricks to be laid with the lugs turned in the same direction, and the sharp corners readily spall or chip in handling.

Present practice is to lay or "drop" the bricks in place on a cushion of sand which may be mixed with bitumen, the cushion being supported on a concrete base, and to fill the joints preferably with bitumen by pouring sufficient hot bitumen over the top surfaces of the bricks to fill the joints. This pouring operation tends to form air pockets which leave voids in the joints. The excess bitumen must then be scraped off the surface, and in order that it may be removed easily and cleanly, it is necessary thoroughly to spray the top surfaces of all the bricks, before the bitumen is poured, with a water solution of calcium chloride or the like to prevent sticking of the bitumen to the brick top surfaces.

Obviously, the calcium chloride sprayed on the brick top surfaces will flow down the sides of the bricks, with the result that the bitumen poured in the joints will not adhere to the side surfaces of the bricks. Therefore, the individual bricks quickly become loose, and are sometimes actually lifted entirely out of place by the traction of heavy tires rolling over the pavement.

The filling of the joints can be accomplished in other ways, as by carefully pouring hot bitumen from a suitable spout into each individual joint, to avoid spreading it on the brick top surfaces but such operation is so slow and laborious that the cost of the same is prohibitive.

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Moreover, the provision of the lugs on one side only of each brick requires extra care and time in piling or stacking the bricks, all turned in the same way, in readiness for the brick layer or "dropper."

It is an object of the present invention to provide a novel and improved paving block which will overcome the disadvantages of all prior paving bricks or blocks.

Another object is to provide a novel paving block which is adapted to produce a monolithic pavement in which all of the individual blocks are securely interlocked with joint material.

Another object is to provide a novel paving block which is adapted to form a key way with adjoining blocks for receiving filler material.

A further object is to provide a paving block of novel design which is adapted to form interlocking joints in a pavement and openings accessible from the top surface of the pavement for filling the joints.

Another object is to provide a novel paving block which will produce interlocking joints in a pavement, said joints being adapted to be filled rapidly a plurality at one time, without pouring filler material on the top surface of the pavement.

Another object is to provide a novel paving block which is reversible vertically side-for-side, or horizontally end-for-end, and which is not apt to spall or chip during handling.

Finally, it is an object of the present invention to provide a novel and improved paving block which is simple and economical to manufacture, practical to handle by hand or machine, and which lends itself readily to the production of durable non-skid and stable pavements which are resistant to shock and to the action of the elements.

These and other objects which will be apparent from the following description are accomplished by the parts, elements, constructions, arrangements, and combinations which comprise the present invention, the nature of which is set forth in the following general statement, preferred embodiments of which are set forth in the following description and illustrated in the accompanying drawings, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

In general terms, the nature of the novel paving block may be stated as including a block having top, bottom and side surfaces with a continuous horizontal key way groove extending around its four sides midway of its top and

bottom surfaces, and the four vertical corners being beveled to provide openings extending throughout the full depth of the brick and communicating with said groove, whereby a pavement composed of said novel blocks can be filled a plurality of joints at a time by inserting a nozzle into one of said vertical openings.

In the accompanying drawings, preferred embodiments of the invention are shown by way of example.

Figure 1 is a plan view of a portion of a pavement formed of the novel paving blocks;

Fig. 2 is a fragmentary cross secional view thereof as on line 2—2, Fig. 1, showing the method of injecting the filler material in the joints between the blocks;

Fig. 3 is a fragmentary sectional view similar to Fig. 2, taken on line 3—3, Fig. 1;

Fig. 4 is an isometric view, on an enlarged scale, of the improved paving block;

Fig. 5 is a fragmentary plan view, actual size, showing a filler nozzle positioned in one of the vertical openings formed by the beveled corners;

Fig. 6 is a plan view similar to Fig. 1 showing a portion of a pavement formed by hexagonal blocks having beveled corners and embodying the present invention;

Fig. 7 is a cross sectional view as on line 7—7, Fig. 6;

Fig. 8 is a plan view of one of the improved hexagonal blocks on a larger scale;

Fig. 9 is a side elevation thereof;

Fig. 10 is a front elevation thereof; and

Fig. 11 is a fragmentary plan view, actual size, showing a filler nozzle inserted in one of the vertical openings formed by the beveled corners of adjoining blocks.

Similar numerals refer to similar parts throughout the drawings.

Referring to Figs. 1 to 5 inclusive, the novel paving block or brick B has horizontal top and bottom surfaces 12, vertical side surfaces 13, and vertical end surfaces 14. The block is preferably made of clay in the same manner as the standard paving prick, and may be approximately 8 inches long by 4 inches wide and 4 inches deep, in accordance with the dimensions of the standard paving brick. For certain purposes, however, the improved block may be made of other materials such as concrete or molded blocks consisting of an aggregate with a suitable binder, without departing from the scope of the invention as defined in the claims.

As shown, the improved block B is provided with a horizontal key way groove 15 extending continuously around the sides 13 and the ends 14, and located exactly midway between the top and bottom surfaces 12 of the block. Otherwise, the surfaces of the sides and ends 13 and 14 are planes. As best shown in Figs. 2 and 3, the surfaces 16 of the groove may be formed substantially at 45° angles with the side and end surfaces 13 and 14 and at right angles to each other, to form a groove which in cross section is one-half of a square, and when the bricks B are laid as in Fig. 1, the grooves 15 of adjoining bricks form a square key way extending entirely around each brick and between all of the bricks.

The cross-sectional shape of the groove may depend somewhat upon the method of manufacture of the improved blocks, and may vary considerably. All that is necessary, is to accomplish the interlocking feature without weakening the block structure.

Each of the corners of the improved block B are

beveled, preferably on a 45° angle with the intersecting side surfaces, to provide beveled surfaces 17 which intersect the surfaces 16 of the horizontal groove 15. The beveled surfaces 17 extend throughout the full depth of the lock B, and when the blocks are laid in a pavement as in Fig. 1, the beveled surfaces 17 at the adjoining ends of two of the bricks B form, with the adjoining side surface 13 of another brick, a triangular vertical opening which extends throughout the depths of the bricks and communicates with the grooves 15 which form the key ways extending around the sides of the bricks. Thus, when the bricks are laid up, the beveled surfaces 17 form vertical openings at each corner of each brick communicating with the horizontal key ways 15, so that a nozzle 18 can be inserted at any of the triangular openings for injecting filler into the key ways.

If the filler is bitumen in a hot fluid condition and is injected from the nozzle 18 under pressure, it will flow rapidly along the key ways 15 of a plurality of adjoining blocks, and the key ways will act as reservoirs of filler material from which the joints between the bricks are completely filled. As indicated in the drawings, the bricks B are laid with a joint space between all their adjoining surfaces, and if laid by hand such joint space is automatically provided when the brick dropper rapidly drops the bricks into place, the joint space between the adjoining surfaces 13 and 14 being actually about ⅛ inch as shown in Fig. 5, when the bricks are dropped in the usual manner. If laid mechanically, similar joint spaces may be provided by positive means as the bricks are laid.

It is important that the size of the beveled surfaces 17 be properly related to the size of a suitable nozzle 18 for injecting the filler material, without structurally weakening the improved block, so that when the bricks are laid in the usual fashion, as shown in Figs 1 and 5, the triangular opening between the beveled surfaces 17 and the side surface 13 of an adjoining brick is such as to permit ready entry of the required size nozzle without providing too large an opening in which a stone or piece of foreign material might become lodged, or which would have the effect of weakening the pavement structure or roughening its surface.

I have determined that hot bitumen material should be injected in the triangular vertical holes formed by the beveled surfaces 17 through a nozzle made of standard ¼ inch to ⅜ inch diameter pipe, under a pressure of two to four pounds per square inch, in order to obtain rapid flow of the filler into a plurality of the key ways 15 and from said key ways into the adjoining joints, so as to completely fill the joints and key ways between a plurality of bricks in a substantial area surrounding the nozzle location without overflowing the brick top surfaces. I have also determined that with a nozzle of ¼ inch to ⅜ inch diameter pipe, the beveled surfaces 17 should be about 1 inch wide, as shown in Fig. 5, in order to provide an opening into which ¼ inch pipe is easily inserted, and into which a ⅜ inch pipe may also be inserted with a slight clearance.

As shown in Figs. 1 and 2, the improved paving block may be made in fractional sizes known as "bats," a half block *b* being shown to fill out the end of every other row of blocks. These half blocks *b* are of exactly the same construction as the block B except that they are one-half the length. Other fractional sizes, such as one-third

or two-thirds the length of the block B, can be made to correct any irregularities in the pavement and still maintain the proper filling and interlocking features.

Other filler material such as cement grout may be used within the scope of the invention, as long as the material can be inserted in a liquid or semi-liquid condition and sets in a solid or semi-solid condition so as to provide an interlocking joint. Filler material such as bitumen in the key ways formed by the grooves 15 acts as a reservoir which constantly maintains a sufficient quantity of filler material to seal perfectly all vertical surfaces of the adjoining blocks.

The novel and improved paving block can be made in a variety of shapes, and by way of example in Figs. 6 to 11 inclusive, there is shown a hexagonal paving block embodying the present invention. The block H is hexagonal in plan view as shown in Figs. 6 and 8, and has its corners beveled throughout the depth of the block as indicated by the beveled surfaces 20. The hexagonal block H may be about 12 inches between opposite side faces 21 and may have a depth of about 4 inches if desired.

As shown in Figs. 9 and 10, the block is provided midway of its top and bottom surfaces 22 with a horizontal groove 15*a* extending continuously around all of the sides 21, and the sides of the grooves are preferably formed substantially at 45° angles with the side surfaces 21 and at right angles to each other, to form a groove which in cross section is one-half of a square. The cross sectional shape of the groove 15*a* may vary in the same manner as the cross sectional shape of the groove 15 without departing from the spirit of the invention.

The beveled surfaces 20 at the corners of the block H extend throughout the full depth of the block and intersect the surfaces 16*a* of the horizontal groove 15*a* so that when the blocks are laid as shown in Figs. 6 and 7, the three adjoining beveled surfaces 20 of adjoining blocks form triangular vertical openings which communicate with the grooves 15*a* of the adjoining blocks.

I have determined that the beveled surfaces 20 should be about 1 inch wide in order to provide a triangular opening large enough that a nozzle of ¼ inch to ⅜ inch pipe can be readily inserted with a slight clearance therein, and in Fig. 11, I have shown the relation of the size of the triangular opening formed by the 1 inch wide bevel surfaces 20 to a ⅜ inch diameter nozzle pipe.

As shown in Figs. 6 and 7, the improved hexagonal block can be made in one-half blocks *h*, which have the same horizontal groove 15*a* extending around all sides midway of the top and bottom surfaces 22, but which are formed by bisecting the block H along the line 23 as shown in Fig. 8.

In laying a pavement of the blocks B in the arrangement of Fig. 1, it may be desirable to provide a concrete foundation 24 with a usual concrete curb 25 at the sides thereof. After the foundation has set, a layer of cushion material 26 is spread over the foundation 24 to a thickness of say about ¾ inch and levelled so as to provide a smooth bed on which to drop the blocks or bricks B. The cushion material may vary, and is preferably a mixture of sand and bitumen. The bricks B are then stacked across the roadway in piles or are conveyed into position for the brick dropper who rapidly drops them into place in rows as indicated in Fig. 1, and the jar or shock of each brick as it is "dropped" automatically provides a clearance between adjoining bricks, which clearance is on the average about ⅛ inch as indicated in Fig. 5. Obviously, the bricks B may be laid by mechanical means to attain the same result.

After the bricks have been thus laid as indicated in Fig. 1, the filler material is injected by inserting a nozzle 18 in one of the openings formed at the beveled corners, in the manner previously described, and the filler material is preferably hot bitumen having a relatively high fluidity. As the hot bitumen is forced through the nozzle 18 at a pressure of preferably two to four pounds per square inch, it rapidly fills the adjoining continuous key ways 15 of adjoining bricks B, because the key ways communicate one with another, and from the key ways the bitumen gradually fills up the ⅛ inch spaces or joints between the brick surfaces, as indicated at 27 in Figs. 2 and 3, so that a plurality of the key ways and joints in a substantial area surrounding the nozzle 18 are rapidly filled with the bitumen filler up to the top surfaces 12 of the bricks.

It is apparent that injecting the bitumen filler in this manner avoids the formation of air pockets, because the openings at the beveled corners provide means for venting the air in the joints as the filler flows through the adjoining key ways.

In some cases, it may not be necessary to provide a concrete foundation for the improved pavement formed of the novel paving blocks, and they may be laid on a semi-rigid base such as gravel, slag or other like material, or directly upon earth which has been properly shaped, drained and settled. The use of a concrete foundation may be less necessary with larger blocks, such as the hexagonal block H and accordingly, in Fig. 7, the blocks H are shown laid upon a cushion 26*a* which rests directly on the ground 28, there being a curb 25*a* provided at the sides of the roadway.

As shown in Fig. 7, the grooves 15*a* provide square or rectangular key ways for receiving the filler material injected into the vertical openings formed by the beveled surfaces 20 of adjoining blocks, and the grooves or key ways extend entirely around all of the blocks H and *h*, forming reservoirs from which the spaces or joints between the blocks are entirely filled.

Thus, the key ways 15 and 15*a* provide a positive means for interlocking all of the bricks or blocks B or H together to form a monolithic pavement which has ample joint space to take care of expansion and contraction due to temperature changes. The bricks or blocks are readily adapted to be made of baked clay and the like, which provides a non-skid surface and is impervious to moisture and resistant to the action of salt, calcium chloride or other chemicals used to remove ice and snow.

Moreover, the beveled surfaces of each corner of the bricks B or the blocks H permit reversing the bricks or blocks to expose either the top or bottom surfaces thereof, which facilitates handling and culling the bricks or blocks. Furthermore, the fact that the key way grooves 15 and 15*a* extend continuously around all sides of the blocks midway of the top and bottom surfaces thereof, without any projecting spacer lugs on any of the surfaces, saves time in handling and stacking the blocks in readiness for the brick dropper, because the blocks do not need to be turned all in one direction.

The groove 15 or 15*a* extending around all sides of the improved block provides a ready means

for gripping and handling the blocks mechanically in connection with the mechanical handling of blocks during manufacturing, delivering, rehandling and placing them in position in a pavement.

Moreover, the fact that the horizontal groove 15 or 15a provides a relatively large reservoir of filler material at each joint, insures that the joint will substantially prevent the entrance of moisture into the joints between the blocks, which insures longer life of the pavement and much less frost damage, because the presence of ice in the joints of the pavement is obviously very injurious.

The novel paving block is simple, economical to manufacture and handle, and provides a durable non-skid and stable monolithic pavement in which all of the blocks are securely interlocked.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention, the construction, the operation and use, and preferred embodiments thereof, and the advantageous new and useful results obtained thereby; the new and useful constructions and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. A paving block having horizontal top and bottom surfaces and vertical plane side surfaces, the corners between intersecting side surfaces being beveled throughout the depth of the block to provide beveled surfaces, and said side surfaces having a continuous horizontal groove midway of said top and bottom surfaces, and extending entirely around the block and through said beveled surfaces.

2. A paving block having horizontal top and bottom surfaces and vertical plane side surfaces, the corners between intersecting side surfaces being beveled throughout the depth of the block to provide beveled surfaces substantially one inch wide, and said surfaces having a continuous horizontal groove midway of said top and bottom surfaces and extending entirely around the block and through said beveled surfaces.

3. A pavement including a plurality of adjoining blocks each having horizontal top and bottom surfaces and vertical plane side surfaces, the vertical corners of each block being beveled throughout their depths to provide beveled surfaces substantially one inch wide, and said side surfaces having a continuous horizontal groove positioned midway of said top and bottom surfaces and extending entirely around the block and through said beveled surfaces, whereby the adjacent beveled surfaces of adjoining bricks form proper size nozzle openings to receive with a close fit a nozzle of ¼ inch to ⅜ inch diameter pipe for injecting filler material into the continuous horizontal grooves communicating with said opening, and said grooves and nozzle openings being filled with said filler material.

4. A pavement including a plurality of rows of adjoining blocks with the blocks in each row staggered with respect to the blocks in adjoining rows, each block having horizontal top and bottom surfaces, and vertical plane side surfaces, the vertical corners of each block being beveled throughout their depths to provide beveled surfaces substantially one inch wide, said side surfaces having a continuous horizontal groove midway of said top and bottom surfaces and extending entirely around the block and through said beveled surfaces, and the adjacent beveled surfaces of adjoining blocks in each row forming with the side surface of a block in an adjoining row, triangular openings adapted to receive a filler nozzle of ¼ inch to ⅜ inch diameter pipe with a substantially close fit to fill the continuous horizontal grooves communicating with said opening, and said grooves and said triangular openings being filled with said filler material.

5. A pavement including a plurality of adjoining staggered blocks each having horizontal top and bottom surfaces and vertical plane side surfaces, the vertical corners of each block being beveled throughout their depths to provide beveled surfaces, the side surfaces of each block having a continuous horizontal groove midway of its top and bottom surfaces and extending entirely around the block and through said beveled surfaces, the adjacent beveled surfaces of adjoining blocks forming filler openings for receiving filler material, and said horizontal grooves and filler openings being filled with plastic filler material.

WILBUR E. ROWND.

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