No. 844,633. PATENTED FEB. 19, 1907.

J. H. TROMANHAUSER.

STORAGE BIN.

APPLICATION FILED APR. 8, 1905.

2 SHEETS—SHEET 1.

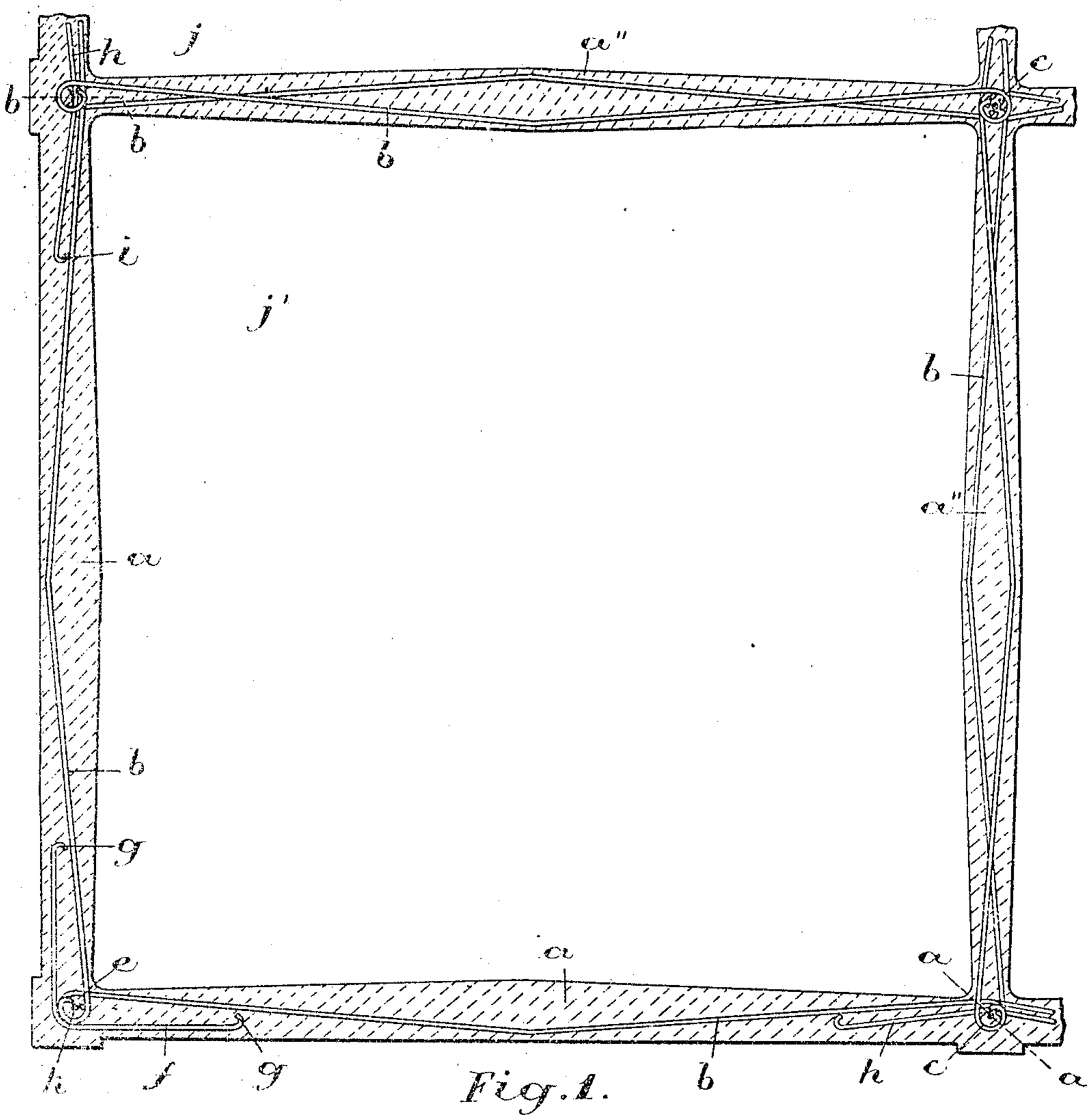

Fig. 1.

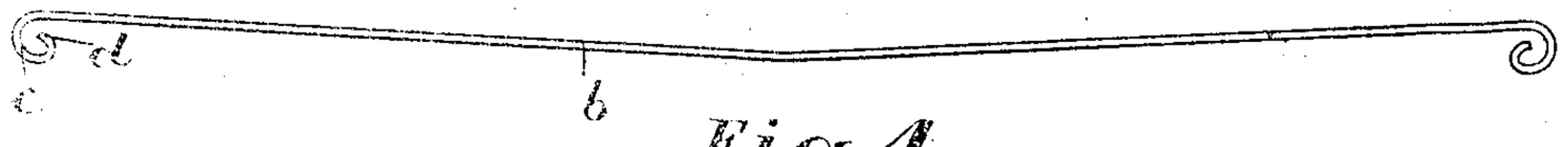

Fig. 4.

Witnesses.
H. C. Trimble.
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2 SHEETS—SHEET 2.

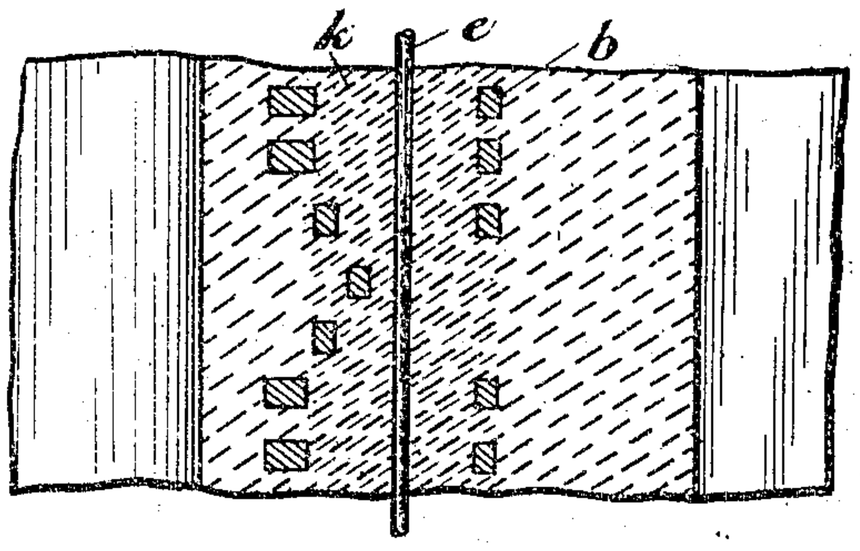

Fig. 2.

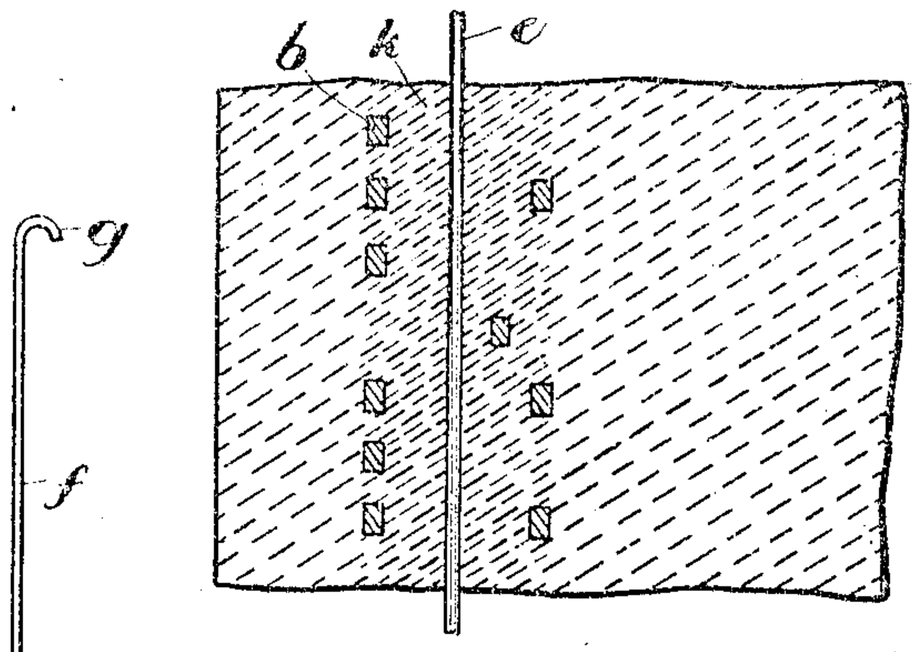

Fig. 3.

Fig. 5.

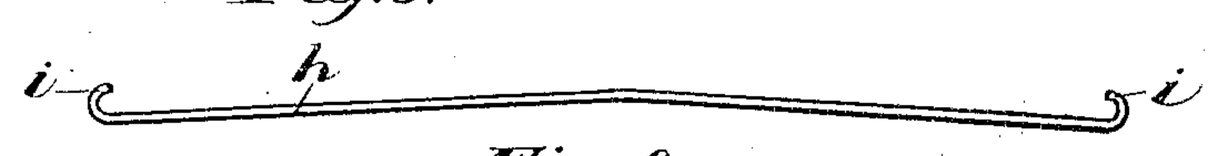

Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

JESSE H. TROMANHAUSER, OF MINNEAPOLIS, MINNESOTA.

STORAGE-BIN.

No. 844,633. Specification of Letters Patent. Patented Feb. 19, 1907.

Application filed April 8, 1905. Serial No. 254,528.

To all whom it may concern:

Be it known that I, JESSE H. TROMANHAUSER, of Minneapolis, in the county of Hennepin and State of Minnesota, one of the United States of America, have invented certain new and useful Improvements in Storage-Bins; and I hereby declare that the following is a full, clear, and exact description of the same.

In my former application for Letters Patent of the United States for improvements in storage-bins, filed October 15, 1904, Serial No. 228,649, the walls are described as being constructed of concrete and braced by longitudinally-disposed binding-stays having anchor-loops of a pear or kite shape formation overlapping at the corners of the structure and engaging concrete-anchors forming homogeneous parts of the walls. This construction is eminently satisfactory so far as the purposes for which the invention is intended; but owing to the formation of the anchor-loops it is necessary to make the binding-stays of a good quality of metal and to employ skilled labor to shape them, thus adding to the cost of erecting the structure without imparting any corresponding advantage.

In the construction described in the above-mentioned application centering-rods are embedded in the concrete to correctly position the binding-stays as the walls are erected, and to place the binding-stays in position it is necessary to raise the anchor loops to the top of and then lower them down the centering-rods until the binding-stays come into contact with the erected structure, an operation which complicates and retards the progress of the work and adds to its cost.

The present invention relates to the construction of a storage-bin in which the walls are strengthened by truss-rods and tied together at the corners by angular tie-rods to resist the crushing strains to which they may be subjected when the storage-bin is in use, and the object of the present invention is to form the truss-rods with anchor-hooks to engage the concrete anchors extending vertically through them and forming an homogeneous part of the material of which the walls are constructed, the anchor-hooks having inturned locking members to resist their withdrawal from the concrete anchorage.

A further feature of the invention is to provide the outer walls opposite the cross-walls with strengthening-rods, the ends of such strengthening-rods being of a hook-shape formation to prevent their displacement in the material.

For a full understanding of the invention, reference is to be had to the following description and to the accompanying drawings, in which—

Figure 1 is a plan view of a portion of a structure suitable for elevator purposes, showing one complete storage-bin and a portion of the walls for two other storage-bins to illustrate the location and formation of the truss-rods and the angular tie and strengthening rods. Fig. 2 is a vertical section taken obliquely through one of the outer corners of the bin on the lines *a a*, Fig. 1. Fig. 3 is a vertical section taken transversely through the outer wall at its junction with one of the cross-walls on the line *b b*, Fig. 1. Fig. 4 is a detail view of one of the truss-rods. Fig. 5 is a detail view of one of the angular tie-rods, and Fig. 6 is a detail view of one of the strengthening-rods.

Like letters of reference refer to like parts throughout the specifications and drawings.

As the construction of all of the bins in a four-bin structure is exactly the same, the description of the construction of one bin will explain the construction of the others. The walls *a* and *a'* are built of a cement mixture, and during their erection the truss-rods *b* are embedded in them with their anchor-hooks *c* overlapping and correctly centered at the corners of the outer walls and at the junction of the outer walls with the cross-walls. In making the truss-rods *b* the anchor-hooks *c* are formed by bending the ends of the truss-rods preferably into a semicircular or other suitable hook-shape, as shown in Fig. 4 of the drawings, with inturned lips *d*, arranged tangentially to the curved or body portion for the purpose of forming locking members to resist the displacement of the anchor-hooks from the concrete anchorage under the influence of the load upon the truss-rods. In erecting the walls the truss-rods are embedded in the walls *a* with their anchor-hooks *c* located at the corners formed by the walls *a* and *a'*. When the truss-rods *b* have been properly positioned in the walls *a*, they are preferably covered with a layer of the concrete mixture, and when covered the truss-rods *b* are similarly placed in the walls *a'* with their anchor-hooks *c* overlapping and correctly centered with the anchor-hooks of the truss-rods embedded in the walls *a*. The truss-rods *b* in the walls *a'* are then covered

with a layer of the cement mixture, and another series of truss-rods *b* are placed in the walls *a*, the operation of placing the truss-rods in the walls *a* and *a'* being alternately repeated until the erection of the walls is completed. By having the anchor-hooks *c* of the truss-rods correctly centered and overlapping a concrete anchor *e* is formed, which extends vertically through the anchor-hooks and constitutes an homogeneous part of the walls *a* and *a'* by uniting with the concrete for the adjoining parts of the corners through the spaces intervening between the truss-rods. This formation enables the structure to resist the shearing strains at those points by utilizing the full strength of the concrete mixture and truss-rods. To further strengthen the structure, angular tie-rods *f*, having hook-shaped ends *g*, are embedded at suitable vertical intervals in the adjoining walls at the corners of the structure and on the outer side of the anchor-hooks, so that the walls *a* will be securely tied to the walls *a'*. The hook-shaped ends *g* of the angular tie-rods *f* form anchorages to prevent the displacement of the tie-rods to enable them to securely fasten the walls together without any possibility of the walls spreading at the corners under the shearing strains upon the structure. In the outer walls *a* and *a'*, opposite the junction with them of the cross-walls *a''*, are strengthening-rods *h*, having hook-shaped ends *i* to anchor the strengthening-rods in the material to fasten together the outer walls for two adjacent bins *j* and *j'* and assist them in resisting the shearing strains at the corners formed by the junction with them of the cross-walls.

Extending vertically through the concrete anchors *e* are centering-pins *k* of comparatively diminutive diameters to correctly position the anchor-hooks *c* during the erection of the walls and to reinforce the concrete anchors when the walls are erected and the concrete mixture has set. By making the anchor-hook *c* of substantially the shape shown in the drawings it is possible to place them in position in the walls without having to raise the truss-rods to the top of the centering-pins and then lower them into contact with the erected portion of the wall, as in the case of the construction described in my former application.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A storage-bin comprising walls of concrete material, truss-rods embedded therein, crooked anchor-hooks at the ends of the truss-rods, embracing a considerable quantity of concrete material, located at the corners of the walls and vertically alined with intervening spaces between them, and columns of concrete material extending through the crooked anchor-hooks and engaging therewith and uniting at the intervening spaces with the concrete material of the walls.

2. A storage-bin comprising walls of concrete material, truss-rods embedded therein, crooked anchor-hooks at the ends of the truss-rods, embracing a considerable quantity of concrete material, located at the corners of the walls and vertically alined with intervening spaces between them, inturned locking members at the ends of the anchor-hooks, and columns of concrete material extending through the crooked anchor-hooks and engaging therewith and uniting at the intervening spaces with the concrete material of the walls.

3. A storage-bin comprising walls of concrete material, truss-rods embedded therein, crooked anchor-hooks at the ends of the truss-rods, embracing a considerable quantity of concrete material, located at the corners of the walls and vertically alined with intervening spaces between them, columns of concrete material extending through the crooked anchor-hooks and engaging therewith and uniting at the intervening spaces with the concrete material of the walls, and angular tie-rods having hook-shaped ends embedded in the concrete material to tie the adjacent walls together at the corners of the bin.

4. A storage-bin comprising walls of concrete material, truss-rods embedded therein, crooked anchor-hooks at the ends of the truss-rods, embracing a considerable quantity of concrete material, located at the corners of the walls and vertically alined with intervening spaces between them, inturned locking members at the ends of the anchor-hooks, columns of concrete material extending through the crooked anchor-hooks engaging therewith and uniting at the intervening spaces with the concrete material of the walls, and angular tie-rods having hook-shaped ends embedded in the concrete material to tie the adjacent walls together at the corners of the bin.

Toronto, March 25, A. D. 1905.

JESSE H. TROMANHAUSER.

In presence of—

C. H. RICHES,

L. F. BROCK.