United States Patent

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[54] **MOLD FOR CASTING A BREAKWATER CONCRETE BLOCK**
5 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **249/10,** 249/160, 25/118R, 61/4
[51] **Int. Cl.** **E02b 1/00**
[50] **Field of Search** ..... 249/10, 11, 12, 118, 160, 163, 165; 25/118 M; 61/4

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ABSTRACT: A mold for casting breakwater concrete blocks defining a block having a central hexahedron body and six symmetrically spaced legs radiating from the six surfaces of said body, each of said legs being in the form of a truncated pyramid, said mold being divided into symmetrical mold portions along two symmetrical planes, each of said planes including an axis of said mold, each of said portions being provided with flanges along its periphery adapted to permit the joining of said portions.

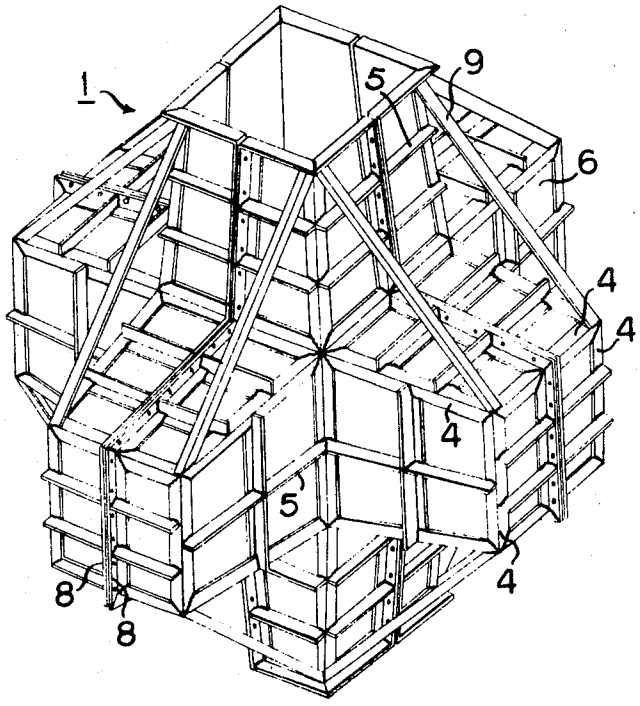


FIG. 1

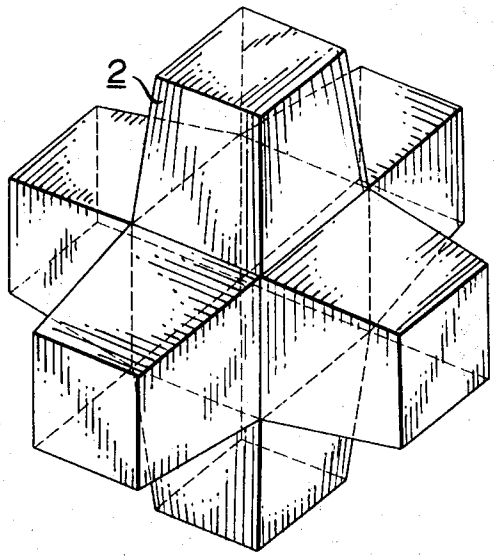


FIG. 2

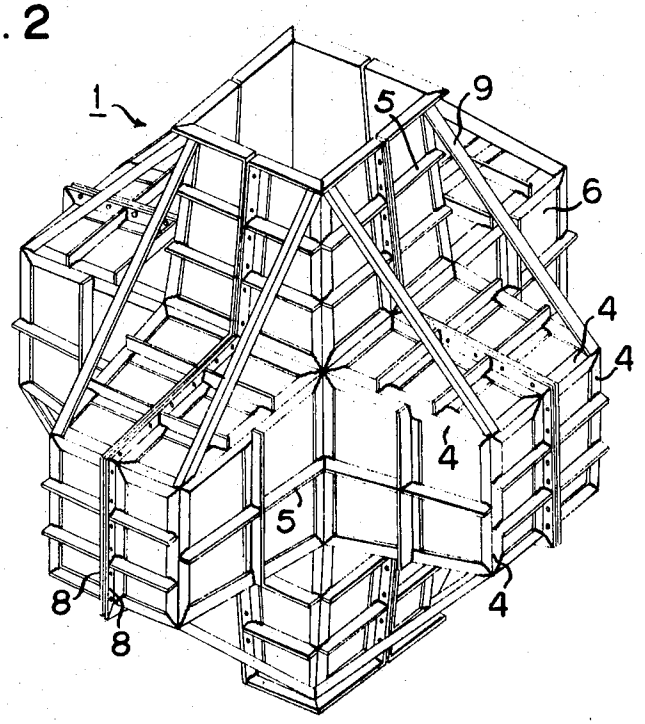


FIG. 3

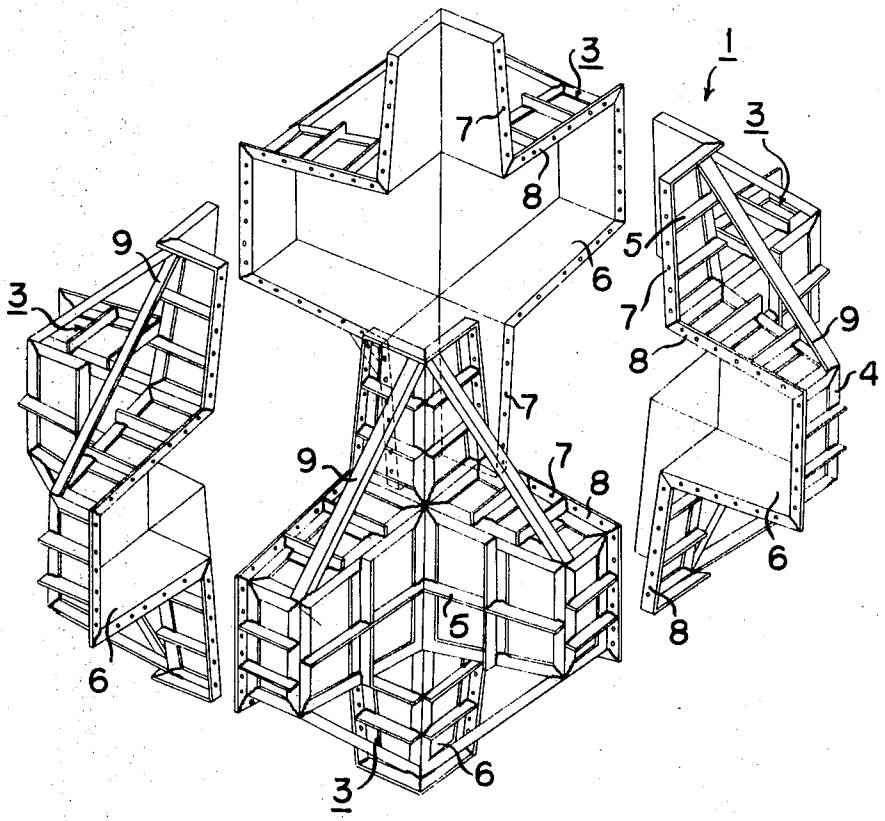


FIG. 4

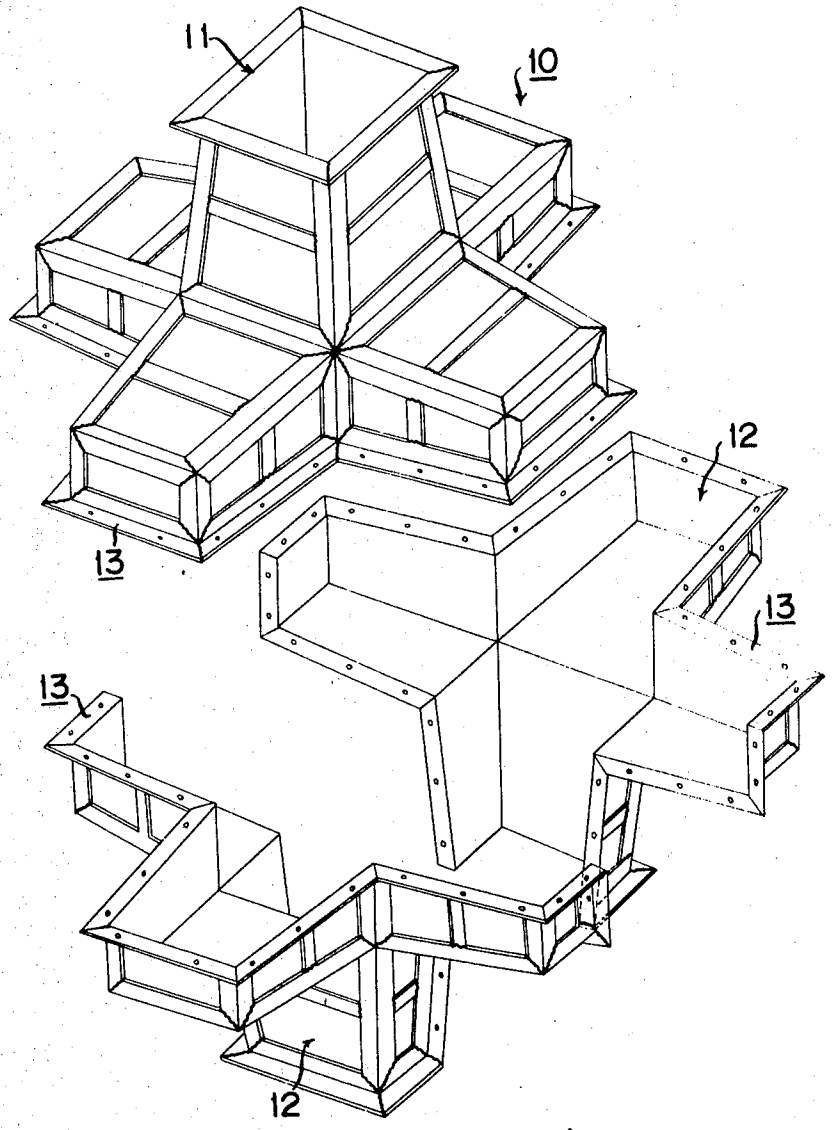
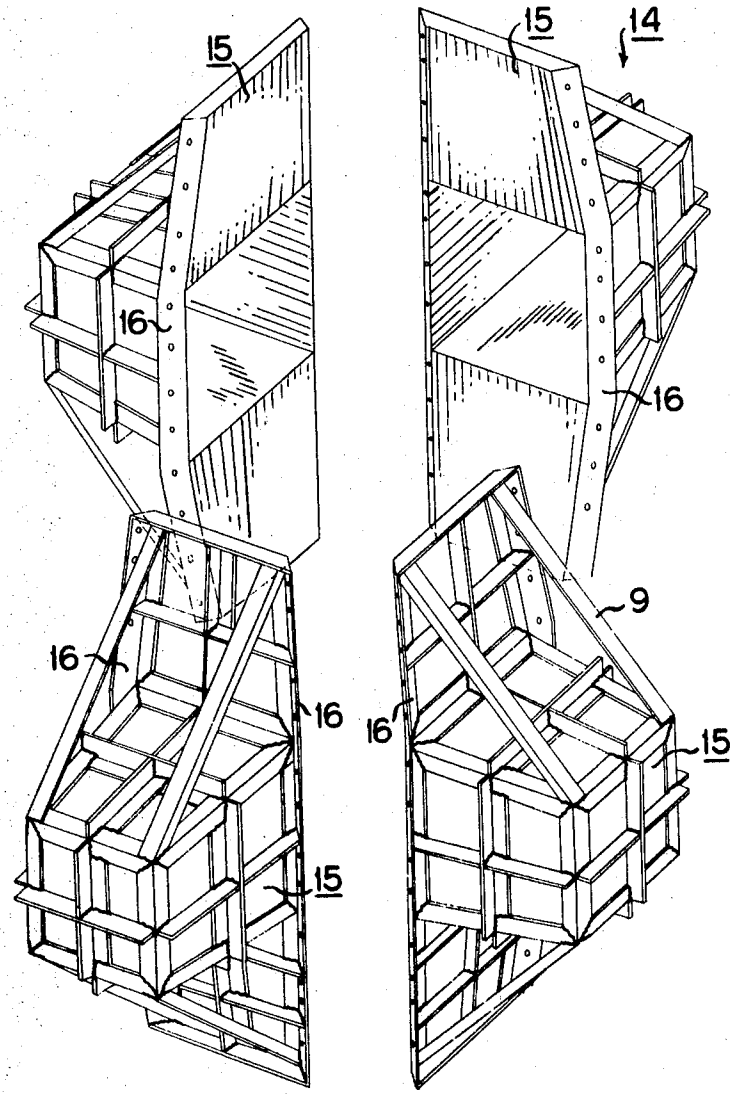


FIG. 5



MOLD FOR CASTING A BREAKWATER CONCRETE BLOCK

BACKGROUND OF THE INVENTION

This invention relates generally to molds for casting a six-legged concrete block for use as a breakwater. Such six-legged blocks are particularly effective in reducing the action of waves which have been amplified by a typhoon, hurricane or the like. By virtue of the six legs, waves are irregularly reflected from the breakwater concrete block and these irregular reflections interfere with one another, dissipating the energy of the wave and substantially reducing the action thereof. However, such concrete blocks must be of substantial weight in order to avoid being carried away by the wave before the dissipating action of the breakwater is effectuated. Consequently, the molds for casting such concrete blocks have to be of substantial size in order to produce concrete blocks of sufficient weight.

SUMMARY OF THE INVENTION

Generally speaking, in accordance with the invention, a mold for casting breakwater concrete blocks is provided which is adapted to produce extremely large six-legged concrete blocks. The mold defines a block having a central hexahedron body and six symmetrically spaced legs radiating from the six surfaces thereof. Each of said legs is in the form of a truncated pyramid and the mold is adapted to be disassembled along two symmetrical planes, each including an axis of said block. Each section of the mold is provided with a peripheral flange adapted to permit adjacent sections to be releasably secured together. The top and bottom surfaces of the mold are left open.

Accordingly, it is an object of the invention to provide a mold for breakwater concrete blocks which is readily disassembled from the block without damage thereto.

Another object of the invention is to provide a mold for concrete breakwater blocks adapted to mass produce large six-legged blocks inexpensively.

A further object of the invention is to provide a mold for concrete breakwater blocks which is easily disassembled and reassembled.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises the features of constructions of elements, and arrangements of parts which will be exemplified in the constructions hereinafter set forth; and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a breakwater concrete block cast by the molds in accordance with this invention;

FIG. 2 is a perspective view of a mold for casting the block shown in FIG. 1, in the assembled position;

FIG. 3 is a perspective view of the mold shown in FIG. 2, in the disassembled position; and

FIGS. 4 and 5 are perspective views of other molds embodying this invention in the disassembled position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to FIG. 1, a breakwater concrete block 2 having six symmetrically spaced legs radiating from the six surfaces of a central regular hexahedron body is shown. Each of said legs is in the form of a truncated pyramid. Four of the legs lie in a horizontal plane, which one pair of opposed legs lie in a vertical plane. A mold adapted to produce breakwater concrete block 2 is shown in FIG. 2. The mold defines said breakwater block except for the top face of the top vertical leg which is left open to receive the poured concrete, and the bottom face of the bottom leg which is left open, but which is defined by the substantially flat surface upon which the rests. The mold 1 is quartered into four mold sections 3, as more particularly shown in FIG. 3. In this embodiment, the four sections are defined by planes drawn through the vertical axis of the vertical legs of the mold.

The corner edges defined by the flat surfaces of each section of the mold are formed by angle members 4. These angle members are connected with each other by flat members 5 as required to provide structural rigidity to the mold. A sheet 6 is secured to the inside surface of said angle members 4 and flat members 5 to define the walls of the mold. Said angle and flat members are preferably formed from steel, while said sheets 6 can be formed from a like material. Said sheets can also be formed from a synthetic resin, secured to said angle and flat members by a suitable adhering means. Synthetic resin sheets are preferred since they facilitate the release of the concrete block 2 from the mold 1.

The peripheral edges of each section 3 is defined by further angle members 8 adapted so that one flange thereof extends normally from said sheets 6. Said flanges are provided with a plurality of perforations 7 whereby adjacent sections of said mold maybe secured together by passing bolts through said perforations and securing said bolts by means of nuts. Each section 3 is also provided with diagonal bracing members 9 extending between adjacent legs for reinforcing same, said diagonal bracings also serving as a means for suspending said section, as required.

In operation, the mold units 3 are assembled into a mold 1 by means of the flanges and nuts and bolts, the open bottom face thereof being placed on a base. Said base may be a sandy plane covered by a releasing film. The mold 1 is then charged with concrete paste through the top opening of the top vertical leg of the mold. When the mold has been filled with concrete paste, the top surface of the concrete is finished with a trowel. After the concrete has hardened, the mold 1 is prepared for disassembly into two portions by removing the nuts and bolts along the peripheral edges defined by one of the two vertical planes. The concrete block 2 is released from mold 1 by displacing the two assemblies, each of which consists of two mold sections 3, laterally in opposite directions. The mold releasing operation may be further facilitated by providing mold 1 with rounded internal corners.

Due to the construction of mold 1, friction between the mold and the block during removal is minimized, thereby preventing any damage to said block. By virtue of the construction of the mold, and in particular, its ability to be quartered into sections, the mold is easy to transport and assemble despite its large size.

Reference is now had to FIG. 4, wherein another embodiment of the mold 10 for concrete breakwater blocks is shown. Said mold is divided into three mold sections, an upper mold section 11 and two lower mold sections 12. The upper mold section 11 is the upper half of said mold defined by a horizontal plane passing through the horizontal axis of the mold, and therefore block 2. The two lower mold sections are formed from the bottom half of the mold and are separated along a vertical plane including a vertical axis of the block.

The three mold sections 11 and 12 may be assembled into mold 10 in the manner described above with regard to the first embodiment of the invention. Thus, a plurality of bolts are inserted through a plurality of perforations formed in the peripheral flanges 13 disposed along the edges of each mold section. The bolts are secured by means of nuts.

By virtue of the construction of this embodiment of the invention, the upper mold section 11 may be displaced by means of a crane or the like so that said upper mold section 11 may be removed from a hardened concrete block 2 by being lifted vertically upwards, thereby resulting in even less damage to said block than would be occasioned by the horizontal releasing of the mold as in the case of the first embodiment. The lower mold sections 12 are removable by being displaced laterally, but this operation is readily accomplished if the

upper mold section **11** is removed first. Thus, a mold is provided which is readily assembled and disassembled.

Still another embodiment of the mold in accordance with the invention is shown in FIG. **5**. Mold **14** is quartered into four mold sections **15** defined along the four vertical edges of the central hexahedron body and the eight substantially vertical edges of the truncated pyramids of the top and bottom legs. These sections **15** are also defined by a pair of vertical planes, each of which passed through the vertical axis of the mold and two opposed vertical edges of said central hexahedron body. The four mold sections **15** may be assembled into the mold as described above by means of a plurality of bolts inserted through a plurality of perforations formed in flanges **16** disposed along the periphery of each section. In like manner, the bolts are secured by nuts. As in the other embodiments of the mold, the top and bottom faces of the vertical legs are open.

Disassembly of mold **14** is accomplished by releasing the various nuts and bolts and laterally displacing the four sections **15** in a radial direction. As in the other embodiments, the releasing operation in readily accomplished without damage to block **2**.

By means of the mold according to the invention, as exemplified by the three embodiments shown in the drawings and described above, it is possible to produce a breakwater concrete block weighing about 20 tons. The mold according to the invention is inexpensive to produce, durable and particularly adapted for use in mass production.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A mold for casting breakwater blocks comprising a plurality of mold sections defining a block having a central hexahedron body and six symmetrically spaced legs radiating from the six surfaces of said hexahedron body, each of said legs being in the form of a truncated pyramid, four of said legs defining a pair of perpendicular axes lying in a substantially horizontal plane, the remaining pair of said legs defining a substantially vertical axis and defining top and bottom legs, said mold sections being formed with a first opening defining the top surface of said top leg and a second opening defining the bottom surface of said bottom leg, the parting lines of said mold sections being defined by two symmetrical planes, each including an axis of said block, said mold sections being formed with peripheral flanges, adjacent peripheral flanges being adapted to be releasably secured together, whereby said mold is adapted to be assembled into a unitary mold and disassembled into its component mold sections.

2. A mold for casting breakwater concrete blocks, as recited in claim **1**, wherein said two symmetrical planes defining said mold sections are substantially vertical and normal to each other, intersecting at the vertical axis of said mold, each of said plane substantially bisecting four of said legs.

3. A mold for casting breakwater concrete blocks as recited in claim **1**, wherein said two symmetrical planes defining said mold sections consists of a horizontal plane substantially bisecting said mold and including the horizontal axis thereof and a vertical plane including the vertical axis of said block.

4. A mold for casting breakwater concrete blocks as recited in claim **3**, wherein said mold comprises three sections, the first of said sections comprises the portion of the mold above said horizontal plane, said second and third sections comprising the portion of said mold below said horizontal plane.

5. A mold for casting breakwater concrete blocks as recited in claim **1**, wherein said two symmetrical planes defining said mold sections comprises a pair of vertical planes intersecting substantially at the vertical axis of said mold, the first of said planes including a first pair of opposed vertical edges of said hexahedron body, the other of said planes including the other pair of vertical edges of said hexahedron body.