E. K. CONKLIN.

APPARATUS FOR ERECTING CONCRETE SILOS AND SIMILAR STRUCTURES.

APPLICATION FILED JAN. 22, 1915.

1,213,838.

Patented Jan. 30, 1917.

3 SHEETS—SHEET 1.

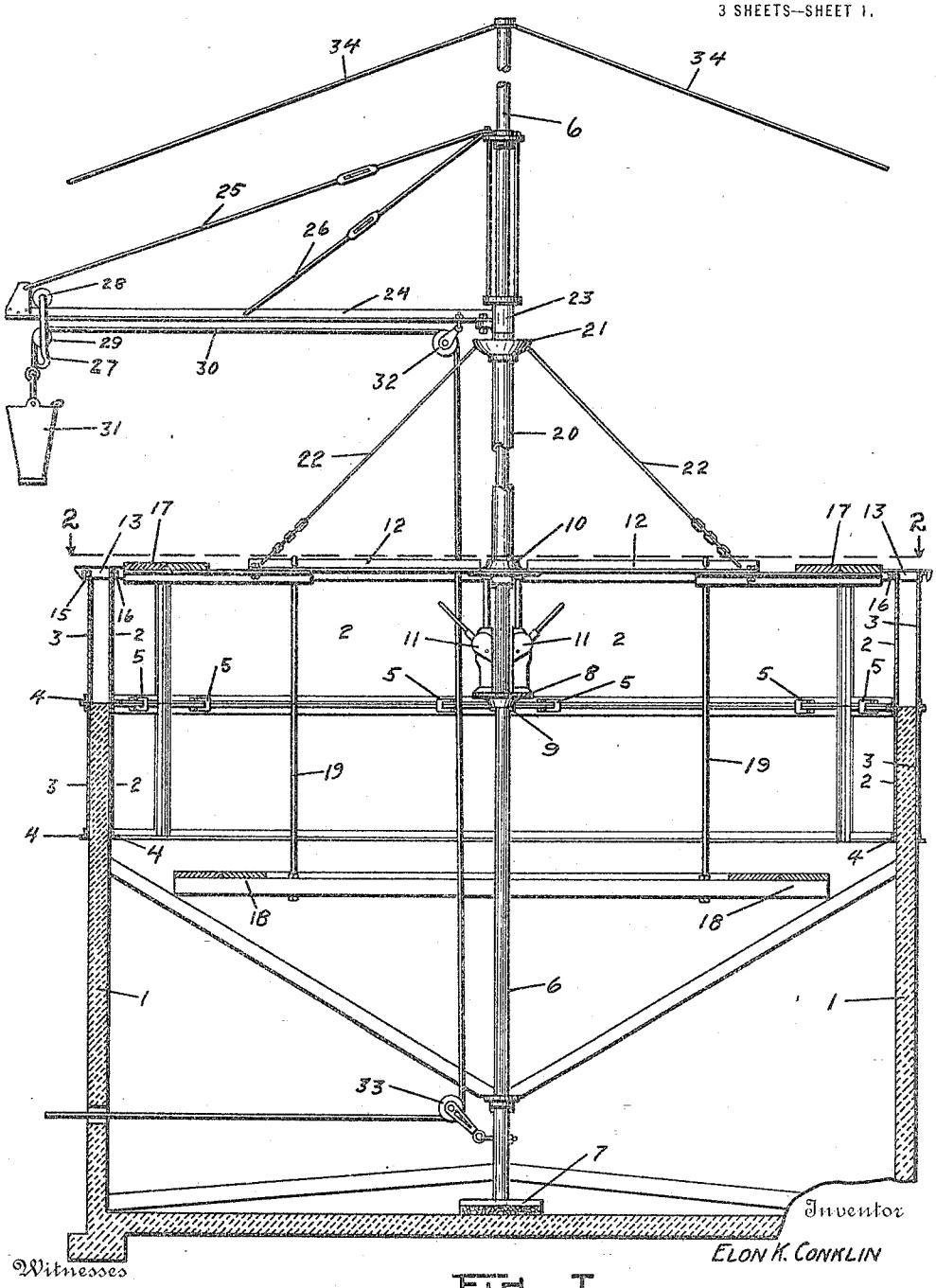


Fig. I.

Witnesses

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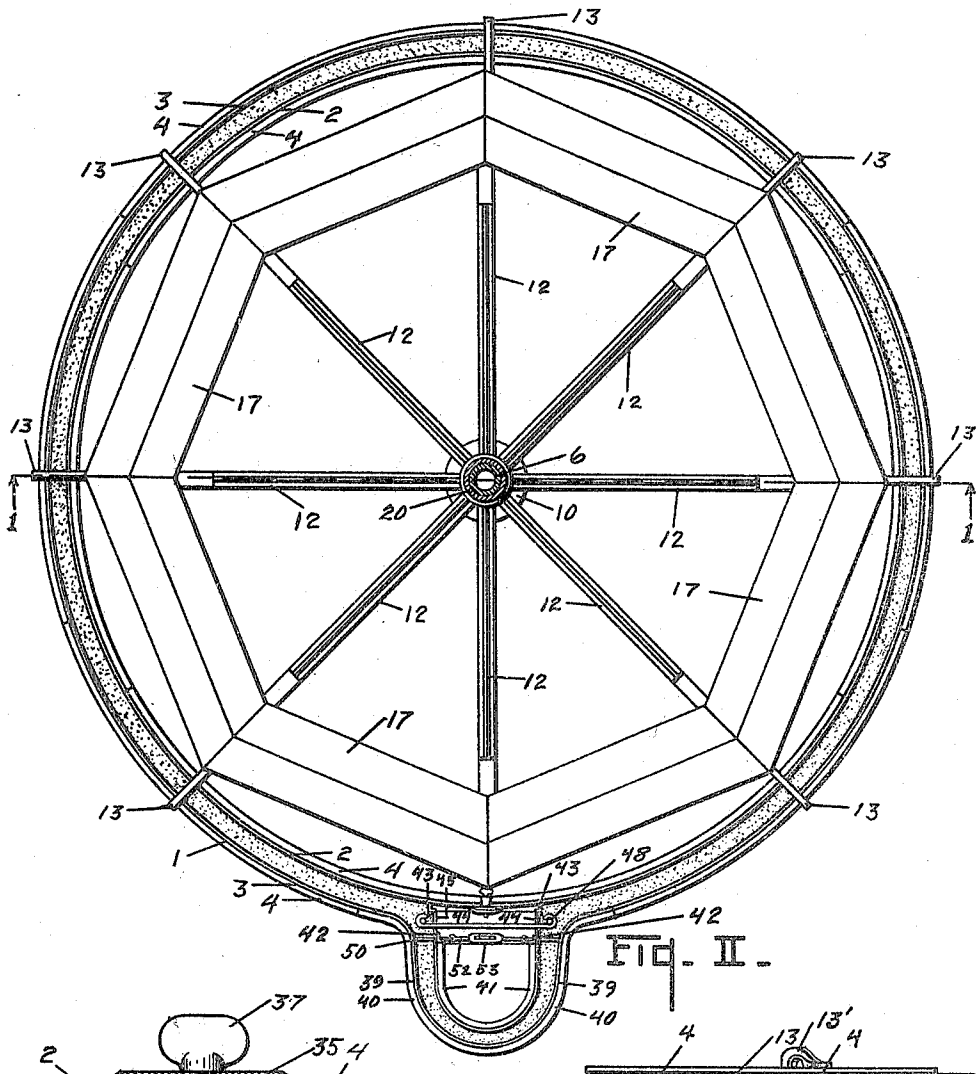


FIG. II.

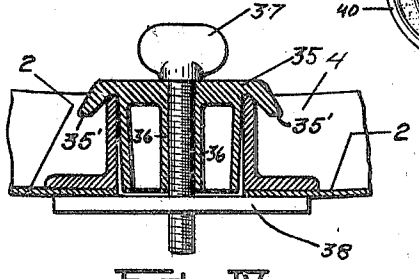


FIG. IV.

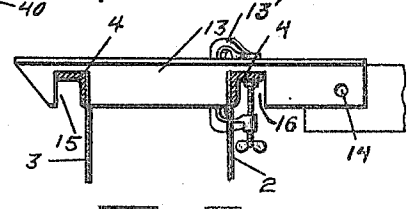


FIG. III.

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3 SHEETS—SHEET 3.

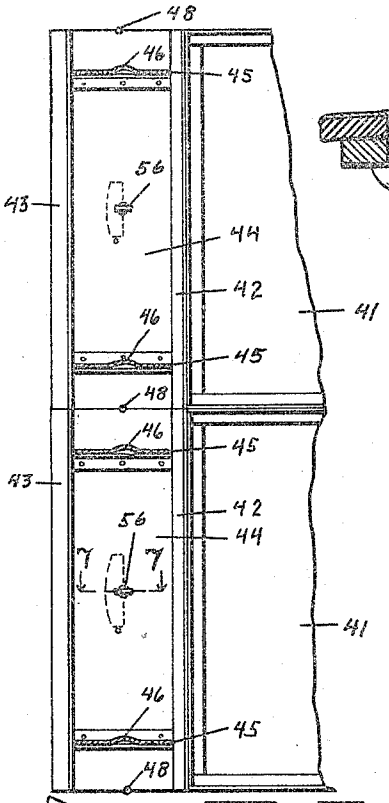


FIG. VI.

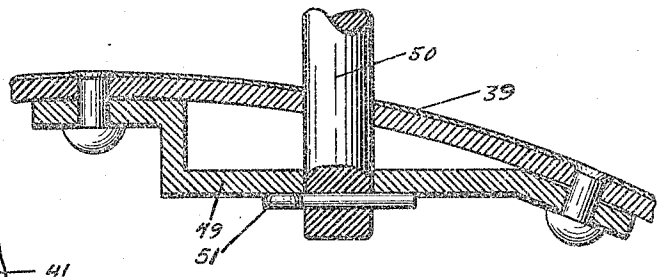


FIG. VIII.

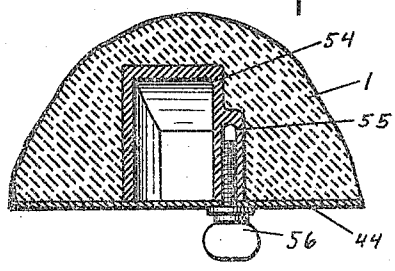


FIG. VII.

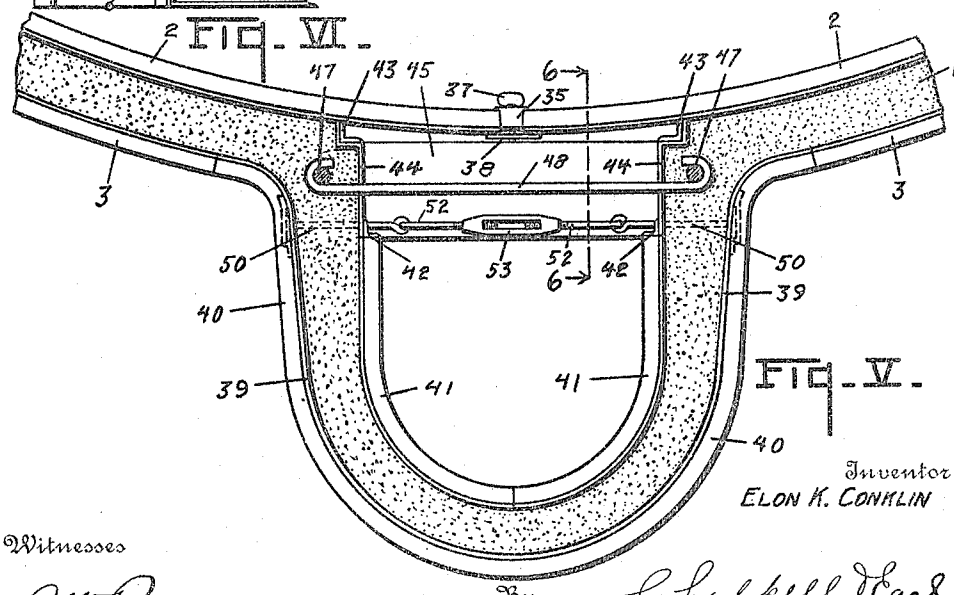


FIG. V.

Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ERECTING CONCRETE SILOS AND SIMILAR STRUCTURES.

1,213,838. Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed January 22, 1915. Serial No. 3,688.

To all whom it may concern:

Be it known that I, ELON K. CONKLIN, a citizen of the United States, residing at Hartford, Michigan, have invented certain new and useful Improvements in Apparatus for Erecting Concrete Silos and Similar Structures, of which the following is a specification.

This invention relates to improvements in apparatus for erecting concrete silos and similar structures.

The objects of this invention are: First, to provide in an apparatus for constructing concrete silos, bins, tanks, elevators, and the like, a vertically adjustable scaffold provided with improved means for centralizing and spacing the mold sections. Second, to provide improved means for facilitating the removal of the mold sections from the finished wall. Third, to provide improved means for incorporating keeper sockets and other similar structures in the wall.

Further objects, and objects relating to details and economies of construction, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined and pointed out in the claims.

A structure constituting a preferred embodiment of my invention is illustrated in the accompanying drawings forming a part of this specification, in which:

Figure I is a vertical sectional elevation view of a structure embodying my invention, taken on the line 1—1 of Fig. II. Fig. II is a sectional plan view of the structure taken on the line 2—2 of Fig. I and showing in plan view the scaffold. Fig. III is an enlarged detail view of a portion of Fig. I, showing in detail the engagement of one of the spacer bars with the upper edges of the mold sections. Fig. IV is a sectional plan view showing the tapered spreader block and its engagement with the inner mold sections. Fig. V is an enlarged detail sectional view, corresponding to a part of Fig. II, showing in detail the mold sections for forming the chute and the means for coupling the same together. Fig. VI is a detail sectional view on the line 6—6 of Fig. V showing the chute mold sections in further detail. Fig. VII is an enlarged detail sectional view on the line 7—7 of Fig. VI, showing in detail the means for securing the keeper socket to the mold section. Fig. VIII is an enlarged detail sectional view showing in detail the manner in which the member 49 is carried by the chute mold section 39.

In the drawings, similar reference characters refer to similar parts throughout the several views and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Considering the numbered parts of the drawing, the partially erected walls are indicated by the numeral 1, the structure illustrated being a silo. In erecting the walls I use inner and outer molds, which are sectional, comprising the inner segmental sections 2 and the outer segmental sections 3, the said inner and outer sections being provided with flanges 4 at top and bottom. Adjacent sections are held together by clips 5 embracing the abutting top and bottom flanges 4. In erecting a wall and for convenience in handling mold sections, I provide a scaffold comprising a mast 6 suitably anchored at 7 and extending upwardly in approximately the center of the silo. A hub or jack bench 8 is slidable on the mast 6 and rests upon a pin 9 passing through any one of a plurality of holes through the mast. A platform or derrick hub 10 is slidable on the mast 6 and is normally supported by a pair of jacks 11 which rest upon the jack bench 8. By manipulating the jacks 11 the hub 10 may be raised and lowered to bring it to the desired position. Secured to said hub 10 are a plurality of radiating arms which extend outwardly to the inner mold sections. To the outer ends of these radiating arms 12 are pivoted at 14 the spacer bars 13. Each of these spacer bars 13 is provided with notches 15 and 16 to engage the upper edges of the outer and inner mold sections respectively, so as to hold said mold sections properly centralized and spaced with reference to each other and to keep the mast and parts carried thereby rigid or to support them against swaying movement. The clamps 13′ secure the spacer bars to the upper flanges of the inner mold sections. The platform 17 is carried by the arms 12 and another platform 18 is suspended from the arms 12 by means of the rods 19, the platform 18 being so located that a person stand-

ing thereon may manipulate the jacks 11 to raise the scaffold, and may also have access to the clips connecting the inside mold sections so as to remove the molds. The operator is preferably supported by the boom 24 while manipulating or adjusting the outer mold sections.

A sleeve 20 is mounted on the mast 6, the lower end of said sleeve engaging the hub 10 and the upper end of said sleeve supporting a hub 21 which is connected with the arms 12 by the guys 22. Above said hub 21 is a collar 23 to which is connected a boom 24 which is supported by the guys 25 and 26. A traveling carriage 27, having a roller 28, travels on the boom 24, said traveling carriage carrying a pulley 29 through which passes the cable 30 connected to the bucket 31 for raising cement to be dumped into the molds. The cable 30 passes over the pulley 32 carried by the boom 24 at its inner end and then passes down to the pulley 33 connected to the mast 6 at its lower end, the cable then passing out through a hole provided in the side of the silo wall to a suitable source of power for hoisting. The upper end of the mast is braced by the guys 34, as shown in Fig. I.

To assist in supporting the inner mold sections and to facilitate their removal, I provide tapered blocks 35 which are disposed between the adjacent edges of two of the inner mold sections, preferably at a point opposite the chute so that the concrete will not enter around the blocks 35 and interfere with the removal of the same. These blocks assist in supporting the mold walls and when removed allow the inner section to collapse inwardly or be moved. The spreading block 35 is tapered toward the outside, as shown in Fig. IV, so as to facilitate its removal, and said block has a boss 36 in which is disposed a thumb screw 37. A plate 38 engages the outer faces of the inner mold sections, as shown in Fig. IV, and the thumb screw 37 is threaded into plate 38 so that by turning the thumb screw 37, the spreader block 35 is drawn into position between the contiguous flanges of the mold sections. The block has hooks 35′ which engage the flanges on the ends of the sections and draw them into alinement as the block is drawn into place. The inner sides of the hooks are preferably beveled, as shown in Fig. IV. This spreads the mold sections so as to hold them in position and when it is desired to remove the same, the screw 37 can be unscrewed from the plate 38 so as to remove the block 35. This allows the inner mold sections to move toward each other so that they may be readily removed and set in a new position.

To form the main part of the wall, the outer and inner mold sections 2 and 3 are used as shown in Figs. II and V. To form the chute, specially constructed mold sections are provided comprising the outer mold section 39 which is U-shaped in cross section and provided with laterally directed flanges 40, and a pair of inner mold sections 41 which, when placed together in position, form a U-shaped mold, as shown in Fig. V. A special doorway form is provided which comprises a pair of vertically extending angle bars 42, 42. Plates 44, 44 are secured at their rear edge to the angle bars 42 so as to form the side walls of the form. The vertically extending angle bars 43 which are offset from the plate so as to form the door jamb and the plate 44 are secured at their forward edges to said plates and bars, being connected at intervals by plates 45 which are provided with strengthening ribs 46. Vertically extending rods 47, 47 are embedded in the wall at each side of the doorway and the ladder irons are connected to said rods, each iron consisting of a rod extending horizontally and having its ends bent around the rods 47 and embedded in the wall, one of said ladder irons is provided at the end of each mold section, the rods being laid in place with the ends thereof encircling the rods 47 and the concrete poured in around it and allowed to set. Secured to the outer mold section 39 at either side thereof is a member 49. Rods 50 pass through said member 49 and through said outer mold section 39 and the plates 44, the outer ends of the rods being provided with retaining pins 51. The inner ends of said rods have eyes and are connected by means of links 52 and a turn buckle 53 so that by turning the turn buckle, the ends of said rods may be drawn toward each other to clamp the outer mold section in place. When the forms are to be removed, the pins 51 are removed, the rods 50 are drawn out of the concrete and this allows the outer mold section 39 and the inner mold sections 41 and the doorway form to be removed.

The doors are fastened in place by suitable latches, not shown, and the latch keeper sockets 54 are each provided with a boss 55 which is internally threaded to receive a thumb screw 56. The thumb screw 56 is threaded through the side plate 44 so that the keeper socket 54 is attached to said plate and the door form and is carried thereby. Concrete is poured in between said mold sections and around said socket and when the forms are removed the screw 56 is unscrewed from the boss 55 leaving the socket embedded in the concrete.

Fig. I shows in cross section the scaffold and apparatus for constructing the silo and a silo partially constructed. Concrete is poured in between the mold sections 2 and 3 until the top of the mold sections is reached. After this is sufficiently set the lower mold sections are then removed by releasing the

clamps and removing the spreader blocks 35 as above described. The spreader bars are released. The scaffold is elevated by manipulating the jacks 11 to lift the hub 10. In this connection it should be stated that when the hub 10 has been lifted to the limit of the capacity of the jacks the scaffold may be supported by inserting a pin through one of the holes in the mast below the hub 10. The lower hub 8 can then be moved up by lowering the heads of the jacks and the pin 9 inserted in another hole below the hub 8 and the hub 10 again lifted by manipulating the jacks. In this manner the scaffold is lifted until it is at the proper height. The mold sections which were removed are then placed on top of the other mold sections and connected thereto by the clips or clamps 5 in the manner described.

The mold spacer bars 13 which are pivoted on the ends of the arms 12 are lowered until the flanged upper edges of the mold sections are engaged in the notches 15 and 16 respectively and the clamps 13′ adjusted. By this means the molds are held properly centralized and spaced with reference to each other and the mast and parts carried thereby effectively supported against lateral or swaying movement. Concrete is then poured in between these molds as before and the operation is repeated until the desired height of wall is formed.

In forming the chute, mold sections 39 and 41 are used. These mold sections are clamped in place by means of the rods 50, the links 52 and the turn buckle 53, the doorway form being also held in place by this means. The angle bars 43 of the doorway mold section form in the concrete a door jamb. The ladder irons are disposed as indicated. When the concrete has set between these mold sections they may be removed, after the inner mold sections 2 have been removed, the removing the bolts 50, then removing the doorway form consisting of the angle bars 42 and 43 and the plates 44 and 45, after which the inner sections 41 can be removed. The ladder irons 48 being disposed at the joint between the mold sections do not interfere with the removal thereof. The keeper sockets 54, which are carried by the plates 44 of the door form, are disconnected therefrom by removing the thumb screw 56, thus leaving the socket embedded in the concrete.

I am aware that the particular embodiment of my invention which I have here shown is susceptible of considerable variation without departing from the spirit of my invention, and, therefore, I do not wish to be restricted to the same. I have found, however, that this form is to be preferred, and, therefore, I desire to claim the same specifically, as well as broadly, as indicated by the appended claims.

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

1. In a structure of the class described, the combination of a mast, a hub slidable on said mast, means for elevating said hub, a plurality of radiating arms carried by said hub, spacer bars pivoted to the ends of said arm and each provided with a pair of notches to receive the upper edges of outer and inner mold members, and means for securing said spacer bars to one of the mold members with which they engage, all coacting substantially as described and for the purpose specified.

2. In a structure of the class described, the combination of a mast, a hub slidable on said mast, means for elevating said hub, a plurality of radiating arms carried by said hub, spacer bars pivoted to the ends of said arm and each provided with a pair of notches to receive the upper edges of outer and inner mold members, all coacting substantially as described and for the purpose specified.

3. In a structure of the class described, the combination of a door form comprising a pair of vertically extending angle bars, a second pair of vertically extending angle bars, vertical plates secured to said angle bars, horizontal plates provided with strengthening ribs extending between said vertical plates and secured thereto, a keeper socket provided with a boss having a threaded socket therein, secured to the outer face of said plate by means of a screw extending through said plate and threaded in said socket whereby said keeper socket may be disconnected from said door form, all coacting substantially as described and for the purpose specified.

4. In a structure of the class described, the combination of a door form comprising a pair of vertically extending angle bars, a second pair of vertically extending angle bars, vertical plates secured to said angle bars, a keeper socket provided with a boss having a threaded socket therein, secured to the outer face of said plate by means of a screw extending through said plate and threaded in said socket whereby said keeper socket may be disconnected from said door form, all coacting substantially as described and for the purpose specified.

In witness whereof, I have hereunto set my hand in the presence of two witnesses.

ELON K. CONKLIN.

Witnesses:
J. INGALLS,
MARY THORN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."