

Feb. 25, 1969

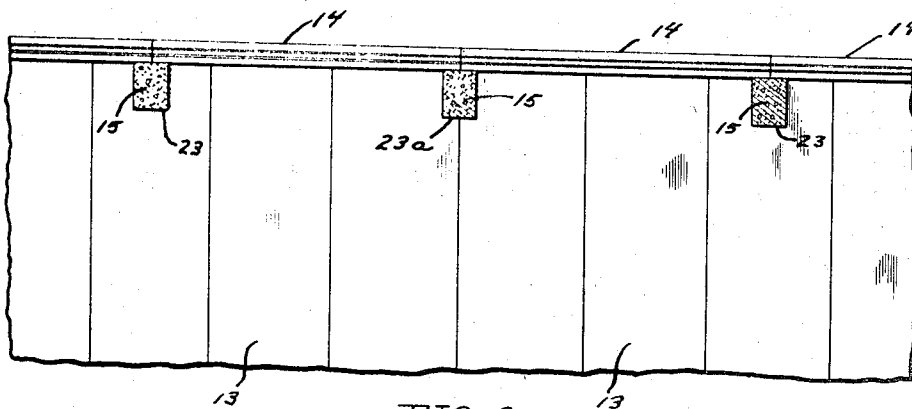
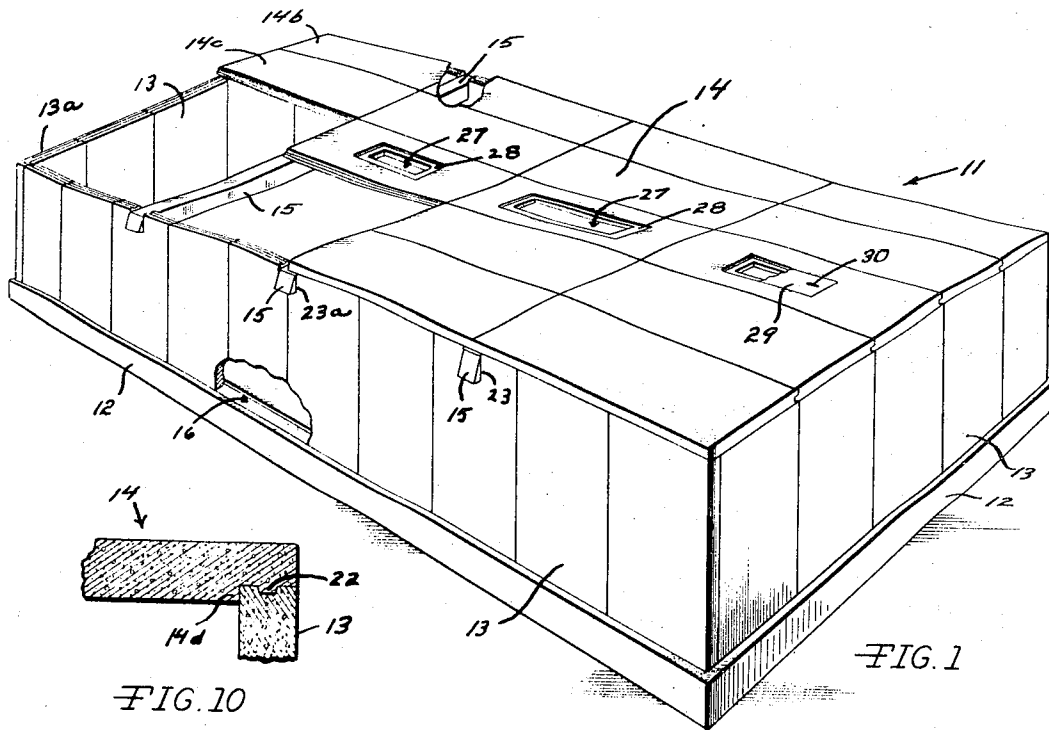
A. L. VROMAN ET AL

3,429,473

PRECAST SEGMENT LIQUID STORAGE TANK

Filed July 5, 1966

Sheet 1 of 2



INVENTORS
ALBERT L. VROMAN
LEO E. BOUCHER

BY *Miller, Morris & Pappas*

ATTORNEYS

Feb. 25, 1969

A. L. VROMAN ET AL

3,429,473

PRECAST SEGMENT LIQUID STORAGE TANK

Filed July 5, 1966

Sheet 2 of 2

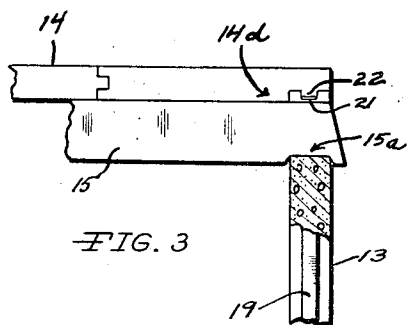


FIG. 3

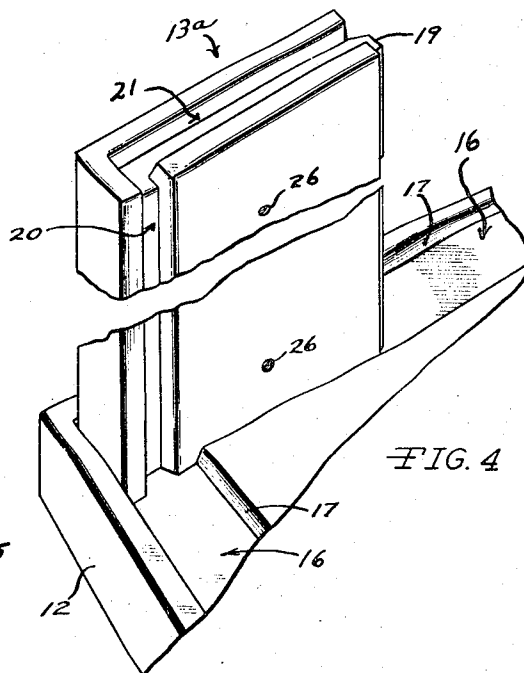


FIG. 4

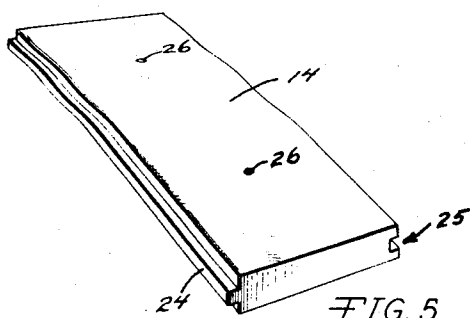


FIG. 5

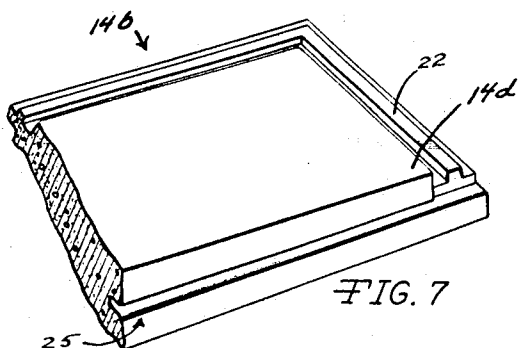


FIG. 6

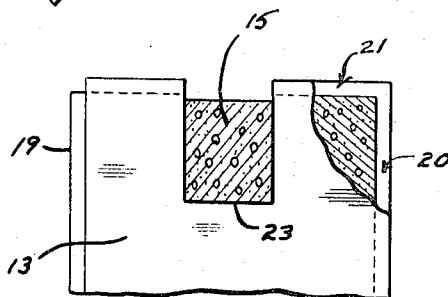


FIG. 7

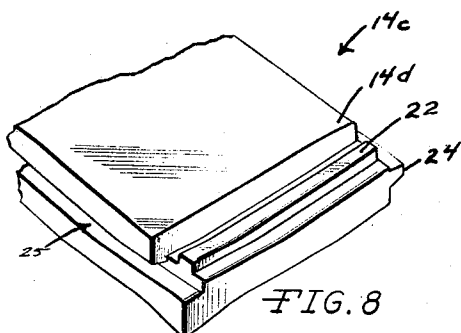


FIG. 8

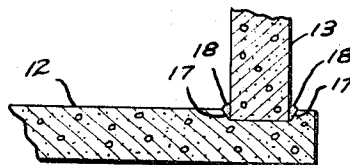


FIG. 9

INVENTORS

ALBERT L. VROMAN

LEO E. BOUCHER

BY

Miller, Morris, & Pappas

ATTORNEYS

1

3,429,473

PRECAST SEGMENT LIQUID STORAGE TANK

Albert L. Vroman, Portland, and Leo E. Boucher, Mulliken, Mich., assignors to A. D. L. Cement Products, Inc., Portland, Mich., a corporation of Michigan

Filed July 5, 1966, Ser. No. 562,886

U.S. Cl. 220-5

8 Claims

Int. Cl. B65d 11/10, 11/18, 13/02

ABSTRACT OF THE DISCLOSURE

A liquid storage tank comprised of precast concrete segment wall and roof panel members and precast concrete beam elements which upon assembly uniquely interlock with each other and coact to form an inherently stable structure which does not require ancillary support, locking, or adhesive means in its assembled use position. The beam elements and wall and roof panel members are configured to be assembled in such a manner that any desired size of tank can be obtained without the use of other than the standard size precast concrete panel segments and beam members used in installations of any size.

This invention relates to a liquid storage tank fabricated from precast segment elements and more particularly to liquid storage tanks fabricated by use of precast segment elements which are adapted for assembly so as to impart a selective longitudinal incremental expansion capability to such tanks as required to meet specific installation capacity requirements. This invention further relates to a liquid storage tank structure comprised of panel segments and support beams which are assembled so as to uniquely interlock with each other to form an inherently stable structure which does not require ancillary support, locking, or adhesive means to hold it in its assembled use position.

An object of this invention is to provide a prefabricated liquid storage tank assembly which can be incrementally expanded along its longitudinal dimension so as to increase its capacity, as required by any specific job installation.

Another object of this invention is to provide a liquid storage tank for underground installation and which can be assembled at any desired site by use of standard precast concrete panel segments and support beams.

Another object of this invention is to provide a liquid storage tank which can be assembled so as to provide a liquid storage tank of any desired capacity by virtue of a unique longitudinal incremental expansion capability incorporated therein.

A further object of this invention is to provide a liquid storage tank wherein a plurality of wall panels, roof panels, and support beams are provided which are assembled into a uniquely interlocking relationship so as to provide an inherently stable tank structure which does not require ancillary support, locking or adhesive means (such as mortar) to maintain it in its assembled use position.

Yet another object of this invention is to provide a liquid storage tank assembly which utilizes interlocking longitudinally oriented precast concrete roof panel segments supported by transversely oriented parallel spaced-apart cross beams to permit assembly of a liquid storage tank of any desired longitudinal dimension in accordance with specific capacity requirements of a particular job installation.

A still further object of this invention is to provide a liquid storage tank assembly having a variable capacity capability whereby an increased capacity can be achieved without the use of other than the standard size precast

2

concrete panel segments and beam members used in all installations, regardless of the capacity involved.

It is thus within the scope of this invention to provide a liquid storage tank which is fabricated by use of precast concrete segments and coacting support beams. The precast concrete segments consist of wall panel segments, roof panel segments and cross support members which are configured for easy on the spot interlocking assembly into an underground liquid storage tank.

The unique configuration of the precast concrete segments and, further, the unique orientation and assembly thereof permits longitudinal segmental expansion of said tank as desired, pursuant to the capacity requirements of any specific installation.

Other objects and advantages found in the construction of my invention will be apparent from a consideration of the following specification in connection with the appended claims and the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view of a prefabricated liquid storage tank in a partially assembled position and illustrating the interlocking inter-relationship of the tank floor, the wall segment panels, the plurality of transversely oriented parallel spaced apart cross beams and the roof segment panels.

FIGURE 2 is a side schematic view of the elongate roof panels in their assembled end-to-end abutting relationship and further illustrating the inter-relationship of the wall panels, the spaced apart cross beams (shown in cross-section) supported thereby and the roof panels supported by the cross beams.

FIGURE 3 is a schematic view showing a wall segment panel in its use position supporting and interlocked with the end of a cross beam and further illustrating the roof panels in position on and supported by said cross beam and in interlocked engagement with the upper portion of the wall panel.

FIGURE 4 is a schematic perspective view of a portion of the concrete slab which forms the tank floor and showing the groove provided along the outer perimeter of the tank floor and further illustrating a corner member wall panel in position thereon.

FIGURE 5 is a perspective view of a roof panel illustrating the tongue and groove configuration along the longitudinal side edges thereof.

FIGURE 6 is a side schematic view of the upper portion of a wall panel which has a slot provided therein so as to receive the end of a cross beam and further showing the tongue and groove portions along the sides and across the top of the wall panel itself.

FIGURE 7 is a partial schematic perspective view of the under portion of a roof panel which is intended for mounting on the wall panels forming the corner of the liquid storage tank and showing in detail the tongue and groove construction thereof.

FIGURE 8 is a partial perspective schematic view of the under portion of another embodiment of the roof panel having a tongue and groove portion at one end thereof for engaging the wall panels forming the end wall of the assembled structure.

FIGURE 9 is a schematic partial cross sectional view of the floor slab with a wall panel in position thereon.

FIGURE 10 is a schematic partial cross sectional view of a roof panel in its interlocked relationship with a wall panel segment.

General description

In general, an underground liquid storage tank 11 is provided for assembly from precast concrete panel segments. The precast liquid storage tank 11 is designed so that the precast standard concrete segments can be fabricated on the site or at a central manufacturing plant

for transfer to installation sites as needed. In this manner, liquid storage tanks of any desired capacity can be assembled on any site and be ready for use in a matter of hours.

The unique design of the precast liquid storage tank 11 utilizes a plurality of transversely oriented parallel spaced apart cross beams 15 which interlock and co-operate with the side walls of the tank assembly to support a plurality of roof panels 14 thereon. Although the roof panels 14 are supported by the beams 15 and wall panels 13, selected of the roof panels 14 are configured to interlock with wall panels 13 so as to support and stabilize the wall panels in their vertically oriented horizontal use position.

This critical interlocking interrelationship between the transversely positioned parallel spaced apart cross beams 15, roof panels 14 and wall panels 13 create a liquid storage tank assembly which can be readily expanded incrementally in a longitudinal direction to meet the capacity requirements of any particular job installation without having any effect on the existing manufacturing facilities for the precast segments or panels. Thus, the standard molds used in the manufacture of such segments or panels do not have to be changed to meet changes in capacity requirements of tanks assembled by use of such standard panels. Thus, correspondingly larger panel components and beams are not required to achieve tanks of larger capacity.

The incorporation of longitudinal expansion capabilities into a liquid storage tank has not been found in the devices of the prior known art. The liquid storage tank assembly of this invention provides a unique liquid storage tank which can be assembled at any desired site in a matter of hours and which has the capability of being installed with any desired longitudinal dimension (hence any desired volume) by use of standard precast concrete slab panels and cross support beams as described herein.

In addition, the wall panels 13, roof panels 14, and support beams 15 are configured to uniquely interlock with each other so as to provide an inherently stable structure which can be assembled into its use position without the need for mortar, screws, bolts, glue or any other ancillary supporting, locking or adhesive means.

A further advantage of the instant invention is the provision of a liquid storage tank assembly which can be enlarged by longitudinally added increments to provide a liquid storage tank of any desired expanded capacity without the need of utilizing large and unwieldy non-standard precast concrete segments. Thus, if a particular installation requires a larger capacity storage tank, the longitudinal dimension of the tank is extended by insertion of additional standard wall panels to form the extended side walls of the tank. Spaced-apart transversely positioned beams are positioned on the extended side walls and standard roof panels are positioned on the beams to complete the tank.

It is therefore seen that the instant invention consists of a liquid storage tank assembly which is fabricated from standard precast concrete panel segments and which can be quickly assembled by virtue of a longitudinal expansion capability to meet any desired capacity in accordance with the particular job requirements. Further, such tank is inherently stable in its assembled use position due to the unique interlocking and self-bracing capabilities of its wall panels, roof panels and support beams.

Specific description

As shown in FIGURE 1, a liquid storage tank 11 is assembled upon a pre-poured concrete slab 12 which forms the floor of the tank. The slab 12 is provided on the bottom of an appropriately prepared excavation. The liquid storage tank 11 is assembled by use of a plurality of precast concrete wall panel segments 13, a plurality of precast roof panel segments 14, and a plurality of precast concrete beams 15.

As shown in FIGURES 1, 4 and 9, the upper surface of the slab 12 of the liquid storage tank 11 is provided with a wall panel engaging groove 16 along the outer peripheral edges thereof. As shown in FIGURE 9, the side walls 17 of the groove 16 are sloped outwardly so as to form a tapered space with the walls of a side panel 13 placed therein. A waterproofing compound 18 is added to the groove 16 prior to the installation of the wall panels 13. When the lower end of each wall panel 13 is placed into the groove 16, the waterproofing compound 18 flows therearound and fills the open spaces on either side of the side panel 13 and the sloped walls 17 of the groove 16. This permits a more effective waterproof seal than has hitherto been possible in the devices of the prior known art. The waterproofing compound which is used can be any one of the many types now available on the market.

As shown generally in the drawings, the wall panels 13 and roof panels 14 are precast concrete segments which have an internal reinforcing steel bar lattice (not shown) provided therein for the purpose of enhancing the strength of the precast concrete segment or panel.

The wall panels 13 are provided with a flat bottom end surface in order that they may be vertically mounted into the groove 16 provided in the upper surface of the slab 12. The longitudinal edges of the wall panels 13 are provided with an oppositely positioned tongue 19 and a groove 20 in order that the panels 13 can interlock with the next adjacent panel 13 when placed in a side by side abutting contact with each other within the groove 16 of the slab 12. Thus assembled, the wall panels 13 form the longitudinal side walls and end walls of the liquid storage tank 11. It is within the scope of the invention to provide multiple socket pickup inserts 26 in the panels by imbedding them in the body of the preformed concrete panels. These inserts provide readily accessible pick up points on the surface of each precast panel for ease in attaching lift wires or chains thereto so as to facilitate the mounting of the wall panels 13 and roof panels 14 into their respective use positions.

The upper ends of the wall panels 13 are provided with grooves 21. The grooves 21 are adapted to engage the tongue elements 22 which are provided on selected of the roof panels (14b and 14c) which engage the wall panels 13. Thus, not only are selected of the roof panels supported in part by the wall panels 13 but selected of the roof panels interlock with wall panels 13 to enhance the stability of the tank in its assembled use position.

As shown in FIGURE 10, the central body portion 14d of the roof panels 14 which interlock with the wall panels 13 extends below the tongue 22 and engages the inside vertical surface of the upper end of the wall panel 13 so as to perform a bracing function against an inward shear force created by the pressure of earth fill against the outer surface of the wall panels 13. This also creates an inherent stability in the overall tank structure and prevents shearing of the tongue elements 22.

Selected of the wall panels 13 which form the side walls of the tank 11 have a beam engaging slot 23 provided at the upper end thereof which opens upwardly and which is configured to receive the end of a support beam 15. The slot 23 can also be formed by notching out the corners of adjacent interlocked wall panels 13. This is shown in FIGURE 2 as slot position 23a.

The support beam 15 is also fabricated with elongate steel reinforcing bars (not shown) therein so as to enhance the strength thereof. As is shown in part in FIGURE 3, the ends of the support beams 15 are provided with slotted portions 15a at the bottom surface thereof. The slots 15a are adapted to engage the bottom portions of the slots 23 which are provided in certain of the wall panels 13 which form the longitudinal sidewalls of the tank. Thus interlocked, the beams 15 not only provide support for the roof panels 14, but the plurality of beams 15 interlock with the longitudinal side walls of the tank to positively

stabilize and maintain the side walls in their parallel spaced-apart upright position.

It is within the scope of the invention to provide special corner wall panel segments 13a as shown in FIGURE 4. In these panels, the groove 20 is not positioned oppositely the tongue 19, but is positioned along the opposite vertically oriented edge of the panel in a plane 90 degrees to the plane of the tongue 19 so that the special side wall panel 13a constitutes a cornering wall element for the tank 11. This type of a wall panel forms the corners of the liquid storage tank and is capable of engaging adjacent wall panels 13 installed thereagainst from either side.

As stated previously, the panel elements 13 which form the longitudinal sides of the tank 11 and which have a beam engaging slot 23 provided therein are positioned oppositely each other at regularly spaced intervals along the longitudinal sides of the liquid storage tank 11. Thus positioned, the beam engaging slots 23 permit the installation of transversely oriented parallel spaced-apart support beams 15 therein so that the support beams are transversely positioned in an equally spaced-apart manner along the entire length of the liquid storage tank. The transversely oriented parallel spaced apart relationship of the beams 15 is shown specifically in FIGURES 1 and 2 of the drawings.

As shown in FIGURE 5, the roof panels 14 are provided with oppositely positioned tongue 24 and groove 25 portions along the longitudinal edges thereof so as to permit a positive interlocking relationship with the next adjacent roof element 14. The embodiment of the roof panel 14 as shown in FIGURE 5 is provided with flat end surfaces and is intended for use in spanning from one beam 15 to the next adjacent spaced apart beam 15. As shown in FIGURE 2, the ends of the roof panels 14 are positioned on the support beams 15 in an end-to-end abutting relationship so as to form a portion of the tank 11. The wall shown in FIGURE 2 is the longitudinal side wall of the tank 11.

The embodiment of the roof panel 14 which is shown in FIGURE 7 consists of a roof panel corner element 14b which is provided with a downwardly extending side wall engaging tongue 22. In FIGURE 7, the bottom surface of the roof panel 14b is shown as the upper surface. However, in use the surface of the roof corner panel 14b shown extends downwardly and faces the interior of the liquid storage tank. In its use position, the roof panel corner element 14b engages the upper edges of the wall panels 13 which form the corners of the tank 11. Here again, the central portion 14d of the roof panel extends below the tongue portion 22 thereof so as to engage and brace the inner vertical surface of the upper end of the wall panel 13, as shown in FIGURE 10.

As shown in FIGURE 8, the roof panel 14c (also shown in an inverted position) is provided with the wall engaging tongue 22 extending along one end thereof. Here again, the main body portion 14d of the roof panel extends below the tongue portion 22. This embodiment of roof panel is configured to span the distance between a beam 15 and the panels 13 which form the end walls of the tank 11.

Similarly, the roof panels 14 which engage the wall panels 13 forming the longitudinal sides of the liquid storage tank 11 are also provided with similar wall panel engaging tongues 22 along one longitudinal edge thereof. Here again, the main body portion of the roof panel 14d extends below the tongue member 22 thereof so as to engage and brace the inside vertical surface of the upper ends of the wall panels.

As shown in FIGURE 1, selected of the roof panels 14 are provided with access openings 27 of any desired size or configuration so as to render the liquid storage tank usable. The access openings 27 are provided with groove portions 28 along the peripheral edges thereof which are adapted to receive the edges of metal cover plates 29. The cover plates 29 are provided with pick-up slots 30 near

each end thereof for ease in lifting the plates 29 as desired.

The tongues and grooves utilized on the roof and wall panels are provided with corresponding tapered surfaces which vary slightly in slope so that they matingly engage one another in sealing engagement.

Further, in order that the inventive concept embodied in the invention can be more readily appreciated, the relative sizes of the various component parts utilized in assembling the storage tank should be known. The beam 15 is approximately ten inches wide, fourteen inches deep and is approximately twenty-two feet in length. The approximate weight of the beam is 3,000 pounds.

The roof panels 14 are approximately four feet, six inches wide, ten feet long and six inches thick. The roof panels which engage the end walls are ten feet six inches long. The roof panels also weigh approximately 3,000 pounds.

The wall panels 13 are approximately four feet wide, eight feet six inches high and six inches thick. The roof panels weigh approximately 2,500 pounds.

The foregoing dimensions and weights are not intended to be critical and can be varied if so desired. They are set forth merely to indicate the nature of the structure embodied in this invention. From these standard components, liquid storage tanks of any desired capacity can be easily assembled. For instance, a tank can be assembled being eight feet high, twenty feet wide and twenty feet long and utilizing one cross beam. The tank would have a 24,000 gallon capacity. Larger tanks can be assembled by use of these standard components by merely increasing the longitudinal dimension of the tanks. For instance, a tank can be assembled having dimensions eight feet high, twenty feet wide and ninety feet long. The capacity of the tank would be 108,000 gallons and would utilize eight cross beams. Furthermore, even larger capacities are possible while utilizing the same standard size components.

Heretofore, tanks of this type and size have had to be custom built and poured as a unitary tank. Prior to this invention, the prefabricated concept has not heretofore been applied to or even thought possible in this type of unit and operative use setting.

Operation

The liquid storage tank 11 is primarily designed for use as a liquid manure storage tank which is installed underground along the side of a livestock barn for tie-in into an automatic barn floor washing assembly (not shown).

The liquid storage tank can also be used for water storage for general utility or fire-fighting purposes. Tanks of this type are also intended for use as holding tanks for sewage treatment plants.

The ultimate overall size of the liquid storage tank is determined by the capacity requirements of the particular installation. After the capacity requirements have been determined, the exact layout of the particular liquid storage tank is determined by use of a planning chart whereby the dimensions of the tank are laid out in terms of longitudinally extended increments which are determined by the number of transversely positioned spaced apart beams 15 that are to be utilized.

The capability for longitudinal expansion of the liquid storage tank assembly 11 is achieved by the unique design of the liquid storage tank and the manner in which the longitudinally oriented roof panels 14 coast with the transversely positioned parallel spaced-apart cross beams 15 and the wall panels 13 which support such beams.

After the longitudinal dimensions of the end product storage tank have been determined, the appropriate excavation is made and the floor slab 12 is poured so as to form the floor of the liquid storage tank. The depth of the excavation is generally of such a height that the upper surface of the completed tank 11, with roof pan-

els 14 in place, is just below or even with the surface of the adjacent ground.

Prior to the installation of each wall segments or panel 13, the groove 16 is coated with a waterproofing compound. The wall panels 13 and 13a are then positioned in the groove 16 in a vertical adjacent interlocked abutting position so as to form the longitudinal side walls and end walls of the tank 11.

As stated previously, selected of said panels 13 which form the sides of the tank are provided with beam engaging slots 23 at the upper ends thereof. In mounting the wall panels 13 along the longitudinal sides of the floor slab 12, care is taken that pairs of such transverse slots 23 are provided in an aligned oppositely positioned register with each other along the opposite longitudinal sides of the tank enclosure. Thus positioned, the slots 23 receive the beams 15 in transverse parallel equally spaced-apart positions across the top of the tank enclosure.

Thus positioned, the parallel spaced apart beams 15 are adapted to receive the ends of the roof panels 14 so as to form a cover for the liquid storage tank 11 as shown in FIGURE 1. The roof panel members 14 not only form a cover for the tank, but also form an earth support surface so that the entire tank can be covered by a layer of dirt if so desired.

As shown in the drawings, this unique assembly of coacting precast roof and wall panel segments and support beams 15 provides a storage tank which can be expanded longitudinally to meet the capacity requirements of any particular job installation. Thus, the longitudinal dimensions of a liquid storage tank 11 can be increased as desired in increments equal to the length of the individual roof panel elements 14.

After the roof panels 14 have been placed in position and the liquid storage tank has been completed, the excavation is filled so that the top surface of the tank is substantially level with the adjacent ground. In this manner, a highly sanitary and stable liquid storage tank is provided which can be easily and quickly installed as desired.

In addition, the unique structure described herein provides an expandable liquid storage tank which can be assembled to any desired longitudinal dimension without the necessity of fabricating oversize and unwieldy precast concrete segments for use with larger capacity tanks. Thus, a large capacity tank can be easily planned and installed by use of the standard size precast concrete segment building "blocks" described herein. It is the use of the transversely positioned spaced apart cross beams 15 which coact with the roof panels 14 and the wall panels 13 to make this incremental longitudinal "expansion" capability possible.

Further, the unique interlocking and self-bracing coaction between the wall panels 13, roof panels 14 and support beams 15 provides a highly stable structure even though it can easily and quickly be assembled without the use of ancillary connecting, locking or adhesive means.

Thus, for the first time in the history of liquid storage tanks of this size and type each installation is not a custom built tank due to the specific capacity requirements of the particular job. A tank of any desired capacity can be easily and quickly assembled by use of standard size wall panels, roof panels and beams which do not vary in size even though they are used to provide tanks of different capacities.

We claim:

1. In a liquid storage tank, the combination comprising:

- (a) a plurality of interlocking wall panel segments vertically positioned upon a base slab so as to form a storage tank enclosure having end walls and elongate parallel spaced apart longitudinal sidewalls;
- (b) spaced apart pairs of oppositely positioned aligned upwardly opening beam engaging slots provided at

the top of selected of said wall panel segments forming said longitudinal sidewalls;

- (c) a plurality of parallel spaced apart roof panel support beams, said beams provided with downwardly opening side wall panel engaging slots at the bottom surface proximate to the ends thereof which are interlockably engaged in said upwardly opening beam engaging slots provided in said selected wall panel segments, said support beams lockably supported in said beam engaging slots so as to transversely span said enclosure from one of said side walls to the other so as to stabilize and maintain said side walls in their parallel spaced apart upright position; and
- (d) a plurality of interlocking roof panel segments supported on said support beams in an end-to-end abutting relationship, selected of said roof panel segments interlockably engaging said wall panel segments so as to form a cover for said storage tank enclosure.

2. In the liquid storage tank as claimed in claim 1, wherein the base support slab is provided with a wall panel support groove along the outer peripheral edges of the upper surface thereof, said groove adapted to receive the bottom portions of said wall panels in their vertically oriented interlocked positions so as to form a storage tank enclosure.

3. In the liquid storage tank as claimed in claim 1, wherein selected of said roof panel segments are provided with access openings therein.

4. In a liquid storage tank as claimed in claim 1, wherein selected of said wall panel segments are provided with oppositely positioned tongue and groove elements along the longitudinal edge portions thereof, said tongue and groove elements being positioned in planes perpendicular to each other so as to provide cornering wall panel elements.

5. In the liquid storage tank as claimed in claim 1, wherein said transversely positioned support beams are supported in oppositely positioned slots provided in said longitudinal sidewalls, said support beams supporting the ends of roof panel segments positioned transversely thereon, said roof panels being in an end to end abutting relationship to each other and interlocked with next adjacent roof panel segments along the longitudinal edges thereof so as to form a cover for said liquid storage tank.

6. In the liquid storage tank as claimed in claim 1, wherein the upper ends of said wall panels are provided with a grooved portion adapted to receive downwardly extending tongue members provided on selected of said roof panel members.

7. In the liquid storage tank as claimed in claim 6, wherein selected of said roof panels which engage the said wall panels are provided with a central body portion which extends below said tongue members thereof, said central body portion having vertical sides which braceably engage the inner vertical surface of the upper end of the said wall panels.

8. A liquid storage tank comprising:

- (a) a concrete base slab provided with a groove in its upper surface, said groove extending along the peripheral edges of said base slab;
- (b) a plurality of precast interlocking concrete wall panel segments set in said groove of said base slab so as to form an enclosure having end walls and elongate parallel spaced apart longitudinal side walls;
- (c) selected pairs of oppositely positioned wall panels forming said longitudinal side walls provided with upwardly opening beam support cut out slots in the upper portions thereof, selected of said beam support slots being in aligned spaced apart register with each other;
- (d) a plurality of parallel spaced apart roof panel support beams, said beams provided with downwardly opening side wall panel engaging slots at the bottom surface proximate to the ends thereof which are interlockably engaged in said upwardly opening beam

9

support cut out slots in said side wall panels, said support beams lockably supported in said beam support slots so as to transversely span said enclosure from one of said side walls to the other, said beams being in parallel spaced apart relationship with each other and with said end walls so as to stabilize and maintain said side walls in their parallel spaced apart upright position; and

- (e) a plurality of interlocking roof panel members provided so that the ends thereof rest upon the upper portions of selected of said wall panels and said transversely positioned beams, selected of said roof panels adapted to extend from the upper ends of said end walls to said beams and selected of said roof panels longitudinally oriented to extend from one beam to the next adjacent beam, said roof panels provided with grooves and tongues so as to interlockably engage each other and selected of said wall panels so

10

as to form a unitary roof construction for said liquid storage tank.

References Cited

UNITED STATES PATENTS

1,684,050	9/1928	Adams	52—593
1,872,590	8/1932	Hollopeter	220—4
2,000,897	5/1935	Alcott	52—593
2,204,195	6/1940	Steinmetz	52—593 X
2,684,134	7/1954	Ruppel	52—262
2,903,878	9/1959	Humphrey	52—593 X
3,106,044	10/1963	Tullio	52—251 X
3,113,401	12/1963	Rose	52—593 X

GEORGE E. LOWRANCE, *Primary Examiner*.

U.S. Cl. X.R.

52—593