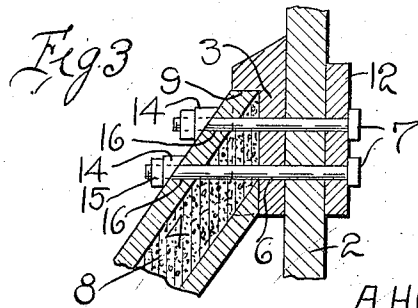
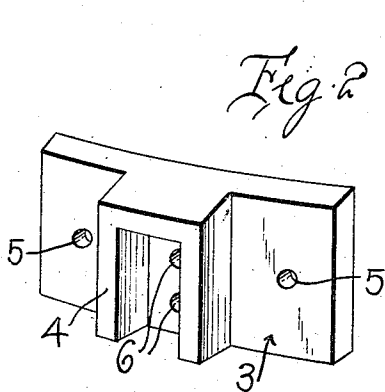
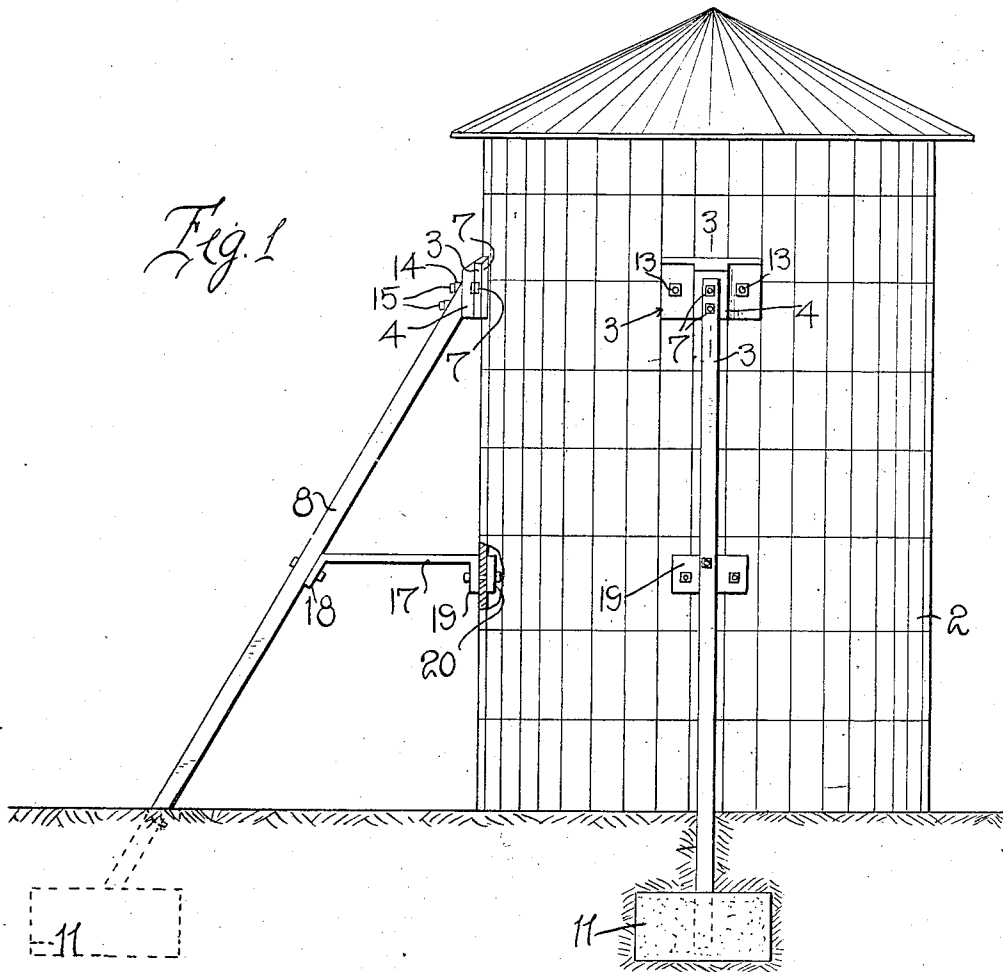


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SILO BRACE.

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1,178,641.

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SILO-BRACE.

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To all whom it may concern:

Be it known that I, AUGUST HENKEL, a citizen of the United States, residing at Campbell, in the county of Franklin and State of Nebraska, have invented certain new and useful Improvements in Silo-Braces, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to silos, and particularly to the bracing thereof.

The primary object of this invention is the provision of means for bracing silos and like structures which shall be simple, easily applied, and which shall be extremely effective in supporting the silo against the pressure of wind or other stresses.

A further object of the invention is the provision of a bracing means comprising a socket plate adapted to be initially attached to the silo wall and a brace of such form and construction that it may be readily applied to or detached from the socket plate, the socket and brace being so formed as to rigidly engage each other against movement of the silo in three directions but which will permit the ready removal of the brace itself.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation of a silo having braces constructed in accordance with my invention, one of the braces being shown in front view and the other in side view; Fig. 2 is a perspective view of one of the socket plates detached from the silo; and Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 1, showing the manner in which the brace is connected to the socket plate and the manner in which the socket plate is connected to the wall of the silo.

Referring to these figures, 2 designates a silo of any usual or approved construction. Disposed at intervals upon the wall of the silo and at any desired height from the ground are a plurality of socket plates, designated generally 3. One of these plates is illustrated in Fig. 2. Each plate comprises a base portion which is curved to conform to the wall of the silo or otherwise made to conform to the contour of the structure to which it is applied, and from this base projects the inverted U-shaped flange 4 which is preferably integral with the plate and may be cast as part thereof. The upper

edge of the plate 3 and the horizontal portion of the flange 4 is downwardly inclined to form a water shed. The socket formed by the U-shaped flange 4 is narrower than the length of the base 3 so that laterally projecting wings are formed on each side of the socket which are perforated as at 5 for the passage of bolts which attach the socket plate to the wall of the silo. The base within this socket portion formed by the walls 4 is also perforated at a plurality of points, as at 6, for the passage of bolts 7 whereby the brace 8 is held in engagement with the socket. The brace 8 is preferably hollow and is preferably rectangular in cross section. The upper end of the brace is cut at an acute angle to the longitudinal axis of the brace, as shown clearly in Fig. 3, so as to provide a flat surface which will fit against the inside face of the socket and the upper end of the brace is cut away, as at 9, so as to fit firmly against the horizontal portion of the outwardly projecting flange 4. The brace is of such width that the outer faces of the side walls will fit snugly against the inner faces of the vertical portions of the flange 4. Thus the brace is firmly engaged with the socket. The lower end of the brace is embedded in an anchoring block 11 which may be made of concrete or other suitable material, this anchoring block having an area considerably larger than the base so that when it is buried in the ground it will resist any upward movement of the brace and also act as a foot resisting the downward movement of the brace.

In applying my invention to the silo or other structure, a reinforcing plate 12 is disposed upon the inner face of the silo wall. This plate 12 has the same size as the socket plate. Bolts 13 connect the plate 12 to the socket plate, these bolts passing through the perforations 5. It is to be particularly noted that the plates 3 and the plates 12 have a length greater than their width and that the length of the plates extends transversely to the upright staves of the silo so that the strain is not brought upon one stave but is distributed over a number of staves, and furthermore, this construction prevents the splitting of the staves by the strain exerted by the braces 8 upon the walls of the silo when the silo is forced against the brace under the action of wind pressure. The braces are adjusted with their upper ends in the socket plates as shown in Fig. 3, and then

the bolts 7 are inserted through the proper perforations in the reinforcing plate 12 and through the perforations 6 in the socket plate and through perforations 16 formed in the upper wall of the brace. Wedge shaped washers 14 are then disposed upon the ends of the brace so as to bear flat against the outer face of the brace, and nuts 15 are applied to the bolts 7 and screwed up, drawing the brace home and also drawing the brace upward until it is snugly engaged with the outwardly projecting flange 4. It will be noted in Fig. 3 that the upper corner of the brace is drawn snugly to the upper corner of the socket so that there can be no downward movement or outward movement of the silo and the socket plate relative to the brace. It will further be seen that the horizontal portion of the flange 4, extending as it does over the upper corner of the brace, prevents water from entering the hollow brace, and that the entrance of water into the joint between the hollow brace and the socket plate is also prevented by the outwardly projecting flanges 4. The flange 4 is of uniform depth throughout its entire length so as to secure a uniform engagement with the upper end of the brace.

It will be seen that wind pressure upon the silo and any stress which would tend to tip the silo is fully resisted by the braces applied thereto, and that there will be no giving or yielding of the connection between the brace and the silo because of the fact that the brace bears constantly against the horizontal portion of the flange 4. When the silo under the action of wind pressure or other causes tends to tip against the brace, the strain will be transmitted downward by the flange and be transmitted to the downwardly extending brace and in turn to the anchoring block. Furthermore, this strain does not come alone upon the bolts 7 and indeed is only slightly borne by these bolts, nor is very much strain placed upon the bolts 13. If considerable strain were placed upon the bolts 7 and the bolts 13 it would tend to split the staves forming the silo or cause the bolts to pull out. The bolts, however, resist any tendency of the brace under strain to pull apart from the socket plate. It will be understood, of course, that when the silo under the action of wind or other forces is tending to tip in one direction and exert a compressive strain upon one brace, the oppositely disposed brace will also resist the tipping action of the silo. The tipping movement of the silo will tend to cause a relative movement of the brace and of the socket plate so that the brace will rock at its lower corner of its upper end as upon a fulcrum. But this movement will not only be resisted by the bolts 7 but will also be resisted by the engagement of the flat face 9 of the upper end of the brace with the under

face of the horizontal portion of the flange 4. Thus the strain upon the bolts will be to some extent relieved. Lateral strains upon the braces will be resisted by the vertical flanges 4 engaging with the upper ends of the braces.

My invention has been found very effective in practice. The braces are easily applied or readily detached, and they firmly brace the structure. There is no loose connections between the brace and the silo. At the same time the strain upon the silo wall is distributed over a relatively large area and thus there is no tendency to split the staves of the silo or otherwise damage it. The braces 8 being hollow, are relatively light, may be easily put in place, and at the same time the joint between each brace and the socket plate is so snug and so protected that water cannot enter the brace.

It is of course obvious that the brace may be filled with concrete, if desired, but this is unnecessary unless the brace is made of relatively light and thin material.

Under some circumstances it may be desirable to provide an intermediate brace, designated 17 in Fig. 1, this brace having a head 18 which is bolted to the brace 8 and having at its inner end a foot 19 having a length sufficient to extend over a plurality of staves of the silo, bolts passing through this foot and through a reinforcing member 20 corresponding to the member 12 being disposed upon the inner face of the silo wall. This brace 17, however, is only necessary where the brace 8 is relatively long and the silo relatively high and where there is a tendency of the silo wall to bulge under the pressure of the ensilage contained within the silo. It will be seen that inasmuch as the upper portion of the brace cannot move outward from the plate 3 and the lower portion of the brace is buried in the ground, it is practically impossible for the silo wall to bulge unless the brace bends, and still the tendency of the silo to bulge will be relieved by the fact that the upper portion of the silo is supported by the braces 8 which constitute legs in that case.

Having thus described my invention, what I claim is:

1. The combination with a structure having a vertical wall, of a socket plate mounted upon the wall and having an inverted U-shaped flange projecting from the face of the plate to provide parallel vertical portions, said flange forming a socket upon the face of the plate, a brace rectangular in cross section, the upper end of the brace fitting within the flange of the socket plate and, the parallel vertical portions of the socket engaging the side walls of the brace and preventing rotation of the brace, fastening devices passing through the upper

end of the brace, through the socket plate and the wall of the structure, and an embedded anchoring member carried upon the lower end of the brace and projecting beyond the brace on all sides.

2. The combination with a silo having its wall formed of upright staves, of bracing means therefor comprising a socket plate extending horizontally over a plurality of staves, the socket plate at its middle portion being formed with an inverted U-shaped flange projecting from the face of the plate, bolts passing through the socket plate on either side of the flange and fastened to the staves of the silo, a reinforcing plate having a length approximately the same as the socket plate disposed upon the inside of the silo wall with which said bolts connect, a brace extending upward and inward and engaging in said socket plate, the lower end of the brace being spaced from the silo wall, an embedded anchoring member rigidly connected to the lower end of the brace, and bolts disposed vertically above each other passing through the upper end of said brace, through the socket plate and through said reinforcing plate.

3. The combination with a silo, of a plurality of socket plates attached to the wall thereof at spaced intervals, each plate having its greatest length extending horizontally and therefore transversely to the staves of the silo, the face of each plate being formed with an integral inverted U-shaped flange, bolts passing through the

plate on each side of said flange and attaching the plate to the wall of the silo, a plurality of braces one for each socket plate extending upward and toward the wall of the silo and engaging with the corresponding socket formed by the flange on said plate, embedded anchoring members each rigidly connected to the lower end of one of said braces, and bolts passing through the wall of the silo, the socket plate and the upper end of the brace and holding the brace in engagement with the outer face of the socket plate and the under face of the flange.

4. The combination with a silo, of a plurality of socket plates mounted upon the silo wall at its upper end and at spaced intervals, a plurality of braces disposed in planes radial to the center of the silo, each brace engaging at its upper end with the corresponding socket plate, the lower end of each brace being spaced from the silo and formed with an embedded anchor, and an auxiliary intermediate brace attached to each of the first-named braces and extending and engaging against the wall of the silo above the ground to thereby resist any tendency of the wall to bulge.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

AUGUST HENKEL.

Witnesses:

J. B. LAPORTE,
H. M. L'HEUREUX.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."