UNITED STATES PATENT OFFICE.
ALBERT K. MANSFIELD, OF BATAVIA, ILLINOIS.

TANK AND SUPPORTING STRUCTURE THEREFOR.


To all whom it may concern:

Be it known that I, ALBERT K. MANSFIELD, a citizen of the United States, residing at Batavia, county of Kane, State of Illinois, have invented a certain new and useful Improvement in Tanks and Supporting Structures Therefor; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates in general to elevated tanks, and more particularly to a supporting structure for such tanks.

The load imposed upon the upright columns of a tank-supporting structure is greatest at their base, owing to the weight of the tank and structure, and is gradually less upon the relatively higher portions of the columns.

An object of my invention is to provide a tank-supporting structure so arranged that the columns thereof may be of the same cross-section throughout their height, and yet possess gradually-increasing strength toward their base corresponding to the gradually-increased load imposed upon them.

A further object of my invention is to provide a supporting structure for tanks in which the wooden beams or joists heretofore used in such structures beneath the bottom of the tank will be unnecessary, the bottom of the tank being supported directly upon a series of I-beams counterbalanced by overhanging the underlying beams.

A still further object of my invention is to provide a supporting structure for elevated tanks which will be simple in construction, inexpensive in manufacture, and durable in use.

The embodiment of my invention herein disclosed may be generally described as comprising a plurality of upright columns of uniform cross-section, a series of diagonal tie-rods uniting the columns, the successive sections of the columns united by the tie-rods being of graduated heights, horizontal girders uniting the columns intermediate of the adjacent series of the rods, a pair of parallel horizontal I-beams supported at the upper ends of the columns, and a plurality of parallel I-beams upon which the bottom of the tank rests, supported transversely upon and overhanging the pair of I-beams.

My invention will be more fully described hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is an elevational view; Fig. 2, an enlarged sectional view on line 2 2, Fig. 1; Fig. 3, an enlarged elevational view of a portion of one of the horizontal girders; Fig. 4, a sectional view on line 4 4, Fig. 3; Fig. 5, an enlarged sectional view through one of the columns; Fig. 6, an enlarged plan view, the tank being indicated in dotted lines; Fig. 7, a sectional view on line 7 7, Fig. 6; and Figs. 8 and 9 detail views.

The same reference characters are used to designate the same parts in the several figures of the drawings.

Reference character A indicates a tank of any suitable construction supported in an elevated position by my improved structure.

Reference characters B', B', B', and B' indicate upright columns, preferably formed of angle-steel. Each column is composed of two angle-bars arranged with their apices together and rigidly united by angle-brackets b'b', connected to the adjacent flanges of the beams by bolts or rivets.

The lower ends of the columns rest upon suitable foundations, (indicated at B.) The columns preferably converge upwardly and are rigidly united together by diagonal tie-rods and horizontal girders. Each column is united to the adjacent columns by a series of diagonal tie-rods, (indicated by reference characters C', C', C', C', and C'). The tie-rods are bifurcated at their ends, as indicated at c' in Fig. 5, so as to straddle the aligned flanges of the two columns which they unite. Rivets or bolts pass through the registering holes in the flanges of the columns and bifurcated heads of the rods.

The panels of the structure formed by the sections of the columns united by the successive series of diagonal tie-rods are of graduated heights, the panels nearer the supporting-surface being of less height than the higher sections.

Horizontal girders D', D', D', D', and D' unite each column to the adjacent columns and are located intermediate of the several series of tie-rods. The girders may be conveniently constructed, as shown in Figs. 3.
and 4, in which $d$ and $d'$ designate angle-bars rigidly united by plates $d$ and $d'$. The girths are located within the inner angles of the columns and are rigidly united to the flanges of the columns by rivets or bolts.

A pair of I-beams $E'$ and $E''$ are supported upon the upper ends of the columns and in turn support a plurality of parallel smaller I-beams $F$. The I-beams $F$ are of graduated lengths, as shown in Fig. 6, in order to directly support the bottom $A'$ of the tank. The I-beams $F$ are arranged so close together that the weight imposed upon the bottom of the tank will be uniformly distributed and sustained without interposing wooden beams beneath the bottom of the tank. The I-beams $E'$ as well as a number of the I-beams $F$, extend beyond or overhang their supports, so that that portion of the weight supported by the overhang counterbalances in part that portion sustained between the supports. By this construction the weight moment acting on the I-beams is so reduced that the beams may be comparably light, thereby producing economical construction.

H indicates a platform surrounding the tank and supported upon beams $H'$, $H''$, $H'''$, and $H'''$. Such beams rest upon short I-beams projecting outwardly from and supported by the I-beams $F$. $G'$ indicates the I-beams for supporting the beam $I'$. The I-beams $G'$ overlap a beam $c'$, supported at its ends between the I-beams $E'$ and $E''$ and extend beneath the I-beam $f'$. The short I-beams $G''$ are supported in a similar manner by overlapping the beam $c'$, which is supported at its ends between the I-beams $E'$ and $E''$ and extend beneath the I-beam $f''$.

The I-beams $G'$ and $G''$ are supported beneath the ends of the I-beams $F'$ and $F''$ in any suitable manner—such as, for instance, by the means shown in Figs. 8 and 9, in which hangers $K$ pass through holes in the supporting I-beams and after straddling the short I-beams pass through holes in a keeper-plate $k$, beneath which nuts are secured on the ends of the hangers. $h$ indicates a railing surrounding the platform.

By dividing the structure into panels of gradually-increasing height, each panel being provided with diagonal tie-rods connecting the portions of the columns in such panels, the strength of the structure is gradually increased toward its base, because a short column will sustain a greater load than a long column of the same sectional dimensions. It is thereby rendered economically possible to use columns of uniform cross-section and at the same time having the increased strength near their base necessary to support the increased load imposed upon them. It will be evident that by my improvement the bottom of the tank will be uniformly supported throughout its area without the use of supporting wooden beams.

From the foregoing description it will be observed that I have invented an improved supporting structure for tanks, which, though simple and inexpensive in construction, is strong and durable.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a supporting structure for tanks, the combination with a plurality of columns, of means for rigidly connecting said columns, a pair of I-beams mounted upon the upper ends of said columns, and a plurality of I-beams supported upon said pair of I-beams and arranged sufficiently near together to afford a support upon which the bottom of the tank may directly rest.

2. In a supporting structure for tanks, the combination with a plurality of columns, of means for rigidly connecting said columns, a pair of I-beams mounted upon the upper ends of said columns, and a plurality of I-beams supported transversely and arranged sufficiently near together to afford a support upon and overhanging said pair of I-beams upon which the bottom of the tank may directly rest.

3. In a supporting structure for tanks, the combination with a plurality of columns, of means for rigidly connecting said columns, a pair of I-beams mounted upon and overhanging the upper ends of said columns, and a plurality of I-beams supported transversely and arranged sufficiently near together to afford a support upon said pair of I-beams upon which the bottom of the tank may directly rest.

4. The combination with a supporting structure, of a pair of I-beams mounted upon the upper end of said structure, a plurality of I-beams of graduated lengths supported upon said pair of I-beams, and a tank the bottom of which projects over the ends of and directly rests upon said plurality of I-beams.

5. The combination with a supporting structure, of a pair of I-beams mounted upon said supporting structure, a plurality of I-beams of graduated lengths supported transversely upon and overhanging said pair of I-beams, and a tank the bottom of which projects over the ends of and is supported directly upon said plurality of I-beams.

6. The combination with a supporting structure, of a pair of I-beams mounted upon and overhanging said structure, a plurality of I-beams of graduated lengths supported transversely upon and overhanging said pair of I-beams, and a tank the bottom of which projects over the ends of and rests directly upon said plurality of I-beams.

7. In a supporting structure for tanks, the combination with a plurality of columns of uniform cross-section, of means connecting
said columns and forming therewith panels of gradually-increasing heights upwardly thereby imparting to the structure gradually-increased strength toward its base.

5. In a supporting structure for tanks, the combination with a plurality of columns each composed of a pair of angle-beams rigidly united with their flanges extending in opposite directions, of means connecting said columns and forming therewith panels of gradually-increasing heights upwardly thereby imparting to the structure gradually-increased strength toward its base.

9. In a supporting structure for tanks, the combination with a plurality of columns of uniform cross-section, of a plurality of series of diagonal braces connecting said columns, the panels of the structure formed by the sections of the columns united by the successive series of braces being of gradually-increased heights.

10. In a supporting structure for tanks, the combination with a plurality of columns each composed of a pair of angle-beams rigidly united with their flanges extending in opposite directions, of a plurality of series of diagonal braces uniting said columns, the panels of the structure formed by the sections of the columns united by the successive series of braces being of gradually-increased heights, and horizontal girths uniting adjacent columns intermediate of the several series of braces.

11. In a supporting structure for tanks, the combination with a plurality of columns, of a plurality of series of diagonal tie-rods connecting said columns, the panels of the structure formed by the sections of the columns united by the successive series of tie-rods being of gradually-increased heights, and horizontal girths uniting adjacent columns intermediate of the several series of tie-rods.

12. In a supporting structure for tanks, the combination with a plurality of columns, of a plurality of series of diagonal tie-rods connecting said columns, the panels of the structure formed by the sections of the columns united by the successive series of tie-rods being of gradually-increased heights, and horizontal girths each composed of a pair of rigidly-united angle-bars connecting adjacent columns intermediate of the several series of tie-rods.

13. In a supporting structure for tanks, the combination with four columns of uniform cross-section, of a plurality of series of diagonal braces connecting the aligned pairs of columns, the panels of the structure formed by the sections of the columns united by the successive series of braces being of gradually-increased heights.

14. In a supporting structure for tanks, the combination with four columns each composed of a pair of angle-beams rigidly united with their flanges extending in opposite directions, of a plurality of series of diagonal braces uniting the aligned pairs of columns, the panels of the structure formed by the sections of the columns united by the successive series of braces being of gradually-increased heights, and horizontal girths uniting adjacent columns intermediate of the several series of braces.

In testimony whereof I sign this specification in the presence of two witnesses.

ALBERT K. MANSFIELD.

Witnesses:

GEO. L. WILKINSON,
C. A. MULLEN.