

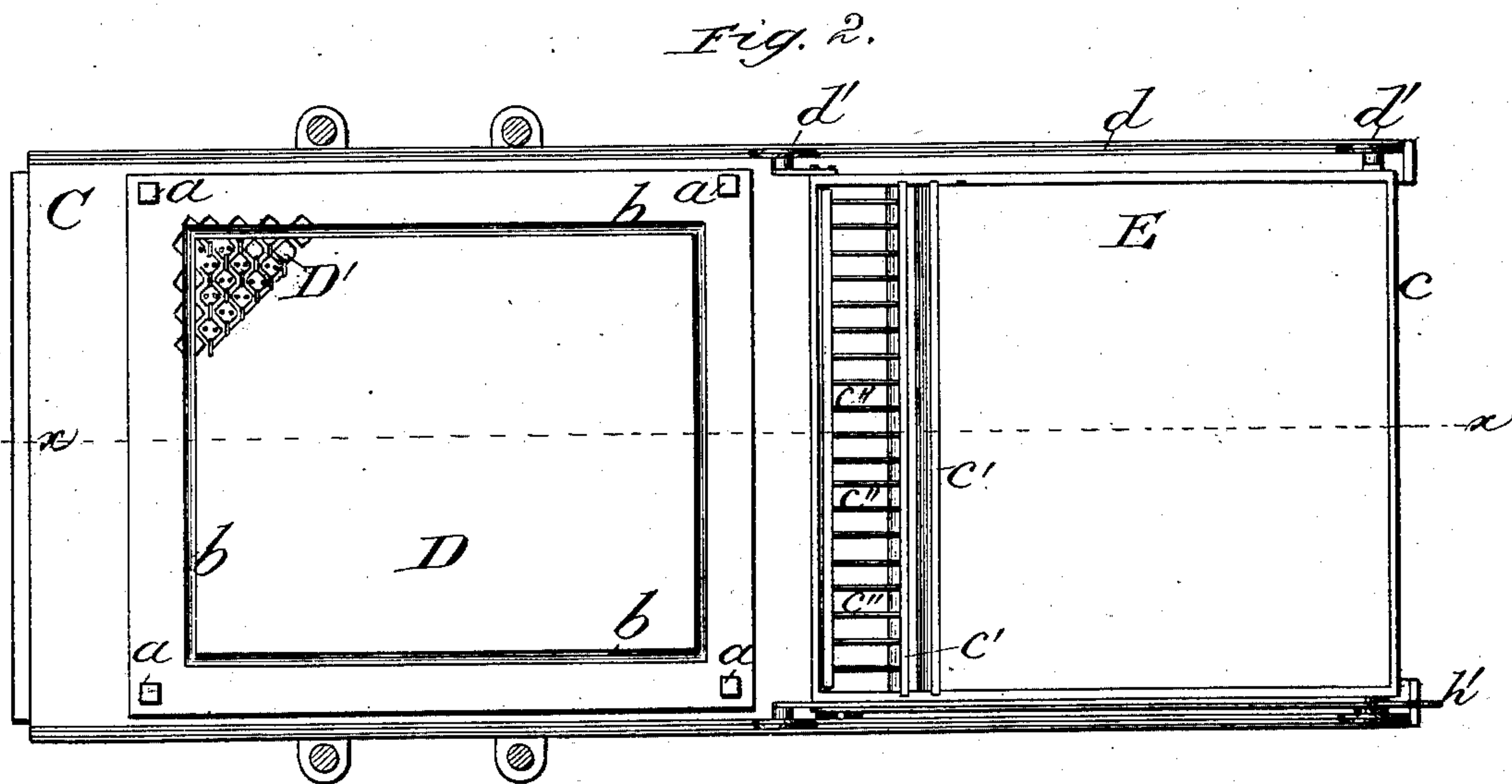
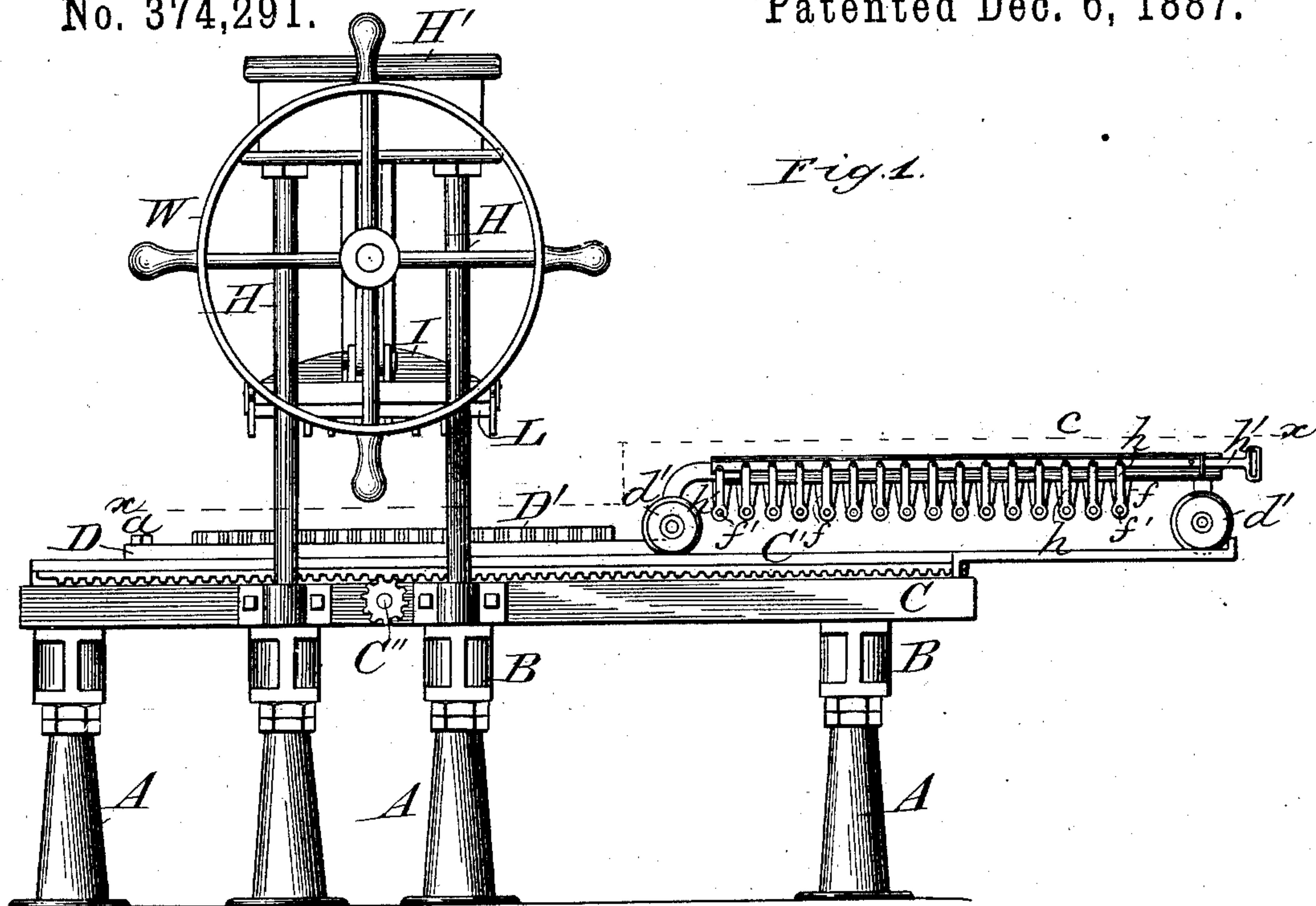
(No Model.)

3 Sheets—Sheet 1.

A. F. CALDWELL.  
MACHINE FOR MAKING WIRE SCREENS.

No. 374,291.

Patented Dec. 6, 1887.



Witnesses:  
*W. B. Porter*  
*J. L. Caldwell*

Inventor  
*Alfred F. Caldwell*  
By *M. H. Chandler*  
*Att'y*

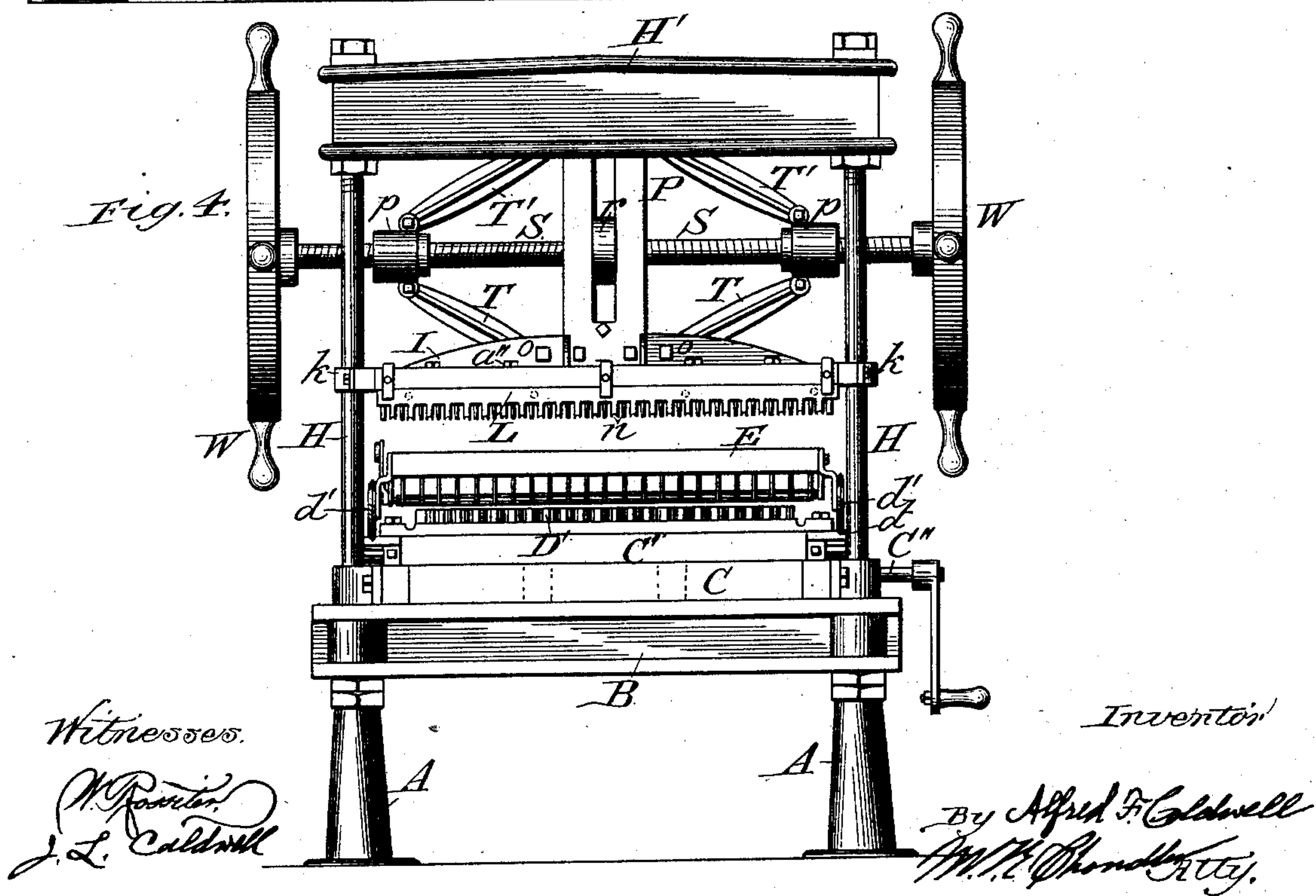
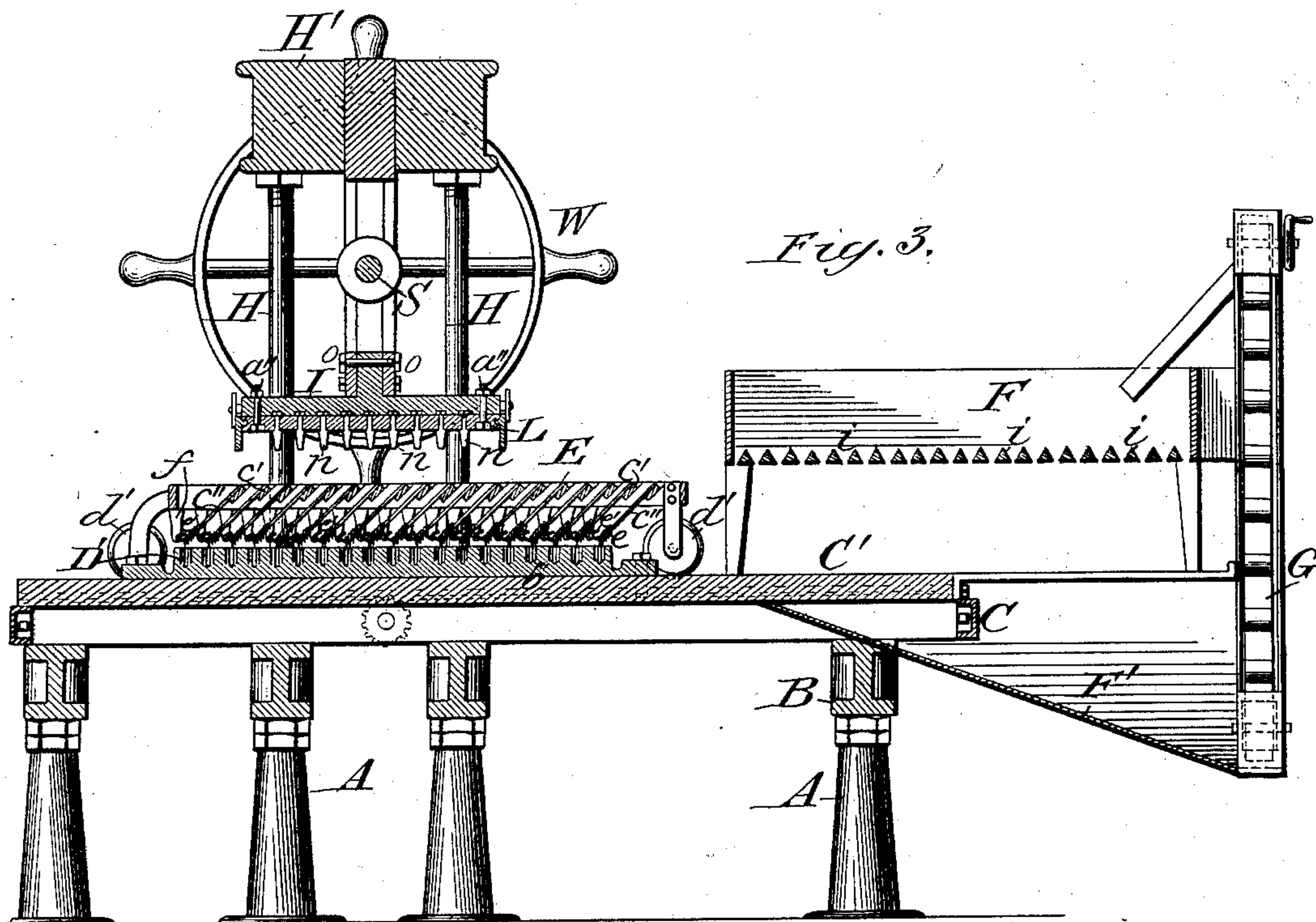
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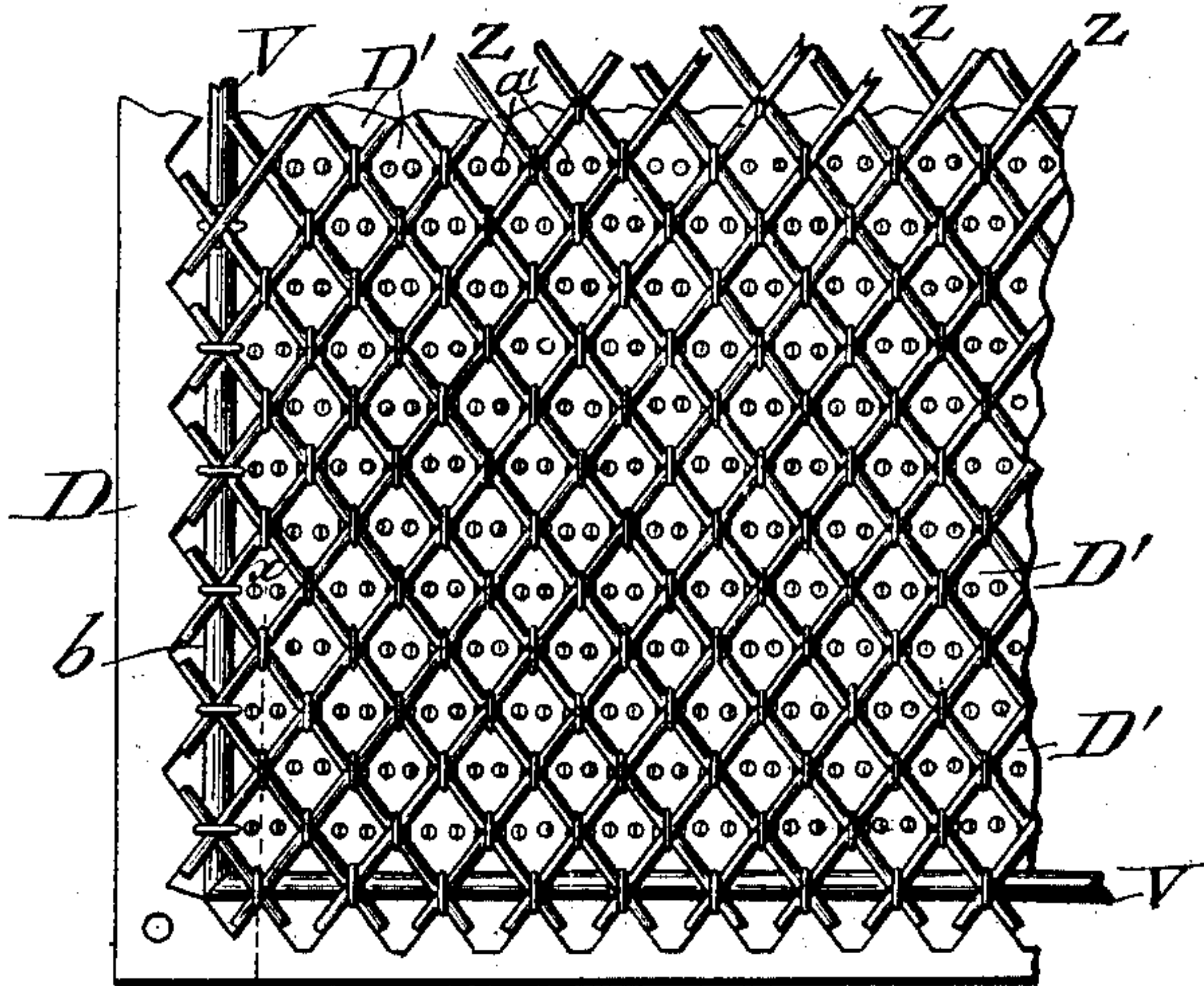
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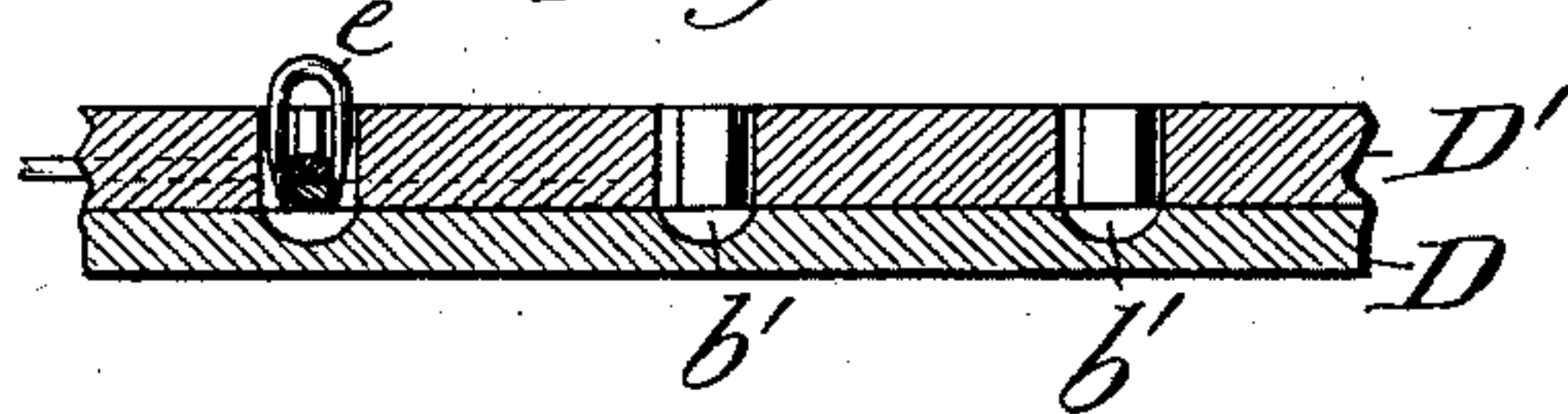
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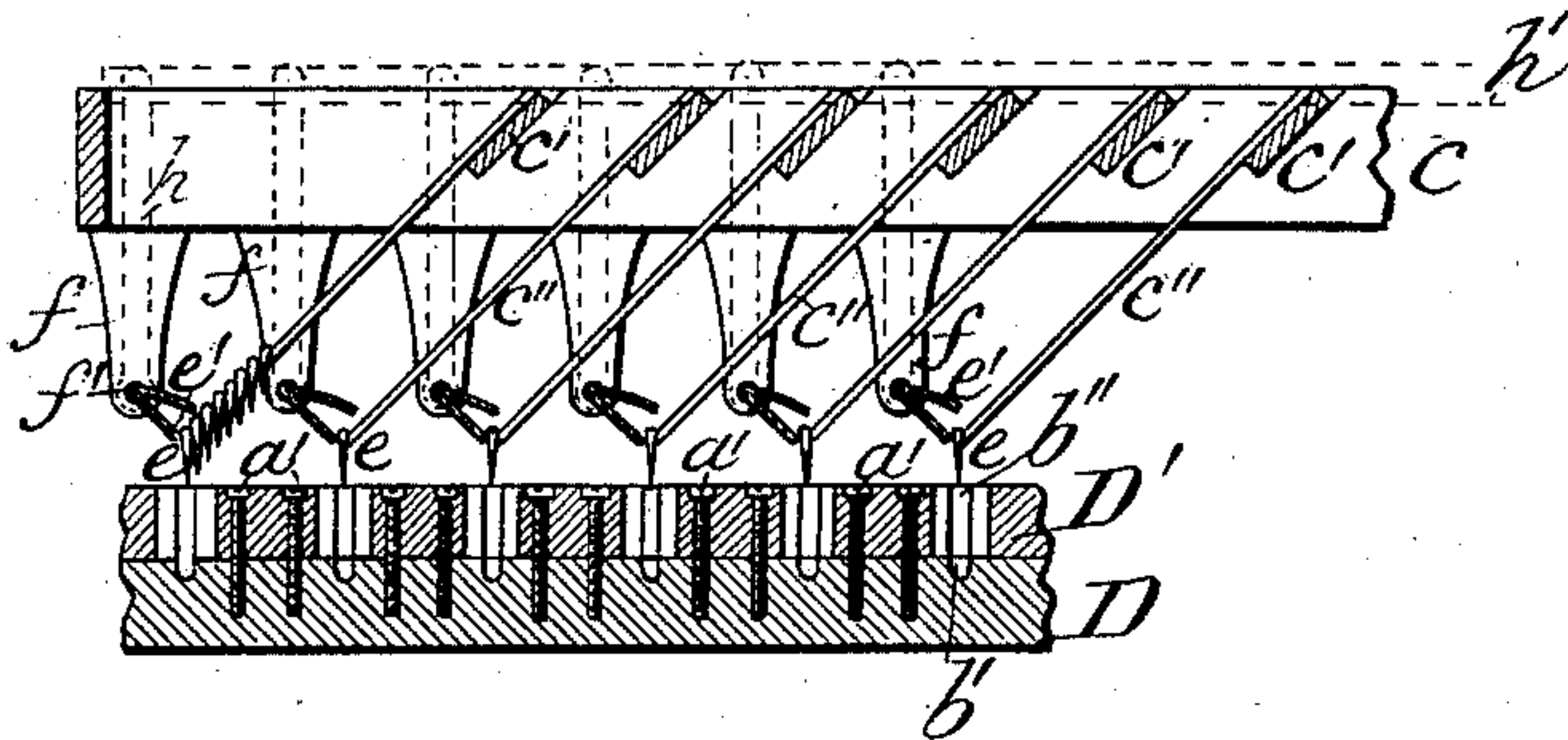
*Fig. 5.*



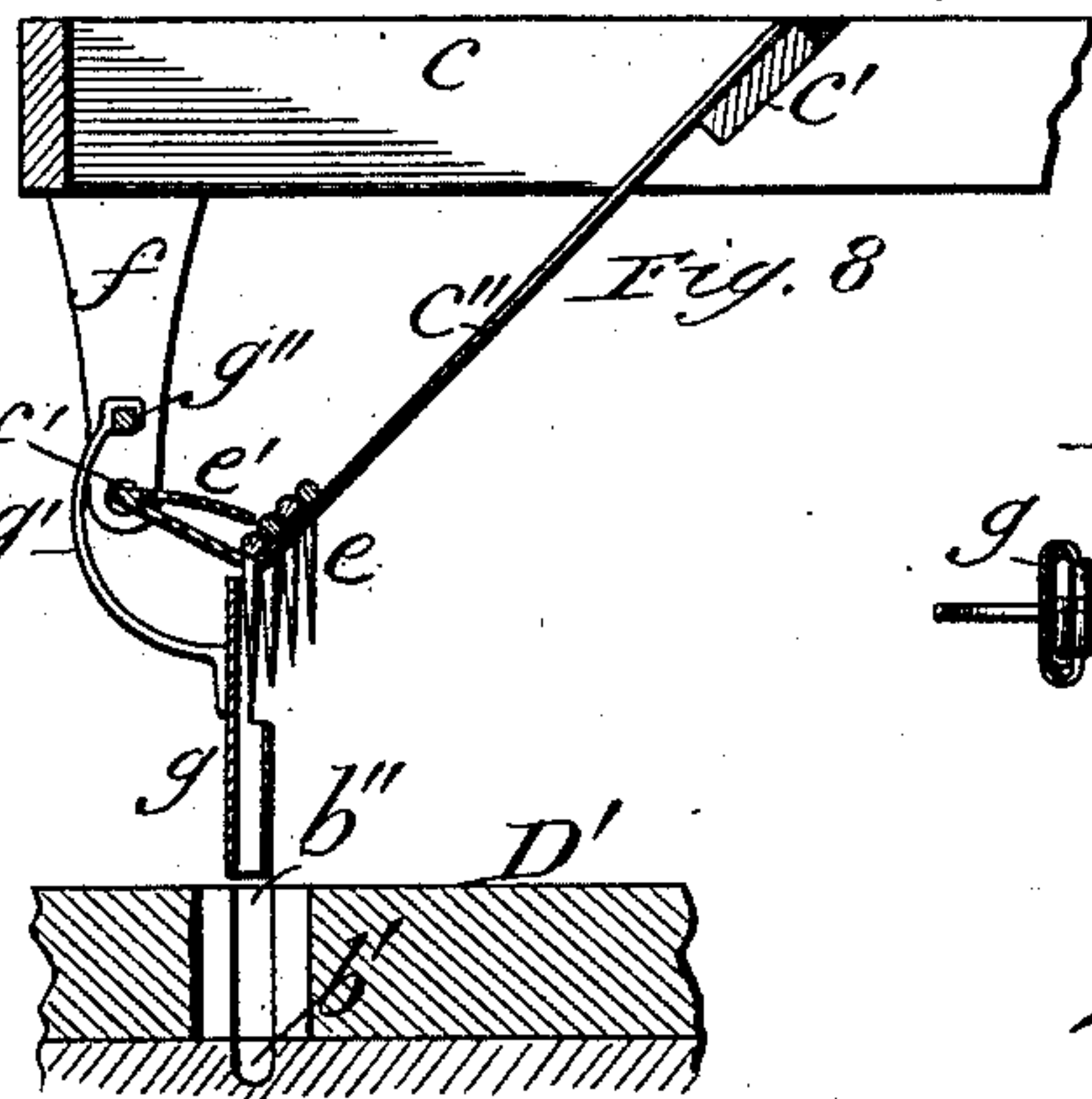
*Fig. 6.*



*Fig. 7.*



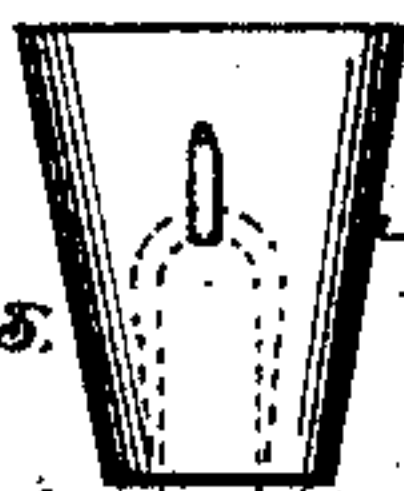
*Fig. 8.*



*Fig. 9.*



*Fig. 10.*



Witnesses.

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# UNITED STATES PATENT OFFICE.

ALFRED F. CALDWELL, OF CHICAGO, ILLINOIS.

## MACHINE FOR MAKING WIRE SCREENS.

SPECIFICATION forming part of Letters Patent No. 374,291, dated December 6, 1887.

Application filed September 16, 1887. Serial No. 250,725. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED F. CALDWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Wire Screens; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to a machine designed to manufacture wire screens by securing the cross-wires thereof to each other and to the border wire or frame by means of staples surrounding the intersections of the cross-wires and their junction with the frame, said staples being supplied in quantity and carried to the joints where they are needed, bent around the crossing of the screen-wires, and firmly secured, the whole operation being automatic, thus reducing the price of such screens by avoiding the expense incurred in the ordinary course of their manufacture, which consists in applying and securing the staples by hand.

The machine consists, essentially, of a grooved and perforated bed-plate carried on suitable supports, the grooves of said bed-plate being arranged to receive and hold in place the border-frame and cross-wires of the screen while the staples are being bent in place and secured around said wires. These staples are carried upon a staple-carrier consisting of a series of inclined rods attached to a movable frame mounted upon rollers that travel in guiding-grooves at the sides of the bed. This carrier-frame may therefore be moved over the bed after the wires to form the screen and its border-frame are in place, and as there are as many inclined staple-carrying rods as there are intersections of the screen-wires to be fastened, there will of course be one or more staples suspended over each crossing. When in this position, the movement of a sliding rod at the side of the staple-carrier operates a series of levers and allows a staple to drop astride of the screen-wires at each intersection. The staple-carrier is then withdrawn

and a platen provided on its under side with a series of downwardly-projecting dies is powerfully forced down upon the staples, the points of which are thus caused to follow the grooves formed for that purpose in the bed and tightly embrace the wires of the screen, thus producing at one operation a complete screen.

In the accompanying drawings, Figure 1 is a side elevation of the machine with the platen raised and the staple-carrier drawn out, the bed being ready to receive the frame and wires for a screen. Fig. 2 is a sectional plan on the line *x x* of Fig. 1, showing a portion of the bed filled with the blocks used to form the receiving-grooves for the cross-wires, also the groove for the frame. Fig. 3 is a longitudinal section on the line *x x* of Fig. 2, the staple-carrier being run in under the platen and in position to drop a staple at each crossing of the wires. Fig. 4 is an end view of the machine and illustrates the construction and arrangement of the devices employed in forcing down the platen to secure the staples around the screen-wires. Fig. 5 is a plan view of a portion of the bed with the screen in place thereon upon an enlarged scale. Fig. 6 is a section of the bed on the line *x* of Fig. 5, showing its construction and the manner in which the staples are made to embrace the screen-wires. Fig. 7 is a longitudinal section through a portion of the staple-carrier and bed, and illustrates the means employed for retaining the staples in position upon the inclined rods. Fig. 8 is also a longitudinal section, showing the staple-carrier with a guide attached to conduct the released staple to its proper position astride the screen-wires. Fig. 9 is a plan view showing the relative position of the guide, staples, and inclined rods which support them. Fig. 10 is a front view of the guide, showing the position of the lower staple in dotted lines.

In this machine *A A* represent the legs or supports upon which the operative parts of the machine are carried, and should be of such construction as to give a firm and solid base not liable to derangement from the shocks it may receive in the operation of the machine. Upon these legs are placed the transverse beams *B B*, generally four in number, each resting upon two of the legs, which are preferably provided with means for ad-



justing the height of said beams, so that their upper surfaces may always be kept in proper alignment. These beams carry the rectangular frame C, upon which is placed the movable plate C', guided in its movements by the frame C and provided upon each side with a toothed rack, which racks engage the pinions upon the crank-shaft C'', so that by operating this crank-shaft any part of the plate and bed which it carries may be brought directly under the vertically-moving platen, by which the staples are forced around the cross wires. Firmly secured to this movable plate C' by means of bolts *a a* is the bed D. This bed, as shown in Fig. 2 of the drawings, has a plane surface, except the semicircular grooves *b*, formed therein to receive the frame *d* of the screen. This groove and frame, which bounds the periphery of the screen, is of the same size and shape of the finished screen, and is shown as a rectangle, that being the form commonly used for screens; but it is evident that this form may be changed to suit the shape of any screen it is desired to make. Additional depressions *b'* are also formed, in which the ends of the staples are received and turned toward each other, when they are forced down by the platen. Upon the top of this bed D are secured the series of blocks D' by means of screws *a'*, which pass through the blocks into the bed. These blocks are of the shape and size of the interstices between the cross-wires of the screen, and may be varied from a rectangular to a diamond or other shape, just as it is desired to have the openings in the screen, space being always left between them for the wires. They are also provided at the corner with a groove, *b''*, which receives the staples and holds them in a vertical position as they are dropped from the staple-carrier, and guides them as they are forced down by the dies of the platen.

Along the margin of each side of the frame C is formed a groove, *d*, which receives and guides the wheels *d'* of the staple carrier E as it is moved over or away from the bed. This staple-carrier consists of a rectangular frame, *e*, mounted horizontally upon the wheels *d'*, and provided with a series of movable cross-bars, *e'*, placed at the same distance from each other as the distances between the intersections of the wires of the screen to be made upon the machine. Attached to these cross-bars *e'* are the inclined rods *e''*, equaling in number the crossings of the wires composing the screen, and each of sufficient length to carry a large number of the staples *e*, which are placed astride the rods and descend as they are wanted by gravity.

Hangers *f* are attached to and depend from the sides of the frame *e*, carrying at their lower ends rock-shafts *f'*, which rock-shafts are provided with the bifurcated arms *e'*—a pair for each inclined rod. These bifurcated arms are of such length that when the rock-shaft is swung toward the rods one of them comes in contact with their ends and prevents

the dropping off of the staples, while the other passes above the rod and staples; but when the shaft is rotated so as to remove the lower arm from its contact with the end of the rod and allow a staple to escape, the upper arm comes down upon the top of the rod and prevents more than one staple escaping at each oscillation of the rock-shaft.

In order to provide a convenient means for oscillating these rock-shafts, they are each provided at one end with upwardly-projecting crank-arms *h*, to which is pivoted the horizontal handled bar *h'*, sliding in suitable guides at one side of the frame *c*. It is apparent from this construction that a pull upon the rod *h'* will release a staple and allow it to drop from the end of each of the inclined rods, and that, if said staple-carrier is in its proper position over the bed D, one of these staples will be dropped into the grooves *b''* of the blocks D' at each intersection of the passages for the reception of the screen-wires between said blocks, and that a reverse movement of said handled rod will raise the upper arms, *e'*, of the rock-shaft and allow the staples to slide down the inclined rods to take the place of those that have been dropped.

If desired, guides may be attached by the curved arm *g'* to the bars *g''*, crossing the carrier and supported by the hangers *f*. These guides are preferably formed of thin material and slightly conical in one direction, as shown in Fig. 10, to enable them the better to direct the points of the staple into the groove of the bed.

Various devices may be employed for the purpose of supplying the inclined rods of the staple-carrier with staples; but I prefer that shown in Fig. 3 of the drawings, in which F is a box supported upon the plate C' by suitable legs at such a height that the staple-carrier may be run under it. The bottom of this box is formed of bars *i i*, preferably triangular in cross-section, crossing it, and placed close enough together to allow the staples to pass between them only flatwise. Such of the staples as pass between these bars points downward will be caught by the rods *e''* of the carrier. The others will fall through between these rods and be caught by the double incline F', placed beneath and carried to the rear, where they are taken up by the elevator G, raised, and again emptied into the box F, the operation being continued until each of the inclined rods has received its supply.

In order to force down and clinch the staples around the wires of the screen, I employ the following mechanism: Firmly secured to the ends of the two central cross-beams, B B, and to the frame C are the four vertical posts or columns H H, which carry at the top the heavy cross-beam H', forming the resistance-piece for the toggles which operate platen I. This platen is a heavy strong metallic plate provided with guides *k k*, which slide upon the columns and keep the platen in its proper position during its vertical movements. To the



under side of this platen is attached, by bolts  $a'' a''$  or other suitable means the die-plate L, in which are secured the removable dies  $n n$ .

These dies have a semicircular recess in their lower ends fitting the rounded end of the staples, and, as shown, may be changed to suit the different kinds of screens manufactured. The die-plate L may also be readily changed to allow dies of different construction or of greater or less distances from each other to be used.

To operate this platen and its accompanying die-plate, I pivot between the flanges  $o o$ , upon its upper side, the toggle-arms T T, the opposite ends of these arms being pivoted to the nuts  $p p$  upon the screws S. Another pair of toggle-arms, T' T', are also pivoted to the nuts  $p$  at their lower ends and to the beam H' at their upper ends. The screw S has a strong collar,  $r$ , formed upon its middle, which collar is placed in the slots of the guide-bar B, which guide-bar is secured at its lower end to the platen, its upper end moving freely through a mortise in the beam H'. Upon each end of the screen is placed a hand-wheel, W, by which it may be revolved. It is evident that the revolution of the screw in one direction will force the nuts  $p p$  apart, which movement of the nuts, acting through the toggle-levers, will raise the platen, and that a reverse movement of the screw will draw the nuts toward each other, and thus press down the platen with great force, carrying the die-plate and dies attached thereto down upon the staples with sufficient pressure to cause the points of the latter to bend around the wires of the screen in the grooves of the bed, uniting said wires firmly at each crossing. As the platen and its dies require great force to accomplish its work in a proper manner, it is made so as to cover only a portion of a large screen at a time, the latter, together with its bed, being moved along under the dies by means of the crank-shaft C' and its connecting-gears in successive sections, the pressure being applied to each as it comes under said dies.

The operation of the machine is as follows: A border-frame, V, of the same dimensions as the proposed screen, is formed of a bar of iron or other metal by bending it into the required shape and uniting its ends. This frame is then laid in the groove  $b$  in the upper surface of the bed D. Wires  $z z$  are then placed in the channels between the blocks D' upon the bed. These wires cross each other and project over the border-frame V, crossing on top of it, as shown in Fig. 5 of the drawings. The staple-carrier E is then run over the bed and a staple dropped over the intersections of the wires  $z z$  with each other and with the border-frame. The staple-carrier is then withdrawn, and the bed placed in position to receive the impact of the dies upon its first section. By revolving the screw S the dies are brought down upon the staples, forcing them into the grooves  $b'$  and  $b''$  of the blocks D' and bed D, thus causing them to encircle the wires and firmly unite them to each other as well as the border-frame.

The dies are then raised, the bed and screen moved along, and another section submitted to the impact of the dies, and so on until the whole screen is completed.

It will be apparent that this machine may be used not only in the manufacture of screens, but also in the production of ornamental wire fencing and other analogous articles, as its construction allows it to operate, if desired, upon a screen or other similar structure of a certain specified width, but of unlimited length.

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

1. In a machine for making wire screens, the combination of the movable plate C, the plate D, fixed to said plate, said plate D provided with a groove,  $b$ , for the reception of the border-frame, and also provided with indentations  $b'$ , to turn ends of staples, the blocks D', so arranged on plate D as to receive the cross-wires, and a vertically-reciprocating platen carrying a series of dies constructed to secure staples around said wires and border-frame at their intersections, as set forth.

2. In a machine for making wire screens, the bed-plate D, provided with the groove  $b$  to receive the border-frame, the blocks D', arranged for the reception of the cross-wires, and indentations  $b'$ , for turning the ends of the staples, in combination with the staple-carrier, constructed to deposit a staple at each intersection of said wires and border-frame, and the vertically-reciprocating dies arranged to clasp and secure cross-wires and border-frames at their intersections.

3. In a machine for making wire screens, the combination, with the staple carrier, constructed to deposit staples singly astride the cross-wires of said screen, of the hopper F, supported on the plate C at a sufficient height to allow the staple-carrier to run under it, and provided with the cross-bar  $i$ , the double incline F', and the elevator G, substantially as set forth.

4. In a wire-screen-making machine, the supports A, cross-beam B, and frame C, supported on said beams, in combination with the movable plate C', crank-shaft C'', and gear connected therewith for moving plate C', the grooved bed D, secured to said plate, and the blocks D', arranged upon the bed, constructed to form channels for the reception of the cross-wires of the screen, the staple-carrier E, and the dies  $n$ , substantially as set forth.

5. In a machine for making wire screens, the movable plate C', provided with the track-grooves  $d$ , and the grooved bed D, secured to said plate, in combination with the staple-carrier E, provided with wheels  $d'$ , running in grooves  $d$  of plate C', and the dies  $n$ , substantially as set forth.

6. In a machine for making wire screens, the combination, with the plate C', of the movable staple-carrier E, provided with a series of cross-bars, and the bifurcated stops  $e'$ ,



adapted to deliver the staples singly from said inclined rods, substantially as set forth.

7. In a screen-making machine, the combination, with the movable staple-carrier E, having inclined rods, of the hopper F, having a bottom composed of bars *i i*, the inclined spout F', and elevator G, adapted to deposit the staples upon the inclined rods of the carrier, substantially as shown and described.

10 8. In a wire-screen-making machine, the vertically-reciprocating platen provided with the die-plate secured thereto, and the removable dies *n n*, in combination with the bed D, having the grooves *b'* to co-operate with the  
15 dies *n* in bending the staples about the wires.

9. In a staple-carrier for a screen-making machine, the combination of the inclined rods *e'*, supporting the staples, with the oscillating bifurcated stops *e'*, said stops being attached

to the rotating shaft *f'*, which shaft is operated by the arms *b* and *b'*, and the guides *g*, constructed to conduct the staple after leaving the rods to the grooves of the bed, substantially as set forth.

10. In a screen-making machine, the combination, with the frame C, the column A, beam H', platen I, die-plate L, and the movable dies *n n*, of the device for operating said dies, consisting of the toggle-lever, screw and band wheels attached to said lever, and the  
30 bed-plate D', having grooves *b'*, all substantially as set forth.

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

A. F. CALDWELL.

Witnesses:

H. A. AMES,

J. L. JONES.