

W. MUESER.
REINFORCED CONCRETE RESERVOIR.
APPLICATION FILED APR. 2, 1915.

1,301,154.

Patented Apr. 22, 1919.

3 SHEETS—SHEET 1.

Fig. 1

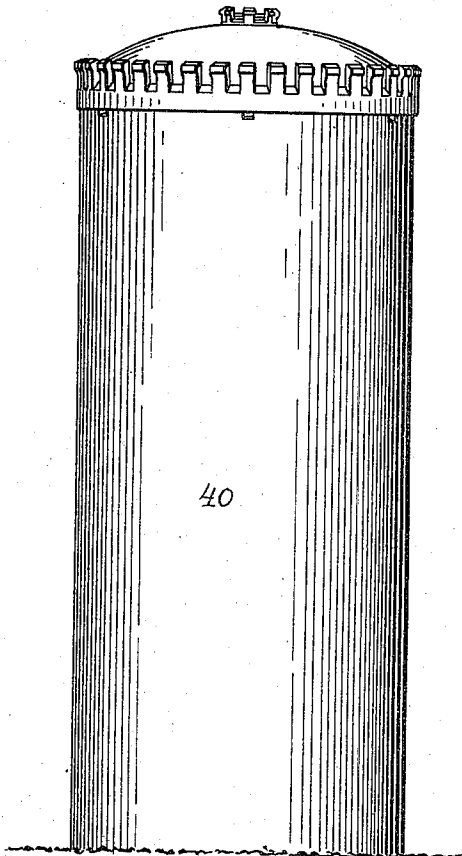


Fig. 3

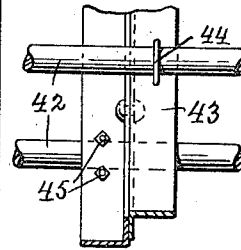


Fig. 4

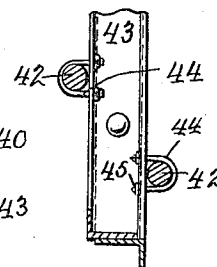
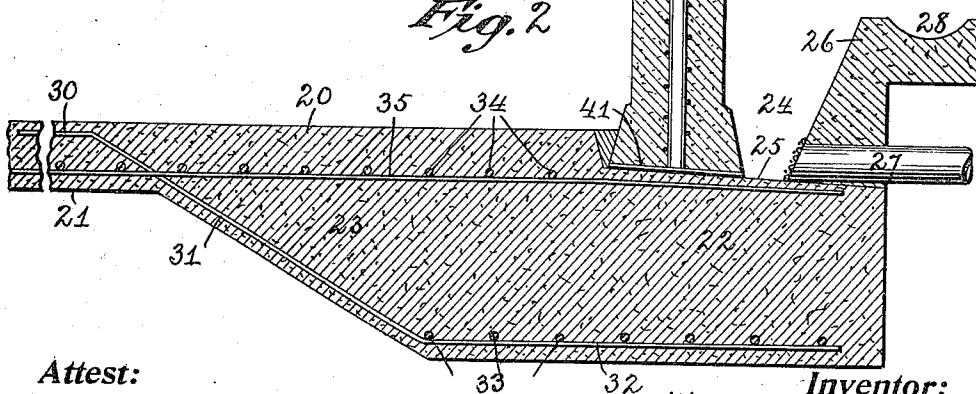


Fig. 2



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Fig. 5

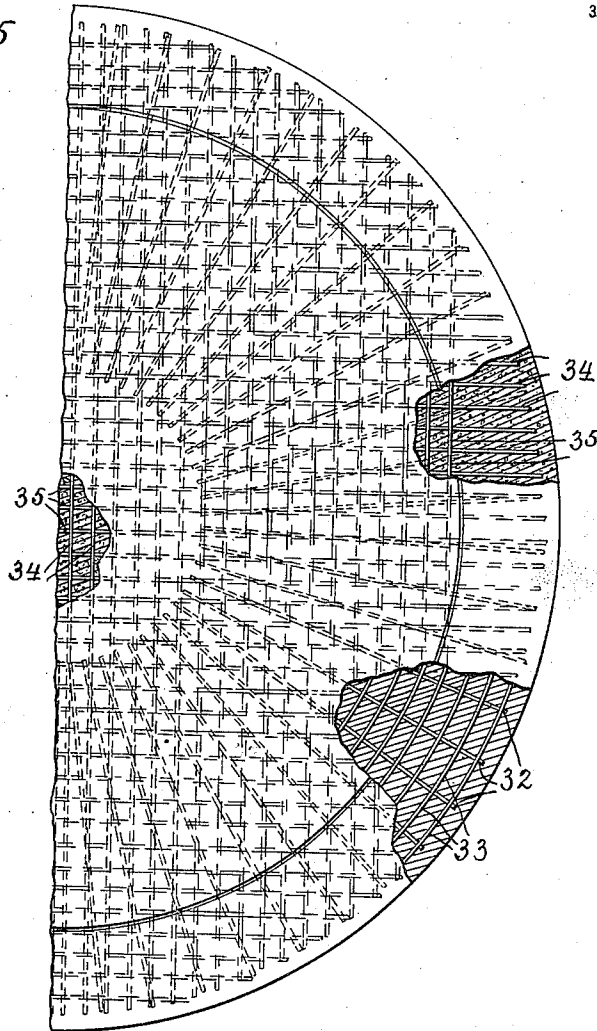
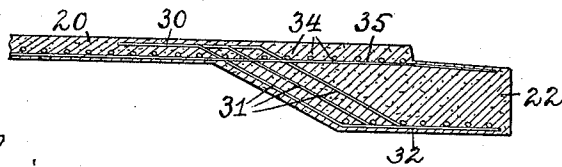


Fig. 6



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3 SHEETS—SHEET 3.

Fig. 7

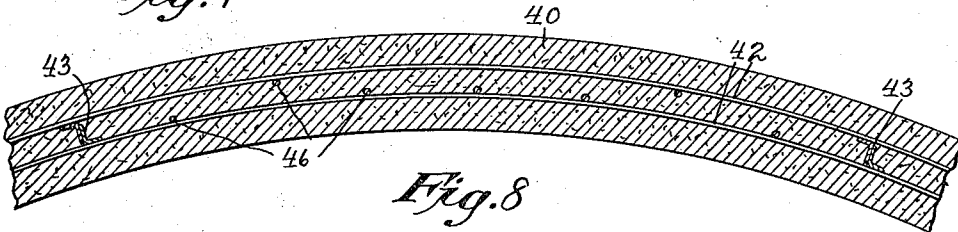


Fig. 8

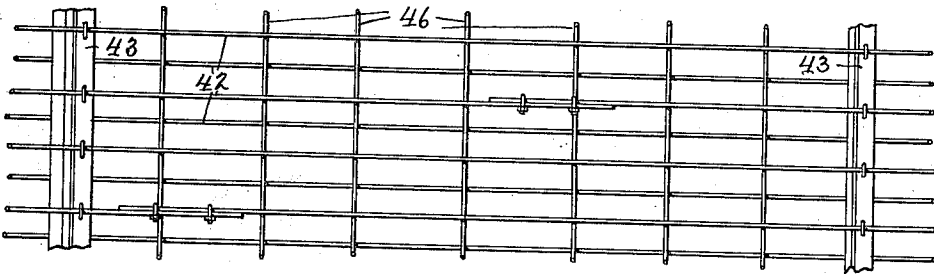


Fig. 9

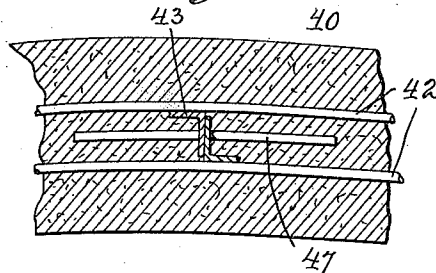
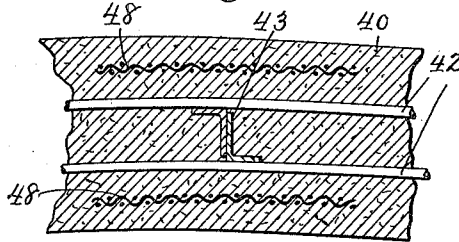


Fig. 10



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UNITED STATES PATENT OFFICE.

WILLIAM MUESER, OF NEW YORK, N. Y.

REINFORCED-CONCRETE RESERVOIR.

1,301,154.

Specification of Letters Patent.

Patented Apr. 22, 1919.

Application filed April 2, 1915. Serial No. 18,661.

To all whom it may concern:

Be it known that I, WILLIAM MUESER, a citizen of the United States, residing at New York, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Reinforced-Concrete Reservoirs, of which the following is a specification.

This invention relates to tanks or reservoirs adapted to contain water and made of reinforced concrete. In an application for Letters Patent of the United States filed by me September 14th, 1911, and recently allowed, I have described a reinforced concrete tank for this purpose comprising essentially a bottom, a separate wall mounted thereon, and a joint between the wall and the bottom whereby movement between them may be facilitated, and the subject-matter of this application may be considered an improvement on the invention described in that application.

Experience has developed the fact that when a reservoir of this character has to be built on sandy, gravelly or other soil of an elastic or compressible nature, or when such soil lacks uniformity over its entire surface, it will happen that after filling the reservoir to its maximum the weight of the same, in addition to the weight of the fluid contents, will cause a settlement of the bottom into the soil, but as soon as the reservoir is emptied only the weight of the wall will press on the outer rim of the bottom. The middle part of the bottom not being thus under downward pressure of the fluid will tend to lift under the influence of the elasticity of the soil, while the weight of the wall will keep the outer edge of the bottom down. Under such circumstances certain bending stresses are developed likely to crack the bottom, and one object of this present invention is to provide means for lessening this tendency or preventing it.

In addition to the means which I described for facilitating the movement of the circular wall in the patent application referred to, I have found it desirable to make a construction of the wall whereby its bottom where it contacts with the upper surface of the bottom of the tank shall be slightly inclined downwardly so as to more readily overcome the frictional resistance resulting from the weight of the wall on the bottom when the tank is being filled.

I have also provided a more efficient means

for reinforcing the wall, as will be hereinafter described in detail.

In the drawings, Figure 1 is a front elevation in miniature of a tank or reservoir embodying my invention; Fig. 2 is a vertical section through the lower portion of the wall and the corresponding adjacent portions of the bottom; Fig. 3 is an elevation detail of one of the wall standards and two of the reinforcing rings; Fig. 4 is a section of the detail shown in Fig. 3; Fig. 5 is a top plan view of a portion of the bottom with a portion of its upper surface shown cut away to disclose the reinforcing members in two planes beneath the same; Fig. 6 is a vertical section of a portion of the bottom showing the radial reinforcing members arranged in groups of three; Fig. 7 is a horizontal section of a portion of the wall showing the manner of supporting the reinforcing rings; Fig. 8 is an elevation of the reinforcing skeleton of the part of the wall shown in section in Fig. 5; Fig. 9 is an enlarged detail of the supplementary reinforcement adjacent to the standards; and, Fig. 10 is a detail similar to Fig. 7 showing a modified form of such reinforcement.

In the drawings, 20 designates generally the bottom of the reservoir. In the form illustrated, it is shown as a comparatively flat disk having a relatively thin inner section 21 and a relatively thicker outer annular section 22 upon which the wall rests, an intermediate wedge shaped section 23 joining the inner and outer sections and having a constantly increasing cross-sectional area from the inner section outwardly. The upper surface of the disk is, in the example illustrated, substantially plane and at its outer edge it is provided with an annular recess 24, the bottom 25 of which, upon which the wall rests, slopes downwardly and outwardly to a flange 26 forming a gutter to collect overflowing water which is carried to the sewer by pipes 27. A depression 28 in the upper surface of the flange serves to carry off water filling the gutter if the pipes 27 are clogged. Water is thus kept away from the foundation of the structure.

The reinforcing members of the bottom disk are arranged in two series. One comprises a series of radial bars arranged in three lengths, viz. one length 30 along the upper part of the inner section 21, another length 31 along the lower part of the section

23, and another length 32 along the lower part of the section 22. Circular bars 33 are arranged at intervals transverse to the lengths 32. This series of bars is adapted
 5 to take care of the bending stresses produced in the bottom and liable to crack the concrete. In Fig. 6 there is shown an arrangement in which this series of bars is arranged in groups of three, the middle
 10 oblique lengths 31 being arranged at varying distances from the edge of the section 23.

The second series of bars consists of a series of two sets 34 and 35 arranged at right
 15 angles to each other in the upper part of the bottom disk. They are intended to take care of local stresses and may be arranged in the upper part of the disk, as shown, or in its lower part or in any intermediate
 20 plane.

The wall 40, in the example illustrated, is cylindrical in form. It is obvious that it might be of any form of polyhedron, the cylinder being the ultimate form. It is of
 25 suitable thickness, which may vary as the exigencies of the situation demand, and it is preferably provided with a bottom surface 41 beveled to correspond to the surface 25 of the recess 24 in which it rests.

The reinforcement of the wall follows certain principles. It is greatest near the bottom where the greatest pressure will be exerted against it and will gradually diminish toward the top. The form of reinforcement
 30 which I prefer consists of independent steel rings 42 arranged in parallel horizontal planes. If they are of uniform cross sectional area they should be closer together near the bottom than they are at the top and
 35 they should be spaced apart with a considerable degree of exactitude. If they vary in cross sectional area they might be placed at equal vertical distances apart. In such case they would have a constantly diminishing
 40 cross sectional area from the bottom to the top of the wall. The one construction is the exact mechanical equivalent of the other but I prefer to use the former because it is easier
 45 to procure a large quantity of steel rings of uniform size than a smaller quantity of many sizes.

The means employed to space the rings consists of a series of upright standards 43 arranged at regular intervals around the
 55 wall. Any usual form of beam may be employed; but I prefer two L-beams with one L arranged the reverse of the other so as to form in section a Z like outline (see Figs. 9 and 10). In the flanges of the beams holes
 60 are punched at the proper places and the rings 42 held in place by means of straps 44 secured by bolts 45, or in any other suitable manner. I also prefer to stagger the rings in vertical succession and even near the bot-
 65 tom to have an additional series of rings

closer to the inside of the wall. Vertical bars 46 are arranged at intervals between the standards in the usual manner.

As the stresses in a wall of this kind are uniform around the entire wall for any
 70 given height, it is desirable that the steel and concrete should each bear its proper share in taking care of such stresses. At the places where the standards are located one part of the concrete is practically separated from
 75 the adjacent part by the presence of such standards and the uniform strength of the wall is not preserved. In order to remedy this and to insure the continuance of such
 80 uniformity, extra reinforcement is provided, either in the form of short steel bars 47 (as shown in Fig. 9) or in the form of sheets of expanded metal or woven wire 48 (as shown in Fig. 10).

I claim:

1. In a structure of the character described, a bottom, a wall separate therefrom and adapted to move thereon and means for reinforcing the wall consisting of a series of
 90 independent rings unconnected with the bottom of uniform cross sectional area arranged in successive horizontal planes, those at the bottom being closer together.

2. In a structure of the character described, a bottom, a wall separate therefrom
 95 and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings unconnected with the bottom of uniform cross-sectional area arranged in successive horizontal planes so that there
 100 is a gradually increasing distance between the planes from bottom to top.

3. In a structure of the character described, a bottom, a wall separate therefrom
 105 and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings unconnected with the bottom of uniform cross-sectional area arranged in successive horizontal planes and provided
 110 with means for spacing them properly apart including standards arranged vertically at intervals.

4. In a structure of the character described, a bottom, a wall separate therefrom
 115 and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings of uniform cross-sectional area arranged in successive horizontal planes and provided with means for spacing them
 120 properly apart including standards arranged vertically at intervals, in combination with means for reinforcing the concrete at the junction of each ring with a standard.

5. In a structure of the character described, a bottom, a wall separate therefrom
 125 and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings of uniform cross sectional area arranged in successive horizontal planes and provided with means for spacing
 130

them properly apart including standards arranged vertically at intervals, in combination with means for insuring uniform resistance to stress in the plane of each ring.

5 6. In a structure of the character described, a bottom, a wall separate therefrom and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings of uniform cross sectional area arranged in successive horizontal planes and provided with means for spacing them properly apart including standards arranged vertically at intervals, in combination with means for insuring uniform resistance to stress in the plane of each ring, consisting of a supplemental reinforcing member at the junction of each ring and standard.

7. In a structure of the character described, a bottom, a wall separate therefrom and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings of uniform cross sectional area unconnected with the bottom arranged in successive horizontal planes and provided with means for spacing them properly apart including standards arranged vertically at intervals, the rings being arranged in two series one on each side of the series of standards.

8. In a structure of the character described, a bottom, a wall separate therefrom and adapted to move thereon and means for reinforcing the wall consisting of a series of independent rings of uniform cross sectional area arranged in successive horizontal planes and provided with means for spacing them properly apart including standards arranged vertically at intervals, the rings being arranged in two series one on each side of the series of standards and staggered with respect to each other.

9. A reservoir or the like comprising a bottom having near the outer edge of its upper surface a downwardly and outwardly sloping portion, a tubular wall separate from the bottom and adapted to stand thereon and having at its bottom a bevel corresponding in obliquity to the slope of the surface of the bottom.

10. A reservoir or the like comprising a bottom provided with a beveled annulus near its edge, and a tubular wall having a beveled lower surface adapted to stand thereon.

11. A reservoir or the like comprising a bottom provided with an annular circumferential recess, the bottom of which slopes downwardly and outwardly, and a tubular wall adapted to rest in the recess and having its lower surface correspondingly beveled.

12. A reservoir or the like comprising a bottom provided with an annular circumferential recess, the bottom of which slopes downwardly and outwardly, and a tubular wall adapted to rest in the recess and having its lower surface correspondingly beveled, in combination with a retaining wall beyond the recess.

13. In a structure of the character set forth, a bottom having an upstanding outer marginal portion and a tubular wall supported on the bottom and movable thereon toward and from the upstanding marginal portion during expansion and contraction, and means for draining the open space between the wall and the upstanding marginal portion.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM MUESER.

Witnesses:

MARY H. LEWIS,
ALDA L. MILLER.