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C. HUNGERFORD.

SILO.

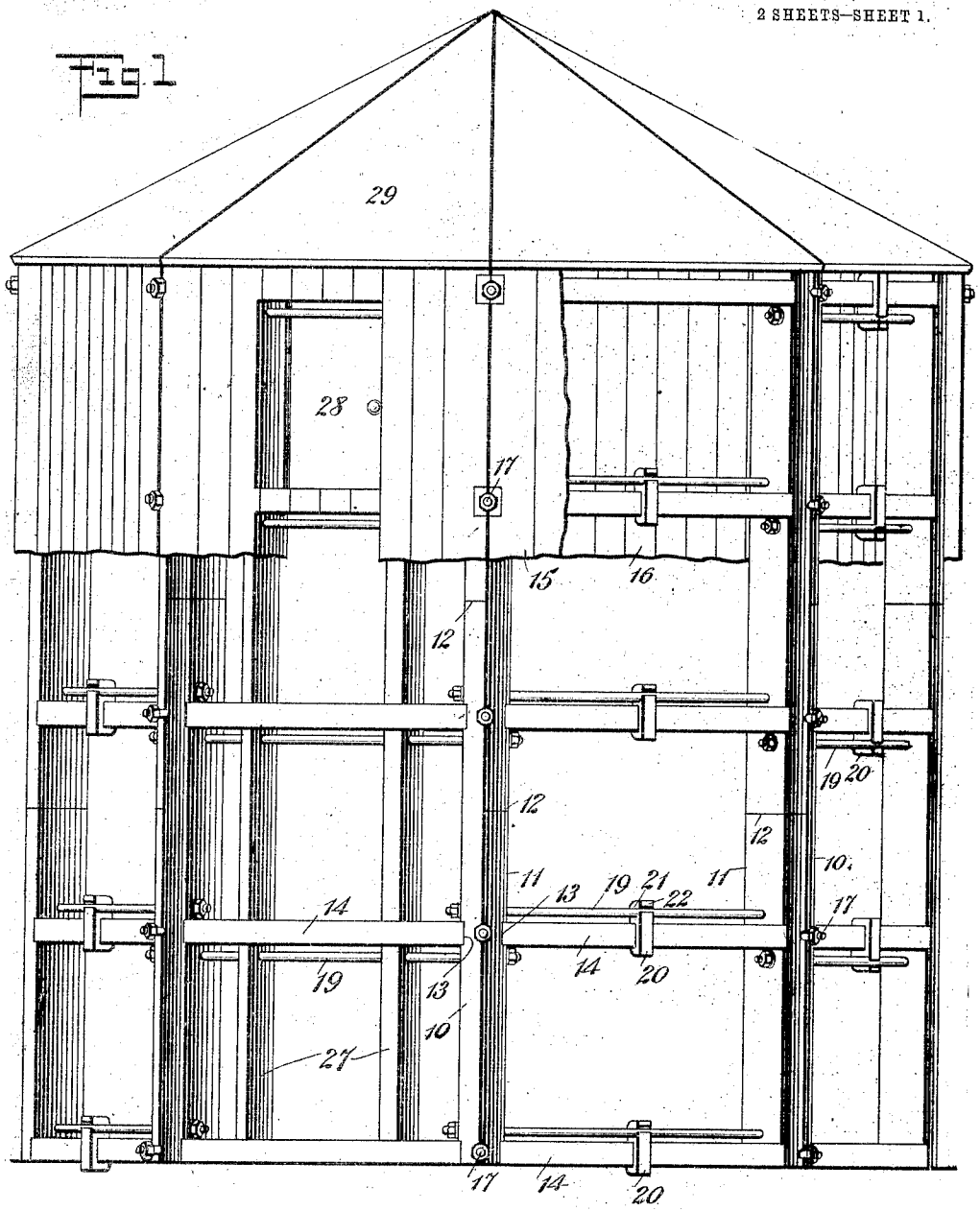
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1,099,749.

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2 SHEETS—SHEET 1.

Fig 1



WITNESSES

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2 SHEETS—SHEET 2.

Fig 2

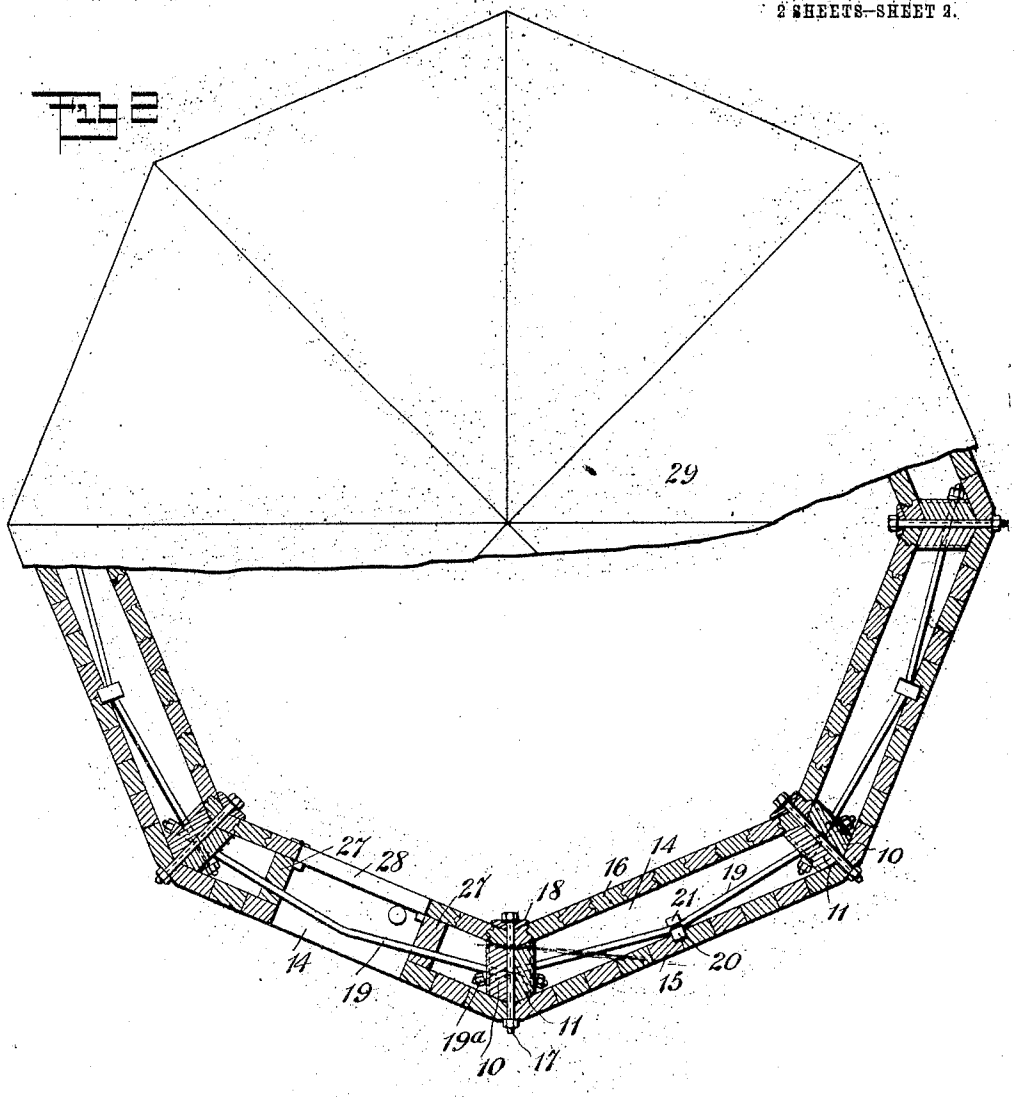
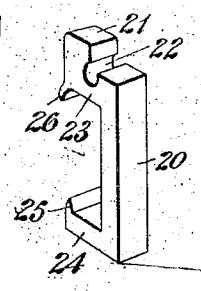


Fig 3



WITNESSES

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To all whom it may concern:

Be it known that I, CHARLES HUNGERFORD, a citizen of the United States, and a resident of Soldier, in the county of Jackson and State of Kansas, have invented new and useful Improvements in Silos, of which the following is a full, clear, and exact description.

An object of my invention is to provide a structure particularly adapted for silos, and in which uprights are employed, together with horizontal tie elements so arranged as to form a complete tie between the upright members around the structure without the disadvantages of the hoop and stave construction, or equivalent types, of silos, said hoop and stave types being, as is known, liable to distortion under the strains of swelling and shrinking.

A further object of the invention is to provide a structure formed for the most part of elements readily available, even in country towns.

The invention also has for its object to provide a construction embodying a novel arrangement of uprights and horizontal beams, whereby the necessary strength will be given the structure as it progresses, and the elements entering into the construction will be so disposed as to provide a convenient and effective support for planks or other platform elements without the necessity of erecting scaffolding.

The invention furthermore has for its object to provide a structure which may be quickly and conveniently erected at a minimum cost and will possess increased strength.

This invention will be particularly explained in the specific description following.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of a silo constructed in accordance with my invention, portions of the outer covering and inner lining being broken away; Fig. 2 is a partly sectional plan view of the complete structure; and Fig. 3 is a perspective view of a novel strut element entering into the structure.

In carrying out the practical embodiment of my invention as illustrated, a series of spaced uprights are provided, each upright being formed of separate side sections 10, 11, and each section being formed of a plurality of members in vertical succession, the respective members of the sections of an upright overlapping to break joint, said joints being indicated by the numeral 12. Opposite side faces of the uprights are formed with mortises 13 which receive the ends of horizontal beams 14 which will be utilized as nail ties when boarding is employed for the outer covering 15 and the inner lining 16. The covering and lining are laid on the horizontal beams and also on the inner and outer faces of the sections 10, 11 forming the uprights. In the case of a polygonal silo the inner and outer faces of the uprights are reversely beveled, as shown in Fig. 2, and those boards applied to or overlapping the uprights will have a corresponding angle, and preferably present joints in line with the vertical joints between the respective sections 10, 11, of the uprights. Transverse bolts 17 extend through the uprights at the vertical joints, and between adjacent elements of the covering 15 and lining 16, there being a batten 18 on the lining adjacent to each upright and disposed so as to cover the joint. Either wood or metal lining may be used.

In order to avoid the use of continuous hoops around the silo and yet obtain an effective continuous horizontal tie extending around the silo between the respective uprights, I provide tie elements 19, there being separate series of tie rods extending between adjacent uprights and through the respective sections 10, 11, thereof. These tie elements 19 are in the form of horizontally disposed truss rods, as seen clearly in Fig. 2, nuts 19^a being employed on the threaded ends thereof.

In connection with the truss rods 19 and the horizontal beams 14, I provide a novel arrangement of strut elements in the form of blocks 20, which present vertically offset members 21 disposed above and below the horizontal beams 14 and are formed to engage the truss rods and bear against the said beams. As will be seen from Fig. 1, the adjacent horizontal truss rods 19 are arranged alternately above and below the horizontal beams 14, in order to form an effective tie between the adjacent uprights and provide the desired endwise pressure against the horizontal beams. To conform to the alternate positions of the truss rods 19

above and below the horizontal beams 14, the blocks 20 of alternate vertical series are inverted so that horizontally alternating blocks will alternately present the offsets 21 above and below the horizontal beams. Each block 20 has at one face of the strut offset 21, an undercut recess 22, to receive a truss rod. The offset is formed on a rearwardly extending arm 23 at the top of the block, there being a second rearwardly extending arm 24 at the back of the block, at the bottom, said arms 23, 24, being spaced to slip over the front edge of a horizontal beam 14, so as to dispose one arm on top of the beam and one below the same. The lower arm 24, as appears in Fig. 3, is preferably provided with a beveled, upwardly-extending tooth or rib 25, and there may also be a toothed rib or tooth 26 at the inner end of the upper arm 23 of the said block.

In practice, the bearing block may be driven onto a beam 14 from the front, and when the block is made of malleable iron or equivalent material, the lower arm 24 may be hammered upwardly to drive the tooth 25 into the under side of the beam. The recess provided by the arms 23, 24, will in any event afford a firm bearing for the block against the beam, so that the rocking strain exerted through the strut in a rearward direction will be resisted and the block held against displacement.

In constructing the silo, sections 10 of the uprights and shorter sections 11 are arranged in position; horizontal beams 14 are located in succession between a pair of uprights, and one or more of the tie trusses 19 are secured in place to tie the two adjacent uprights together, and tie the respective sections of each upright, with the positioned horizontal beams tightly held in place. Similarly, the lower sections 10, 11, of successive uprights around the silo are positioned in proper sequence with their complement of horizontal beams 14 and truss ties 19. The beams 14, as the construction progresses, will afford proper support for any platform planks required in lieu of scaffolding. The platform so provided is thus utilized to conveniently secure additional overlapping sections 10, 11 of the uprights in position on top of the sections first placed, and the necessary complement of additional vertically spaced beams 14, and truss rods 19, are placed in position in connection with the said additional upright sections. Before securing a tie truss, it is understood that a strut element 20 for said truss is placed in position on the adjacent horizontal beam 14. Between any two of the uprights, doorposts 27 may be positioned to receive any approved arrangement of doors 28 the said posts presenting a door opening between adjacent horizontal beams 14. The said horizontal beams constitute the door-way ladder in the completed structure, and strut elements 20 may be omitted at the door structure. It is to be noted also, that in the erection of the framework of the structure, successive horizontal beams 14 and adjacent upright sections, constitute in effect, ladders for the convenient use of the workmen. Any suitable roof 29 is provided for the structure.

A very marked advantage of the described manner of forming and assembling the elements for the silo is, that the structure can be made up in any desired number of sections in order to make it readily portable. The comparatively few elements entering into the structure enables unskilled labor to readily assemble the parts. Thus the extreme portability makes it convenient to cart or ship the elements more or less assembled to where corn is purchased in quantity, and permits of the structure being erected at the point of consignment by such labor as may be available.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:

1. In a structure of the character described, spaced uprights, each composed of separate side sections in close relation, and each section being formed of a plurality of members in vertical succession, the members of the respective sections overlapping to break joint, horizontal beams extending between adjacent uprights and disposed endwise to the same, and separate horizontal tie rods disposed between horizontal beams and extending through the respective side sections of adjacent uprights.

2. In a structure of the character described, spaced uprights, each composed of separate sections in close relation, and each section being formed of a plurality of members in vertical succession, the members of the respective sections overlapping to break joint, horizontal beams extending between adjacent uprights and disposed endwise to the same, tie means extending between adjacent uprights and disposed between vertically adjacent beams, an outer covering and an inner lining on the beams and uprights, the lining presenting vertical joints at the uprights, battens over said joints, and transverse bolts extending through the uprights between the sections thereof, through the lining at said vertical joint, and through the battens.

3. In a structure of the character described, spaced uprights, horizontal beams extending between adjacent uprights and disposed endwise thereto, truss rods connecting adjacent uprights, and strut elements associated with the horizontal beams and engaging the truss rods, said strut elements comprising blocks recessed to receive an

edge of a beam, said blocks having offsets receiving in the face thereof the adjacent truss rods.

4. In a structure of the character described, spaced uprights, horizontal beams extending between the uprights and disposed endwise thereto, truss rods forming ties between adjacent uprights adjacent to the beams, blocks having spaced arms to overlie and underlie the beams, and strut offsets on said blocks at an end thereof, the said offsets having undercut recesses receiving the adjacent truss rods.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES HUNGERFORD.

Witnesses:

VIRGINIA A. WILSON,

ALLAN F. WILSON.