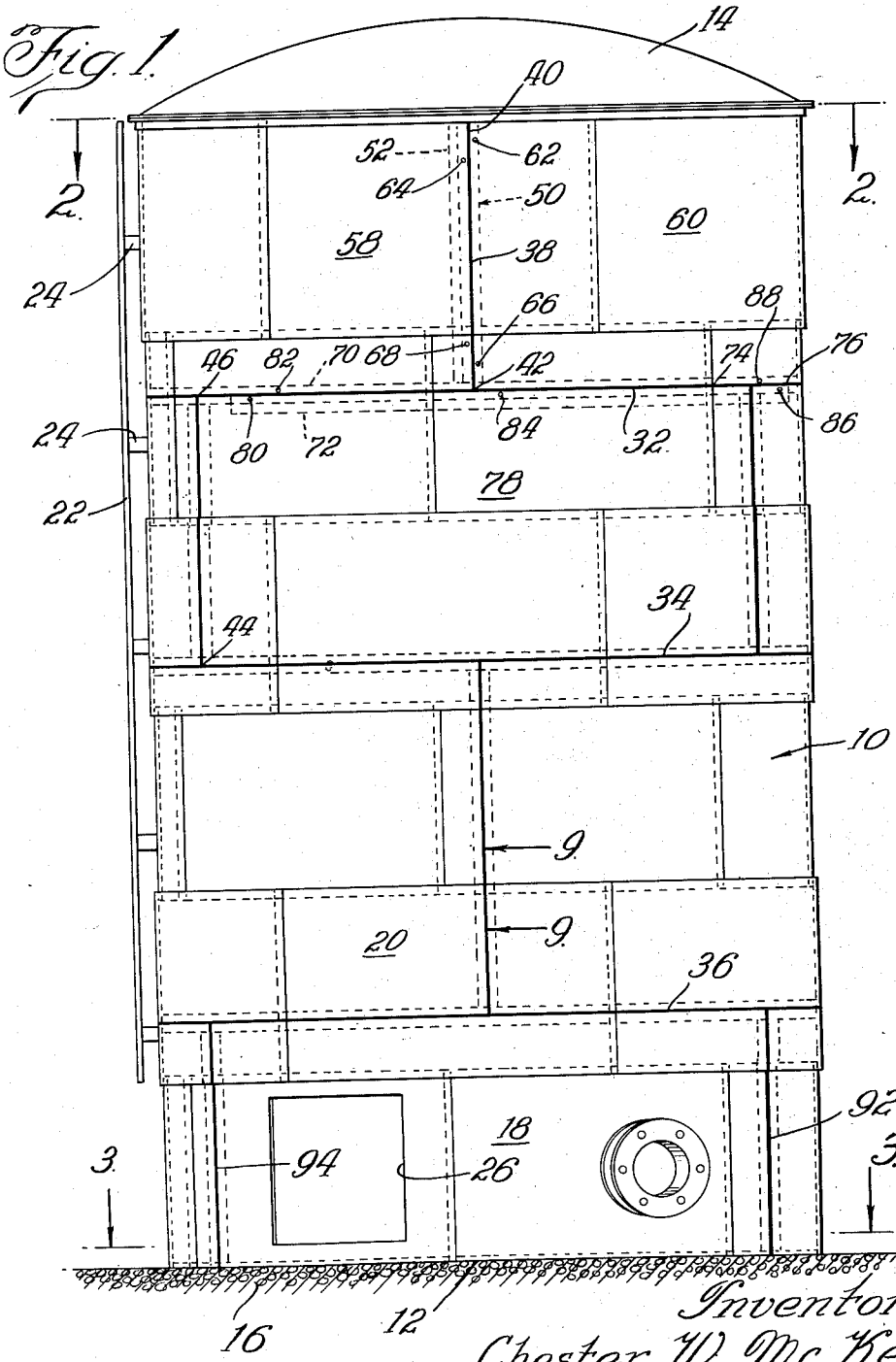
Dec. 21, 1943. C. W. McKEE 2,337,058

METHOD OF DISMANTLING AND REBUILDING STEEL TANKS

Filed Feb. 9, 1940 3 Sheets-Sheet 1

Fig. 1.



Inventor:
Chester W. McKee
By:- Richard Spencer Atty.

Dec. 21, 1943. C. W. McKEE 2,337,058

METHOD OF DISMANTLING AND REBUILDING STEEL TANKS

Filed Feb. 9, 1940 3 Sheets-Sheet 2

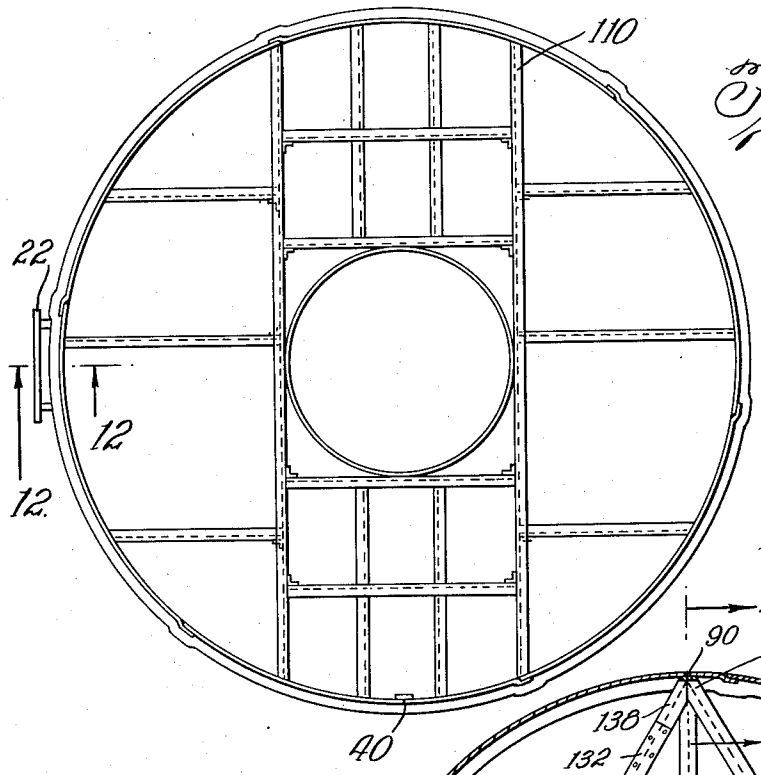


Fig. 2.

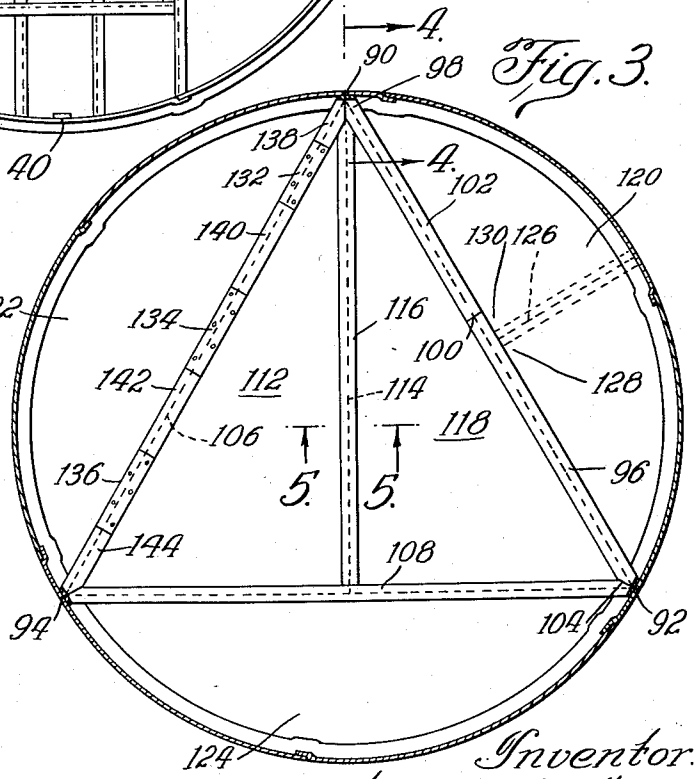


Fig. 3.

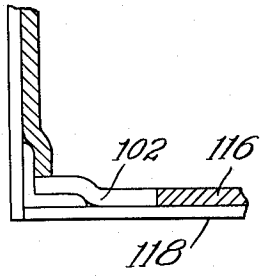


Fig. 4.

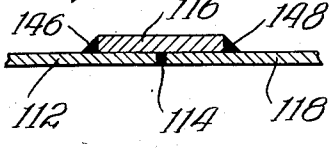


Fig. 5.

Inventor:
Chester W. McKee
By:- Richard Spencer
Atty

Dec. 21, 1943. C. W. McKEE 2,337,058

METHOD OF DISMANTLING AND REBUILDING STEEL TANKS

Filed Feb. 9, 1940 3 Sheets-Sheet 3

Fig. 6.

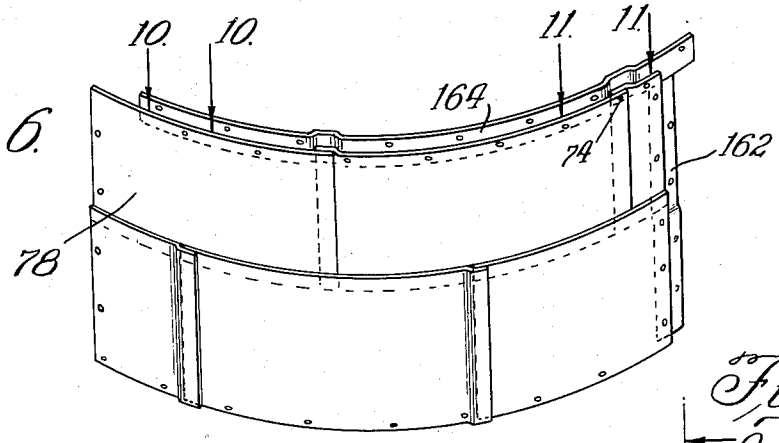


Fig. 8.

Fig. 7.

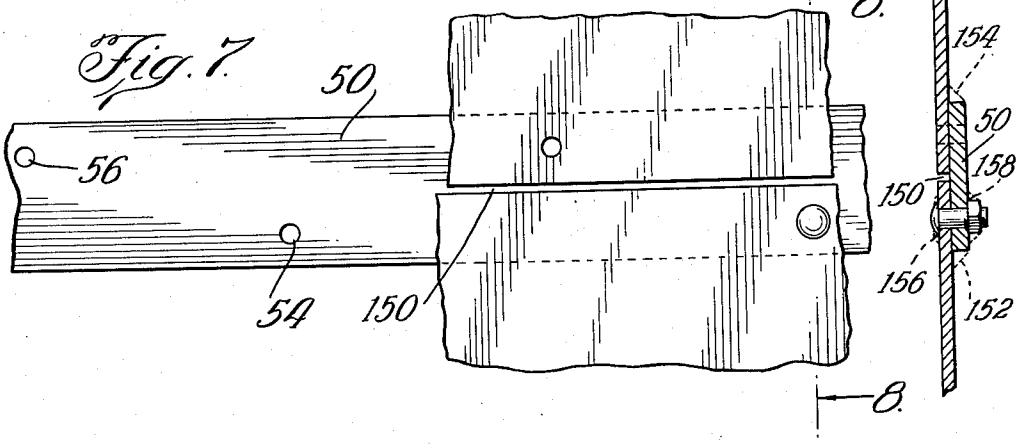


Fig. 9

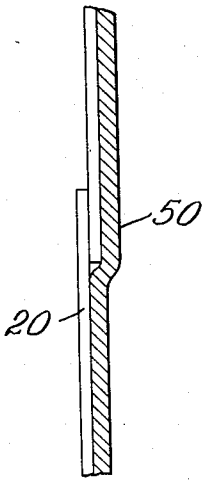


Fig. 10.

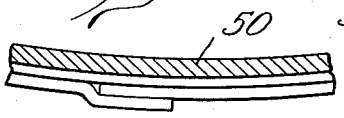


Fig. 11.

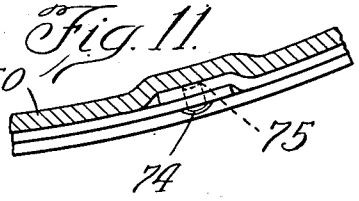


Fig. 12.

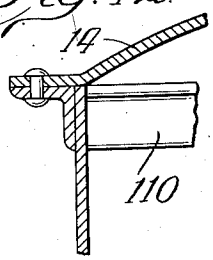
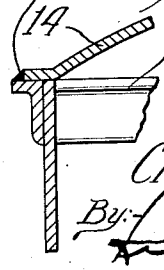


Fig. 13.



Inventor:
Chester W. McKee
By: Richard Spencer
Att'y.

Patented Dec. 21, 1943 2,337,058

UNITED STATES PATENT OFFICE

2,337,058

METHOD OF DISMANTLING AND REBUILDING STEEL TANKS

Chester W. McKee, Chicago, Ill., assignor to Welding Service, Inc., Chicago, Ill., a corporation of California

Application February 9, 1940, Serial No. 318,095

8 Claims. (Cl. 29—148.2)

This invention relates to an improved method of dismantling and rebuilding steel tanks, and to a tank construction, and more particularly to an inexpensive method of sectionally dismantling a large tank, moving the sections, and re-erecting them into a tank that is safe, symmetrical and watertight.

During the past two decades railroads have been increasing the water capacity of their locomotive tenders for the purpose of increasing the number of miles that the locomotive may cover between trips to water tank standpipes. Necessarily, this development has reduced the usefulness of many water tanks which are no longer located at strategic points and studies have been made of the feasibility of changing the location of these tanks which are so large that they cannot be moved any great distance in one piece. Similarly, the oil industry has had occasion to re-locate storage tanks and has encountered problems relative to cutting up such tanks into sections of a size capable of shipment and reassembling the sections into a usable tank.

These water or petroleum storage tanks are expensive. In size they may vary in diameter from twenty to one hundred feet, in height from twenty to sixty or eighty feet. The steel walls are generally formed of overlapping plates riveted together while the gauge of the metal used in these tanks varies from three-sixteenths of an inch to an inch in thickness. Obviously their size is such that they cannot be loaded into a freight car for movement to a new location. For all practical purposes it can be said that these tanks cannot be moved from one location to another without being taken apart or dismantled, moved in sections and thereafter reassembled.

At least two methods of taking such a tank apart are now in existence. One is to cut the heads of the rivets and to dismantle the tank into its original plates. This method has the advantage, when properly followed, of making it possible to reassemble the plates at the new location without the use of templets or new hole cuttings for rivets and the like. It has the disadvantage of requring amounts of labor which raise the cost of the re-erected tank toward the cost of a new tank.

A second method is to cut the tank into vertical sections, the cuts running from the top to the bottom of the tank, and to reassemble these vertical sections with the aid of heavy reinforcing struts. In principle, this method is undesirable because it is extremely difficult to reassemble the parts into a tank having a predictable strength. Even with careful use of the torch and careful handling of the sections in moving them, it is difficult to effect accurate joinder of the sections at the new location with the result that neither rapid nor good butt welding of the joints is possible. The result has been that in the instances where this method has been employed, the rebuilt tank has been assembled only with the aid of unsightly exterior reinforcing members and because of the uneven width of the gap to be welded, the joint does not have a known or uniform strength. Moreover, when a leak is sprung in one end of a long joint it is likely to extend the full length of the joint.

Incidental to the tearing down and re-erecting of such tanks are several specific problems. The top and the bottom of these tanks present one such problem. Quite commonly, the top of a tank consists of a dome which is seated on the side walls of the tank. The upper portion of the tank itself has a reinforcing structure extending across it to prevent spreading of the walls due to the weight of the dome. Similarly, the bottom presents its own problems. It is common practice to join the bottom at its circumference with the strake of plates forming the lower portion of the tank. As will appear more clearly hereafter, the bottom of the tank, depending upon the way it is cut up, can present many difficulties in refabricating the tank or it can constitute a sort of a templet which may be of great use in re-erecting the tank to its exact original dimensions and strength.

Other special problems include that involved in the expense of a crane. At the present time much of this work is done by independent contractors who are not equipped with a crane of sufficient size to remove steel plates from a position forty to sixty feet in the air. It is essential in the case of water tanks, therefore, that a railroad crane with a long boom be available. Such a crane is very costly to the contractor and if held on location during the entire time of dismantling and reassembling a tank will greatly increase the cost of the work. Additionally, it is essential in tearing down and building up a tank by any method which retains the original rivets and joints that these rivets and joints be not weakened during any step of the rebuilding process. There have been instances where the cutting up of a tank was so done with reference to the joints and rivets in the tank that these joints were weakened in certain places with the result that the re-erected tank had several leaks in the original joints although the new joints, made during

the cutting up and rebuilding process, were amply strong. Excessive flexing of plate sections during moving will cause leakage in the original seams and this should be avoided.

It will, of course, be appreciated that in any method of performing this work, it is necessary to cut up the tank into sections which may be readily transported. In the case of a water tank on a railroad, the size of the sections should be such as to enable them to be dropped into a railroad gondola. In the case of petroleum storage tanks and the like, it is possible to cut sections into slightly larger sizes because linear load limits on special highway trucks exceed that available in railroads.

With the above considerations in mind, the first object of this invention is to cut up a steel tank into sections of a size which may readily be shipped and to re-fabricate these units into a symmetrical, watertight tank having a predictable strength. Toward attaining this general object, several more specific objects have been kept in mind in developing the hereinafter disclosed method.

One such object is to follow a course of procedure in tearing down a tank such that the re-erecting of the tank may be as accurate as if the plates were cut and the holes therein punched in accordance with an accurately drawn templet actually applied to the plate on a shop floor. One of the important steps in this method is that of mounting a backing-up strip having punch holes for rivets along the flame cuts that form the edges of the sections into which the tank is being divided immediately after each cut is made and cutting holes in the walls of the sections on both sides of the cuts in exact registry with the punch holes in the backing-up strip. By this step, the backing-up strip may be marked and used as a templet in reassembling these two particular edges of the same units to re-create exactly the tank which was cut up. More specifically, the torch will make a six or seven foot cut and over the cut will be placed a backing-up strip of steel having two rows of spaced rivet or bolt holes. The torch is next applied through these bolts holes to the walls of the tank adjacent the cut to burn holes therethrough in exact registry with the holes in the backing-up strip. The backing-up strip might be marked for identification and removed. In fact it is fastened by nuts and bolts to one of the sections so that only the section need be marked. By this step, each section is equipped with templets which will make it possible to reassemble the section with its complementary section so that they will occupy exactly the same position relative to one another in the rebuilt tank that they occupied in the tank which was cut up. By this step, the gaps between the units in the rebuilt tank will be of a uniform width which is so desirable in flowing welds of a uniform and known strength.

A further object of this invention is to make certain that the step of re-erecting the walls of the tank commences with an exactly formed base. It will be understood that these tanks are, of course, built from the bottom up and while there would appear to be a close similarity between joining the bottom strake of plates to the circumference of a tank bottom in the case of building a new tank and joining sections of a cut-up tank to a bottom, there is one important difference, namely, that the smaller, uniformly szied plates for a new tank can be handled much more carefully in transport and on the field than is possible with the large cut-up sections of various sizes which are handled by a crane and dropped into a railroad gondola in the case of rebuilding a tank. One of the important steps in this method is that of cutting the bottom into several sections while retaining attached to the circumferential arc of each section an eleven to fifteen foot height of side wall. The cutting up of such bottom sections follows the same method pursued in cutting up the side wall in that backing-up strips having punch holes therein are positioned temporarily over the flame cuts in the bottom and attached side wall, holes are cut in the bottom in registry with the holes in the backing-up strip, and the backing-up strip are fastened to the bottom by removable bolts, whereby at the new location the several parts of the bottom may be reassembled into the exact relationship which they bore to each other before being cut up. The important element in this feature lies in the fact that the base sections are rigid due to the joinder of the curved side wall to the arc edges of the bottom segments and hence are not likely to be bent so as to impair their ability to form a bottom having punch holes so exactly positioned as to facilitate the rapid and accurate attaching thereto of the upper sections.

A further object of this invention is to restrict the amount of time necessary for a crane to be present during the cutting up step of this process. An important step in the method disclosed herein is that of bolting the backing-up strips temporarily to the steel walls on both sides of a cut whereby even after a unit or large plate has been cut completely around so that unsupported it might fall from the tank, it will not do so because it is held by nuts and bolts through the agency of the backing-up strips. This practice of bolting the backing-up strips across the cuts is followed during the entire cutting process, with the result that at the end of that process the water tank continues to stand erect although it has been cut into a large number of separate units. When all of the flame cutting has been completed, a crane may now be brought to the scene and disassembling the tank may proceed without being slowed up by the steps of cutting out the units and positioning backing-up strips and the like.

Another object of this invention is to space the parallel lines of punch holes in the backing-up strips by a distance sufficiently great to make it possible to make a flame cut having a width approximating that of the thickness of the plate cut without having the punch holes in the joined plates so close to the edge of the cut that a tendency to tear might occur. It is thought by some that in butt welding the edges to be joined should be as close together as possible or that the regularity of the spacing between the edges is immaterial because metal is to be flowed into the space anyway. Such is not the case. The width of the cut should be about the thickness of the plate and the sides of the cut should be as straight as possible for these two factors assist the welder in flowing the right amount of metal into the cut while establishing a close joinder between the welding rod material and the edges that are joined. A feature of this invention is, therefore, the utilization of backing-up strips of sufficient width so that the holes may be spaced by a distance which will permit spanning cuts varying in width from three-eighths of an inch up to an inch.

Another object of this invention is to form as smooth a joinder between the backing-up strips and the plates as is possible. It is desirable that these plates be mounted on the inside in order that the outside of the tank may not be marred and for this reason, all of the flame cutting is done from the inside of the tank in order that the metal burrs which form on the sides of the cut opposite to the torch will be on the outside thereby leaving a smooth inside surface to engage the backing-up strip. In this connection mention might be made that one of the important problems of this invention is to re-erect the tank so that it looks like new. Mounting the backing-up strips on the interior of the tank goes far toward attaining this end and the use of carriage bolts having beads resembling rivets, each one of which is water sealed by a fine fillet weld around its edge, further attains this objective.

Another object of this invention is to provide a new and novel means of cutting the dome of the tank from the side walls and in conjunction therewith of reassembling the dome with the side walls in the new structure.

These and such other objects as may hereinafter appear are obtained by the embodiment of the invention shown in the drawings, comprising three sheets, wherein:

Figure 1 is a view in elevation of a water tank showing the original seams and the proposed flame cuts;

Figure 2 is a plan view taken on the line 2—2 of Figure 1;

Figure 3 is a view in section taken on the line 3—3 of Figure 1;

Figure 4 is a view taken on the line 4—4 of Figure 3;

Figure 5 is a view taken on the line 5—5 of Figure 3;

Figure 6 is a view of a flame cut side wall section with attached backing-up strips as it is removed from the tank;

Figure 7 is a view showing the detail of a flame cut with a backing-up strip in position held by bolts;

Figure 8 is a sectional view taken on the line 8—8 of Figure 7;

Figure 9 is a view taken on the line 9—9 of Figure 1;

Figure 10 is a view taken on the line 10—10 of Figure 6;

Figure 11 is a view taken on the line 11—11 of Figure 6;

Figure 12 is a view taken on the line 12—12 of Figure 2; and

Figure 13 is a view similar to Figure 12 showing the weld between the wall bracket and the dome in the tank as reassembled.

Believing that the best way of describing this method of tearing down a tank and re-erecting it to be a detailed description of the process, discussion of the general principles underlying the method will be postponed to the end of the disclosure.

Referring to Figure 1, a tank 10 having a bottom 12 and a dome top 14 rests upon a suitable foundation such as gravel 16. This tank is formed of a plurality of regularly sized plates, such as 18, 20 and the like, there being in this particular tank six plates to each strake, a strake being one tier of plates.

The first step in dismantling the tank is to remove the ladder 22 and the dome 14. The ladder 22 is cut from the supports 24 in such a fashion that the supports may again be used in repositioning the ladder on the side of the rebuilt tank. The dome may be fastened to the tank in many ways. Where a conventional joint such as that shown in Figure 12 is found, a flame cut just inside the bolt line is made. If a crane is available at this time, the dome 14 may now be removed. If not, the dome may be left in position until the entire flame cutting operation has been completed. A manhole 26 is next cut in a bottom wall plate in order that the work may progress from within the tank without making it necessary to enter the tank over the top edge. Suitable scaffolding is erected both within and without the tank.

The lines along which the horizontal flame cuts are to be made are next laid out. The governing principle in laying out these lines for flame cuts is to space them from substantially parallel seams already in the tank by a distance sufficient to avoid weakening these seams. Also, generally speaking, the cut out sections such as 78, see Figure 6, are larger than the plates as originally cut from the tank because gondola limits and right-of-way clearances permit large sections. A point in the line 32 is selected and a rope is drawn tight around the tank and after its horizontal direction has been carefully checked, a chalk line is made around the outside of the tank to indicate the line 32. This step is repeated for the lines 34 and 36. Thereupon the uppermost strake of plates is divided into three equal segments having partition lines such as 38 therebetween. These vertical lines are also marked in chalk on the outside of the tank. Small indicating holes are now drilled through the tank wall at points such as 40, 42 and at similar points on the horizontal line 32 and on the other vertical lines corresponding with 38. These steps may be completed for all of the proposed flame cuts in the side wall of the tank. It will be readily understood that in each instance the holes corresponding with 40 and 42, as for example 44 and 46, define the upper and lower limits of a vertical flame cut as well as a point through which the horizontal lines 32 and 34 must pass.

Activity may now be transferred to the inside of the tank. The first step here is to take a backing strip 50, which is shown in detail in Figures 7 and 8, and tack it by fillet welding into the dotted position 52, shown in Figure 1. One edge of the backing strip 50 will now connect the positioning holes at 40 and 42. It will be understood that the chalk line 38 is on the outside of the tank and hence may not be used for a flame cutting operation within the tank. The torch jet is rested on the side of the backing-up strip 50 and the flame is applied to the wall of the tank commencing at a point just below the upper edge of the tank, as at 40, and is advanced downwardly to the point 42. The strip 50 by means of a pinch-bar is now broken loose from the fillet welds holding it on the inside wall of the tank and is moved into the position identified by the numeral 50, see Figure 1. Referring now to Figure 7, it will be noted that the strip 50 carries punch holes, such as 54 and 56, disposed in two parallel lines along its outer edges. In this position the strip 50 is again tacked along one edge by a fillet weld to the inside of the tank and the flame is now applied to each bolt hole, such as 54 and 56, in the backing-up strip 50, with the result that there is cut into the tank wall holes which will register with the holes in the backing-up strip.

Nuts and bolts are now put through a few of these holes as 62, 64, 66 and 68 in order that the two partly created sections 58 and 60 will continue to be held in exactly the same relationship as they held before the cut 38 had been made.

The next step in the method is to make two flame cuts similar to 38 one hundred and twenty degrees in each direction around the tank and position a similar backing-up strip in a similar fashion thereto. The first horizontal cut may now be made. Referring to Figures 1 and 6, it will be recalled that several positioning holes in the horizontal line 32 have been cut in the exterior of the tank. A backing-up strip 70 is tacked by fillet welding in the position identified by the numeral 72, and, utilizing the upper edge of the backing-up strip 70 as a guide, a flame cut is now made along the line 32 starting at 46 and continuing toward the right through the lower end 42 of the flame cut 38, through the overlapping plates at 74 to a point 76. When this cut has been completed the fillet welds holding the backing-up strip 70 is moved upwardly to the position indicated by the numeral 70 in Figure 1, where it is again tacked along one edge to the interior of the tank. The process above described is now repeated. The holes in the backing-up strip are duplicated in the sections 58 and 60 and in what has now become the upper edge of the tank itself. At 74, if rivets interfere with the joint, see Figure 11, the rivet heads are cut off and the backing-up strip is bent to follow the inside contour of the tank. Inasmuch as these cut rivets might fall out, the shank of the rivet is dished at 75, see Figure 11, and a small weld flowed to hold the rivet in position. Holding nuts and bolts are now placed at each critical point, as at 80, 82, 84, 86 and 88. The bolts are drawn up tight so that there will be no settling of the sections. Either one of the above steps are now followed successively until the vertical cuts 90, 92 and 94, see Figures 1 and 3, have been made in the lowermost strake of plates. It will be observed that the vertical cuts in each strake are staggered with respect to the vertical cuts of an adjacent strake.

Continuing to refer to Figure 3, a line 96 is now drawn across the bottom between the lowermost points of the cuts 90 and 92 and there is made a flame cut along the line 96 commencing at a point 98 which is just inside the edge of the bottom and running to a point along the line 96 such as 100. It will be noted that in starting the cut along line 96, a metal land was left at the edge of the bottom and this prevents spreading of the the cut. A backing-up strip 102 is now laid on the cut portion of the line 96 and the step of cutting holes in the bottom of the tank corresponding to the holes in the backing-up strip 102 is followed. Two or three holding bolts and nuts are then put in position and the step of flame cutting the balance of the line 96 up to a point, such as 104, is repeated. It will be understood that a single continuous cut between the points 90 and 92 is not made for the reason that the cut might spread due to the load above and this would make it difficult to rebuild the bottom properly.

This step of cutting the bottom of the tank into segments is followed along the lines 106 and 108 and when completed, there is now standing a tank which has been cut into comparatively small sections with the exception of small uncut lands at top points as 40, see Figure 1, and at bottom points as 90, 92 and 94, see Figure 3. With the exception of these six lands between certain of the sections and the top reinforcing structure 110, see Figure 2, the tank is held together entirely by nuts and bolts which may be readily removed.

The step of taking down the tank will now be described. As mentioned above, the dome 14 may have been taken down earlier in the operations if a crane was available. If not, it is still on the tank and a crane is now brought up. If the crane has a capacity sufficiently great to remove the dome without cutting it, this is done as the cutting of the dome for shipping purposes may be more readily accomplished upon the ground. The reinforcing structure 110 is removed by any method of cutting whereby the reinforcing structure may be shipped in sections which may be repositioned in the rebuilt tank.

With the dome 14 and the reinforcing structure 110 removed from the tank, the uncut lands at 40, 41 and 43 are now cut and with the aid of the crane the sections are successively unbolted and removed from the structure until the entire tank has been dismantled. The triangular portion 112 of the bottom is too large to ship by rail for frequently each of its base lines measure twenty feet. The plate is now flame cut at 114, a backing-up strip 116 is positioned along the cut and the bolt holes are burned through. The backing-up strip 116 is then bolted to part 112 or part 118 of the bottom and the bottom is now ready for shipping.

Frequently the curved segments 120, 122 and 124 have a height along the line 126, see Figure 3, which exceeds the width of a railroad gondola, this distance being about eight feet. The curved wall sections under such circumstances may readily be sprung apart so that they can be placed in a gondola. This, of course, cannot be done with the curved segments 120. Where the distance 126 exceeds the width of the gondola, a cut is made along the line 126 and the side wall of the unit is bent so that it will go into a gondola. A backing-up strip is used here as elsewhere. The tips 128 and 130 still would not clear and these tips are cut down by any suitable means such as the backing-up strip method herein described, and are replaced before the tank is re-erected. In practice, this difficulty rarely arises because most tanks do not exceed thirty feet in diameter, with the result that the distance 126 is slightly less than eight feet and will permit the bottom segments to be placed in a gondola.

The units of the tank are now shipped to the new location and the work of rebuilding the tank will now be described. The five bottom units, referring to Figure 3, 112, 118, 120, 122 and 124 are positioned on the new base. 112 and 118 are joined together by any suitable method, a step which can be readily completed before the two plates, 112 and 118, are laid on the ground. After this joinder has been made and before the segment 120, 122 and 124 one positioned on the ground around the central triangular unit, bolts are passed from the bottom upwardly through the holes along the flame cuts 96, 106 and 108 and are held in position there by small filled welds. This is necessary because in fabricating the bottom the work must all be done from the upper side only and not from both sides as is possible in the case of the side sections. The segments 120, 122 and 124 are now positioned around the triangular central plate 112, 118 on the foundation. In order to join the segment 122 to the triangular plate 112, 118, short bits of backing

strips as 132, 134 and 136 are bolted to these members, 112 and 122. Short butt welds are now made at 138, 140, 142 and 144. With the completion of these butt welds the members 122 and 112 are held in assembled relationship by the welds and the short backing-up strips 132, 134 and 136 may now be removed. Upon their removal, the butt weld along the entire line 106 is completed. Any upwardly projecting metal is ground down, and the backing strips which were used in the cutting operation are now positioned and the nuts drawn tight.

Referring to Figure 2, fillet welds 146 and 148 for the purpose of providing a water seal are now flowed. This assembly step is repeated for the cuts 96 and 108 after which, referring to Figure 1, carriage bolts having curved heads, are pushed inwardly along the cuts 90, 92 and 94 and are drawn tight. Referring to Figure 8, it will be noted that there is left a uniform channel 150 between the plates and this is ideal for forming a good butt weld. For this purpose of establishing a water seal, the fillet welds 152, 154, 156 and 158 are flowed. The bottom of the tank has now been reassembled and without in any way weakening the original plate joints, an exact duplicate or the original tank bottom has been effected.

The method of completing the tank is fairly evident. Generally speaking, all sections are similar to that bearing the numeral 78 shown in Figure 6. While the sections vary in height and while the original plate seams cross the different sections in different places, each section will have the burned holes along its edges, which holes will exactly register with the holes in a backing-up strip. Also, for uniformity the backing-up strips will remain attached to certain of the edges of the section, as the right and upper edges of section 78 in Figure 6. It will be appreciated that it is not necessary that all of the sections have the backing-up strip along the same edges. Each section will have its own number so that it may occupy the same position in the re-erected tank that it occupied in the original tank and under certain circumstances it may be found convenient to attach the backing-up strips to three or more sides of one section and to no side of another section. The process is repeated until the tank has been re-erected. When this has been done, the reinforcing structure 110 is replaced in position, as is the dome 14. The ladder 22 is added and the cut out from the manhole 26 replaced. Referring to Figure 13, the outer edge of the dome 14 is cut back while the same is on the ground sufficiently far to permit a fillet weld 160 to be made with the side wall flange.

Having described the method in detail, certain of the salient features of the method will be pointed out. It will be observed that the underlying thought in the method is to dispense with any kind of a templet other than that provided by the backing-up strips and secure registry of bolt holes as accurate as that obtained in plants which erect a structure prior to disassembling it and shipping it to location for final erection. This is accomplished by making a limited cut, that is, one which is not sufficiently great to permit the sides adjacent the cut to spread. To such a limited cut a templet comprising a backing-up strip is applied and holes are burned. It will be appreciated that it is immaterial whether or not the cuts are straight or curved or where they are made in the tank or the order of their making. What is important is that the cut be made under circumstances where the metal forming the sides of the cut does not spread apart so as to prevent the backing-up strip from being positioned as a templet at a time when the adjoining walls are already out of alignment. While this invention contemplates maintaining the tank in erected condition until all of the sections have been cut, this procedure is followed not to attain the primary purpose of dispensing with a templet but for the purpose of dispensing with a crane until the crane can be efficiently used. Where the process is practiced by one having a crane available, the dome 14 and the reinforcing structure 110 will be removed immediately after being cut from the tank and thereafter the sections will be removed, if not as cut, at least strake by strake.

As pointed out, a unit 78, see Figure 6, will normally have backing-up strips 164 and 162 on the upper and right hand sides. The positioning of the backing-up strips along any particular side of the section is of no importance. It is important that a particular strip be assembled along the cut where that strip was used as a templet for cutting the holes in the section. It follows, therefore, that the strip can either be disassembled from the unit 78 and so identified that it can be properly positioned during construction, or it may be temporarily fastened to the cut along which it has been used as a templet. The latter method is the simpler and accordingly it is followed.

In cutting the bottom and reassembling the same, it will be understood that both operations will be hampered by inability to work from both sides of the tank, a conditon which does not exist when working along the sides of the tank. It will further be appreciated that it is of prime importance that this bottom be reassembled to conform exactly to the dimensions of the tank. The fundamental feature of applicant's steps in cutting the bottom into units and reassembling it lies in his step of putting the bolts on the outside of the bottom portions and tacking them there by welding whereby it is unnecessary to get at the bottom of the tank during the assembly operation. In this connection, maintaining the bottom strake of the side wall in association with the bottom segments provides a firm base for the tank.

As a finished article of construction, this tank has one very important merit in itself, namely, its plates are held together by both nuts and bolts or possibly rivets and by welding, with the result that the tank cannot fall down due to faulty welding. Also, it will be observed that each weld is made not only between the adjoining edges of the plates but also to the backing-up strip, the result being an exceedingly strong tank.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. The method of dismantling a metal tank and rebuilding it which comprises the steps of making a cut of a selected length in the tank, of temporarily holding the cut edges in normal assembled relationship by template means, of repeating said first two steps until a section of the tank has been cut free although temporarily held in assembled relationship by the template means, of following the preceding steps until the tank has been cut into sections, of dis-assembling the sections and the template means in such a fashion that the template means used to temporarily hold together two adjoining edges of sections may be identified as the template for those particu-

lar adjoining edges, of re-erecting the sections into a tank by positioning them section by section beginning at the bottom in the same relative relationship that they had occupied prior to dis-assembling the dismantled tank and by utilizing as the sections are being reassembled that template means to join together each pair of edges of sections which same template means had been used to temporarily hold together the same edges during the dismantling steps, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

2. The method of dismantling a metal tank formed of plates joined at seams and rebuilding it which comprises the steps of laying out lines along which cuts are to be made in such a way as to space them substantially from parallel seams already in the tank, of making a cut of a selected length along one of said lines, of temporarily holding the cut edges in normal assembled relationship by template means, of repeating said first two steps until a section of the tank has been cut free although temporarily held in assembled relationship by the template means, of following the preceding steps until the tank has been cut into sections, of dis-assembling the sections while leaving each template associated with one of the edges of a section adjoining the cut with which the template had been associated, of re-erecting the sections into a tank by positioning them section by section in the same relative relationship that they had held in the dismantled tank and by employing the templates to hold adjoining edges of sections in the same relationship that they had occupied prior to dis-assembling the dismantled tank, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

3. The method of dismantling a metal tank and rebuilding it which comprises the steps of making a cut of a selected length in the tank, of spanning the cut with a backing-up strip by removable holding means associated at predetermined points with the portions of the tank on both sides of the cut whereby the edges of the tank adjoining the cut may be held in temporary assembled relationship, of repeating said first two steps until a section of the tank has been cut free although temporarily held in assembled relationship by the backing-up strips, of following the preceding steps until the tank has been cut into sections, of dis-assembling the sections while leaving each backing-up strip associated with one of the edges of a section adjoining the cut with which the backing-up strip had been associated, of re-erecting the sections into a tank by positioning them section by section beginning at the bottom in the same relative relationship that they had held in the dismantled tank and by employing the backing-up strips to hold adjoining edges of sections in the same relationship that they had occupied prior to dis-assembling the dismantled tank, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

4. The method of dismantling a metal tank and rebuilding it which comprises the steps of making a cut of a selected length in the tank, of spanning the cut with a backing-up strip by removable holding means associated at predetermined points with the portions of the tank on both sides of the cut whereby the edges of the tank adjoining the cut may be held in temporary assembled relationship, of repeating said first two steps until a section of the tank has been cut free although temporarily held in assembled relationship by the backing-up strips, of dis-assembling the cut-out section from the tank, of following the preceding steps until the tank had been completely dis-assembled, of re-erecting the sections into a tank by positioning them section by section beginning at the bottom in the same relative relationship that they had held in the dismantled tank and by employing the backing-up strips section by section to hold adjoining edges of sections in the same relationship that they had occupied prior to dis-assembling the dismantled tank, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

5. The method of dismantling a metal tank and rebuilidng it which comprises the steps of making a cut of a selected length in a tank, of affixing a backing-up strip along one side of the cut so that it will span the cut, of placing holes through the backing-up strip in registry with and through holes in the tank on the other side of the cut, of positioning temporary holding means through each pair of holes in the backing-up strip and the tank, of repeating these steps until a section of the tank has been cut free although temporarily held in assembled relationship by the backing-up strips and the nuts and bolts, of following the preceding steps until the tank has been cut into sections, of dis-assembling the sections by removing the nuts and bolts, of re-erecting the sections into a tank by positioning them section by section in the same relative relationship that they held in the dismantled tank and by using the nuts and bolts through the backing-up strips and the proper associated hole in the associated section for maintaining the proper assembled relationship, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

6. The method of dismantling a metal tank formed of plates joined at seams and rebuilding it which comprises the steps of laying out lines along which cuts in the tank are to be made in such a way as to space the cuts substantially from parallel seams already in the tank, of making a cut from the inside of the tank of a selected length along one of said lines, of affixing on the inside of a tank a backing-up strip along one side of the cut so that the backing-up strip will span the cut, of placing holes through the backing-up strip in registry with and through holes in the tank on the other side of the cut, of positioning temporary holding means through each pair of holes in the backing-up strip and the tank, of repeating these steps until a section of the tank has been cut free although temporarily held in assembled relationship by the backing-up strips and the temporary holding means, of following the preceding steps until the tank has been cut into sections, of so marking the sections that their position in the original tank will be known after they have been dis-assembled, of dis-assembling the sections by removing the temporary holding means, of re-erecting the sections into a tank by positioning them in the same relative relationship that they held in the dismantled tank and by using the temporary holding means through the backing-up strips and the proper associated hole in the associated section for maintaining the proper assembled relationship, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

7. The method of dismantling a metal tank formed of plates joined at seams and rebuilding it which comprises the steps of laying out lines along which cuts in the tank are to be made in such a way as to space the cuts substantially from parallel seams already in the tank, of temporarily tacking a backing-up strip in an upright position within the tank, of using the edge of the backing-up strip as a guide for a torch to make a cut along the edge of the strip, of then freeing the backing-up strip from the tank and positioning it over the cut, of affixing one side of the backing-up strip to that portion of the tank on one side of the cut, of placing holes through the backing-up strip in registry with and through holes in the tank on the other side of the cut, of positioning temporary holding means through each pair of holes in the backing-up strip and the tank, of repeating these steps until a section of the tank has been cut free although temporarily held in assembled relationship by the backing-up strips and the temporary holding means, of following the preceding steps until the tank has been cut into sections, of so marking the sections that their position in the original tank will be known after they have been disassembled, of dis-assembling the sections by removing the temporary holding means, of re-erecting the sections into a tank by positioning them in the same relative relationship that they held in the dismantled tank and by using the temporary holding means through the backing-up strips and the proper associated hole in the associated section for maintaining the proper assembled relationship, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

8. The method of dismantling a large, stationary metal tank formed of plates joined at seams and rebuilding it which comprises the steps of removing the top by any suitable means, of laying out lines on the outside vertical wall of the tank along which cuts are to be made in such a way as to space them substantially from parallel seams already in the tank, of making with a blow torch a cut of a selected length along one of said lines from the interior of the tank, of temporarily holding the cut edges in normal assembled relationship by template means, of repeating said first two steps until a section of the tank has been cut free although temporarily held in assembled relationship by the template means, of following the preceding steps until the vertical wall of the tank has been cut into sections, of dis-assembling the sections while leaving each template associated with one of the edges of a section adjoining the cut with which the template had been associated, of cutting up the bottom of the tank into sections, of removing the sections to a new location, of re-assembling the sections of the bottom of the tank in such a manner that the bottom will have the same dimension as the bottom of the tank before cutting up, of re-erecting the sections of the vertical wall of the tank on the bottom by positioning them section by section in the same relative relationship that they had held in the dismantled tank and by employing the templates to hold adjoining edges of sections in the same relationship that they had occupied prior to dis-assembling the dismantled tank, and of filling the spaces between the sections with weld metal to form a fluid-tight tank.

CHESTER W. McKEE.