

July 4, 1967

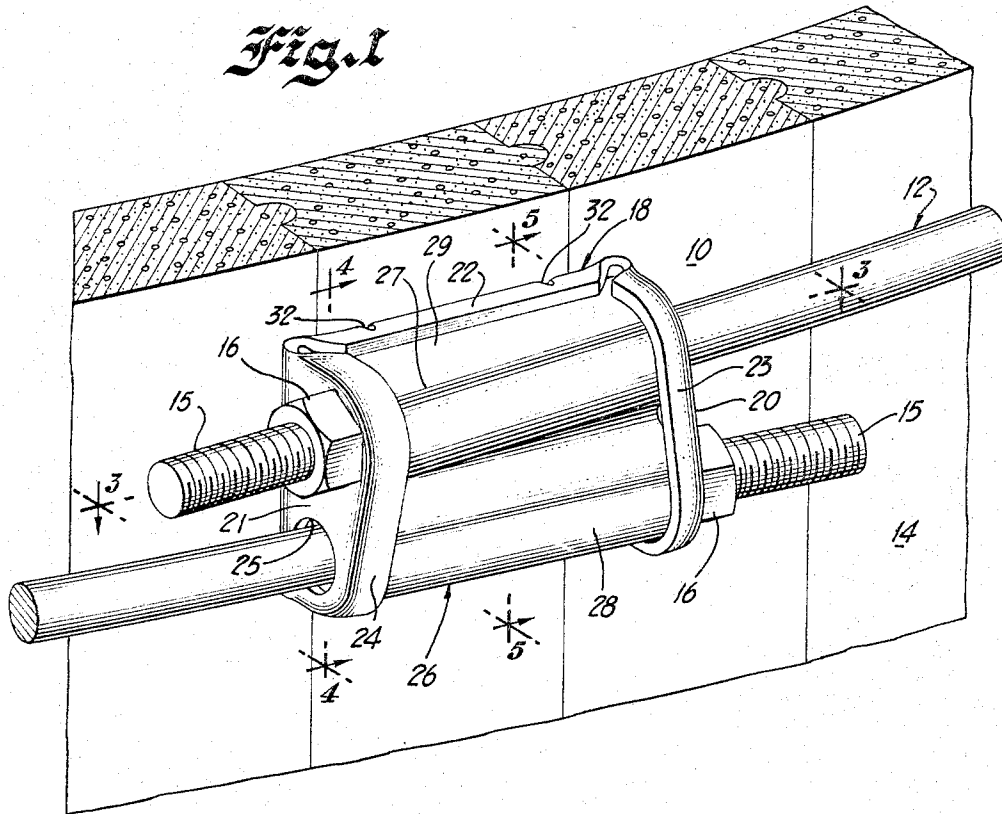
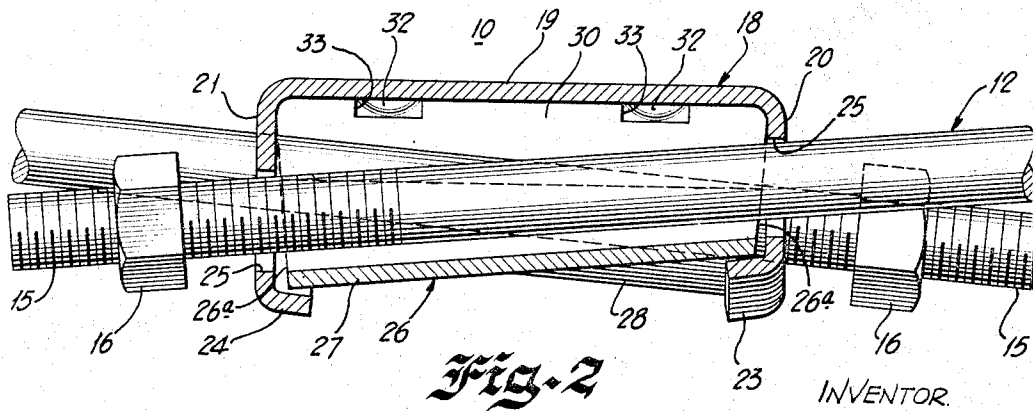
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3,329,296

LUG FOR SILO OR SIMILAR STRUCTURE

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3 Sheets-Sheet 1



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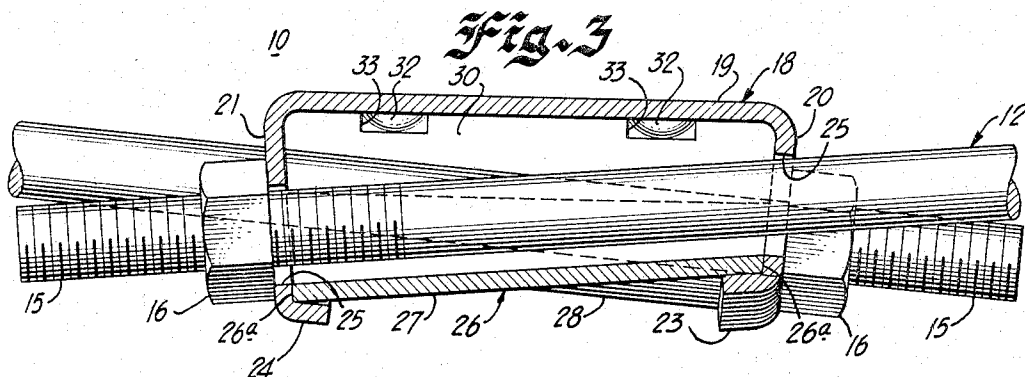
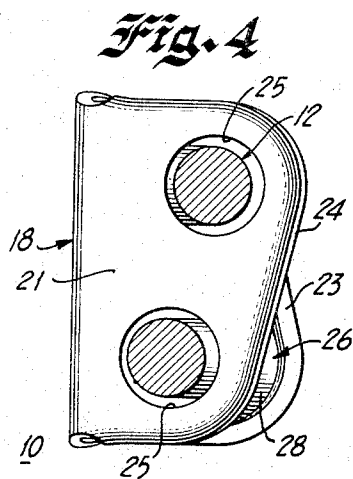
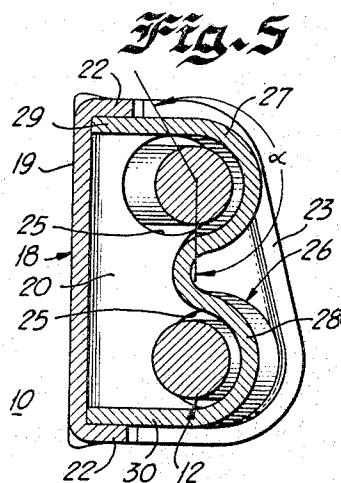
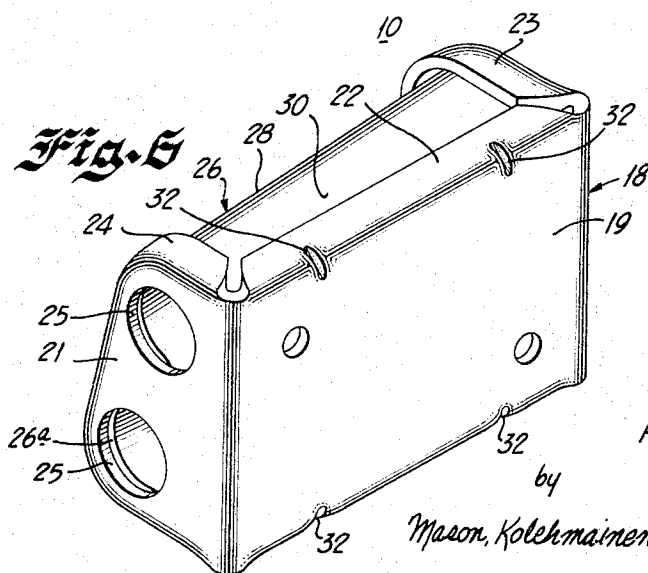
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LUG FOR SILO OR SIMILAR STRUCTURE

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3 Sheets-Sheet 2



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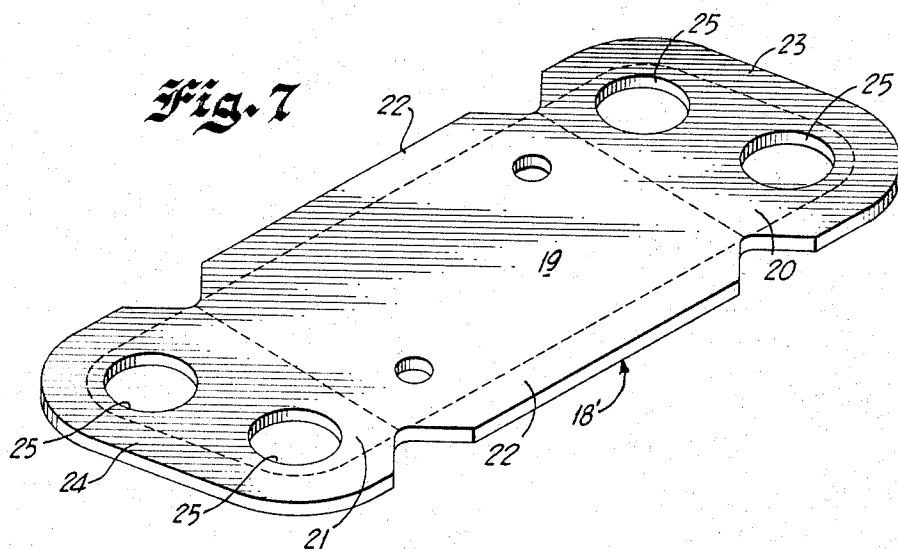
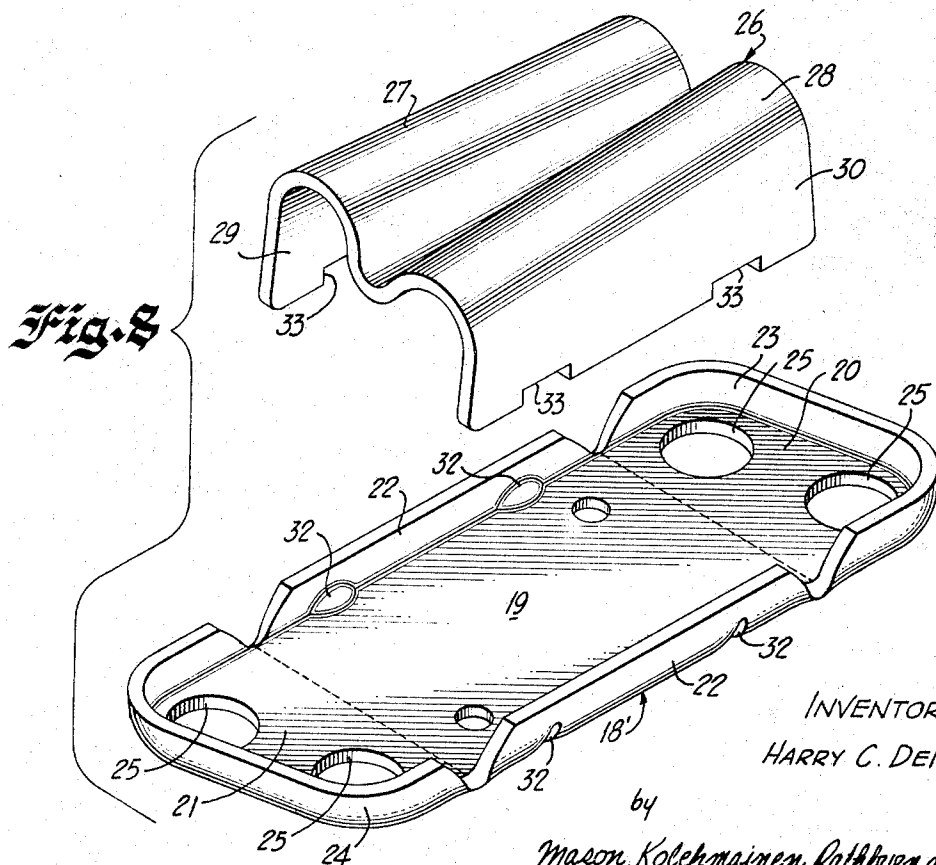
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LUG FOR SILO OR SIMILAR STRUCTURE

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3 Sheets-Sheet 3



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3,329,296

LUG FOR SILO OR SIMILAR STRUCTURE

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3 Claims. (Cl. 217-95)

This invention relates to silo lugs, and particularly to silo lugs used for receiving the screw threaded ends of the encircling rods or hoops on silos or similar structures such as tanks and forming bearings against which the nuts may be drawn up to tighten the rods or hoops.

Commercial silo lugs are generally cast from malleable iron and thereafter galvanized. With an ever increasing size and capacity of silos, tanks and storage bins, hoops of a larger diameter are required and silo lugs of great strength are needed. The lugs must withstand heavy pressure and in galvanizing the cast malleable lugs there is danger of weakening the lugs through crystallization during the heating of the lugs in the melted galvanizing material. Also the casting of the lugs is an expensive process, and, although the individual cost of a lug may not be too great, many lugs are used on a silo.

Silo lugs pressed from sheet material are also known. Such pressed silo lugs must be capable of withstanding the great tension load in the hoops.

Accordingly it is an object of the present invention to provide an improved silo lug which may be easily and economically made from pressed sheet material and which will be stronger and more durable than silo lugs made in the past.

A further object of the present invention is to provide an improved silo lug of the type described and having great strength to withstand high tensile loadings in the encircling hoop of the silo.

Yet a further object of the present invention is to provide an improved silo lug.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

In accordance with these and many other objects of the present invention, there is provided an improved fabricated metal silo lug according to the present invention and including a U-shaped base member having a generally rectangular-shaped bight portion and integral end walls bent at substantially right angles to the bight portion. A generally inverted W-shaped cap strut member is fitted against the bight portion. The base member is provided with side flanges bent up at substantially right angles to the bight portion and abutting against the outside surface of the side edges of the cap strut member. Additionally, the end walls are provided with end flanges bent at substantially right angles to the end walls and abutting the outer surface of the end edges of the cap strut member. Apertures for the hoops or silo rods are provided in the end walls.

Under load the end walls of the base member bear against the end edges of the cap strut member and the cap strut member provides a large bearing surface to withstand the load of each of the rods. In a particular embodiment, for example, wherein the W-shaped cap strut member is formed of a cross section of two longitudinally connected parallel cylindrical elements, there is provided a bearing surface closely surrounding each of the apertures in the end walls through an angular extent in excess of 180° and approximately 210° or greater. This large bearing surface provides substantial strength to the silo lug where strength is required.

Additionally, the end walls having the end flanges pro-

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vide a smooth, continuous end wall with considerable side material which minimizes the possibility of tearout in the sheet material and provides additional metal and strength to the lug.

Additionally, in accordance with another feature of the present invention, the intersection between the side flanges and the bight portion is staked at one or more areas thereby preventing the side flanges from bending outwardly and minimizing the column action in the side flanges.

It will be appreciated that, according to the present invention, the silo lug is formed of pressed sheet material and is provided with strengthening and reinforcing flanges and stakes in critical areas so that there is provided an improved silo lug possessing great strength and being very economical to manufacture.

For a better understanding of the present invention, reference may be had to the accompanying drawings wherein:

FIGURE 1 is a fragmentary perspective view of a section of a silo illustrating the connection of the hoop ends to an improved lug according to the present invention;

FIGURE 2 is a cross-sectional view of a hoop and lug joint prior to the tightening of the hoop nuts;

FIGURE 3 is a cross-sectional view of a hoop and lug joint, similar to FIGURE 2 but shown with the bolts of the hoops tightened and taken along line 3-3 of FIGURE 1;

FIGURE 4 is an end sectional view of a lug and hoop joint according to the present invention and taken along line 4-4 of FIGURE 1;

FIGURE 5 is a cross-sectional view of a hoop and lug joint according to the present invention and taken along line 5-5 of FIGURE 1;

FIGURE 6 is a rear perspective view of the silo lug according to the present invention;

FIGURE 7 is a developed view of the base metal of the improved silo lug according to the present invention; and

FIGURE 8 is an exploded perspective view of a silo lug according to the present invention prior to the assembly of the cap strut member with the base member.

Referring now to the drawings, and particularly to FIGURES 1 to 6 thereof, there is illustrated an improved silo lug 10 according to the present invention receiving the threaded ends of a silo hoop 12 encircling a silo 14. The silo 14 in the illustrated embodiment is made of concrete staves held together as a tank or cylinder by a plurality of the hoops 12. Customarily each of the hoops 12 is threaded at each end 15. The threaded ends 15 pass through the silo lug 10 and are secured with suitable nuts 16.

Referring now to the silo lug 10, the silo lug 10 includes a base member 18 of generally U shape and having a bight portion 19 joining respective end walls 20 and 21. The end walls 20 and 21 are bent at substantially right angles to the bight portion 19. Additionally, the base member 18 is provided with side flanges 22 bent at substantially right angles to the bight portion along the side edges thereof, and end flanges 23 and 24 are provided along the edges of the end walls 20 and 21, respectively, to provide strength and rigidity to the end walls. The end walls 20 and 21 are provided with two pairs of aligned openings 25 for receiving the opposite threaded ends 15 of the silo hoop 12. In order that the ends 15 be received tangentially from engagement with the silo 14, the axis of each pair of aligned openings are skewed at an opposite inclination to the bight portion, as best illustrated in FIGURES 2 and 3.

In order to form a strut or brace between the end walls 20 and 21, there is provided a cap strut member 26 of

generally inverted W shape. More particularly, the cap strut member is formed in cross section of two longitudinally connected partial cylindrical elements 27 and 28 terminating with parallel opposed side elements 29 and 30, respectively. The axis of the cylindrical elements 27 and 28 are skewed relative to each other to provide an opposite inclination thereof relative to the bight portion 19 of the base member 18. In the illustrated embodiment the partial cylindrical elements extend through an effective angle α , FIGURE 5, of approximately 210° .

To provide for stiffening the side flanges 22 and to prevent them from buckling out, and for minimizing the column action in the side flanges 22, the intersection between the side flanges 22 and the bight portion 19 is staked inwardly as at 32. Because the stakes 32 form a depression on the inner side of the base member 18, the cap strut member 26 is provided with recesses 33 along its inner edges to prevent interference with the stakes 32.

Advantageously the silo lug 10 according to the present invention may readily be pressed and stamped from sheet material as illustrated in FIGURES 7 and 8. More specifically, the base member 18 is stamped from sheet material to provide the stamping 18', FIGURES 7 and 8, with the openings 25 stamped therein. The side and end flanges 22, 23 and 24 are then formed, as best illustrated in FIGURE 8, and the stakes 32 are made. The formed cap strut member 26 is then set on the bight portion 19, the recesses 33 providing clearance for the stakes 32, with the side flanges 22 abutting against the outer surface of the edges of the cap strut member 26. Thereafter the end walls 20 and 21 are bent upwardly from the base member 19 with the end flanges 23 and 24 enclosing an abutting relation along the sides and across the top of the end of the cap strut member 26.

Although the end walls 20 and 21 will be bent at approximately right angles to the bight portion 19, as indicated in FIGURE 2, nevertheless because of the resiliency of the comparatively thick sheet material used in forming the silo lug 10 a slight angular deviation between the end walls and the side edges of the cap strut member 26 will exist. Subsequent tightening of the nuts 16 will draw the end walls 20 and 21 into abutting engagement with the ends of the cap strut member 26 to the position illustrated in FIGURE 3. It will be noticed that, since it is desirable for the nuts 16 to fit flat against the outside surface of the end walls 20 and 21, the end edges 26a of the cap strut member 26 diverge outwardly, normal to the inclination of the cylindrical elements 27 and 28 and normal to the inclination of the ends 15 of the hoop 12.

From the above detailed description it will be understood that the silo lug according to the present invention may be readily and economically formed from sheet material as by stamping and bending of the sheet material to produce a strong and inexpensive silo lug. The end walls 20 and 21, with their corresponding end flanges 23 and 24, provide strong bearing surfaces which will resist tearout between the openings 25 and the edges of the end walls. Additionally the encircling nature of the cylindrical elements 27 and 28 in the cap strut member 26 provides support of the end walls 20 and 21 over a substantial area adjacent the openings 25. The stakes 32 between the bight portion 19 and the side flanges 22 provide increased strength and rigidity to the bight portion 19 and the side flanges 22.

Although the present invention has been described by reference to only a single embodiment thereof, it will be apparent that numerous other modifications and embodiments will be devised by those skilled in the art which will

fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A metal silo lug fabricated from sheet metal comprising a U-shaped base member having a generally rectangular-shaped bight portion and integral end walls bent at substantially right angles to said bight portion, said end walls being provided with two pairs of aligned openings for permitting opposite ends of tie rods to extend therethrough, the axis of each pair of said aligned openings being at an opposite inclination to the bight portion to receive the opposite ends of silo rods as they extend tangentially from engagement with a silo, and a generally inverted W-shaped cap strut member fitting against said bight portion, said cap strut member being formed in cross section of two similar longitudinally connected partially cylindrical elements and terminating with parallel opposed side elements extending tangentially from the outer edges of said cylindrical elements, the inner connecting portion of said cylindrical elements extending substantially to a line connecting the center of said aligned openings, said base member being provided with side flanges bent at substantially right angles to said bight portion and abutting the outside surface of the side edges of said cap strut member, said base member further being provided with end flanges bent at substantially right angles to said end walls abutting the outer surface of the end edges of said cap strut member, said end walls being adapted to bear against the end edges of said cap strut member.

2. A silo lug as set forth in claim 1 wherein the intersection between said bight portion and said side flanges is provided with inwardly extending stakes for stiffening said flanges and reducing column action therein.

3. A metal silo lug fabricated from sheet metal comprising a U-shaped base member having a generally rectangular-shaped bight portion and integral end walls bent at substantially right angles to said bight portion, said end walls being provided with two pairs of aligned openings for permitting opposite ends of tie rods to extend therethrough, the axis of each pair of said aligned openings being at an opposite inclination to the bight portion to receive the opposite ends of silo rods as they extend tangentially from engagement with a silo, and a generally inverted W-shaped cap strut member fitting against said bight portion, said cap strut member being formed in cross section of two similar longitudinally connected partially cylindrical elements and terminating with parallel opposed side elements extending tangentially from the outer edges of said cylindrical elements, the inner connecting portion of said cylindrical elements extending substantially to a line connecting the center of said aligned openings, said base member further being provided with end flanges bent at substantially right angles to said end walls abutting the outer surface of the end edges of said cap strut member, said end walls being adapted to bear against the end edges of said cap strut member.

References Cited

UNITED STATES PATENTS

1,680,913	8/1928	Rassmann	217—95
2,244,728	6/1941	Rutten	217—95
2,406,054	8/1946	Anderson	217—95
2,741,390	4/1956	Moore	220—4
2,968,416	1/1961	Rutten	217—95

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