(No Model.) 3 Sheets—Sheet 1.

E. O. FALLIS.

METALLIC GRAIN STORAGE BUILDING.

No. 521,951. Patented June 26, 1894.

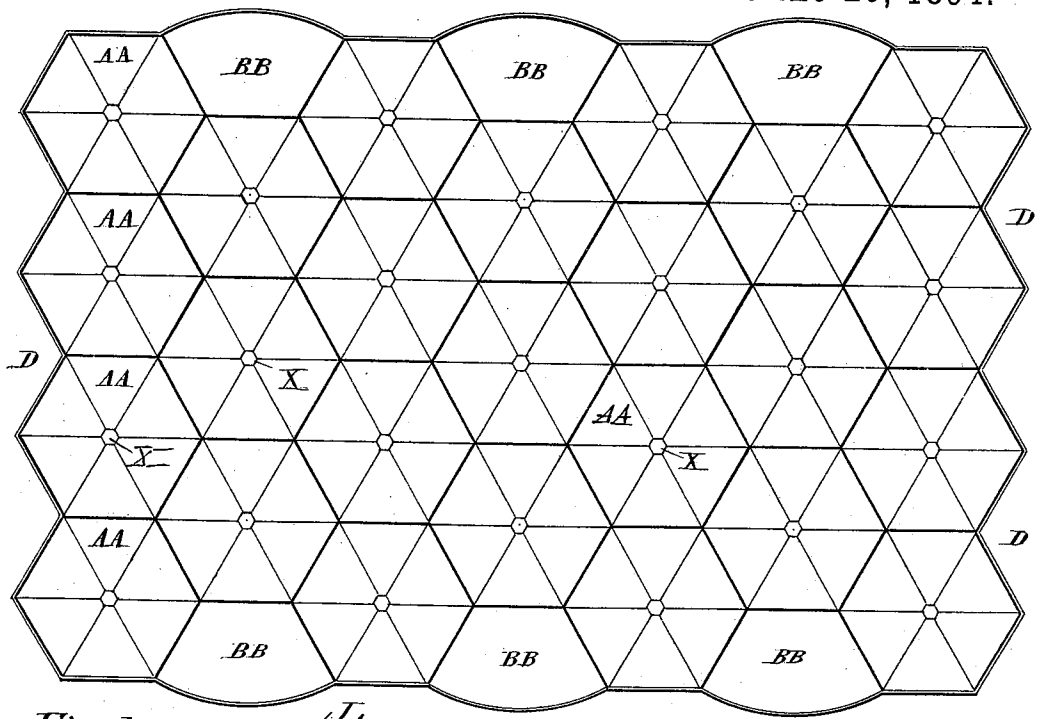

Fig. 1.

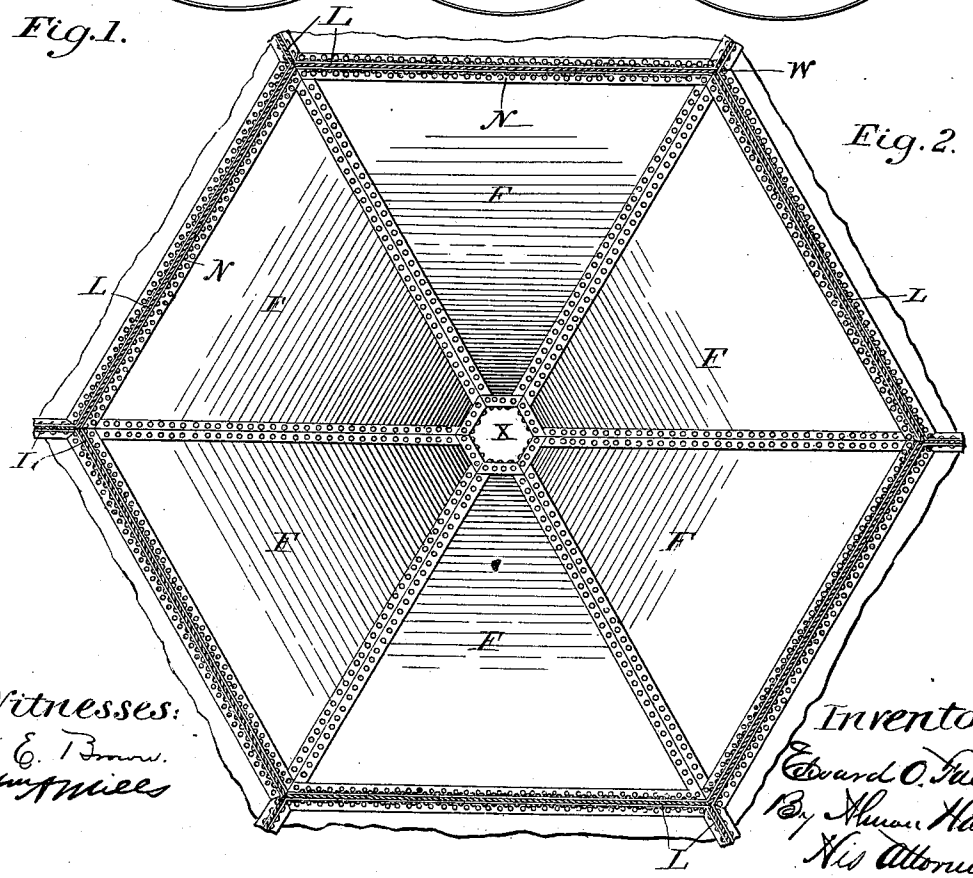

Fig. 2.

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Fig. 5.

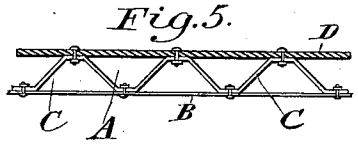

Fig. 4.

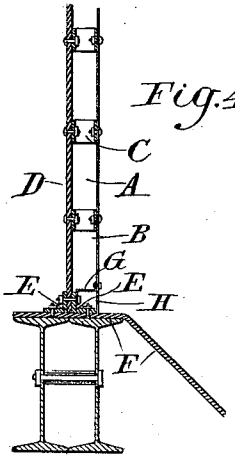

Fig. 3.

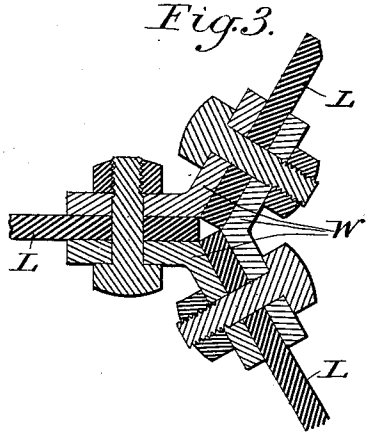

Fig. 6.

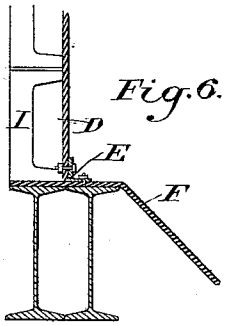

Fig. 8.

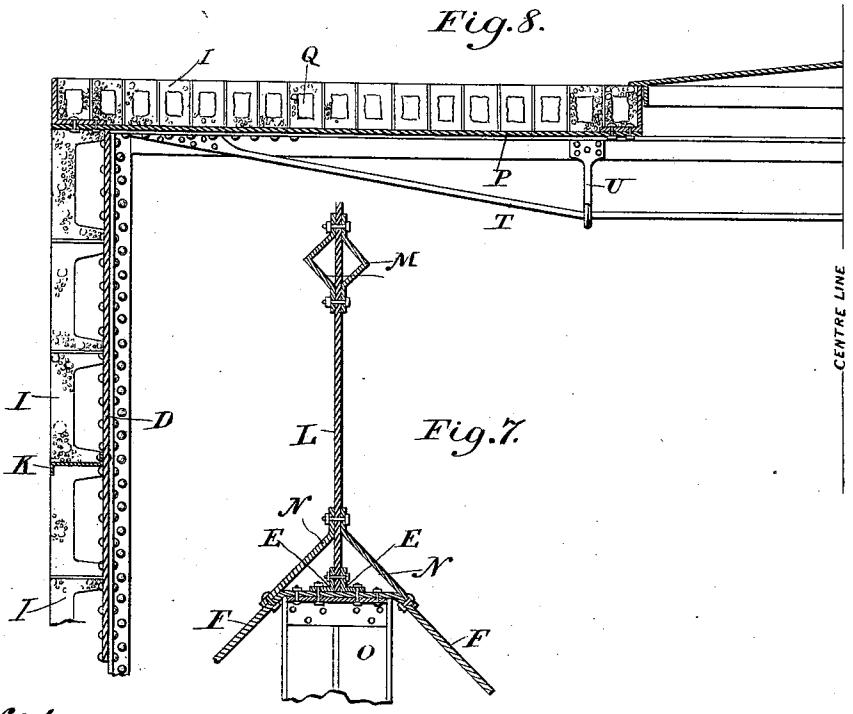

Fig. 7.

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(No Model.) 3 Sheets—Sheet 3.

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METALLIC GRAIN STORAGE BUILDING.

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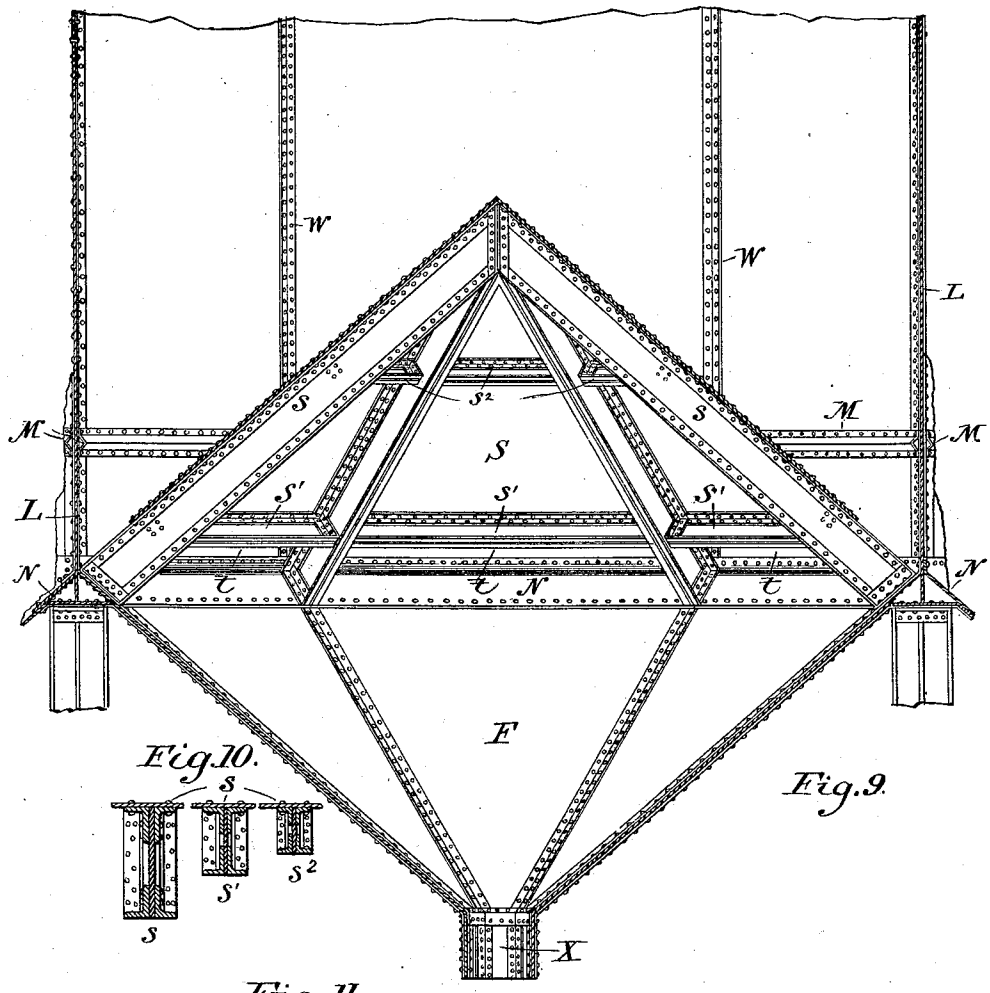
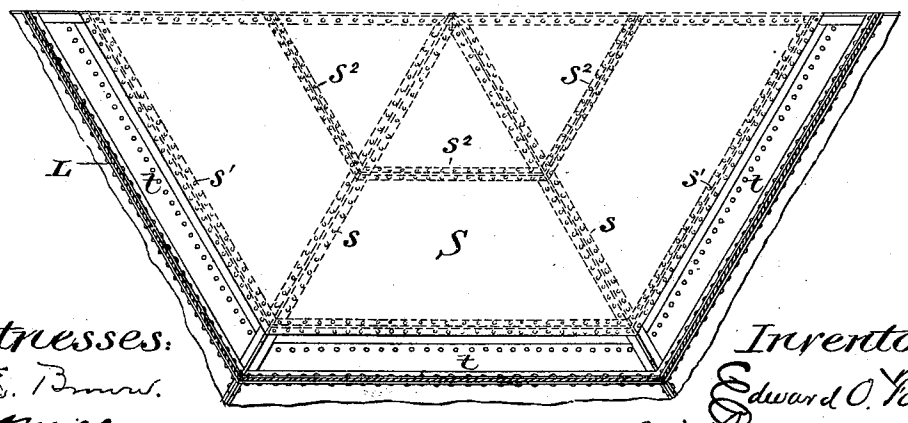


Fig. 9.

Fig. 10.

Fig. 11.



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UNITED STATES PATENT OFFICE.

EDWARD O. FALLIS, OF TOLEDO, OHIO.

METALLIC GRAIN-STORAGE BUILDING.

SPECIFICATION forming part of Letters Patent No. 521,951, dated June 26, 1894.

Application filed November 3, 1893. Serial No. 489,953. (No model.)

To all whom it may concern:

Be it known that I, EDWARD O. FALLIS, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented a certain new and useful Metallic Grain-Storage Building, of which the following is a specification.

My invention relates to improvements in the form and construction of metal buildings for the storage of grain; and its object is to provide a building which shall be strong, durable and fire-proof, interchangeable in parts, easily and rapidly constructed or taken down, and which shall afford the greatest amount of strength and storage capacity in proportion to the amount of metal used, and in proportion to the area of ground occupied.

The further object of my invention is to so construct the grain-bins of my warehouse that the light and heavy grain contained in said bins shall be thoroughly mixed before passing from the hopper.

I attain these objects by means of the devices and construction and arrangement of parts hereinafter described, and shown and illustrated in the accompanying drawings, made part hereof, in which—

Figure 1, is a general, horizontal, sectional plan of my warehouse, showing the arrangement of the storage and weighing bins hereinafter referred to; Fig. 2, an enlarged plan view, in detail, of the bottom of one of the bins hereinafter referred to; Fig. 3, a horizontal, sectional view, in detail, of three meeting plates or walls of my hexagonal bins, and the manner of securing them rigidly together; Fig. 4, a vertical section of the outside wall of the building and its supports; Fig. 5, a horizontal, sectional view of the same; Fig. 6, a vertical section of such part of the outside wall as may be exposed to extraneous fire; Fig. 7, a vertical section through the partition walls and bottoms of the bins at their junctions; Fig. 8, a vertical section through the top and side of a bin provided with fire-proof covering, showing the manner of attaching such covering; Fig. 9, a vertical, sectional view of one of the bins of my building, provided with the conical grain deflector hereinafter referred to; Fig. 10, details of said deflector hereinafter referred to, and Fig. 11, a plan view of one-half of said deflector.

Like letters of reference represent like parts throughout the several views.

The metallic, grain storage house, which is the subject of my invention, consists of numerous, contiguous, hexagonal compartments or bins, (A, A, Fig. 1,) arranged in connection with each other, as are the cells of the comb of the honey-bee, the walls, and bottoms, and, if desired, the tops of these bins being constructed entirely of metal sheets or plates. The radiating walls, L, of the adjoining hexagonal bins form a series of braces and ties, and provide means for distributing weights and strains over large areas, a feature very essential in the storage of grain.

The spaces, "B, B," (Fig. 1,) formed at the sides of the building by the interruption of the progression of the hexagonal figure, are designed as weighing or shipping bins or hoppers, the outside walls of these hoppers being curved or segmental in plan, forming a wall that will not be subject to movement by varying loads. The bins may be of any height or depth required and of any horizontal area, within the limit of strength. The bins may be supported directly on foundation walls, or on columns placed under the walls at their meeting point, as in Fig. 7, or on beams, as in Figs. 4 and 6, suitably supported on foundations or pillars. In practice such is the strength of a building constructed according to my plan, that, within certain limits of area, supporting pillars or foundation walls may be dispensed with, except under the outer walls. The plates or sheets of metal composing the walls, L, and bottoms, F, of the bins vary and are graduated in thickness in proportion to the strain. The partition-walls of the adjoining bins meet, or radiate, at an angle of one hundred and twenty degrees, and are rigidly secured together by vertical metal strips W, formed and fitted into the angles, and bolts or rivets passing through the partition-walls and the two opposite angle-strips W, as shown in Fig. 3. These angle-strips W, are also used to unite the plates forming the bottoms of the bins. The bottoms of the bins are, preferably, in the form of an inverted, hexagonal frustum. At the meeting point of the converging, inclined plates, forming the bottom or hopper of the bin is an opening X, provided with a suitable slide or valve, for

the discharge, by gravity, of the contents of the bin. The opening X may, however, be located wherever desired, and the inclination of the bottoms of the bins may accordingly be varied to conform to such point of discharge. The bottoms of the bins are joined to the partition-walls by angle-irons, E, riveted or bolted to both. The outer margins of the bottom sheets, F, are flanged, at an obtuse angle, to form a level, supporting surface for the partition-walls, and a level bearing surface for the foundations, pillars or beams upon which the structure rests, (see Figs. 4, 6 and 7.) Continuous strengthening plates N, (see Fig. 7,) join the bottom, F, of each bin with the partitions L, and serve in a two-fold capacity, that of adding to the strength and uniform slant of the bin-bottom, and serving, also, as the lower chord or tension-member of a beam, of which the continuous stiffening plates M, bolted or riveted to the partition-walls, form the top chord or compression-member, and that part of the wall L lying between these two chords, the web-member.

The outside wall of the building here described, is shown in vertical section in Fig. 4, and in horizontal section in Fig. 5. In these figures, A is a dead-air space between the inside lining B, and the outside shell D, which are connected by horizontal, zig-zag strips C, bolted or riveted thereto. G is a gutter of copper or other suitable metal suitably attached to the inner and outer walls near their lower edges. The object of the arrangement here described is to prevent the condensation of moisture within the bins where the grain is stored.

When the outside shell is exposed to temperature lower than that within the bins, moisture will be condensed and collected upon its inner surface, and will flow down into gutter G, and will be conducted off through suitable traps, (not shown in the drawings,) arranged to prevent ingress of outer air to the dead-air space A. The dead air space will be neutralized in temperature by the bulk of grain, thereby preventing condensation on the inside shell.

The construction of the outside walls, above described, may be departed from when the outside shell is in whole or in part to be protected from extraneous fire.

Fig. 6, shows in vertical section an outside wall in which the shell D, is protected by a covering of terra cotta blocks, I. These blocks should be laid in mortar and should rest upon projecting flanges of the bin-bottoms, and upon shelves or ledges K, (Fig. 8,) secured to the outer shell at intervals between the top and bottom of the bins. The terra cotta blocks I, are designed to be made with legs or projections on their inner vertical face, which legs or projections rest against the shell D. The openings between the legs or projections of the inner faces of the blocks I, furnish a continuous air space next to shell D, which serves the same purpose as the air space A, above described.

When the structure above the bins is composed of inflammable material, the fire proofing of terra cotta blocks should be continued over the bins, as shown in section in Fig. 8, in which the terra cotta blocks are supported upon angle beams P which are trussed and supported by tension-rods T and struts U. When the structure above the bins is not inflammable simply an iron covering is to be used.

Grain-bins are usually filled by conveying the grain to a point above the bin, on its central, vertical line, and then allowing the grain to fall into the bin. The grain as it accumulates, piles up in a cone-shaped heap, the heavy grains falling straight down, while the lighter grains and the chaff roll down the surface of the conical heap until they reach the walls of the bin. It follows that the bin will contain a core of the heavier grains, while the outside of the heap, next to the walls of the bin, will contain an undue proportion of the lighter and inferior part of the grain. As the grain is drawn off from the middle of the heap, through the opening in the bottom of the hopper, the best of the grain is first discharged separately, and the inferior part follows. Thus it sometimes happens that from a bin which has been filled with wheat which has been inspected and graded as No. 2 wheat, there will be drawn, at first, No. 1 wheat, and, later, No. 3 or No. 4 wheat, but no No. 2 wheat. To overcome the difficulty here pointed out I provide the device shown in Figs. 9 and 11, in which S is a hollow, sheet-metal, cone, preferably hexagonal in horizontal section, resting, at its base, upon the converging sides of the hopper-bottom of the bin. This cone or deflector may be constructed of iron braces or rafters *s*, their lower ends being secured to the sides of the bin, or, preferably, resting upon the hopper bottom of the bin, and meeting at their upper ends at or near the vertical axis of the bin. Upon these rafters rest horizontal beams or purlins s', s^2, uniting pieces *s*, this frame-work being covered with sheet metal plates which extend from the top of the cone or deflector nearly to the sides or bottom of the bin. Between the lower margin of the covering of the deflector and the sides or bottom of the bin are openings *t*, leading from the bin to the hopper. When grain is drawn from the bin into the hopper the heavier grain in the center of the bin, when it reaches the cone or deflector, is caused to flow down the surface of the cone toward the openings *t*, where it meets and mingles with the lighter grain which is descending vertically, with the result, that the contents of the hopper, thus mixed, are of the same grade as that originally placed in the bin. It will be observed that the construction of the grain deflector here shown adds strength and rigidity to the bins, and somewhat relieves the hopper bottoms of the great

weight and strain to which they would otherwise be subject.

Having fully described my invention and the manner of constructing and using the same, what I claim, and desire to secure by Letters Patent, is—

1. In a grain storage building, a series of sheet metal bins having partition walls meeting at an angle of one hundred and twenty degrees, in combination with vertical strips (W), bent at a corresponding angle, and suitably secured to each other and to the partition walls in each of the angles of their meeting lines, substantially as shown and described, for the purpose specified.

2. In a grain storage building, a series of contiguous sheet metal bins, hexagonal in horizontal section, and sheet metal hopper bottoms, the said hopper bottoms having at their upper outer edges horizontal flanges which meet under the partition walls of adjacent bins, in combination with angle-irons secured to each other and uniting said walls and hopper bottoms, substantially as and for the purpose specified.

3. In a grain storage building, a series of contiguous sheet metal bins, hexagonal in horizontal section and sheet metal hopper bottoms having at their upper outer edges horizontal flanges, in combination with continuous strengthening plates (N) secured to the walls and to the hopper bottoms of the bins, and the angle-irons or plates (M) attached to the walls of said bins, substantially as shown and described for the purpose specified.

4. In a grain storage building, a series of contiguous sheet metal bins, hexagonal in horizontal section, sheet metal hopper bottoms, the said hopper bottoms having at their upper, outer edges horizontal flanges, and angle irons (M) secured to and uniting said walls and bottoms, in combination with strengthening plates (N) secured to said walls and bottoms, and strengthening plates (M) secured to said walls, substantially as and for the purposes specified.

5. In a grain storage building having sheet metal outer walls, the herein described covering for said walls consisting of blocks of terra cotta or like substance having projecting legs on their inner surfaces, whereby an air space is formed next to the exterior of the metal wall, in combination with shelves or ledges secured to said metal wall and adapted to engage said terra cotta covering, substantially as shown and described and for the purpose specified.

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