

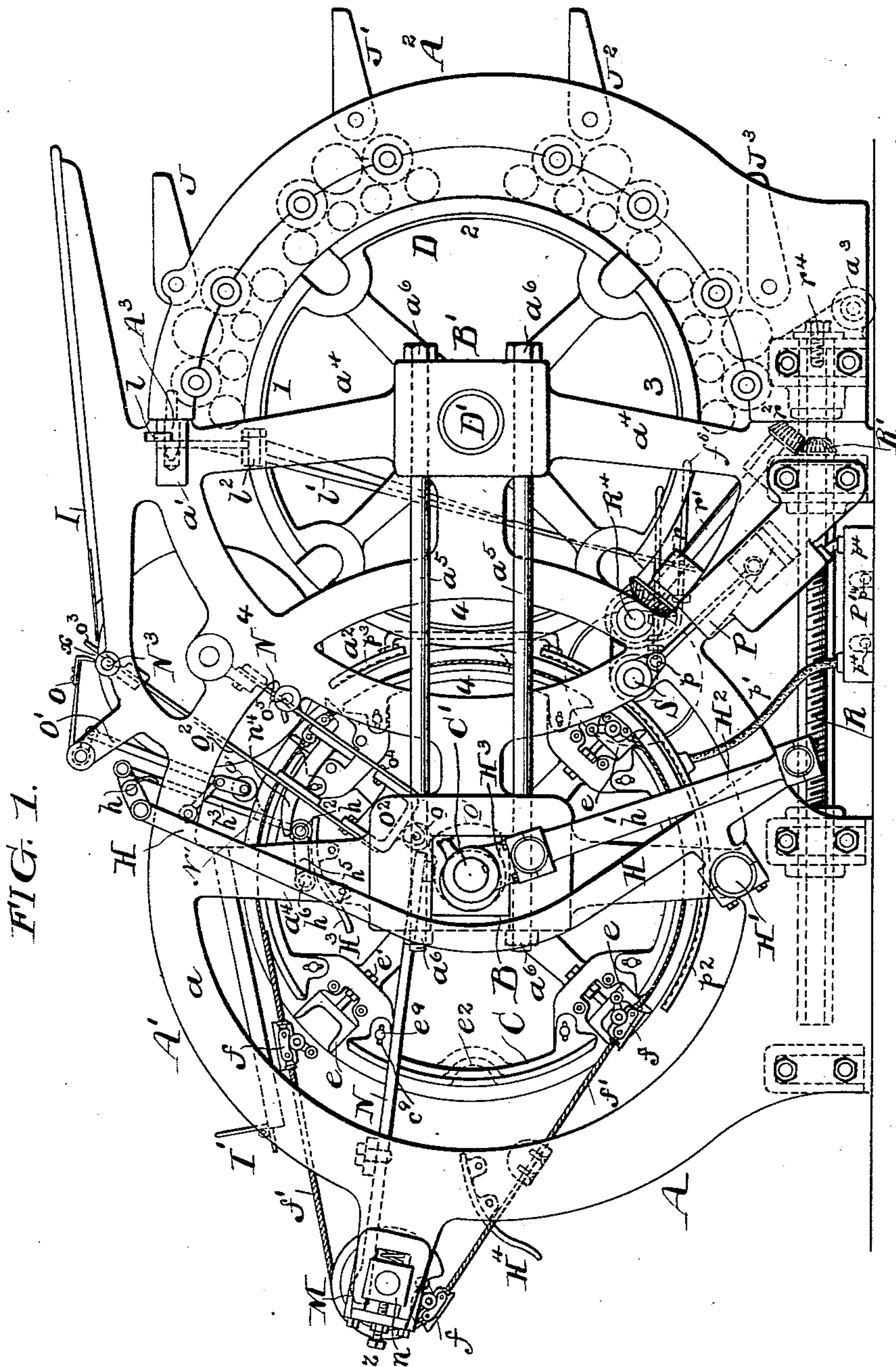
(No Model.)

3 Sheets—Sheet 1.

W. H. R. TOYE.  
PRINTING PRESS.

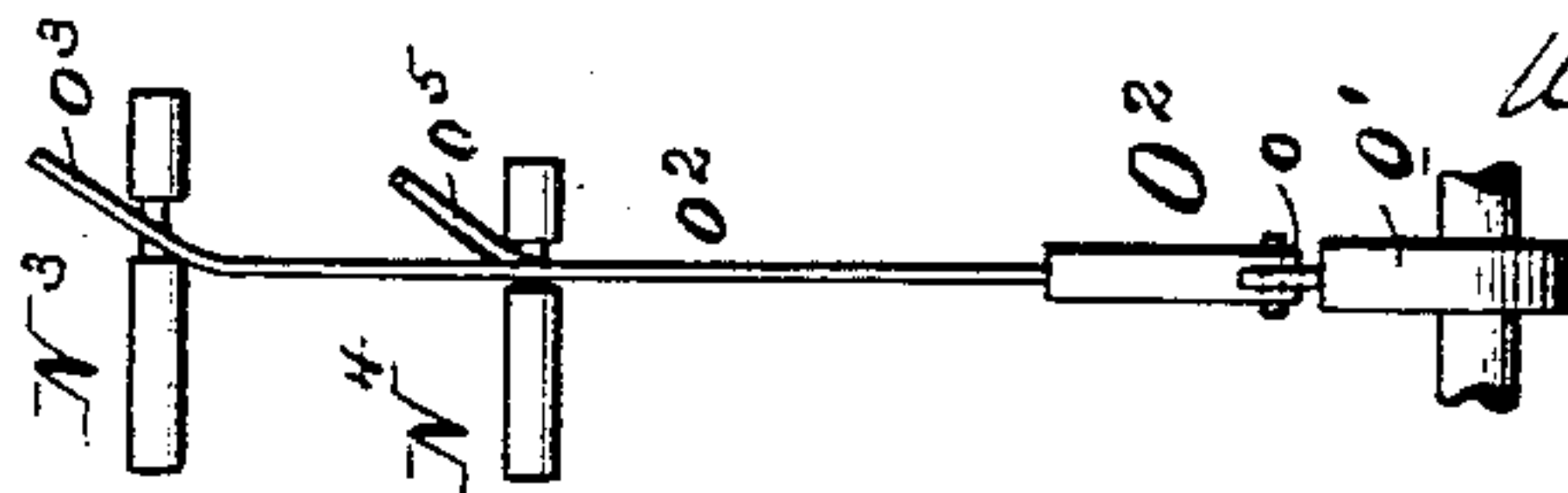
No. 557,626.

Patented Apr. 7, 1896.



Witnesses:  
*Edw. F. Ayres*  
*Stewart*

FIG. 12.



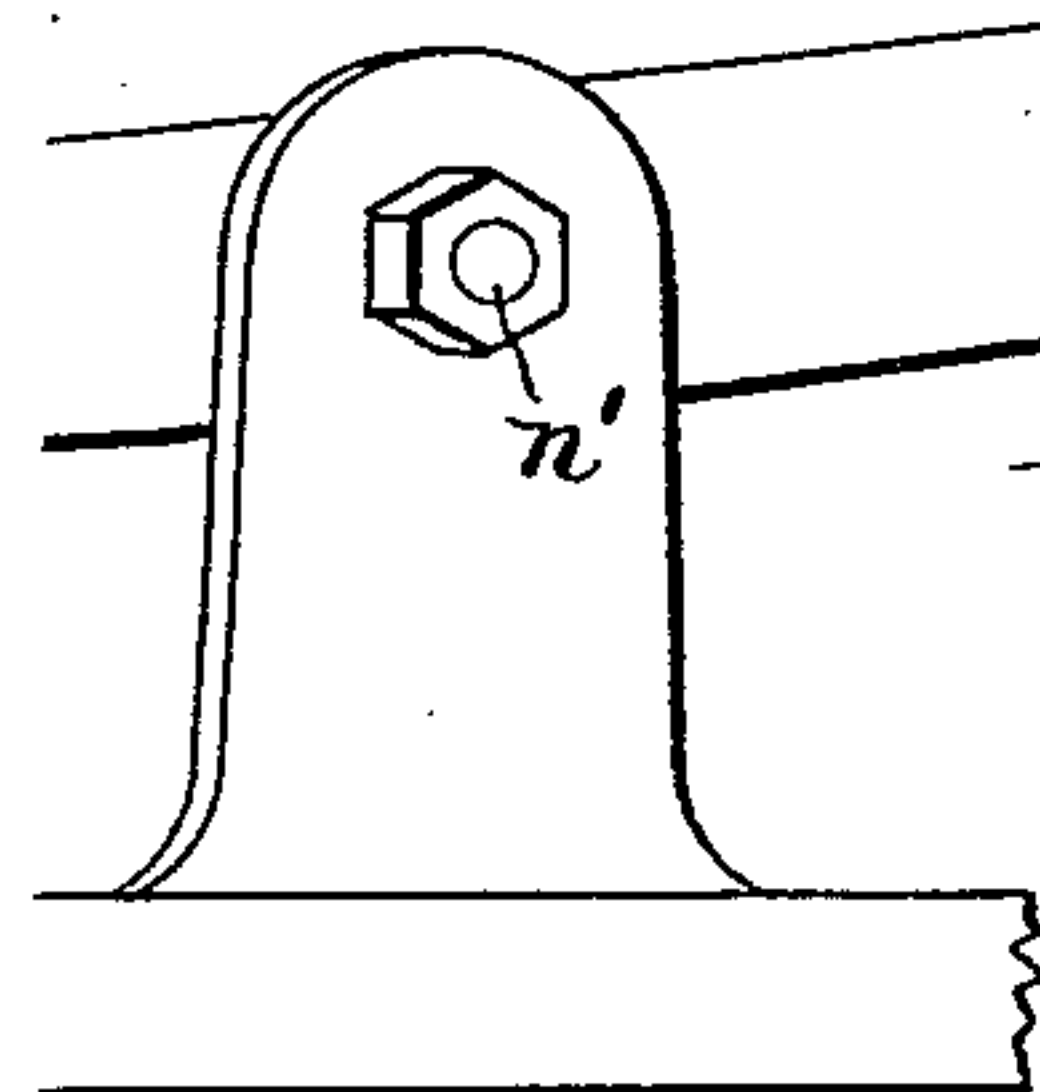
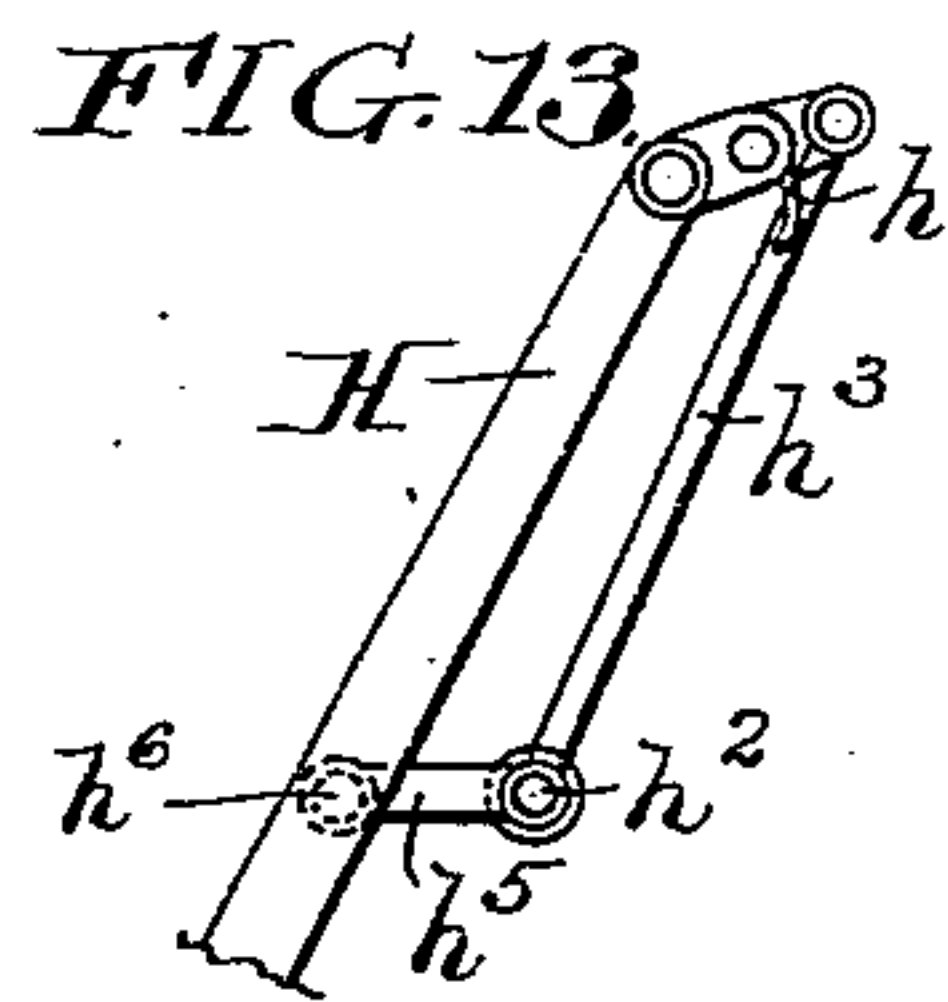
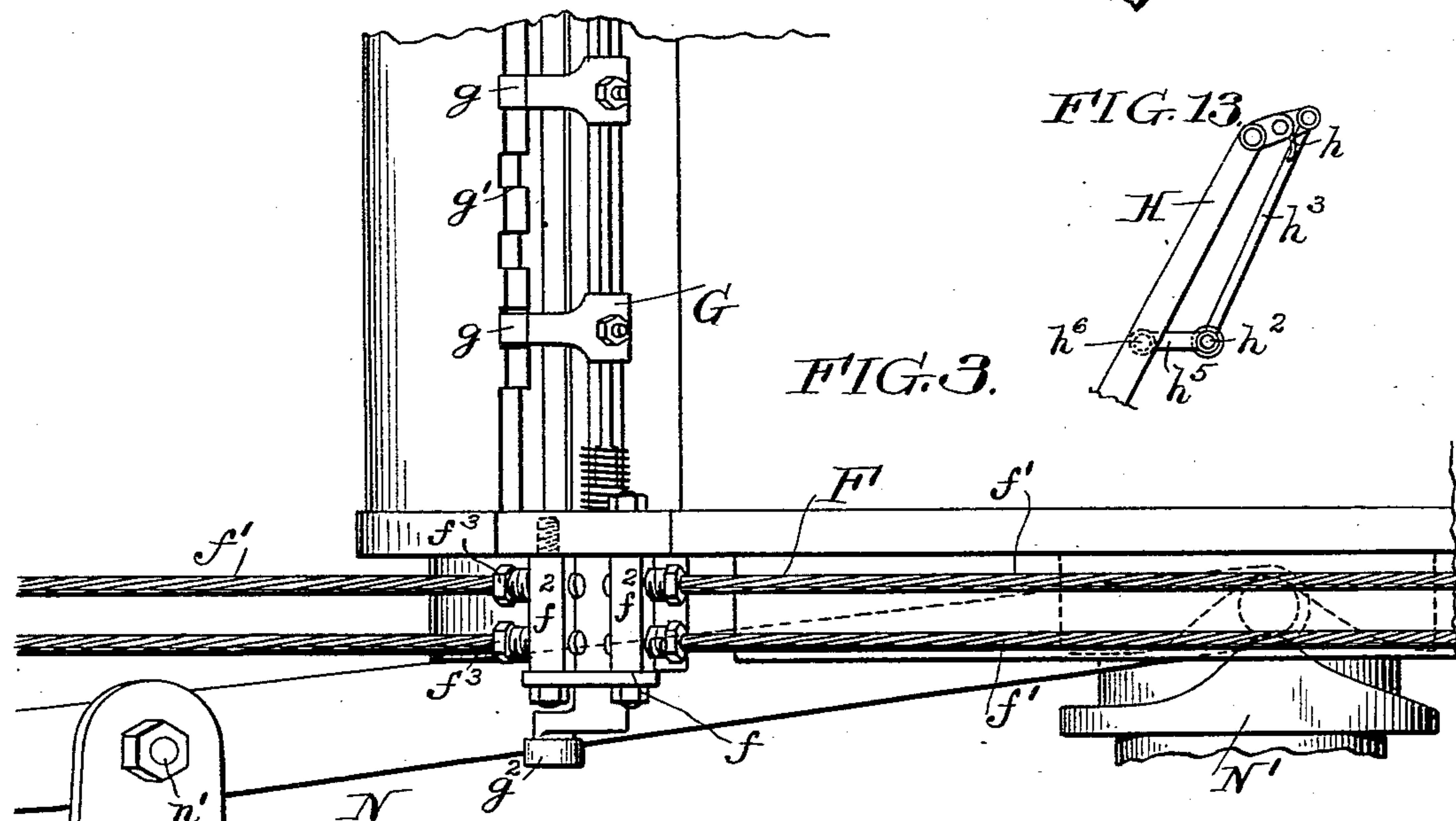
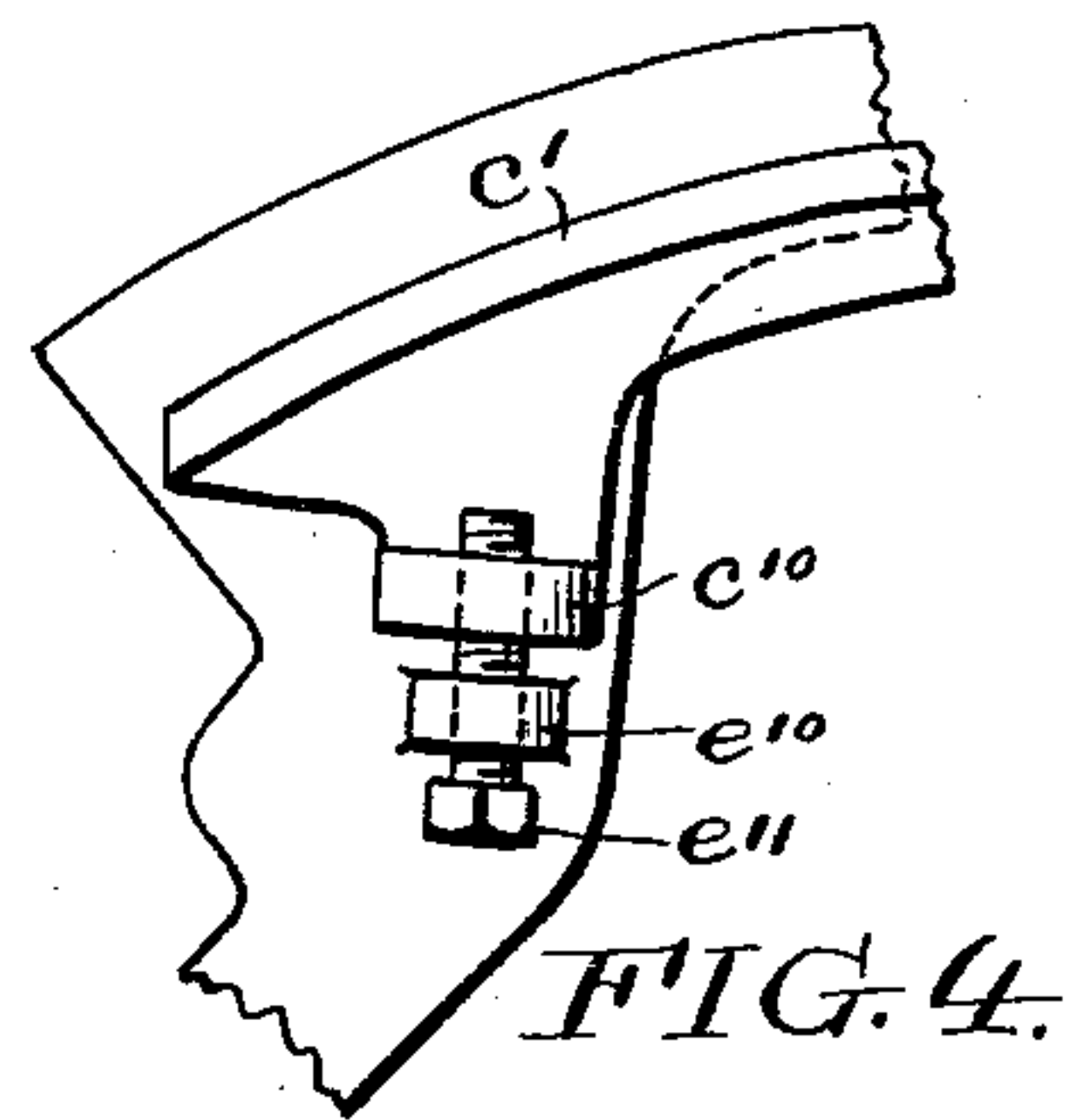
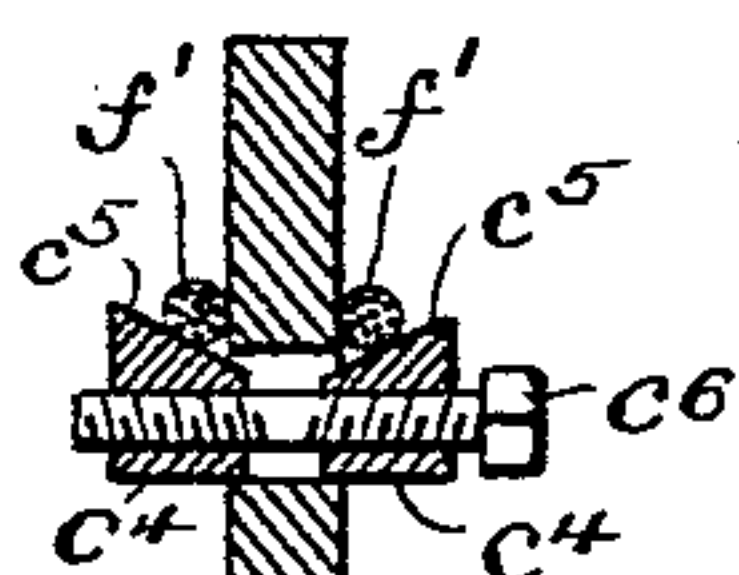
Inventor.

*William H. R. Toye*  
by  
*Francis T. Chambers*  
his  
Attorney.

3 Sheets—Sheet 2.

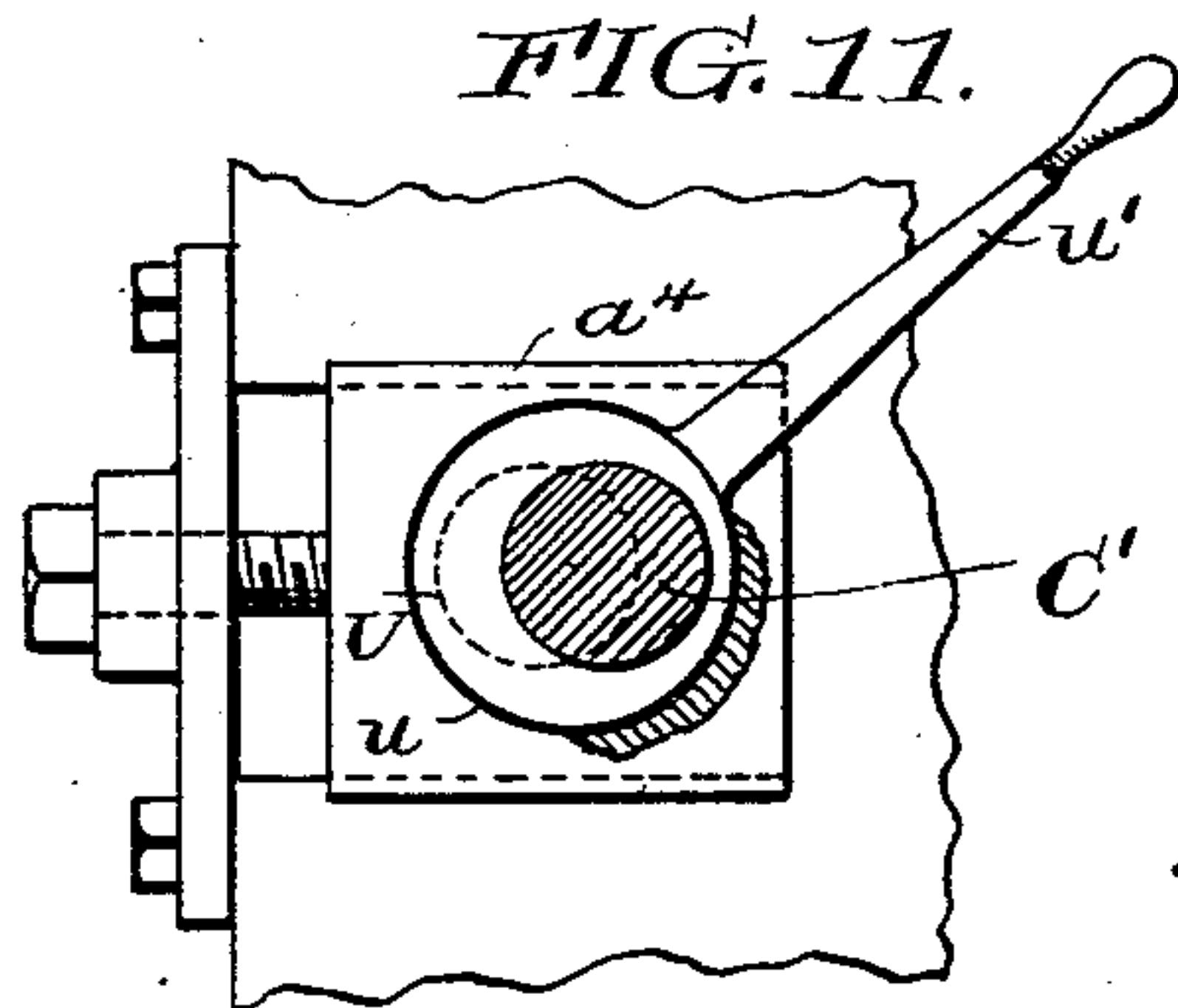
No. 557,626.

Patented Apr. 7, 1896.



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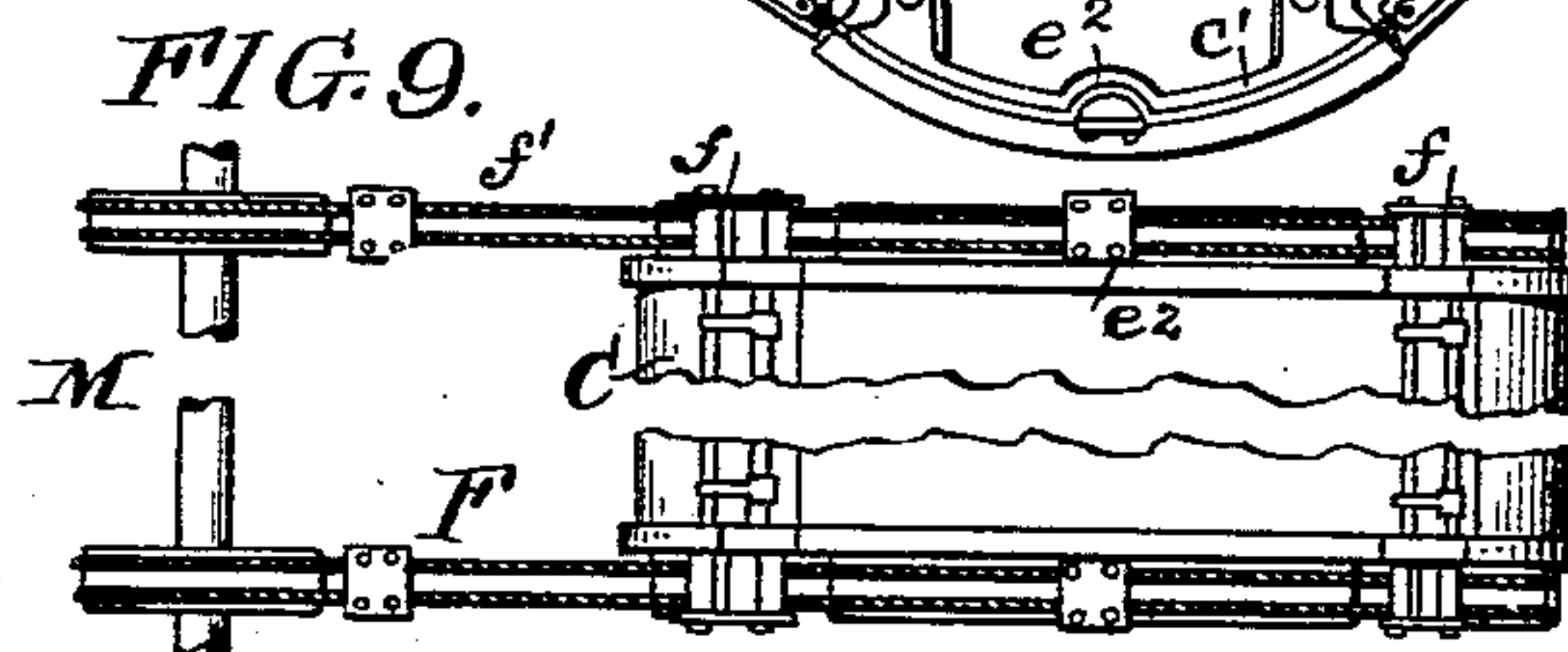
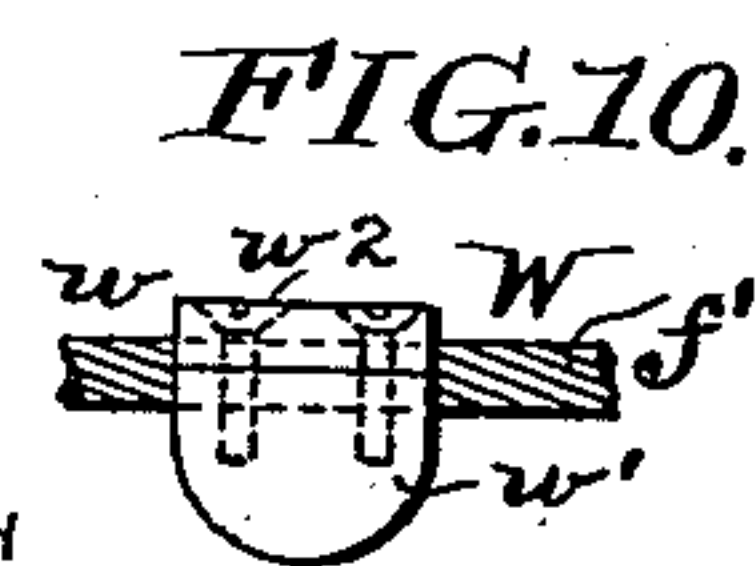
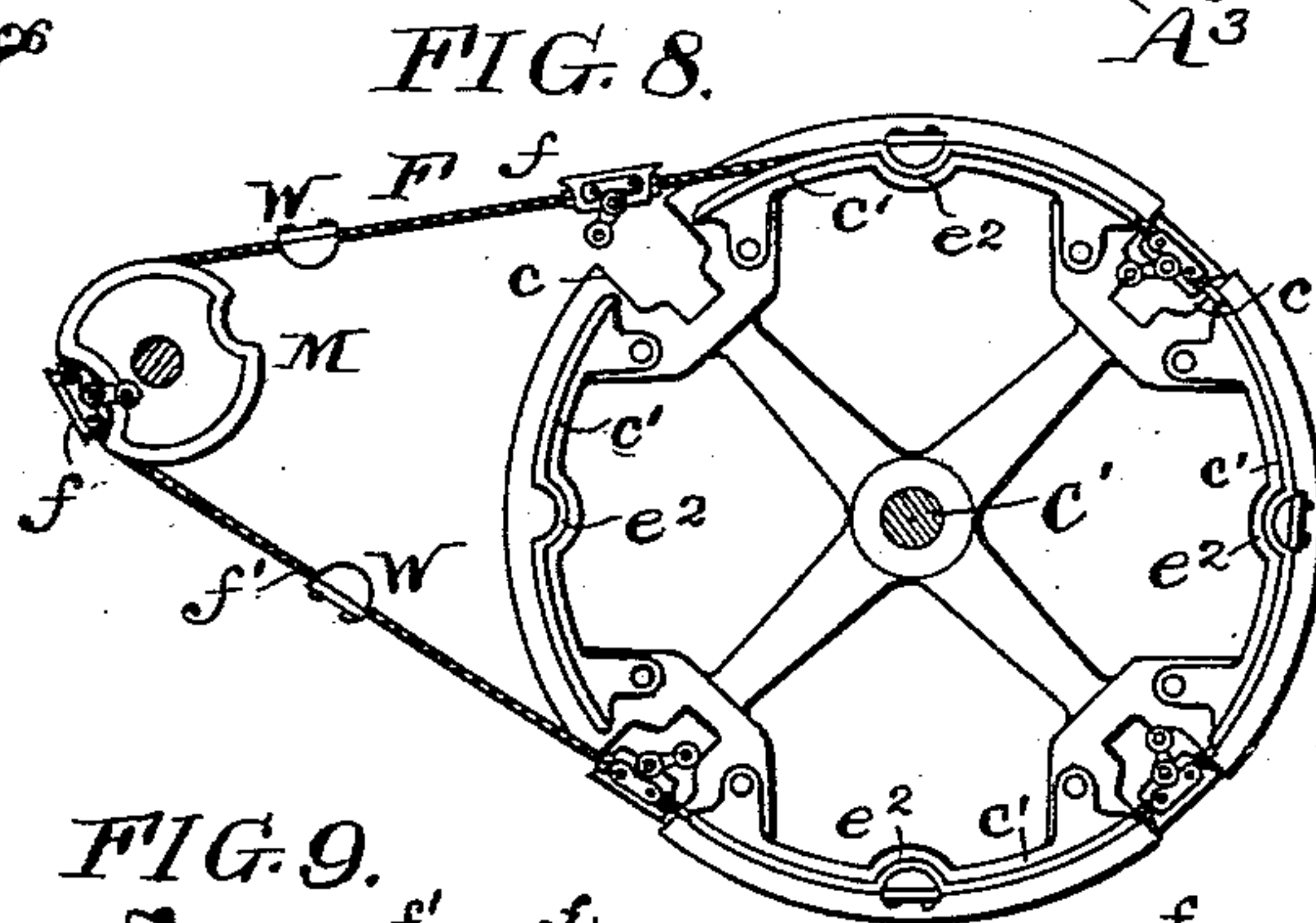
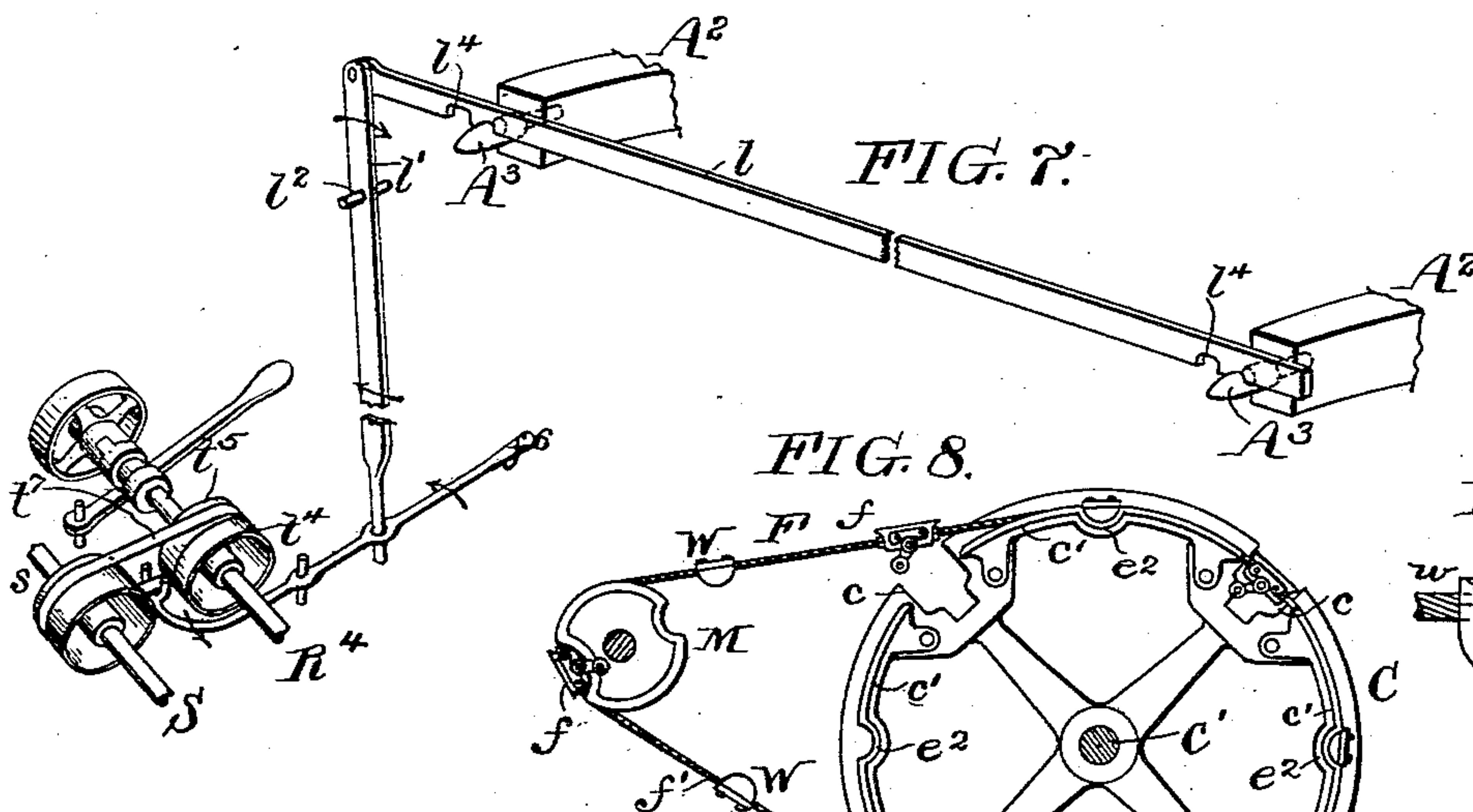
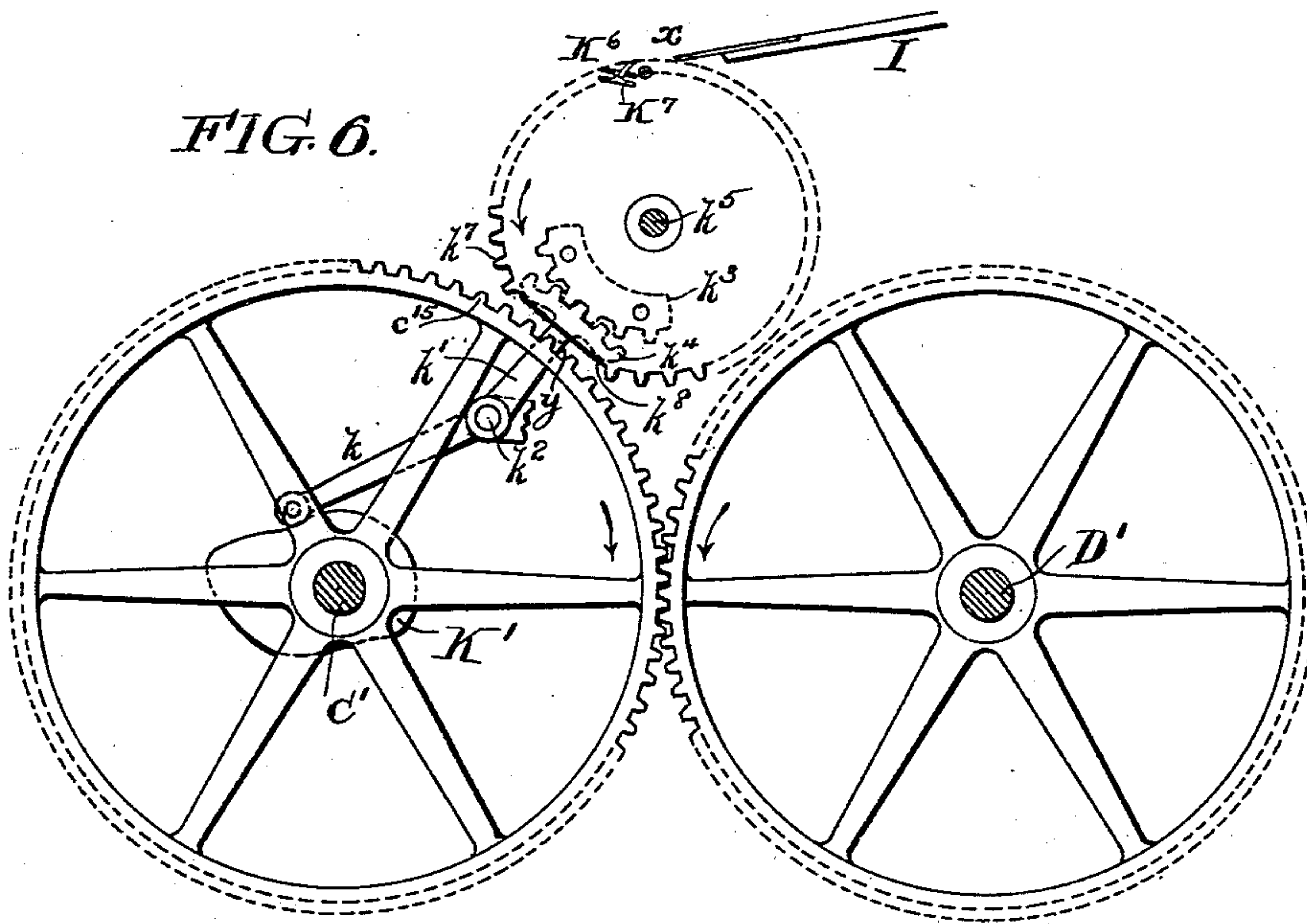
Francis J. Chambers  
 his  
 Attorney.



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PRINTING PRESS.

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Witnesses:  
Edw. F. Ayres  
Shewart.

Inventor.  
William H. R. Toye  
by  
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Attorney.



# UNITED STATES PATENT OFFICE.

WILLIAM H. R. TOYE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HIMSELF, ROBERT P. BROWN, AND EDWARD L. BAILEY, OF SAME PLACE.

## PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 557,626, dated April 7, 1896.

Application filed November 18, 1893. Serial No. 491,303. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. R. TOYE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Printing-Presses, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to printing-machines; and has for its object to improve the general construction of such machines, and particularly the mechanism for conveying the sheets between the printing couple in such a way that exact adjustment can be made to correct the slightest variation in the sheets or in the operation of the machine itself.

To accomplish these improvements, my invention consists in the arrangement and combination of parts hereinafter described, and more specifically pointed out in the claims which are appended to and form a part of this specification.

Referring now to the drawings, which illustrate a press and parts thereof embodying my invention, Figure 1 is a side elevation of a press embodying my improvements. Fig. 2 is an enlarged detail view showing the carrier device and a part of the supporting-pulley therefor. Fig. 3 is a plan detail view of the carrier and its support shown in Fig. 2. Fig. 4 is a detail view showing a modified form of adjustment for the faces of the pulley shown in Fig. 2. Fig. 5 is a cross-section of the rim of the pulley, showing a further modification in the mode of adjustment. Fig. 6 is a diagrammatic view of the type and impression cylinders, showing the stop-cylinder auxiliary feed mechanism. Fig. 7 is a diagrammatic view showing the mode of locking the portion of the frame which carries the inking mechanism onto the rest of the frame. Fig. 8 is a detail view of the impression-cylinder and the supporting-pulley of the carrier device, showing a modified construction. Fig. 9 is a top view of the carrier shown in Fig. 8. Fig. 10 is a detail view of one of the auxiliary teeth shown in Fig. 8. Fig. 11, Sheet 2, is a detail view showing the eccentric box for moving the impression-cyl-

inder. Fig. 12, Sheet 1, is a detail view showing the rods for throwing the pins which trip the grippers on the auxiliary feed mechanism; and Fig. 13 is a detail view of the top of the take-off lever shown in Fig. 1 to more clearly illustrate the mode of operating the grippers carried on said lever.

A is a frame on which is supported the printing couple, which consists, in the construction shown, of two cylinders C D, the inking mechanisms J J', &c., for the type-cylinder D, and the other parts which go to make up an operative press. The cylinders C D are divided into a number of corresponding sections, (four being shown,) and a carrier device F is provided, which has one more set of gripper mechanisms than the number of the sections on the cylinders, (in the present case five sets of grippers would be provided,) and the distance between each set is equal to the breadth of a section, so that a sheet carried by a certain set of grippers will be retarded relatively to the cylinder on each revolution of the carrier and will therefore be presented to a different set of types each time it passes between the two cylinders. This mode of operation is well known, being explained, for instance, in my application, Serial No. 469,682, filed April 10, 1893.

The carrier F for the sheets consists of a band or bands  $f'$  and a block or blocks  $f$ , to which is secured the usual gripper mechanism G, consisting of fingers  $g$  and the transverse rod  $g'$ , against which the fingers  $g$  press and hold the sheet. These blocks  $f$  are secured together by means of the band or bands  $f'$ . I prefer to arrange two bands between each block, so that the mechanism will not be thrown out of gear by the breaking of one of the bands, and I prefer to form the connecting-bands of wire cables, as shown, though flexible strips of steel or other suitable connection can be used, if desired. The connecting-bands are preferably secured to the blocks in such a manner that the length of the bands between any two blocks can be adjusted. To accomplish this, I have shown the bands secured to the blocks by means of thimbles  $f^3$ , which screw into cross-pieces  $f^2$  of the block. By turning the thimbles the length of the bands can be adjusted. Any means, however,



as wedges, pawls, and ratchets, or other suitable device, may be used to adjust the bands. The blocks  $f$  serve not only to support the gripper mechanism, but may also be used to drive the carrier device of which they form a part, and when so used they are formed with that portion which engages with their driving-support cut in the shape of a gear-tooth, as indicated at  $f^5$ , Fig. 2. It is not, however, necessary that the blocks should serve as the means for driving the carrier, as the teeth  $W$  may be arranged on the carrier between the blocks. Such a tooth is shown in Fig. 10, and consists of two sections  $w$  and  $w'$ , clamped around the cables, as shown, by screws  $w^2$ . The portion  $w'$  of said tooth is cut as a gear-tooth and is adapted to engage in suitable sockets  $e^3$  of the supporting-pulley. It will be noted that these additional teeth are adjustable along the bands.

The main supporting and driving pulleys for the carrier are preferably arranged at the ends of the impression-cylinder and revolve with it, and are provided with sockets  $c$  for the blocks, and also, if desired, with sockets  $e^2$  for the additional teeth. For purposes of adjustment, in connection with the faces for supporting the bands  $f'$  of the carrier, I prefer to make these sockets  $C$  adjustable, and therefore form said sockets in an independent block  $e$ , which can be adjusted by means of screws  $e'$ . The supporting-faces for the bands  $f'$  are shown in Fig. 2 as segmental rims  $c'$ . To permit of the most delicate adjustment, I form these faces or rests, which support the bands, so that they can be radially adjusted so as to form, as it were, a larger or smaller wheel over which the bands  $f'$  have to travel. This is accomplished, in the construction shown in Fig. 2, by forming the faces  $c'$  with elongated slots  $c^9$  and securing the faces in proper position by means of the bolts  $e^9$ . In Fig. 4 the faces  $c'$  are shown provided with lugs  $c^{10}$ , and screws  $e^{11}$ , working in these lugs and in lugs  $e^{10}$  on the pulley, serve to move the faces radially to increase or decrease the size of the wheel. There are, obviously, many other ways of doing this, as by spring or wedge constructions. An example of a wedge construction is shown in Fig. 5, where wedge-shaped rims  $c^4$  are adapted to be adjusted by screws, as  $c^6$ . The faces  $c^5$  of the wedge, on which the hands or cables  $f'$  rest, will, on the adjustment described, force these cables to travel in a path a slight distance nearer to or farther from the center, which will result in the adjustment desired.

By constructing the carrier as described and by supporting it on a pulley-rim capable of being adjusted so as to form a larger circle of travel for the band the most delicate adjustment of all the parts is obtainable. If a sheet of paper stretches under the action of one set of types more than under the action of another, this can be corrected by changing the length of the travel of the band in that particular section by adjusting the cor-

responding face  $c'$ . The whole carrier can be lengthened or shortened, its engagement with the supporting-pulleys governed by adjusting the sockets  $e$ , and the travel of the whole system changed by causing it to move over a larger or smaller supporting and driving pulley. The idle pulley  $M$ , over which the carrier runs, is shown journaled in a box  $m$ , capable of adjustment to and from the cylinder  $C$  to accommodate the carrier when shortened and lengthened.

Turning now to the auxiliary feed mechanism,  $K$  is a rotating cylinder journaled at  $k^5$  (see Fig. 6) and provided with grippers  $k^6$  having a tripping-cam  $k^7$  of the usual construction and adapted to seize a sheet from the feed-board  $I$  at the point  $x$  and deliver it to the grippers of the main carriers  $F$  at the point  $y$ . In order to seize the sheet when both it and the auxiliary feed mechanism are at rest, and to deliver the sheet to the main feed mechanism—that is, the carrier  $F$ —when the auxiliary feed and the carrier are moving at substantially the same rate, I prefer to arrange the cylinder  $K$  as a stop-cylinder, and I give it the requisite motion by any of the devices usually employed to operate a stop-cylinder in printing-machines. I have illustrated such a device in Fig. 6,  $K'$  being a cam on the shaft  $C'$  of the cylinder  $C$ , which is adapted to actuate a lever  $k$   $k'$  pivoted at  $k^2$  to the frame  $A$  and provided at the end  $k'$  with a rack  $k^4$ , which is adapted to engage with a partial rack  $k^3$  on the cylinder  $K$ . In operation, a sheet having been seized at the point  $x$  by the grippers on the cylinder  $K$ , the cam  $K'$  will operate to turn the cylinder  $K$  till the teeth at  $k^7$  engage with the teeth  $c^{15}$  of the cylinder  $C$ , when the two cylinders turn together. After the sheet is delivered to the main feed mechanism the cylinders continue to turn together till the cut-away portion  $k^3$  of the cylinder  $K$  comes into the position shown in Fig. 6, thus disengaging the cylinder  $K$  from the cylinder  $C$ . At this point the rack  $k^4$  of the lever engages with the rack  $k^8$  of the cylinder  $K$  and holds said cylinder still until such time as it is necessary to turn it to carry another sheet forward.

$O$  are suitable stop-fingers operated by a cam-lever  $O'$ . This lever may be actuated by any suitable means, as by a cam on the edge of the impression-cylinder.

$O^2$  is a frame having a roller  $o$ , operated by a cam  $o'$  on the shaft  $C'$ .  $o^2$   $o^4$  are rods carried by said frame having bent ends  $o^3$   $o^5$ , respectively, said ends being adapted to engage with grooves in pins  $N^3$   $N^4$  and, by putting said pins in position, to engage the cams  $k^7$  of the grippers  $k^6$  to trip said grippers at the proper time to seize and release a sheet. The rollers  $g^2$  on the grippers of the main feed mechanism are operated at the point  $y$  by a cam  $n^4$ , carried by the rod  $o^2$ , and at the point  $z$  by a cam or pin  $M$ , operated by the lever  $N$ , (see Fig. 3,) pivoted at  $n'$  and operated by a cam  $N'$ . Obviously any suitable cam or lever



device can be used to trip the grippers, and I do not claim as new nor restrict myself to the particular form shown.

The take-off is accomplished by levers H, one on each side of the press, pivoted at H' to the frame and actuated by a link h' from a crank H<sup>5</sup> on the main shaft. These levers are provided with grippers at h, operated from cams H<sup>3</sup> and H<sup>4</sup> by a link h<sup>3</sup> provided with cam-rollers h<sup>2</sup>. This link, being connected by a short link h<sup>5</sup> to one of the levers H and pivoted at h<sup>6</sup> thereto, and being shown in the present instance as carried by the lever H on the far side of the machine, is illustrated more clearly in Fig. 13, the cam H<sup>4</sup> operating to open the grippers h at the point z. The main feed mechanism releases the sheet at this point, and the grippers h are closed on it by the weight of the links h<sup>3</sup> and rollers h<sup>2</sup> as the levers H start upward. The arm H<sup>3</sup> at the upper limit of the travel of the arms H causes the grippers to open and deposit the sheet printed side up on the receiving-board I'.

In order to enable the pressman to get at the plates on the cylinder D with ease, I divide the frame A into two parts A' and A<sup>2</sup>, the part A<sup>2</sup> carrying nothing but the inking mechanism, which may be operated by any suitable system of cams, and I provide mechanism for removing the inking mechanism and its supporting-frame from the rest of the press. R, Fig. 1, is a suitable screw, one being provided on each side, which is secured to the frame A<sup>2</sup> at r<sup>4</sup> and runs through a tapped gear R' secured from longitudinal movement in the frame A'. This gear R' is driven by gears r<sup>2</sup> r' r from a shaft R<sup>4</sup>. On this shaft R<sup>4</sup> are fast and loose pulleys t<sup>4</sup> t<sup>5</sup>. (See Fig. 7.) A belt t' is arranged to drive said pulleys from a pulley s on the main drive-shaft S. A suitable lever t<sup>6</sup>, provided with a belt-shifter, is adapted to shift the belt from the fast to the loose pulley and so operate the screw to push back the frame A<sup>2</sup>, which is provided with wheels a<sup>3</sup> to facilitate such movement. The upper part of the frame A<sup>2</sup> is normally locked to the frame A', as by means of the catches A<sup>3</sup>, which are engaged by a bar l. In order to unlock the two parts A' A<sup>2</sup> of the frame before or at the same time that the screw or other mechanism which operates the frame A<sup>2</sup> is put into operation, I connect the lever t<sup>6</sup>, which puts the screw into operation with the locking-bar l, in such a manner that the two frames will be unlocked by the same motion of the lever that shifts the belt t' to turn the screw, as shown. A lever l', pivoted at l<sup>2</sup>, is connected to the bar l and operates it to bring the notches l<sup>4</sup> of the bar opposite the catches to permit their withdrawal. A suitable clutch (shown in Fig. 7) is provided to drive the screw in the opposite direction to bring the frame A<sup>2</sup> up to the frame A', when desired.

It is of course obvious that various other means of communicating motion may be provided instead of the pulleys, and also that

any convenient latch may be substituted for the one shown.

The frame A, I preferably cast in the shape of two circles a a', so interlaced that there will be an opening at a<sup>2</sup> opposite the line of contact of the cylinders, whereby the operator can observe the action of the cylinders at the place where the printing takes place. The boxes in which the cylinder-shafts are journaled are supported by bars a<sup>4</sup> cast integral with the frame, the construction being such as to give great lightness as well as great elasticity. To prevent breakage and at the same time to hold the cylinders C and D firmly in contact, I arrange tie-rods a<sup>5</sup> secured by bolts a<sup>6</sup>, so as to firmly brace the parts of the frames where the greatest strain comes.

It sometimes happens that a sheet may be missed by the grippers, and the result is that the types bear directly upon the platens or tympan, smearing these and thus the backs of succeeding sheets. To prevent this, I provide means whereby one of the cylinders, preferably the impression-cylinder, can be quickly moved out of contact with its companion. Many devices can obviously be used for so moving the cylinders; but in Fig. 11 I have shown a very convenient arrangement for so moving the impression-cylinder, and which I prefer. The box in which the shaft C' is journaled has a sleeve U fitting in a bore u in said box, said bore being eccentric to the shaft C'. This sleeve can be turned by means of a lever U', and when so turned it will move the shaft C and with it the cylinder C to the position indicated in dotted lines, so that the two cylinders C and D will be out of contact and will revolve idly. This movement, of course, need only be very slight and not enough to draw the teeth on intermeshing gear-wheels secured to the two cylinders out of engagement. Indeed, the movement is so slight that but one box on one side of the press need be made movable, although, of course, both may be so arranged, if desired.

In order to keep the sheets in place while being carried below the cylinder C by the carrier and at the same time to obviate the disadvantages incident to the use of star-wheels usually employed for this purpose, but which when used in color-presses are apt to become smeared with one color and dot the next sheet with such color, I direct an air-blast against the sheet, which not only holds the sheet in position, but also tends to dry it. In Fig. 1 I have shown a convenient mode of doing this. P is a pump operated from a moving part of the press, as shaft S, by means of a crank p. p' is a reservoir for the air which is conducted to the blast-pipes p<sup>2</sup> by means of a pipe p'. I also provide a suitable pipe or pipes p<sup>3</sup>, arranged behind the point where the sheet is to be printed on—that is, the line of contact of the cylinders C D—and connect this pipe and the air-reservoir so that an air-blast may be directed against the paper before and during such time as it is being printed



on, so that it may be held down to the platen-cylinder and smoothed by the force of the air, so that there will be no buckling or wrinkles as it reaches the types. If it is desired, the air may be heated to increase its drying effect, as by means of gas-jets  $p^4$  under or in suitable recesses of the reservoir  $p'$ .

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

1. A flexible carrier for conveying sheets of paper or other material, consisting of two or more blocks, gripper mechanism carried by said blocks, a length or lengths of cable extending between the blocks and adapted to secure one block to the next and adjustable connections between the ends of the lengths of cable and the blocks whereby each length of cable can be taken up at the block.

2. A flexible carrier for conveying sheets of paper or other material, consisting of two or more blocks, gripper mechanism carried by said blocks, a length or lengths of cable extending between the blocks and adapted to secure one block to the next and screws  $f^3$  for securing the ends of the cables to the blocks and adjusting their lengths.

3. A flexible carrier for conveying sheets of paper and other material which consists of two or more blocks having gripper mechanisms carried thereby, a band or bands secured to the blocks and adapted to connect one block with the next, means for adjusting this length of the band or bands between the blocks, and a tooth adjustably secured to the band or bands intermediate of the blocks in combination with a suitable carrier having sockets adapted to engage with the blocks and other sockets to engage with the intermediate teeth.

4. The combination in a printing-machine of type and impression cylinders, constituting a printing couple, a carrier for conveying the sheets between the rolls of the printing couple, and consisting of two or more blocks carrying gripper mechanism, and a band or bands for connecting one block with the next one, and supports for said carrier consisting of pulleys secured to the impression-cylinder and having sockets adapted to engage with the blocks and radially-adjustable faces for supporting the bands between the blocks.

5. The combination with a type and impression cylinder each divided into the same number of segmental sections of a carrier consisting of a greater number of blocks than

there are segmental sections in the cylinders, gripper mechanism carried by the blocks and a band or bands of substantially the same length as the breadth of the sections for connecting each block with the next one.

6. The combination with a type and impression cylinder each divided into the same number of segmental sections of a carrier consisting of blocks, one more than the number of the segmental sections into which the cylinders are divided, gripper mechanisms carried by the blocks and a band or bands of substantially the same length as the breadth of the sections for connecting each block with the next one.

7. The combination with a printing couple consisting of two cylinders, each divided into an equal number of corresponding sections, of a carrier of greater length than the circumference of the cylinders, said carrier being provided with gripping devices and constituting a main feed mechanism, a stop-cylinder adapted to seize a sheet when both it and the sheet are at rest and deliver the sheet to the carrier when both are moving at substantially the same rate of speed and means for operating the stop-cylinder.

8. The combination with a printing couple as described and a carrier of greater length than the circumference of the cylinders which compose the printing couple and having grippers adapted to carry the sheets between the printing couple, of a delivery-board arranged above the impression-cylinder, levers pivoted on either side of the frame, grippers carried thereby, means for oscillating the levers and means for actuating the grippers whereby the sheets will be delivered from the carrier to the delivery-board when said sheets are completely printed.

9. The combination in a printing-press of a frame for supporting the type-cylinder, an independent frame for supporting the inking mechanism, a connection with the power-shaft of the press whereby the frame supporting the inking mechanism may be moved away from the main frame, a lock to secure the two frames together and means for unlocking the frames by the same movement that puts the power connection between the main shaft and the frame which supports the inking mechanism into operation.

WILLIAM H. R. TOYE.

Witnesses:

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