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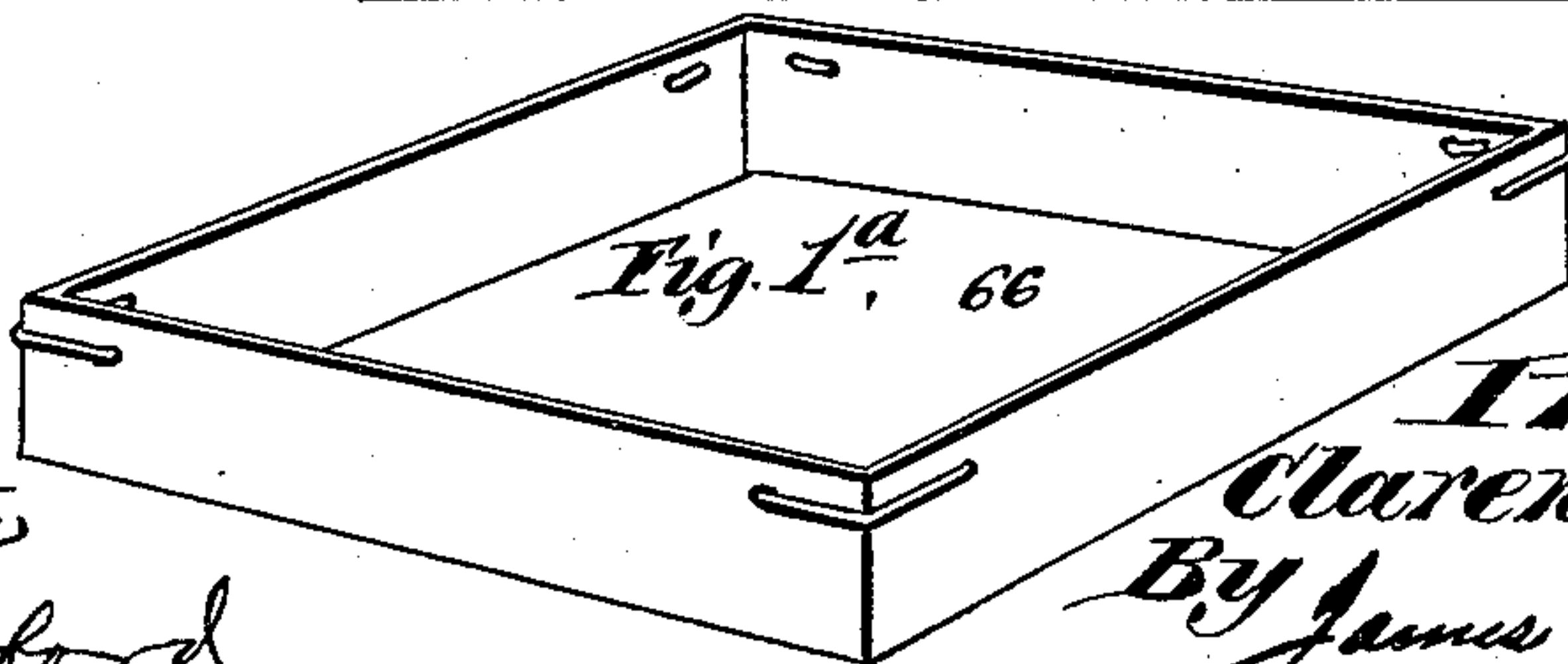
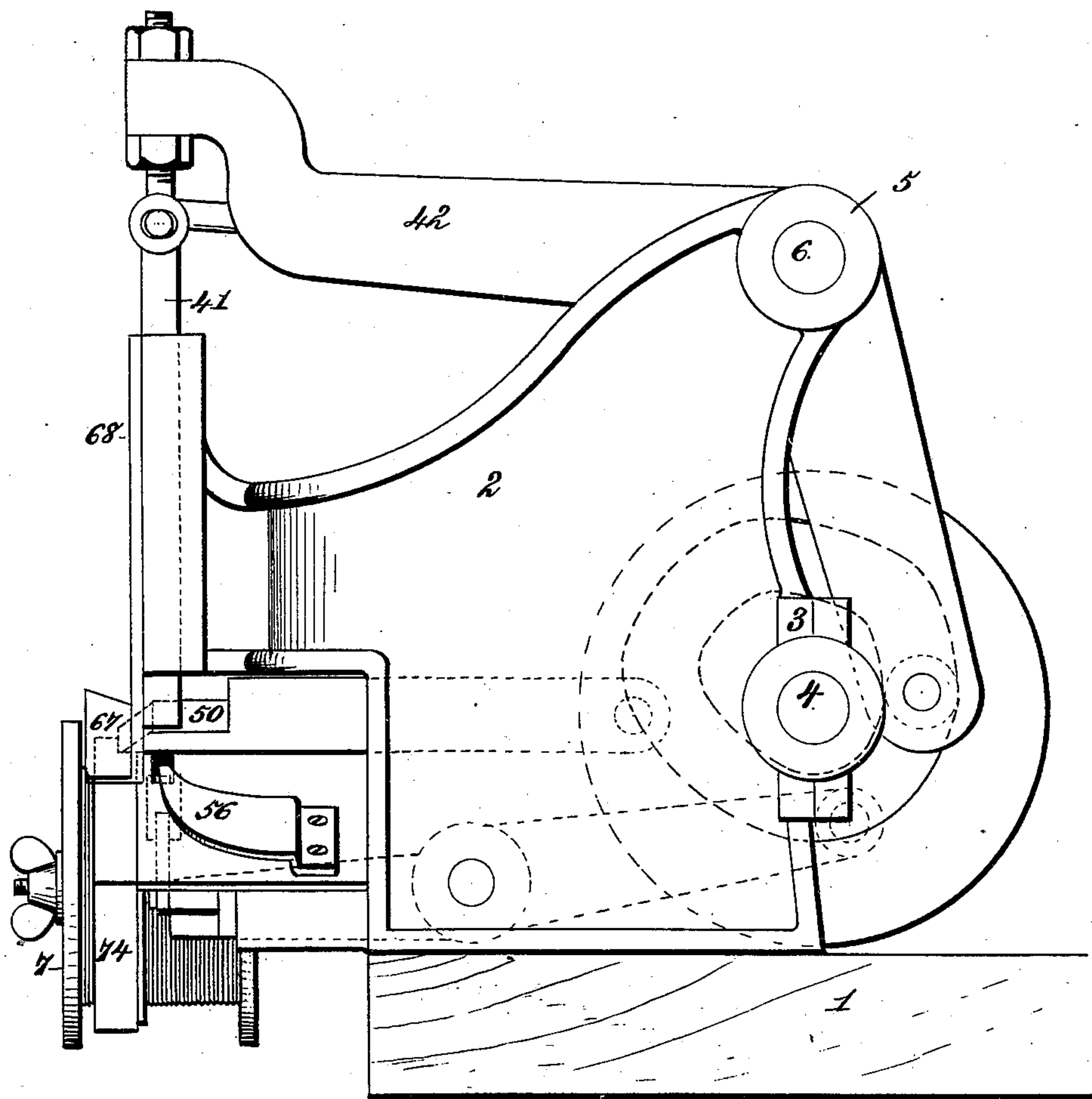
C. W. HOBBS.

MACHINE FOR STAYING PAPER BOXES.

No. 367,397.

Patented Aug. 2, 1887.

*Fig. 1.*



*Witnesses.*  
*Robert Everett.*  
*J. A. Rutherford.*

*Inventor.*  
*Clarence W. Hobbs.*  
*By James L. Norris.*  
*Atty.*

(No Model.)

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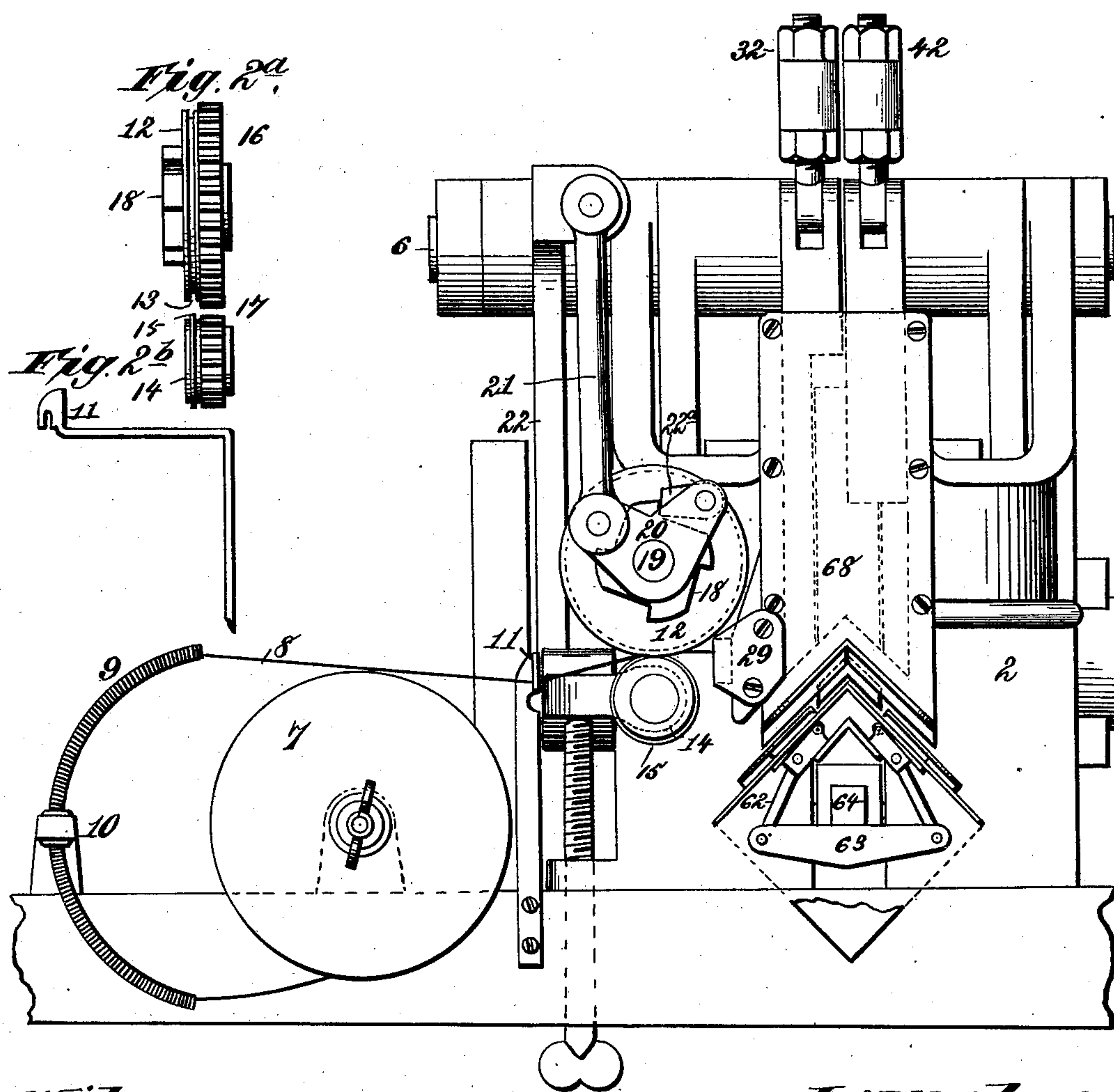
C. W. HOBBS.

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Patented Aug. 2, 1887.

*Fig. 2.*



*Witnesses.*  
*Robert Everett.*  
*Jo. L. Coomes.*

*Inventor.*  
*Clarence W. Hobbs.*  
*By James L. Norris.*  
*Atty.*

(No Model.)

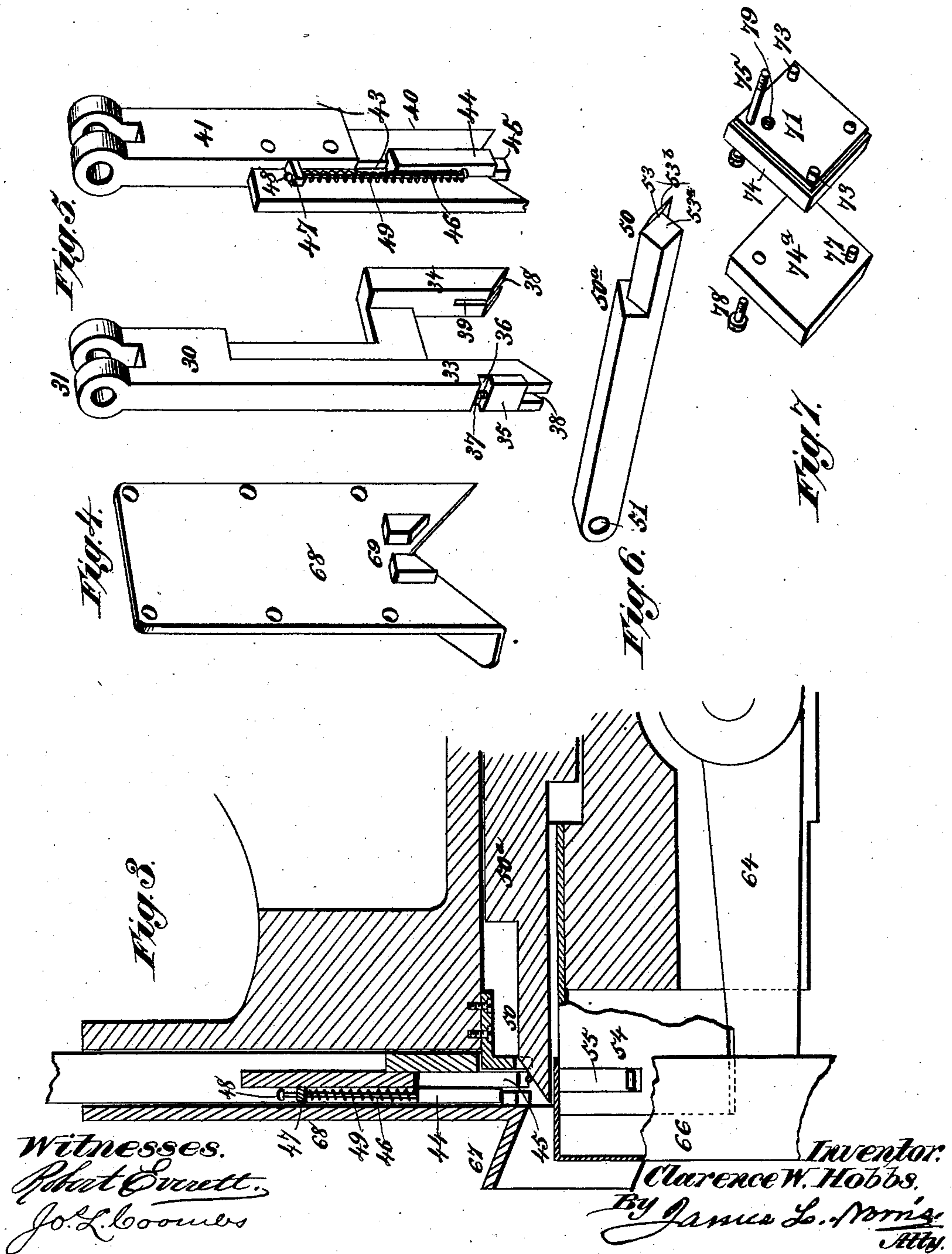
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C. W. HOBBS.

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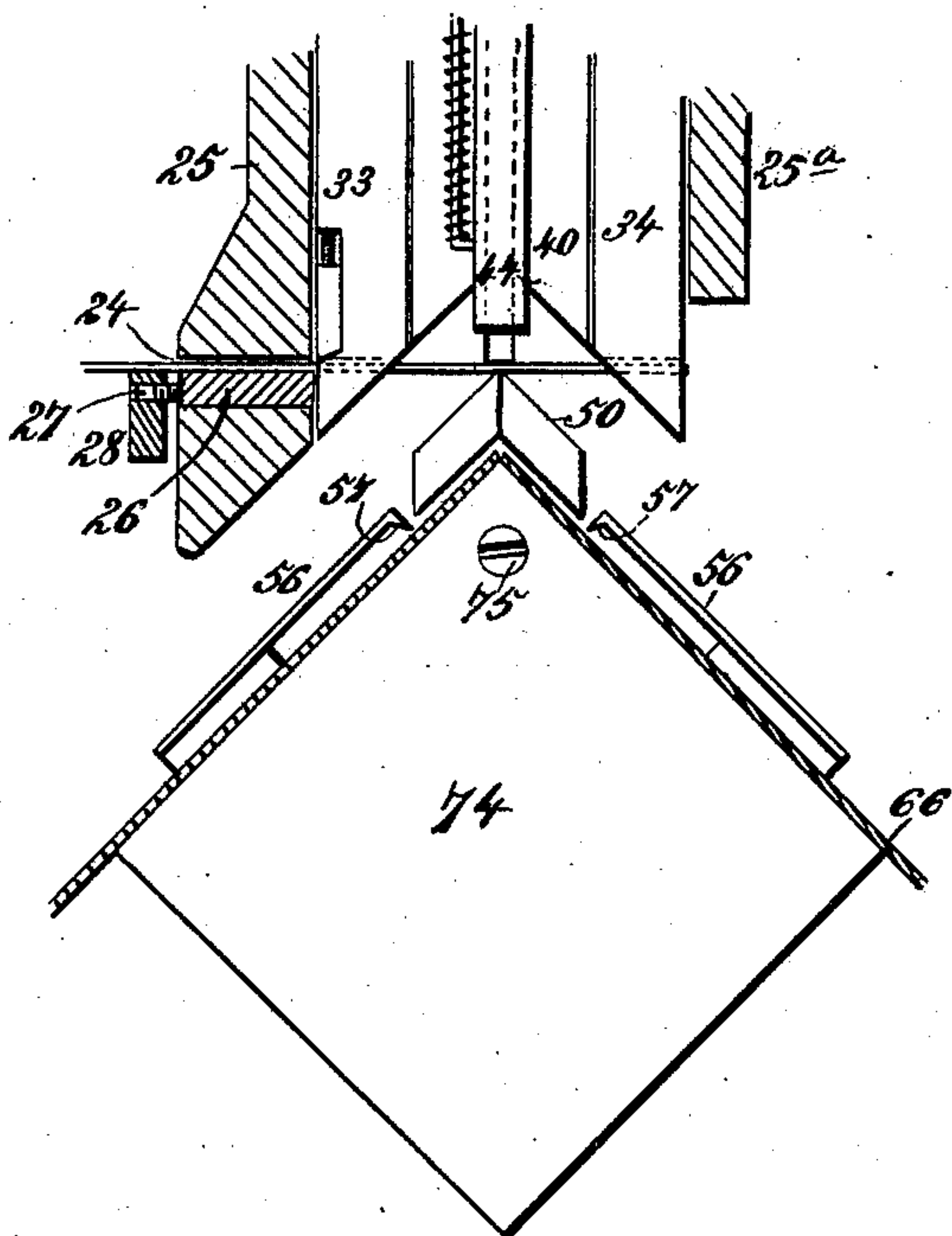
C. W. HOBBS.

MACHINE FOR STAYING PAPER BOXES.

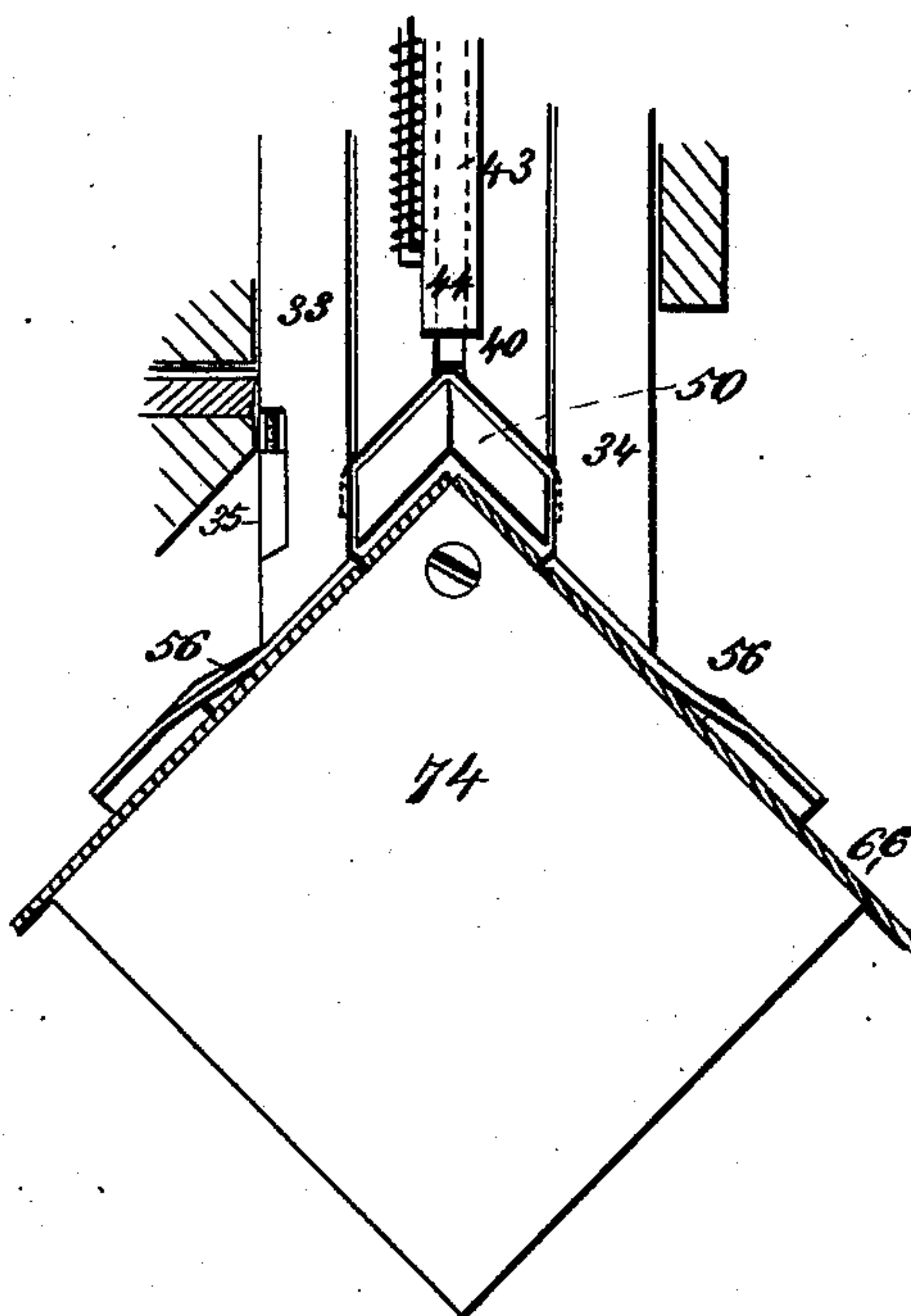
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Patented Aug. 2, 1887.

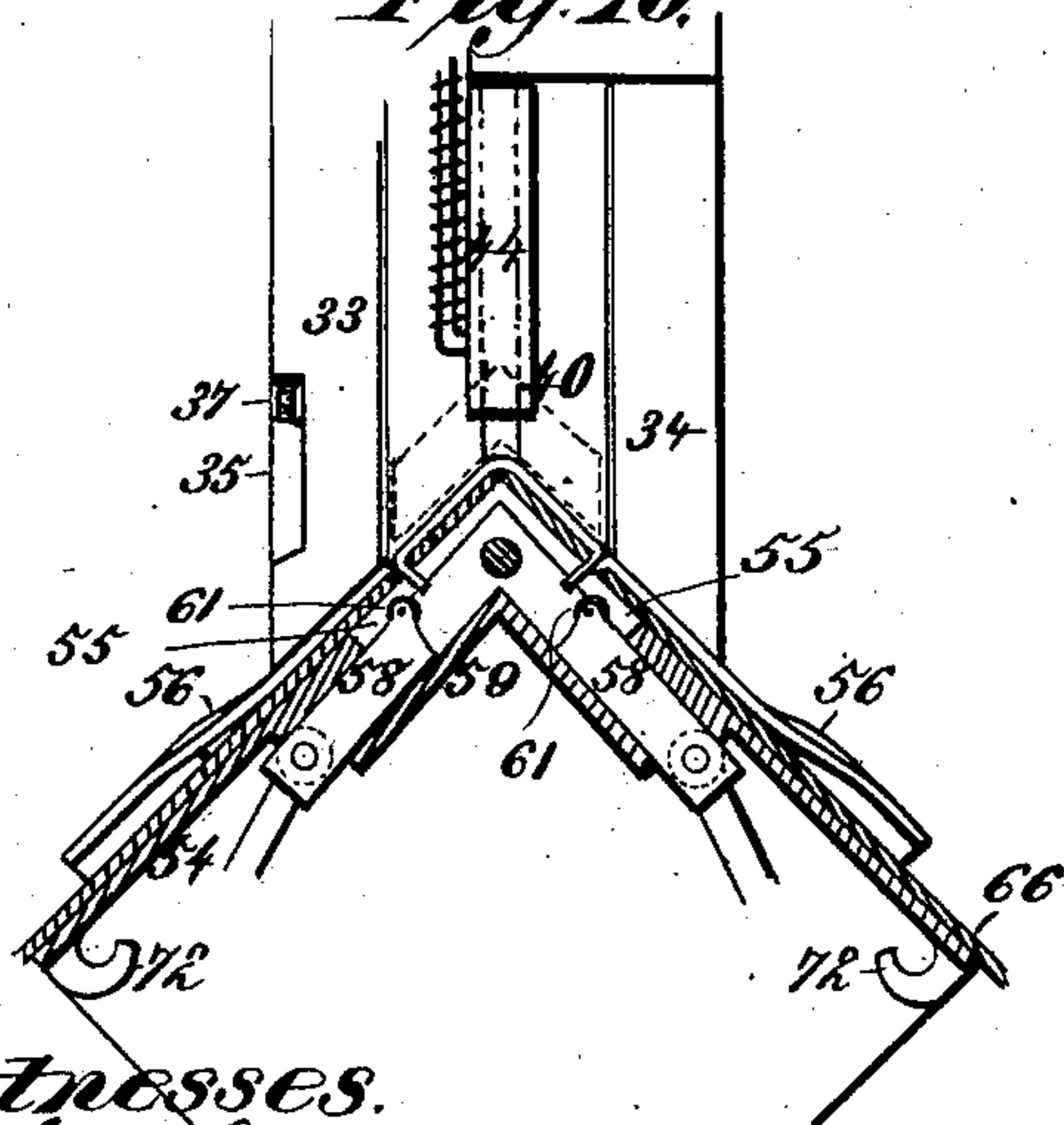
*Fig. 8.*



*Fig. 9.*

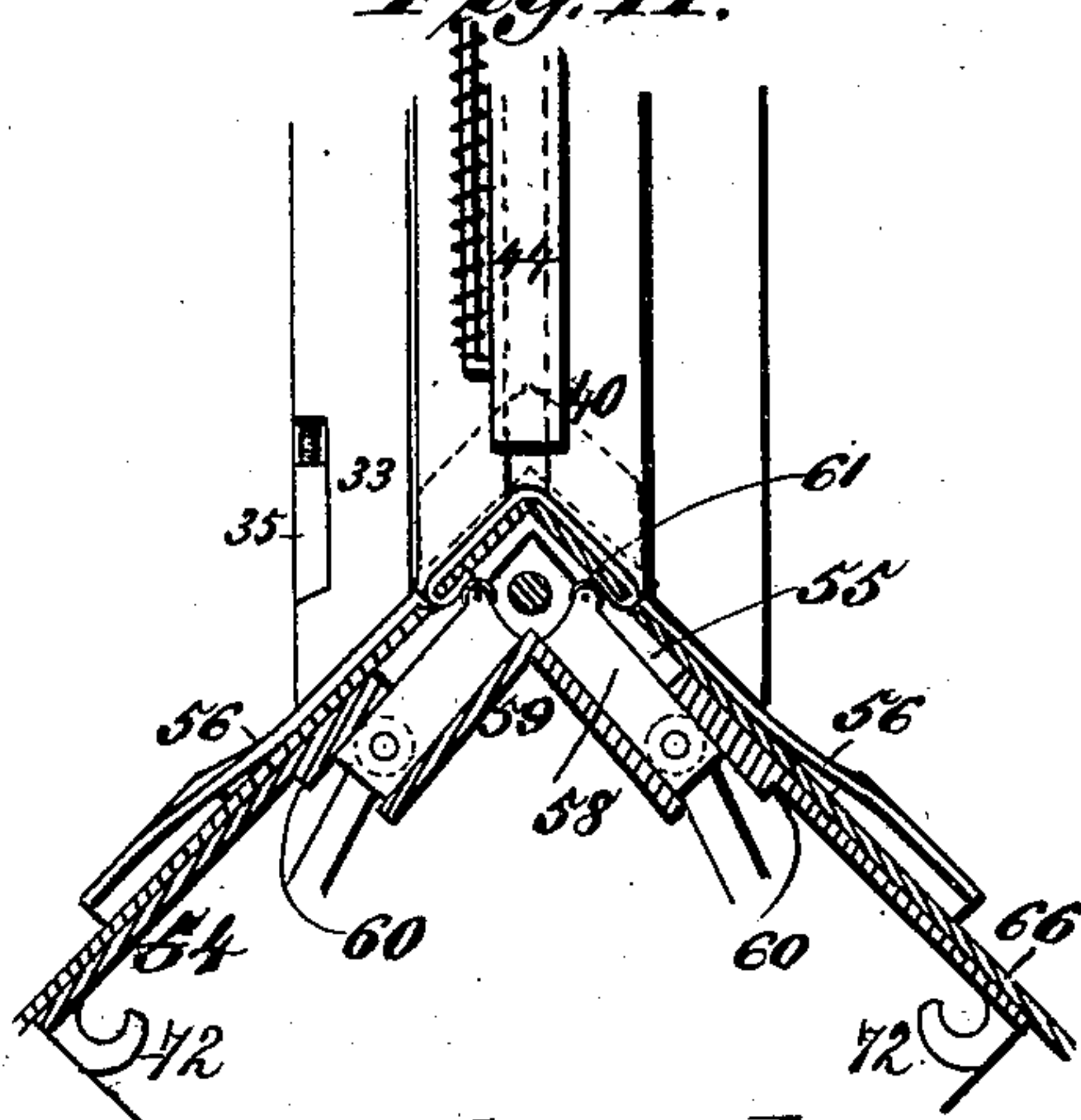


*Fig. 10.*



Witnesses.  
*Robert Swatt.*  
*Jo. L. Coombs*

*Fig. 11.*



Inventor.  
*Clarence W. Hobbs.*  
By *James L. Norris.*  
*Atty.*

(No Model.)

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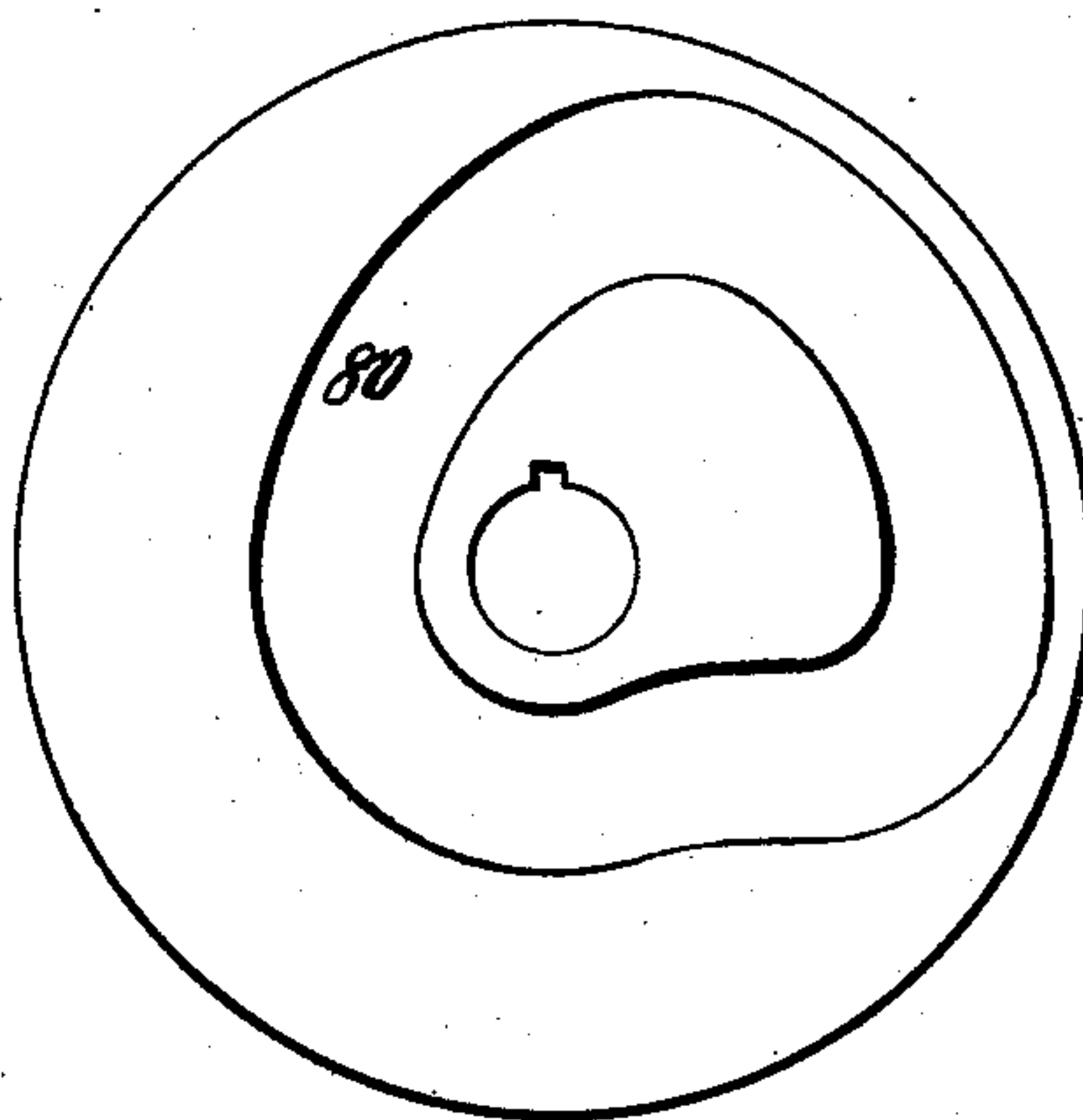
C. W. HOBBS.

MACHINE FOR STAYING PAPER BOXES.

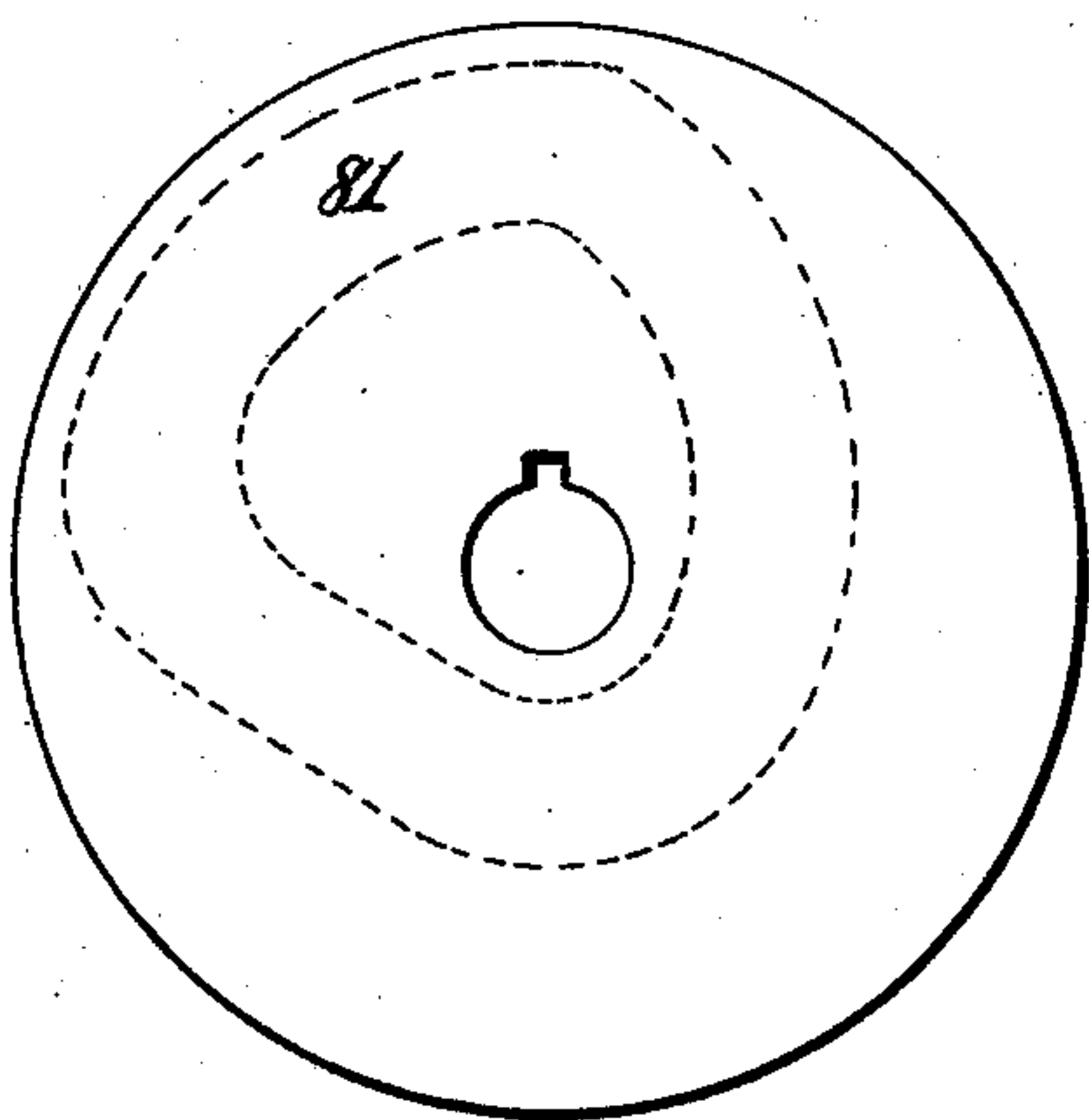
No. 367,397.

Patented Aug. 2, 1887.

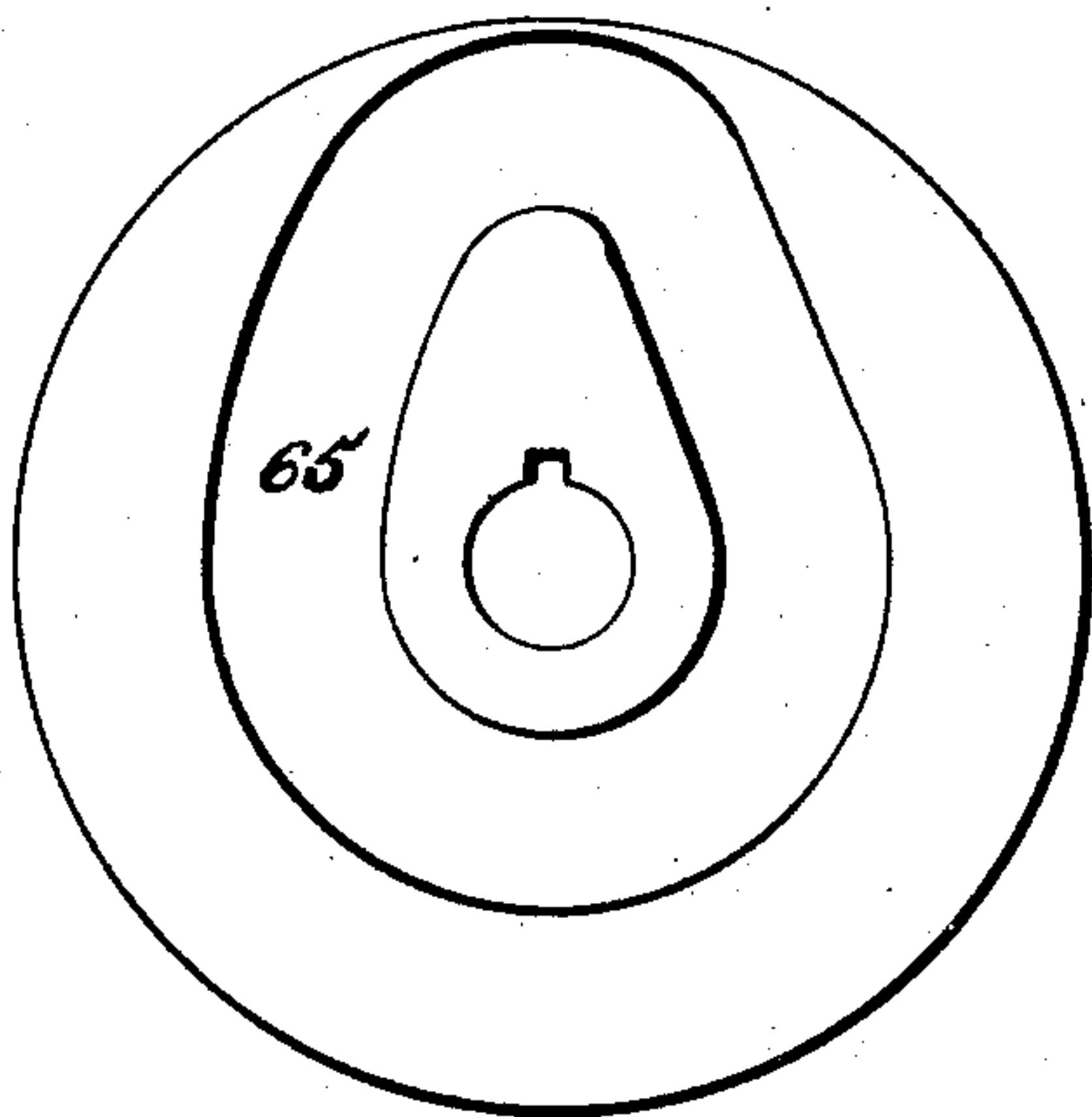
*Fig. 12.*



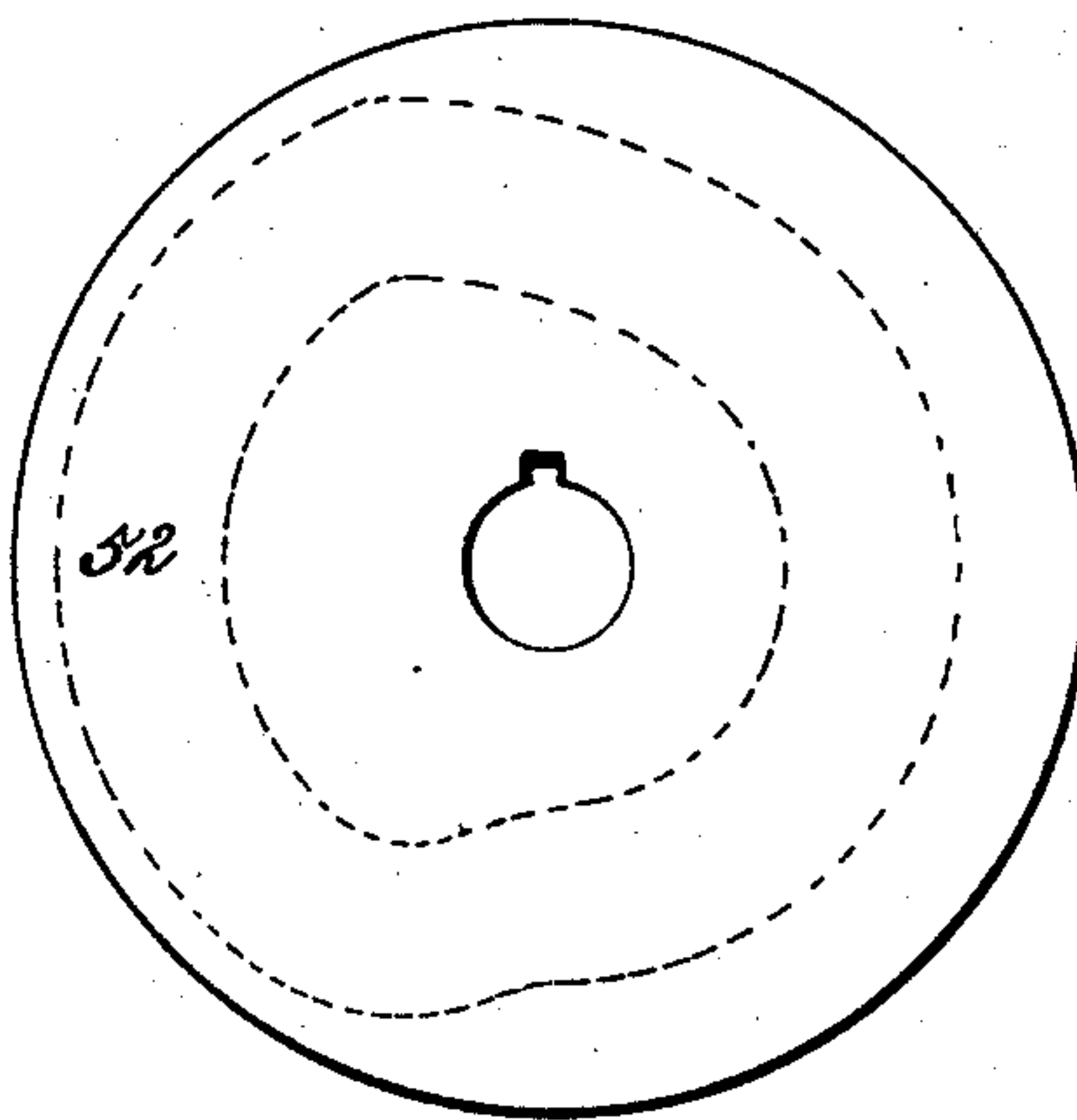
*Fig. 13.*



*Fig. 14.*



*Fig. 15.*



*Witnesses.*  
*Robert Everett,*  
*Jo. L. Coombs*

*Inventor.*  
*Clarence W. Hobbs.*  
*By James L. Norris*  
*Atty.*

(No Model.)

6 Sheets—Sheet 6.

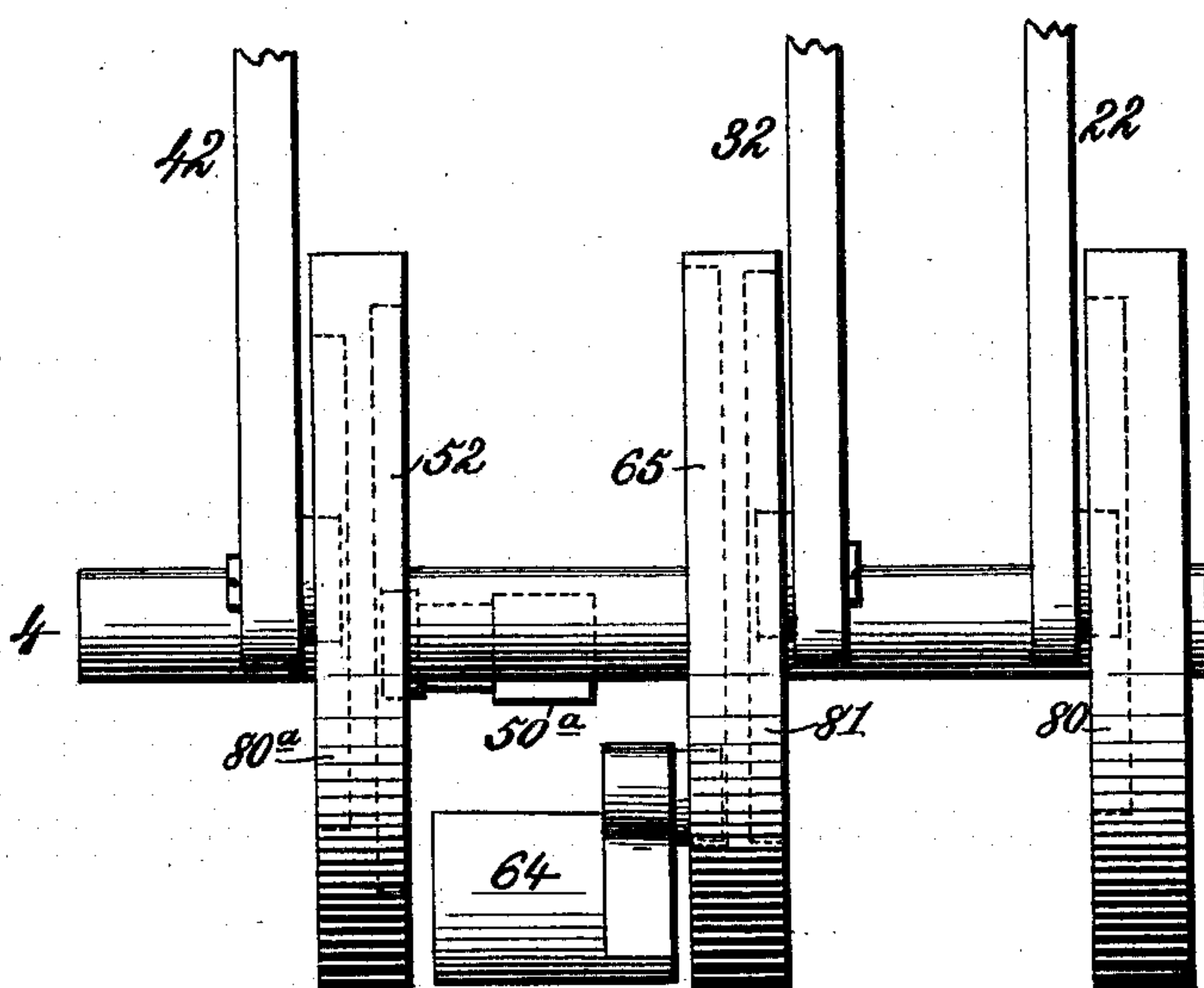
C. W. HOBBS.

MACHINE FOR STAYING PAPER BOXES.

No. 367,397.

Patented Aug. 2, 1887.

*Fig. 16.*



*Witnesses.*

Robert Everett,

Geo. W. Rea

*Inventor:*

*Clarence W. Hobbs.*

By James L. Norris.

Atty.



# UNITED STATES PATENT OFFICE.

CLARENCE W. HOBBS, OF LYNN, MASSACHUSETTS.

## MACHINE FOR STAYING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 367,397, dated August 2, 1887.

Application filed May 29, 1886. Serial No. 203,653. (No model.)

*To all whom it may concern:*

Be it known that I, CLARENCE W. HOBBS, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Machines for Staying Paper Boxes, of which the following is a specification.

My invention relates to mechanism for staying the angles of paper boxes and box-covers, and the purpose thereof is to provide an apparatus whereby the metallic stays may be formed from a continuous strand or strip, which is fed to the forming devices, cut off at the proper length, and bent, driven, and clinched by automatic devices.

It is my purpose, also, to so construct and organize the mechanism that the stay is not only formed so as to embrace the angle of the box, but the clinching ends are driven through the paper of the box at a right angle thereto, whereby all danger of marring the same is avoided and the stay is neatly, strongly, and durably attached.

It is my further purpose to provide means whereby the clinched ends of the stay may at their extremities be embedded in the inner face of the box to avoid the presence of sharp points or angular projections, which are liable to catch upon surrounding articles.

It is my further purpose to provide automatic devices whereby the wire may be fed to the machine under a proper tension, cut off at the required point, and accurately held in central engagement with the forming-die during the process of bending it into form.

It is my further purpose to combine with the forming mechanism a retracting-anvil having an inclined extremity of the required angularity, to combine therewith a support for the box having elastic arms provided with perforating and wire-guiding extremities, a forming and guiding die, and means for clinching the ends of the stay upon the inner faces of the box.

It is my purpose, finally, to provide simple and easily-applied devices whereby the machine may be used with boxes of various depth, to simplify and improve the construction and operation of mechanism of this class, and to provide an apparatus capable of rapid operation and of doing strong and finished work.

The invention consists in the several novel

features of construction and combinations of parts, hereinafter fully set forth, and definitely pointed out in the claims annexed to this specification.

In the accompanying drawings, Figure 1 is a side elevation of the machine. Fig. 1<sup>a</sup> is a perspective view showing a box with corner-stays attached by said machine. Fig. 2 is a front elevation of the machine shown in Fig. 1. Fig. 2<sup>a</sup> is a detail edge elevation of the feed-wheels detached. Fig. 2<sup>b</sup> is a detail side elevation of the hook-guide for the wire detached. Fig. 3 is a partial vertical section of Fig. 2, taken through the apex of the forming-die from front to rear. Fig. 4 is a detail perspective of the face-plate removed. Fig. 5 is a similar view of the cutter and of the forming-die, the latter carrying the wire holding and centering device. Fig. 6 is a perspective of the retracting-anvil detached. Fig. 7 is a perspective of the detachable body-plates for adapting the machine to boxes of varying depth. Fig. 8 is a partial front view of the machine, the face-plate being removed. Fig. 9 is a similar view, the parts being in a different position. Fig. 10 is a similar view showing a further advance in the operation of forming the stay. Fig. 11 is a similar view showing the last stage in the operation of the stay forming, driving, and clinching mechanism. Figs. 12, 13, 14, and 15 are views of the cams of the machine, with one exception, showing the relative position by which the cams are timed to their several successive operations. Fig. 16 is a rear elevation showing the cam-shaft with the several cams mounted thereon and the levers having pins which lie in the cam grooves or races from which the several movements of the machine are derived.

In the said drawings, the reference-numeral 1 designates any suitable support, upon which is mounted the frame 2 of the machine, having bearings 3 for a cam-shaft, 4, and bearings 5 for a lever-shaft, 6.

For the convenience of description I will in the following specification follow the order of operation as nearly as may be, beginning with the devices for feeding the wire and ending with the driving and clinching of the stay.

Upon the support 1, at the right hand (proper) of the machine, is placed a suitable



bearing for a reel, 7, which carries a continuous strand or strip of the metal, 8, from which the stays are formed. This material may be wire of suitable size, either round, half-round, or flat, the latter being in some respects preferable. From the reel 7 the wire is carried through a stretcher, 9, which consists of a spiral coil of elastic wire centrally mounted upon a support, 10, and thence the wire passes under a guide-hook, 11, (see Figs. 2 and 2<sup>b</sup>,) to a feed-roll, 12, having a groove, 13, in its periphery, in which the wire lies. Below this feed-roll is a second roll, 14, having a rib or feather, 15, which presses the wire into the groove 13 and holds it firmly. These feed-rolls are geared together by pinions 16 and 17, and rotation is imparted thereto by a ratchet, 18, upon the outer face of the roll 12. Upon the shaft 19 of said roll is mounted a rocking lever, 20, actuated by a pitman, 21, which is reciprocated by a lever, 22, upon the lever-shaft 6.

Upon one end of the rocking lever 20, which lies against the front face of the ratchet 18, is pivoted a pawl, 22<sup>a</sup>, which takes into the teeth of the ratchet, the latter being of such number and size that at each reciprocation of the pitman the ratchet is advanced one tooth, feeding the wire forward a distance equal to the entire length of wire required for the formation of a single stay. From the feed-rolls the wire passes through an opening, 24, Fig. 8, formed in a rigid depending portion, 25, of the face of the machine, cast upon the front of the frame 2. Within the opening is placed a knife-block, 26, having its cutting-edge flush with the inner face of the part 25, and capable of adjustment to compensate for wear by means of a screw, 27, tapped through a block, 28, which is carried by a plate, 29, Fig. 2, screwed to the front of the piece 25.

The portion 25, together with a parallel casting, 25<sup>a</sup>, form ways, within which the stay-forming mechanism with its adjuncts move. This mechanism consists of a forked die-carrier and an independently-operating die moving therein, Fig. 5. The former is provided with an arm, 30, having a bifurcated bearing, 31, to receive the eye of a lever, 32, by which it is raised and dropped. At the lower end of the arm are two parallel bars, 33 and 34, of such width that their outer faces lie and slide against the faces of the vertical casing formed by the part 25 and the parallel portion 25<sup>a</sup>, Fig. 8. In the outer face of the arm 33 is set a knife, 35, which reciprocates over the knife-edge 26 in the part 25. This knife is set in a recess, 36, and is capable of slight adjustment downward by means of a screw, 37, to compensate for the wear caused by use or by grinding up the edge.

The extremities of the arms 33 and 34 are beveled off outwardly and the beveled portions are slotted, as shown at 38, Figs. 5 and 8. Immediately above the beveled faces the inner faces of these arms are provided with vertical channels 39, of such depth as to re-

ceive the ends of the stay which are to enter the box.

Between the arms 33 and 34 is formed a space, within which is placed the forming-die. This die consists of a plate, 40, having an arm, 41, offset to one side to allow it to rise alongside the arm 30 to engage with the actuating-lever 42. The lower end of the plate 40 is notched at a right angle, and the notched edge is grooved out to receive part of the body of the wire. In the plate 40 is formed a central vertical slot, 43, which opens into the notch, and in said slot is mounted a block, 44, having a toe, 45, projecting downward. To the block is attached a rod, 46, extending upward and passing through an eye in a lug, 47, upon the arm 41. The end of the rod is provided with a head, 48, to prevent the block 44 from passing downward beyond the point shown in Fig. 5, and upon the rod is coiled a spring, 49, by the tension of which the block is normally thrown downward with force. The function of this element will be pointed out hereinafter.

Beneath the stay-forming devices is arranged the anvil 50, Fig. 6, consisting of a rectangular block, 50<sup>a</sup>, having an eye, 51, at its rear end, which receives a bearing for a roller running in a cam-groove, 52, Fig. 15, by which the necessary action is given. The outer end of the block is cut away to form a right-angled surface or anvil, 50, having the vertex central and the angular surfaces equally inclined on each side thereof, thereby bringing them into parallelism with the notched end of the forming-die 40. The extreme outer end of the anvil is beveled off to form a right-angled incline, 53, and the device is placed within a suitable slideway in the machine, where it may lie horizontally, with the end 50 beneath the forming-die.

Directly beneath the anvil 50 is the box-support 54, Figs. 3, 8, 9, *et seq.*, consisting of a rectangular shell having support on the main frame, Fig. 3, and arranged so that one of its angles lies in the same vertical plane with the angle of the anvil 50, whereby the adjacent sides are brought into parallelism with the angular faces of said anvil. The latter is notched on its under side to lie down upon the box-support, though not in contact, a space being left for the insertion of the box; and by thus causing the anvil to overlap the sides of the box-support it will be seen that the two beveled faces 53<sup>a</sup> and 53<sup>b</sup> form substantially inclined continuations of the horizontal faces of the anvil intermediate the horizontal faces of the support.

In the same vertical plane with the forming-die 40 is formed a slot, 55, cut from the vertex of the supporting-shell 54 into each inclined face thereof, Fig. 11. Upon the outer faces of said shell, at the rear thereof, are mounted elastic plates 56, which clear the surfaces on which they are mounted by a space a little more than equal to the thickness of the paper box, and are curved forward and upward until their ends overhang the slots 55, Fig. 8, at the



point where the ends of the stay engage with the box. The extremities of said plates are provided with prongs 57, bent toward the inclined surfaces of the box-support 54 at a right angle thereto. It will be seen from Figs. 8 to 11, inclusive, that the free pronged ends of these spring-plates 56 lie directly beneath the beveled ends of the arms 33 and 34, the inwardly-turned prongs 57 meeting the angle between the beveled ends and the inner vertical faces of said arms.

Within the supporting shell 54 are placed the clinchers, consisting of blocks 58, sliding between an angular guide-plate, 59, and bosses 60, formed on the inner faces of the shell 54. The construction of these guideways is such that the clincher-blocks 58 do not move in lines parallel with the inclined supporting-faces of the shell 54, but in lines which, if produced, would meet at an angle less than ninety degrees. The consequence is that as each block moves toward the vertex of the supporting angle of the shell it also approaches toward the inner face of the shell, the purpose thereof being set forth hereinafter.

Upon the upper angle of each block 58 is journaled a small friction-roll, 61, which said rolls directly underlie the slots 55, and have their peripheries projecting therein far enough so that when the blocks are retracted or drawn downward the rolls will be slightly within the outer edges of the said slots. Each block is reciprocated by a pitman, 62, pivoted to the end of a yoke-bar, 63, which is lifted and dropped by a lever, 64, Figs. 2 and 3, fulcrumed beneath the machine and actuated by a cam, 65, upon the cam-shaft 4.

Having thus far described the construction and organization of the mechanism, I will now point out the operation of said parts.

The parts being in the position of Fig. 1, with the anvil thrown out and the forming-die 40 and die-carrier 33 and 34 lifted, the paper box 66 is placed upon the supporting-shell 54, as shown in Fig. 3, the portion that is to receive the stay lying directly over the slot 55 in said shell. A flaring flange, 67, upon the face-plate 68 assists in guiding the box into place, so that it lies not only over the slots 55, but beneath the anvil 50 and the prongs 57. The machine being now set in motion, the feed-wheels 12 and 14 project the wire through the opening 24 and through the slots 38 in the arms 33 and 34, Fig. 8, and between the knives 26 and 35. Both the die carrier and the forming-die now descend, and the toe 45 upon the block 44 first engages with the wire and holds it firmly upon the apex of the anvil 50. The upper portion of the block 44 now comes in contact with the shoulder 41 and is carried down by it, thus becoming essentially a part of the die former 40. After this engagement has taken place the wire is severed by the knives 35 26, and the further descent of the forming-die 40 bends the wire down until it lies upon the angular faces of the anvil, the block 44 remaining stationary as the die 40

descends, the latter moving upon said block by means of the slot 43. The forming-die now rests upon the anvil, holding the wire in the channel in its notched edge. The movement of the forming-die is arrested at this point, but the die-carrier continues to move until the arms 33 and 34 have passed down upon each side of the opposite vertical faces of the anvil, thereby bending the ends of the wire directly downward, in which position they lie in the channels 39 in said arms, Fig. 8. At this point the anvil 50 begins to move toward the rear until the stay, which is still held in the end of the forming-die, rides down the outer inclined end of the anvil, being forced down by the positive movement of the forming-die. Prior to this action, however, the arms 33 and 34 have been driven down upon the spring-plates 56, pressing them down upon the sides of the paper box and driving their prongs 57 down nearly through the paper, in which position they are firmly held by the arrested arms, Fig. 9. As the anvil 50 retreats the downwardly-pointed ends of the stay, which lie in the channels 39 of the arms 33 and 34, impinge upon the surfaces of the prongs 57, and are thereby turned inward, and, following the direction of said prongs, the ends of the stay enter the box at right angles to its surface. The purpose of beveling the front end of the anvil is to hold the points or legs of the stay in a vertical position in the channels until the points have penetrated the paper. Moreover, the paper having been pierced by the said prongs, the ends of the stay will penetrate the paper through the openings formed by the prongs without difficulty, and will stand in the slots 55, the ends projecting inside the box at right angles to its sides and the stay lying closely down upon the outside of the box, Fig. 10. The lever 64 now operates, raising the yoke-bar 63 and driving the clinching-blocks 58 upward and toward each other. The rolls 61 engage the projecting ends of the stay and turn down upon the inner faces of the box and travel to the extreme end of each clinched portion. As the clinchers approach these ends they also approach or converge toward the inner faces of the box—in other words, moving in lines which meet at the vertex of the box-support—thereby burying the clinched ends of the stay deeper in the paper, until, as they pass off the ends of the wire, the latter are embedded in the inner surface of the box, leaving a smooth surface, without projecting angles or points which may catch upon or mar light and delicate tissues contained in the box. The die and die-carrier now rise, the pronged plates 56 spring up, withdrawing the prongs 57, and the box is shifted to bring the next corner upon the support.

In order to provide for staying boxes of varying depths, I propose to use filling plates or blocks, Fig. 7, which will extend the shell-support 54 outward. In applying these I first place a thin block, 71, just within the edge of the said shell, where it is supported by hooks



72, Fig. 10, engaging with dowels 73 on the block. Immediately outside the block, and forming part of the same, is a thick block, 74, connected by a bolt, 75, passing through both and into the base of the machine. If a further extension is required, a second block, 74<sup>a</sup>, may be attached, having a steadying-dowel, 77, which engages with the adjacent block, and secured by a bolt, 78, passing through the first, and having its end tapped into the second, a threaded opening, 79, being provided therefor, Fig. 7. These filling-plates are not strictly necessary in order to apply the stays to boxes of varying depth; but they serve to gage the point at which the stay is driven, and they insure the angle of the box being placed squarely on the support under the die, as they afford so extended a surface that any deviation from the correct position is not likely to occur.

The operative parts of the mechanism are driven by a series of cams upon the cam-shaft 4, as shown in Fig. 16, said cams also being shown in Figs. 12 to 15, inclusive, with the exception of one, which appears in dotted lines in Fig. 1. The latter cam actuates the forming-die 40. The cam 80, Fig. 12, actuates the feed-rollers. The cam 81 drives the die-carrier, having arms 33, 34. The cam 65 drives the clinching devices, and the cam 52 actuates the anvil in its forward and rearward movements. These several cams are shown in their true relative positions.

The power is contributed to the machine by a clutch on the main shaft, which causes the cams to make a single revolution and come to a stop.

What I claim is—

1. In a machine for staying boxes, the combination, with wire-feeding rolls, of a stretcher composed of a wire coil having a central support, through which the wire passes, substantially as described.

2. The combination, with rolls feeding a continuous wire, of a frame having a knife lying in an opening for the wire, a forked die-carrier moving in the frame and having a knife, a forming-die moving within the fork of the die-carrier and having a rectangular notch in its end, with a groove in the edge, a retracting rectangular anvil below, a box-support beneath the anvil, and elastic plates mounted on said support, said plates having pronged ends lying a little above and in the vertical plane of the openings in the box support which receive the ends of the wire stays, substantially as described.

3. The combination, with a die-carrier reciprocating in a vertical head and having parallel arms containing vertical slots in their inner faces, of a forming-die moving between said arms, said die having a rectangular notch in its lower end and a groove in the notched edge, a box-support having surfaces parallel with the channeled edges of the forming-die, an anvil having two inclined faces parallel with the surface of the box-support, said anvil

being notched upon its under side to bring the extremities of the inclined faces in close proximity to the anvil, and means, substantially as described, for retracting said anvil, substantially as described.

4. The combination, with a die-carrier having parallel inwardly-channeled arms, of a forming-die moving between said arms and provided with a notch in its lower end, the notched edges being grooved, an anvil having angular faces parallel with the grooved edges of the die, and a retracting-block centrally mounted in a slot in said die, substantially as described.

5. The combination, with a forming-die having its channeled end edges meeting at a right angle, of parallel arms having their ends beveled off to form a right angle with each other, said arms inclosing said die and moving upon it, an anvil having two inclined faces parallel with the end edges of the die and provided with a downwardly-inclined angular end, a box-support beneath the anvil, elastic plates mounted upon the faces of said support and having pronged ends lying in the plane of the openings which receive the ends of the stay, and beneath the beveled ends of the parallel arms, and means, substantially as described, for reciprocating the said anvil horizontally, substantially as described.

6. The combination, with the descending forming-die and the inwardly-channeled arms moving with and upon said die and having outwardly-beveled ends, of a reciprocating horizontal anvil having an inclined end, a support over which said anvil moves, having slots in its inclined faces, spring-plates having prongs which overlie said slots, and clinching devices, such substantially as described, moving within the box-support, for the purposes set forth.

7. The combination, with the stay-forming mechanism, substantially as described, of a box-support, spring-plates having perforating and guiding inwardly-turned prongs which normally lie above the slotted portions of the support, and bevel-ended arms forming part of the stay-forming mechanism and having channels in their inner faces, said channels having their lower open ends lying above and upon the surfaces of the inwardly-turned prongs, substantially as described.

8. The combination, with the stay forming and driving mechanism, substantially as set forth, of a slotted supporting-shell for the box, clinching devices, such substantially as described, moving in ways arranged inside said shell and in lines which converge toward the supporting-surfaces and meet at the vertex of the box support or shell, for the purposes set forth.

9. The combination, with the stay-forming mechanism, substantially as set forth, of a slotted angular box-support, clinching-blocks moving within said support, rolls upon the angles of said blocks, and ways within which the latter move, said ways being inclined to-



ward each other at an angle less than the angle of the support, substantially as described.

10. The combination, with the supporting-shell, of detachable and attachable blocks, one of which lies within the shell and is connected therewith by dowels engaging with hooks upon the shell, and bolts passing through the same and into the machine-frame for supporting the outer blocks, substantially as described.

11. The combination, with the face-plate having a notched end and provided upon its inner face with a block at the apex of the notch, of a forming-die having a notched end and provided with a vertical slot opening at the apex of said notch, a block moving in said slot, a spring by which said block is normally pressed down, a rod within the spring moving in a lug on the die-plate, and an angular horizontally-reciprocating anvil beneath the die, substantially as described.

12. The combination, with the head of the machine having an opening for the wire, of a knife lying in said opening, a die-carrier having parallel inwardly-channeled arms beveled outwardly at their ends and provided with slots in the beveled ends, said slots lying in

the path of the wire, a forming-die having an angular notch in the end and moving between the arms and the die-carrier, an anvil having an angular face and an inclined angular end, a spring-pressed holding-block moving in the die-plate, a box-support beneath the anvil, plates having perforating and guiding prongs, clinching devices within the box-support, and means, substantially as set forth, for reciprocating the anvil horizontally, substantially as described.

13. The combination, with a horizontally-reciprocating anvil having its outer end beveled to the form of the stay and inclined downward to the plane of the box-support, or nearly so, of a die-former having vertical motion above the anvil and having its notched stay-forming end grooved to receive and hold the ends of the stay in a vertical position as they enter the box, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CLARENCE W. HOBBS.

Witnesses:

FRANK S. KNIGHT,  
GEORGE E. LEGER.