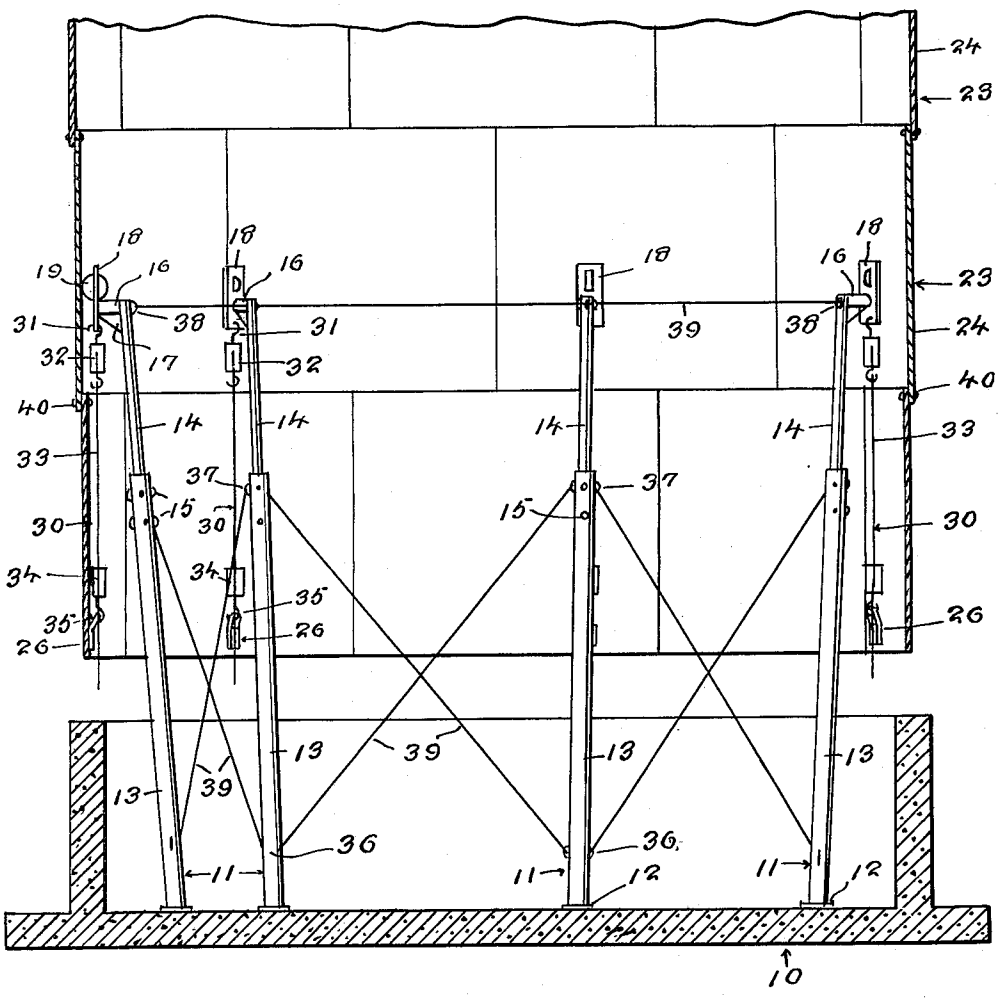
July 25, 1961 J. S. MORGAN 2,993,679

HOISTING APPARATUS FOR CYLINDRICAL TANKS

Filed Feb. 20, 1959 4 Sheets-Sheet 1

Fig. 1.



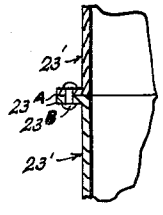


Fig. 12.

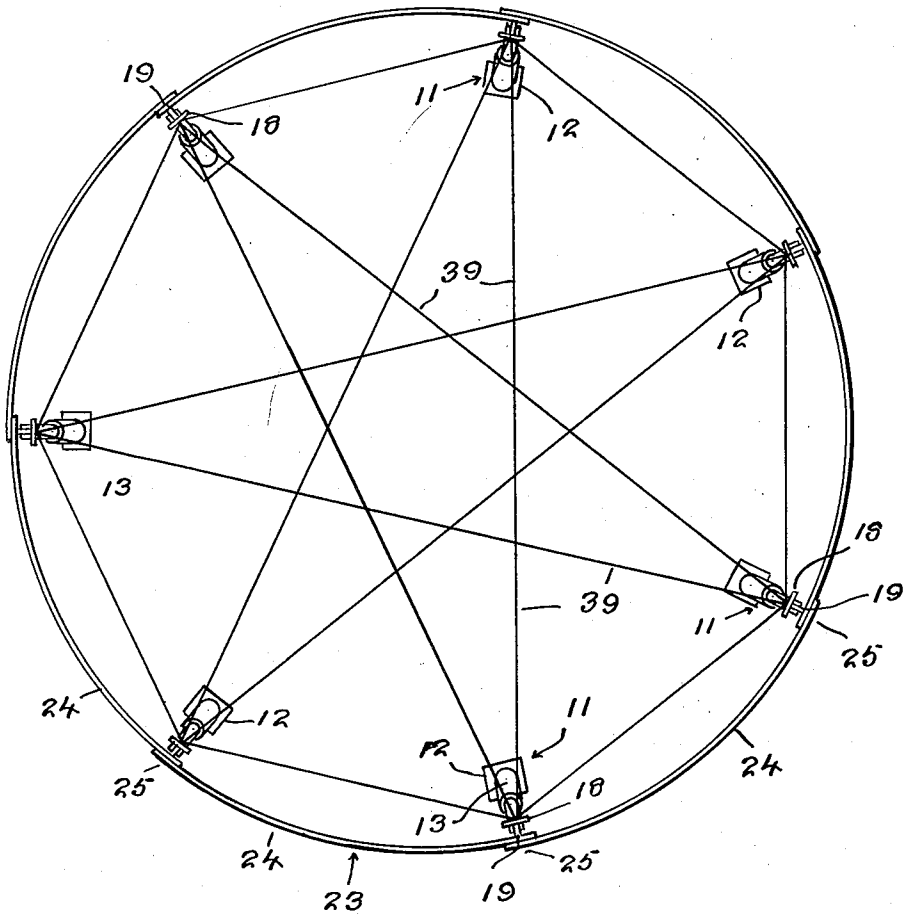
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HOISTING APPARATUS FOR CYLINDRICAL TANKS

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Fig. 2.



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HOISTING APPARATUS FOR CYLINDRICAL TANKS

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Fig. 3.

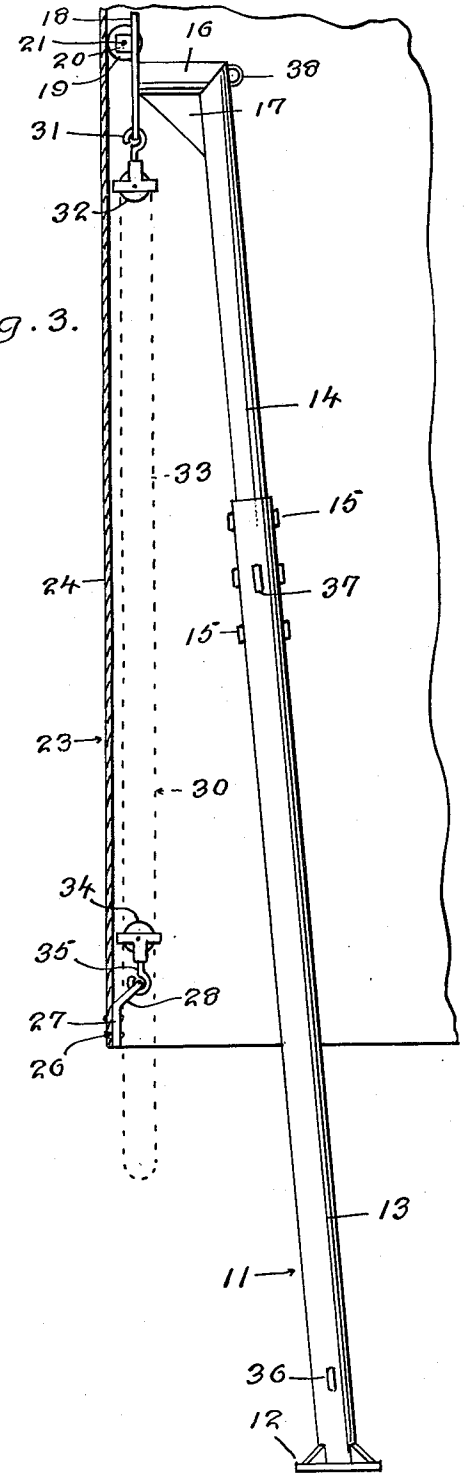


Fig. 4.

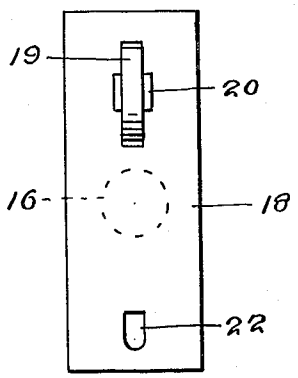


Fig. 5.

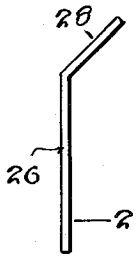


Fig. 6.

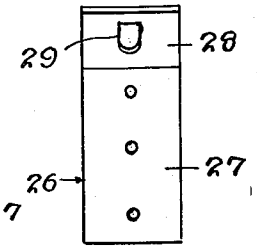
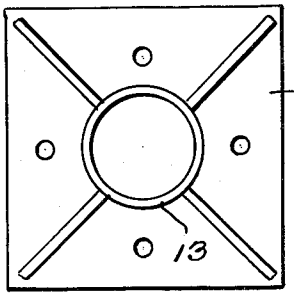


Fig. 7.



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HOISTING APPARATUS FOR CYLINDRICAL TANKS

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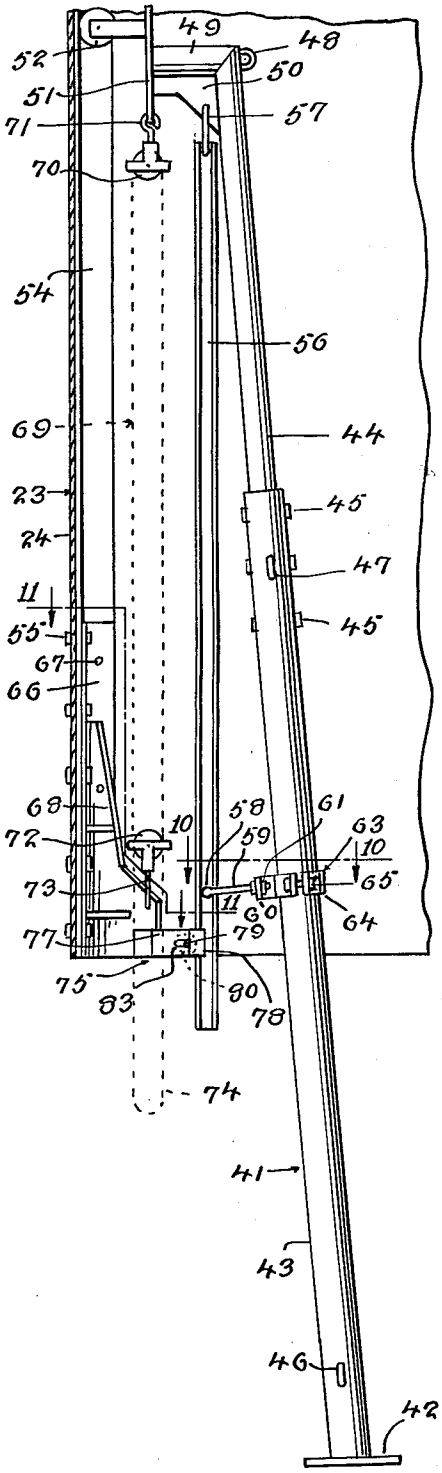


Fig. 8.

Fig. 9.

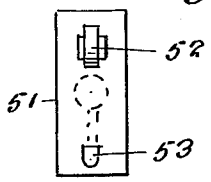


Fig. 10.

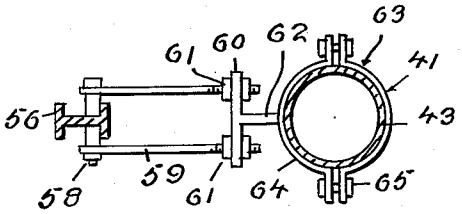
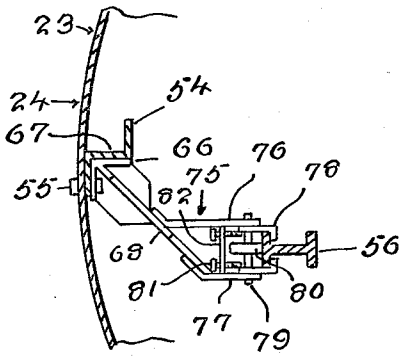


Fig. 11.



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2,993,679

HOISTING APPARATUS FOR CYLINDRICAL TANKS

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Filed Feb. 20, 1959, Ser. No. 794,622
1 Claim. (Cl. 254—89)

This invention relates to a method of and means for constructing tanks such as hollow steel storage tanks.

The object of the invention is to provide a means for constructing or erecting steel storage tanks wherein such tanks can be erected with a minimum amount of effort and in a highly safe manner and in the shortest possible time.

Another object of the invention is to provide a method of and apparatus for constructing tanks such as hollow storage tanks, and wherein the necessity of having workmen ascend to high locations is eliminated since all of the various work can be performed at a low level near the ground.

A further object of the invention is to provide a hoisting arrangement which can be used for either a square tank, circular tank or the like, and wherein the sections or sheets for making the tank can be of any desired formation, and wherein the various parts can be put together by rivets, bolts or welding or a combination of these methods.

Another object of the invention is to provide a method of and means for erecting tanks wherein a plurality of curved sheets are joined together at their ends so as to form a circular section, and wherein this circular section is then hoisted or raised to a predetermined height, and wherein additional sheets are then used to form another circular section, so that the first and second sections can be joined together by suitable securing elements such as rivets or bolts, and wherein after these sections are joined together, both sections can be simultaneously raised so that other sections can be formed and joined, so that by repeating this process the entire tank can be conveniently and quickly constructed or erected.

A further object of the invention is to provide a hoisting mechanism which is extremely simple and inexpensive to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are used to designate like parts throughout the same—

FIGURE 1 is an elevational view illustrating the present invention with parts broken away and in section.

FIGURE 2 is a plan view.

FIGURE 3 is an enlarged sectional view showing one of the jacks.

FIGURE 4 is an elevational view showing the plate which carries the roller that is arranged adjacent the upper end of the jack.

FIGURE 5 is an elevational view illustrating a lug which is engaged by the lower portion of the block and tackle.

FIGURE 6 is a view taken at right angles to the view shown in FIGURE 5.

FIGURE 7 is a plan view showing the tube.

FIGURE 8 is a view similar to FIGURE 3, but illustrating a modification.

FIGURE 9 is an elevational view of the plate and roller for use with the assembly of FIGURE 8.

FIGURE 10 is a sectional view taken on the line 10—10 of FIGURE 8.

FIGURE 11 is a sectional view taken on the line 11—11 of FIGURE 8.

FIGURE 12 is a fragmentary sectional view illustrating a modification.

Referring in detail to the drawings, and more particularly to FIGURES 1–7 of the drawings, the numeral 10 indicates a base which may be made of concrete or the like, and supported on the base 10 is a plurality of similar jacks or hoists which are each indicated by the numeral 11. Each jack 11 includes a bottom member 12 and an upstanding inclined tube 13 which is hollow. A post 14 is adjustably or telescopically connected to each tube 13, and the post 14 is adapted to be held in its adjusted position by means of securing elements 15 which extend through suitable openings in the post 14 and tube 13.

It is to be understood that the present invention is not restricted to a cylindrical tank since the present invention can be used in the construction of tanks which are non-cylindrical such as square tanks, and wherein the sheets may be curved or straight, and wherein the parts can be assembled by means of rivets, bolts, welding or a combination of these methods.

Extending outwardly from the upper end of each post 14 is a horizontally disposed arm 16, and a brace 17 extends between the arm 16 and the upper portion of the post 14, FIGURE 3. Secured to the outer end of each arm 16 in any suitable manner, as for example by welding is a vertically disposed plate 18, FIGURE 4. A pair of apertured ears 20 extend outwardly from each plate 18, and a roller 19 is journaled between the ears 20 by means of a pin or shaft 21. There is provided in the lower portion of each plate 18 an opening 22, FIGURE 4.

In the drawings, the numeral 23 designates one of the circular sections which are used in erecting or constructing a tank such as a storage tank, and the circular section 23 is made from a plurality of similar curved sheets 24 which may be made of steel. In constructing the circular section 23, the curved sheets 24 have their ends joined together and arranged in overlapping relation with respect to each other, as for example as shown in FIGURE 2, and the overlapping ends of the sheets 24 may be joined or secured together by securing elements such as bolts or rivets 25.

Secured to the inner surface of certain of the sheets or plates 24 are lugs 26, FIGURES 5 and 6, and each of the lugs 26 includes a lower portion 27 as well as an upper offset portion 28, and the upper portion 28 is provided with an opening 29. The numeral 30 indicates a block and tackle which has a hook 31 on its upper end for engagement with the opening 22 in the plate 18. The block and tackle 30 further includes an upper roller 32 as well as a chain assembly 33 and there is further provided a lower roller 34 which has a depending hook 35 for engaging the opening 29 in the corresponding lug 26. Thus, by manually actuating the chain 33, the block and tackle 30 can be actuated so as to raise the section 23 to the predetermined elevation or height.

Each of the jacks 11 is provided with eye members 36, 37 and 38, and guy lines or cables 39 are connected to these eye portions 36, 37 and 38 so as to help steady the jacks 11. Thus, the guy lines as indicated by the numeral 39 in FIGURE 2 serve to interconnect the various jacks together so that accidental movement or shifting thereof is prevented.

The numeral 40 indicates securing elements such as rivets or bolts which are used for joining together adjacent overlapping portions of the various circular sections 23.

Referring now to FIGURES 8–11 of the drawings, there is illustrated a modified jack which is generally indicated by the numeral 41, and it is to be understood that a plurality of the jacks 41 are adapted to be used and these jacks 41 may be arranged in the same manner as the previously described jacks 11. Each jack 41 includes a lower member 42, an upstanding inclined tube 43, a post 44 which is adjustably or telescopically connected to

the tube 43, and securing elements 45 for maintaining the post 44 in its desired position in the tube 43. Eye members 46, 47 and 48 are connected to each jack 41 whereby guy lines such as the guy lines 39 can be connected to the eye members 46, 47 and 48.

Extending outwardly from the upper end of each post 44 is a horizontally disposed arm 49, and a brace 50 extends between the arm 49 and the upper portion of the post 44. The numeral 51 indicates a vertically disposed plate which is secured as by welding to the arm 49, and the plate 51 carries a roller 52, the plate 51 being also provided with a lower opening 53.

There is further provided a Z-shaped beam 54 which is secured to the circular section 23 in any suitable manner, as for example by means of securing elements 55. The numeral 56 indicates an I-beam 56 which has a hook 57 on its upper end for engaging the brace 50. A pin 58 extends through the lower portion of the I-beam 56, and a pair of rods 59 extend from the pin 58 and project through a crosspiece 60, FIGURE 10. Lock nuts 61 are arranged in threaded engagement with threaded portions of the rods 59, and a shank 62 extends from the crosspiece 60 to a clamp 63. The clamp 63 is arranged in engagement with the tube 43, and the clamp 63 includes a pair of curved members 64 which are maintained connected together by means of securing elements such as bolt and nut assemblies 65. The numeral 66 indicates an L-shaped beam which is secured as at 67 to the beam 54, and a support member 68 is secured to the L-shaped beam 66. The numeral 69 indicates a block and tackle assembly which includes an upper pulley 70 that has a hook 71 extending upwardly therefrom for engaging the opening 53 in the plate 51. The block and tackle 69 further includes a lower pulley unit 72 which has a depending hook 73 which is arranged in engagement with an opening in the support member 68, and the block and tackle 69 further includes a chain 74 which can be actuated in the usual manner.

As shown in FIGURE 11 there is further provided a supporting structure which is indicated generally by the numeral 75, and the supporting structure 75 includes side members 76 and 77 which have ears 78 extending therefrom, and a shaft or pin 79 in this structure serves to support a roller 80 which is arranged in engagement with the I-beam 56. Adjustable screw members 81 extend through a brace 82 and engage the pin 79 so that by rotating the screw members 81 the position of the parts can be controlled or regulated as desired. The pin 79 extends through slots 83 so that the movement of the screw members 81 can be used for effecting an adjustment of the pin 79 whereby the roller 80 can be moved towards or away from the I-beam 56.

From the foregoing, it is apparent that there has been provided a method of and means for erecting structures such as hollow cylindrical storage tanks. According to the present invention a plurality of the jacks such as the jacks 11 are supported on the base 10 at the site of the tank to be erected. The plates or sheets 24 are provided with a curvature, and then a plurality of these sheets 24 are arranged in circular formation so as to form a first circular section as indicated by the numeral 23. It will be noted that these plates 24 have their ends arranged in overlapping relation with respect to each other, and the overlapping ends of the sheets 24 are secured together in any suitable manner, as for example by means of rivets or bolts 25. Certain of the sheets 24 have lugs 26 affixed to the inner surface thereof, and after the circular section 23 has been formed, the section 23 can be raised. The jacks 11 which are used for raising the section 23 are fastened together by means of the guy lines 39 which engage the eye members such as the members 36, 37 and 38.

To raise the first section 23, the hooks 35 on the lower ends of the block and tackle assemblies 30 are arranged in engagement with the openings 29 in the lugs 26, and then with the hook 31 arranged in engagement with the opening 22 of the plate 18, it will be seen that the chain 33 can be pulled on so as to actuate the block and tackle assembly 30. As the block and tackle assembly 30 is actuated, the first section 23 will be raised to a predetermined or desired distance above the base 10, when such a base is being used.

Next, a plurality of other sheets 24 are arranged so that their ends overlap each other, and these sheets 24 are also joined together as at 25. After the second section 23 has been formed by securing the overlapping ends of the sheets 24 together, then the lower edge portion of the first section 23 can be fastened to the upper edge portion of the second section 23 as for example by means of securing elements 40, and with these two circular sections joined together, certain of the hooks 35 can be arranged in engagement with the openings 29 in some of the lugs 26 so that by actuating the proper block and tackles 30, both of the circular sections 23 can be simultaneously raised. Then, with these two circular sections in raised position, the next circular section can be formed by means of joining the curved sheets 24 together, and then after fastening the overlapping portions of the last named circular section with the lower edge of the second named circular section, all three joined together sections can be raised as previously described. This process is of course repeated until the storage tank has the desired height or elevation.

It is to be noted that as the completed sections move upwardly, the rollers 19 bear against the inner surface of the sections 23 so as to help maintain the parts in their proper alined position.

When using the mechanism of FIGURES 8–11, the procedure is substantially the same. That is, a plurality of curved sheets 24 are joined together to form a circular section 23, and by actuating the block and tackle assembly 69, the first section 23 can be raised. It will be noted that the hook 73 on the lower end of the block and tackle 69 engages the support member 68 which is affixed to the section 23, while the hook 71 on the upper end of the block and tackle 69 engages the plate 51 and this insures that the section will move upwardly when the block and tackle 69 is actuated. After the first section is moved upwardly, the next section is formed and then joined to the first section, and then both sections are raised and this process is repeated as before.

The parts can be made of any suitable material and in different shapes or sizes. The member 12 may be bolted to the concrete base 10. The bolt 15 can be loosened so as to permit up and down adjustment of the post 14 in the tube 13. The present invention is especially suitable for raising and erecting round steel tanks.

In FIGURE 8 the beam 56 functions as a wheel guide, and the numeral 75 defines a guide assembly. The guide assembly 75 is adjustable as previously stated.

The completed tank can be used for holding any desired material such as grain.

From the foregoing, it will be seen that there has been provided a method of and apparatus for erecting round steel storage tanks, and the metal which is used may vary in gage, height and diameter. The tanks may vary in height from approximately eight feet to ninety-six feet and the diameter may vary from nine feet to fifty-two feet. These tanks are made of sheet metal and the holes for the securing elements are pre-punched or formed, and the top section telescopes over the lower section therebelow approximately two inches when the bolts such as the bolts 40 are applied. The bolt holes are approximately two inches apart around the circumference of the tank.

The sheets of metal 24 are approximately four feet wide and eight feet long but this will vary according to the size that the tank is to be made. The sheets 24 are furnished in curved or rounded shape and on the first increment the sheets 24 are put together and bolted until

the circular section 23 is completed. The roof is also of metal but made in segments of a circle and they are put together and bolted and fastened to the top section.

A chain hoist is used and extending therefrom is a metal steel clip such as the clip or lug 26 which may be fastened in place by bolts or rivets or welding, and this permits the section to be raised up and after the first section is raised up, the next section is put in place, and then the section that is in the air is lowered to the proper position and then these sections are bolted together and then lifted together. The tank is raised eight feet at a time provided that is the width of the new section, and then another eight foot section is bolted together and then bolted to the part above. Then, the lugs or clips are removed and it is fastened to the last addition and then it is raised up and another eight foot section is put in.

The completed tank can be used for various purposes such as for holding grain and the lifting mechanism of the present invention hastens the erection of the tanks and it is especially suitable and advantageous in small farming communities since it has been found very difficult to obtain persons who will work at high elevations and the use of the chain hoist device of the present invention will eliminate the necessity of high climbing.

As previously stated, the present invention can be used for erecting round steel storage tanks of various heights and diameters as well as structures of other shapes. The completed tank which is put together may rest on a cement foundation such as the foundation 11, the depth and width of which depend upon the circumference and height. The steel sheets are furnished already punched so that the overlapping ends can be bolted together as at 25 and these sheets are already rolled to conform with the circumference of the finished product and the sheets may vary in weight from approximately 140 to 600 pounds according to the gage of the steel.

Heretofore it has taken approximately twelve men eight hours to put together one eight foot high circumference of a tank and in accordance with the present invention approximately eight men can put three sections together in eight hours so that the job can be speeded up and performed more efficiently and with greater facility.

It will be seen that according to the present invention a plurality of jacks such as the jacks 11 or 41 are used, and the upper sections or posts will telescope into the bottom section or tube. Each jack supports a chain hoist and the steel plate such as the plate 12 or 42 can be bolted to the base 10. By providing a telescopic post and tube arrangement, the jack is advantageous as for example when tanks are built from a flat concrete base or when tanks are built on a twelve inch thick concrete wall of varying height, depending upon the tank. The rollers such as the rollers 19 or 52 bear against the inner surface of the tank being constructed. It will be seen that the members 13 and 14 or the members 43 and 44 are inclined, and these members may be five degrees out of perpendicular leaning towards the wall of the tank. Since the jack exerts pressure in lifting, the roller such as the roller 19 or the roller 52 will exert pressure in the skirt of the tank so as to give it the strength which is necessary because the lift is on the inside of the arc. The I-beam 56 remains parallel with the wall of the tank and the roller 80 is movable with respect to the I-beam 56 so as to provide constant strength to the tank skirt.

The lugs 26 permit the sections which have already been prepared to be lifted by the jacks when a new section is to be assembled underneath the raised section so that the raised section can then be lowered to the top of the new section and the two sections are bolted together and then the entire process is again repeated.

While the present invention has described specifically the construction of a cylindrical tank, it is to be understood that the principle of the present invention is applicable to the construction of other types of units or tanks such as square tanks, and the sheets may be straight or curved, and the assembly can be carried out by means of rivets, bolts, welding or the like.

Referring now to FIGURE 12, there is illustrated a slight modification wherein the sections 23' have flanges such as the flanges 23A which are adapted to be fastened together, as for example by means of securing elements 23B. The sections 23' may function or be used in the same manner as the previously described sections 23.

Minor changes in shape, size and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice, if desired.

I claim:

In a hoisting mechanism for use in constructing a cylindrical tank from curved sheets, a plurality of similar jacks arranged in spaced apart relation with respect to each other, guy lines connecting said jacks together, each of said jacks including an inclined hollow tube, a post telescopically connected to each tube, a horizontally disposed arm extending outwardly from the upper end of each post, a vertically disposed plate secured to said arm, a roller carried by said plate, and a chain hoist depending from said plate, a Z-shaped beam engaged by said roller and said beam being secured to an arcuate tank section made from a plurality of curved sheets joined together, a brace secured to said arm and post, a hook depending from said brace, an I-beam having its upper end connected to said hook, a pin extending through said I-beam, rods extending from said pin, a crosspiece connected to said rods, a shank extending from said crosspiece, a clamp surrounding said tube and connected to said shank, an L-shaped beam secured to said Z-beam, a support member secured to said L-shaped beam, said chain hoist having its lower end connected to said support member, a supporting structure connected to said support member, and a roller connected to said supporting structure for engaging said I-beam.

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