

[54] **DEVICE FOR PROTECTING WORKS
AGAINST LIQUID MASSES**

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52/609

[56] **References Cited**

UNITED STATES PATENTS

3,368,357 2/1968 Takamori 61/3 X
3,375,667 4/1968 Hard 61/4 X

3,516,255 6/1970 Akamatsu 61/37
3,614,866 10/1971 Kaneko et al. 61/4 X
3,636,713 1/1972 O'Neill 61/4

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[57] **ABSTRACT**

This block for protecting fixed or floating works against the impact of moving liquid masses, for example waves, comprises a pair of convergent elongated elements forming together a kind of bow directed towards the wavefront to be deadened, and one or more complementary elements connected to said bow to constitute seating means for the complete block. The free ends of these elements are provided with protrusions or the like, preferably of substantially frustoconical configuration, for interlocking the blocks disposed in any suitable order or arrangement.

4 Claims, 2 Drawing Figures

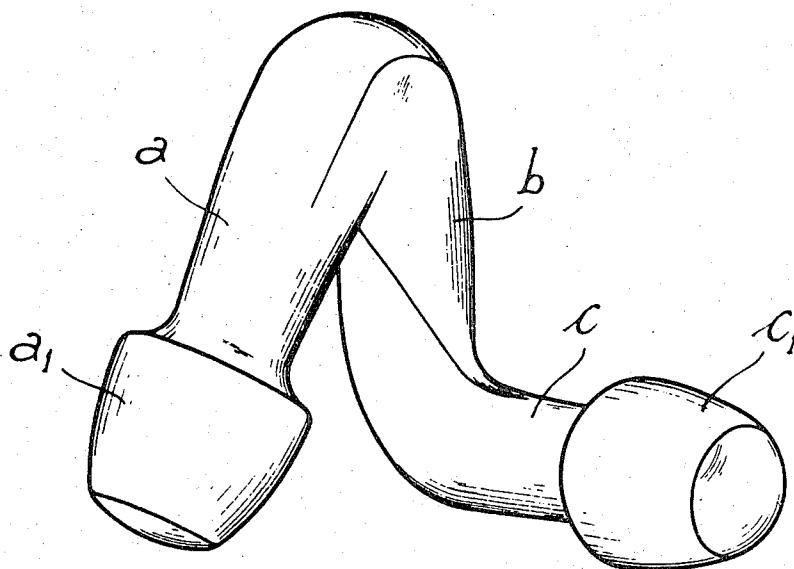


FIG. 1

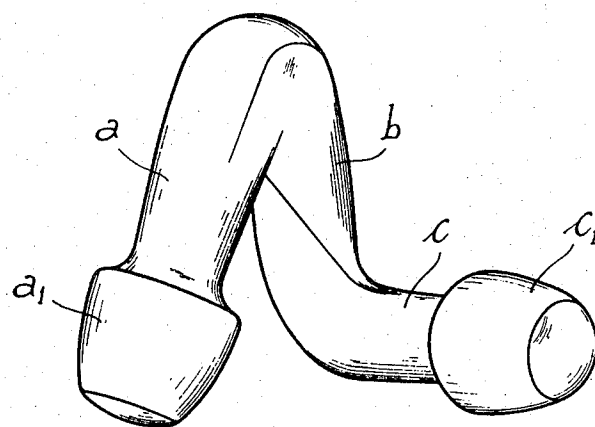
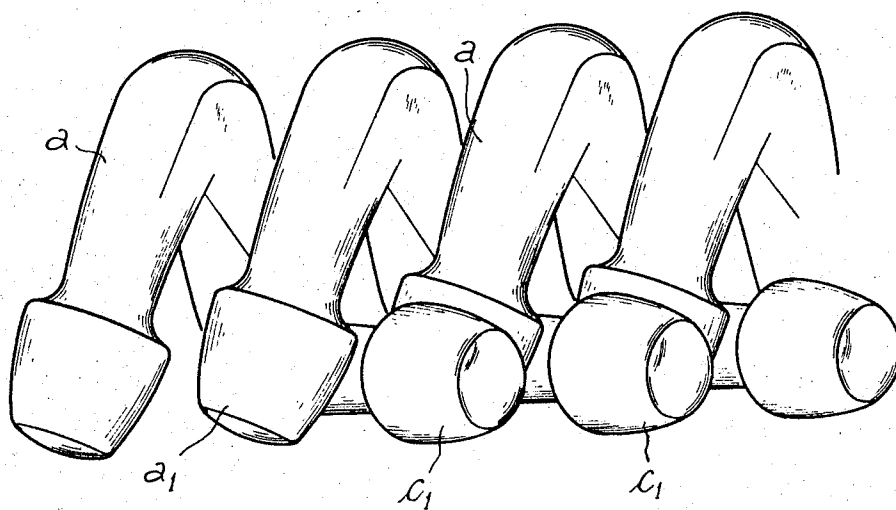


FIG. 2



DEVICE FOR PROTECTING WORKS AGAINST LIQUID MASSES

The present invention relates by way of novel industrial product, to blocks or like devices for protecting works, whether fixed or floating, against the detrimental action or impact of moving liquid masses.

Since ancient times works such as piers, seawalls, jetties and the like have been protected against the attack of waves by means of blocks so disposed in relation to the work to be protected that they produce a certain dispersion of the wave impact energy.

For many centuries the conventional defense method consisted in transporting these blocks, mostly rocks, to the site, placing them at the base of the work, and disposing them more or less at random.

More recently, systematic studies led to the adoption, for certain defense blocks, of a predetermined geometrical form.

Practical tests proved that to achieve the desired result (free, as far as possible, of reflection and "clearing" effects) the front "line" erected for protecting the work by means of said defense blocks must not be compact but should comprise a certain percentage of apertures or gaps and also a shape promoting as much as possible the impacts of liquid streams with one another, thus causing the desired shock-absorbing effect.

It is the essential object of the present invention to provide a defense block capable of meeting the contradictory and existing conditions broadly set forth hereinabove.

To this end, the present invention provides a defense block of any suitable and preferably mouldable material, such as concrete (reinforced or not), resin and mineral fibre compounds, etc., said block being characterised essentially in that it comprises two convergent elongated elements constituting a kind of V directed toward the wavefront to be deadened, said V being connected to at least one complementary elongate element adapted to "seat" the complete block on the ground.

The V comprising said pair of convergent elements may be more or less inclined to the wavefront to be deadened and the angle measured between the plane containing said pair of V-forming elements and the third or seating element of the block may vary according to the specific application contemplated.

The free ends of the component elements of the protection or defense block according to this invention may advantageously comprise means for permitting the mutual tangling up of blocks disposed in a row line for constituting a defense structure. These means may advantageously consist of protrusions, projections, acorn-shaped ends, or the like, having any suitable configuration.

A typical form of embodiment of this invention given by way of example, not of limitation will now be described, with reference to the attached drawing, it being understood that the shapes, proportions and relative arrangement of this example may be varied without departing from the basic principle of the invention as set forth in the appended claims. In the drawing:

FIG. 1 is a perspective view of a block according to this invention, and

FIG. 2 is a view similar to FIG. 1 but showing an assembly or row comprising a plurality of blocks disposed in line.

In the example illustrated notably in FIG. 1 the defense block according to this invention, which may advantageously be formed by moulding from concrete (preferably reinforced concrete) or other compounds, comprises three main elongated elements *a*, *b* and *c* having any suitable cross-sectional configuration. Elements *a* and *b* converge to constitute a kind of V but lie either in a common plane or in different planes.

One of these elements, for example element *b* in the form of embodiment illustrated, is connected to a third element *c* of which the essential function is to seat the V *a b* on the ground. The direction of this third element *c* in relation to the plane of said V or to the plane of each component element thereof is immaterial or at least subordinate to the specific conditions to be met for erecting a defense system intended for the protection of a work, structure or construction by assembling a plurality of blocks according to this invention.

Advantageously, according to a specific feature of this invention, the free ends of the V-forming elements *a* and *c* may comprise means for interlocking a plurality of juxtaposed blocks. These means may consist, as in the example illustrated in FIG. 2, of projections or protrusions *a*₁, *c*₁ having any suitable shapes and dimensions, for example a substantially frustoconical shape as shown.

By using a plurality of blocks according to the present invention it is possible to erect defense lines or systems for protecting any work against the detrimental or impact action of moving liquid masses, along any possible contour. These blocks may be disposed at random or disposed in rows in a vertical plane, or along horizontal lines as shown in FIG. 2, or in rows disposed at an angle with respect to the front line of the work to be protected. Any desired combinations of these various arrangements may of course be envisaged.

Practical tests accomplished by the applicant proved that by using the blocks according to the present invention, adapted to constitute a structure of front having the optimum percentage of gaps or interstices and an optimum geometry, it is possible to obtain particularly efficient defense systems irrespective of the specific characteristics of the works to be protected; moreover, in certain cases, the relatively low weight of a block according to the present invention may prove particularly advantageous.

Of course, this invention should not be construed as being strictly limited to the specific form of embodiment shown and described herein by way of example, since many modifications and variations may be contemplated in the practical actuation of the invention, notably with respect to the material constituting said blocks, the shape and proportions of the cross-sectional contour of the component elements thereof, the angular relationship between these elements and finally the means contemplated for mutually anchoring or interlocking these blocks, without departing from the scope of the invention as set forth in the appended claims.

What I claim:

1. A block for protecting floating or fixed works such as piers, seawalls, jetties and the like against action of moving liquid masses, which comprises a pair of convergent elongated elements which are connected together only at their ends in an inverted V-formation, the second end of one of said elements being free, a complementary elongated member connected at one end only to the second end of the other of said conver-

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gent elements and extending laterally therefrom in one direction only in position to act in cooperation with said free end of said one element to seat the composite block on an underlying supporting surface, said pair of elements providing an open area sufficient to receive the complementary member of an identical block in interengaging adjacent relationship.

2. A block as claimed in claim 1 in which said pair of elements are formed to lie in an upstanding plane which is inclined at an angle to the wave front to be deadened when a series of said blocks are interengaged in a line substantially paralleling the wave front.

3. A block as claimed in claim 1 in which said free

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end of said one element of the V-formation and the unconnected end of said complementary element have enlargements thereon which interengage, when a series of said blocks are interconnected, to maintain the interconnection.

4. A block as claimed in claim 1 in which the unconnected end of said complementary element has an enlargement thereon for interengagement with the V-formation of an adjacent block, when a series of said blocks are interconnected to maintain the interconnection.

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