

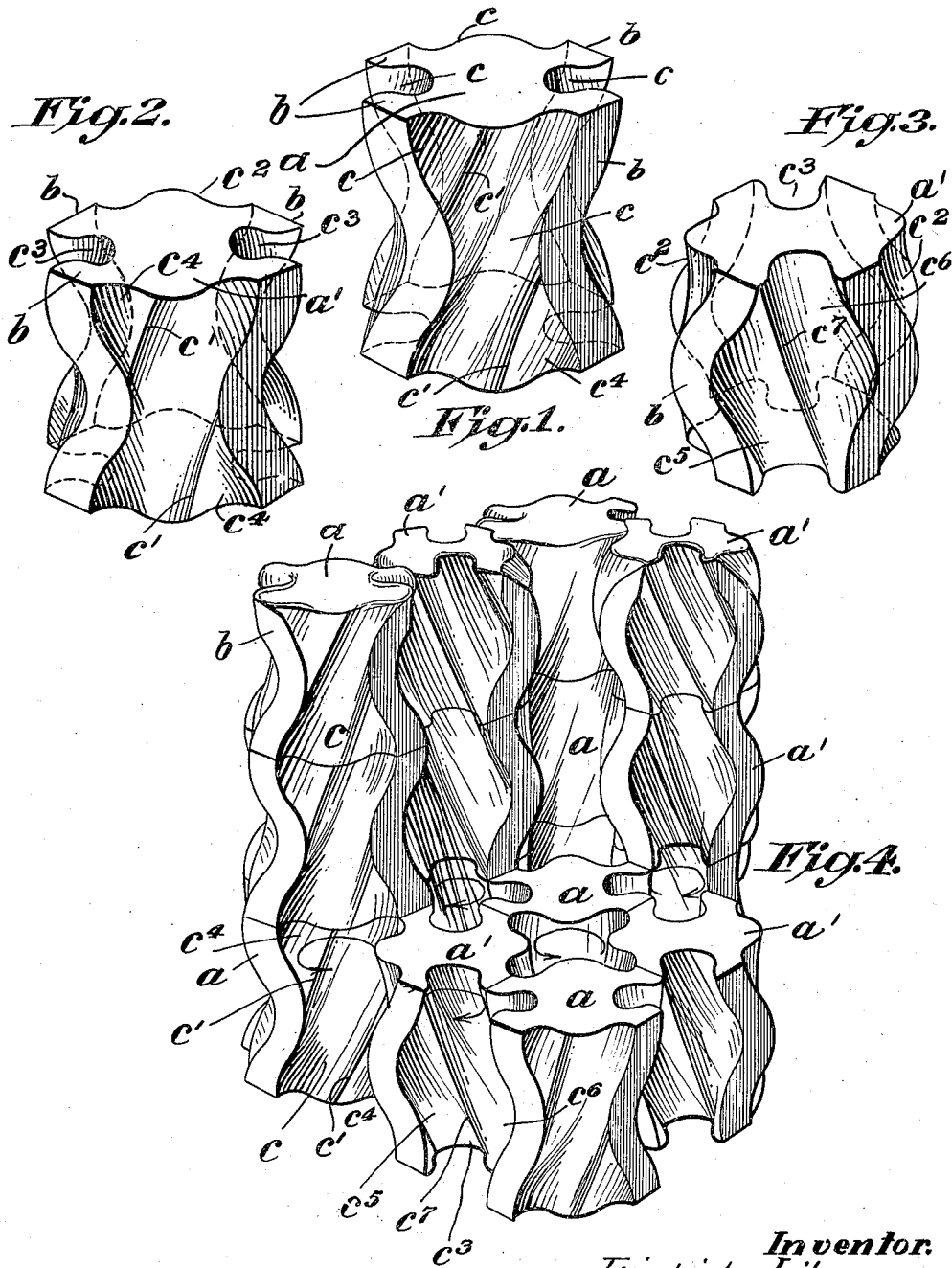
July 10, 1928.

1,676,451

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PACKING OR FILLING BODY

Filed Dec. 18, 1924



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PACKING OR FILLING BODY.

Application filed December 18, 1924, Serial No. 756,646, and in Germany October 6, 1924.

This invention relates to building bricks or blocks for use in the construction of packing or filling walls or gratings, such as flue walls employed in heat exchange apparatus and plants, and in the filling of chambers, towers and the like employed for various metallurgical, chemical and similar purposes; and it is one of the important objects of the invention to provide building bricks or blocks so constructed that a wall or grating having a great heating and reaction surface may be built and easy access may be obtained to the passages and channels in the wall produced by the assembled rows of bricks or blocks. The invention is directed in particular to building bricks or blocks for flue walls in which the gases or reagents are given a tortuous or twisted path with a view of producing a thorough intermingling of the gases, fluids or the like passing through the particular space. For the purpose mentioned of producing tortuous passages in blast heaters and similar heat exchange apparatus, hollow bricks formed with spiral blades and flutes have been suggested. With such bricks there is the objection, however, that their manufacture is very difficult and consequently expensive, that they are of delicate structure and therefore easily broken, and that they present an excessive resistance to the passage of the fluids; while the channels, passages or ports produced by the assemblage of such bricks do not allow access to the same for cleaning purposes.

The present invention provides a building brick or block which overcomes these objections, and which is suitable for the erection of walls and gratings in producers and other heat exchange apparatus and for equivalent purposes; and which comprises a substantially quadrifoliate-shaped body formed on its outer surface with ribs and flutes in such manner that upon the assemblage of a plurality of such bodies or bricks spiral-like tortuous passages are produced. The bricks or blocks are so constructed that these tortuous passages may be arranged to wind, spiral-like, in either a right hand or a left hand direction, or in both directions in one and the same wall. The bricks or blocks, while strong and capable of being shipped without damage, are comparatively light in weight, allowing a wall of great strength to be economically built. The construction of the blocks is such as to provide ribs and flutes, which may be of such form or shape as to present riffles, subjecting the fluids to a zig-zag line of travel and more effective whirling and mixing action in their course of flow. The construction of the bricks or blocks is further such that the channels or passages formed thereby may be readily illuminated and inspected and reached and cleansed by the usual cleansing implements.

In the accompanying drawings showing two forms of embodiment of my invention, Figure 1 is a perspective view of one form of building block. Figure 2 is a perspective view of another form of building block. Figure 3 is a perspective view of the block shown in Fig. 2 taken at right angles to the view shown in Figure 2. Figure 4 is a view perspective of a portion of a wall or grating made from blocks of the type shown in Figures 1, 2 and 3.

Referring now more particularly to the drawings, *a* and *a'* designate building bricks or blocks constructed in accordance with my invention. Each of these blocks comprises a body of some material thickness, and, as shown, each block *a* is formed upon its exterior with annular series of alternately arranged diagonally disposed and spiral like ribs *b* and spiral like grooves or flutes *c* between said ribs, having four similar ribs *b* and four similar grooves or flutes *c*, of such shape as to make it of quadrifoliate form in horizontal transverse section, but the number of ribs and grooves may be varied with a corresponding variation of the cross-sectional shape. Blocks *a'* differ from blocks *a* in that each block *a'* has two grooves or flutes *c*² like the grooves or flutes *c* and two grooves or flutes *c*³ of a different form from the flutes *c*, *c*². Each block *a* and *a'* also has a pair of supplemental triangular-shaped grooves or flutes *c*⁴ communicating with each groove or flute *c*, *c*², said grooves or flutes *c*⁴ opening through the opposite ends of the block and intersecting the ends of the groove *c* or *c*² at opposite sides of the latter. The grooves or flutes *c*⁴, as shown, extend obliquely to the groove *c* or *c*² with which they communicate, and at a diagonal angle or in a spiral direction with respect to the axis of the block, which is the reverse of that of the groove *c* or *c*². The grooves *c*⁴ expand each groove *c*, *c*² at its ends and provide for a proper connection between superposed blocks of the courses in a wall to widen the flue or chan-

nel formed by the flutes thereof so as to permit expansion of the gases, as well as to cause the gases to flow back and forth laterally of their general line of flow, in a zig-zag manner, so as to secure a better mixing action of the gases. The blocks are designed to be laid in courses in the usual manner to form a grating or wall with the ribs of adjacent blocks abutting, so that like flutes of adjacent blocks register, the flutes c and c^2 forming spiral-like passages or channels and the flutes c^3 straight perpendicular passages or channels throughout the wall. These spiral-like channels may all wind in the same directions, either clockwise or counterclockwise, about the blocks or they may wind alternately in opposite directions, i. e., consist of both right and left hand spirals, about the blocks. As shown, the flutes c and c^2 of blocks a and a' are contracted or narrowed centrally of the block and thence flare to a funnel-shape formation at their ends toward the top and bottom portions of the blocks, and, as shown by blocks a' , the flutes c^3 are narrowed at their ends and widened or expanded centrally of their length. When blocks a are alone used in tiers, channels or passages are formed by all their flutes which are alternately contracted and expanded, the points of contraction being within the blocks and the points of expansion in line with the joints between superposed rows of blocks, while when blocks a' are alone used the points of contraction and expansion will be in the flutes both at the joints and within the block bodies. By using both kinds of blocks a and a' in the construction of a wall or grating, variations in the arrangement of the points of contraction and expansion may be obtained, as will be readily understood. Gases flowing through the passages will thus be contracted and expanded in their flow, preventing their too rapid flow, while at the same time preventing undue resistance to their flow, so that their flow velocity may be automatically controlled to any exact degree desired. The walls of the flutes c and c^2 , having the triangular-shaped supplementary grooves or flutes c^4 , provide riffles c^5 at the angle of intersection of the grooves, giving an increased tortuous flow to the gases, whereby a more thorough agitation and commingling of the gases is obtained. It will be observed that each groove c^3 is of a form corresponding to the portions of connecting grooves c of two superposed blocks across the joint and between the contracted intermediate portions of the grooves c of the two blocks. As thus formed the groove c^3 consists of two parallel communicating grooves c^5 , c^6 each shallow at one end and of gradually increasing depth toward its opposite end. The shallow end of each groove communicates with the deep end of

the other groove adjacent to an end of the block, and the deep end of the one groove c^5 opens through one end of the block while the deep end of the other groove c^6 opens through the other end of the block. By such formation of the grooves a diagonally arranged or spiral-like riffle is formed by the edge wall c^7 at the angle of intersection between adjacent sides of the grooves.

It will be seen that when a group of four blocks a or a' in two parallel rows of a course are set up, a passage of quadrifoliate form is formed between the adjacent faces of the four blocks and that each passage is expanded at points and contracted at points, for the purpose described. The form of the grooves c of blocks a will produce spiral-like passages through a wall formed of superposed courses, while the grooves c , c^2 of blocks a' will respectively form straight and spiral-like passages through the courses. The grooves c , c^2 and c^3 will also produce straight passages perpendicular to the plane of the courses and spiral-like passages grouped about the straight or perpendicular passages. By this means a very effective swirling motion and intermixture of the traveling fluids is secured. The swirling and intermixing effect is further intensified by the production of the riffles c^5 , c^7 formed by surfaces between adjacent flutes or grooves. It will be understood that in the case of either block a or a' , a reversal of the block, end to end, will result in a change in the direction of the spiral-like flutes. Hence by use of the same blocks, all the passages or channels in a wall may be made of right-hand spiral-like formation, or of left-hand spiral-like formation, or a combination of the two.

In blast heaters it is desirable to have different sizes and weights of wall structures and heating areas at different points. By the use of blocks made according to this invention this object may easily be accomplished by employing different sizes of blocks and by varying the depths of the ribs and flutes and the configuration thereof; and it thereby becomes possible to provide channels or passages with varying sectional areas and dimensions or with alternately different dimensions from top to bottom of the walls.

It should be pointed out in this connection that the invention is not restricted to the particular configuration, arrangement and relative sizes of blocks herein shown and described by way of exemplification only, and that modifications and changes may occur as varying conditions of application may suggest. Nor is the invention restricted to the application of such blocks in the packing of producers and the like; but it may be applied, wherever the heat value or the chemical activity of gases, fluids and liquids

are utilized by the provision of extended contact surfaces, and within the meaning of the claims hereunto appended. It is, of course, understood that in their preferred form the blocks will be made of refractory, fire-proof material.

I claim:—

1. A building block comprising a quadrifoliate-shaped body provided upon its exterior at quarter points with alternately arranged and longitudinally extending ribs and flutes, one or more of the flutes having expanded portions and contracted portions.

2. A building block comprising a body provided upon its exterior with longitudinally extending spirallike ribs and flutes, each flute being contracted at a point in its length.

3. A building block comprising a body

provided upon its exterior with longitudinally extending spiral like ribs and flutes, each flute being contracted at a point in its length and provided with riffles.

4. A building block comprising a substantially quadrifoliate-shaped body provided upon its exterior with alternately arranged and longitudinally extending spirallike ribs and flutes, each flute having expanded end portions and a contracted central portion.

5. A building block comprising a body provided upon its exterior with longitudinally extending and alternately arranged spiral-like ribs and flutes, each flute having expanded end portions and contracted central portion, said expanded end portions being provided with riffles.

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