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F. C. BUCHANAN

TANK CONSTRUCTION

Filed June 27, 1922

Fig. 1.

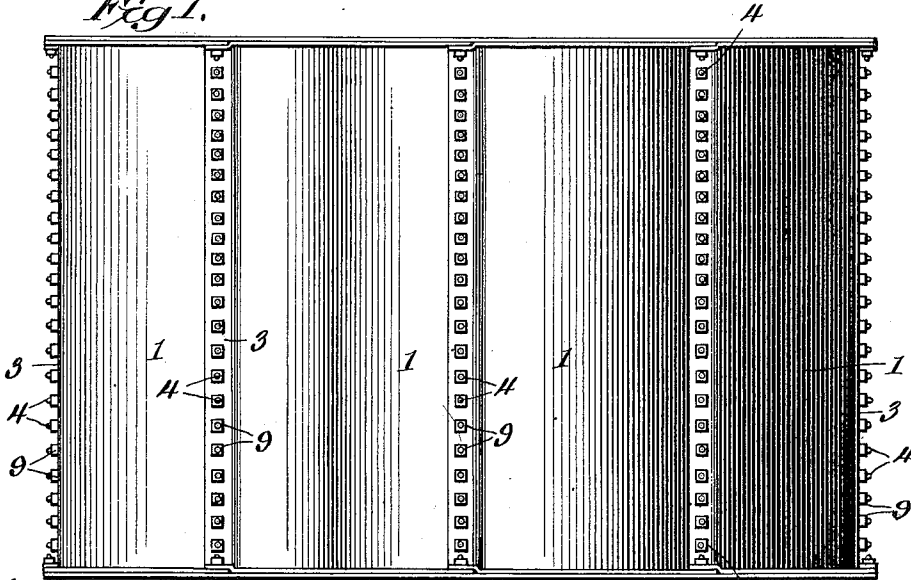


Fig. 2.

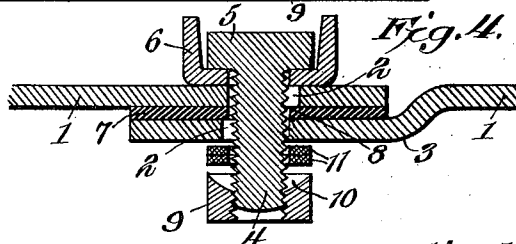
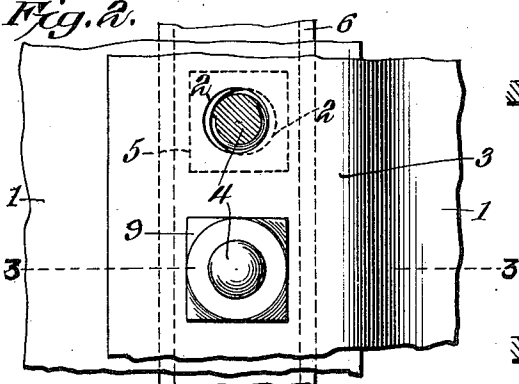


Fig. 5.

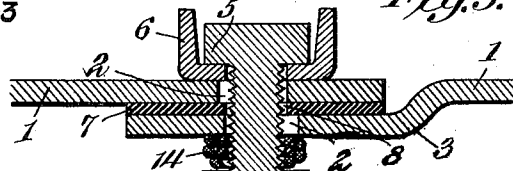


Fig. 6.

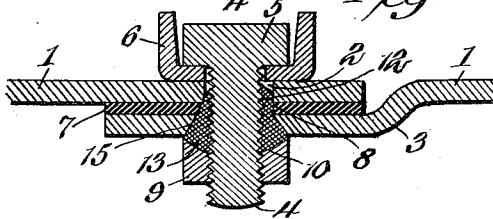


Fig. 3.

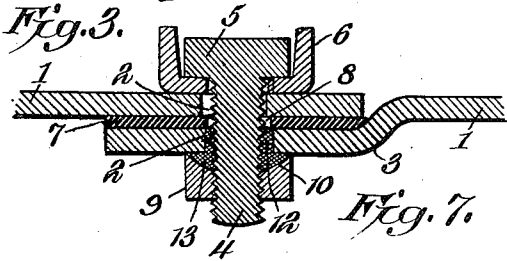
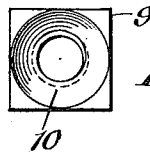


Fig. 7.



WITNESSES

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TANK CONSTRUCTION.

Application filed June 27, 1922. Serial No. 571,167.

To all whom it may concern:

Be it known that I, FERDINAND C. BUCHANAN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Tank Constructions, of which the following is a specification.

This invention relates to the construction of tanks.

The object is to improve the construction of tanks for the storage of fluids by providing means for joining the metal plates or sheets, of which the tank is constructed, whereby all leakage at the seams is eliminated.

Another object is to provide means for fastening the overlapping edges of the metallic sheets or plates, such means comprising threaded bolts having nuts applicable thereto and so formed as to crowd metallic packing into the previously punched openings in the plates, and in close adherence to the threads of the bolt, and to retain the same in such condition to effectually prevent leakage of the contents of the tank around the fasteners.

A full and complete understanding of the invention may be obtained from a consideration of the following detailed description, taken in connection with the accompanying drawing forming a part of this specification, it being understood that while the drawing shows a practical form of the invention, the latter is not confined to strict conformity with the showing thereof, but may be changed or modified, so long as such changes or modifications mark no material departure from the salient features of the invention, as specifically pointed out in the appended claims.

In the drawing, in which similar reference characters designate corresponding parts throughout the several figures:

Figure 1 is a side elevation of a one-unit tank constructed in accordance with the invention;

Figure 2 is an enlarged detail front view of two of the fasteners for the overlapping edges of two adjacent sheets or plates, one of said fasteners being shown in section;

Figure 3 is a horizontal section of one of the fasteners, taken on the line 3—3 of Figure 2;

Figure 4 is a similar view showing the parts of the fastener before being tightened up;

Figure 5 is a view similar to Figure 4, showing a slightly modified form of packing used to prevent leakage;

Figure 6 is a view similar to Figure 3, showing the hole in the outer overlapping edge of one of the sheets or plates reamed for the reception of the metallic packing, which is turned or crowded into the space by the nut;

Figure 7 is a face view of the rear side of the nut used in connection with the fastener.

In the building of tanks of whatever capacity for the storage of various kinds of fluids, sheets or plates of steel, of varying sizes, proportions and thickness, depending on the size of the tank, are used to form the walls thereof. These sheets which are generally rectangular in form and preferably somewhat elongated or oblong, are provided with a series of spaced holes adjacent to their edges, previously punched therein while in a flat condition, in predetermined spacing, said sheets or plates to be afterwards bent into the proper arc of a circle, depending upon the diameter of the tank to be constructed, and to have a longitudinal offset along one long side edge for the purpose of overlapping the adjacent edge of the next sheet or plate, with the holes of the coating series in the two plates in substantial alinement.

The holes, however, in many cases fail to register, due to imperfect punching, when the plates or sheets are applied in position on the tank, and it has been the custom, heretofore, to ream either a portion of the inner or the outer hole to provide a passageway for the rivet or fastener, which is a time-consuming, laborious and expensive operation. This treatment provides, in effect, an elongated hole or slot, extending sometimes vertically or horizontally, or at an angle and which, in the hundreds of instances, where this is resorted to, around a large tank, permits of a great amount of play or bellying of the plates or sheets when the tank is filled, and subjected to the tremendous pressure of the contents of the tank, thus resulting in many irremediable leaks around the numerous fasteners.

In the herein disclosed plan of construction of tanks, the holes which do not register properly require reaming only in a minimum number of cases, by reason of the fact that use is made of a bolt which is somewhat smaller in diameter than the diameter of the punched holes and which, in most cases, will slip through the passageway without the necessity for any reaming whatsoever, the inequalities or irregularities in the size and shape of the said hole surrounding the bolt being effectually closed against leakage by novel means of forcing metallic or plastic packing thereinto.

The threads on the shank of the bolt extend to the head of the same, and the said head is located on the inside of the tank, and the packing which is formed of lead, babbitt or any other suitable malleable or plastic material is forced into the space around the bolt of whatever shape, whether eccentric or concentric, by the turning action of the nut, which is concave on its inner face, such action crowding the packing into the threads of the bolt for a distance and also into the outer hole, and sometimes into the inner hole if it is found necessary to apply additional packing in order to effectually stop a leak around the bolt.

The packing may be in the form of a washer or washers, or a length of wire of proper material wound around the shank of the bolt and, after the nut is applied and turned up, under heavy pressure, the said packing is forced, by reason of the turning action of the concave nut, into a thread shape closely following the threads of the bolt which forms a perfect closure and will prevent such penetrating fluids, as gasoline or other fluids, from finding their way out around the threads of the bolt.

Referring to the drawing there is illustrated in Figure 1 a relatively small tank consisting of what may be termed one unit, it being understood that other units may be mounted thereon to increase the capacity, and that such units may be of any desired diameter. Each unit is preferably made up of a plurality of vertically disposed sheets or plates 1 of steel or other suitable metal, such sheets being preferably oblong shape, and provided along the edges with spaced holes 2, one of said longitudinal edges being further provided with an offset 3 in order to allow the same to lie against the outer face of the plain edge portion of the next adjacent plate or sheet, in a well known manner.

In assembling the sheets or plates, it is often found that the holes do not register, sometimes overlapping each other to such an extent that it is impossible to pass the rivet therethrough when such fasteners are used, and it then becomes necessary to ream

the holes which results in an opening much larger than the shank of the rivet, and the impinging of the heads of the rivets against the faces of the plates is not sufficient to stop the passage of the fluid in the tank around the shank of the rivet. By the use of the bolts 4, as shown, which are small enough in diameter to pass through the space in the average holes where overlapping, it is generally, in the majority of cases, unnecessary to do any reaming. The head 5 of the bolt, which is preferably square is located on the inside of the tank and rests between the flanges of a vertically disposed channel iron 6, which are in general use in the construction of tanks of this class, said iron extending from top to bottom of the tank and serving to strengthen and hold the side plates in position, and also serving to prevent the bolt from turning.

As clearly shown in Figures 3, 4, 5 and 6, the shank of the bolt is threaded from the head 5 to the end of the same, and the non-registrability of the holes 2 is also illustrated in said figures, which is merely illustrative of some of the many conditions which are found with relation to the holes.

A packing strip 7, which is formed of some special rubber or other suitable packing adapted for tank purposes is interposed between the abutting faces of the sheets 1 and the same is treated on its faces with a coating of tank cement so as to closely adhere to the plates, and this flexible strip 7 may or may not be provided with suitable holes or passages 8 for the passage of the shank of the bolt, as it is possible to force the latter through the strip at the proper point without previously punching the same.

A nut 9 is adapted to be threaded on the free end of the shank of the bolt which is located at the outer side of the tank, and said nut is provided on its inner face with a concavity 10, into which is adapted to be crowded or jammed a malleable or plastic washer or washers 11 which are placed on or over the shank of the bolt, as shown in Figure 4 of the drawing, and which, when the nut is turned up with great force, is forced into the irregular space or spaces around the shank of the bolt, as shown at 12 in Figure 3. The soft, pliable metal fills in between the threads of the bolt and forms a tight joint of considerable length along the shank of the bolt, and at the same time impinges the walls of the outermost opening 2, even though the latter may be eccentrically disposed relative to the bolt. The balance of the malleable packing forms a tapered, conical head 13, where filling the concavity 10 of the nut, and has a wall fitting tightly against the outer face of the offset portion 3 of the plate 1, thus serving,

in conjunction with the flexible strip 7, to prevent any leakage of the contents of the tank at any point along the seam.

In most cases one packing washer 11 may be found sufficient to form a perfect closure, and in others two and even more may be found necessary, and in place of such washer-like formation, the packing may consist of lead or other wire cut to proper length to give a few turns around the shank of the bolt, as indicated at 14, in Figure 5, and the same may be forced, by the turning action of the nut, into substantially a solid mass to fill the space or spaces and form a tight joint as before.

As shown in Figure 6, the hole formed in the offset portion 3 of the plate 1 may be reamed out to provide a tapering or conical wall 15 to form a passageway for the packing which may be forced into the same under the action of the nut for the purposes set forth.

From the foregoing it will be seen that a simple and effective method of connecting the seams of metal tanks has been provided, which eliminates a great amount of the labor of constructing the same, by doing away with the expensive process of applying rivets as in the ordinary method of construction, and that the nuts and bolts may be employed, together with the novel form of packing, to provide leak-proof joints to withstand the pressure of even the maximum size tanks.

What is claimed is:

1. In tank construction, a plurality of plates provided with marginal series of holes and adapted to overlap each other with the holes in alinement, bolts traversing the aligned holes, each bolt having the shank threaded from the head to the free end

thereof with the shank of less diameter than the holes to permit the insertion thereof through holes which may be partially out of alinement, a nut adapted to be threaded onto the shank of each bolt and having its inner face provided with a concavity, and pliable packing placed around the shank of each bolt outside the overlapping plates and adapted to be directly forced by the nut into the space around said shank at the holes so as to fill the latter, into the threads of the bolt and into the concavity of the nut when the nut is tightened.

2. In tank construction, a plurality of metallic plates each provided with a marginal series of holes, said plates being overlapped at their margins with the holes in substantial alinement, and having a packing strip between the overlapping margins, a concavity formed in the outer face of the outer plate at each hole, bolts having continuously threaded shanks of smaller diameter than the holes to permit the insertion thereof through holes which may be partially out of alinement, said bolts traversing the several holes and said packing strip, nuts threaded to the shanks and having concavities in their inner faces, and pliable packing surrounding the shanks of the bolts between the outer face of the outer plate and the inner, concave faces of the nuts and adapted to be directly forced by the turning action of the nuts, into the threads of the bolts and the spaces surrounding the bolts at the holes and filling the latter, and also into the concavities of the nuts.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

FERDINAND C. BUCHANAN.