

Oct. 20, 1936.

H. SCHORER

2,058,038

TANK CONSTRUCTION

Filed March 20, 1936

2 Sheets-Sheet 1

Fig. 1.

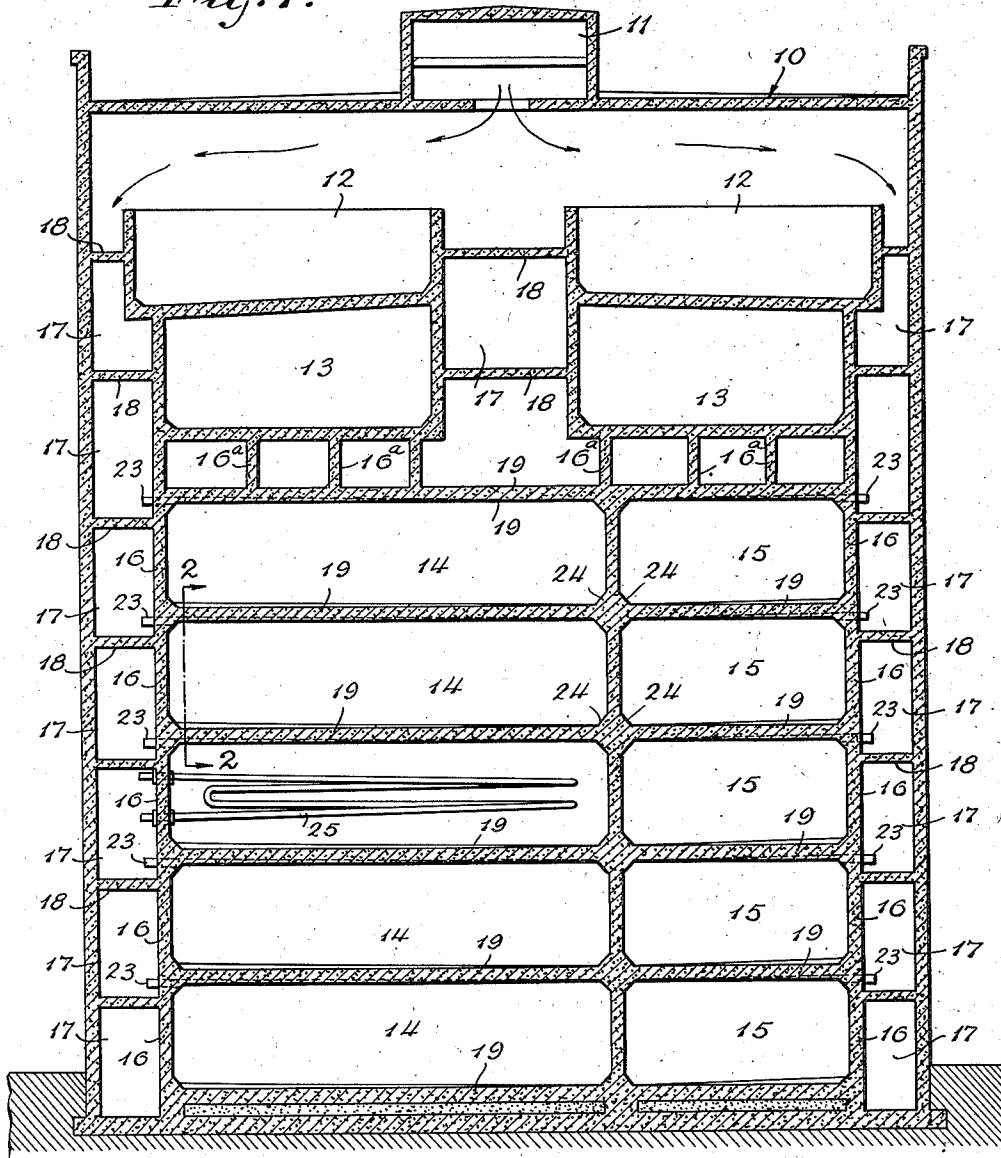
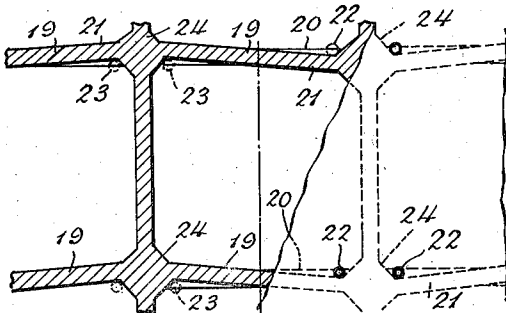


Fig. 2.

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Fig. 3.

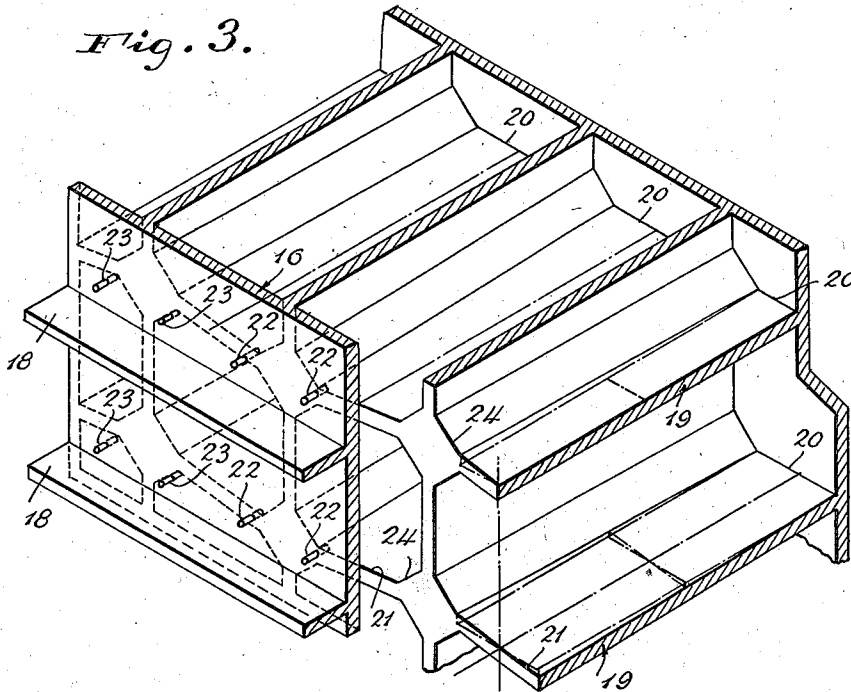


Fig. 4.

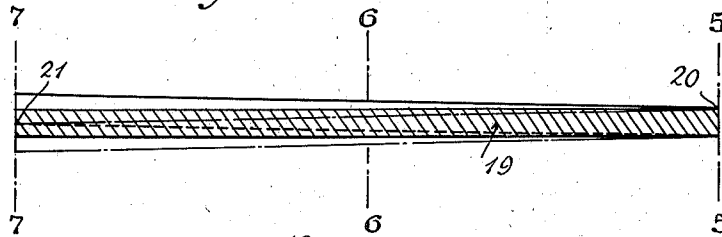


Fig. 5.

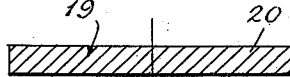


Fig. 6.

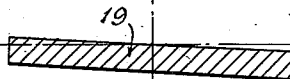
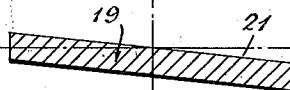


Fig. 7.



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TANK CONSTRUCTION

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9 Claims. (Cl. 72—13)

This invention relates to storage tanks and the like and has particular application to monolithic tier buildings for beer storage, although it may be used for other analogous purposes with equal efficacy.

The main object of the invention is to provide a tank construction in which proper drainage of the floor and ceiling surfaces is obtained toward a corner point at one end of the tank.

Another object is to provide a concrete tank construction which permits uniform arrangement of the reinforcing bars and uniform height of the form boards throughout the length of the tank.

Still another object is to provide a monolithic tank building eliminating waste of concrete material and permitting simplification of the steel reinforcement.

A further object is to provide a monolithic tier building of practical and simplified construction in which the available space is better utilized for the storage of liquid.

Other objects will be in part obvious and in part hereinafter pointed out in connection with the following analysis of the invention wherein is described and illustrated a preferred mode of carrying out the inventive concept.

In the drawings:—

Figure 1 is a cross-section of a tank building embodying the invention.

Figure 2 is a section along the line 2—2 of Fig. 1 showing the construction of the forward part of the tank.

Figure 3 is an isometric perspective view of a part of the tank construction.

Figure 4 is a diagrammatic view of the floor construction.

Figures 5, 6 and 7 are sections along the lines 5—5, 6—6 and 7—7 respectively of Figure 4.

As conducive to a clearer understanding of the improved construction about to be described in relation to prior construction and practices, the following short explanation of its application to the brewing industry may be added.

Originally, the beer was stored in wooden casks placed in vast underground vaults, but in comparatively recent years, tall reinforced concrete buildings having specially lined tanks were substituted for the old method. These buildings may be about 50 x 75 feet plan and 100 feet high. Through the adoption of rectangular tank sections and the arrangement of the tanks in tiers, it was possible to obtain a maximum utilization of the space.

These rectangular tanks must be shaped so

as to give adequate floor drainage upon removal of the liquid. Being normally closed, they must also have provision for proper drainage or complete removal of gas (CO₂) or air accumulations at the highest point of the ceiling.

The method heretofore used for obtaining proper drainage of the tanks consists in inclining the floor and ceiling of the tank, so as to give a downward slope to the floor and an upward slope to the ceiling towards the front end or service end of the tank. When emptying the tank, the liquid will flow toward a bottom outlet valve located at the lowest point. During the filling operation, gas or air will rise towards the highest point of the ceiling, where the air outlet or bunting apparatus is located. This construction also necessitates a lateral sloping of the floor and the ceiling towards the lowest and highest point respectively in order to insure proper drainage.

The resulting wedge-shaped construction of the floor or ceiling slab of this conventional tank causes considerable waste of concrete material above the minimum slab thickness required for structural reasons and loss of useful storage space. In addition, the variable thickness of the slabs separating the tanks in the tier causes expensive form work, since the form boards are not of uniform height throughout the length of the tank. The variable thickness also requires a variable spacing of the reinforcing steel or a non-uniform thickness of the reinforcing bars throughout the length of the tank.

These disadvantages have been overcome by the present invention and the waste of concrete material and expensive form work is avoided. Contrary to the conventional construction, the slab according to the present invention is preferably of constant thickness and is built so as to appear warped or twisted around the longitudinal center of the tank. The rear end of the slab is disposed horizontally, or slightly inclined in a cross-wise direction. This cross-wise slope gradually increases towards the front end or service end of the tank.

Thus, complete drainage of the floor as well as of the ceiling is obtained towards a corner point of the service end of the tank. While in the conventional tank heretofore used, the floor as well as the ceiling had to be given a special lateral slope in order to insure proper drainage.

Referring to the drawings, reference character 10 indicates generally a tank building. This building may be reduced to a mere shell of cork and brick veneer supported by the tank con-

struction itself. Reference numeral 11 indicates generally an air conditioning room from where air is circulated through the building.

The fermentation tanks are generally indicated at 12 and 13 respectively. It will be noted that the modification shown in Figure 1 shows two rows of such tanks. Tanks 12 and 13 are supported on the upper ones of the storage tanks 14 and 15 by means of supports 16^a. The storage tanks 14 and 15 are arranged in tiers and in the modification shown in the figure in two blocks of five stories each. This arrangement may of course, be varied according to the practical requirements.

The front ends or service ends 16 of the tanks face towards a work aisle 17 separated by platforms 18 and through which the air from the air conditioning house 11 is circulated. The work aisles in the different tiers may be reached by stairways or elevators (not shown in the drawings).

The different tanks 14 and 15 are separated by means of a slab 19. The rear end 20 of the slab or the end opposite to the service end of the tank is disposed horizontally or slightly inclined in a cross-wise direction. The cross-wise slope gradually increases toward the front end 21 as illustrated diagrammatically in Figure 4 of the drawings, so as to give the slab 19 a warped or twisted appearance about its longitudinal axis. In other words, the center line of the slab is substantially horizontal while the lateral edges slope. In the modification shown in the drawings the degree of the slope is approximately 2% of the length of the tank. The thickness of the slab 19 is constant throughout its length.

Thus the tank floor of each tank slopes toward the work aisle 17, reaching its lowest point at the draw-off cock 22. The tank ceiling, on the other hand, slopes gradually upwards to its highest point at the air outlet or bung fitting 23 where the gas and air are collected and conducted towards the bunting apparatus (not shown). It will thus be seen that the lowest point of the floor and the highest point of the ceiling are diagonally opposite.

The tanks are usually provided with corner haunches 24 which serve to reinforce the structure. Interior cooling coils 25 may be provided within the tanks.

It will be noted that this type of construction permits the use of form boards of uniform height throughout the length of the tank, combined with complete elimination of waste in concrete material and a considerable simplification of steel reinforcement.

Due to the compactness of the tank layout resulting from the invention, the space required for aging the liquid, such as beer and wine, has been reduced to a minimum. A corollary to the space saving is the saving effected in refrigerating costs, since a minimum surface area of walls and roof is exposed to the air temperature. The liquid fills every inch of space in the storage section of the structure with the exception of the few narrow work aisles.

Operation of the installation is simplified and through the absence of any inaccessible corners or hidden parts of the structure, the installation is made more sanitary.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment without departing from the spirit of the invention.

What is claimed is:

1. In a tank construction, a floor slab and a ceiling slab, said slabs being disposed at substantially a right angle with the sides of the tank at one end thereof and twisted about their longitudinal axis so as to incline in a cross-wise direction gradually towards one corner of the opposite end, said inclination progressively increasing from one end to said opposite end, the length of the side walls being of constant height from one vertical edge to the other.

2. In a tank construction, a floor slab and a ceiling slab of constant thickness throughout their length, said slabs being disposed at substantially right angle with the sides of the tank at one end thereof and twisted about their longitudinal axis so as to incline in a cross-wise direction gradually towards one corner of the opposite end, said inclination progressively increasing from one end to said opposite end, the length of the side walls being of constant height from one vertical edge to the other.

3. In a tank construction, a floor slab and a ceiling slab parallel with each other, and of constant thickness throughout their length, said slabs being disposed at substantially a right angle with the sides of the tank at one end thereof and twisted about their longitudinal axis so as to incline in a cross-wise direction gradually towards one corner of the opposite end, said inclination progressively increasing from one end to said opposite end, whereby the lowest point of the floor will be diametrically opposite the highest point of the ceiling, the length of the side walls being of constant height from one vertical edge to the other.

4. A tank building comprising a plurality of superimposed tanks, the partitions separating said tanks being substantially parallel with each other, and disposed at substantially a right angle with the side of the tank at one end thereof and twisted about their longitudinal axis whereby they are made to slope gradually towards one corner of the opposite end of the tank, said inclination increasing progressively from one end to said opposite end, the length of the side walls of each of said superimposed tanks being of uniform height from one vertical edge to the other.

5. A tank building comprising a plurality of superimposed tanks, the floor slab of one of said tanks constituting the ceiling slab of the adjacent tank, said slabs being disposed at substantially a right angle with the sides of said tanks at one end and twisted about their longitudinal axis so as to slope gradually in the same direction towards one corner of the opposite end of the tank, said inclination increasing progressively from one end to said opposite end, whereby the lowest point of the floor will be diametrically opposite the highest point of the ceiling.

6. A tank building comprising a plurality of superimposed tanks, the floor slab of one of said tanks constituting the ceiling slab of the adjacent tank, said slab being disposed at substantially a right angle with the sides of said tanks at one end and twisted in a parallel direction about their longitudinal axis so as to slope gradually towards one corner of the opposite end of the tank, said inclination increasing progressively from one end to said opposite end, whereby the lowest point of the floor will be diametrically opposite the highest point of the ceiling, means for draining the contents of said lowest point and means for air and gas drainage at said highest point, said slabs being of constant thick-

ness and the length of the side walls of said tanks being of constant height from one vertical edge to the other.

5 7. A monolithic tank building comprising a plurality of superimposed tanks having a service end and a rear end, means in the service end for draining the contents of said tanks in one corner and means for draining the air and gas in the diametrically opposite corner of said service end, the slabs separating said superimposed tanks being disposed at substantially a right angle with the sides of the tank at said rear end and twisted in a parallel direction about their longitudinal axis so as to slope gradually downward to said contents drainage means of the tank and correspondingly upward to said air drainage means of the tank below, said inclination increasing progressively from one end to said opposite end, said slabs being of constant thickness and the length of the side walls of said tanks being of constant height from one vertical edge to the other.

15 8. A construction for fermenting, storing and aging of a malt beverage comprising partitions connected and arranged to form at least two

chambers disposed one over the other and having a common partition one face of which constitutes the floor of the upper chamber, the other face of said common partition constituting the ceiling of the lower chamber, said common partition being of substantially uniform thickness throughout and having a relatively slight longitudinal twist about its longitudinal axis, said inclination increasing progressively from one end to said opposite end, whereby all of the liquid beverage in the upper chamber can drain from one corner of the upper chamber and whereby all gases tending to accumulate in the lower chamber incidental to the fermenting and aging process can vent from the lower chamber at one corner thereof.

9. In a tank construction, a floor slab and a ceiling slab, said slabs being twisted about their longitudinal axis so as to incline in a cross-wise direction gradually toward one corner of the opposite end, said inclination progressively increasing from one end to said opposite end, the length of the side walls being of uniform height from one vertical edge to the other.

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