July 22, 1969 SUGIAKI KUSATAKE 3,456,446

CONCRETE BLOCK

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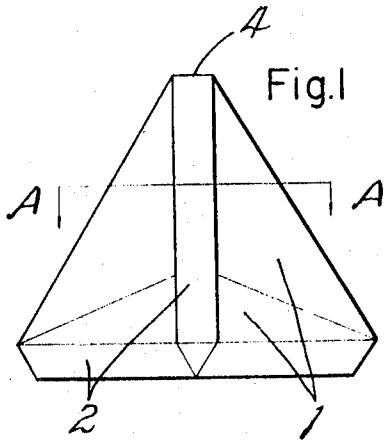


Fig. 1

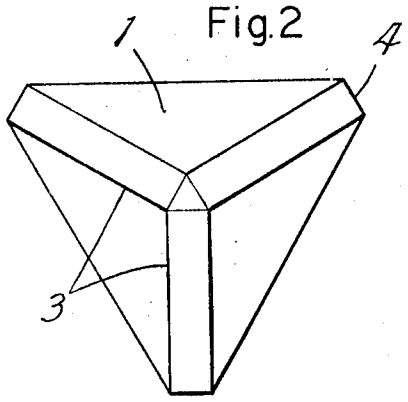


Fig. 2

Fig. 3.

Fig. 4.

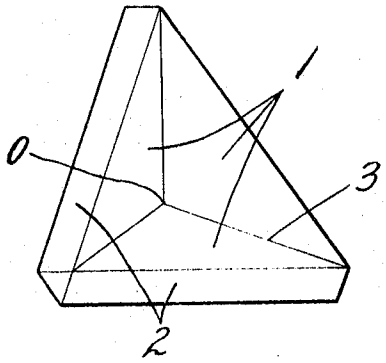
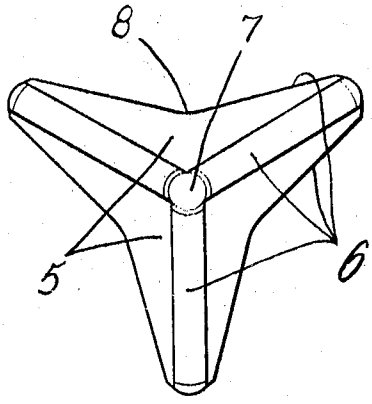
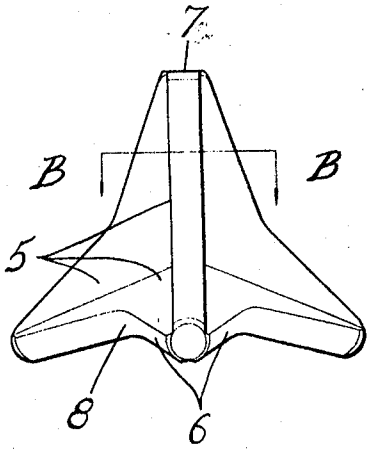


Fig. 5.





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Fig. 6

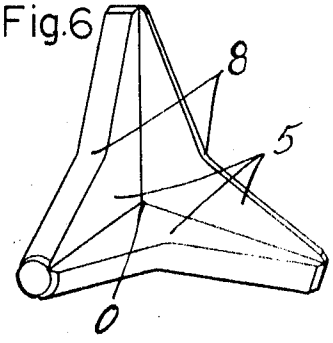


Fig. 7

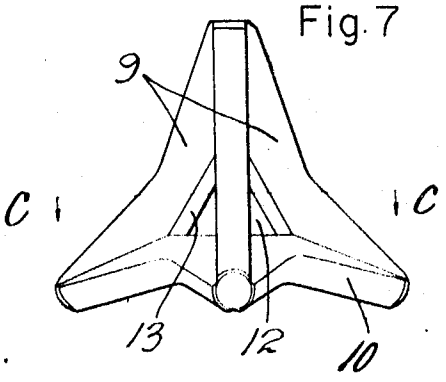


Fig. 8.

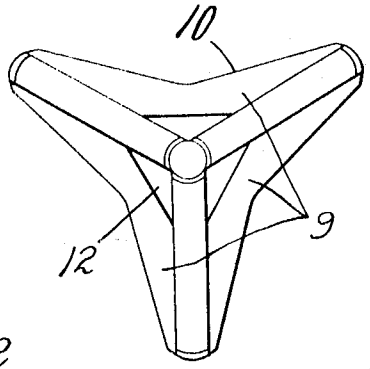


Fig. 9.

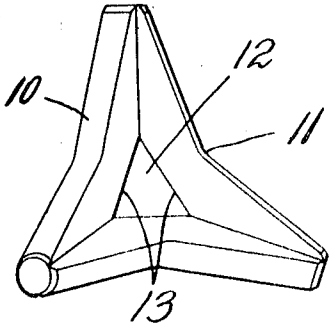


Fig. 10.

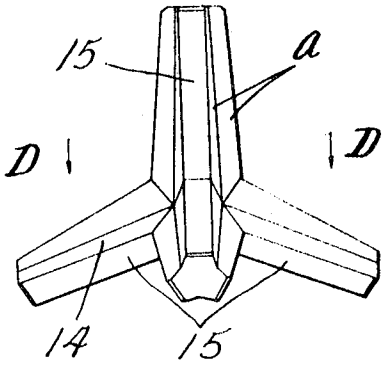
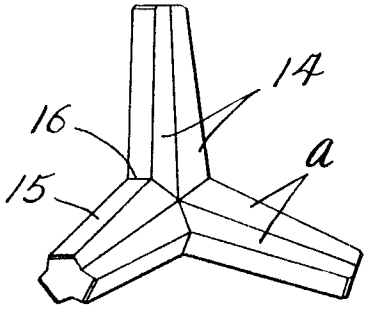


Fig. 11.



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Fig.12

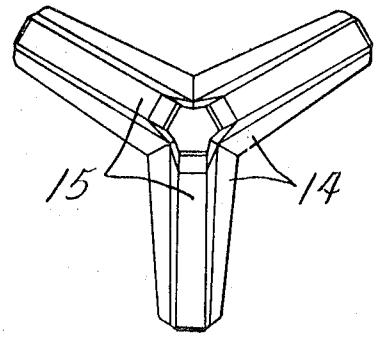


Fig.13

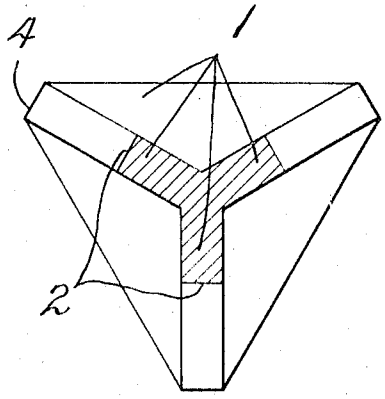


Fig. 14.

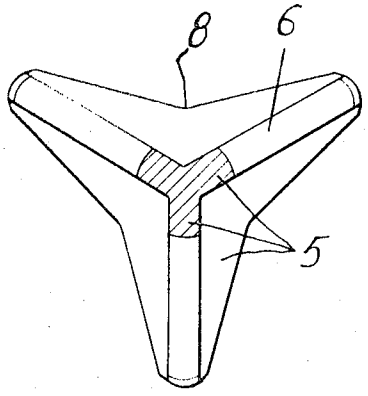


Fig. 15.

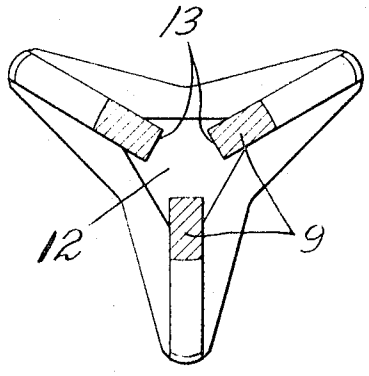
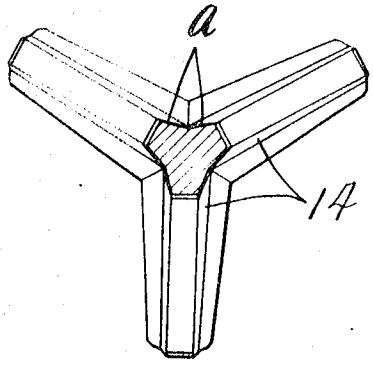


Fig. 16



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United States Patent Office 3,456,446 Patented July 22, 1969

3,456,446

CONCRETE BLOCK

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Int. Cl. E02b 3/12
U.S. Cl. 61—4 11 Claims

ABSTRACT OF THE DISCLOSURE

This invention relates to a concrete block which consists of a concrete structure comprising six triangular plate-shaped mural bodies integrally combined with the respective apexes concentrated at the center, the aim of which is to prevent seashores and river banks from the damage of the dashing waves by depositing such blocks at seashores and river banks.

This invention relates to a concrete block to be used for the purpose of protection of the shores of the sea, harbor, river and the like.

To protect the aforementioned shores from damage, it is necessary to reduce the force of the dashing waves against the shores. For this purpose various kinds of blocks have hitherto been made use of, and the block of this invention has a greater effect to diminish the breaking force of the waves and the kinetic energy thereof because of a remarkably larger surface area as compared with any of the known blocks.

The aim of this invention consists in increasing the effect of reducing the wave force by remarkably enlarging the said surface area, and at the same time in weakening the wave force with effect and reducing the kinetic energy thereof by an intricate combination of the blocks as a result of entanglement with each other, the projections provided on each block being caught in the hollows of the adjoining blocks.

The aim and the advantage of this invention will be described in detail with reference to the respective embodiments illustrated by the accompanying drawings, of which: FIG. 1 is a front elevation of the embodiment No. 1, showing the fundamental form of the block of this invention. FIG. 2 is a ground plan thereof. FIG. 3 is a side elevation thereof. FIG. 4 is a front elevation of the embodiment No. 2. FIG. 5 is a ground plan thereof. FIG. 6 is a side elevation thereof. FIG. 7 is a front elevation of the embodiment No. 3. FIG. 8 is a ground plan thereof. FIG. 9 is a side elevation thereof. FIG. 10 is a front elevation of the embodiment No. 4. FIG. 11 is a ground plan thereof. FIG. 12 is a side elevation thereof. FIG. 13 is a sectional view across the line A—A of FIG. 1. FIG. 14 is a sectional view across the line B—B of FIG. 4. FIG. 15 is a sectional view across the line C—C of FIG. 7. FIG. 16 is a sectional view across the line D—D of FIG. 10.

As is shown by each figure, the block of this invention is a concrete structure integrally formed by combining six triangular plate-shaped mural bodies with the respective apexes assembled at the center, the said mural bodies being of course reinforced with steel bars buried inside.

In the embodiment No. 1 of this invention illustrated by FIGS. 1, 2 and 3, six mural bodies **1**, each consisting of an equilateral triangular piece which has an obtuse vertical angle and a fixed thickness, are integrally combined with each base **2** facing outward, each oblique side **8** being linked with each other, and each apex **0** being assembled at the center.

Accordingly, each three mural bodies **1** are connected together stellately as shown by FIG. 13, a trigonal pyramidal hollow being formed between the adjoining

mural bodies **1** respectively, projections **4** being formed on four sides as a result of assemblage of the bottom surfaces **2** of the three mural bodies **1**.

In the foregoing block a very wide surface area is obtainable as a result of combination of the obverse and reverse surfaces of the six mural plates **1** and the surfaces of the bases **2** and the triangular surfaces formed by the projections **4**. When these blocks are deposited at seashores or river banks, the projections **4** of one block are caught in the trigonal pyramidal hollows formed between the mural bodies **1** of the adjoining block, with the result that the blocks are entangled wtih one another into a mass of a complicated shape, thereby preventing the wave force with effect.

In the embodiment No. 2 of this invention illustrated by FIGS. 4, 5 and 6, six triangular mural bodies **5** are integrally combined with each apex **0** concentrated at the center just as in the case of the embodiment No. 4. However, the base **6** is not rectilineal but has a shallow concave in the shape of the letter V at the center **8** and the surface of the base **6** is curved in a circular arc transsectionally as designated by FIG. 14. Moreover, each projection **7** is formed circularly.

The block of the foregoing embodiment No. 2 has the same effect as the embodiment No. 1, but the surface area is larger than in the case of the embodiment No. 1 as the base **6** is curved. In the embodiment No. 3 of this invention shown by FIGS. 7, 8 and 9, the base **10** of each mural body **9** is given a slight concavity in the shape of the letter V and the surface of the base **10** is also curved in a circular arc transsectionally as in the case of the embodiment No. 2. However, in the embodiment No. 3, each mural body **9** is shaped in an equilateral triangle with its top cut out, as a result of which an empty space **12** is left at the center of each block.

Because of the aforementioned empty space formed at the center, the edge **13** of each mural body **1** adjacent the said empty space **12** serves to increase the surface area, and the dashing waves, passing through the space **12**, are not only broken up but are forced to change the course, the energy of the waves being thus reduced with greater effect. Besides, the said space **12** can also be utilized for the embodiment No. 1.

In the embodiment No. 4 of this invention shown by FIGS. 10, 11 and 12, the base **15** of each mural body **14** is also curved so as to cave in at the center **16** in the shape of the letter V, but the curvature is of a sharper angle than in the cases of the bases **6**, **10** of the embodiments Nos. 2 and 3 shown by FIGS. 4 to 9. Besides, each mural body **14** is slanted at each side so as to decrease the thickness at the side of the base **15**. In this embodiment, each mural body **14** is comparatively narrow, each three mural bodies **14** being integrally stellated as shown by FIG. 16, forming a pillar encircled by a number of narrow surfaces, but the surface area is so large that the effect of reducing the wave force as well as the effect of the mutual entanglement when the blocks are deposited are great enough.

The curvature of the base **6**, **10**, **15** of each mural plate composing each block illustrated by the foregoing FIGS. 2 to 4 represents a straight line with a concave formed at the center in the shape of the letter V, but the entire base may be curved in the shape of a circular arc with the deepest concave at the center.

As described above, this invention is embodied in a structure which is an integral combination of six triangular mural plates, thereby enabling to obtain a large surface area and irregular indentations taking advantage of the reverse and lateral faces of each mural plate, with the result that, when deposited at seashores or river banks, the force of the waves can be diminished with extremely great effect.

This invention is not limited to the embodiments described in detail according to the respective drawings but a large number of modifications are also applicable to the said embodiments.

I claim:

1. A reenforced generally stellately shaped, concrete block for use with others in controlling erosion, comprising in combination:

(a) a plurality of six triangular shaped planar mural bodies having substantial thickness and being integrally formed with the apices of each body adjoined at a common center and the planes of each body being non-parallel with any other body;

(b) three of said bodies being inclined and intersecting relative to one another to form a three-sided relatively shallow pyramidal base having three inclined points of juncture by the sides of the planar bodies forming the apices thereof;

(c) each of the other three planar bodies having one of the two sides forming the apex intersecting with and extending vertically upright from the three respective inclined junctures of the pyramidal base with the planes of the respective three upright bodies intersecting in a common central vertical axis; and

(d) the other side of the two sides forming the apices of the three upright bodies merging into a common juncture generally coaxial with said central vertical axis, and with each set of three adjacently intersecting bodies being of open pyramidal configuration.

2. A reenforced, generally stellately shaped, concrete block as defined in claim 1, wherein the planar triangular bodies are so related to one another as to form pyramidal shaped hollow recesses or spaces between each set of three adjacently intersecting bodies, whereby the merged free ends of the triangular shaped bodies of adjacently and irregularly disposed blocks are adapted to project into said pyramidal recesses of such adjacently disposed blocks.

3. A reenforced, generally stellately shaped, concrete block as defined in claim 1 wherein each of the triangular bodies includes an obtuse apex angle defined by diverging sides of equal length.

4. A reenforced, generally stellately shaped, concrete block as defined in claim 1 wherein the exposed base or peripheral edge of each triangular shaped planar body is longitudinally concave at its general midpoint to give greater exposure surface.

5. A reenforced, generally stellately shaped, concrete block as defined in claim 1 wherein the exposed base or peripheral edge of each triangular shaped planar body is transversely convex to provide increased exposure surface.

6. A reenforced, generally stellately shaped, concrete block as defined in claim 1 wherein the area of each body adjacent the common center of juncture of the apices thereof is cut away to define an open area in the center of said block.

7. A reenforced, generally stellately shaped, concrete block as defined in claim 1 wherein each triangular body is cut off at the apex thereof generally parallel with a plane passing through the base opposite the apex, and thereby forming a central hollow space in the concrete block body.

8. A reenforced, generally stellately shaped, concrete block as defined in claim 2 wherein the merging end of adjacently intersecting bodies form stellately projections having triangular radial end faces.

9. A reenforced, generally stellately shaped, concrete block as defined in claim 5 wherein the merging ends of adjacently intersecting bodies form stellately projections having generally circular and spherical radial end faces.

10. A reenforced, generally stellately shaped concrete block as defined in claim 1 wherein the stellately shaped block comprises essentially four projections, and which is adapted to stabilize upon any three projections when setting upon a generally horizontal surface.

11. A reenforced, generally stellately shaped concrete block as defined in claim 1 wherein the longitudinal base edge of each planar body comprising the external periphery of the block is extremely concaved in V-shape and the lateral faces of each body are inclined to form a peripheral edge of lesser thickness than the rest of the body.

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U.S. Cl. X.R.

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