

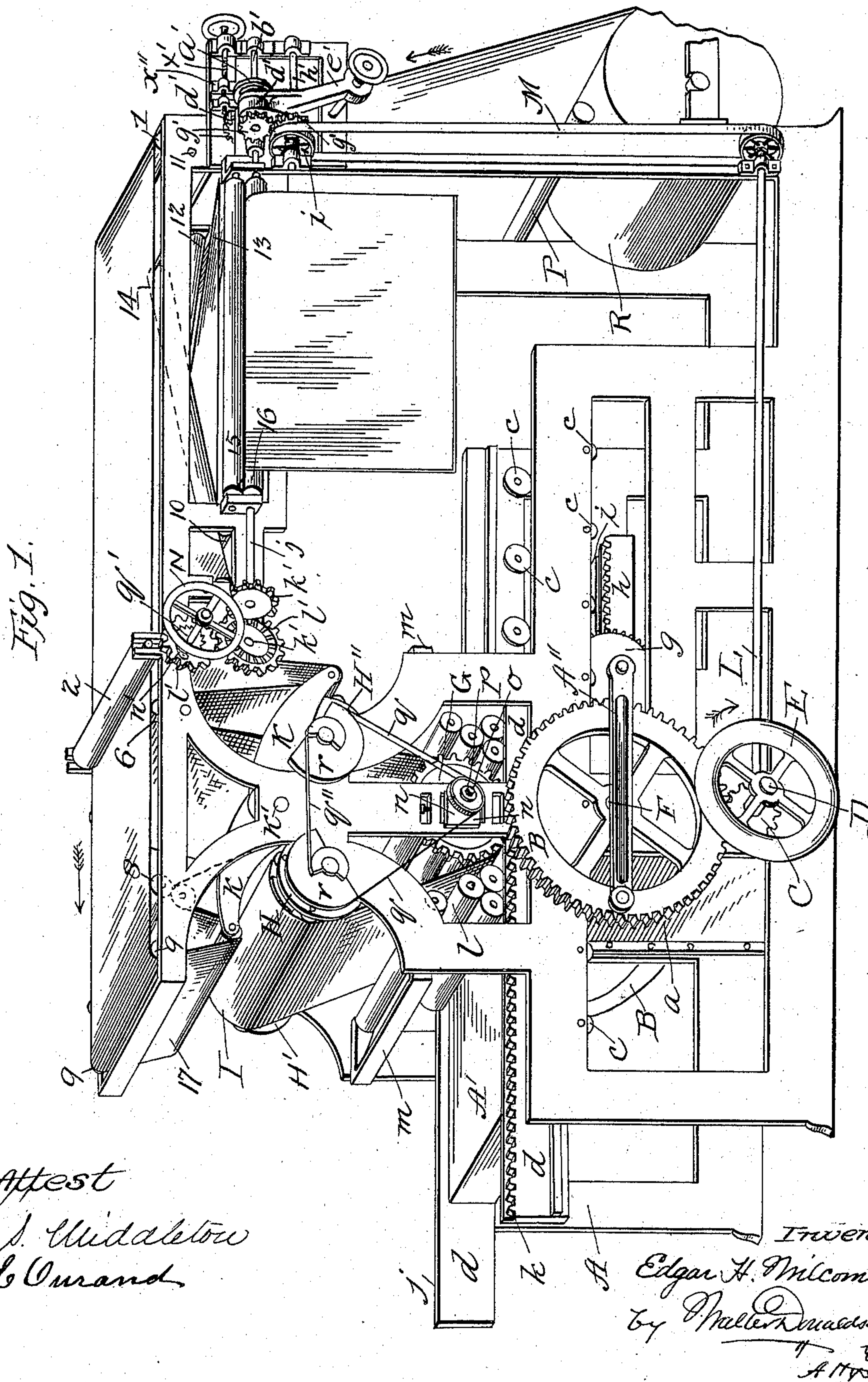
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6 Sheets—Sheet 1.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776.

Patented Sept. 15, 1896.



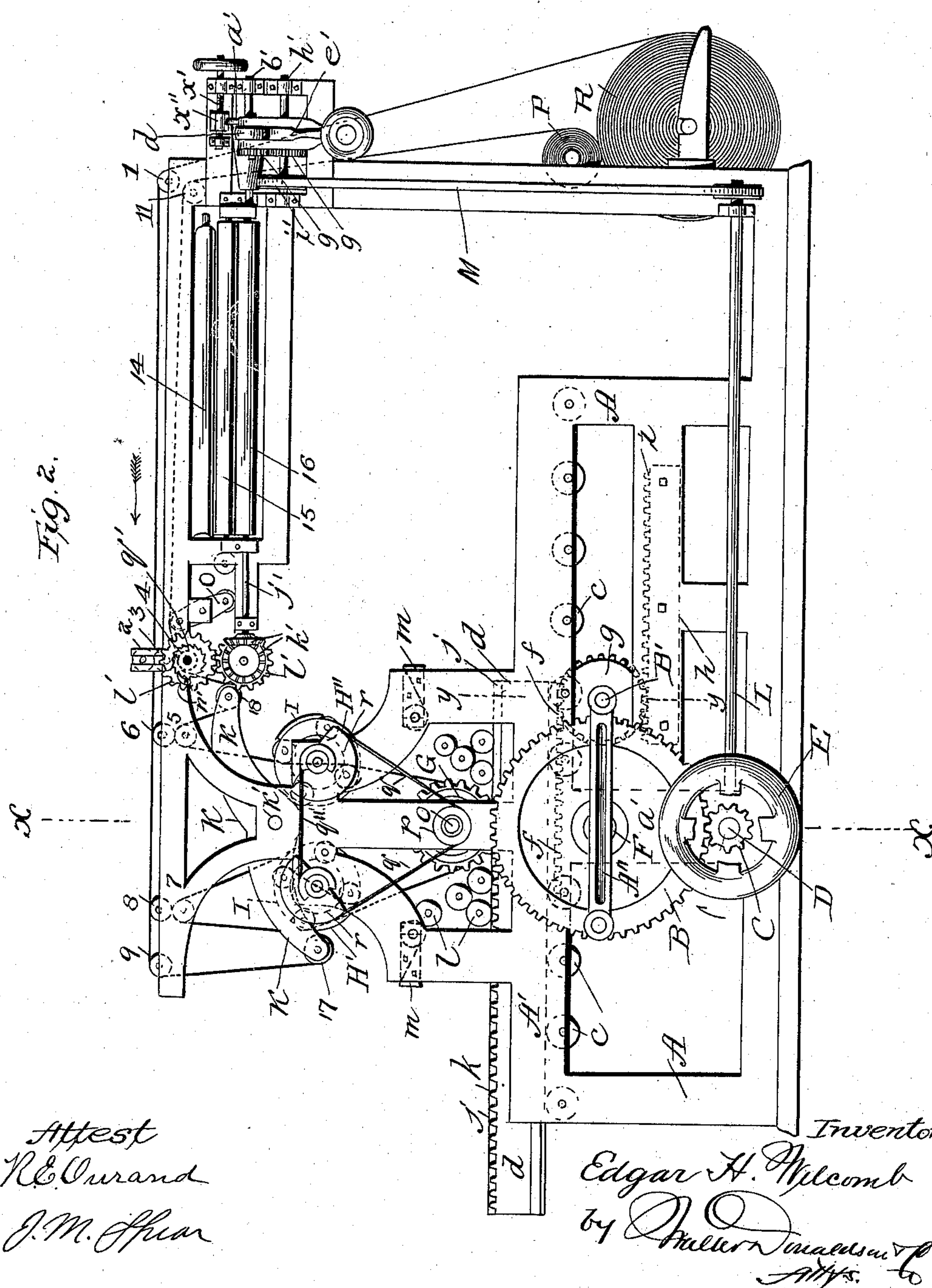
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6 Sheets—Sheet 2.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776

Patented Sept. 15, 1896.





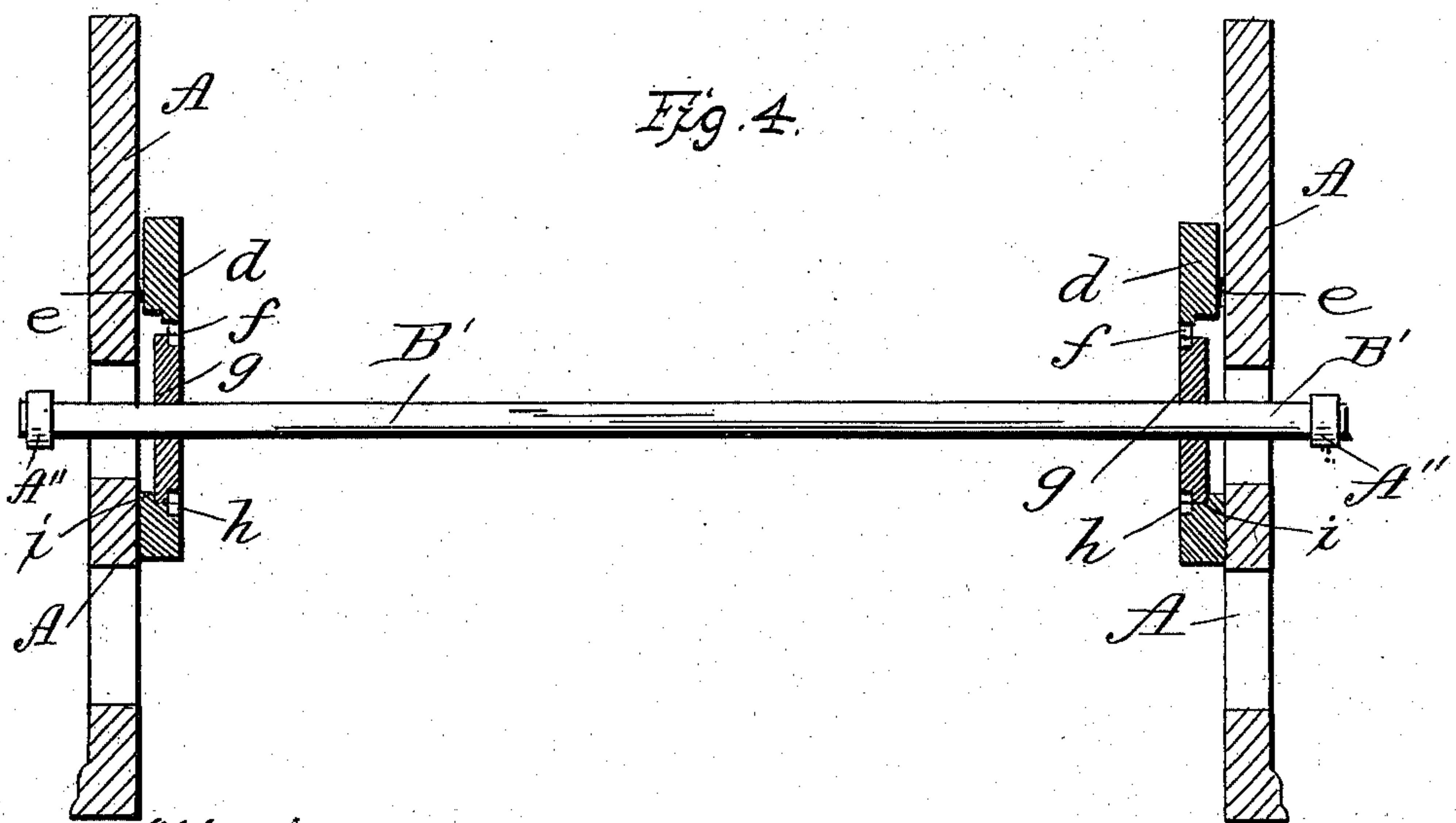
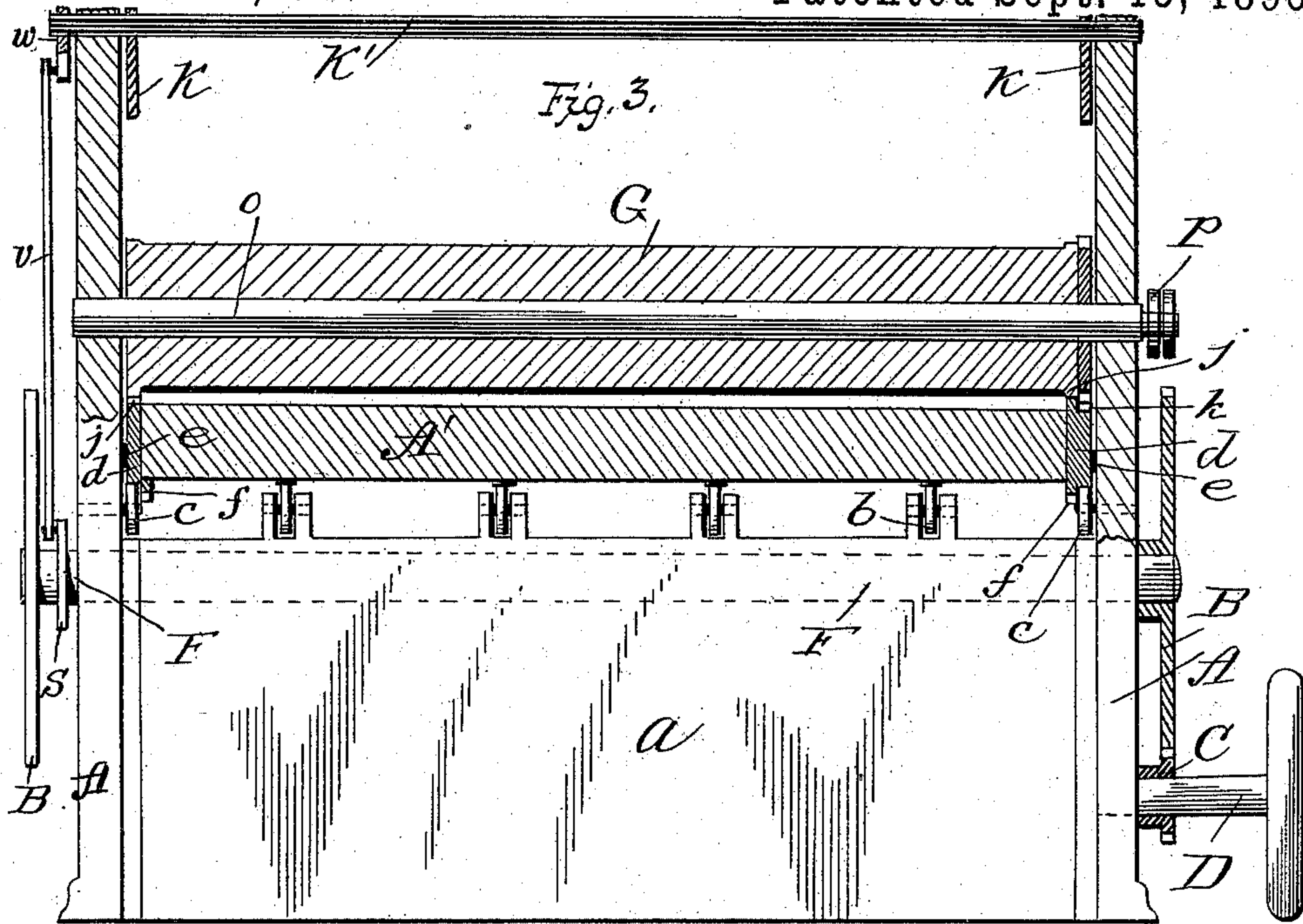
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6 Sheets—Sheet 3.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776.

Patented Sept. 15, 1896.



Attest  
R. L. Orrand  
J. M. Spear

Inventor  
Edgar H. Wilcomb  
by *Phyllis Donaldson*  
Attys. Co

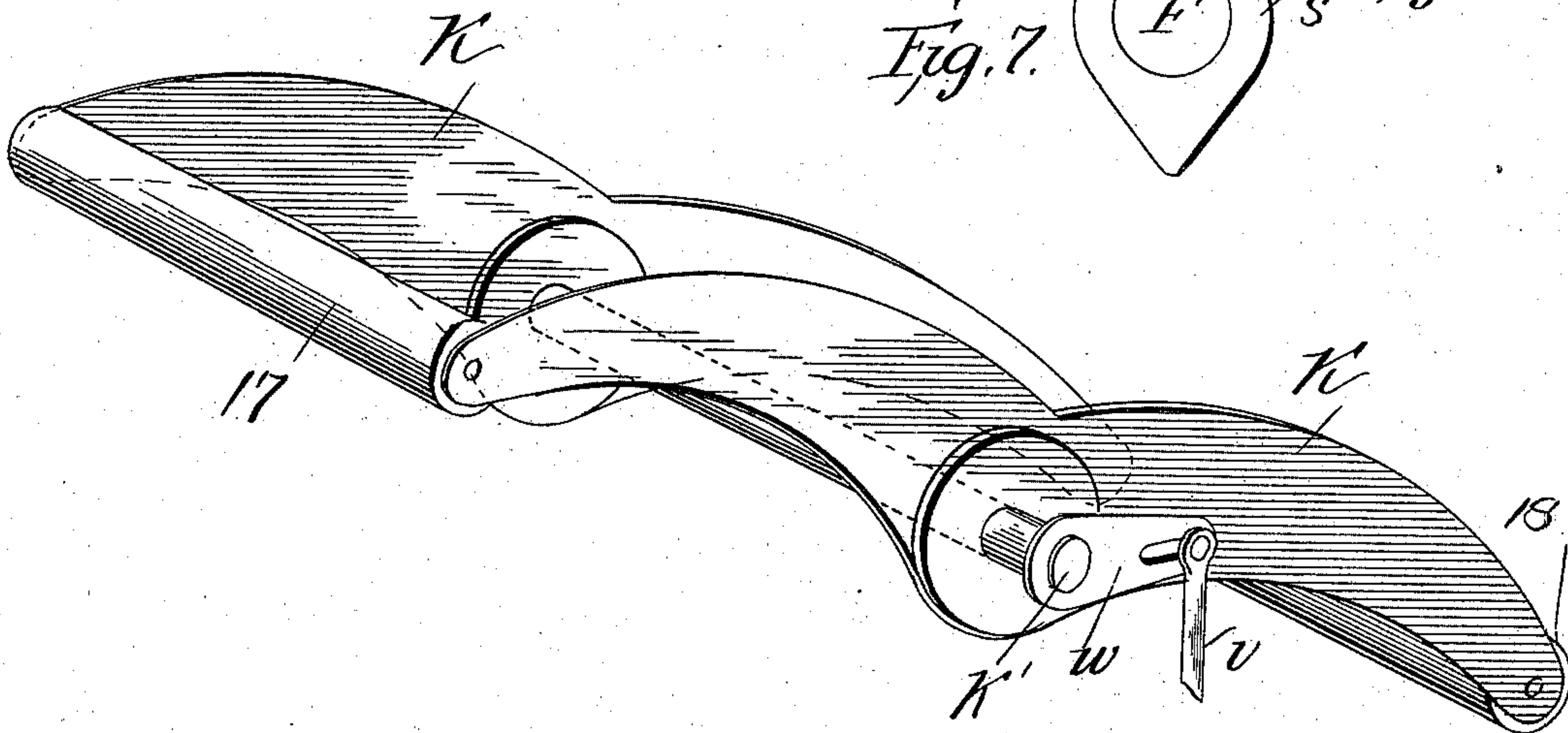
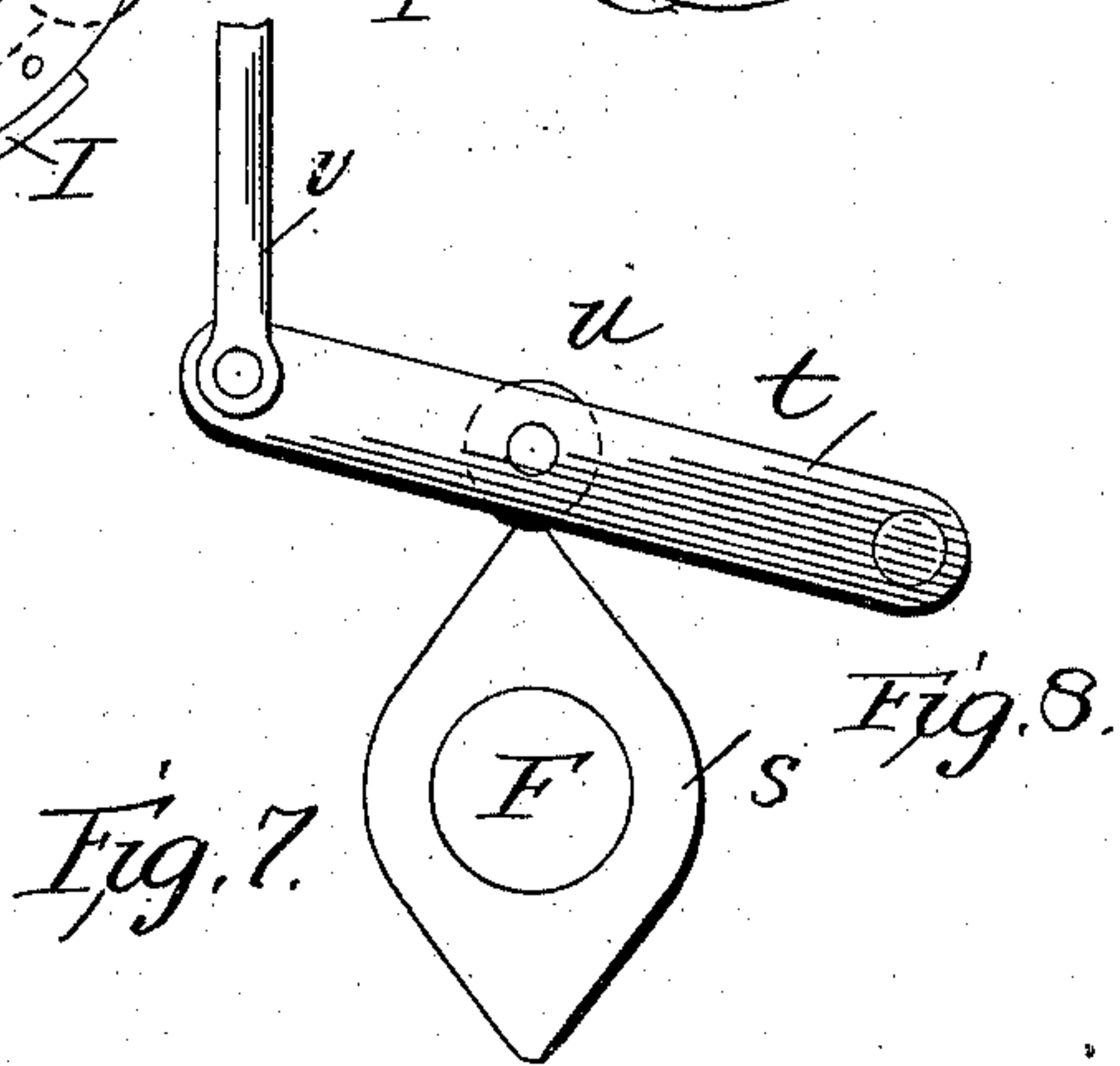
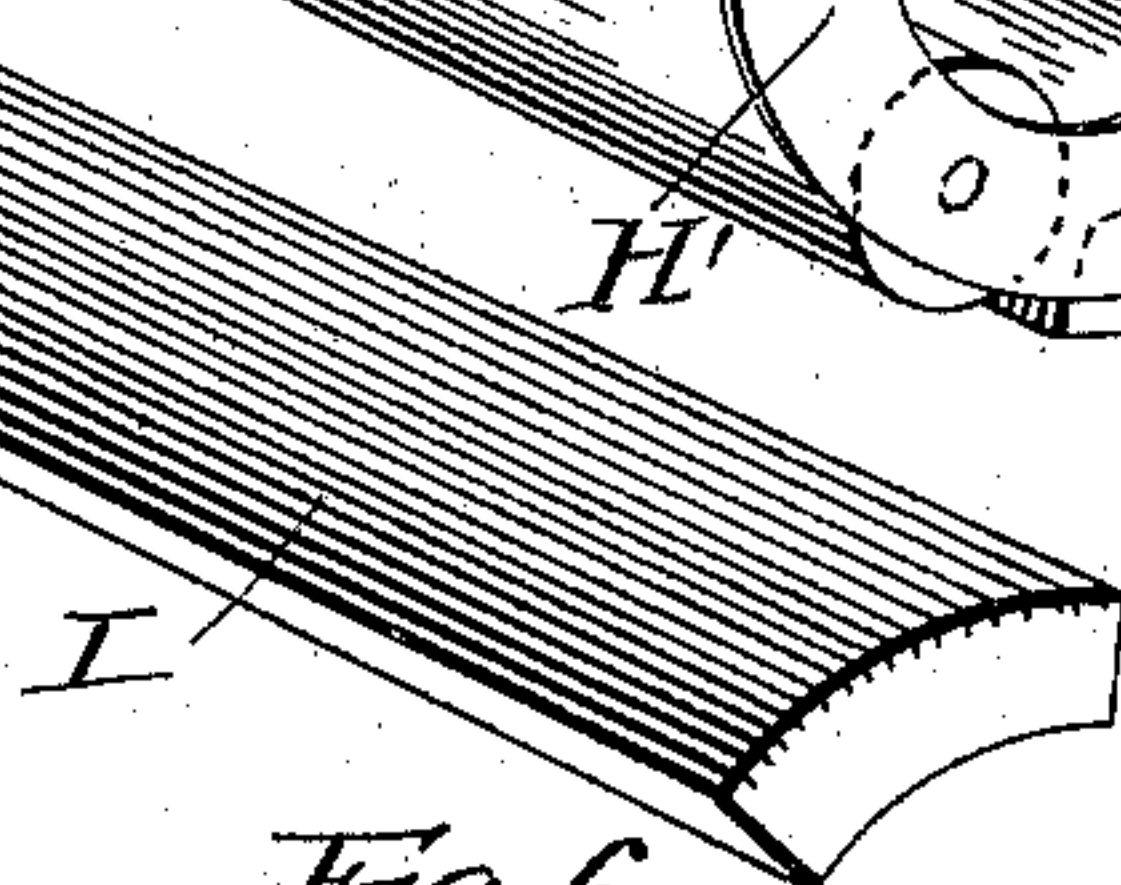
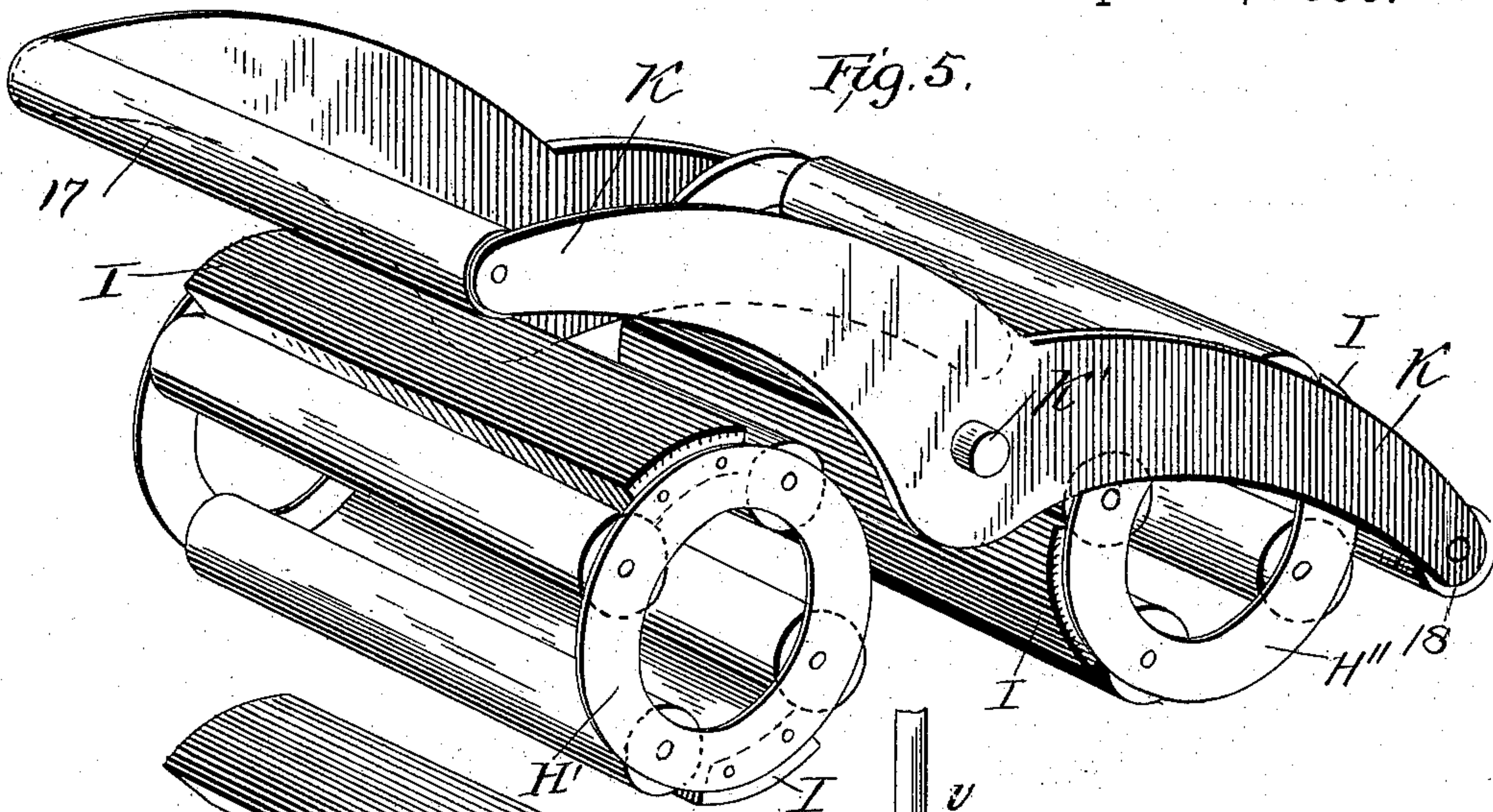
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6 Sheets—Sheet 4.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776.

Patented Sept. 15, 1896.



Attest  
W. E. Curand.  
J. M. Spear

Inventor  
Edgar H. Wilcomb  
by *Charles M. Adams*  
Attys.



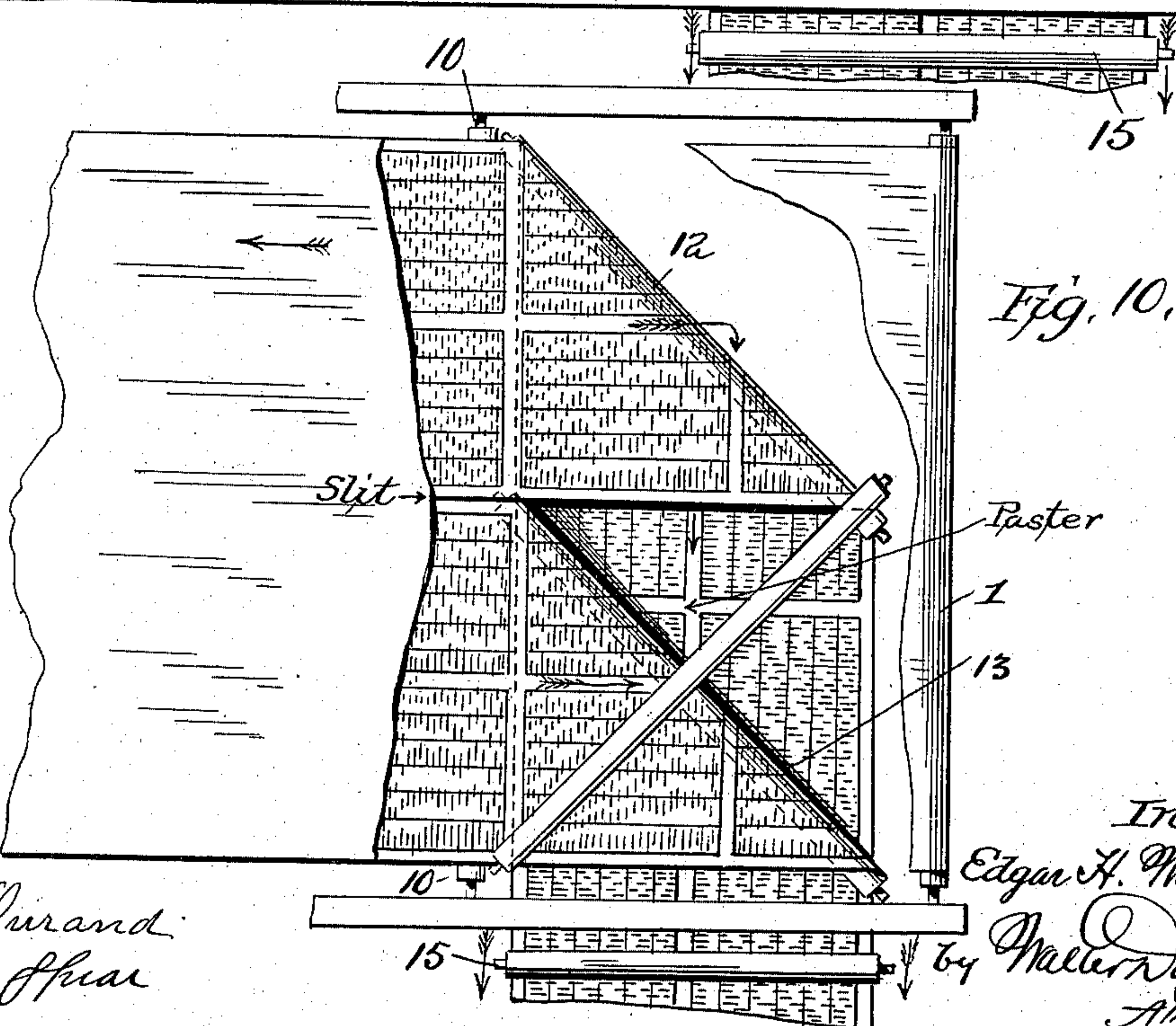
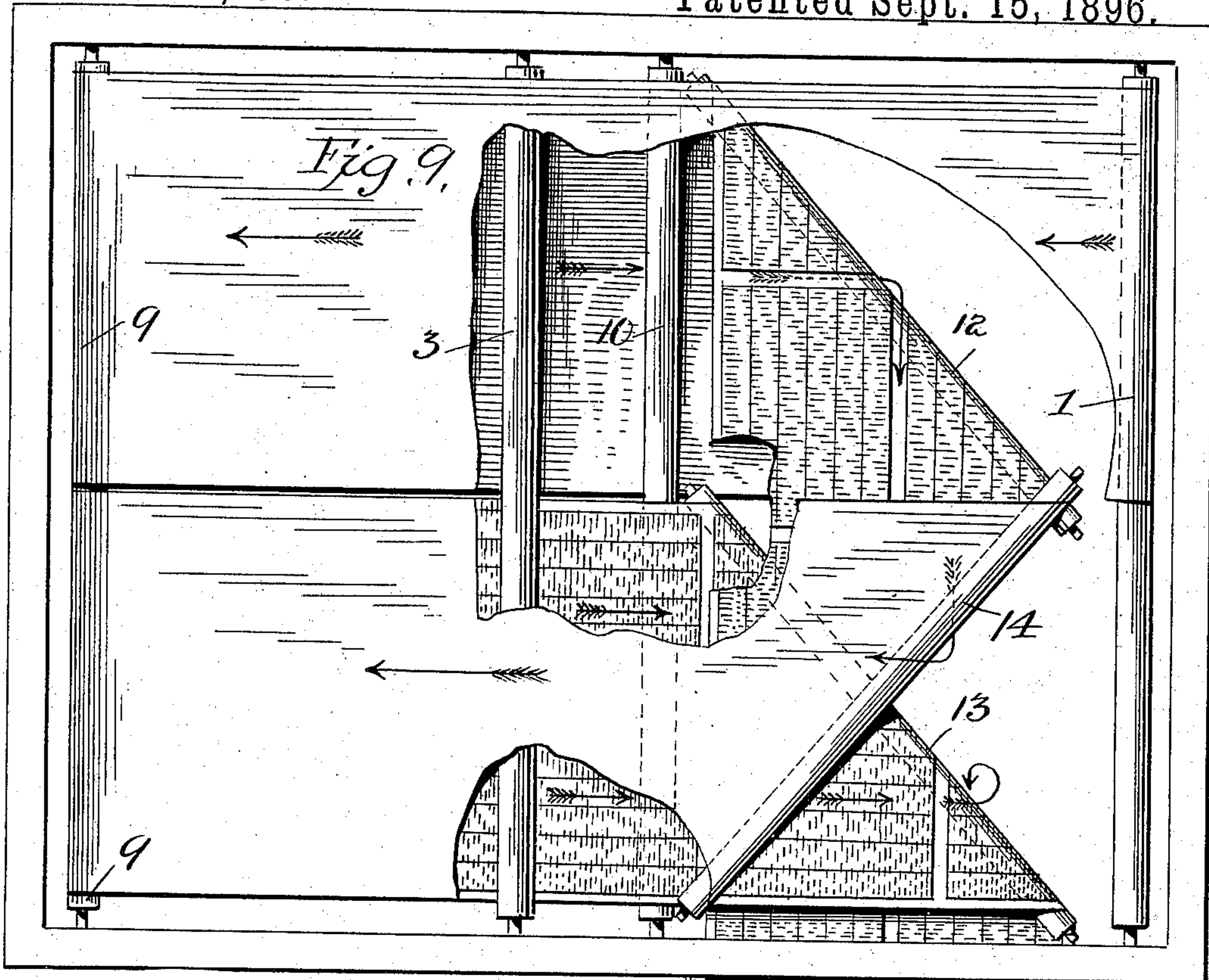
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6 Sheets—Sheet 5.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776.

Patented Sept. 15, 1896.



Attest  
R. C. Durand  
J. M. Spear

Inventor  
Edgar H. Wilcomb  
by *Walter Donaldson*  
Atty.

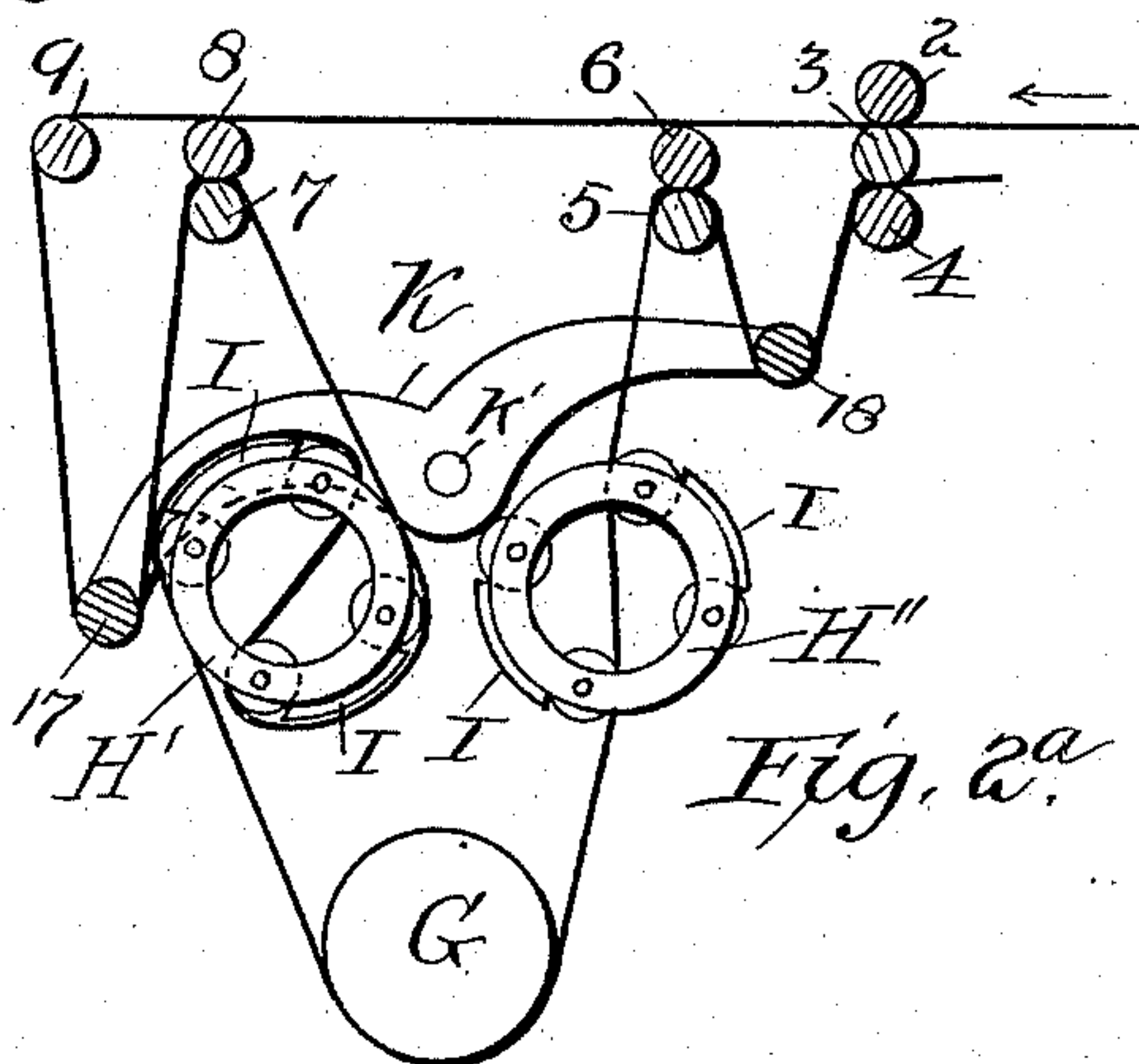
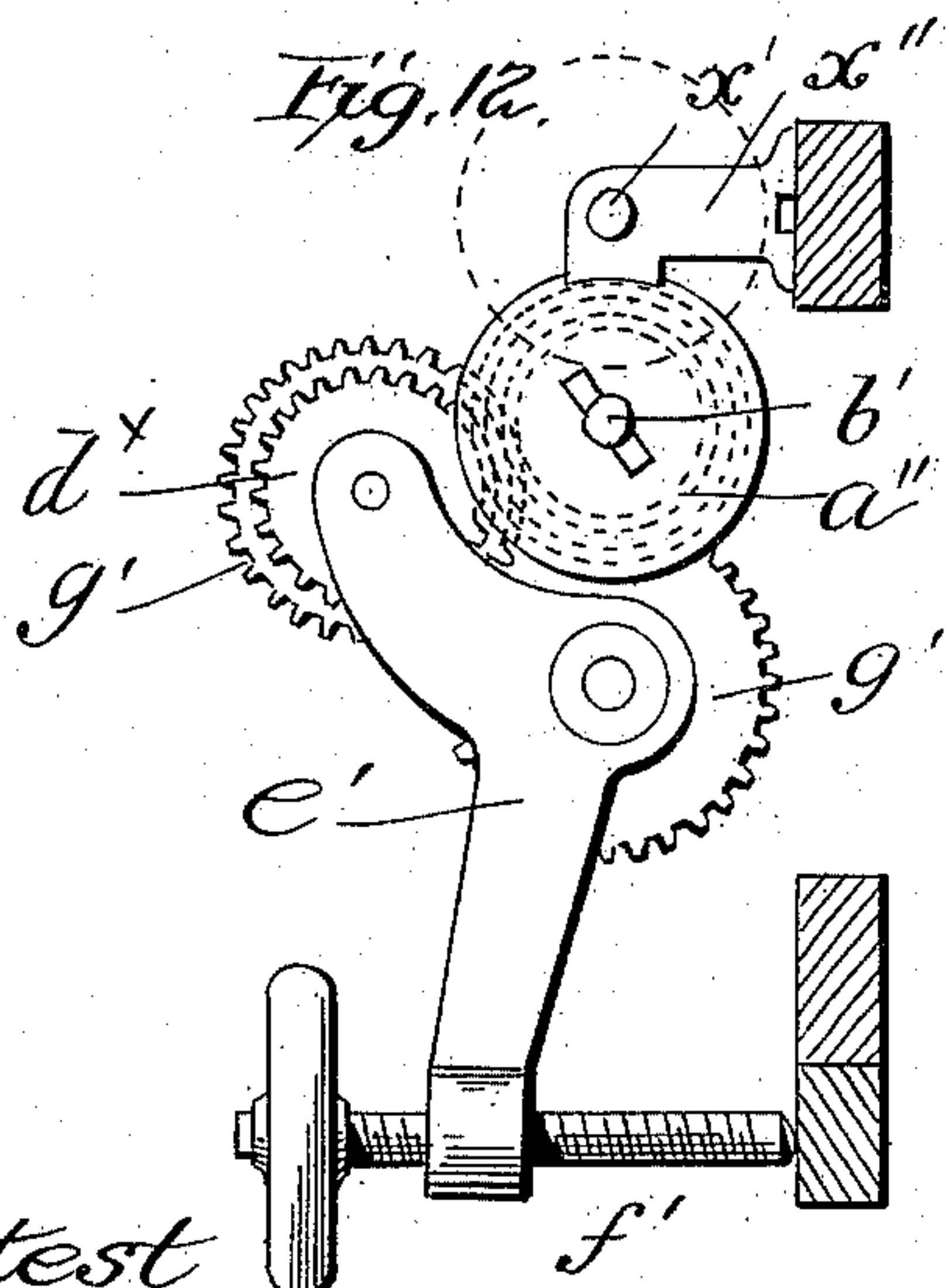
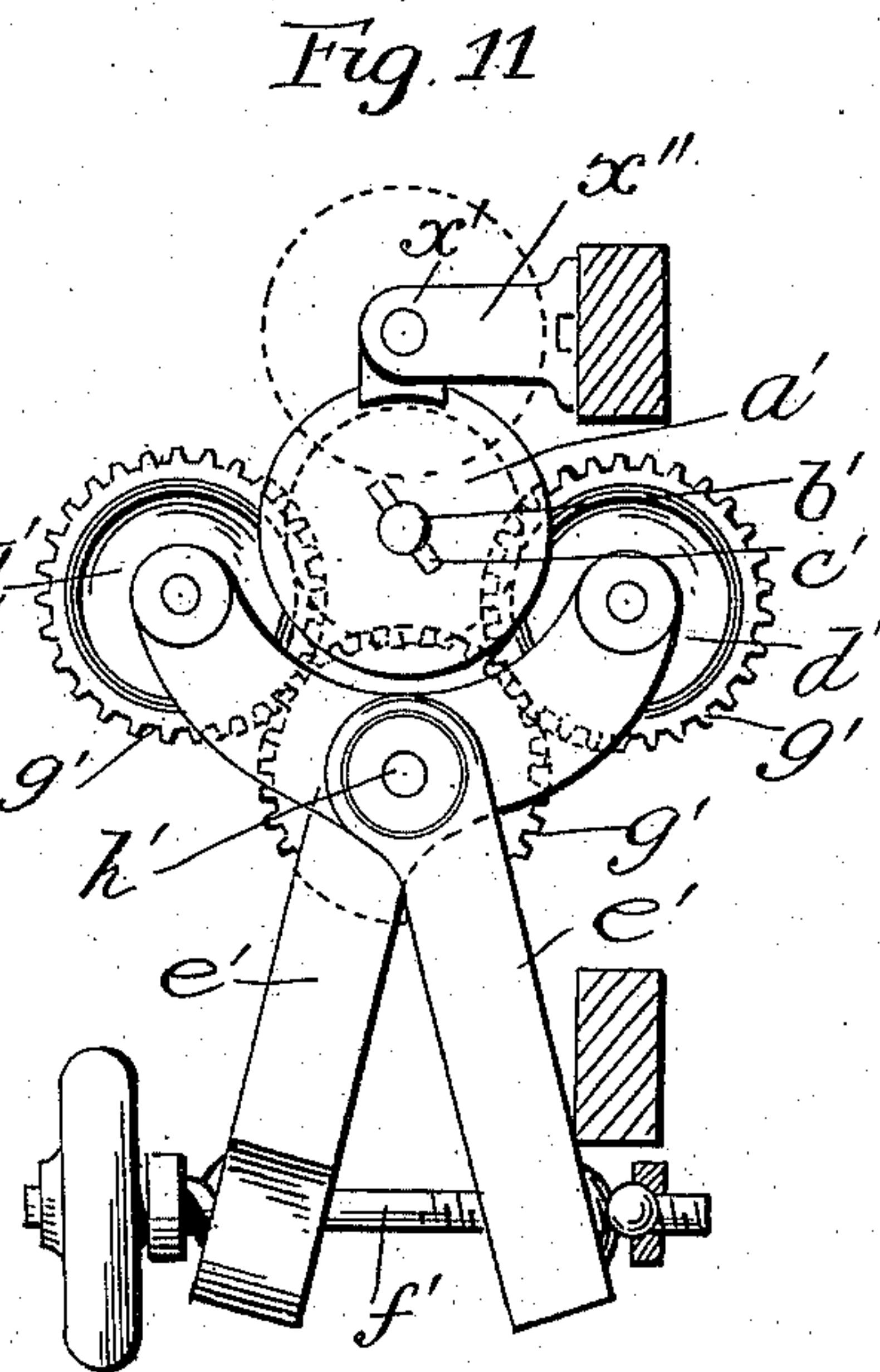
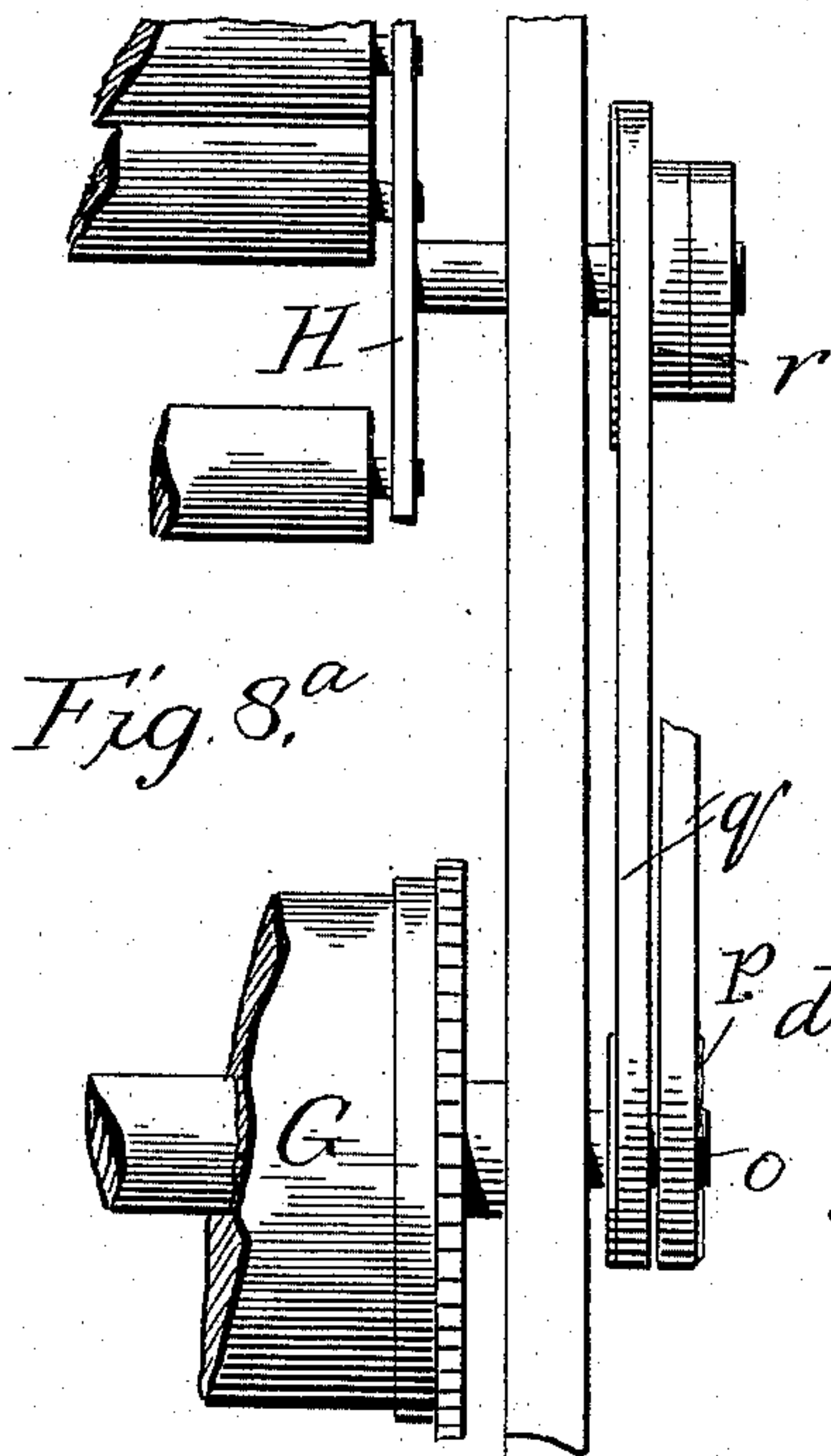
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6 Sheets—Sheet 6.

E. H. WILCOMB.  
WEB PRINTING PRESS.

No. 567,776.

Patented Sept. 15, 1896.



Attest  
R. C. Orrand  
J. M. Spear

Inventor  
Edgar H. Wilcomb  
by Walter Donaldson & Co  
Attys.



# UNITED STATES PATENT OFFICE.

EDGAR HARLAN WILCOMB, OF WORCESTER, MASSACHUSETTS.

## WEB-PRINTING PRESS.

SPECIFICATION forming part of Letters Patent No. 567,776, dated September 15, 1896.

Application filed January 23, 1895. Serial No. 535,914. (No model.)

*To all whom it may concern:*

Be it known that I, EDGAR HARLAN WILCOMB, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Web-Printing Presses, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention is an improvement in web-printing presses, and relates especially to flat-form cylinder web-printing presses wherein the printing is effected on a continuous web previous to severance thereof into sheets, and the present press is a combined type-bed and cylinder-press of simple and economical construction, capable of being run at a high rate of speed and which can be employed to print one side of the web or sheet or as a perfecting-press, wherein it is advisable to print both sides of the web at one operation, and wherein the register of the impressions on opposite sides of the web can be quickly and accurately effected without any necessary alteration or adjustment of the impression-cylinder or type-bed or forms, and these are the main objects of the invention.

Other objects are to enable the press to print both ways, or at each movement of the type-bed or impression-cylinder back and forth, and to avoid the use of tapes for directing the web and supporting the same during its progress through the press.

Before entering upon a detailed description of the press it is deemed proper to state that it has been found impracticable to build flat-form cylinder-presses with a type-bed larger than is necessary for four pages of a large-sized newspaper, and this is especially true in regard to presses having traveling or reciprocating beds, such as herein described, on account of the great weight of the bed and forms of type thereon and the consequent slowness of operation. Besides, in medium or small offices, where such presses are generally employed for newspaper-work, it is seldom convenient to have more than four pages of the larger size in readiness to print at one time. At the same time such offices desire to issue papers having either six or eight of such pages, in which case they would prefer, even with the best of press-facilities, to print

one side of the sheet at a time. The majority of such offices issue a four-page daily paper and an eight-page weekly, the latter being made up principally from the daily. Hence in the present description I have confined myself to a press capable of perfecting (printing both sides at one operation) a four-page paper and printing one side at a time of a six or eight page paper, and my invention is so simple in construction as to enable the changes to be made from one size to another with little or no change of any of the mechanism. It is also so simple that ordinary cylinder-pressmen should be able to run it.

Figure 1 is a perspective view of my improved web-printing press. Fig. 2 represents in detail a side elevation. Fig. 2<sup>a</sup> is a diagram of the web-reels. Fig. 3 is a transverse sectional view on the dotted line *x x*, Fig. 2. Fig. 4 is a transverse sectional view of the traveling gears, frame, and racks on the dotted line *y y*, Fig. 2. Fig. 5 is a perspective view of the two web-reels and oscillating beams and rollers, showing their positions in relation to each other. Fig. 6 is a perspective view of the convex rib-surfaced attachment, which is a distinctive feature of the web-reels. Fig. 7 is a perspective view of the oscillating beam and roller web-looping attachment, showing partial means of operating the same. Fig. 8 is a detail face view of the cam devices for operating the foregoing web-looping attachment. Fig. 8<sup>a</sup> is a detail view of the means for operating the web-reels. Fig. 9 is a top or plan view of the web conveying, turning, and reversing rollers, showing their position in relation to each other and the course of the web over and around the same while printing both sides or perfecting the same at one operation, parts of the web being cut away and the top feed-roll 2 being removed. Fig. 10 is a top plan view of the same rollers and the course of the web over and around the same when the web is run full width, being slit or divided longitudinally and the two sections brought together and pasted, forming, in this case, an eight-page paper, one side having previously been printed, as will be hereinafter described, part of the web being cut away. Fig. 11 is a side elevation of the new and improved mechanism for regulating the feed of the web, and which is also



shown in two other positions in Figs. 1 and 2. Fig. 12 is a side elevation of a modified form of the foregoing mechanism, wherein gears are employed instead of the cone and trucks hereinafter described.

Referring to the drawings by letters thereon, A A designate the frames of the press, which consist of two sides supported and braced by a standard *a*, extending across between the two side frames below the position of the impression-cylinder and supporting the movable bed A' at the point of impression, being provided with bearing-rollers *b* in contact with the under surface of the bed. Additional bearing-rollers *c c c* are attached to each side frame. The bed carries extensions *d d* on each side, which rest upon the rollers *c c c* and bear against guides *e e*, attached to the side frames and which serve to guide the bed. These extensions *d d* carry racks attached to their lower sides, as shown at *f f*, and the racks are in mesh with traveling gear-wheels *g g*, which also intermesh with racks *h h*, attached to the inner side of each side frame. On the side of each of these racks is a bearer *i i*, upon which wheels *g g* rest by means of a corresponding bearing-surface. A shaft B' passes through these gear-wheels, to each end of which one end of pitmen A'' are attached, the opposite end of the pitmen being attached to large crank-wheels B B, one of which is a gear and intermeshes with and is driven by gear C on shaft D, to which power to drive the entire machine is attached.

E is a hand-wheel on shaft D.

Shaft F, connecting the two large crank-wheels B B, extends through the hollow cross-standard *a*.

Shaft D has an outer bearing. (Not shown.)

The necessary reciprocatory movement of the type-bed is secured by means of the mechanism just described. The upper surface of the type-bed has ordinary bearers *j j* and a gear-rack *k*, which intermeshes with and operates the impression-cylinder G, giving it the necessary oscillating movement.

Inking-rollers *l l l* and fountains *m m* are parts of a double set of ordinary inking apparatus situated one set each side of the impression-cylinder.

All the parts described thus far are of ordinary construction, with slight variation of form to meet the requirements.

The impression-cylinder is made vertically movable in journal-bearings *n n* in the ordinary manner. A shaft *o* extends through the impression-cylinder and journal-bearings *n n*, upon which shaft are drums *p* outside the frame.

H' H'' are two oscillating web-reels connected with each other and with drums *p* by means of bands *q q'*, extending the required distance around drums *r r* and *p*. These drums *p* and *r r* are of the proper size and conformation to operate the web-reels, as hereinafter described. The bands may be of spring-steel or any other suitable material

and are calculated to be kept perfectly taut at all times. The web-reels may be attached and operated by means of cranks, gears, or any other means not described, but I prefer to employ the bands for the reasons that, if used properly, they prevent any looseness or backlash, and the operation of the reels may be made adjustable to conform to the requirements of the cylinder by increasing or diminishing the size of drums *p*. As will sometimes occur, a variation in the thickness of the packing or "tympan" on the surface of the impression-cylinder will increase or diminish the size of the cylinder to a very slight extent, which may be remedied by pasting on or taking off a strip or more of paper on the face of drums *p* under the bands. An improved attachment to the web-reels referred to consists of the convex or oval-surfaced disk or shield described elsewhere, and which is designated as I I I. Modifications in connection with these reels consist of using straight stationary bars in place of rollers. Pivoted in the frame of the press, between and slightly above the web-reels just referred to is the oscillating double beam and web-looper arrangement previously referred to herein, and which is designated as K K, the operation of which, together with the reels, will be more fully described. Returning to shaft D, a smaller shaft L is shown, extending at right angles lengthwise of the press. This smaller shaft is driven by means of bevel-gears (not shown) from shaft D and drives the entire web feeding and delivery apparatus, in this case by means of a belt M, extending to the improved adjustable speed arrangement, though another shaft and bevel-gears could be employed in place of the belt.

The adjustable speed arrangement is a new and improved device for regulating the speed of the web independently of the press proper, and is described as follows: a cone *a'* upon shaft *b'*, the cone having a slot *c'* on its inner surface, which engages with a pin or spline on the shaft, compelling the cone to turn with the shaft, but enabling it to slide lengthwise of the shaft, and two bearing trucks or rollers *d' d'* of suitable material, rubber-covered or otherwise, situated one on each side of the cone and bearing upon its inclined surfaces, these rollers having bearings in the upper ends of two pivoted arms *e' e'*, which hinge upon each other shear-like, and by means of a thumb-screw *f'* or its equivalent at the lower end, these two arms being made to compress the two rollers upon the surface of the cone and adjust said rollers to the varying size of the cone, the two rollers being driven by gears *g' g' g'*, the two upper gears intermeshing with the lower one, the latter having a fixed position on shaft *h'*, which shaft serves to support and act as the central pivot for the two arms *e' e'*, shaft *h'* being the drive-shaft and deriving power, in this instance, from the belt M by means of a pulley *i'*. The adjustably-speeded cone is made adjustable by



means of the hand-screw  $x'$  and slide  $x''$ , a projection on the end of the cone fitting into a notch in the lower part of slide  $x''$ , as shown, and through the cone power is transmitted to the entire web driving and delivery mechanism through shaft  $j'$ , which is a continuation of shaft  $b'$ , to the bevel-gears  $k' l'$  and gears  $l' l'$ , these latter gears driving the feed and delivery rolls 2, 3, and 4.

My idea embraces a modified form of the adjustable feed arrangement to be employed where a more positive means of operation is desired. In this case a set of different-sized gears, say a difference of one tooth in each gear, is employed in place of the cone, the gears being fastened together and forming, virtually, a cone of gears, or the whole may be made in one piece and this cone made adjustable on shaft  $b'$ , as before described; also a gear in place of the front truck  $d'$ , the rear truck and its accompanying mechanism being dispensed with, gear  $d^x$ , Fig. 12, being firmly held in place by means of the thumb-screw  $f'$  or its equivalent at the lower end of arm  $e'$ . In this case, however, the thumb-screw would press against the surface of the framework of the mechanism, forcing outward the lower end of the arm  $e'$ .

Referring to Figs. 1 and 2, it will be seen that the feed and delivery rolls consist of three arranged one above the other, the lower one being driven by the gears  $l' l'$  and accompanying mechanism and the middle one resting upon this one, and the upper one upon the center one. Rollers 5 6 7 8 are web-guide rollers which have an intermittent movement, as will be hereinafter described. Rollers 1 9 10 11 are continuous-moving web-guide rollers. Rollers 12 13 14 are angle-rollers employed for the purpose of turning and reversing the web, as required and as hereinafter more fully described. Rollers 15 16 are continuously-moving final-delivery rollers, driven by the shaft  $j'$ , and between which two rollers the web passes in its perfected state to be afterward severed crosswise into sheets and delivered to fly or folder in any ordinary or improved manner not necessary to be shown. Hand-wheel N on shaft of lower roller 4 is employed to turn the web-driving apparatus by hand independently of the rest of the machine, to accomplish which purpose a ratchet-wheel  $q'$  is attached fast to its shaft, and the accompanying pawl  $r'$  is attached to the upper gear-wheel  $l'$ , the latter wheel being loose upon its shaft. Between the feed and delivery rollers 2 3 4 and the angle-rollers 12 13 14 is situated a two-roller type of web-reel O, the purpose of which in this case is, by proper adjustment, to make one section of the web register with the other in the act of perfecting and bringing together the two sections. Roll P is an auxiliary web-roll, the purpose of which, in certain cases, will be more fully described herein.

In the foregoing description I have referred

to web-rollers and angle-rollers, and I wish to have it understood that in place of rollers, in any place where deemed preferable, straight or angle bars may be used, my meaning having reference to bars as well as rollers throughout this specification and accompanying claims.

I will now describe the press in operation. First, the press will be considered as perfecting a four-page newspaper of the full capacity of the press, the four forms being arranged side by side, crosswise of the press, on bed A'. The supply-roll of paper is shown at R, which in this case is one-half of a full width, placed at the rear side of the press, from which the web passes over guide-roller  $l$  on the course marked to the continuously-moving feed-rolls 2 3, which serve to draw the web along and supply it as required, thence over the outer guide-roller 9 at the left of the drawings, down under the outer roll 17 of the oscillating looper, up over roll 7, down through reel H', and under the impression-cylinder, where one side is printed, thence up through reel H'', between rolls 5 6, down under roll 18 of the oscillating looper, and up between rolls 3 4, which, coacting with each other and with the upper roller 2, serve to feed and deliver the paper at the same uniform speed. Thence the web passes under guide-roller 10, Fig. 1, and under angle-roller 12. To this point the web has run continuously on the rear side of the press, when it now passes up over angle-roller 14, which serves to reverse and turn the web, Fig. 9, and to transfer it to the opposite or front side of the press, whence, with its unprinted surface uppermost, it again passes over the same course as before, between feed-rollers 2 3, over roll 9, under roll 17 of the looper, between rolls 7 8, through reel H', under the impression-cylinder, where it receives the second impression on the opposite side from the first, thence up through reel H'', between rolls 5 6, under roll 18 of the looper, and up between feed and delivery rolls 3 4, making twice that the web has passed over the same course, but at opposite sides of the press. Thence, in its perfected state, the web passes over angle-roller 13 and out of the press between rolls 15 16, when the web is separated into sheets by any ordinary or improved means. Return now to the manipulation of the web by the oscillating looper K K and the rotary reels H' H'', in order to understand how the necessary results are attained. In this case the oscillating looper K K is employed and so controlled as to exactly take up the web as fed, by means of the descending roll 17, and at the same time releasing, by the other roll, 18, the web as it is taken up by the delivery-rolls, the web remaining stationary between rolls 5 6 and 7 8 during this operation, which is during the printing stroke in either direction. A positive movement of the looper may not be required during this operation, as by having the rolls 5 6 and 7 8 remain station-



ary, as they may be required to do by ratchet or other positive means, the pull of the web at the point of roll 18 will cause roll 17 to be lowered at exactly the same speed, which will accomplish the required result of taking up the feed and releasing the delivery while the web remains stationary at the points described. Between each and every impression stroke the looper K K is caused to reverse its position and draw the web forward the required distance over the impression-surface of the impression-cylinder, which distance in this case is the length of one page as the web is afterward cut up. This is effected by means of the cam s, located on the rear side of the press on shaft F inside the crank-wheel, lever t, truck u, upright connecting-rod v v, crank w, with slot and adjustable pin on shaft K'. The purpose of the two web-reels H' H'' in this case is to cause the web to move backward and forward at the point of impression in exact unison with the oscillating movements of the impression-cylinder, allowing the web to be printed at each movement of the bed back and forth, at the same time allowing the web to be drawn freely through the reels, as required, by the oscillating looper K K. The means of operation of these web-reels has been herein described, although I do not confine myself to this method, nor do I confine myself to the method described for operating the oscillating looper K K, as various other means of operation can be employed. Furthermore, I do not confine myself to the employment of the oscillating looper, as described, as two sets of reels may be used instead with the same or other desired results. It will be seen that the operation of two reels coupled together in substantially the manner described, with the web running through them in the manner described, causes the web, while stationary, both before and after having passed through the reels, to have a forward and backward movement between the reels themselves, according as the reels are oscillated, wherever they may be placed on a press.

Having described the operation of perfecting a four-page paper or its equivalent, I will now describe how an eight-page paper or its equivalent may be printed upon the same press, supposing the forms to be the same size, occupying the full capacity of the bed for each side printed. The forms are arranged as before, and a full-width roll of paper is used, from which the web runs in the same course as before described, except that the web this time occupies the full width of the press, passes only once through the press at each operation, and is printed only on one side at each operation, though the impression stroke is given at each movement of the bed back and forth the same as before. On its return through the delivery-rolls 3 4 the web passes straight back over roll 11 and is rewound on roller P, which, in order to secure a winding speed equivalent to the unwinding

of the main supply-roll, rests upon that roll, although I do not confine myself to this method of rewinding. Thus I have described the method of printing the first side of the web. After the forms have been changed and new ones substituted and the roll of paper previously printed on one side substituted and placed in position of the main supply-roll, the web is run through the press again the same as before until it has passed between the delivery-rolls 3 4, the opposite surface of the web from the first being presented this time, of course. After having passed the delivery-rolls 3 4 the full-width web is slit longitudinally through the center by ordinary means and separated into two sections, the rear section passing over angle-roll 12 and the front section over angle-roll 13, roll 14 not being employed this time, whereby the two sections are brought together in a double web, which may be pasted, if desired, whence the web passes out of the press between rolls 15 and 16 and is severed, as before described. A six-page paper or its equivalent is printed in the same manner as last described, three pages being run each time and a web of paper three-quarters width being employed, running, say, on the rear side of the press, when the longitudinal slit would come in the same place as before, and a narrow strip, the width of one page, running over the front angle-roll 13, would be laid and pasted, if preferable, over the left side of the lower full-width strip, and when the web is afterward cut crosswise would give a six-page paper.

In the construction of a press embodying the principles herein described I do not confine myself to the particular kind of operating mechanism herein described in connection with type-bed and cylinder, as the web-operating mechanism may be applied to any kind of flat-bed cylinder or platen press, and is particularly applicable to the stationary-bed and traveling-cylinder type of press, an example of which type is shown in my said application. Furthermore, I do not confine myself to the particular kind of feed and delivery arrangement herein shown and described, nor to the particular location of the web-conducting rolls or bars, as the arrangement of rolls or bars is susceptible to many modifications and changes without affecting the results to be obtained by the employment of the main ideas in connection with the manipulation of a web of paper for the purposes specified. Furthermore, in the construction of web-controlling reels I do not confine myself to the particular construction described herein, as the invention is intended to cover any kind of construction of reels employed for the purposes specified herein. Furthermore, I do not confine myself to the employment of rolls in any part of the web mechanism described, as my idea embodies the situation of straight or angle bars in fixed or adjustable positions in place of rollers,



wherever deemed preferable, whether in the reels, the looper referred to, or in other parts of the press. Furthermore, I do not confine myself to any particular direction in which the web is run through the press, as it is evident that the web can be run in one direction as well as another with the same results. Furthermore, I do not confine the application of the web mechanism herein described to presses printing both ways after the manner described, as it is evident that the web mechanism is equally well adapted to presses printing only one way.

I claim—

1. In combination in a printing-press, the printing means, and two rotary web-conducting reels, one located at each side of the said printing means, to control the web, paper-feed mechanism, and means for rotating the reels in unison with the stroke of the printing means, substantially as described.

2. In combination in a printing-press, the printing means and two rotary web-conducting reels, coupled or geared together, for controlling the web at the printing means, paper-feed mechanism and means for rotating the reels in unison with the stroke of the press, substantially as described.

3. In combination with the impression means, the paper-feeding means, the web-reels composed of the cross bars or rolls arranged at equal distances from a common axis, and the convex sheath with the ribbed surface, carried by the reel, the ribs of which extend transversely of the web.

4. In combination with the impression means, the paper-feeding device, the two web-reels, the drums on the axis thereof and the belts connecting the drums, substantially as described.

5. In combination with the impression means, the paper-feeding device, the two web-reels, the drums on the axis thereof, the strap connecting the drums, to make the reels operate in unison, and the strap connected with the drums for operating the reels, substantially as described.

6. In combination, in a flat-bed printing-machine, the impression means, continuously-moving web-feed means, delivery devices, means for reciprocating the web past the impression-line, and the take-up means, comprising the oscillating looper having the cross-bars at opposite ends connected together, and the intermediate axis upon which the looper oscillates, said oscillations operating the cross-bars reversely, substantially as described.

7. In combination, the impression means, continuously-moving web-feeding means, web-delivery means, the two web-conducting reels, and the take-up device for each reel, operating alternately, substantially as described.

8. In combination, in a printing-press, the printing means, web-delivery means, the relatively-fixed guide-rolls for the paper on each

side of the printing means, the two reels between the said rolls and printing means for reciprocating the paper past the printing-point, and the vertically-movable looper rolls or bars operating on the opposite sides of the fixed rolls from that of the reels, substantially as described.

9. In combination in a printing-press, the printing mechanism, the feed and delivery rolls 2, 3, 4, with operating means, the angle-rolls 12, 14, for transferring the web and reversing the same, and the guide-roll for the entering web and the guide-roll for the web after leaving the rolls 2, 3, 4, the said feed and delivery rolls extending across the path of the two parallel parts of the web, and the reversing-rolls being substantially in the same plane with the feed and delivery rolls, substantially as described.

10. In combination in a printing-press, the printing means, the reels H' H'', the double looper K, K, the pairs of rolls 5, 6, and 7, 8, acting on the web between the looper and reels, and the guide-rolls 9 and 10, substantially as described.

11. In combination in a printing-press, the printing means, the feed mechanism for the web and the controlling mechanism therefor, comprising the longitudinally-adjustable cone, the connection therefrom to the feeding mechanism, the power-transmitting shaft h', the wheel arranged to bear on different parts of the cone, the support therefor swinging on the transmitting-shaft, means for adjusting said support and gear connection between said wheel and said shaft, substantially as described.

12. In combination in a printing-press, the printing means, the feed mechanism for the web and the controlling mechanism therefor, comprising the longitudinally-adjustable cone, the connection therefrom to the feeding mechanism, the two wheels arranged to bear on opposite sides of the cone, the two levers carrying the wheels and pivoted together, means for adjusting the levers toward and from each other, and means for driving the said wheels, substantially as described.

13. In combination, the printing means, the feed mechanism for the web and the controlling mechanism therefor, comprising the longitudinally-adjustable cone connected to the feed mechanism, the wheels on each side of the cone, the two levers, the driving-shaft on which said levers are pivoted, means for adjusting the levers and driving means for the wheels, comprising the gear on the driving-shaft and the gears meshing therewith and connected with the said wheels, substantially as described.

14. In combination, the impression-cylinder, the paper reversing and transferring rollers, arranged to reverse the web and transfer it from one side of the press to the other, and the feeding-rolls extending across both portions of the web lying side by side and feeding the paper in opposite directions to and



from the cylinder and to and from the reversing and transferring rollers, said feeding-rollers being arranged between the cylinder and the transferring-rollers, substantially as described.

15. In combination, the impression-cylinder, the bed, the two web-reels, one on each side of said cylinder, the two looper-rollers, one on each side of the pair of reels, the frame  
10 carrying the same, pivoted centrally over the

axis of the cylinder and between the reels, and web feeding and delivery mechanism, substantially as described.

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

EDGAR HARLAN WILCOMB.

Witnesses:

WM. W. CORMACK,  
ALEXANDER C. WOOD.