B. B. VORSE.

SILO AND METHOD OF ERECTING SILOS.

APPLICATION FILED MAY 9, 1917.

1,418,216. Patented May 30, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

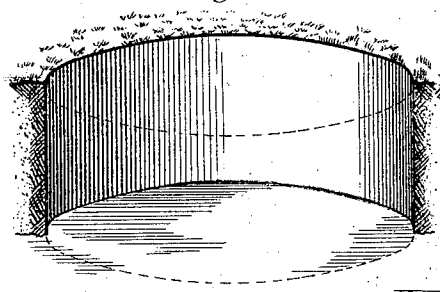


Fig. 2.

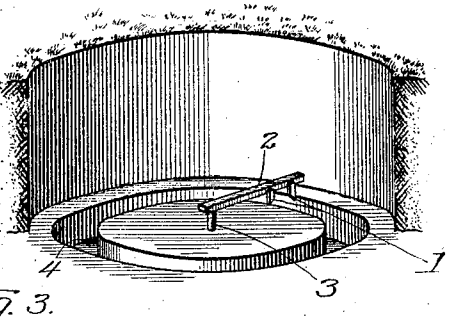


Fig. 3.

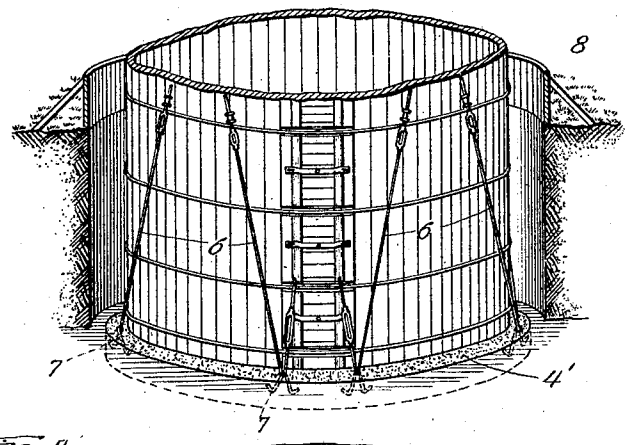
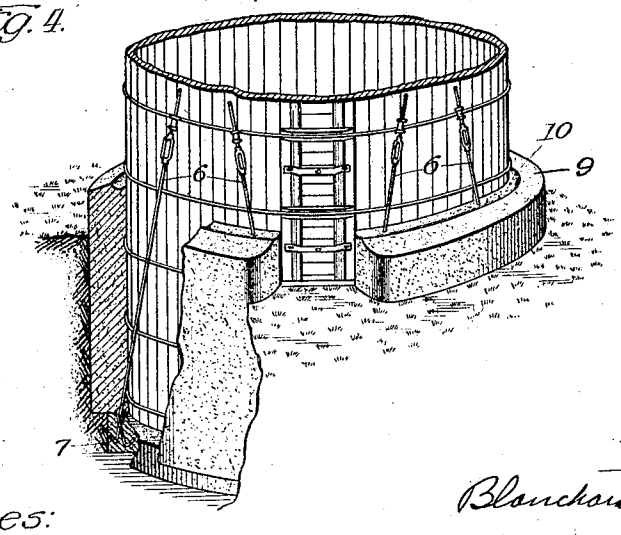


Fig. 4.



Witnesses:

Arthur H. Jackson

Inventor.

Blanchard B Vorse

by Wallace R. Lane

Atty.

B. B. VORSE.

SILO AND METHOD OF ERECTING SILOS.

APPLICATION FILED MAY 9, 1917.

1,418,216. **Patented May 30, 1922.**

2 SHEETS—SHEET 2.

Fig. 6.

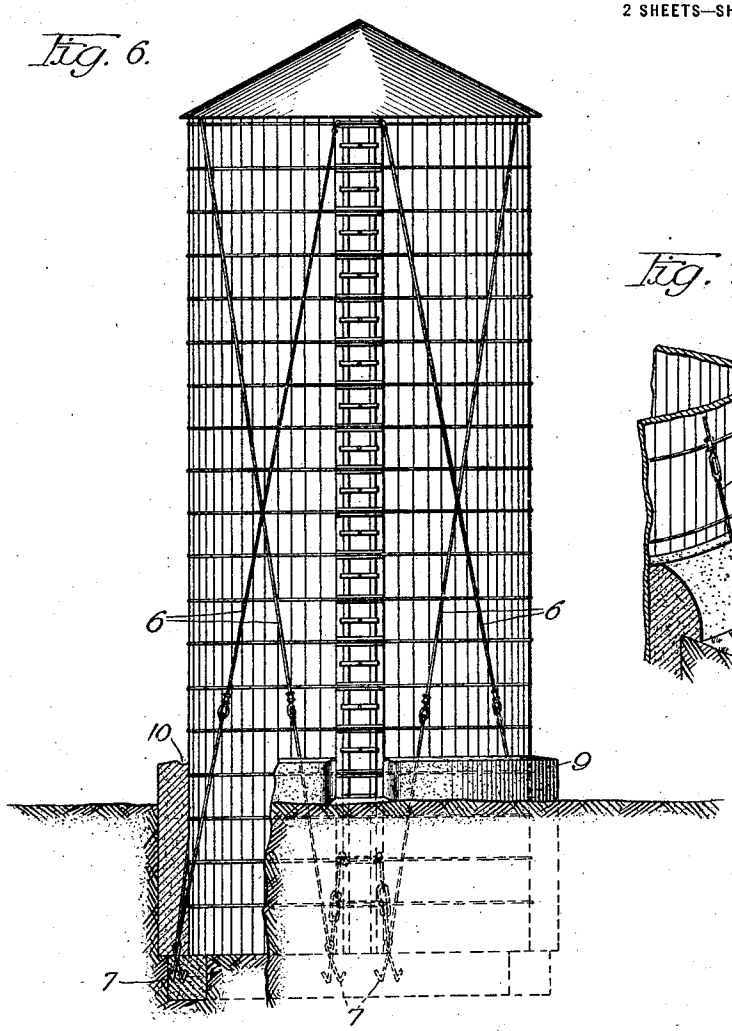


Fig. 7.

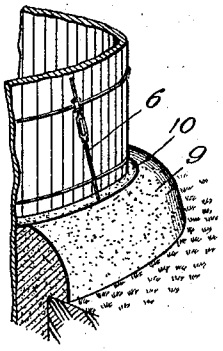
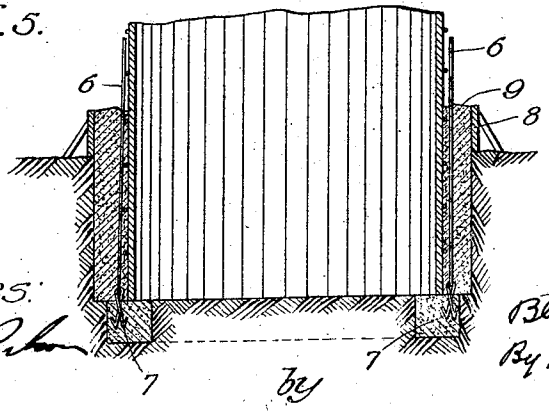


Fig. 5.



Witnesses:

Inventor.
Blanchard B. Vorse
By Wallace R. Lane
Atty.

UNITED STATES PATENT OFFICE.

BLANCHARD B. VORSE, OF DES MOINES, IOWA, ASSIGNOR TO WESTERN SILO COMPANY, LIMITED, A CORPORATION OF WEST VIRGINIA.

SILO AND METHOD OF ERECTING SILOS.

1,418,216. Specification of Letters Patent. Patented May 30, 1922.

Application filed May 9, 1917. Serial No. 167,546.

To all whom it may concern:

Be it known that I, BLANCHARD B. VORSE, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Silos and Methods of Erecting Silos, of which the following is a specification.

This invention relates to silo constructions and methods of erecting silos, in particular to a silo construction and a method and means of erecting the same which will afford a silo so firmly braced and supported as to resist any conceivable wind action short of a cyclone, which would destroy everything in its path.

As is well known, the most frequent difficulty and danger with silos is that of collapse or distortion, with quickly following destruction due to wind action or unequal strains upon the silo. This means not only the loss of the silo but of the silage a farmer may be depending upon to carry his stock through the winter. Sometimes, because of the expansion of the staves, two staves will buckle inwardly, forming a flat place in the silo and a bulge at another point, after which the strains ordinarily imposed upon the structure by the hoops which encircle it, the pressure of the silage, wind pressure, etc., soon cause its downfall. This danger also, my improved method and construction entirely eliminates, by making the bulge, without which a flat place cannot occur, impossible.

Another commonly occurring accident is that the silo will "creep" or "walk" on its foundation until a part of its circumference has slipped over the edge, usually the inside edge of the foundation, with disastrous results. This is particularly apt to happen, as generally only an inch or two of foundation projects inwardly beyond the inner periphery of a silo. This accident is also rendered absolutely impossible by my invention.

In the drawings:

Figures 1 to 4 are perspective views partly in cross-section illustrating the steps contemplated in erecting a silo according to my improved method.

Figure 5 is a partial cross-sectional view showing the construction of the interior of a silo when completed.

Figure 6 is a view of the complete silo with parts in section illustrating the arrangement of the bracing system.

Figure 7 is a detail view of a modification.

In erecting a silo according to my improved method, I first dig a hole, such as indicated in Fig. 1, approximately eighteen (18) inches greater in diameter than the silo I wish to erect. I next describe at the bottom of this hole two circles by means of the markers 1 arranged upon the plank 2, supported upon the pivot 3 at the center of the hole in a fashion which will be clearly understood, and excavate between these lines so as to provide a circular pit or trench. I next fill up the pit or trench 4 with concrete even with the top, forming a foundation 4′ as shown in Figure 3. When this has hardened, I erect a silo S upon the foundation thus secured, applying diagonally arranged bracing rods 6 to the silo, these bracing rods terminating in anchors 7 firmly embedded in the foundation 4′, but preferably substantially spaced from the inner periphery of the foundation 4′. Subsequently I erect a form 8 about and flush with the original hole, as clearly indicated in Figure 3, and fill up the space between the hole and form 8 and the silo with concrete. The form 8 is so shaped as to interrupt the concrete which projects above the ground enough to bring the bottom level of concrete at the front of the silo exactly even with the bottom of one of the doors, so as to permit the removal of such door. This is clearly indicated in Figure 4.

The top of the portion 9 of the concrete wall, which extends above ground, is beveled as indicated, and provided with a gutter 10, which is sloped downwardly from the back of the silo to its front, so as to afford adequate drainage for water running down the sides of the silo and upon the concrete foundation.

It is particularly to be noted that the brace rods 6 are spaced from the silo at their bottoms and firmly embedded throughout a substantial portion of their length in con-

crete. The entire silo is firmly gripped in concrete throughout a substantial portion of its height, this concrete being in turn adequately supported by the surrounding earth. By such a construction the silo is as firmly located as the foundation of a building, and practically indestructible except by fire.

The advantages of the method of construction above described are numerous and include in addition to those specifically mentioned above, the fact that by this means the necessity for providing forms for erecting the foundation of a silo (except for the single form 8) is rendered unnecessary. The staves of the silo itself form the inner form, saving very considerably in labor and effort. It would be possible to omit the form 8 according to my method, if so desired, but this, being a single form arranged flush with the large hole, is easy to erect, and it is preferable to increase the sheathing or encasing of concrete by carrying the same up a little way above the ground.

Furthermore, according to my method, there is no shoulder adjacent the bottom of the silo, where the wooden silo wall rests upon the foundation, the inner periphery of which is smaller than the inner periphery of the silo. Such a shoulder catches the silage as it settles, forming air spaces and the like, and causing the destruction of a considerable portion of the silage.

To afford the best results it is preferable that the silo structure according to my invention be made of wood treated with the heat and pressure method, or wood treated in such a fashion as to prevent its being particularly liable to rot, or the like. Another advantage involved in first treating the wood before erecting a silo according to my invention, is that if the silo be rendered waterproof, the staves will not absorb any considerable quantity of water, and will not, therefore, expand excessively, which might tend to crowd them too closely together if they are encased solidly in concrete. The fact that the concrete and iron hoops of the silo have exactly the same coefficient of expansion will largely prevent any danger to the concrete sheathing from expansion of the silo staves because the size of the silo is practically controlled by its hoops, which confine and bind the staves and limit them. For this reason it is generally unnecessary to reinforce the concrete silo sheating, and a thin layer of concrete may be used, main dependence being imposed upon the surrounding earth, which would be impossible were all of the strain of the expanding staves to come directly against the concrete sheath, which would probably rupture it. To make for double security, however, reinforcing iron may be laid circumferentially in the concrete.

In Figure 7 I have shown another modification of the invention, in which the form 8 is omitted in the top of the sheathing and the wall 9′ is enlarged to cover the surrounding earth and make a firm support and shoulder as indicated. This presents a neater appearance and this form of construction may be employed where the earth is hard and will support itself readily.

Having now described my invention, I claim:—

1. The method of erecting a silo so as to resist wind action which consists in making in the ground an annular hole having a larger diameter than the finished silo is to have, forming a silo foundation in the bottom of said hole, embedding anchoring means in said foundation during the formation thereof, erecting on said foundation a stave silo, securing in the anchoring means and adjacent the top of the silo bracing means extending diagonally of said silo, and filling the space between the lower portion of the silo and the surrounding earth wall with concrete, whereby the silo is firmly supported and cannot be distorted or collapsed by wind pressures.

2. A stave silo construction comprising a foundation sunk in the ground, a silo anchored on said foundation by diagonally extending anchor rods secured to the foundation and adjacent the top of the silo, a sheating of concrete braced by the surrounding earth and tightly gripping said silo and imbedding the lower portion of the anchor rods, said sheating being continued above ground.

3. A silo construction comprising an annular concrete foundation sunk in the ground, a wooden stave silo resting near the middle of said foundation, a wall of earth surrounding and spaced from the lower portion of said silo, a sheathing of concrete surrounding the bottom portion of said silo, extending slightly above the earth wall, and filling the space between the staves and earth, and anchoring rods to brace said silo having their bottom ends anchored in said concrete foundation and said concrete wall, said rods being secured adjacent the top of the silo and extending diagonally thereof.

In witness whereof, I hereunto subscribe my name to this specification in the presence of two witnesses:

BLANCHARD B. VORSE.

Witnesses:
LEO E. STEVENS,
JAMES E. MORTON.