Apr. 24, 1923. 1,452,578

F. J. VAN COTT

SILO STRUCTURE

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Fig 3

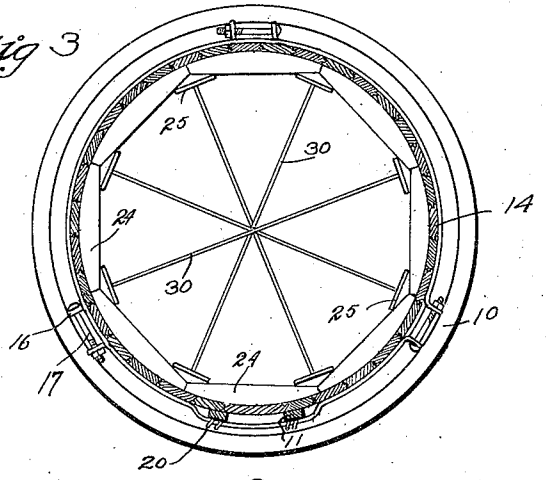


Fig 1

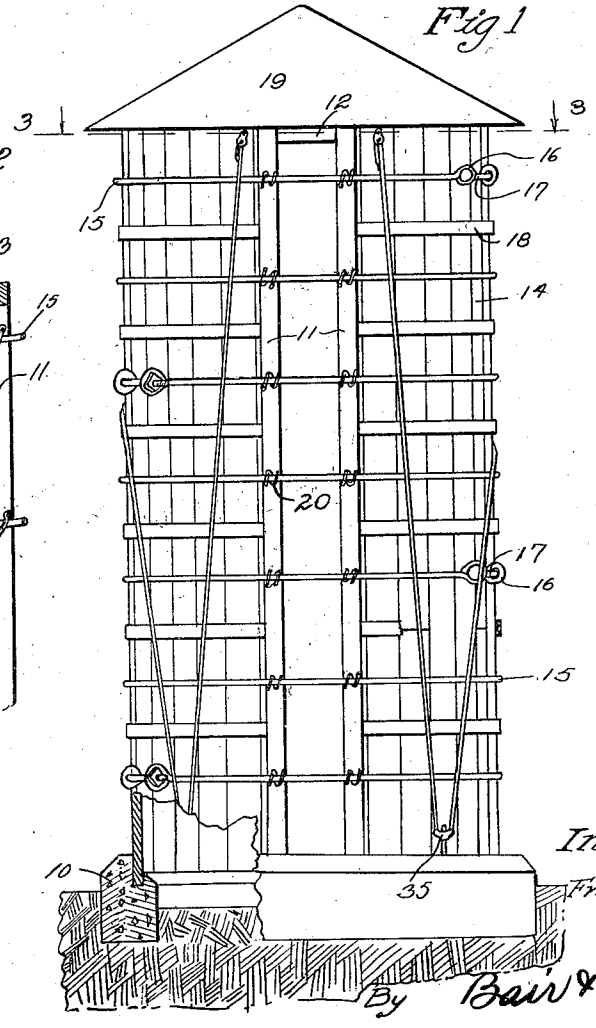
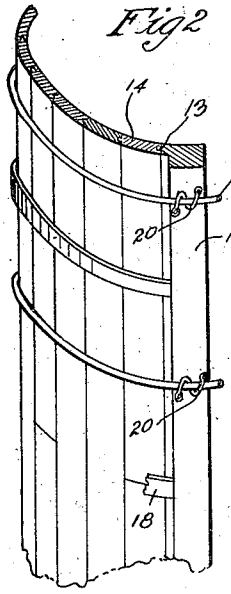


Fig2



Witness
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F. J. VAN COTT

SILO STRUCTURE

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Fig 6

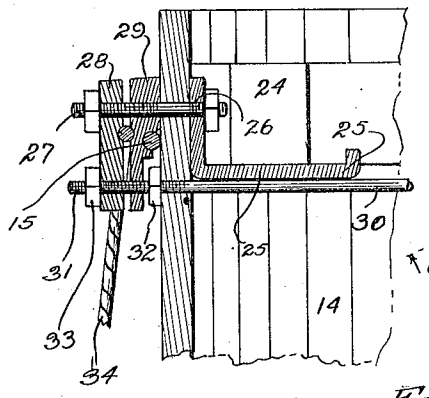


Fig 5

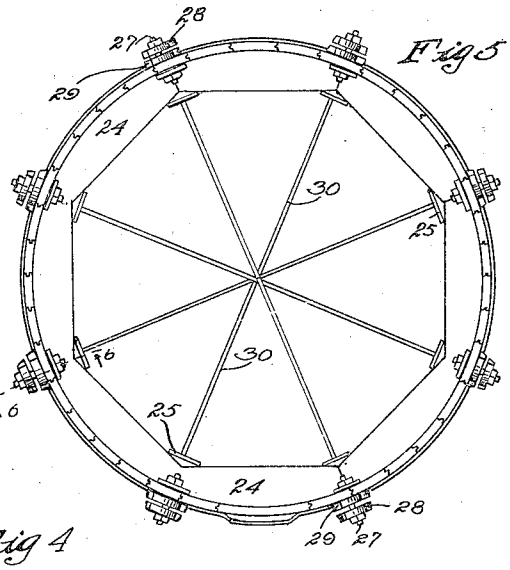


Fig 4

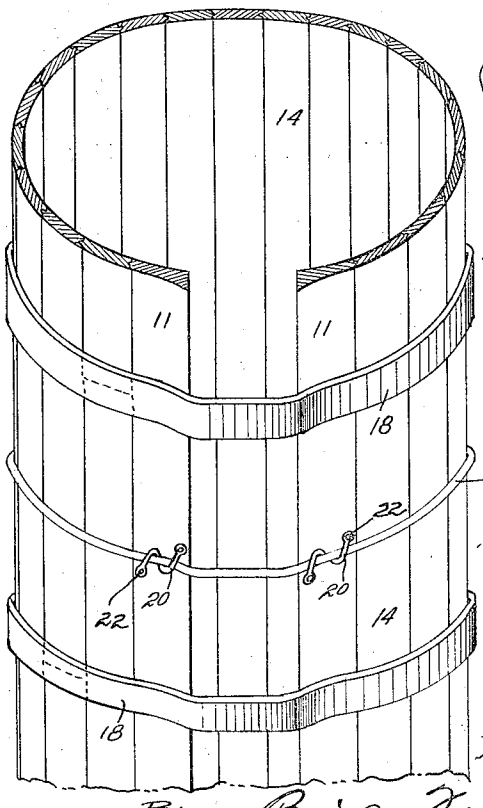


Fig 8

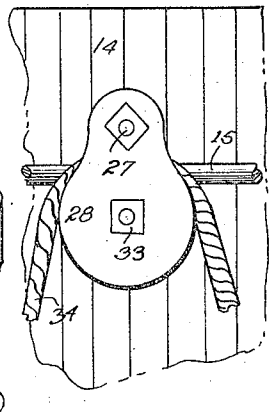
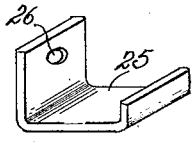


Fig 7



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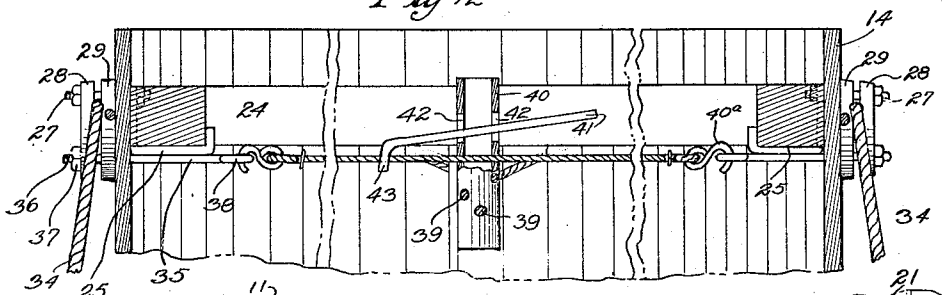
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F. J. VAN COTT

SILO STRUCTURE

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Fig 12



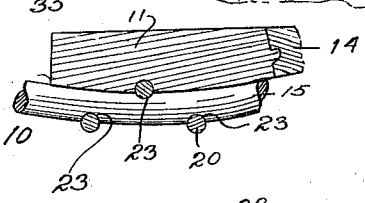
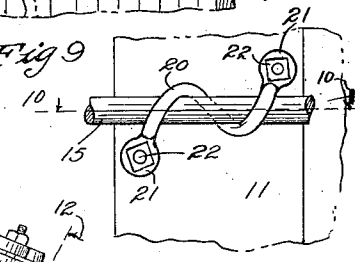


Fig 10

Fig 9



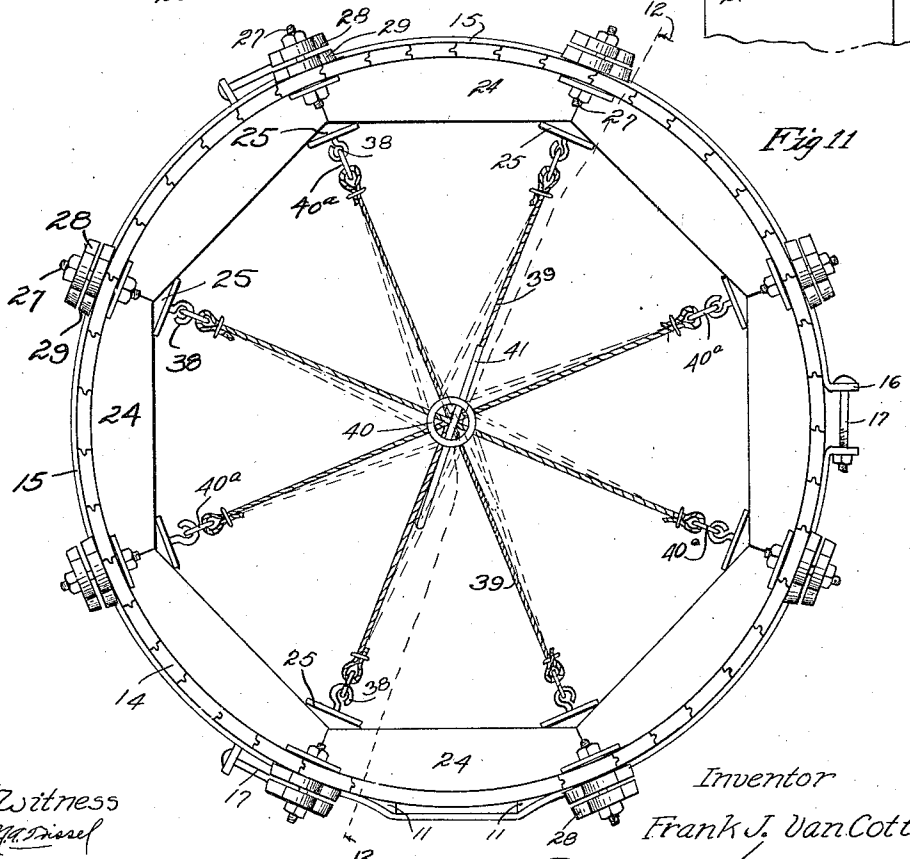


Fig 11

Witness

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By

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Patented Apr. 24, 1923. 1,452,578

UNITED STATES PATENT OFFICE.

FRANK J. VAN COTT, OF UNADILLA, NEW YORK.

SILO STRUCTURE.

Application filed March 20, 1922. Serial No. 545,117.

To all whom it may concern:

Be it known that I, FRANK J. VAN COTT, a citizen of the United States, and a resident of Unadilla, in the county of Otsego and State of New York, have invented a certain new and useful Silo Structure, of which the following is a specification.

The object of my invention is to provide a silo structure of simple, durable and comparatively inexpensive construction.

More particularly, my invention relates to a silo structure, wherein the silo staves used in constructing the silo are very thin and about half as thick as the ordinary wooden staves now commercially used.

My invention relates particularly to a silo structure of very thin staves, in which the staves and the reinforcing elements are used therein in such a peculiar manner that the thin staves will prove as efficient and as strong as the staves ordinarily commercially used.

Still another object is to construct a silo of thin staves, the arranging of the staves in circular form and then drawing them up tight against each other for preventing their movement, and then placing wooden strips around the exterior of the staves and securely fastening the strips to the staves, so that when the staves and strips are united together, they jointly will be as strong and as efficient as the ordinary so-called "two-inch stave." The staves I preferably use may be properly termed "one-inch staves."

Still another object is to provide means for anchoring the iron bands or hoops to the door frame, so that when the hoops or bands are tightened up for drawing the staves towards the door frame, the door frame will be held against any movement relative to the hoops.

Still another object is to provide reinforcing means arranged within the silo wall structure and near the top thereof, the reinforcing means preventing any possible inward movement of the staves relative to each other and at the same time tending to cause the silo to remain in a true circle.

Still another object is to provide reinforcing means near the top of the silo, together with radially arranged rods extending from one side of the silo to the opposite side of the silo for preventing any movement of the silo wall.

Still another object is to provide means for drawing the silo wall to position where it will form a substantially true circle and for maintaining it in its true circular form, the last mentioned means being detachably mounted, so that when the silo is being filled with ensilage the parts may be removed and not be in the way with the filling of the silo.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of my improved silo, parts being broken away to better illustrate the construction.

Figure 2 is a detail perspective view, showing the staves abutting against the door frame.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1, showing the reinforcing means near the upper end of the silo.

Figure 4 is a perspective, sectional view of a slightly modified form of a silo, showing iron hoops and wooden bands extending clear around the silo and over the door opening.

Figure 5 is a top view of the silo with the roof thereof removed.

Figure 6 is a detail, sectional view taken on the line 6—6 of Figure 5, showing the coacting means for anchoring the guide cables to the silo and for maintaining the filler members in proper position.

Figure 7 is a perspective view showing one of the brackets for maintaining the ends of the filler members.

Figure 8 is a side elevation of one of the clamp devices, to which the guide cables are secured. This form of clamp is illustrated in my Letters Patent, issued to me on a clamp on March 11, 1919, No. 1,296,883.

Figure 9 is a detailed view showing the means for anchoring the iron hoops to the door frame of the silo.

Figure 10 is a detailed, sectional view taken on the line 10—10 of Figure 9.

Figure 11 is a top, plan view of a silo structure with the roof thereof removed, showing the removable means for drawing the silo to a true circular form; and

Figure 12 is a central, sectional view taken on the line 12—12 of Figure 11.

In the accompanying drawings, I have used the reference numeral 10 to indicate an ordinary cement base for a silo and 11 to indicate the vertically arranged door frame members.

The door frame members 11 may be provided with cross pieces or may be spaced apart without any cross pieces arranged therebetween.

At the top of the door frame members 11, I have shown a cross piece 12. The particular means arranged for preventing the door frame members 11 from moving towards each other will be hereafter more fully set forth.

Each of the door frame members 11 is provided on one of its sides with a tongue 13 designed to be received in a groove formed in the staves 14 of the silo. The staves 14 are of the ordinary tongue and groove type, but are just about half as thick as the ordinary so-called "two-inch" commercial stave.

The staves 14 are placed vertically upon the base or foundation 10 and iron hoops 15 are then placed around the staves. The ends of the iron hoops 15 are formed with loops 16 and are connected together by a bolt 17 extending into the loops 16. The tightening of the bolt 17 will cause the hoops 15 to be drawn tightly around the staves 14. The hoops 15 prevent the expansion of the silo wall.

Wooden bands or strips 18 are placed around the staves 14 and are securely fastened thereto in a manner that will be hereafter more fully set forth.

In Figure 1 of the drawings, I have shown the wooden bands as extending up against the door frame members 11, while in Figure 4 of the drawings, I have shown the wooden bands as extending clear around the door frame members and over the door opening.

The silo is provided with a roof structure 19.

When the door frame members 11 are arranged with no cross pieces between their upper and lower ends, it is necessary to provide means for anchoring the door frames to the iron hoops. In order to properly do this, I arrange spiral members 20, having their ends flattened as at 21, and formed with openings through which may be extended the bolts 22.

The bands 15 are provided with grooves 23 for receiving the spiral members 20. The bolts 22 are extended through the door frame members 11.

From the construction of the parts just described, it will be seen that when the spiral member 20 is in position and is secured to the door frame member 11, movement of the door frame members 11 relative to the iron hoops 15 will be eliminated.

After the door frame members 11 have been anchored to the hoops 15, I then tighten the hoops by tightening the bolts 17. The tightening of the bolts 17 will cause the staves 14 to be crowded towards each other and against the door frame members 11. The tightening of the hoops 15 brings the silo to a substantially true circular outline.

After the hoops have been tightened, I then take flat bands of wood and nail them to the staves at spaced intervals thereon. The flat bands are also arranged to overlap the end joints of the staves.

The wooden bands being nailed to each of the staves will tend to hold each of the staves from any movement whatsoever relative to each other and at the same time prevent any up-and-down movement of the staves.

In this connection, it may be mentioned that the iron hoops will prevent expansion of the silo wall structure and retain it in its true circular form, while the wooden bands will prevent any up-and-down movement of the staves relative to each other and also prevent any of them from moving inwardly, due to the fact that the staves are nailed to them.

When thin staves are used for constructing the silo wall, it is extremely necessary that the staves be first brought to their true circular shape, and then the wooden bands snugly fitted against the staves, thus bringing the wooden band to position where it will be a true circle.

In order to prevent any inward movement of the staves, I arrange reinforcing means on the interior of the silo wall near the top thereof. I provide filler members 24, which are arranged on the cords of a circle and have their ends abutting against each other as clearly illustrated in Figures 3 and 5 of the drawings.

One edge of the filler members 24 is curved from end to end, so as to fit snugly against the inner surface of the silo wall formed by the staves 14.

The filler members 24 are supported on brackets 25. The brackets 25 are formed with an opening 26 through which is extended a bolt 27. The bolt 27 extends through the silo wall and has mounted thereon on the exterior of the silo wall, a clamp device, which is composed of a pair of castings 28 and 29. The clamp device is the form of clamp device shown in my Letters Patent, No. 1,296,883, issued March 11, 1919.

The casting 29 of the clamp device rests over the upper iron hoop 15. Diametrically arranged rods 30 are extended below the bracket 25 and through the silo wall. The ends of the rods 30 are screw-threaded as at 31 and are extended through openings formed in the parts 28 and 29 of the clamp device. A nut 32 is placed on the screw-threaded end 31 and rests against the exterior of the silo wall. A nut 33 is also placed on the screw threaded end 31 of the rods 30 and rests against the casting 28 of the clamp device.

Guy cables 34 are received between the parts 28 and 29 of the clamp device and extend along the silo wall and are anchored to the base 10 of the silo by means of the saddle device 35.

From the construction of the parts just described, it will be seen that the rods 30 hold certain points on the silo wall against any movement while the filler members, which are arranged to have their ends abut against each other, will prevent any inward movement of the silo wall between the points where the rods 30 are extended through the wall.

The securing of the guy cables 34 to the clamp device and in turn fastening the rods 30 to the clamp device tends to form a construction wherein twisting of the silo wall is eliminated.

The door frame 11 shown in Figure 4 of the drawings is arranged with its outer surface beveled, so that one edge is substantially the thickness of the thin staves 14, while its other edge is approximately twice as thick.

In Figures 11 and 12 of the drawings, I have shown the anchoring means, wherein the silo is drawn to position where it will form a true circle in outline, also detachable and removable, so that it will not in anyway interfere with the filling of the silo.

In this form of device, the brackets 25 and the clamp members and guy cables are all arranged as has just been mentioned in connection with Figures 5 and 6 of the drawings. Instead of using rods 30, I arrange short rods 35, having their outer ends screw-threaded as at 36. The screw-threaded ends 36 of the rods 35 extend through openings formed in the castings 28 and 29 of the clamp device and are provided with nuts 37, which rest against the casting 28.

The rods 35 are also provided with a nut 32 (not shown), which rests against the silo wall similar to the nut 32 shown in Figure 6 of the drawings. The inner ends of the rods 35 are formed with loops 38. The rods 35 project inwardly slightly beyond the brackets 25. The opposite rods 35 are connected together by flexible elements 39. I have shown the flexible elements 39 as cables although chains may be used. Each of the flexible elements 39 have secured to their ends, hooks 40^a, which are designed to be extended into the loops 38 on the rods 35. A tubular member 40 is supported on the flexible elements 39 at a point where they all cross each other, as clearly illustrated in Figure 11 of the drawings.

The tubular member 40 is provided with openings through which the flexible elements 39 are permitted to pass. The openings in the tubular member 40 are arranged in different horizontal planes, so that the openings will not materially weaken the tubular member 40. A lever 41 is slidably mounted in a pair of slots 42 formed in the tubular member. One end of the lever 41 is provided with a downwardly extending hook portion 43. The purpose of the hook portion 43 will be hereafter more fully set forth.

After each of the flexible elements has been connected to the rods 35, and it is desired to tighten them for drawing the silo to a substantially true circle, the lever 41 is moved to position where the hook 43 will not rest against any of the flexible elements 39.

The rotating of the lever will cause the tubular member 40 to rotate, thus swinging the flexible elements where they will not be exactly diametrically arranged. This will bring the flexible elements to the position shown in dotted lines in Figure 11, and cause them to be greatly tightened.

After the parts have been tightened as much as possible, the end of the lever having the hook portion 43 thereon is then slid or moved downwardly until it engages against the side of one of the flexible elements. One end of the lever resting against the flexible elements and the other end being received in the slots 42 in the tubular member will hold all of the parts against any possible movement. The lever is of sufficient strength to withstand any twisting due to the pressure and tension of the flexible elements. The lever 41 is square in cross section or flat sided so as to prevent any rotation or twisting thereof within the slot 42.

When it is desired to release the flexible elements and to remove them from within the silo, the end of the lever opposite from the hook portion 43 is swung downwardly, thereby raising the end having the hook 43 thereon until it no longer rests against the flexible element 39.

The flexible elements 39 will then be loose enough so that each of the hooks 40^a may be removed from the loops 38 in the rod 35.

It will be seen that the flexible elements 39 may be easily removed when it is desired to fill the silo and may be easily reinstalled after the silo has been filled.

When the silo is empty during the sum-

mer months, it usually will become twisted much more than when the silo is filled, due to the fact that the staves contract and each of them gives a little bit, so that in a very short time, the silo will become oval-shaped rather than circular. The providing of the flexible elements, so that inward tension of the silo wall may be varied, permits me to adjust the tension to such an extent that any contraction of the silo wall may be easily taken care of, thus giving me a silo, which may always be retained in its true circular form.

It will be seen that I have provided a very practical and efficient silo, which may be built at a comparatively cheap cost.

Some changes may be made in the construction, and arrangement of the various parts of my silo structure without departing from the essential features and purposes of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A silo structure including a base, a door frame thereon, a plurality of wooden staves arranged on said base to form a circular wall structure, means for preventing the expansion of the wall structure, means arranged on the interior of silo wall for preventing inward movement thereof, including a number of filler members arranged to have their ends abut against each other, rods extended through the wall, flexible elements connecting the inner ends of the rods together and means, rotatable on said flexible elements, for drawing the rods towards the vertical center of the silo structure.

2. A silo structure including a base, a door frame thereon, a plurality of wooden staves arranged on said base to form a circular wall structure, means for preventing the expansion of the wall structure, means arranged on the interior of silo wall for preventing inward movement thereof, including a number of filler members arranged to have their ends abut against each other, rods extended through the wall, flexible elements for detachably connecting the inner ends of the rods together and means, rotable on said flexible elements, for drawing the rods towards the vertical center of the silo structure.

3. A silo structure including a base, a door frame thereon, a plurality of wooden staves arranged on said base to form a circular wall structure, means for preventing the expansion of the wall structure, means arranged on the interior of silo wall for preventing inward movement thereof, including a number of filler members arranged to have their ends abut against each other, rods extended through the wall, flexible elements connecting the inner ends of the rods together, means on said flexible elements capable of rotation for drawing the rods towards the vertical center of the silo and means for retaining said last means in any of its positions for the purposes stated.

4. A silo structure including a base, a door frame thereon, a plurality of wooden staves arranged on said base to form a circular wall structure, means for preventing the expansion of the wall structure, means arranged on the interior of silo wall for preventing inward movement thereof, said means including rods extended through the silo wall and projecting into the interior of the silo, diametrically arranged flexible elements for connecting the opposite rods together, means mounted on said flexible elements capable of rotation, whereby the rods may be drawn towards the vertical center of the silo and means for retaining said last means in any of its positions.

5. A silo structure including a base, a door frame thereon, a plurality of wooden staves arranged on said base to form a circular wall structure, means for preventing the expansion of the wall structure, means arranged on the interior of silo wall for preventing inward movement thereof, said means including rods extended through the silo wall and projecting into the interior of the silo, diametrically arranged elements, coacting means for detachably connecting said elements to the inner ends of said rods and means for placing said elements under tension for drawing the rods toward a common center.

6. A silo structure including a base, a plurality of thin wooden staves having coacting tongues and grooves arranged on said base, a plurality of iron bands on said silo structure for preventing the expansion thereof, and a plurality of flat wooden bands on said silo structure, said wooden bands being secured to the staves for preventing inward movement of the staves, or up and down movement of the staves.

7. A silo structure including a base, a plurality of thin wooden staves having coacting tongues and grooves arranged on said base, a plurality of iron bands on said silo structure for preventing the expansion thereof, spiral members arranged to receive the iron bands, said last members having openings in its ends, means for fastening and drawing said spiral member towards the staves, and a plurality of flat wooden bands on said silo structure, said wooden bands being secured to the staves for preventing inward movement of the staves, or up and down movement of the staves.

Des Moines, Iowa, December 22, 1921.

FRANK J. VAN COTT.