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Masonry block splitter assembly with projections adjacent to splitting blades

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Abstract

A block splitter including an activatible first splitting assembly for creating at least one concrete block from a concrete workpiece, wherein during an activation of the first splitting assembly the splitting assembly splits the workpiece into at least two pieces, the first splitting assembly including a first splitting blade characterized by the first splitting assembly includes a plurality of projections positioned adjacent the first splitting blade on at least one side thereof and positioned on the first splitting assembly to erode portions of the concrete adjacent the first splitting blade during the activation of the first splitting assembly.

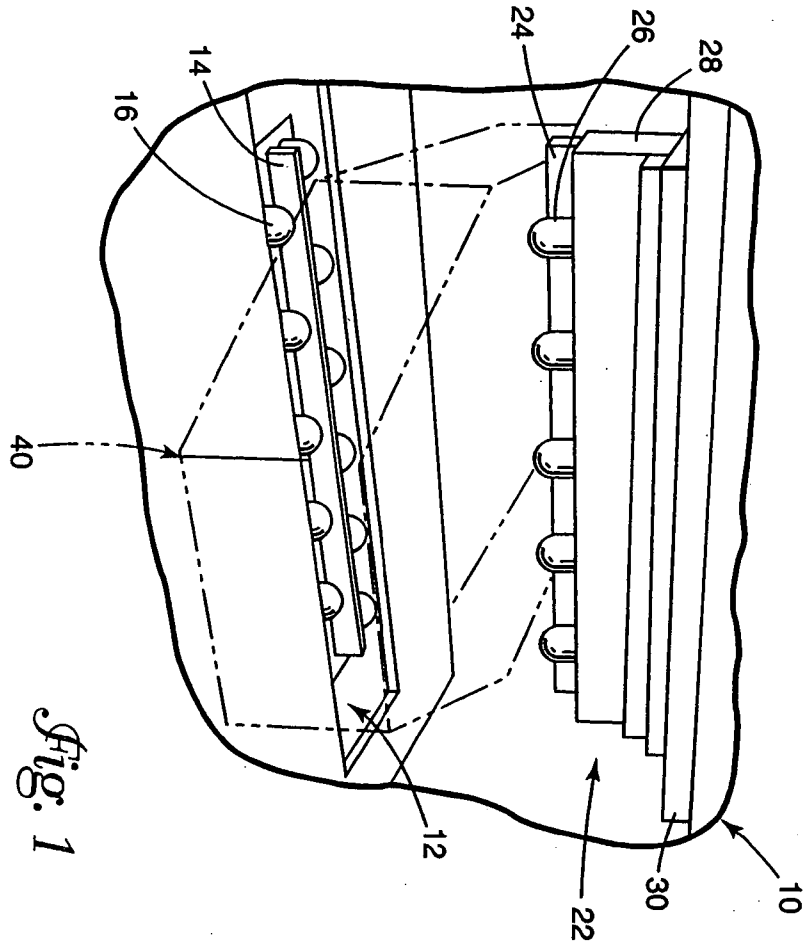

Fig. 1

AUSTRALIA

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COMPLETE SPECIFICATION

STANDARD PATENT

Applicant:

ANCHOR WALL SYSTEMS, INC

Invention Title:

MASONRY BLOCK SPLITTER ASSEMBLY WITH PROJECTIONS ADJACENT TO SPLITTING BLADES

The following statement is a full description of this invention, including the best method of performing it known to us:

MASONRY BLOCK SPLITTER ASSEMBLY WITH PROJECTIONS ADJACENT TO SPLITTING BLADES

Field of the Invention

The invention relates generally to manufacture of masonry block. More specifically, it relates to equipment and processes for the creation of decorative faces on masonry block. Even more specifically, the invention relates to equipment and processes for producing roughened textures and the appearance of weathered edges on masonry block.

Background of the Invention

The process of splitting a masonry block to create a rock-like appearance on the exposed face of the block is known. See, for example, Besser, US Patent No. 1,534,353, which discloses the manual splitting of blocks using a hammer and chisel. Automated equipment to split block is well-known, and generally includes a splitting table comprising a supporting table and one or more hydraulically-actuated splitting blades. These machines are useful for the high-speed processing of blocks. They produce a rock-face finish on the blocks. The adges of the faces are generally well-defined, i.e., "sharp".

It is sometimes desirable to produce a concrete product that has edges which appear to be weathered. This has been a desired look for concrete pavingstones for sometime. Recently, it has become desirable to create the weathered look on the decorative face of concrete retaining wall blocks. The common process for producing the weathered look on pavers is to "tumble" the pavers in a rotary drum to knock off their sharp edges. This process can be used with some retaining wall blocks, as well, provided that the blocks do not have any features,

such as integral concrete locator flanges, that would be damaged by the tumbling process. Tumbling is not an option with such blocks. The problem with the tumbling process is that it is costly. The process requires the capital investment in a tumbling apparatus, and the upkeep of that equipment. In addition, the pavers or blocks must be removed from the production line, tumbled, and then reassembled into suitable cubes for transportation. This makes the process labor-intensive.

Another option is to use a hammermill to attack the face of the block with various hammers. This option can slow down production, if it is done "in line", because the process can only move as fast as the hammermill can operate on each block, and block may need to be manipulated-flipped over and or rotated-to attack all of its edges.

Accordingly, there is a need for equipment and a process that will create the appearance of weathered edges on retaining wall block, in such a manner that it will not slow down the production line, will not add costly equipment to the line, will not be labor-intensive, and will not have high cull rates when processing blocks with integral locator flanges or other similar features.

Summary of the Invention

In accordance with a first aspect of the invention there is provided a block splitter including an activatible first splitting assembly for creating at least one concrete block from a concrete workpiece, wherein during an activation of the first splitting assembly the splitting assembly splits the workpiece into at least two pieces, the first splitting assembly including a first splitting blade characterized by the first splitting assembly includes a plurality of projections positioned

adjacent the first splitting blade on at least one side thereof and positioned on the first splitting assembly to erode portions of the concrete adjacent the first splitting blade during the activation of the first splitting assembly.

In accordance with a second aspect of the invention there is provided a splitting assembly for use in a block splitter to create at least one concrete block from a concrete workpiece, the splitting assembly including a splitting blade for splitting the workpiece into at least two pieces during an activation of the splitting assembly, characterized by a plurality of projections positioned adjacent to the splitting blade on at least one side thereof and positioned on the splitting assembly to erode portions of the concrete adjacent the splitting blade during activation of the splitting assembly.

In accordance with another aspect of the invention there is provided a method of producing a concrete block having at least one irregular split edge and surface during a splitting operation, comprising providing a block splitter that includes an activatible first splitting assembly having a first splitting blade positioned to engage a concrete workpiece to split it into at least two pieces during an activation of the first splitting assembly and that has a plurality of projections adjacent the first splitting blade on at least one side thereof, the projections being positioned to erode portions of the concrete adjacent the first splitting blade during the activation of the first splitting assembly locating a concrete workpiece in the block splitter so that the splitting assembly can engage the workpiece when the splitting assembly is activated and activating the first splitting assembly so that the splitting blade splits the concrete workpiece into the at least two pieces and the projections erode portions of the concrete.

Brief Description of the Drawings

Figure 1 is a partial perspective view of a block splitting machine using the block splitter blade assembly of the invention.

Figure 2A is a top plan view of one portion of a splitting blade assembly in accordance with the invention.

Figure 2B is a top plan view of one portion of a splitting blade assembly also showing protrusions of various diameters positioned in a random manner.

Figure 2C is a top plan view of one portion of a splitting blade assembly in accordance with a further alternative embodiment of the invention comprising protrusions which are random connected and unconnected panels.

Figure 3 is a side elevational view of an alternative embodiment of a protrusion in accordance with the invention.

Figure 4A is a side elevational view of a further alternative embodiment of a protrusion in accordance with the invention.

Figure 4B is a side elevational view of another alternative embodiment of the invention depicting protrusions of varying height.

Figure 5 is a perspective view of a split work piece, (forming two masonry blocks), which was split using the splitter blade assembly of the invention.

Figure 6 is a top plan view of a masonry block split using the splitter blade assembly of the invention.

Figure 7 is a front elevational view of the masonry block depicted in Figure 6.

Detailed Description of the Preferred Embodiment

Attention is now directed to the figures where like parts are identified with like numerals through several views. In Figure 1, a conventional block splitting machine modified in accordance with invention is depicted, in part, showing in particular the block splitter assembly 10. Generally, block splitting machines may be obtained from Lithibar Co., located in Holland, Michingan. In particular, the Lithibar Co. 6386 was used in practicing the invention. The block splitter assembly generally has opposed first 12 and second 22 splitting blade assemblies. The first splitting blade assembly 12 is positioned at the bottom of the block splitter 10 and, as depicted, includes a splitting blade 14 and a number of protrusions positioned on either side and adjacent to the blade.

The invention may be used with any variety of blocks molded or formed through any variety of processes including those block and processes disclosed in US Patent No. 5,827,015 issued October 27, 1998, US Patent No. 5,017,049 issued May 21, 1991 and US Patent No. 5,709,062 issued January 20, 1998.

An upper or second splitting blade assembly 22 may also be seen in Figure 1. The second splitting blade assembly 22 also includes a splitting blade 24 and a plurality of projections 26 located on either side of the blade 24. The second splitting blade assembly may be attached to the machine's top plate 30 through a blade holder 28. The position of the work piece 40, (shown in

phantom), within the block splitter may be seen in Figure 1, in the ready-to-split position.

As can be seen in Figure 2A, the splitting blade assembly 12 is generally comprised of a number of projections 16 positioned adjacent to blade 14 and on either side of the blade 14. As shown, the projections 16 on the first side of the blade are staggered in relationship to the projections 16' on the second side of the blade. The projections on either side of the blade may also be aligned depending upon the intent of the operator.

As can be seen in Figure 2B, the protrusions 16 may be used without a splitting blade. The protrusions 16 may also be varied in diameter or perimeter, (if not round), and placed randomly on the splitting assembly 12. Any number of ordered or random patterns of protrusions 16 may be created using regular or irregular spacing depending on the effect to be created in the split block.

Figure 2C shows a further alternative embodiment of the invention where plates 16" are attached to either, or both, assemblies 12 and 22. As can be seen, these plates may be configured in random order and left unconnected across the surface of the assembly 12. The invention has been practiced using steel plates about four inches (about 10.16cm) long welded to the assembly to provide a number of partially connected protrusions 16" about two inches (about 5.08cm) high.

As shown in Figures 1, 2A and 2B, the projections 16 and 16' may have a rounded shape. However, the shape of the projections may also be pyramidal, cubic, or pointed with one or more points on the top surface of the projection. In Figures 2B and 2C the relative position of the work piece 40 is again shown in phantom outline.

Generally, the protrusions may have a diameter of about ½ to 1 and ¼ inches (about 1.27 to 3.18cm) and may be attached by welding, screwing or other suitable means. The height of the protrusions may be about 1 and ¼ inches (about 3.18cm) and varied about ¼ of an inch (about 1.91cm) shorter or taller depending upon the affect to be created in the block at splitting. Attaching the protrusions by threading or screwing allows easy adjustment of protrusion height.

The relative height of the projection and blade may also be varied depending upon the effect that is to be created in the block split according to the invention. Specifically, as can be seen in Figure 3 the relative height of the blade 14 may be less than the relative height of the projection 16. Alternatively, as can be seen in Figure 4A the relative height of the blade may be greater than the height of the projections 26. Generally, we have found with the first splitting blade assembly that X may range from about 1/8 to about 3/8 of an inch (about 0.32 to about 0.95cm) beyond the first blade. With regard to the second splitting blade assembly, X' may range from about 1/16 to 1/8 of an inch (about 0.16 to 0.32cm) beyond the height of the plurality of the projections.

Protrusions 16 such as those depicted in Fig.2A have been found useful having a diameter of about 1 and ¼ inches (about 3.18cm) and, when used with a blade 14, having a height of about 1/8 of an inch (about 0.32cm) above the blade in the first or lower assembly and 1/8 of an inch (0.32cm) below the blade in the second or upper assembly. Overall, the height of the protrusions may vary up or down about 3/8 of an inch (about 0.95cm) relative to the height of the blade.

In operation, the work piece is generally centered in the block splitter according to known practices as seen in Figures 1 and 2. The block splitter is then activated resulting in the first and second opposing splitting blade assemblies converging on, and striking, the work piece 40. In operation, the first and second splitting blade assemblies may travel anywhere from about ¼ to one inch (about 0.63 to 2.54cm) into the top and bottom surfaces of the work piece. The work piece 40 is then split resulting in an uneven patterning on the split edges 46 and 46' of the resulting blocks, 42 and 44, as illustrated in Figure 5. As depicted, the work piece 40' in split in two. However, it is possible and within the scope of the invention to split the work piece into more than two pieces.

The distance traveled by the protrusions 16 into the work piece may be varied by adjusting the limit switches on the machine and, in turn, varying the hydraulic pressure with which the splitting assembly acts. Generally, the splitting assemblies act on the block with a pressure ranging from about 600 to 1000 psi (about 4.14 x 10^6 to 689 x 10^6 Pa), and preferably about 750 to 800 psi (about 5.17 x 10^6) to 5.52 x 10^6 Pa).

As will be well understood by one of skill in the art, the splitting machine may include opposed hydraulically activated side knife assemblies (not shown) which impinge upon the block with the same timing and in the same manner as the opposed top and bottom assemblies. Projections 16 may also be used to supplement or replace the action of the side knives.

Closer examination of block 44 after splitting (see Figures 6 and 7) shows the formation of exaggerated points of erosion in the front split surface 46 of the block 44. With the block 44 depicted, both the first and second

blade assemblies 12 and 22 comprised protrusions 16 and 26, respectively. As a result, depressions 48 and 50 were formed in the front, split surface 46 of the block 44, adjacent the upper 52 and lower 54 respective surface of the block 44.

The magnitude of the indentations, 48 and 50, or pints of erosion is far greater than that which is caused by conventional splitting blades and may be varied by varying the prominence of the protrusions 16 and 26, (height and size), relative to the height and thickness of the blade. In one embodiment of the invention, masonry block may be split with only a row or rows of protrusions 16 and 26 without a blade 14 and 24.

The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A block splitter including an activatible first splitting assembly (12) for creating at least one concrete block from a concrete workpiece, wherein during an activation of the first splitting assembly the splitting assembly splits the workpiece into at least two pieces, the first splitting assembly including a first splitting blade characterized by the first splitting assembly includes a plurality of projections positioned adjacent the first splitting blade on at least one side thereof and positioned on the first splitting assembly to erode portions of the concrete adjacent the first splitting blade during the activation of the first splitting assembly.

2. The block splitter of claim 1, including a plurality of projections positioned on each side of the first splitting blade.

3. The block splitter of claim 1 or claim 2, wherein the block splitter includes a second activatible splitting assembly opposed to the first splitting assembly, the second splitting assembly including a second splitting blade and a plurality of projections positioned adjacent the second splitting blade on at least one side thereof and positioned on the second splitting assembly to erode portions of the concrete adjacent the second splitting blade during the activation of the second splitting assembly.

4. The block splitter of claim 3, including a plurality of projections positioned on each side of each of the splitting blades.

5. The block splitter of any one of the preceding claims, wherein the projections are cylindrical with a rounded end.

6. The block splitter of any one of the preceding claims, wherein the projections have a diameter of between about 1.27cm (about 0.5 inch) and about 3.18cm (about 1.25 inches).

7. The block splitter of any one of the preceding claims, wherein the projections comprise plates.

8. The block splitter of any one of claims 1 to 6, wherein the projections are pyramidal in shape.

9. The block splitter of claim 3, wherein each splitting blade has a height, wherein the projections have a height, and wherein the height of the projections vary up or down about 0.95cm (about 3/8 of an inch) relative to the height of the splitting blades.

10. The block splitter of claim 3, wherein the projections are positioned on the first and second splitting assemblies relative to the first and second splitting blades, respectively, so as to erode the concrete subsequent to the splitting blades engaging the workpiece.

11. The block splitter of claim 10, wherein the protrusion height is adjustable.

12. The block splitter of claim 3, wherein the first and second splitting assemblies are each adapted to be activated by one or more hydraulically actuated cylinders.

13. The block splitter of claim 3, wherein the workpiece includes generally horizontal top and bottom

surfaces and opposed, generally vertical, first and second side surfaces, wherein the first splitting assembly engages one of the top or bottom surfaces of the workpiece and the second splitting assembly engages the opposite surface of the workpiece, and further including a first activatible side knife assembly adapted to engage the first side surface of the workpiece, and an opposed second activatible side knife assembly adapted to engage the second side surface of the workpiece, wherein each of the first and second side knife assemblies includes one or more projections positioned to engage the workpiece during activation of the side knife assemblies.

14. A splitting assembly for use in a block splitter to create at least one concrete block from a concrete workpiece, the splitting assembly including a splitting blade for splitting the workpiece into at least two pieces during an activation of the splitting assembly, characterized by a plurality of projections positioned adjacent to the splitting blade on at least one side thereof and positioned on the splitting assembly to erode portions of the concrete adjacent the splitting blade during activation of the splitting assembly.

15. The splitting assembly of claim 14, the plurality of projections includes projections positioned on each side of the splitting blade.

16. The splitting assembly of claim 14 or claim 15, wherein the projections are cylindrical with a rounded end.

17. The splitting assembly of claim 16, wherein the projections have a diameter of between about 1.27cm (about 0.5 inch) and about 3.18cm (about 1.25 inches).

18. The splitting assembly of claim 14 or claim 15, wherein the projections are pyramidal in shape.

19. The splitting assembly of any one of claims 14 to 17, wherein the splitting blade has a height, wherein the projections have a height, and wherein the height of the projections vary up or down about 0.95cm (about 3/8 inches) relative to the height of the splitting blade.

20. The splitting assembly of claim 15, wherein each projection on one side of the splitting blade is aligned with a projection on the other side of the splitting blade.

21. The splitting assembly of claim 15, wherein the projections on one side of the splitting blade are staggered with respect to the projections on the other side of the splitting blade.

22. The splitting assembly of any one of claims 14 to 19, wherein the protrusion height is adjustable.

23. A method of producing a concrete block having at least one irregular split edge and surface during a splitting operation, comprising providing a block splitter that includes an activatible first splitting assembly having a first splitting blade positioned to engage a concrete workpiece to split it into at least two pieces during an activation of the first splitting assembly and that has a plurality of projections adjacent the first splitting blade on at least one side thereof, the projections being positioned to erode portions of the concrete adjacent the first splitting blade during the activation of the first splitting assembly locating a concrete workpiece in the block splitter so that the splitting assembly can engage the workpiece when the splitting assembly is activated and activating the first

splitting assembly so that the splitting blade splits the concrete workpiece into the at least two pieces and the projections erode portions of the concrete.

24. The method of claim 23, further including the steps of providing an activatible second splitting assembly opposed to the first splitting assembly, the second splitting assembly including a second splitting blade positioned to engage the workpiece to split it during an activation of the second splitting assembly and a plurality of projections adjacent the second splitting blade on the same side of the second splitting blade as the projections of the first splitting assembly, the projections of the second splitting assembly being positioned to erode portions of the concrete adjacent the second splitting blade during the activation of the second splitting assembly, and activating the first and second opposed splitting assemblies in concert so that the splitting blades split the workpiece into the at least two pieces and the projections erode portions of the concrete adjacent the splitting blades, whereby the resulting block includes an opposed pair of irregular edges.

25. The method of claim 24, wherein the first and second splitting assemblies are provided with a plurality of projections disposed one each side of and adjacent to the respective first and second splitting blades.

26. The method of claim 24, wherein the projections erode the concrete subsequent to the first and second splitting blades engaging the workpiece.

27. The method of claim 24, comprising adjusting the relative heights of the projections and each splitting blade.

Dated this 22nd day of March 2004

ANCHOR WALL SYSTEMS, INC
By their Patent Attorneys
GRIFFITH HACK
Fellows Institute of Patent and
Trade Mark Attorneys of Australia

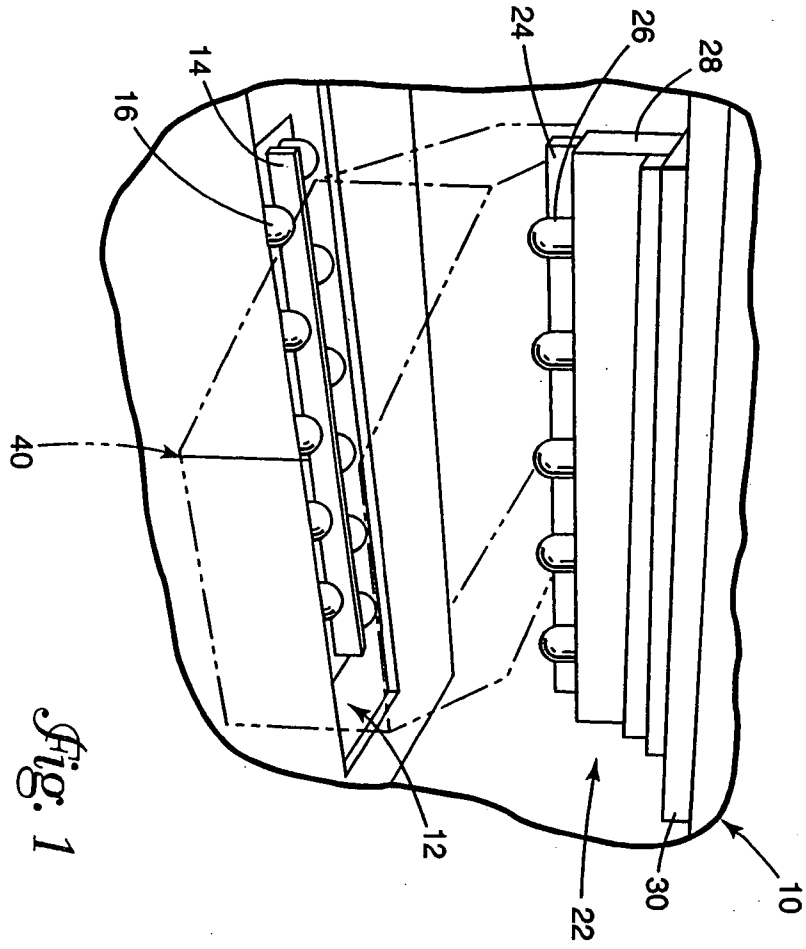

Fig. 1

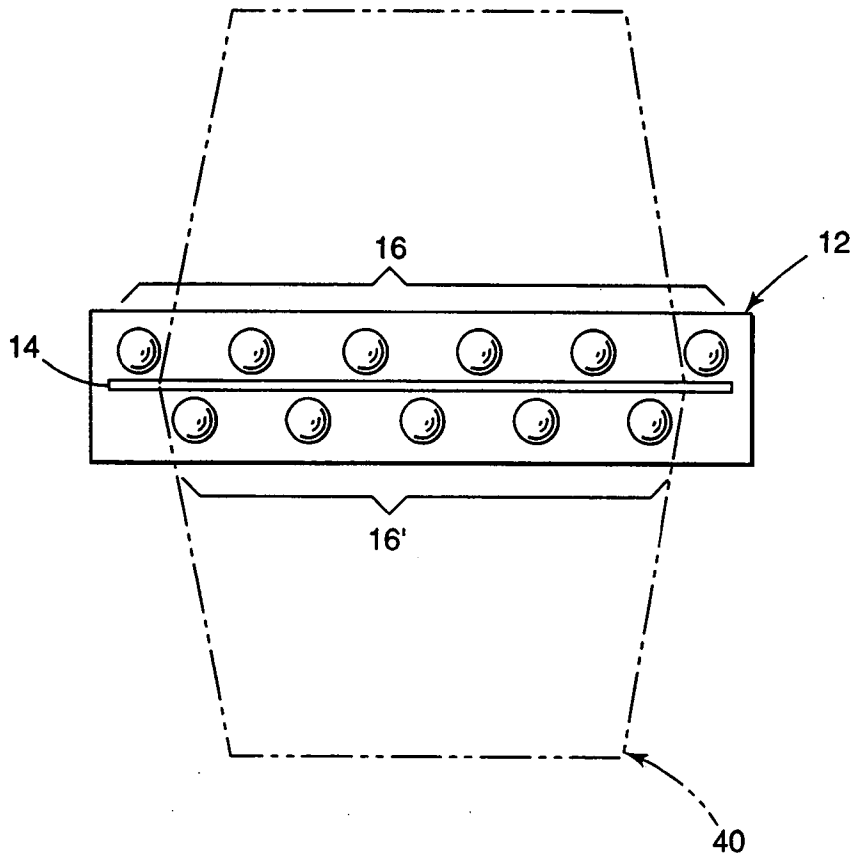

Fig. 2A

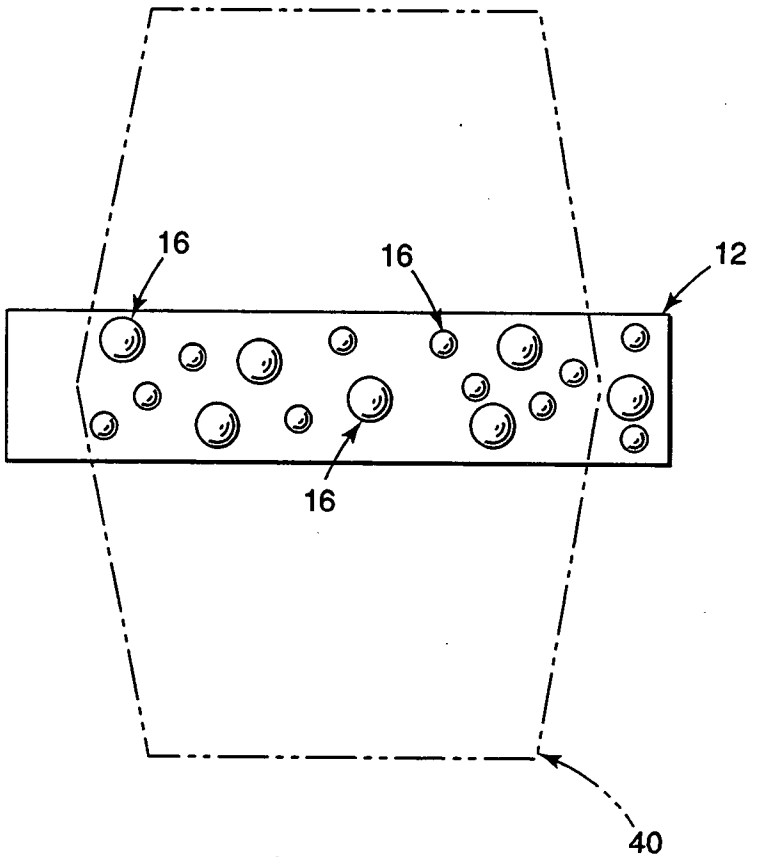

Fig. 2B

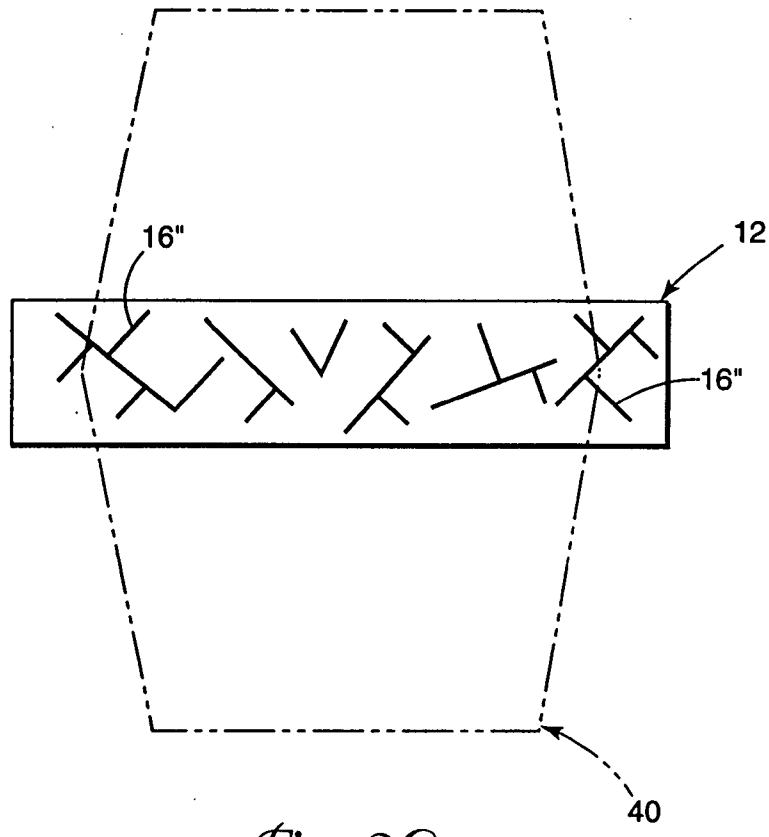

Fig. 2C

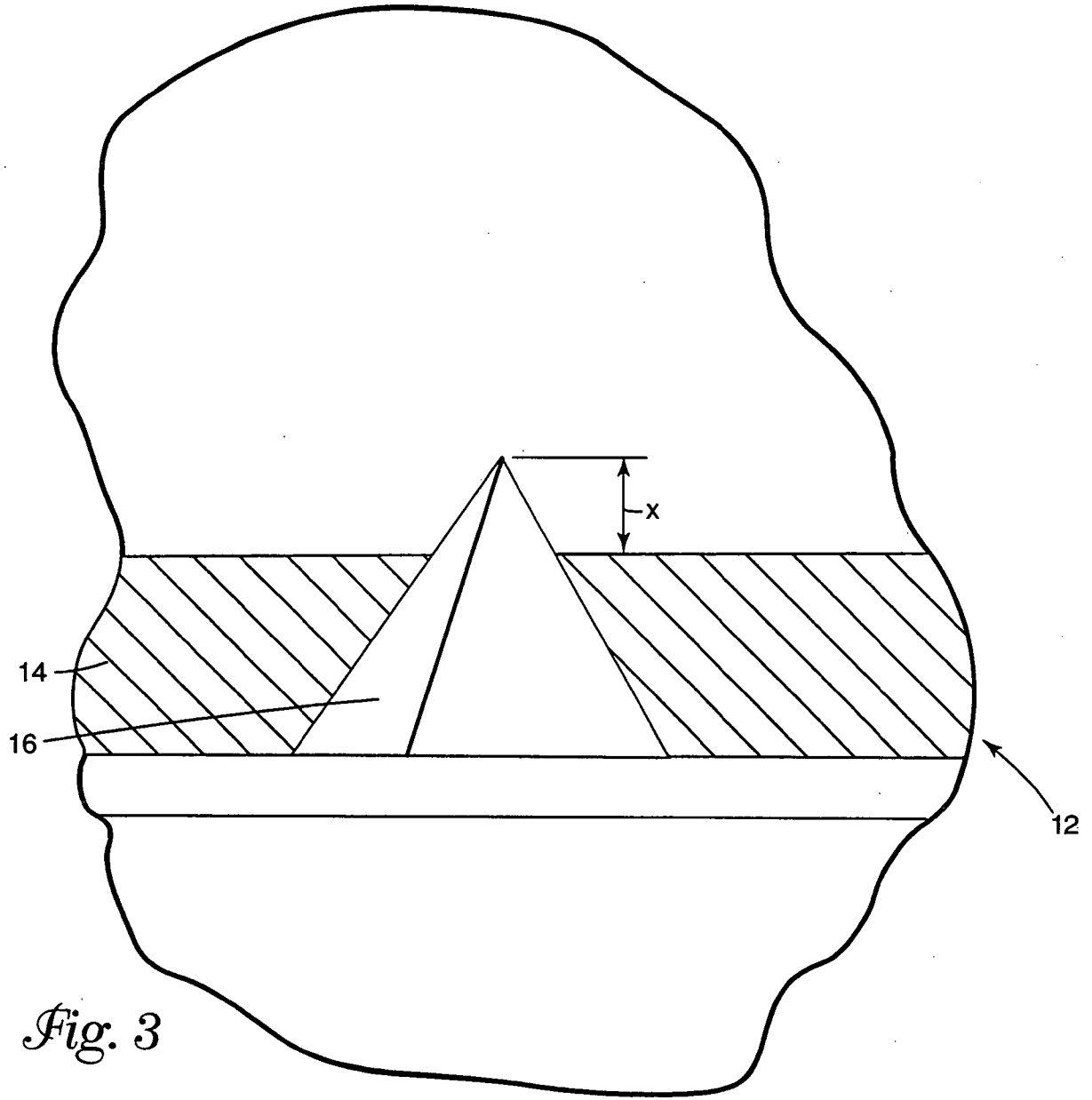

Fig. 3

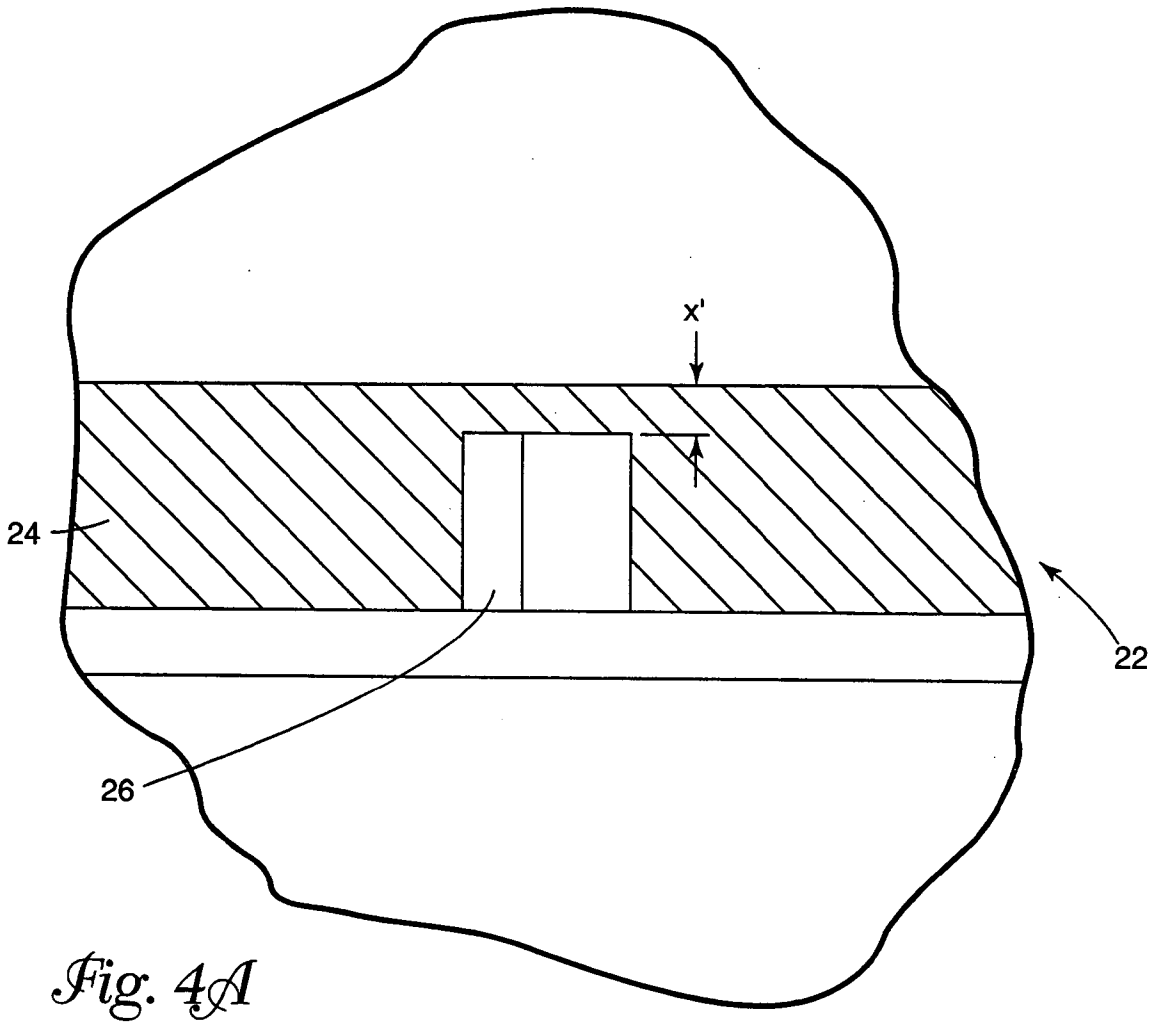

Fig. 4A

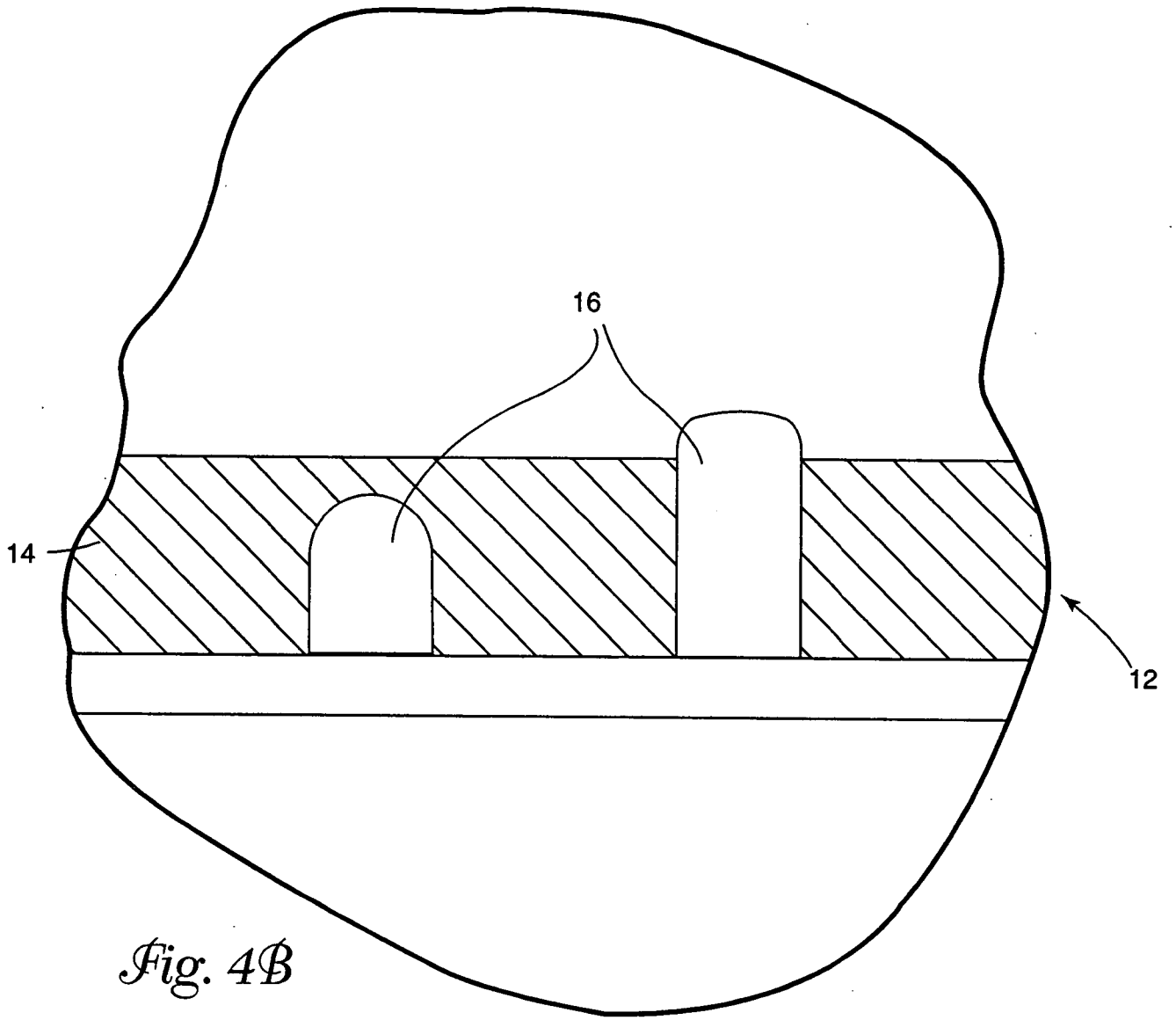

Fig. 4B

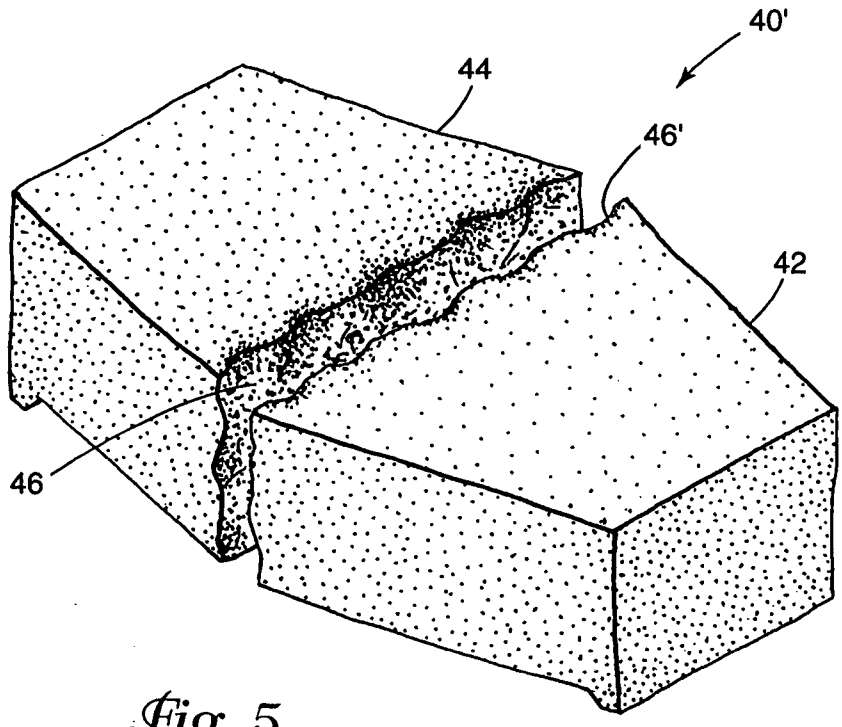

Fig. 5

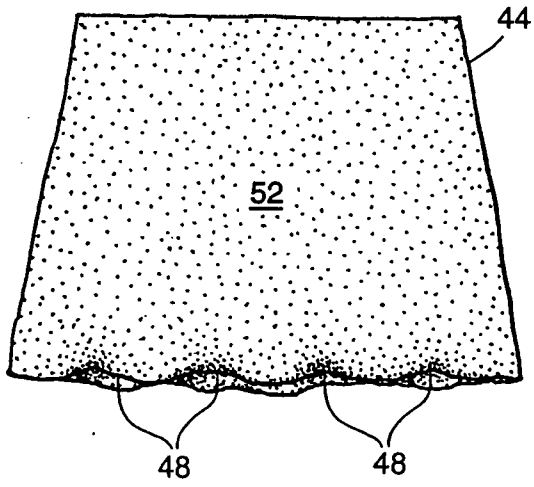

Fig. 6

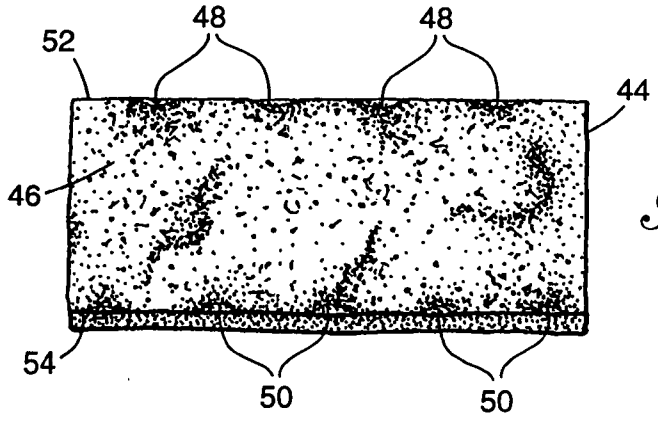

Fig. 7