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REINFORCED CONCRETE BIN STRUCTURE

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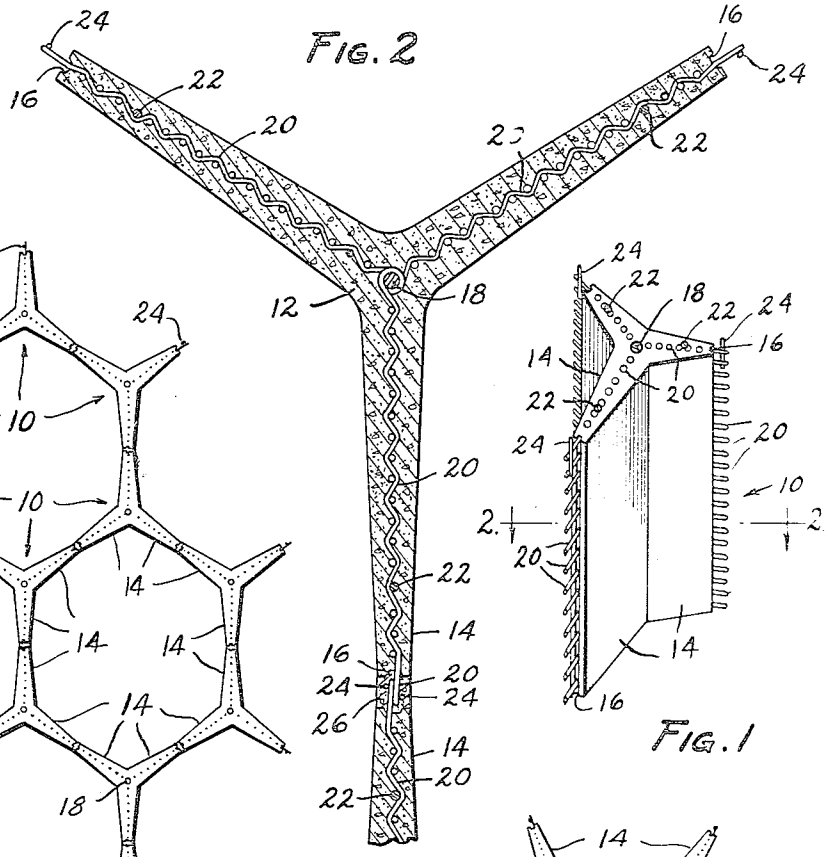


FIG. 2

FIG. 3

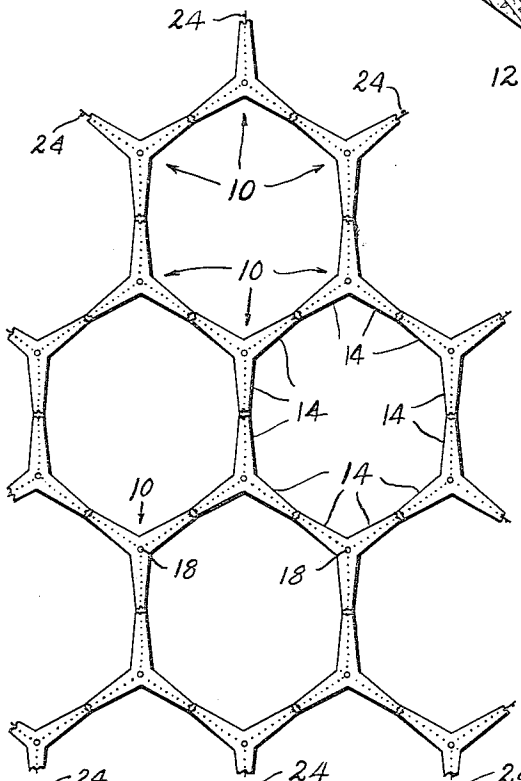





FIG. 1

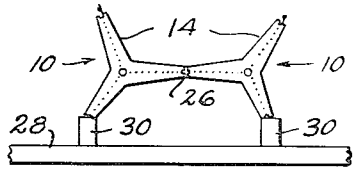


FIG. 5

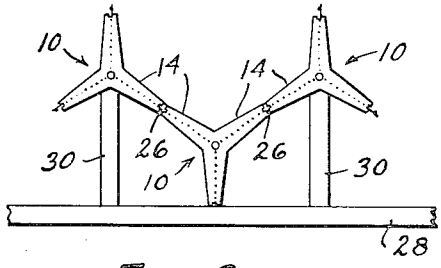


FIG. 6

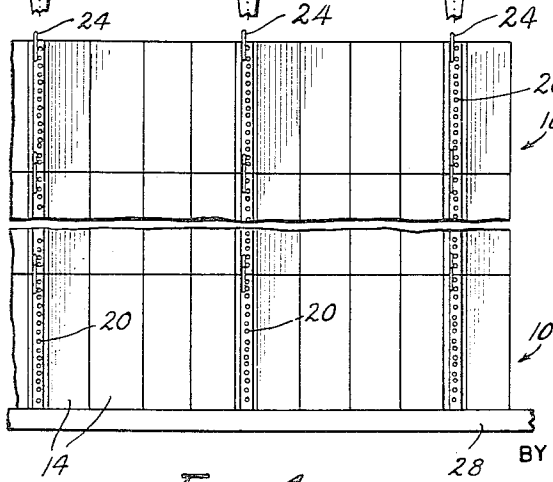


FIG. 4

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# REINFORCED CONCRETE BIN STRUCTURE

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3 Claims. (Cl. 72—6)

This invention relates to reinforced concrete structural members and composite structures.

With considerations of simplicity, economy, strength, stability, and speed of construction paramount, it has nevertheless been possible in accordance with the present invention to produce structural members having a wide variety of uses. Among the uses for which the structural members here under consideration are eminently suited, are columns, piles, retaining walls, sheet piling, fluid conduits, bins, and various other forms of containers.

The structural members are dynamically stable and well adapted for use in their vertical positions in which they are quite capable of withstanding lateral pressures. This stability and capability of withstanding lateral pressures is particularly evident when the members are used in conjunction with similar sections to form multiple flanged columns.

When combined with similar members to produce composite structures, the structural members of this invention facilitate the expansion of existing structures, because of their peculiar shapes, in any direction horizontally or vertically.

It is among the objects of this invention to provide a reinforced concrete structural member having a substantially Y-shaped cross section defined by a hub portion and three symmetrically disposed legs radiating therefrom, the legs being preferably of equal length, converging from the hub and terminating in grooved ends.

It is also among the objects of this invention to provide a composite reinforced concrete structure comprising substantially identical precast reinforced concrete members each having a substantially Y-shaped cross section defined by a hub portion and three symmetrically disposed legs radiating therefrom, adjacent members having adjacent legs secured together in substantial alignment. Where the members are used in their vertical positions, as in the construction of vertical bins, their horizontal cross sections will be substantially Y-shaped. For maximum stability, these legs will be disposed to one another at 120° measured from the axis of the member. In producing structures having completely closed walls, six of these structural members are utilized as a minimum.

Where these structural members are utilized in the construction of bins, certain legs of adjacent members define a portion of one bin, and each of the members has another leg defining a portion of an adjacent bin. More specifically, each member will have two of its legs defining a portion of one bin, the third of its legs defining a portion of an adjacent bin. In any event, in the construction of multiple bins, each leg of a member will abut a substantially aligned leg of an adjacent member. Each of the bins defined by the members contemplated by the present invention will have a hexagonal horizontal cross section and each of the legs contributing to this cross section will define approximately one-half of a side of the hexagon.

It is of course well known to construct bins of the general type here under consideration as will be illustrated



by the disclosures of the patents to Rabitz, No. 339,211, dated April 6, 1886, Wilson, No. 459,806, dated September 22, 1891, Knoche, No. 413,370, dated October 22, 1889, and Macdonald, No. 536,435, dated March 26, 1895, but none of these disclosures contemplates the use of structural members having the advantages of that first disclosed in the present application, nor do the structures produced in accordance with these patents possess the advantages of simplicity, economy, stability, strength, and speed of construction which characterize the present invention.

A more complete understanding of this invention will follow from a detailed description of the accompanying drawings wherein:

Fig. 1 is a perspective view depicting a structural member in accordance with this invention;

Fig. 2 is a section taken along line 2—2 of Fig. 1 and on an enlarged scale;

Fig. 3 is a plan view of a bank of bins produced with the structural elements of Fig. 1;

Fig. 4 is a front elevation of the bank of bins shown in Fig. 3;

Fig. 5 is an elevation of an open top container or conduit constructed with the members of Fig. 1; and

Fig. 6 is another form of open top container or conduit produced with the structural members of Fig. 1, shown in elevation.

The structural member 10 depicted in Fig. 1 of the drawings comprises a hub portion 12 from which the three legs 14 converge to their ends which are formed with grooves 16. These structural members are preferably formed of reinforced concrete, and in order to illustrate feasible proportions so that one skilled in the art can construct such members, it may be well to specify some of the dimensions and materials.

Referring to Fig. 2, extending axially of the hub 12 there is a ⅞ inch diameter reinforcing rod 18, from which radiate reinforcing members 20, depicted as wire mesh, there being another reinforcing rod 22 extending parallel to the hub axis arranged about 8 inches from the outer end of each leg. These dimensions are predicated upon legs approximating 3 feet in length from their hub axis. At its root, each leg can be approximately 6 inches thick, converging to a thickness of approximately 3 inches. With such cross sectional dimensions, these structural members may be 34 feet high and as many as three tiers of such structural members may be stacked as depicted in Fig. 4 to produce bins approximating 100 feet in height.

The wire mesh or other reinforcement 20 can extend beyond the structural members themselves to constitute ties for adjacent members to which they will be secured. As depicted in some of the figures, reinforcing members 24 can be welded to the projecting wire mesh to extend above the structural members to produce a joint with a structural member located thereabove.

As illustrated at the lower portion of Fig. 2, adjacent legs 14 of adjacent structural members are arranged in substantial alignment and the wire mesh projecting from these legs can be overlapped and secured together in a suitable manner and the gap between the ends of the legs filled with concrete 26.

As clearly shown in Fig. 3, portions of six structural members 10 are employed to produce each hexagonal bin, two legs 14 of each member defining wall portions of one bin and the third leg of each member projecting outwardly to define along with one of its other legs, wall portions of an adjacent bin. Thus, each member is adapted to form wall portions of three distinct bins. Regardless of how many bins are completely formed with such members, there will be a certain number of projecting legs ready for cooperation with such similar mem-

bers as may be erected in the future to define additional bins.

Structures embodying the members of the present invention will utilize suitable foundations such as the foundation **28** depicted in Fig. 4 which may be of any suitable material so long as it will sustain the load imposed upon it by the superimposed structure and its contents.

Fig. 5 depicts a container or conduit having an open top defined by two of the structural members **10** whose adjacent legs **14** are secured together in substantial alignment, their downwardly directed legs being supported upon colums **30** which in turn rest upon a foundation **28**.

The use of three such structural members to produce an open top container or conduit is illustrated in Fig. 6 wherein an intermediate structural member **10** has a downwardly directed leg **14** resting upon a foundation **28**, its other two legs disposed at 120°, being secured in alignment with abutting legs **14** of adjacent structural members which are in turn supported at their hubs in a suitable fashion by means of columns **30**.

Inasmuch as the structural members preferred in accordance with this invention have three legs symmetrically disposed with respect to the central axis, these legs will be equal in length and therefore will provide a maximum of stability consistent with a minimum of material. The ends or edges of these legs provided with grooves **16** permit an interlocking engagement or keying action with adjacent structural members, again contributing towards stability and strength.

Whereas many different forms of structures utilizing the structural members of the present invention will suggest themselves to those skilled in the art, just as they have already occurred to the present inventor, only a few illustrations of such structures have been presented to exemplify the applications and accordingly, this invention should not be restricted to the embodiments illustrated beyond the scope of the appended claims.



I claim:

1. A composite reinforced concrete bin structure wherein a bin having a regular polygonal cross section is formed comprising substantially identical precast reinforced concrete members each having a substantially uniform Y-shaped cross section defined by a hub portion and three legs angularly disposed substantially 120° apart and of substantially equal length radiating therefrom, each of said legs having outwardly convergent surfaces, reinforcing elements embedded in said legs and projecting radially therefrom, adjacent members having adjacent legs secured together in substantial alignment, said members being arranged to jointly define a closed perimetrical bin wall, reinforcing elements of said adjacent legs having an interlocked relationship.

2. A composite reinforced concrete bin structure as set forth in claim 1 wherein said legs of each member define portions of two bins.

3. A composite reinforced concrete bin structure as set forth in claim 1 wherein said legs of each member define portions of three bins.

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