

940,170.

B. F. LOCKWOOD.
SILO.
APPLICATION FILED FEB. 1, 1908.

Patented Nov. 16, 1909.
3 SHEETS—SHEET 1.

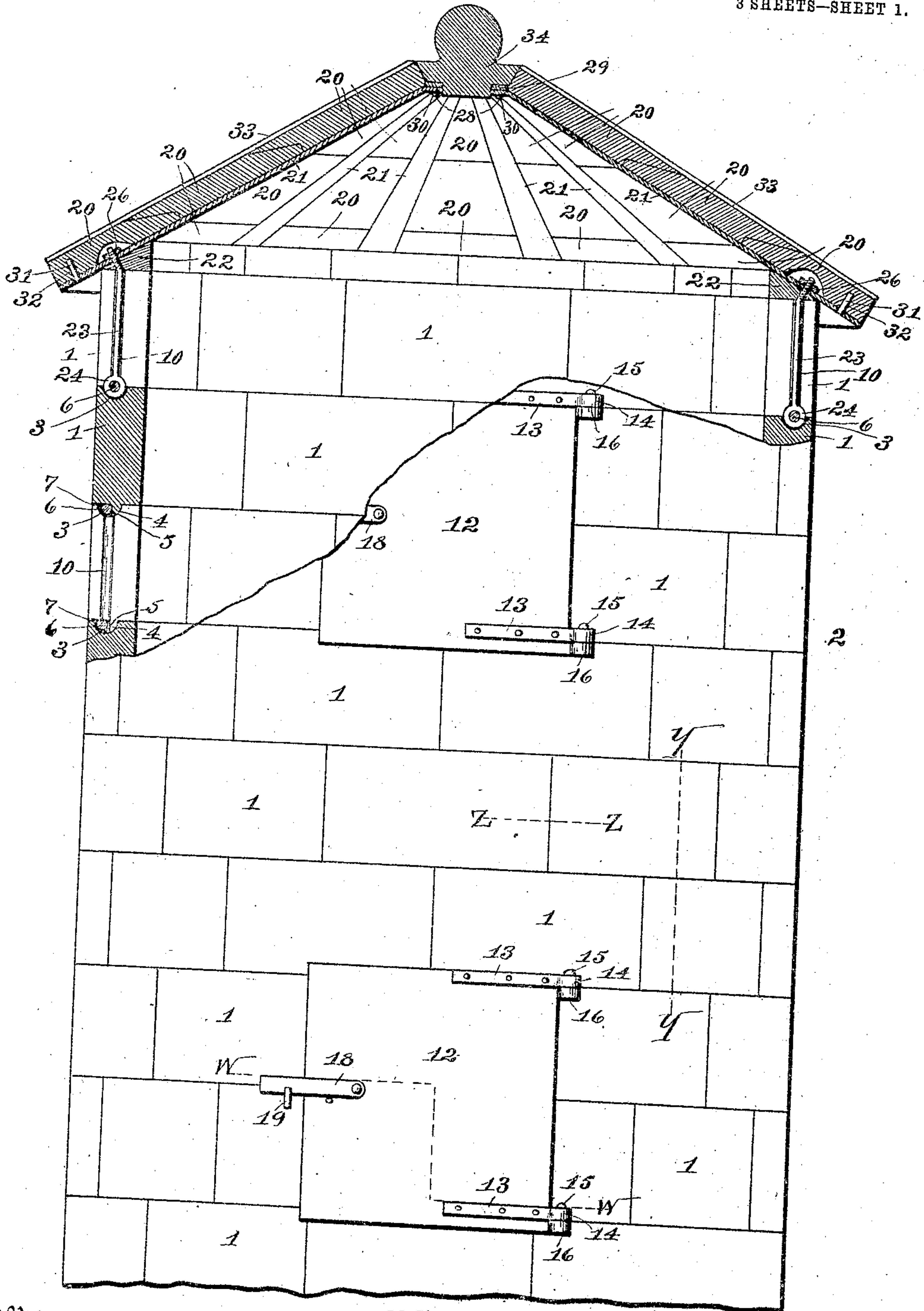


Fig. 1

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Inventor:
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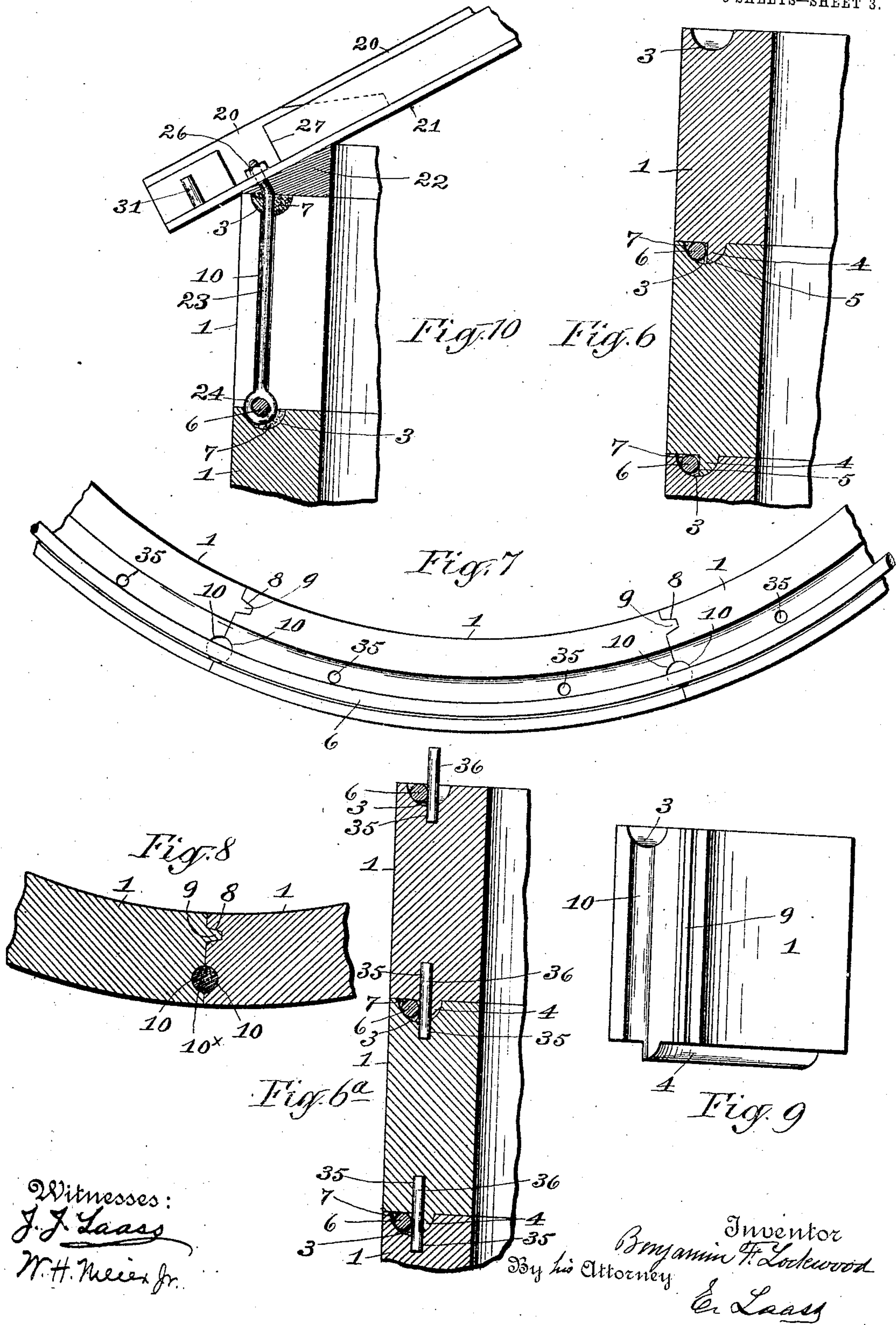
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UNITED STATES PATENT OF FICE.

BENJAMIN F. LOCKWOOD, OF LYONS, NEW YORK.

SILLO.

940,170.

Specification of Letters Patent.

Patented Nov. 16, 1909.

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To all whom it may concern:

Be it known that I, BENJAMIN F. LOCKWOOD, a citizen of the United States, and resident of Lyons, in the county of Wayne, in the State of New York, have invented new and useful Improvements in Silos, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of silos which are composed of concrete blocks.

The main object of the present invention is to produce a silo which shall be strong and durable, and can be quickly erected, and at the same time shall be comparatively inexpensive.

Other objects of the invention will be apparent from the novel details of construction hereinafter fully described and illustrated in the accompanying drawings.

Referring to the drawings, Figure 1 is a front elevation of a portion of the silo embodying my improvements partly in section with the roof and upper part of the body being broken away; Fig. 2 is a plan view, with parts broken away to show the roof formation; Fig. 3 is an enlarged transverse section on the dotted line —V—V— in Fig. 2; Fig. 4 is an enlarged transverse section on the dotted line —W—W— in Fig. 1 showing the hinge of one of the silo-doors, and of door-fastening; Fig. 5 is a vertical section on the dotted line —X—X— in Fig. 4 showing more clearly the construction of the door-hinge; Fig. 6 is an enlarged vertical section on the dotted line —Y—Y— in Fig. 1; Fig. 6^a is a similar view showing the dowel-pins; Fig. 7 is an enlarged plan view of portion of a course of cement blocks; Fig. 8 is an enlarged horizontal section on the line —Z—Z— in Fig. 1; Fig. 9 is an enlarged detail end view of one of the blocks; Fig. 10 is an enlarged detail vertical sectional view showing more clearly the means for anchoring the roof to the body of the silo; and Fig. 11 is an enlarged perspective view of the outer end portion of one of the rafters.

Like numerals of reference indicate like parts in the several views.

—1—1— represent the concrete blocks forming the body —2— of the silo and which are laid up in courses with broken joints. The said blocks are of rectangular shape and are molded with a curvature so

as to produce a cylindrical body as clearly illustrated in Figs. 4, 7 and 8 of the drawings. Each of these blocks —1— is provided in its top surface with a groove —3— extending the entire length thereof and 60 which I prefer to make substantially semi-circular in cross-section. On the bottom surface of each block is formed a tongue —4— also extending throughout its entire length. The tongues —4—4— of each 65 course of blocks are preferably of segmental shape in cross-section and are adapted to enter the grooves —3—3— of the underlying course, so as to bear against the inner side portions of the grooves and present vertical 70 walls (indicated at —5—5—) to the opposite sides of the grooves as shown more clearly in Fig. 6. In the said grooves —3—3— are placed metal hoops —6—6— which firmly embrace the aforesaid vertical 75 walls of the tongues and are embedded in cement as indicated at —7—. These hoops impart strength and rigidity to the body of the silo and tend to resist outward strain incident to the pressure exerted by the en- 80 silage which is heavily packed within. Each block is provided in one end face with a vertical wedge-shaped groove —8— which is adapted to interlock with a correspondingly shaped tongue —9— formed on the adja- 85 cent end face of the abutting block. By providing these interlocking grooves and tongues —8—8— —9—9—, the blocks can be quickly and accurately positioned and thus the work of laying up the courses is 90 greatly facilitated.

The abutting end faces in each course of blocks are provided with coinciding vertical grooves —10—10— which are segmental in cross-section so as to produce channels ex- 95 tending the entire depth of the courses and communicating with the aforesaid grooves —3—3— as clearly illustrated in Figs. 1, 7, 8 and 9 of the drawings. After laying up each course of blocks, I prepare a fluent ce- 100 ment and pour the same into the channels. When this fluent cement becomes firmly set it forms a key (indicated at —10^x—) which aids in locking the blocks together, thus adding strength and rigidity to the body. 105

The body of the silo is provided with the usual openings —11—11— through which to remove the contents. These openings are equipped with doors —12—12— which are preferably formed from sheet metal. Said 110

doors are supported by hinges so as to allow them to be swung laterally. Each of the hinges consists preferably of a metal plate —13— fastened to the outer face of the door 5 and formed with an eye —14— by which it is journaled on a vertical stud —15— formed on a plate —16— secured to the body of the silo. The said plate is inserted into the body and is provided at its inner end with 10 an aperture —17— through which passes one of the hoops —6— whereby the plate is securely fastened to the body.

To the free end of the door is pivoted a latch-bar —18— adapted to engage the well 15 known notched plate —19— secured to the body of the silo. This plate is held by the hoop —6— substantially the same as the plate —16— (not necessary to be shown).

I prefer to provide the silo with a conical 20 roof which is composed essentially of concrete blocks —20—20— arranged in series and supported upon radially disposed metallic rafters —21—21— consisting of inverted T-bars. The said rafters rest with 25 their lower portions upon a ring —22— laid upon the upper course of blocks —1—1—, preferably composed of concrete and made in sections, and beveled to conform to the pitch of the rafters as shown in Fig. 1.

30 The rafters are secured to the silo-body by means of vertical bolts —23—23— which are inserted into the channels in the uppermost course of blocks —1—1— and are formed at their lower ends with eyes —24—24— 35 through which passes the underlying hoop —6— as more clearly illustrated in Fig. 10 of the drawings. By this connection of the bolts to the band, the said bolts are firmly anchored in the silo-body.

40 The upper screw-threaded end-portions of the anchor-bolts —23—23— are deflected outwardly at right angles to the rafters —21—21— and pass through apertures —25—25— in the rafter, and to said threaded 45 portions are applied nuts —26—26— as shown in Fig. 10.

To accommodate the anchor-bolts and nuts, I cut away portions of the T-bars or rafters as indicated at 27. The said rafters are de- 50 flected at their upper end portions into a horizontal plane as indicated at —28— and the deflected portions are united by means of a metal ring —29— to which they are bolted or riveted as represented at —30— in Figs. 55 1 and 2 of the drawings.

The concrete roof-blocks —20—20— of each series are beveled so as to lap one upon another, and the blocks are held in position upon the T-bars or rafters by means of metal 60 pins —31—31— which project upwardly from the outer end portions of the rafters and engage sockets —32—32— provided in the outermost blocks of the series as illustrated in Figs. 1 and 3 of the drawings.

65 The roof-blocks —20—20— are of a suffi-

cient thickness to project slightly above the web-portions of the T-bars or rafters so as to produce crevices. These crevices are filled with cement which is subjected to the operation of a suitably shaped tool so as to form 70 battens —33—33— which render the joints of the series of blocks air- and water-tight as shown in Figs. 2 and 3 of the drawings.

At the apex of the roof is provided a cap 75 —34— which is preferably composed of concrete and is seated upon the aforesaid metal ring —29—. The uppermost blocks of the series are designed to abut against the cap —34— and in the joints of the blocks and cap is provided cement to effectually exclude 80 air and water.

It will be understood that the aforesaid reinforcing bands —6—6— are provided with the usual and well known turn-buckles (not necessary to be shown) to draw the said 85 hoops firmly against the tongues —4—4—.

To more securely lock the courses of concrete blocks —1—1— together, I provide the tops and bottoms of the blocks with coinciding sockets —35—35— for the reception 90 of metal dowel-pins —36—36—. The said sockets are arranged in such position as to cause the pins to be engaged by the aforesaid hoops —6—6— as shown in Figs. 6^a and 7 of the drawings. The application of these 95 dowel-pins to the blocks and the engagement of the hoops with said pins adds greatly to the strength and rigidity of the structure.

At the openings —11—11— of the silo-body, the inner edges of the blocks —1—1— 100 are beveled as indicated at —37—, said beveled portions forming jambs for correspondingly beveled inner wooden doors —38—38— which are designed to be held in place by the pressure of the ensilage. 105

What I claim as my invention is:

1. The combination with a silo having the body composed of concrete, and provided with a series of openings, of hoops extending across the top and bottom of each open- 110 ing, and laterally swinging doors for said openings, having hinges connected to said hoops as set forth.

2. The combination with a silo composed of concrete and provided with an opening 115 and having two embedded metal hoops extending across the top and bottom of the opening, of a laterally swinging door supported by said hoops as set forth.

3. The combination with a silo composed 120 of concrete and provided with an opening and having two embedded metal hoops extending across the top and bottom of the opening, of a pair of plates rigidly connected at one end to the respective hoops 125 and having their opposite ends projecting at the exterior of the silo, and a door hinged to the projecting ends of the plates as set forth.

4. The combination with a silo having 130

the body composed of concrete and provided with an opening, and having concealed metal reinforcing hoops extending therearound, two of said hoops passing across the top and bottom of the opening respectively, of a door for said opening provided with a pair of hinges at one side of the opening, one member of the hinges extending into the silo-body and fastened rigidly to the hoops, and the other hinge-members suitably fastened to the door, a catch-plate connected to a hoop, and a latch-bar pivoted to the door and adapted to engage said catch-plate as set forth.

5. The combination with a silo having the body composed of concrete-blocks laid in courses and provided with an opening extending the depth of two courses, the blocks of each course provided in their top faces with coinciding grooves forming concealed channels extending around the body, and reinforcing metal hoops disposed in said grooves, of a door provided with a pair of hinges fastened to the hoop passing across the top and bottom of the opening, as set forth.

6. The combination with a silo having the body composed of concrete-blocks laid in courses and the courses provided with interlocking tongues and grooves, the silo-body provided with an opening extending the depth of two courses of blocks, and metal reinforcing-hoops disposed in said grooves and embracing the tongues, of a door provided with hinge-plates entering the silo-body and provided with apertures for the reception of the hoops which pass across the top and bottom of the opening as set forth.

7. The combination with the cylindrical body composed of concrete and provided with an opening in its wall, and having two embedded metal hoops extending respectively across the top and bottom of the open-

ing, a door hinged to said hoops, and a roof anchored to the top hoop as set forth.

8. In a silo, the combination with a cylindrical body composed of concrete blocks laid up in courses, the blocks of each course formed in their top faces with coinciding longitudinal grooves so as to produce concealed circumferential channels in the joints of the courses, the lower faces of said blocks being formed with coinciding longitudinal tongues occupying one-half of the channels of the blocks in the next course below and abutting the inner side portions thereof, of metal reinforcing hoops formed round in cross section and seated in the channels and disposed entirely below the joints so as to embrace the tongues and cement fillings in said channels as set forth and shown.

9. In a silo, the combination with a cylindrical body composed of concrete blocks laid up in courses, the blocks of each course formed in their top faces with coinciding grooves so as to provide concealed circumferential channels in the joints, the lower faces of the blocks being formed with corresponding tongues occupying one-half of the channels of the blocks in the next course below and abutting the inner side portions of the channels, the blocks of the uppermost course having their adjacent end faces provided with coinciding vertical grooves to produce channels extending from the top to the adjacent circumferential channel, of a metal reinforcing hoop embedded in the latter channel and embracing the tongues therein, and roof-anchoring bolts disposed in the aforesaid vertical channels and connected to the reinforcing hoop as set forth and shown.

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