Sept. 18, 1951 J. F. MUMMERT 2,567,958

ELEVATED TANK

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Fig. 1.

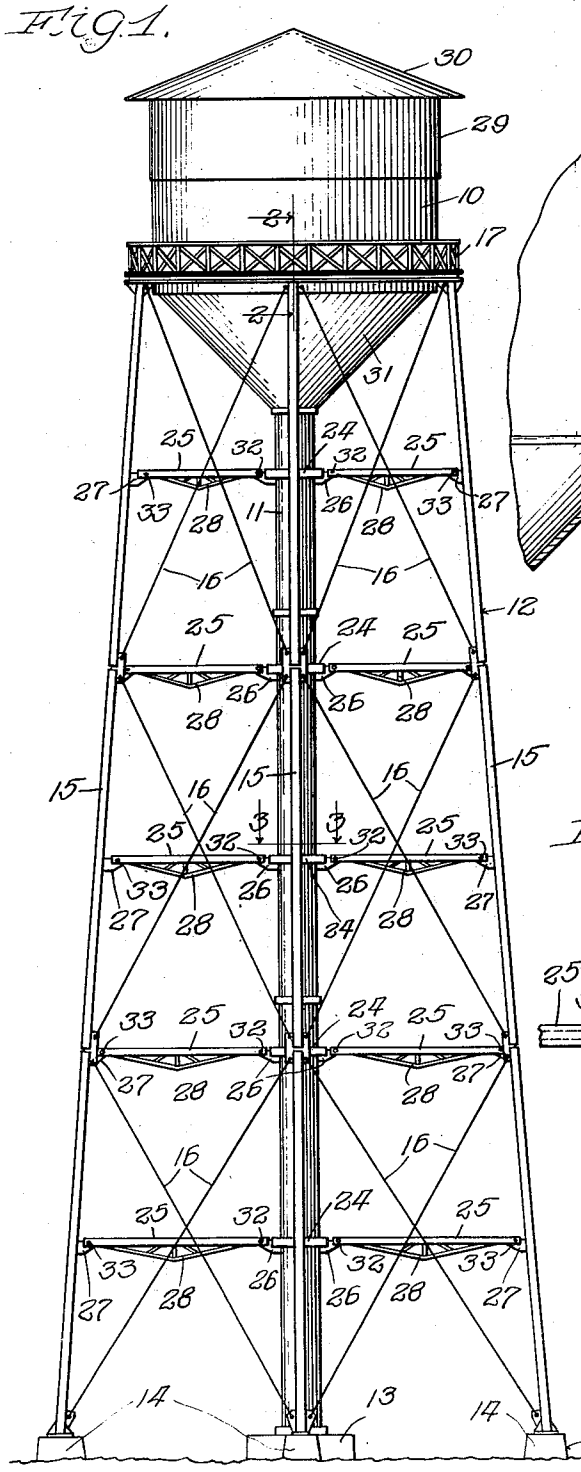


Fig. 2.

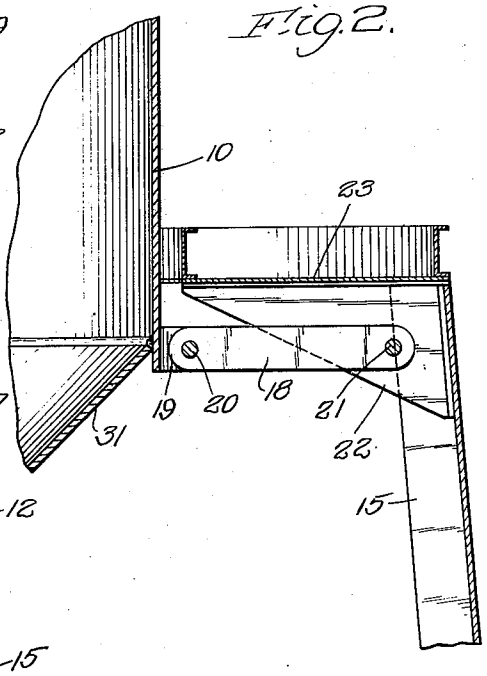
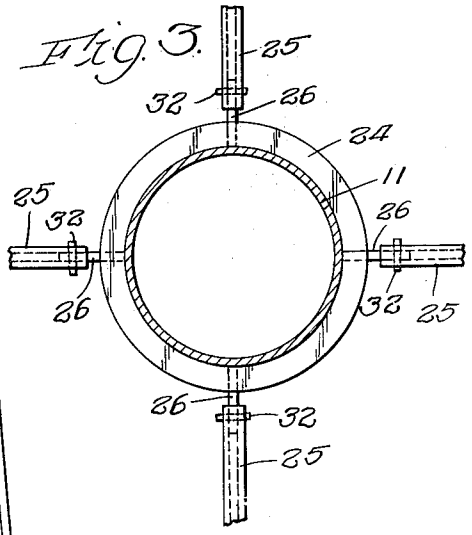


Fig. 3.



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ELEVATED TANK

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3 Claims. (Cl. 220—1)

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This invention relates to an elevated storage tank.

Elevated storage tanks are employed for the storage of liquids such as water. These tanks have been constructed according to many different designs that consist of a storage portion, a supporting framework for the storage portion, and a foundation, usually of concrete, under the supports. Many of the elevated tanks built in the past have disadvantages in that the foundation is ordinarily quite bulky, and there are problems of getting equal loading on the foundation. If one portion of the foundation settles more than the other portions, strains are set up in the tank and in the supports.

I have invented an elevated storage tank comprising a storage portion, a support means for the storage portion concentrating the load on a relatively small area and permitting the vertical movement of the storage portion under load. There is also provided a bracing means resisting any substantially sideways movement of the storage portion but permitting vertical movement thereof. In this construction the weight of the storage portion and the contents is concentrated on a relatively small area so that the problem of uneven loading of the foundation is substantially eliminated. The actual design of the new elevated tank may vary widely so long as the storage portion is supported on a central member and bracing means are provided to resist sideways movement but to offer very little or no resistance to vertical movement, due to the elasticity of the support.

The invention will be described as related to one embodiment of the same, as set out in the accompanying drawings. Of the drawings Fig. 1 is an elevation of a storage tank embodying the invention; Fig. 2 is a vertical section taken along line 2—2 of Fig. 1; and Fig. 3 is a horizontal section taken along line 3—3 of Fig. 1.

The elevated storage tank shown in the accompanying drawings comprises storage portion 10, a combined riser pipe and support 11 for the storage portion, and a framework bracing 12 around the storage portion 10 and riser pipe 11. The riser pipe 11 rests on a concrete foundation 13, while each leg of the bracing 12 rests on foundations 14. The riser pipe 11 and its foundation 13 carry substantially the full weight of the storage portion 10 and the liquid contents of the tank. As can be seen, the entire weight is concentrated on the foundation 13 which covers a relatively small area.

When the tank is filled and emptied of liquid there will be a vertical movement set up due to

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the elasticity of the steel in the riser pipe 11. The bracing 12 which comprises four legs 15, cross cables 16, struts 25, and a circular platform 17 surrounding the storage portion 10, is arranged so that it will not restrict the vertical movement of the tank, but will serve only to prevent any substantial sideways movement due to wind and the like. The bracing is purposely made relatively light in weight, as it is not subjected to any portion of the weight of the tank and its contents.

In order that the bracing 12 will not inhibit the vertical movement of the tank the bracing is either unconnected to the tank or connected by movable members. If the bracing is unconnected, a clearance of approximately ⅛ inch between the top of the bracing and the tank 10 may be provided as horizontal deflection of this amount would not result in undue stress. In the embodiment shown the top of each leg 15 of the bracing is connected to the storage portion 10 of the tank by means of substantially horizontal bars 18. Each bar 18 is rotatably attached to the storage portion 10 by means of clevis plates 19 extending from the storage portion 10. A clevis plate 19 is provided on each side of each bar 18 and a pin 20 passes through the clevis plates 19 and the horizontal bar 20. The opposite end of each bar 18 is also rotatably mounted on the legs 15 by means of a second pin 21 passing through two gusset plates 22 and the horizontal bar 18. A gusset plate is arranged on either side of the bar 18. These gusset plates are of substantially triangular shape, and serve not only as an end support for the horizontal bar 18 but also as supports for the horizontal portion 23 of the platform 17. There is a substantial clearance between the inner end of each gusset plate and the storage portion 10 of the elevated tank.

A plurality of substantially horizontal collars 24 are provided around the riser pipe 11. These collars are attached to the legs 15 of the bracing 12 by means of substantially horizontal struts 25. The collars 24 are attached to the riser pipe 11 as by welding while each strut 25 is attached to a collar by means of a flat vertical plate 26 on the collar and a pin 32 connecting the strut and the plate. The outer end of each girder 25 is attached to a leg 15 by means of a second plate 27 attached to a leg 15 with a second pin 33 passing through the girder and the plate 27. Bracing 28 is provided on each strut 25 so as to strengthen the strut, and aid it in resisting bend. Thus each strut is rotatably held at its two ends.

The storage portion 10 may have any shape

desired. That shown comprises a generally cylindrical body 29 having a cone top 30 and an inverted cone bottom 31. The riser pipe 11 is connected to the tank at the apex of the inverted cone bottom 31.

The invention is particularly useful in constructing storage tanks having relatively small capacities, such as not more than 50,000 gallons. The size will generally depend upon the thickness of steel used in constructing the riser pipe 11 and upon the resistance of the foundation to compression. In the new storage tank the bracing which resists sideways movement may be used as an erection tower and need only be built strong enough to resist movement of the tank due to wind and the like.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. An elevated liquid storage tank comprising a storage portion, a substantially centrally located riser pipe serving to support the entire weight of storage portion above the ground, said riser pipe being incapable of supporting the storage portion against any substantial sideways movement, and a bracing means located around the tank and resting on the ground, said bracing means being adapted to support the storage portion against substantial sideways movement and including a plurality of columns, a plurality of substantially horizontal bar members each rotatably attached to a column and to the storage portion, a plurality of spaced collars surrounding the riser pipe and closely adjacent thereto, and a plurality of struts with each strut having one end rotatably connected to a column and having the other end rotatably connected to said collars.

2. An elevated liquid storage tank comprising a storage portion, a substantially centrally located riser pipe serving to support the entire weight of the storage portion above the ground, said riser pipe being incapable of supporting the storage portion against any substantial sideways movement, and a bracing means located around the tank and resting on the ground, said bracing means being adapted to support the storage portion against substantial sideways movement and including a plurality of columns, a plurality of members each vertically swingably attached to a column and the storage portion and comprising the only connection between the columns and storage portion.

3. An elevated liquid storage tank comprising a storage portion, a centrally located tubular supporting means adapted to support the entire weight of the storage portion in elevated position, said supporting means being incapable of resisting substantial lateral movement of the storage portion, a centrally located foundation for the tubular supporting means, a plurality of outer foundations arranged substantially beyond the central foundation, columns supported on said outer foundations and extending upwardly to said storage portion level, and a ring-like member carried by the upper portions of said columns and extending around the storage portion, said columns and ring-like member being free of rigid connection to the storage portion, bracing members interconnecting said columns to prevent any substantial sideways movement of said ring-like member and columns and means including the ring-like member and columns to prevent movement of the storage portion in excess of permissible movement.

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