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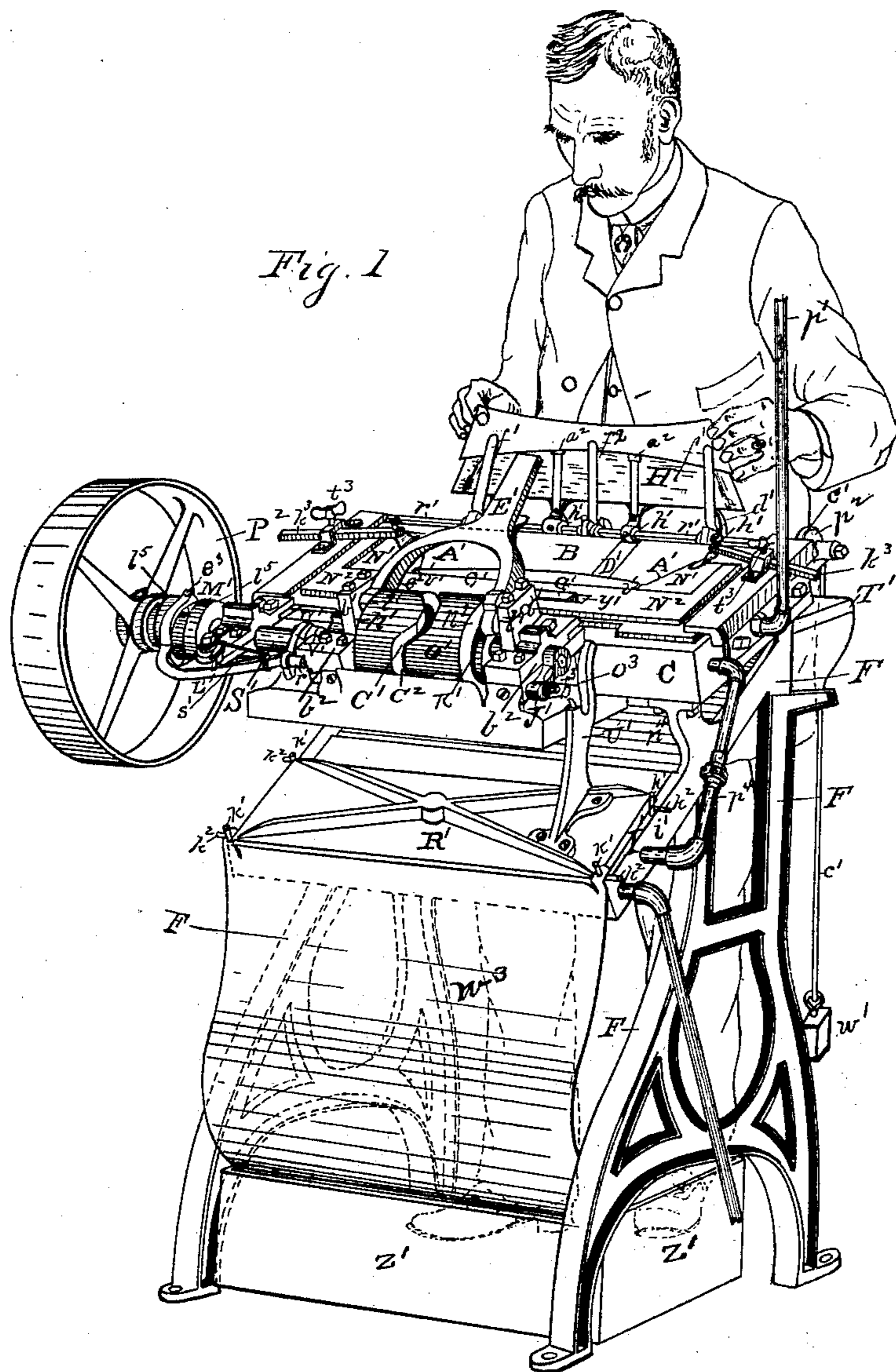
12 Sheets—Sheet 1.

G. E. NORRIS.

COLLAR FOLDING MACHINE.

No. 341,044.

Patented May 4, 1886.



WITNESSES:

Stanley M. Holden.

Charles S. Brintnell

George E. Norris INVENTOR

BY

W. E. Hagan his ATTORNEY

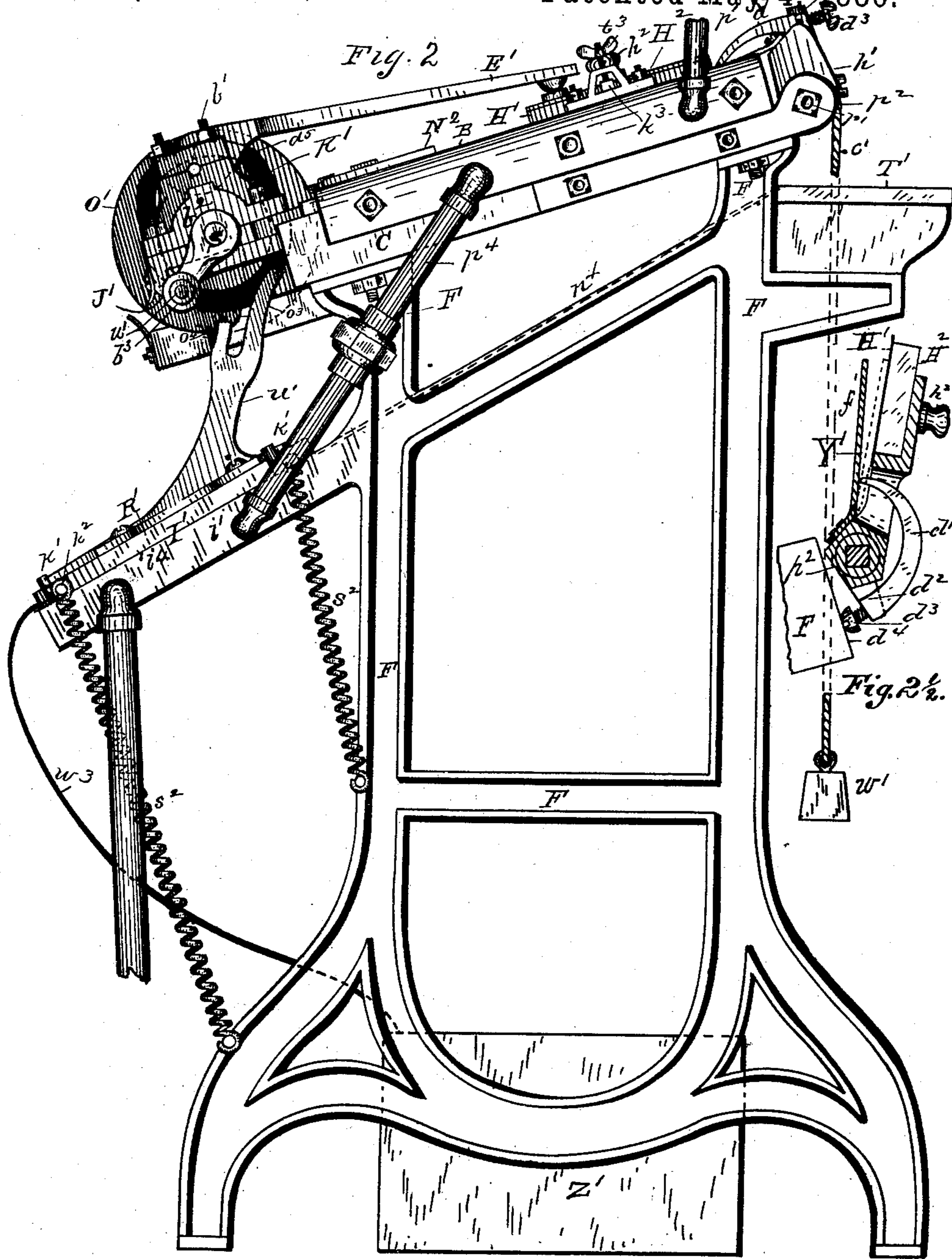
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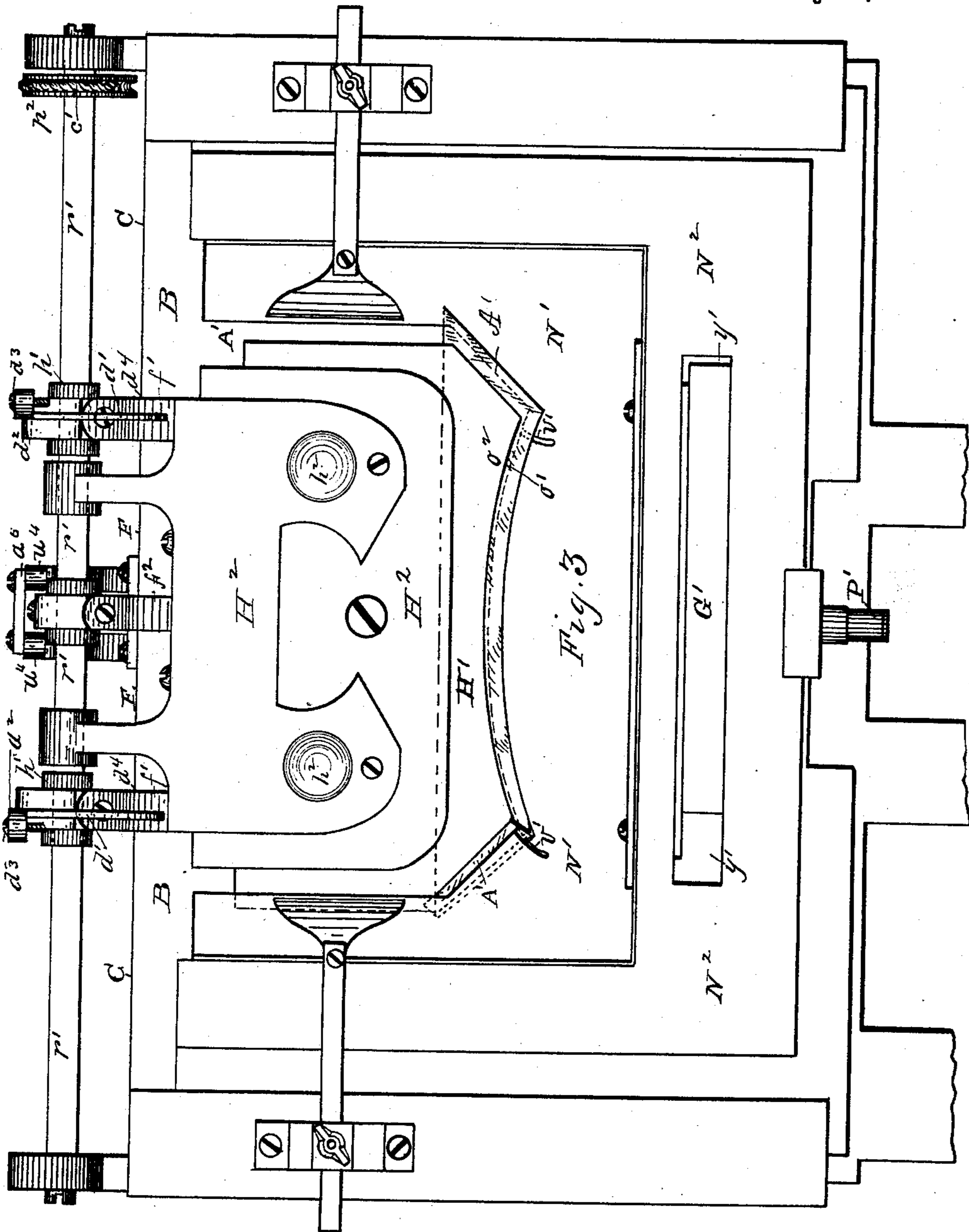
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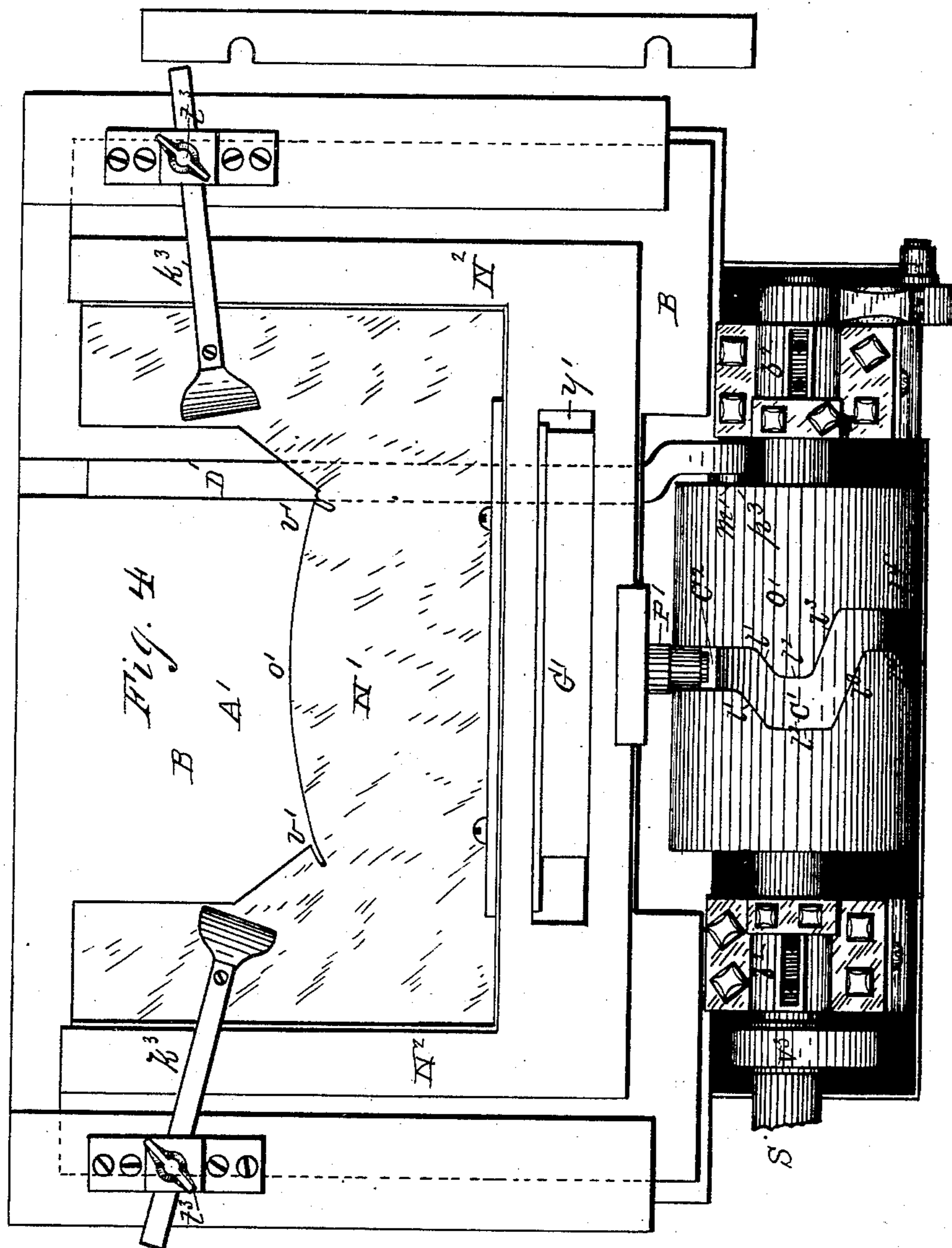
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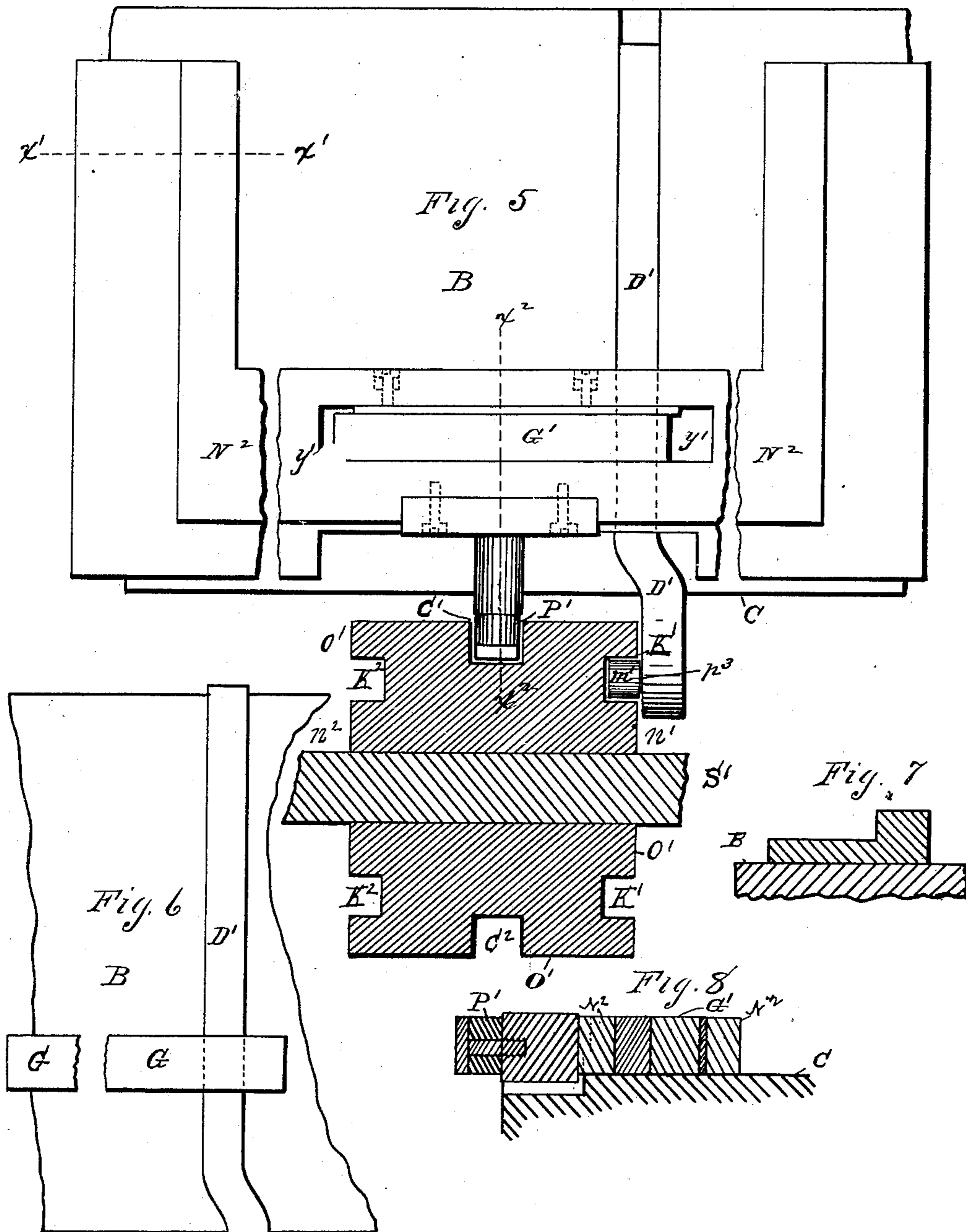
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WITNESSES:   $m^1$   $m^3$

Stanley M. Holden.

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(No Model.)

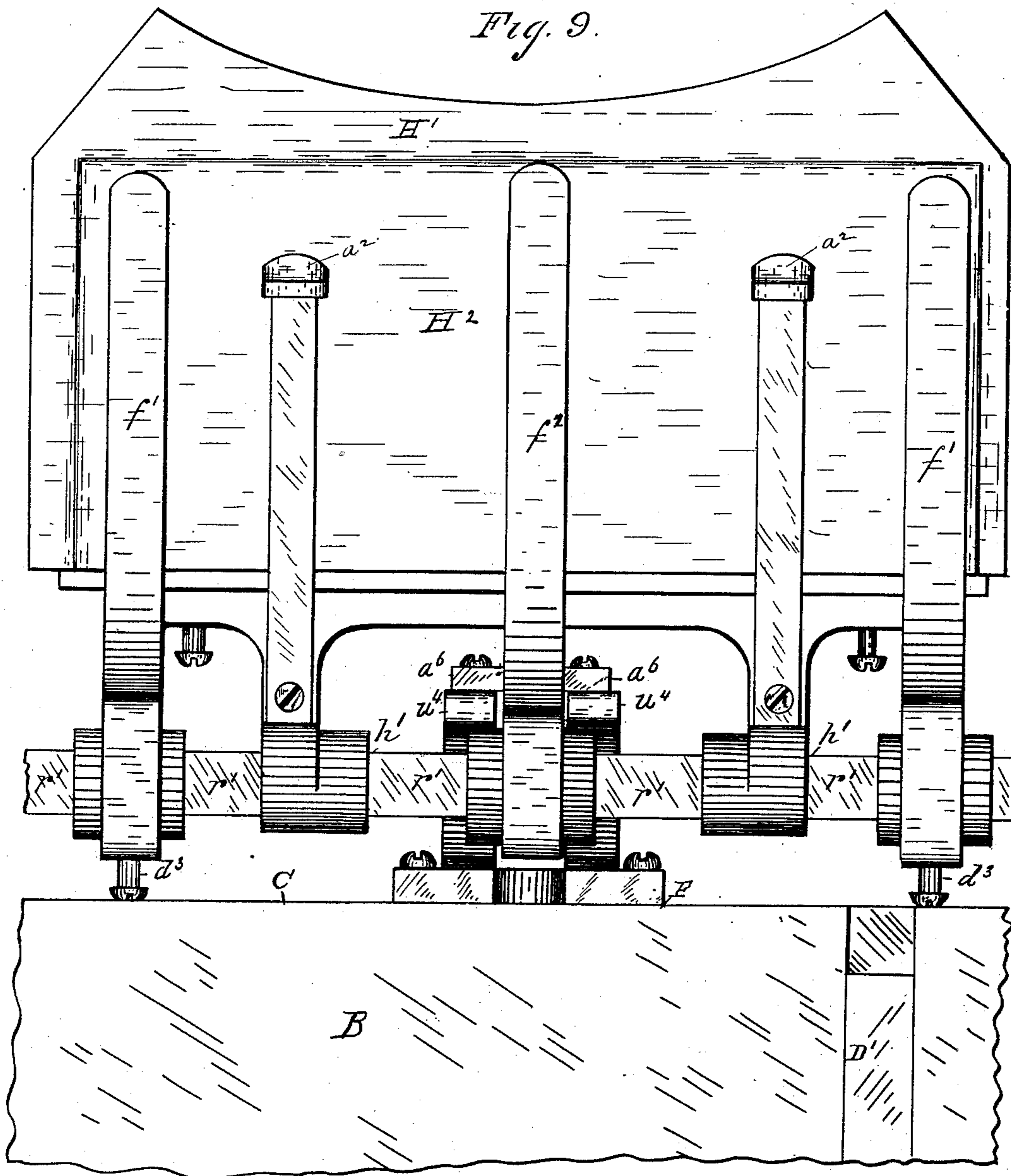
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G. E. NORRIS.  
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Fig. 9.



WITNESSES:

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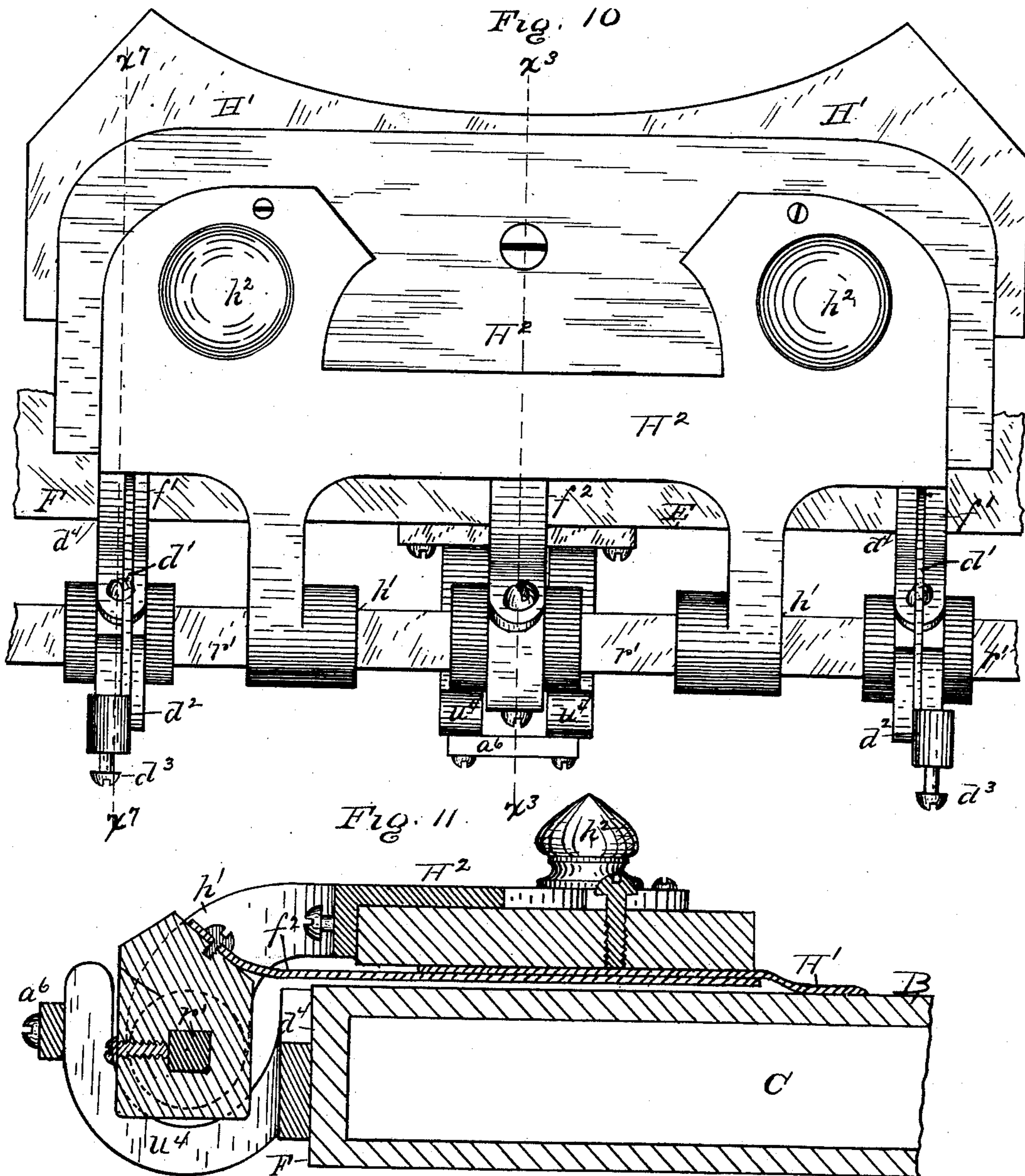
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Patented May 4, 1886.



WITNESSES:

Stanley M. Holden.

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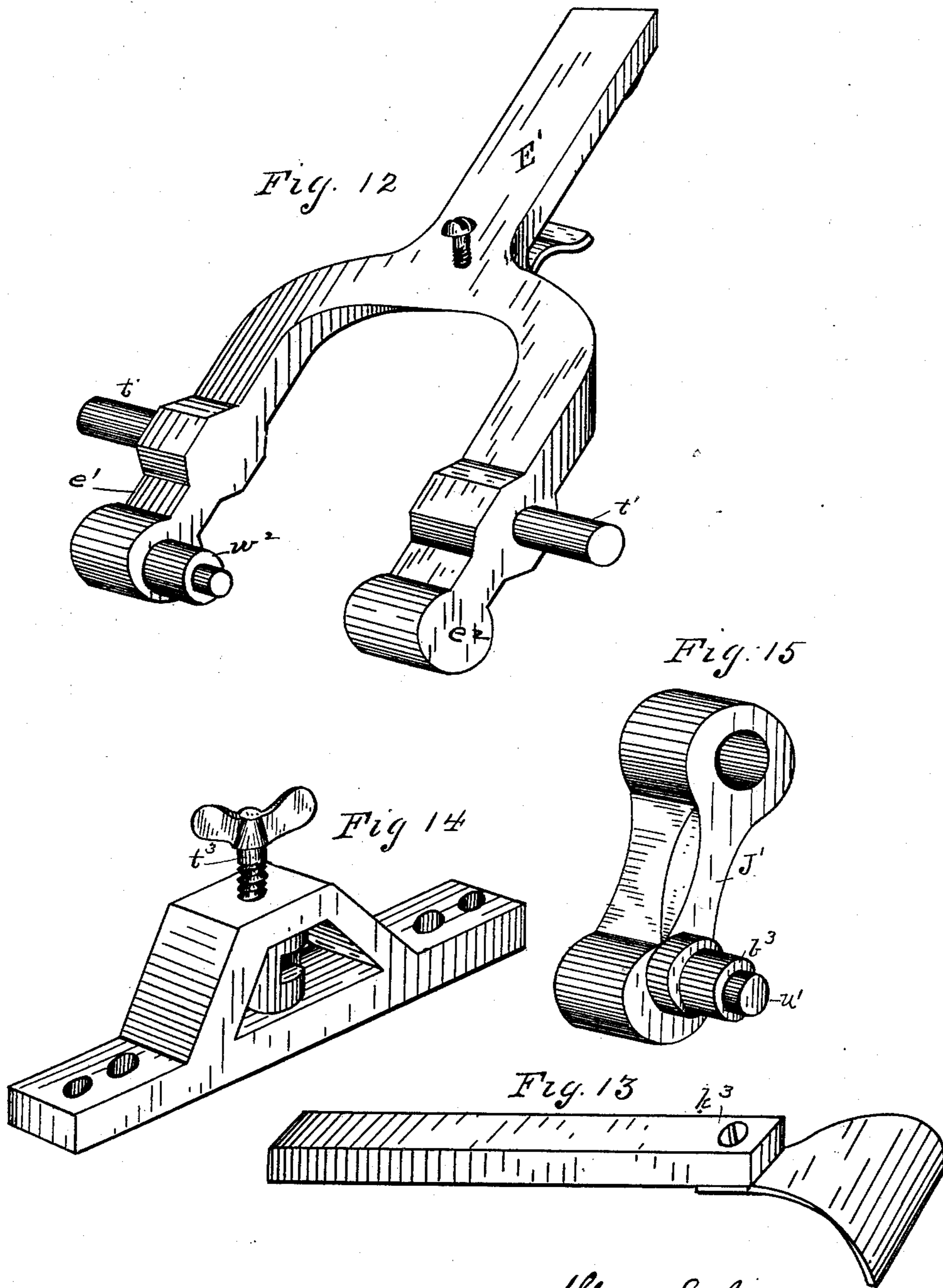
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Patented May 4, 1886.



WITNESSES:  
*Stanley M. Holden.*

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(No Model.)

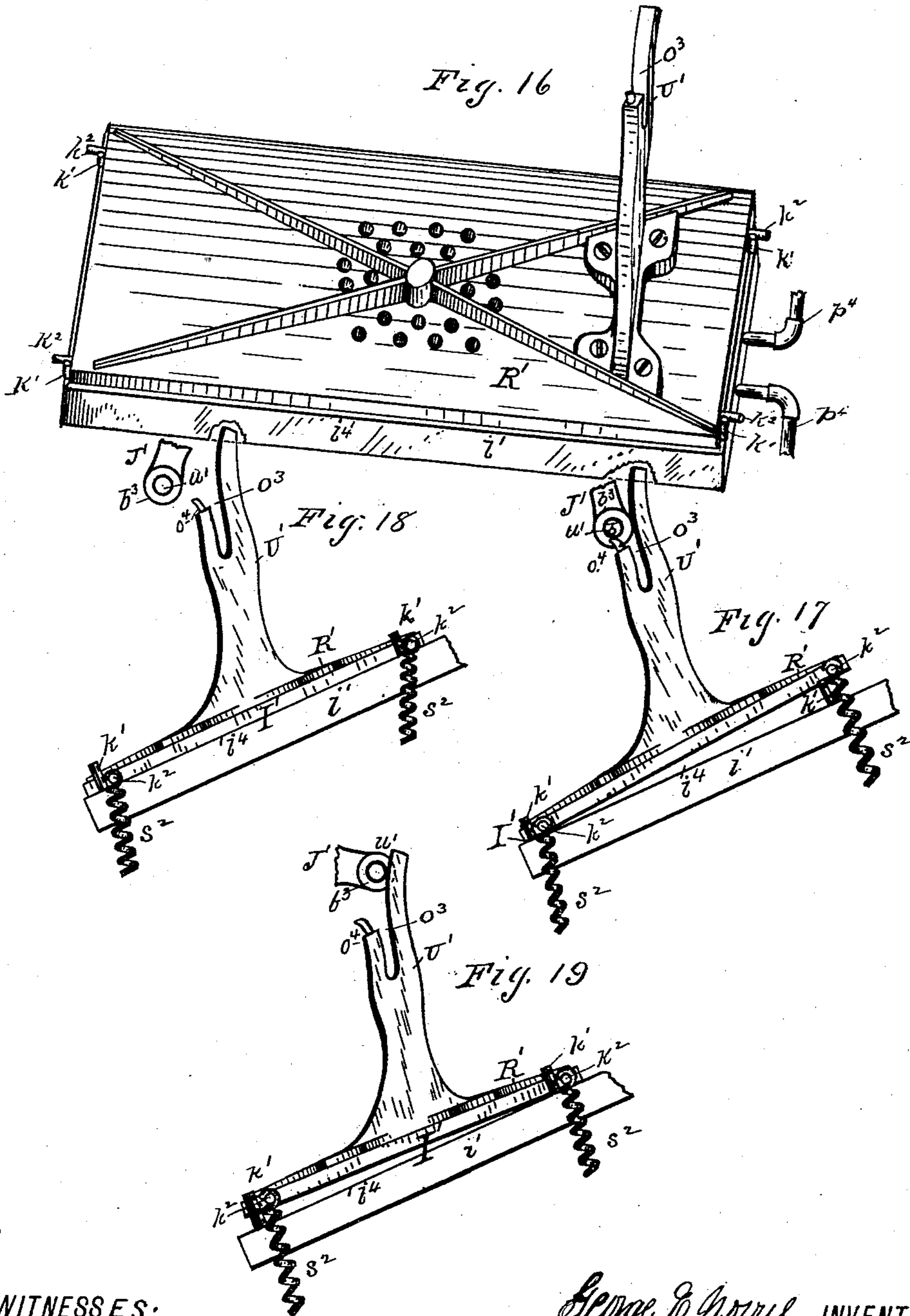
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(No Model.)

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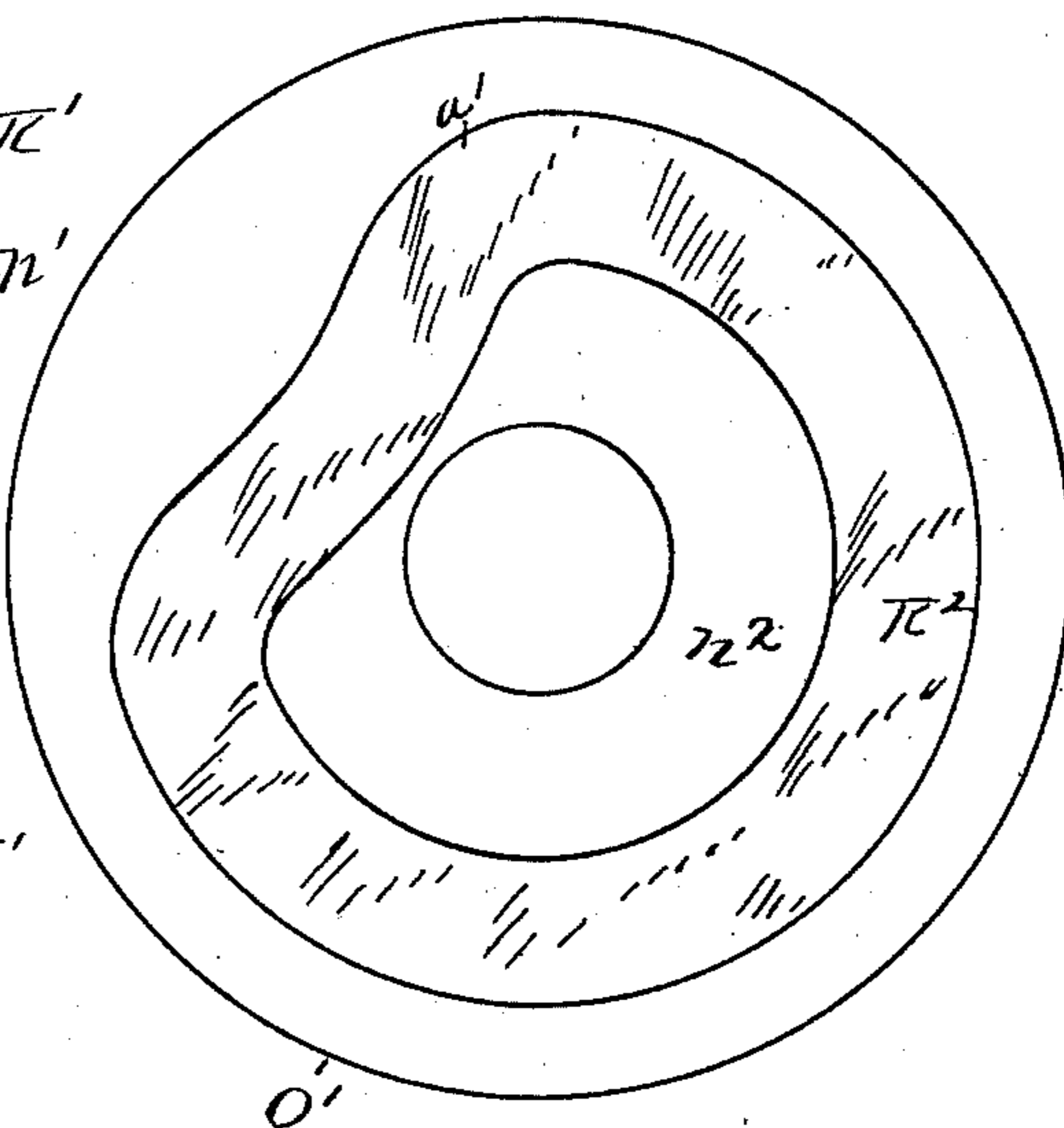
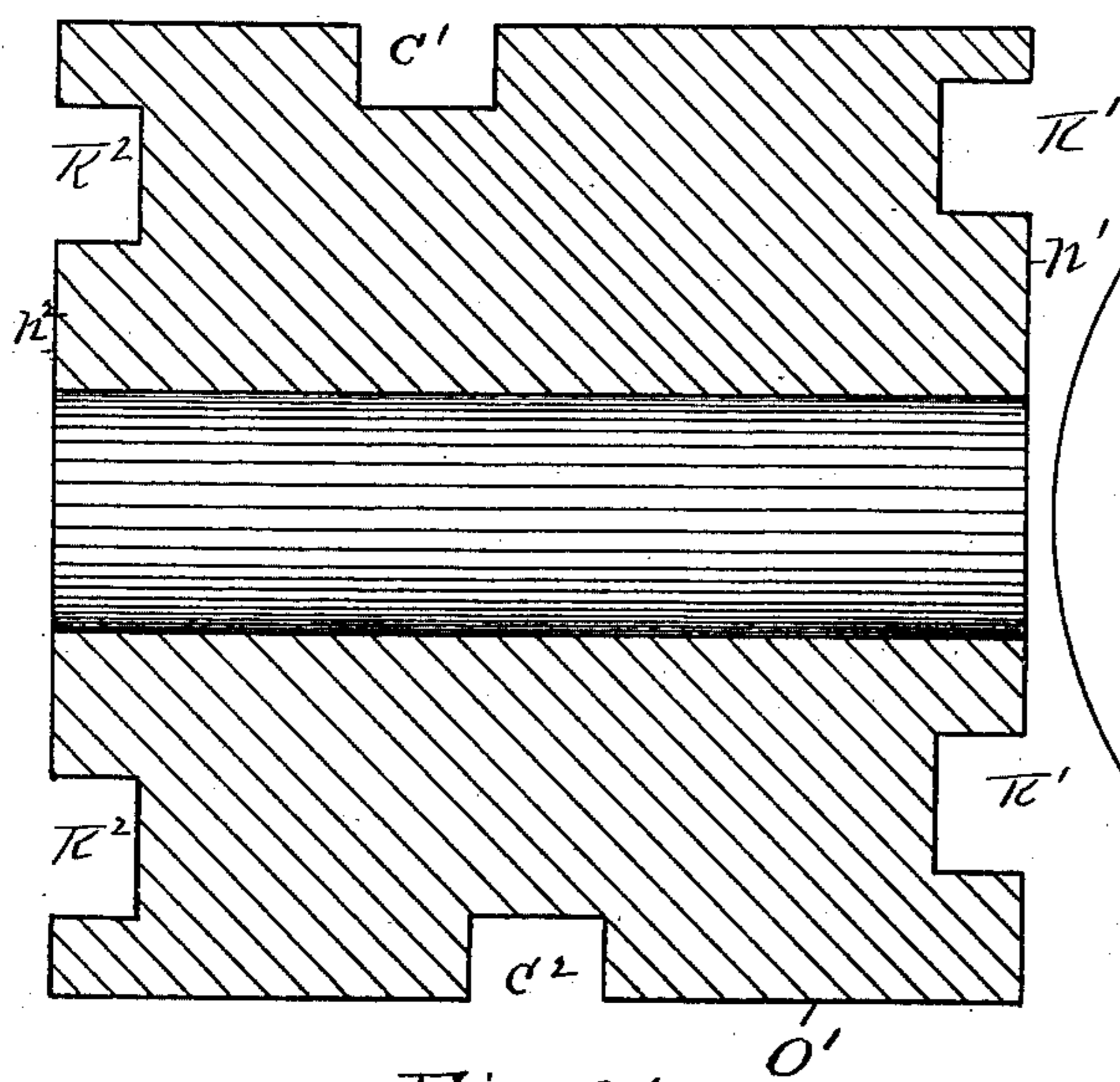
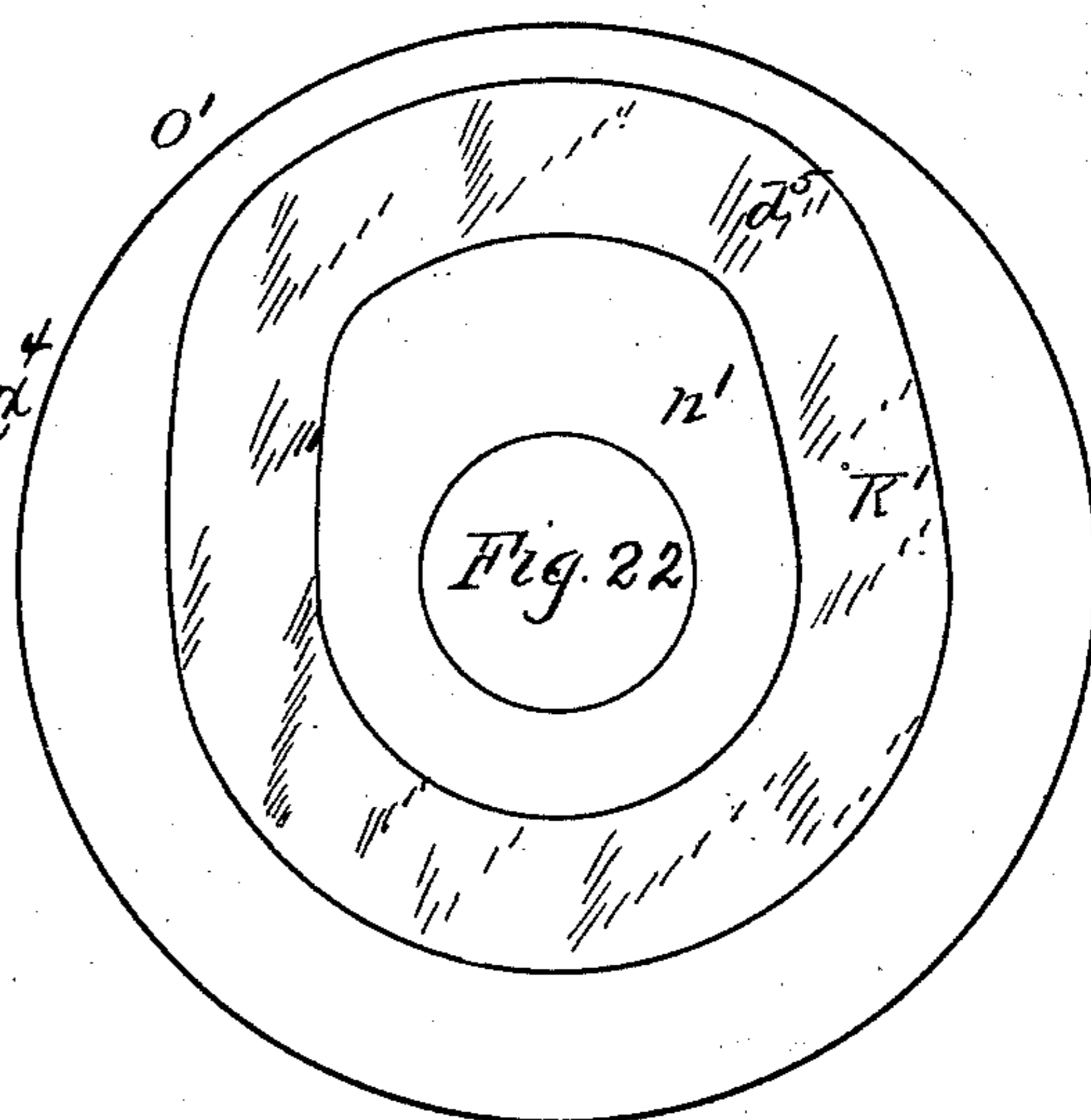
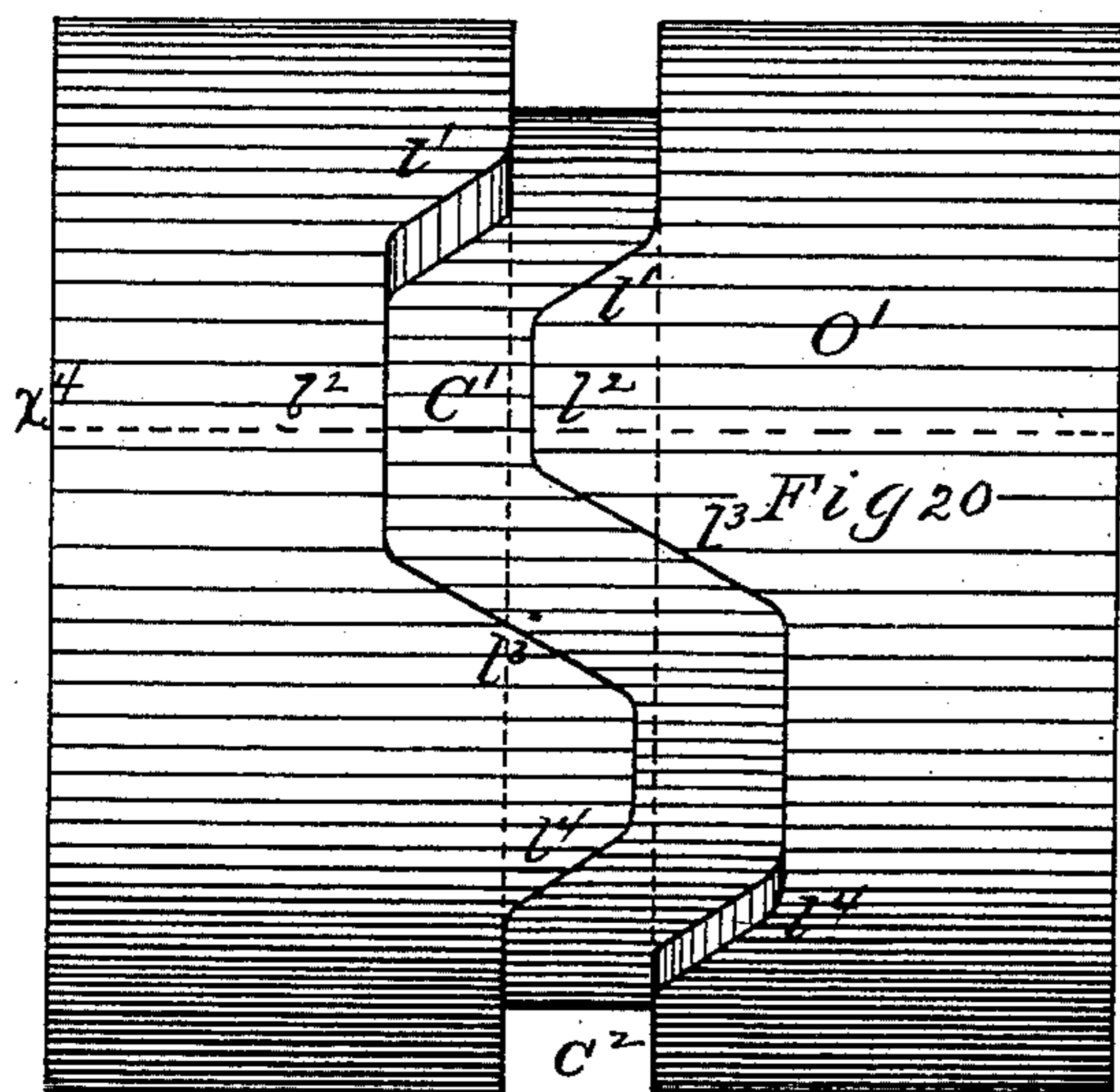


Fig. 21

Fig. 23

WITNESSES:

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Charles S. Pimtrall

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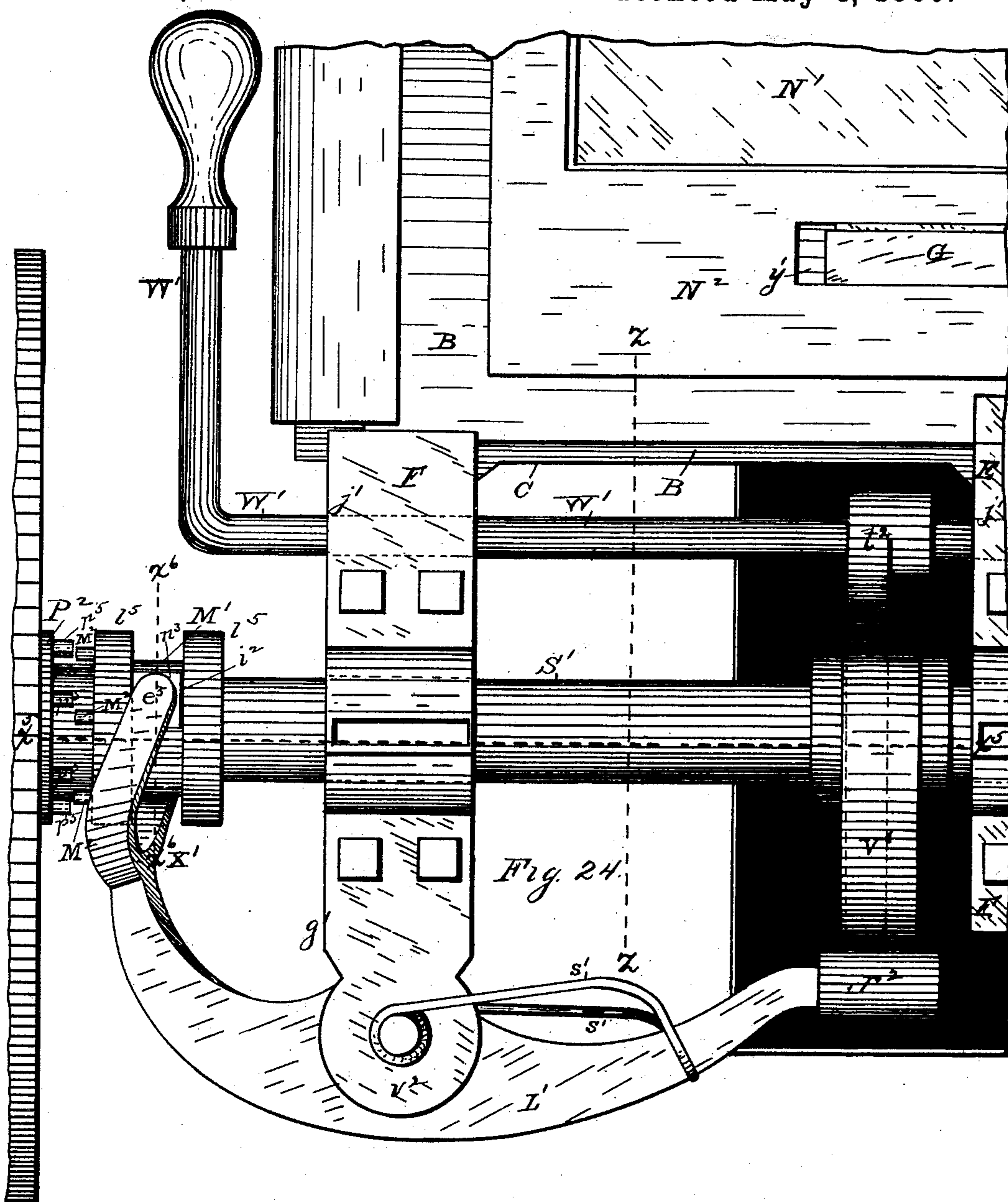
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12 Sheets—Sheet 11.

No. 341,044.

Patented May 4, 1886.



George E. Morris INVENTOR

Stanley M. Holder.

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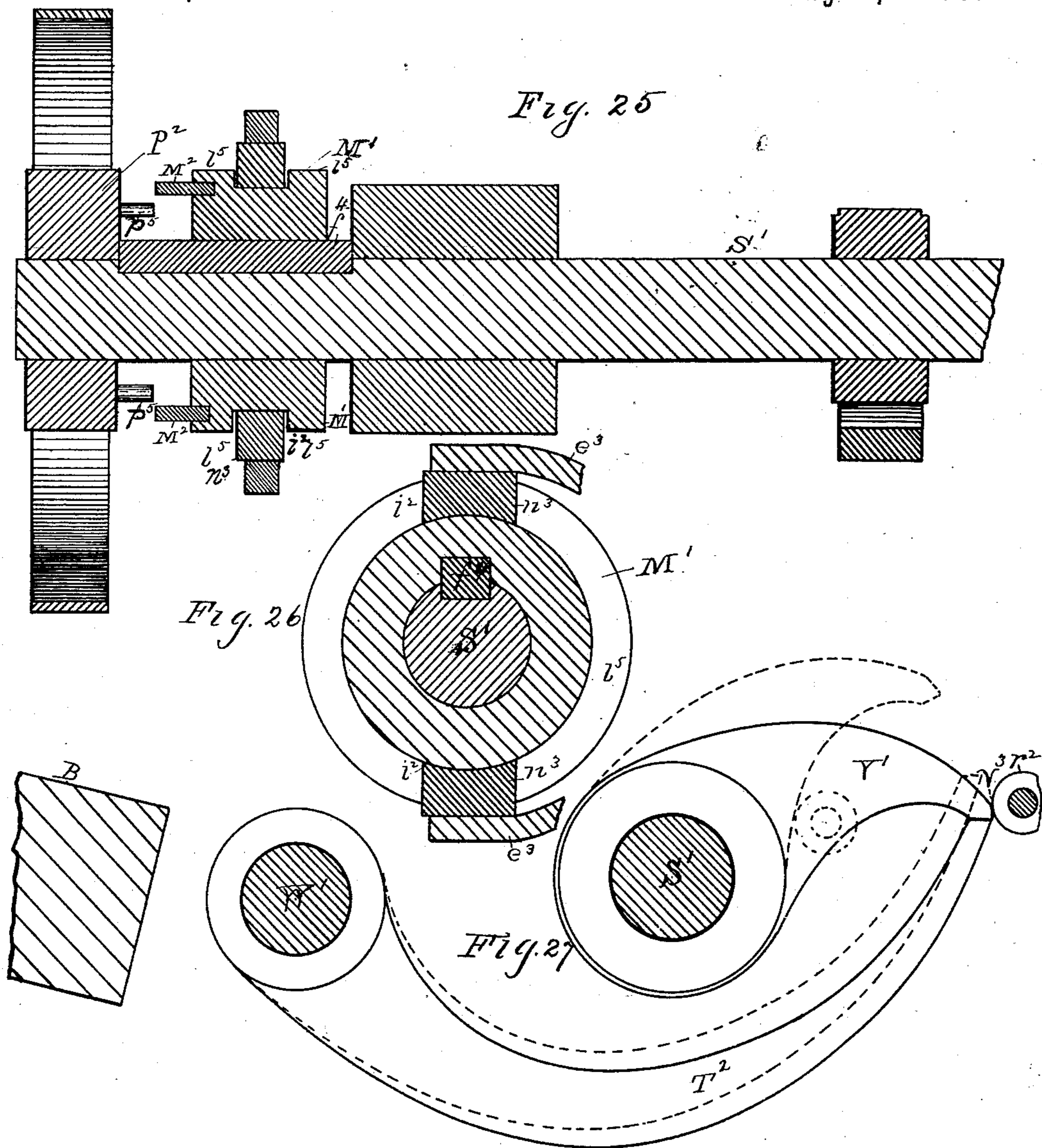
(No Model.)

12 Sheets—Sheet 12

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WITNESSES:

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Charles S. Paintnall

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# UNITED STATES PATENT OFFICE.

GEORGE E. NORRIS, OF TROY, ASSIGNOR OF ONE-HALF TO JAMES K. P. PINE, OF LANSINGBURG, NEW YORK.

## COLLAR-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,044, dated May 4, 1886.

Application filed December 26, 1884. Serial No. 151,154. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. NORRIS, of the city of Troy, county of Rensselaer, State of New York, have invented a new and useful  
5 Improvement in Collar-Folding Machines, of which the following is a specification.

My invention relates to a mechanism for folding the edges of collar and cuff blanks preparatory to the uniting of such edges in the  
10 manufacture of collars and cuffs; and the object and purpose of my invention is to produce uniformity in the finish and edges of the articles thus made, and to do by machinery rapidly what is but slowly done by hand.

15 My invention consists, as will be more fully detailed hereinafter in connection with its illustration, in the combination, with a hinged holder-plate that upon both ends and one side has a form coincident with that of the collar  
20 or cuff blank to be folded, and which holder-plate is adapted to receive, hold, and press down on the upper face of the collar or cuff blank so as to hold it firmly on a folding and creasing bed, with the edges of the blank subtending the edges of said holder-plate, and a  
25 folding-plate arranged in a plane parallel with the holder-plate and on the same bed, said folding-plate having a cut-out area similar in form to, but larger than, the holder-plate, the  
30 outer edges of the holder-plate and the inner edges of the cut-out area of the folding-plate being in the main parallel, said folding-plate being actuated to slide over at intervals of opposite motion the ends of the holder-plate,  
35 and also at an intermediate period of motion over one side of the latter, so as to turn down and fold over the end edges and one side of said holder-plate the subtending end edges and one side edge of the collar or cuff blank,  
40 as held by said holder-plate.

My invention further consists, as will be more fully detailed hereinafter in connection with its illustration, in the combination of a hinged holder-plate for receiving and holding  
45 a collar or cuff blank firmly upon a bed, a folding-plate adapted to turn over and down the end edges and one side edge of a collar or cuff blank by the motion of said folding-plate over the edges of the holder-plate, and a steam  
50 chest or inclosure connected with and form-

ing a part of the bed on which said folding-plate and holder-plate are arranged to operate.

My invention also consists, as will be more fully detailed in connection with its illustration hereinafter, of a mechanism adapted to press  
55 with hot surfaces the edge-folded blanks.

My invention also consists, as will be more fully detailed hereinafter in connection with its illustration, of a mechanism for connecting and automatically disconnecting power to  
60 operate the apparatus.

My invention also consists in the sub-combination of the parts of the mechanism which I illustrate, where the same performs specific  
65 function, as will be designated in claims.

Accompanying this specification, to form a part of it, there are twelve plates of drawings, containing twenty-eight figures illustrating my invention, with the same designation  
70 of parts by letter-reference used in all of them.

Of these illustrations, Figure 1 shows a perspective of my improved collar-folding machine, with the hinged holder-plate shown as turned up, and a blank being inserted between the under surface of the holder-plate and the  
75 fingers arranged thereon to hold the blank. Fig. 2 shows a combined side elevation and vertical section of the mechanism. Fig. 2 $\frac{1}{2}$  is a detail sectional view taken on the line  $x'x'$  of Fig. 10, showing the dog with its screw end  
80 resting against the frame and its point against the finger of the holder. Fig. 3 illustrates a plan view of the top of the machine, the holder-plate being shown as turned down upon a collar-blank, with the actuating mechanism  
85 omitted, as well as the arm which presses down upon the holder-plate. This view illustrates the relative position of a blank as held by the holder-plate, and with the folding-plate  
90 as moved to fold down the edge of the blank at one end over the holder-plate, a dotted line indicating the portion of the blank that is below the holder-plate and the folder. Fig. 4 shows a plan view of the folding-plate, the top  
95 of the bed, a cam-groove arranged in a roller that is on the driving-shaft of the machine, and a cam-pin on the folding mechanism connecting with the said cam-groove for actuating said folding apparatus to move across and  
100 back from over the ends of the blank-holder.

Fig. 5 shows a top view of the folding-bed of the machine, with the folding-plate and a part of its frame removed or broken out. This figure illustrates the position of the bar arranged 5 beneath the folding mechanism, and which, by means of a cam-pin on the end of the bar and a cam-groove in the end of the cam-roller operates the folding mechanism to move across and back over the side edge of the blank-holder 10 plate. This figure shows also a guide arranged on the before-described cam-pin bar, this guide being arranged to project upwardly through a slot made in the folder-frame. Fig. 6 illustrates the bar shown in Fig. 5, also a 15 part of the folding-bed, and the guide for the side-to-side motion of the folder mechanism, part of said guide between its ends being broken out. Fig. 7 is a section taken on the line  $x'x'$  of Fig. 5. Fig. 8 is a section taken on the 20 line  $x^2x^2$  of Fig. 5. Fig. 9 shows an enlarged elevation of the holder-plate, it being illustrated as turned up on its hinged connection to show the fingers and blank stops on its under surface. This view shows also a part of the folding-bed 25 of the machine, and also a part of the bar moving thereon to operate the folding mechanism to move across and back from over the side edge of the holder-plate. Fig. 10 shows an enlarged plan view of the top of the holder-plate and its frame, and in position appearing as when down on the folding-bed, and as 30 detached from the rest of the mechanism. Fig. 11 shows a section taken on the line  $x^3x^3$  of Fig. 10. Fig. 12 illustrates in a perspective the forked end of the presser-arm and its bearings. This figure shows also a cam-pin on one of the 35 bifurcated ends of the presser-arm adapted to run in the cam-groove formed in that end of the cam-roller on the driving-shaft of the machine which is opposite to that in which is formed the 40 cam-groove to operate the folder mechanism. Fig. 13 illustrates one of the presser-fingers, which are adjustably attached to the opposite sides of the machine-frame, having their ends 45 curved downwardly and inwardly, so as to be in contact with the upper surface of the folding-plate. Fig. 14 shows the mechanism by which the outer ends of the presser-fingers are adjustably connected to the opposite sides of 50 the machine-frame, so as to regulate the pressure of the finger ends upon the folding plate. Fig. 15 is an enlarged perspective of a crank-arm and roller arranged on the end of the driving-shaft to operate the hot pressing mechanism. Fig. 16 is a perspective of the hot- 55 pressing mechanism composed of an upper movable plate made with an upwardly-projected forked standard and a lower bed consisting of a steam-chest. Fig. 17 illustrates a side elevation of the hot pressing mechanism with the upper movable plate thereof tilted up on one side for the entrance of a collar-blank between its two pressing-surfaces, showing also the engagement of the forked stand- 60 ard of the hot-presser mechanism with the roller on the crank-arm of the driving-shaft. Fig. 18 illustrates in a side elevation the hot

presser mechanism with the upper plate thereof shown as down on a blank placed between it and the steam-chest, and the crank-arm 70 roller represented as having passed from its engagement with the forked standard. Fig. 19 represents in a side elevation the hot presser mechanism with its upper movable plate tilted over, so as to allow the pressed blank to 75 pass out therefrom, and showing also the engagement between the forked standard and the roller on the crank-arm of the driving-shaft of the machine by which the hot-presser mechanism is so operated. Fig. 20 is a side 80 elevation of the cam-roller on the driving-shaft and the cam-groove formed therein, which operates the folder mechanism to move from side to side over and from off the ends of the blank-holder plate. Fig. 21 is a horizontal 85 section of the roller, taken on the line  $x^4x^4$  of Fig. 20. Fig. 22 is a view of one end of the cam-roller shown at Figs. 20 and 21. This Fig. 22 illustrates the position of the cam-groove in one end of the cam-roller that by 90 means of an engaging cam-pin on a bar moves the folder mechanism over and from off the side edge of the holder-plate. Fig. 23 is an end view of the same cam-roller shown in the three preceding figures, and this illustration 95 shows a cam-groove in that end of the roller which is opposite to that shown in Fig. 22, the cam-groove represented in this figure (23) being that which operates the presser-arm to descend onto and arise from off the blank- 100 holder. Fig. 24 is a plan view of the clutching mechanism by which power is communicated to the driving-shaft of the machine. Fig. 25 is a longitudinal sectional central view taken on the line  $x^5x^5$  of Fig. 24. Fig. 26 is a 105 section of the clutch, taken on the line  $x^6x^6$  of Fig. 24. Fig. 27 is a cross vertical section taken on the line  $zz$  of Fig. 24.

The parts of the mechanism are designated by letters-reference, and their function is described as follows: 110

The letters F designate the frame of the machine, which, at the top, is made to incline from the front downwardly and rearwardly.

The letter B designates the folding-bed 115 formed by the upper surface of the steam-chest C, which receives steam from the steam-pipe  $p'$ , to heat it.

The letter H' designates the blank-holder, which is hinged to the frame at  $H'$ , and on 120 such hinged attachment is adapted to swing down onto or up from off the bed B.

The letters  $f'$  and  $f''$  indicate fingers arranged on the hinging-shaft, to press against the under surface of the holder or a blank 125 placed against said under surface when the hinged blank-holder is swung down on the folding-bed.

The letters  $d'$  designate dogs, that at  $d^2$  are pivoted to the blank-holder hinging-shaft bar 130 on its outer face, the inner curved ends of these dogs being arranged to press on the outer faces of the fingers  $f'$ , and the lower ends of these dogs are provided with out-

wardly-projecting set-screws  $d^3$ , as shown in Figs. 2, 9, and 10. These dogs at their set-screw ends are arranged to engage with the front edge of the machine-frame at  $d^4$  when the blank-holder is turned up, they being at their other ends so moved on their pivots as to press the said fingers away from contact with the under surface of the holder  $H'$  for the insertion of a collar-blank between said holder and fingers, as shown at Figs. 1 and 2 $\frac{1}{2}$ . The set-screws on the ends of the dogs, as they are screwed out or in, regulate the extent at which the dogs shall press upon the fingers  $f'$  to move away the latter from the holder.

The letter  $f^2$  designates a centrally-placed finger having the same function as the fingers  $f'$ , but which is forced away from its contact with the under face of the holder as the latter is turned up by the contact of said central finger with the cross-bar  $a^6$  on the U-form arms  $u^4 u^4$ , the latter being arranged on the machine-frame so as to curve around the rod  $r'$ , the bar  $a^6$  coming in contact with said central finger when the holder is turned up.

The holder-frame  $H^2$  and the blank-holder  $H'$  are turned up on their hinged connection with the machine-frame by the action of a grooved pulley,  $p^2$ , on one end of the holder-frame hinging-rod  $r'$ , a cord,  $c'$ , attached to the said pulley and adapted to wind up in said pulley-groove, with a weight,  $w'$ , attached to the lower end of the cord.

The holder-frame and connected holder are forced down onto the bed  $B$  by the operator by means of the handles  $h^2$ .

The letter  $O'$  indicates a cam-roller, arranged on and so as to turn with the driving-shaft of the machine. (Indicated at  $S'$ .) The circumferential face of this cam-roller, upon one of its diametrical halves, is made with the S-form cam-groove  $C'$ , which cam-groove in continuity joins with the directly-encircling cam-groove  $C^2$  on the opposite circumferential half of said roller. The S-form cam-groove  $C'$ , as produced in one diametrical half of the roller  $O'$ , is made with the oppositely-reversing offset-curves  $l'$ ,  $l^2$ , and  $l^4$ , with an intermediately circumferentially-direct groove part  $l^2$ , the function of these opposite curves in the cam-groove being to engage with a cam-pin on the folder mechanism to move the latter from side to side, over across, and from off the opposite end edges of blank-holder.

The letter  $K'$  indicates a cam-groove formed in one of the ends of the cam-roller  $O'$ , and this cam-groove  $K'$  is adapted to engage with a cam-pin upon a bar connected to the folding mechanism, so as to move the latter over and across the side edge of the holder-plate.

The letter  $K^2$  indicates a cam groove produced in the end of the roller  $O'$ , which is opposite to that which moves the folder mechanism, the said cam-groove  $K^2$  being adapted to operate the presser-arm, as will be subsequently described.

The letters  $N'$  designate the folding-plate, and  $N^2$  the frame to which the former connects,

the two constituting the folding mechanism. This folding-plate  $N'$  is made with the cut-out area  $A'$ , which in form mainly corresponds upon its two ends, and one side with that of the blank, the edges of which are to be turned over, and it in form upon its two ends and one side also coincides with that of the blank, the edges of which are to be turned over; and it in form upon its ends and one side corresponds also with the form of the holder-plate, only that the cut-out area  $A'$  is larger than the holder-plate. This cut-away area of the folding-plate at the corners near where its end and side edges meet is made with the lap-fold slits  $v' v'$ , the use of which will be subsequently detailed.

From the rear side of the folding-plate frame  $N^2$  there projects a cam-pin,  $P'$ , adapted to run in the S-form cam-groove  $C'$ , and the connecting circumferentially direct cam-groove  $C^2$  made in the opposite side faces of the cam-roller  $O'$ .

The letter  $G'$  indicates a guide-bar that is stationary when the folding-plate is being passed horizontally from side to side, over and from off the ends of the holder-plate, there being a slot,  $y'$ , made in the folder-plate frame  $N^2$  for its reciprocating side-to-side passage along said guide  $G'$ . When the folding mechanism is moved across the side of the holder-plate, then the guide-bar moves with the folding mechanism, as will be subsequently described herein, in connection with the mechanism that thus operates the folding plate and frame.

The letter  $D'$  designates a bar that is attached to the rear side of the folding-plate frame, and also to the guide-bar  $G'$ , on the under side of the latter, so as to move with it, as indicated at Fig. 6, said bar  $D'$  having at its inner side near its outer end where projected rearwardly beyond the folder-plate a friction-roller,  $m'$ , arranged upon a pin,  $p^3$ , projected therefrom, the said friction-roller being adapted to run in and be operated by the end cam-groove,  $K'$ . While this roller  $m'$  is moving on that part of the said cam-groove  $K'$  forming a true circle in the end of the roller  $O'$ , it does not actuate the bar  $D'$ ; but when in the movement of said friction-roller it reaches that part of the said end cam-groove,  $K'$ , which is made with a curve,  $d^5$ , that varies it thereat from a true circle, then the engagement of said friction-roller  $m'$  therewith horizontally moves the said bar  $D'$ , connected guide-bar  $G'$ , and the attached folding-plate frame and folding-plate, so that the side edge,  $o'$ , of the cut-away area made in the said folding-plate passes over the side edge,  $o^2$ , of the holder  $H'$ , and then in reciprocation returns therefrom.

The bar  $D'$ , as before described, is connected with the guide-bar  $G'$ , and the latter is projected up through the folder-plate frame through the slot  $y'$ , the latter being made enough longer than the guide-bar to permit of the lateral side-to-side movement of the folder mechanism; but when the bar  $D'$  is moved by

the engagement of its pin  $p^3$  and roller  $m'$  with the end cam,  $K'$ , then the bar  $D'$ , being attached at right angles to the guide-bar  $G'$  and the latter projected up through the slot  $y'$ , by this connection moves the folder-frame and folder-plate in reciprocation from the rear to the front of the mechanism, as before described.

The letter  $E'$  designates a presser-arm, made at its rear end with the bifurcating branches  $e'$   $e^2$ , which branches are each made to have on their outsides a trunnion-bearing,  $t'$ , the said trunnions being located on the outer sides of the branches in advance of the rear ends of the latter.

The letters  $b'$  designate bearings for the said trunnions to journal in, and which bearings are above the bearings  $b^2$  of the driving-shaft  $S'$ . The yoke of the presser-arm is mounted in its bearings with the inner face of the branch  $e^2$  set against the face end  $n'$  of the cam-roller  $O'$ , and the other branch,  $e'$ , arranged with the roller  $w^2$ , fixed on its inner face in the cam-groove  $K^2$  in the face end  $n^2$  of the cam-roller  $O'$ . This cam-groove  $K^2$ , produced in the end face,  $n^2$ , of the roller  $O'$ , as shown at Fig. 23, has a part of it forming a true circle and a part (indicated at  $a'$ ) which curves inwardly therefrom. When the roller  $w^2$  on the branch  $e'$  of the presser-arm  $E'$  reaches this incurve  $a'$  of the cam-groove  $K^2$ , it raises the presser-arm from off the holder, and so soon as the wheel  $w^2$  reaches that part of the cam-groove forming a true circle the presser-arm is returned to press on the top of the holder.

The letter  $I'$  indicates the hot presser, which is made with the steam-chest  $i'$ , adapted to receive steam by means of the pipe  $p^4$ , the top of said chest forming the presser-bed  $i^4$ .

The letter  $R'$  designates the movable plate of the hot presser, and which is arranged on top of the steam-chest  $i'$ , and both of which in parallel coincidence are arranged to incline downwardly and outwardly from the front. This plate  $R'$  has projected from its upper surface a forked standard,  $U'$ .

The letters  $k'$  designate pins vertically projected from the upper surface of the steam-chest  $i'$ , near the corners of the latter, the steam-chest being slightly larger in its top than the movable plate  $R'$ , and the letters  $k^2$  designate pins projected from the ends of the movable plate  $R'$ , near their corners, and so arranged with reference to the vertical pins  $k'$  in the steam-chest that when the movable plate is in position the horizontal end pins on the lower side of the latter shall be inside of the vertical pins on the steam-chest, and the horizontal pins  $k^2$  of the movable plate  $R'$  on the upper or front side of the latter shall be outside of the vertical pins on the upper or front side of the steam-chest. As thus arranged the movable plate may, as held by the pins, as shown at Fig. 18, be tilted up from the upper side for a blank to slide in between the movable plate and steam-chest, as shown at Fig. 17, and then be tilted upwardly on the lower side for a blank to slide from off the steam-chest, as indicated

at Fig. 19, and out from between the latter and the movable plate.

Fixed on the end of the driving-shaft  $S'$  is a crank-arm,  $J'$ , having a pin,  $u'$ , projected outward from its free end, which pin is provided with a roller,  $b^3$ , substantially as shown in Fig. 15. The office of this crank-arm is to tilt the plate  $R'$  on the hot presser, which is done as follows: When the crank-arm is carried around by the shaft, the roller  $b^3$  comes in contact with the long arm of the fork  $O^3$ , substantially as shown in Fig. 19, and lifts the lower edge of the plate up, as shown; thence the crank-arm continues in a downward movement, easing the plate until it assumes its closed position, when the crank-arm moves across the space between the forks and engages with the short projection  $o^4$  on the short prong of the fork and raises the plate from its upper side, substantially as shown in Fig. 17 of the drawings.

The letter  $P^2$  designates a loose pulley arranged on the driving-shaft  $S'$ , said pulley being provided on its inner face with the clutching-pins  $p^5$ .

The letter  $M'$  designates a flanged sleeve arranged on a feather,  $f^4$ , upon the driving-shaft  $S'$  and adapted to slide thereon, but which sleeve, on account of the construction of the feather  $f^4$ , that tongues into it, is made to turn with said shaft. The letters  $\bar{t}^5$   $\bar{t}^5$  indicate two rim-flanges projected outwardly in revolution from the ends of said sleeve  $M'$ , and the letters  $L'$  designate a curved lever that is pivoted centrally at  $v^2$  to an arm,  $g'$ , on the machine-frame  $F$ . The letter  $r^2$  designates a roller arranged on one end of this curved lever, and which roller is constructed to be held in engagement with a curved cam,  $V'$ , on the driving-shaft of the machine by means of a spring,  $s'$ . The end  $X'$  of the lever  $L'$  is forked so as to produce the ends  $e^3$   $e^3$ , each of which is constructed with and pivoted to a bearing-block,  $n^3$ , which blocks are adapted and arranged to journal at  $i^2$  on opposite sides of the sleeve  $M'$  between the flanges  $\bar{t}^5$   $\bar{t}^5$ .

The letters  $M^2$  designate clutching-pins arranged on that end face of the sleeve  $M'$  which is adjacent to that end face of the loose pulley  $P^2$  which is also provided with clutching-pins.

The letter  $W'$  designates a crank-shaft that journals into the machine-frame  $F$  at  $j' j'$ , and the letter  $t^2$  indicates a cam arranged on said crank-shaft, which cam is constructed to pass under the driving-shaft  $S'$  and cam  $V'$ , and when thus operated by said crank-shaft to throw upwardly the end of said cam  $V'$ , so that the spring  $s'$  may force inwardly the inner end of the lever  $L'$ , and thus to bring the roller  $r^2$  into contact with that part of the cam  $V'$  which is near the shaft  $S'$ , and thus force outwardly the other end of said lever  $L'$ , bringing the sleeve  $M'$  and its pins so that the latter will engage with the pins of the loose pulley  $P^2$  to start the mechanism. While the roller  $r^2$  on the end of the lever  $L'$  is running

on that part of the cam  $V'$  which is nearest to the shaft  $S'$ , the lever  $L'$  forces the sleeve  $M'$  and its pins to engage with those on the loose pulley, and the latter operates the machine. When, however, the roller  $r^2$  on the lever  $L'$ , as held against the cam  $V'$  by the spring  $s'$ , reaches the upper outer end of the prolongation of said cam designated at  $v^3$  the sleeve and pins are moved inwardly from an engagement with the loose pulley, and the machine stops after having made one complete revolution. When stopping, the roller  $r^2$  on the end of the lever  $L'$ , rests on the upper side of the extreme end  $v^3$  of the cam  $V'$ , to be started, as before described, by the crank-shaft  $W'$  and cam  $t^2$ . The cam-groove  $K^2$ , in the end of the roller  $O'$ , is arranged on the latter so as to have the presser-arm  $E'$  raised from off the holder when the machine has completed its revolution and the roller  $O'$  stops, and the relative position of the curve  $d^5$  in the cam-groove  $K'$  in the end of the roller  $O'$  is such as to have the bar  $D$  and cam-pin  $p^3$  in that portion of the groove forming a part of a true circle when the roller stops, so that the folding mechanism shall be from off the side edge,  $o^2$ , of the holder. The position of the cam-groove  $C'$  and  $C^2$  in the roller  $O'$  is such that the cam-pin  $P'$  will be in the circumferentially-direct cam-groove  $C^2$ , and the folder-plate connection with and operated by said pin from off and about equidistant from the ends of the holder-plate when the roller  $O'$  stops.

The letters  $k^3$  indicate fingers that are adjustably attached to the sides of the machine-frame  $F$  by means of set-screws  $t^3$ . These fingers are made to curve downwardly from where attached, so as to press on the upper surface of the folder-plate  $N'$ , their function being to keep the latter down closely on the ends of the blank being folded, while the superimposed folding-plate is passing over said ends of the blank and ends of the holder.

The letter  $T'$  designates a table at the front of the machine, and  $n^4$  a slideway running therefrom on an incline downwardly to the upper edge of the hot pressing mechanism for the blank to slide on down to the latter, said slideway being shown at Fig. 1 and in part by a dotted line at Fig. 2.

The mechanism thus constructed is operated as follows: The holder-frame  $H^2$  and the holder-plate  $H'$  being turned up by the pulley-weight  $w'$ , the fingers  $f'$  and fingers  $f^2$  having been forced away from their engagement with the under side of the holder plate by the dogs  $d'$  and the bar  $a^6$ , a collar-blank is inserted beneath said fingers  $f'$ , so as to be between them and the holder-plate, the lower edge of the blank resting on the stops  $a^2$ , with the parts appearing as shown at Fig. 1. The holder plate and frame are then turned down, and when this has been done then the crank-shaft  $W'$  is forced down, and which serves to connect the coupler mechanism, as before described. This actuates the roller  $O'$  and the cam-pin  $P'$  to run in the curved part  $l'$  of the

cam-groove  $C'$ , and which moves the folder-plate  $N'$  so that its cut-out area  $A'$ , where parallel with the end of the holder-plate, moves over one of the end edges of the latter and the blank, and while the pin  $P'$  of the folder mechanism is in a succeeding movement passing through the circumferentially-direct part of the said cam-groove  $C$ , where indicated at  $l^2$ , then the cam  $K'$  is arranged to operate the folder mechanism to move back and forth, so that the side edge of the cut-out area  $A'$  passes over the side edge of the blank and the holder-plate. Soon as this has been done the cam-pin  $P'$  is moved by the curves  $l^3$   $l^4$  of the cam-groove  $C'$  to pass the folder-plate sidewise, so as to have it move over and from off the other end of the folder-plate and the blank to turn down the remaining end edge of the latter. When each end of the blank is being folded thereat, the slots  $v'$  of each end receive to turn over and down the folds made in the corners of the blanks. When the machine starts, and before the cam-pin  $P'$  commences to operate the folding mechanism, the cam  $K^2$  in one of the roller ends forces the presser-arm  $E'$  down on the holder-plate to continue there until the folding of the blank edges is completed, when the presser-arm is raised from off the holder-plate. After the blank has been thus folded, the holder is raised, the folded blank removed, and an unfolded one inserted as before. The folded blank, after having been taken from the holder, is passed from over the table  $T'$ , so as to slide along down the inclined sideways  $n^4$  to the hot pressing mechanism. At each revolution of the crank-arm  $J'$  on the shaft  $S'$ , the movable plate  $R'$  is tilted up to receive a blank, to descend upon it to press it, and is tilted up on its lower side to allow the blank to pass out from under the plate and to slide along the incline  $w^3$  to the receptacle  $Z'$  beneath the machine.

The central finger,  $f^2$ , may be omitted.

While I have shown springs  $s^2$  as connecting the movable plate  $R'$  with the machine-frame, said springs may be dispensed with by making said plate  $R'$  heavy enough to fall promptly by gravity after having been tilted up.

While I prefer to heat the bed  $B$  and the hot pressing mechanism by steam, yet the heat used may be produced in the folding bed and the hot pressing-bed by any other well-known means.

While I have shown the folding-plate made with the slots  $v'$  at the corners of the cut-out area  $A'$ , if desired, the folding-plate may be made without them.

As the combination of a presser-bed and a hinged holder-plate adapted to receive a blank, as shown, and made larger than but in a form coincident to that of the blank to be folded, and a folding-plate made with the cut-out area  $A'$  coincident in form to but larger than the holder-plate, would, if operated to slide over one end of the holder-plate and blank and then over one side of the blank

and holder-plate, and then in sequence over the other end of the holder and blank in so operating, would perform the same useful function whether actuated by the arrangement of cams and cam-pins shown or any other equivalent means which would operate them in the same way; hence I do not limit my invention of the combined holder and folding plate, as they are shown to be made to the specific means used to operate them.

While the work of folding and creasing the folds into the blanks is better done by heating the bed of the folding mechanism, and also that of the pressing mechanism, yet the latter and the folding-bed may be used without heat, if desired.

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

1. In a machine for folding collar-blanks, the combination of the hinged holder-plate  $H'$ , made with the fingers  $f'$ , the folding-plate  $N'$ , made with the cut-out area  $A'$ , and the folding-bed  $B$ , the said parts being constructed and arranged to be operated substantially in the manner as and for the purposes set forth.

2. In a machine for folding collar-blanks, the combination of the folding-bed  $B$ , the hinged holder  $H'$ , made with the fingers  $f'$  and stops  $a^2$ , the folding-plate  $N'$ , made with the cut-out area  $A'$ , the said parts being constructed and arranged to be operated substantially in the manner as and for the purposes set forth.

3. In a machine for folding collar-blanks, the combination of the folding-bed  $B$ , the hinged holder-plate  $H'$ , and the folding-plate  $N'$ , made with the cut-out area  $A'$  and the slots  $v'$ , said parts being constructed and arranged to be operated in the manner substantially as and for the purposes set forth.

4. In a machine for folding collar-blanks, the combination of the hinged blank-holder  $H'$ , made with the fingers  $f'$  and the stops  $a^2$ , arranged and secured on the shaft of said holder, and the dogs  $d'$ , said parts being constructed and arranged to operate substantially in the manner as and for the purposes set forth.

5. The combination of the folding-bed  $B$ , the folder-plate frame  $N^2$ , provided with a cam-pin,  $P'$ , secured to its rear edge, the cam-roller  $O'$ , formed with the cam-groove  $C'$ , the folding-plate  $N'$ , formed with the cut-out area  $A'$ , and the hinged blank-holder  $H'$ , all combined and constructed substantially as described, and for the purposes stated.

6. In a machine for folding collar-blanks, the combination of the folding-bed  $B$ , the folding-plate  $N'$ , made with the cut-out area  $A'$ , the frame  $N^2$ , made with the slot  $y'$ , and cam-pin  $P'$ , the cam-roller  $O'$ , made with the cam-groove  $C'$ , the guide-bar  $G'$ , the guide-bar  $D'$ , and the hinged blank-holder  $H'$ , said parts being constructed and arranged to operate substantially in the manner as and for the purposes set forth.

7. In a machine for folding collar-blanks, the combination of the folding-bed  $B$ , the hinged

blank-holder  $H'$ , the folding-plate  $N'$ , made with the cut-out area  $A'$ , the frame  $N^2$ , made with the slot  $y'$  and the pin  $P'$ , the cam-roller  $O'$ , made with the cam-grooves  $C'$   $C^2$ , and end cam-groove,  $K'$ , the bar  $D'$ , made with the pin  $p^3$ , and the guide  $G'$ , attached to said bar  $D'$ , said parts being constructed and arranged to operate substantially in the manner as and for the purposes set forth.

8. In a collar-folding machine, the combination of the bed  $B$ , the hinged holder  $H'$ , the roller  $O'$ , made with the end cam-groove,  $K^2$ , the presser-arm  $E'$ , having the forked arms  $e'$   $e^2$  and trunnion-bearings  $b'$ , the roller  $w^2$  on the end of the arm  $e'$ , adapted to move in said cam-groove  $K^2$ , said parts being constructed and arranged to operate substantially in the manner as and for the purposes set forth.

9. In a collar-folding machine, the combination of the inclined slideway  $n^4$ , the pressing-bed  $i^4$ , constructed with the pins  $k'$ , the movable plate  $R'$ , made with the pins  $k^2$  and the forked standard  $U'$ , and the crank  $J'$ , arranged on shaft  $S'$ , said parts being arranged and constructed to operate substantially in the manner as and for the purposes set forth.

10. In a collar-folding machine, the combination of the guideway  $n^4$ , the steam-chest  $i'$ , constructed with the pins  $k'$ , the movable presser-plate  $R'$ , made with the pins  $k^2$  and forked standard  $U'$ , said parts being constructed and arranged to be operated substantially in the manner as and for the purposes set forth.

11. In a machine for folding collar-blanks, the combination of a hinged holder-plate constructed upon one side and both of its ends to have the form of the blank to be folded, but made smaller than the latter, a presser-arm constructed to descend onto and to swing up from off said holder, and a folding-plate made with a cut-out area that upon one side and both of its ends is parallel to the corresponding parts of the holder, but larger than the latter, and the said parts being constructed and arranged to be operated substantially in the manner as and for the purposes set forth.

12. In a machine for folding collar-blanks, the combination, with the collar folding and presser mechanism, of the shaft  $S'$ , made with the cam  $V'$ , the feathered clutch-sleeve  $M'$  and loose clutch-pulley  $P^2$ , the curved and pivoted lever  $L'$ , having at one of its ends the forked arms  $e'$   $e^2$  and at the other end the roller  $r^2$ , the crank-shaft  $W'$ , made with the cam  $t^2$ , the said parts being constructed and arranged to operate substantially in the manner as and for the purposes set forth.

Signed at Troy, New York, this 24th day of October, 1884, and in the presence of the two witnesses whose names are hereto annexed.

GEORGE E. NORRIS.

Witnesses:

CHARLES S. BRINTNALL,  
WILLIAM C. BUELL.