Nov. 1, 1966 I. SAGINOR 3,282,054

BLOCK STRUCTURE FOR RETAINING WALLS

Filed April 1, 1964

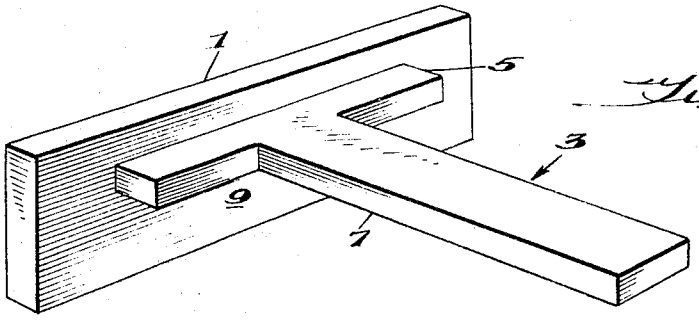


Fig. 1.

Fig. 2.

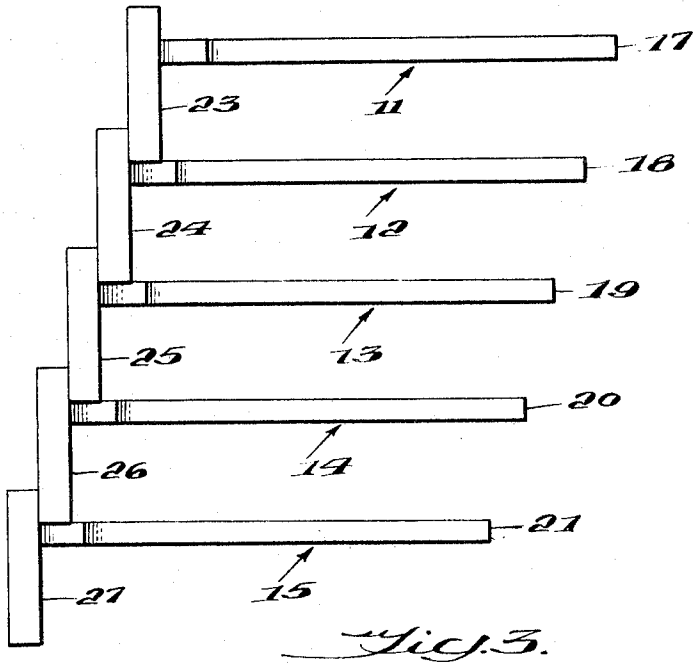
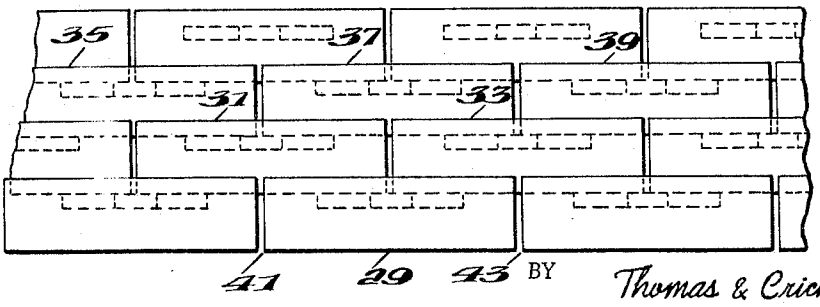


Fig. 3.



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United States Patent Office

3,282,054

Patented Nov. 1, 1966

3,282,054

BLOCK STRUCTURE FOR RETAINING WALLS

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Filed Apr. 1, 1964, Ser. No. 356,585
3 Claims. (Cl. 61—35)

This invention relates to a prefabricated block structure for retaining walls.

In the excavating and filling processes encountered in construction work and for the control of natural erosion it is necessary frequently to provide support for large amounts of earth, sand and stones to prevent lateral displacement. The use of retaining walls is a common expedient to accomplish this purpose and also to retain other materials such as grain. Various designs for such walls have been proposed in the past. Great structural strength in a retaining wall is a basic requirement because of the tremendous forces to which such a wall may be subjected.

Gravitational forces and constant exposure to rainfall and seasonal freezing and thawing cycles cause the earth to settle and seek a state of equilibrium. Consequently, it is desirable that a retaining wall be pervious to moisture and allow water to seep through readily without accumulating large amounts that would increase the lateral pressure on the wall. The expansion and contraction experienced during periods of freezing and thawing, together with the shifting of forces attributable to normal settling, make it desirable to have a wall structure with sufficient flexibility to allow accommodation to these varying forces within certain permissible limits and still retain its structural integrity.

Conventional masonry walls in which mortar serves as a bonding agent do not satisfy the foregoing requirements since these walls are impervious to moisture and have no inherent flexibility to accommodate for the constantly changing forces which are present. Various dry wall constructions have been proposed previously in which mortar is not employed, and, while good drainage is sometimes attained, great skill is required for constructions of this type. The structural strength of many of such walls has not been adequate to warrant their widespread use. Also, the cost of these dry walls has been prohibitive because of the complicated structure involved and the costly manufacturing procedures utilized.

Accordingly, it is an object of this invention to provide a prefabricated block structure for retaining walls which will satisfy the preceding requirements and overcome the problems presented by prior structures.

Another object of the invention is to provide a prefabricated block structure which will interlock readily with similar structures to produce a wall of great structural strength.

Another object of the invention is to provide a prefabricated block structure which can be utilized by relatively unskilled labor to produce a retaining wall structure without the use of mortar.

A further object of the invention is to provide a prefabricated block structure having an interlocking configuration when used in a retaining wall which allows drainage and movements of the blocks within permissible limits without destroying the integrity of the wall.

In a preferred embodiment of the invention these features are realized in a pre-cast concrete block structure comprising a main body portion with a rearwardly extending projection which is "T" shaped in form. The cross-bar of the "T" shaped projection is integral with the main body portion and the stem member projects rearwardly in a direction perpendicular to the main body portion. The cross-bar is located above the center-line of the

body portion and serves as a footing for stacking blocks in interlocking relationship on top of each other. The projecting stem member is embedded in the material being retained and provides an anchoring function which allows limited movements o fthe material being retained without disturbing the basic structural interlocking relationship of the blocks in the wall.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a prefabricated block constructed in accordance with the principles of the invention;

FIG. 2 is a side elevation view of a vertical stack of blocks in assembled relationship; and

FIG. 3 is a front elevation view of a section of a retaining wall constructed of the blocks of the present invention.

The invention will be explained in more detail with reference to the various figures of the drawing. In FIG. 1 the prefabricated block structure is shown in perspective. The main body portion 1 of the block is a rectangular parallelepiped which is shown as being decidedly oblong in shape. It should be understood, however, that the front and rear sides could assume other configurations, and even be square, without departing from the basic principles of the invention.

A "T" shaped projection indicated generally by the numeral 3 is formed integrally with the main body portion 1. The "T" shaped projection 3 includes a cross-bar member 5 and a stem member 7. The cross-bar member 5 is formed on the rear face 9 of the main body portion 1. The cross-bar member 5 is disposed with its longitudinal axis parallel to and somewhat above the longitudinal axis of the main body portion 1. The cross-bar member 5 is not located centrally of the rear face 9 because such an arrangement would result in a waste of materials. This will be seen readily when it is observed from FIG. 2 how the blocks are stacked vertically.

FIG. 2 shows a plurality of blocks 11 to 15 in stacked relationship as they would appear in a retaining wall structure. The material being retained has not been shown in order to keep the illustration as simple as possible, but it will be seen readily that such material would surround the stem members 17 to 21 and be contained by the rear faces 23 to 27 of blocks 11 to 15. The arrangement of the blocks with the lower edge of the main body portion of one block resting on the upper surface of the cross-bar member of the block beneath and fitting securely against the rear face of the lower block provides a structure of great strength. Movement of the material being retained may produce movement of the stem members, but these stem members can move through relatively large distances and still cause only relatively minor tilting of the main body portions, which does not disturb the integrity of the wall. The lateral forces of the material being retained against the rear faces 23 to 27 are distributed over the entire wall surface by reason of the interlocking relationship of the blocks, thereby assuring maximum structural stability.

The manner in which the forces of the material being retained act upon the wall will be understood from FIG. 2 of the drawings. For example, the block 13 will have forces acting downwardly on the stem member 19 from the downward pressure of the material. The rear face 25 of block 13 will also have a lateral force thereagainst from the material with the result that block 13 will tend to have a clockwise turning moment about an axis located where the stem 19 joins the rear face 25 of the

block **13**. Since all of the other blocks are similarly disposed, the same condition will obtain for each of these.

A careful consideration of the composite wall will reveal that the manner in which the blocks interlock causes the turning moments of the individual blocks to work together to preserve the structural integrity of the wall. The lower portion of each block face will tend to move to the left as viewed in FIG. 2, while the upper portion of each block will tend to move to the right. Each of these movements is opposed by counter-movements of contiguous blocks thereby resulting in a tightly knit structure which is held together more securely as the force against it is increased.

The usual pattern followed in constructing a complete wall is shown in FIG. 3. It will be seen from this illustration that each block provides a direct support for the two blocks directly above it. As an example block **29** is shown supporting blocks **31** and **33**, which in turn support blocks **35** and **37** and blocks **37** and **39**, respectively. By employing a lower block as a support for two upper blocks the wall is strengthened along its length and chances of failure because of vertical shearing are minimized. Since no mortar is used in the construction, the structure will contain spaces, such as shown at **41** and **43**, through which water may pass and thereby insure proper and adequate drainage.

The simplicity of the block structure of the present invention results in an economically manufactured unit which can be prefabricated in a one-step casting operation. Although concrete is an excellent choice of materials for the manufacture of this unit, it will be appreciated that other and different materials may work equally as well, depending upon the material cost and the ultimate strength required. The novel stem and interlocking feature of the block permits a relatively wide range of movement of the material being retained, such as might be produced by freezing and thawing cycles, without affecting the structural strength or the integrity of the wall.

While the invention has been shown and described with particular reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A prefabricated block structure for the construction of retaining walls comprising

a main body portion,

said main body portion being of a rectangular parallepiped configuration having substantially rectangular front and rear faces, and

a "T" shaped projection integral with said main body portion, said "T" shaped projection including

a cross-bar member and

a stem member projecting rearwardly from said rear face,

said cross-bar member being formed on the rear face of said main body portion and extending longitudinally equidistant on either side of the midpoint of said rear face with its longitudinal axis parallel to and located above the longitudinal axis of said main body portion,

the longitudinal extent of said cross-bar member being a substantial portion of the longitudinal extent of said main body portion,

whereby a plurality of said blocks can be assembly in self-aligning and nesting relationship with each other to form a wall structure with the cross-bar member of the "T" shaped projection of each block being of a sufficient longitudinal extent to serve as a supporting and aligning base for the blocks disposed above.

2. A retaining wall comprising

a plurality of prefabricated block structures arranged in horizontal rows which are superposed vertically, each of said prefabricated block structures comprising

a main body portion,

said main body portion being of a rectangular parallepiped configuration having substantially rectangular front and rear faces, and

a "T" shaped projection integral with said main body portion, said "T" shaped projection including

a cross-bar member and

a stem member projecting rearwardly from said rear face,

said cross-bar member being formed on the rear face of said main body portion and extending longitudinally equidistant on either side of the midpoint of said rear face with its longitudinal axis parallel to and located above the longitudinal axis of said main body portion,

the longitudinal extent of said cross-bar member being a substantial portion of the longitudinal extent of said main body portion

whereby each block rests upon the cross-bar members of two adjacent supporting blocks located therebeneath to maintain a horizontal alignment of the blocks.

3. The combination according to claim **2** wherein

the rear face of each supporting block fits snugly against the front face of the blocks that it supports, whereby said blocks maintain a vertical alignment as well as a horizontal alignment.

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