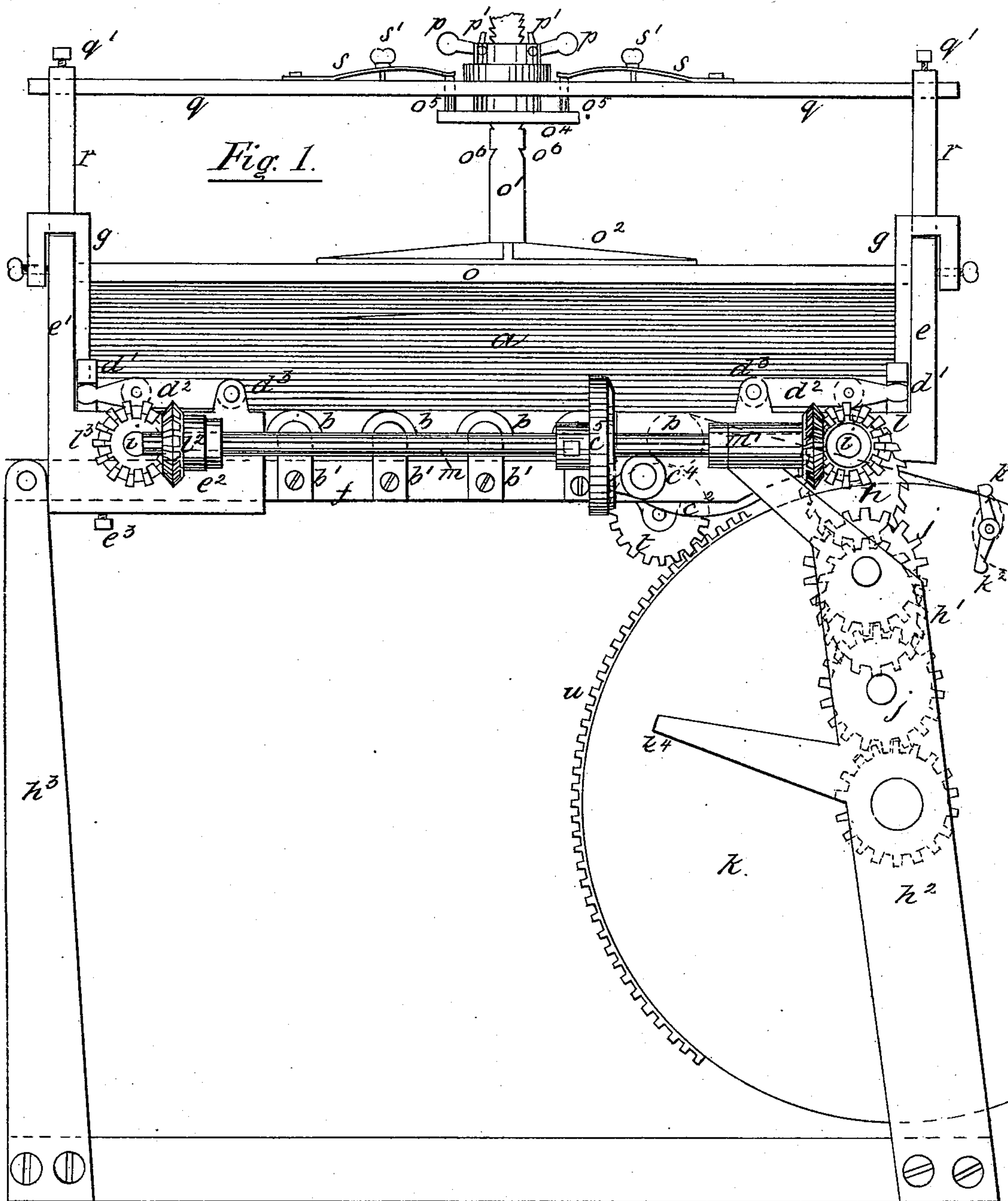


F. W. GRIFFITH & G. P. BYRNE.

Paper Feeding Machine.

No. 236,427.

Patented Jan. 11, 1881.



Witnesses.

W. W. W. W.
H. D. Williams

Frederick W. Griffith
Geo. P. Byrne
Inventors.

per Alfred Sheolock
Att'y.

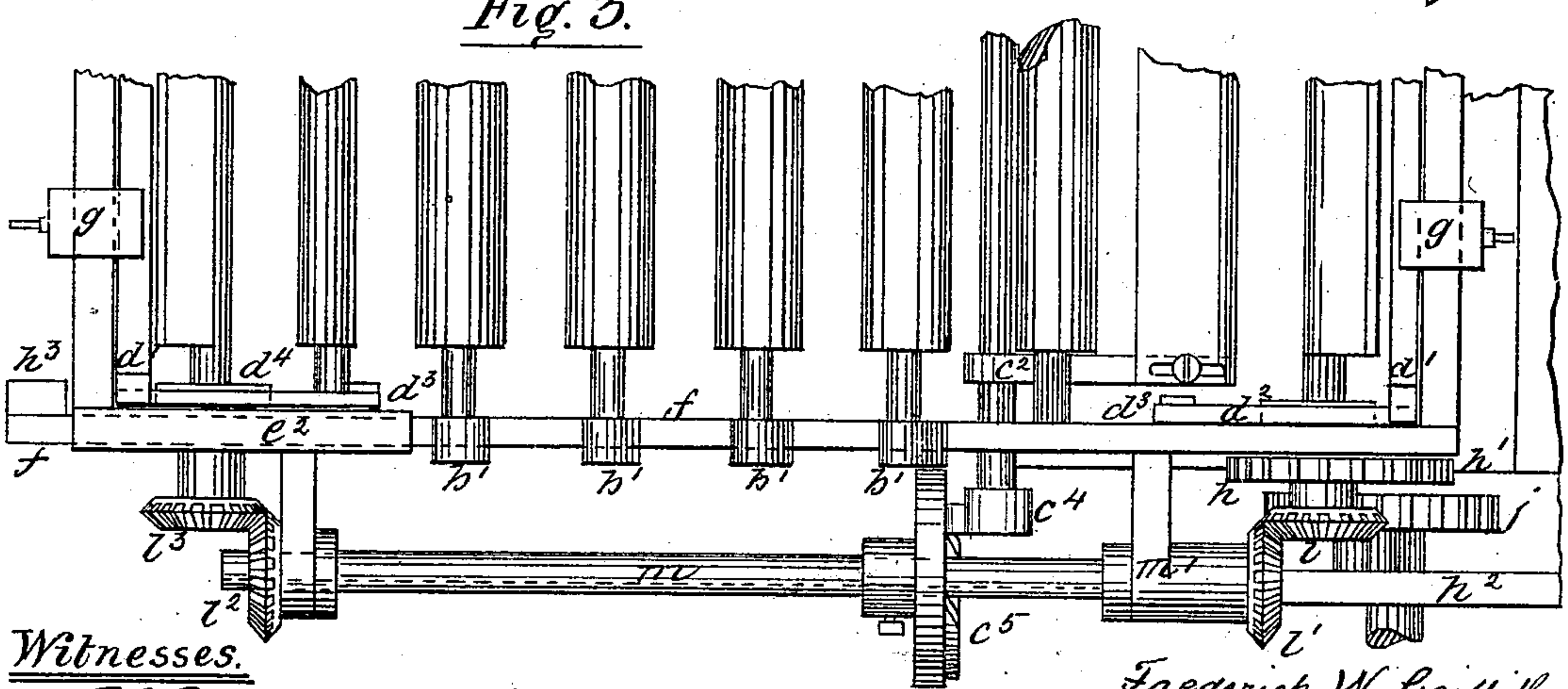
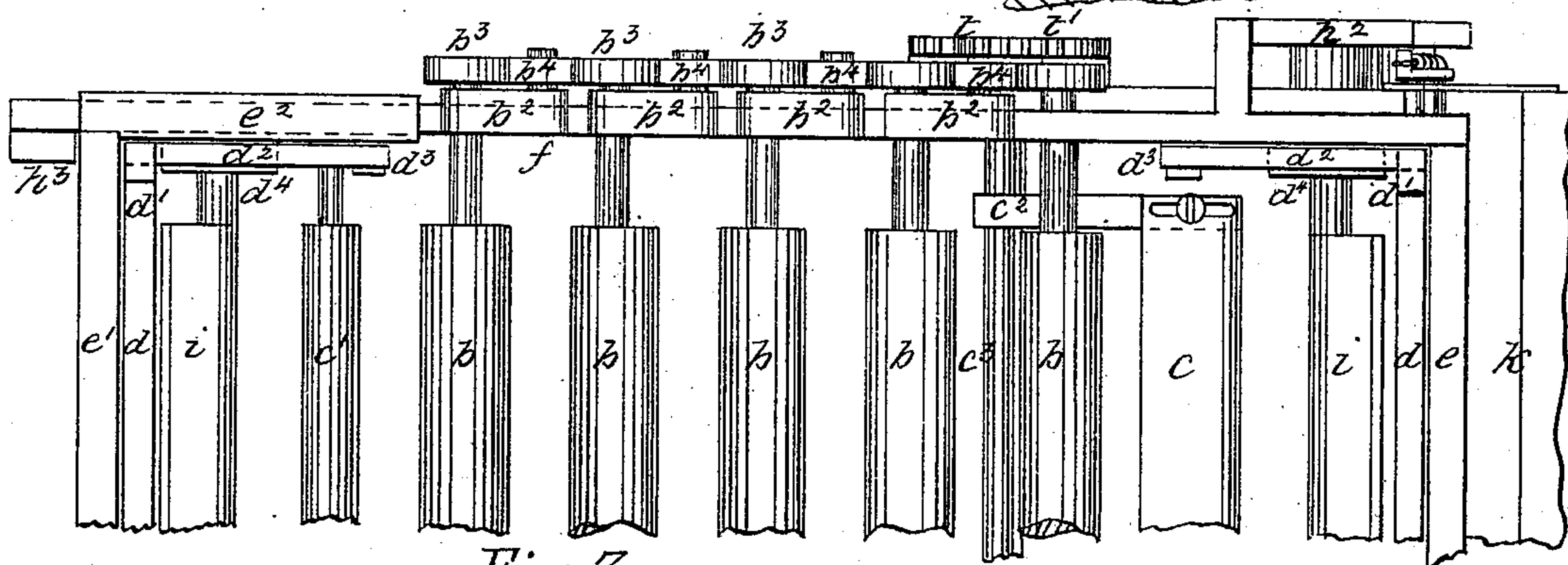
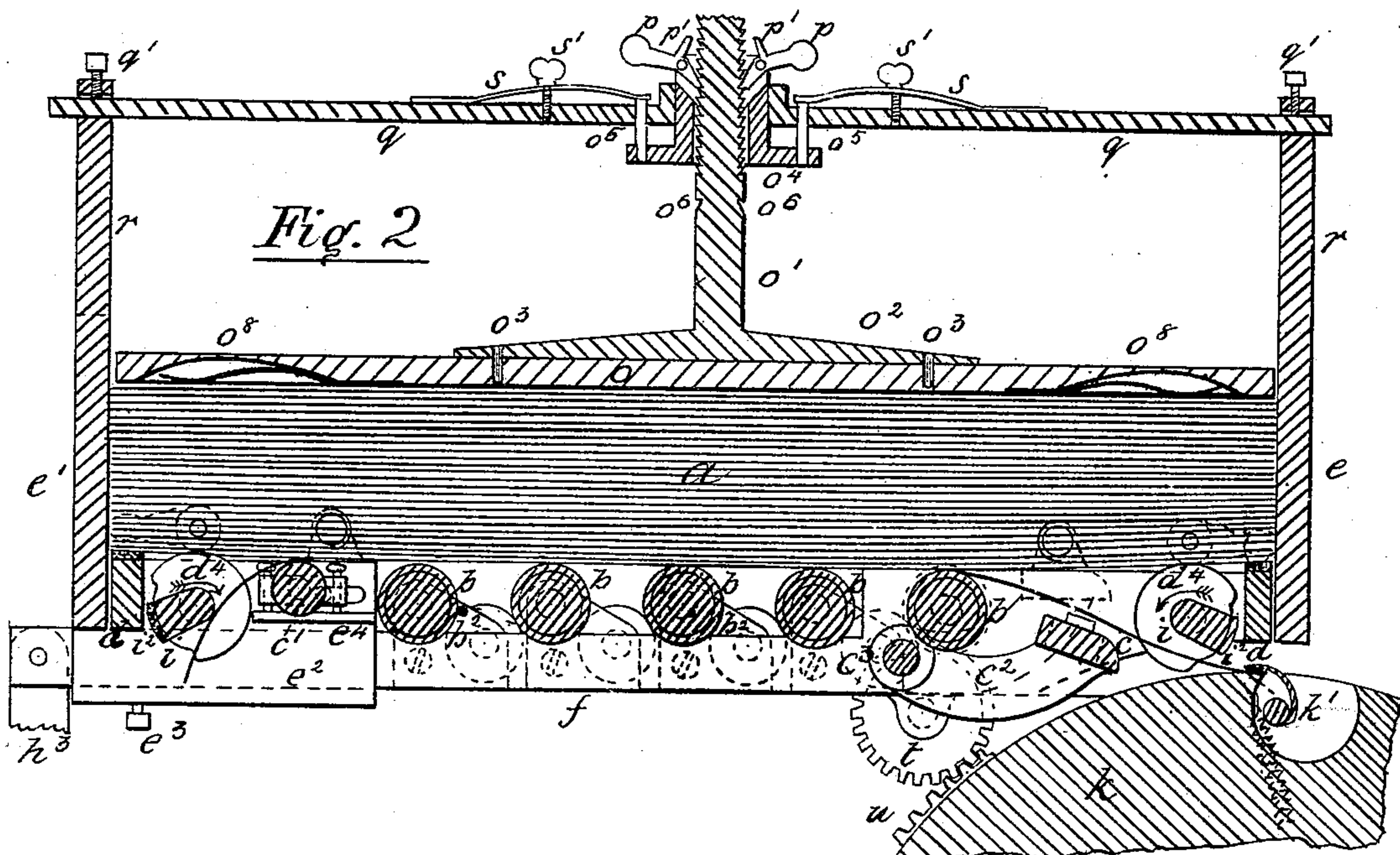
3 Sheets—Sheet 2.

F. W. GRIFFITH & G. P. BYRNE.

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Witnesses.

W. Wallenda
H. D. Williams

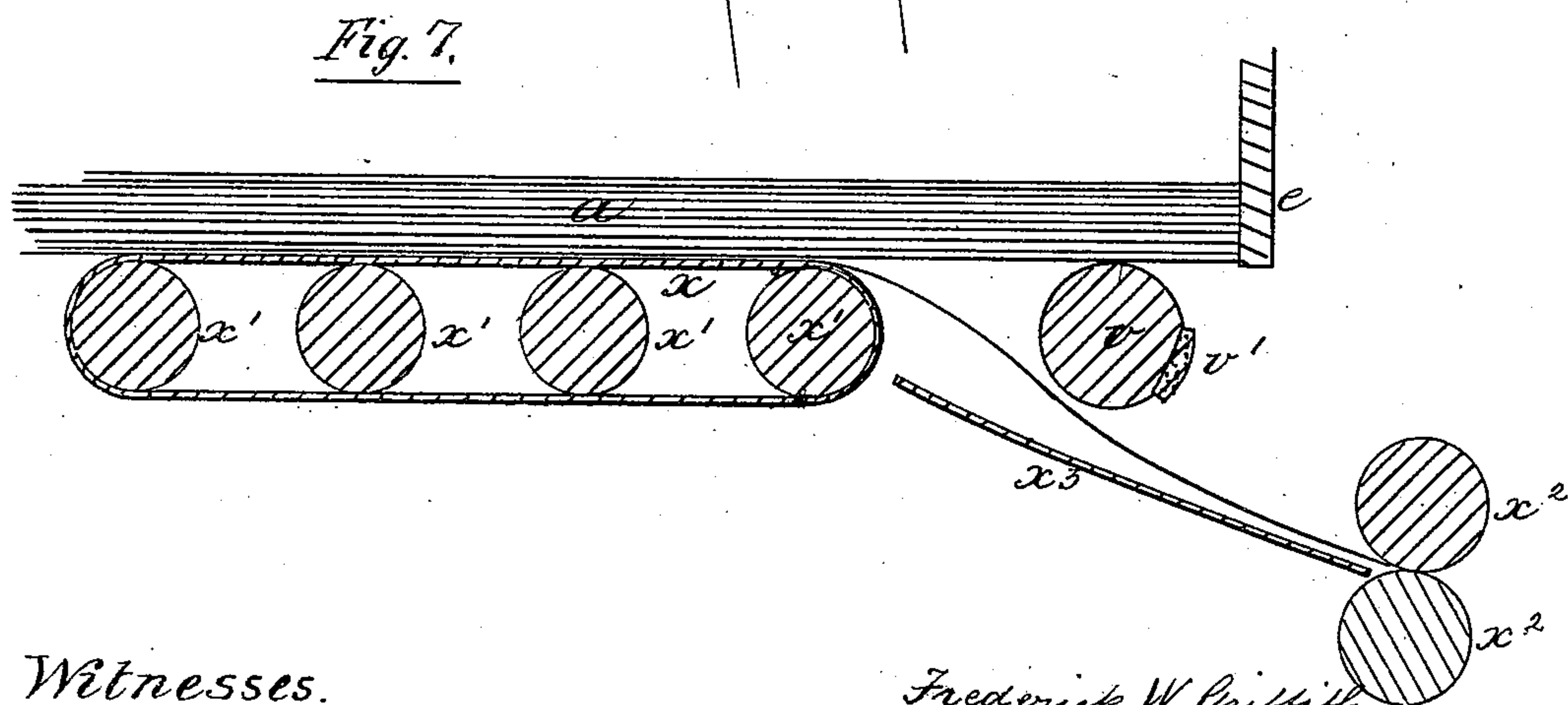
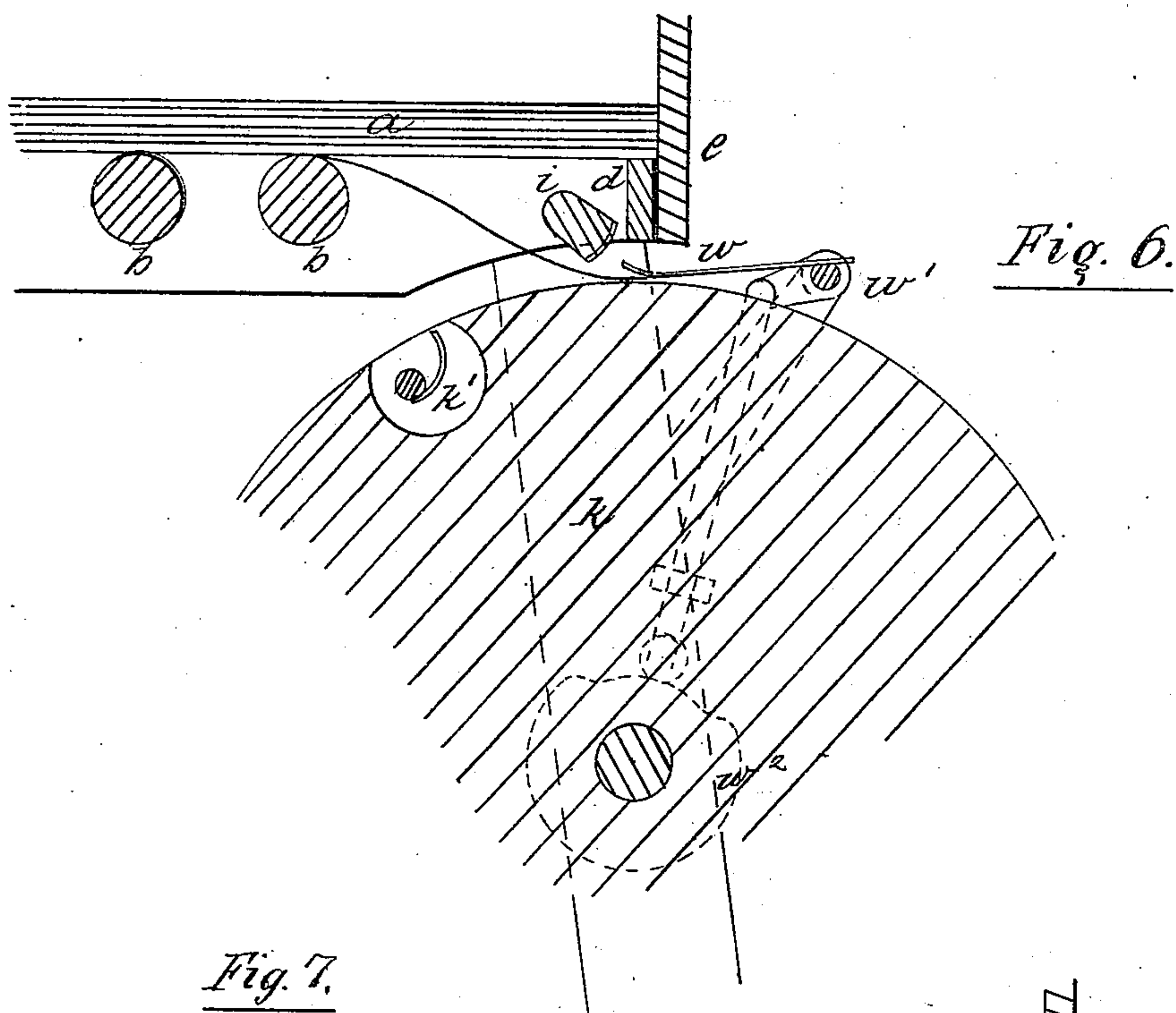
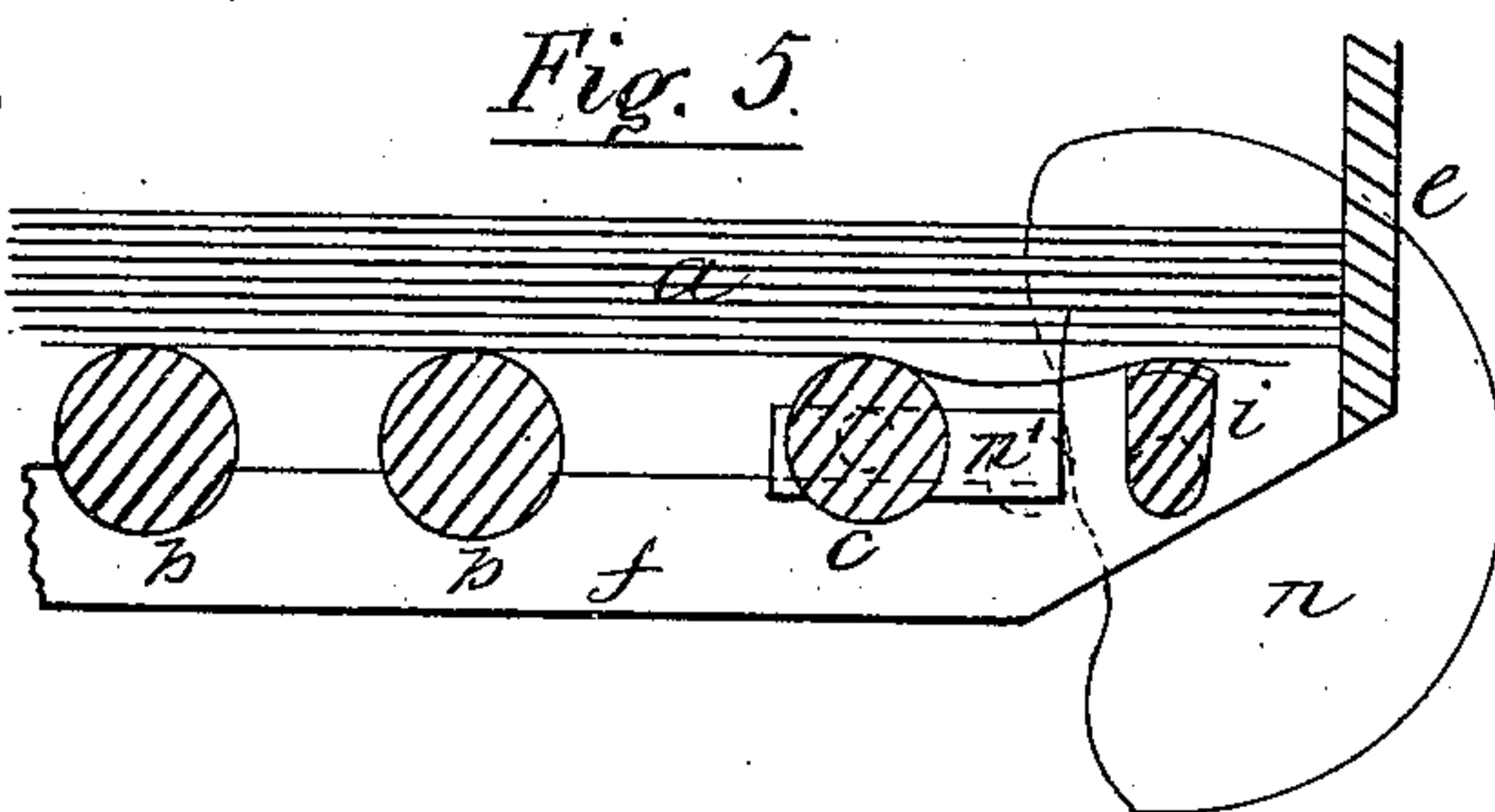
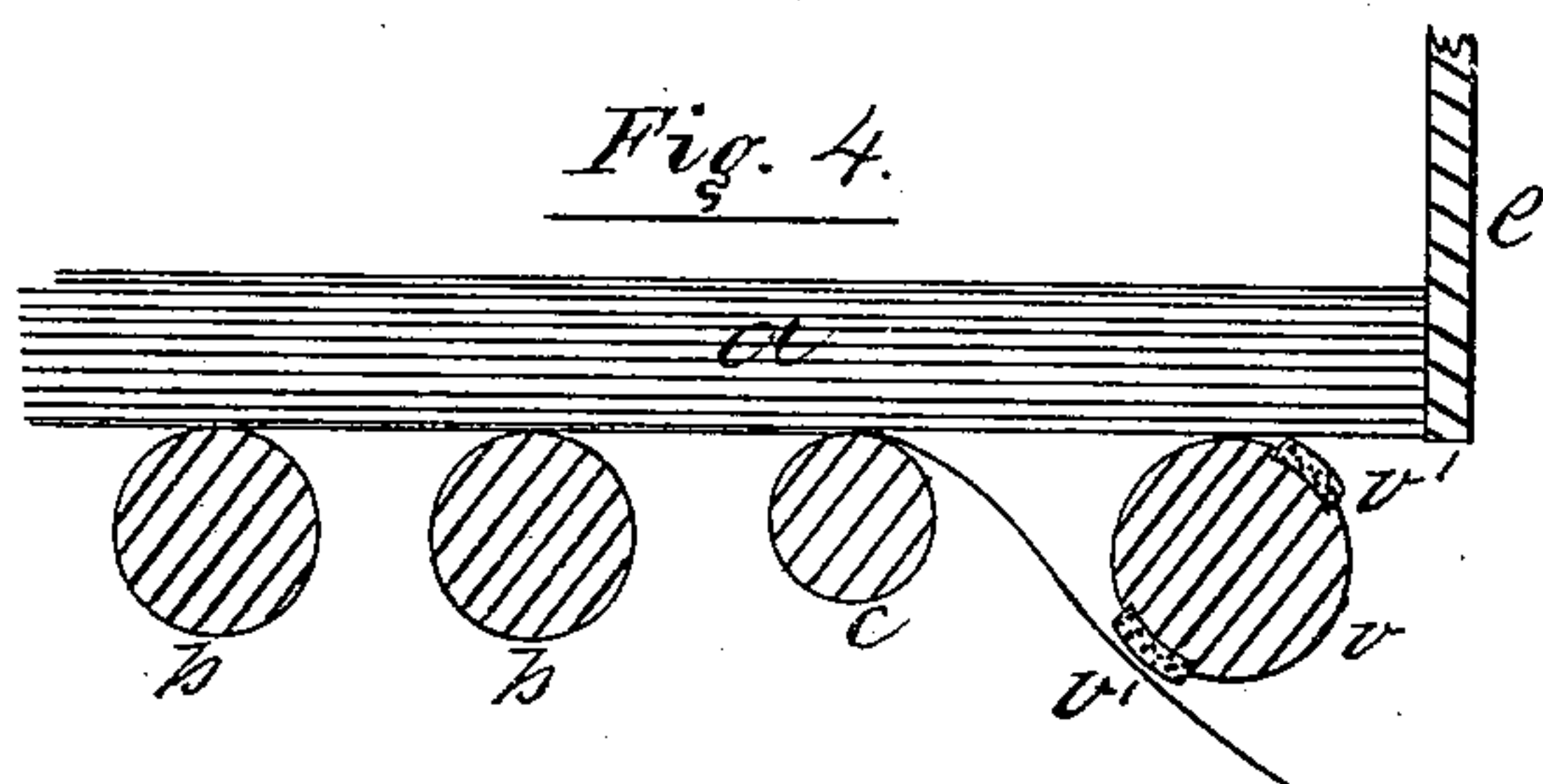
Frederick W. Griffith
Geo. P. Byrne
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per *Alfred Theobald atty.*

3 Sheets—Sheet 3.

F. W. GRIFFITH & G. P. BYRNE.
Paper Feeding Machine.

No. 236,427.

Patented Jan. 11, 1881.



Witnesses.

W. Walbank
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UNITED STATES PATENT OFFICE.

FREDERICK W. GRIFFITH, OF NEW YORK, AND GEORGE P. BYRNE, OF
BROOKLYN, N. Y., ASSIGNORS TO GARRETT S. BYRNE, OF NEWARK,
N. J., AND JOHN FORSYTHE, OF NEW YORK, N. Y.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 236,427, dated January 11, 1881.

Application filed December 13, 1878.

To all whom it may concern:

Be it known that we, FREDERICK W. GRIFFITH, of New York, county and State of New York, and GEORGE P. BYRNE, of Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Paper-Feeding Machines, of which the following is a specification.

This invention consists in such an arrangement and combination of mechanical devices, whereby the bottom sheet is separated from a pile of paper and presented to the feed-rollers of ruling, calender, and similarly-operating machines, and to the feeding fingers or grippers of printing-presses, &c., as will be fully hereinafter described, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of our improved paper-feeder, shown presenting the sheets to the cylinder of a printing-press. Fig. 2 is a longitudinal vertical section of the same with the pile of paper in place. Fig. 3 is a plan view with the pile of paper removed. Fig. 4 shows a modification of the separating-roller. Fig. 5 shows another way of operating the resisting-bar. Fig. 6 is a view showing the presser-fingers for laying the edge of the sheet in proper position to be taken by the grippers. Fig. 7 is a longitudinal section, showing the discharging and supporting rollers surrounded by an endless apron.

The pile of paper *a* is placed on the supporting-rollers *b b*, the resisting-bars *c c'*, and the lifting-bars *d d*, and is held in position by the end boards, *e e'*, of the frame. The back end board, *e'*, to adapt the feeder to various sizes of paper, is adjustable to and from the front end board, *e*, which is always stationary after the feeder is properly set. The back end board, *e'*, is secured to or forms a part of the frames *e² e²*, which are free to slide on the side bars, *f f*, but are clamped thereto when properly set by the set-screws *e³*. The sides of the pile of paper are held by the guides *g g*, which are secured to end boards *e e'*, and are adjustable thereon, and their position determines the side registration of the paper. The bottom sheet is separated from the pile of paper at the front and rear ends by the rotating sep-

arators *i i*, which are caused to revolve in the direction indicated by the arrows shown in Fig. 2 with a variable motion by means of a pair of elliptical gears, *h h'*. The gear *h* is secured to the shaft of the front separator and meshes into the gear *h'*, which revolves on a stud projecting from the standard *h²*. This standard supports the cylinder *k* and the front end of the feeder. A similar supporting-standard is on the opposite side of the machine, and the standards *h³ h³* support the rear end by being attached to the side bars, *f*.

The elliptical gear-wheel *h'* is driven by a train of gear-wheels, *j*, from the driving-shaft of the machine, to which the feeder is attached, so that the separator makes one revolution to one of the machine, which, in the views Figs. 1, 2, 3, and 6, is represented as the cylinder *k* of a printing-press. Instead of the train of gears, the connection between the machine and feeder may be made by means of a chain and chain-wheels, or by a shaft and miter-wheels.

The two separators are connected together, so as to revolve toward the center of the machine, by the miter-wheel *l* on the end of the front separator-shaft meshing into the miter-wheel *l'* on the end of the side shaft, *m*, which works in a bearing, *m'*, projecting from the side of the main frame. The other end of the shaft *m* passes through the miter-wheel *l²* and imparts motion to it by means of a spline or feather in the wheel fitting into a slot or groove cut longitudinally in the shaft *m*. This wheel *l²* is fitted into a bearing projecting from the frame *e²*, so as to revolve therein, and meshes into another miter-wheel, *l³*, secured to the end of the back separator-shaft, and by means of the groove in the shaft *m* and the spline in the wheel *l²* the whole of the rear part of the machine may be adjusted to or from the front part without altering the driving-connection between the separators or their relative positions to one another as regards their action on the paper.

The variable motion imparted to the separators is such that as they are approaching the bottom sheet, as shown at Fig. 2, their motion is slow, so that the edge of the elastic facing *i²* strikes the paper gently, thus insuring a perfect gripe thereon as they draw the edges

of the sheet away from the lifting-bars $d d$, and buckling the paper between the separators and the resisting-bars $c c'$. Then their speed increases while they are carrying the edges of the paper around with them to throw the edges down beneath them in the position shown in Fig. 2, thus saving considerable time in separating the edges from the pile over such operation if they had a continuously steady motion. In place of the elliptical gearing to impart a variable motion to the separators, it is obvious such variable motion may be obtained by other well-known mechanical devices, as segmental gears in which the various segmental parts meshing together are of different diameters, &c.

The resisting bar or roller c' (shown at the rear end of the pile of paper) revolves in blocks which are secured to the frames $e^2 e^2$ by screws passing through slots in the frames, or by screws passing through slots in the blocks and screwed into the frames, so that the opening between the roller and separator may be varied to enable the various qualities and thicknesses of the different kinds of paper to be properly separated. The roller is also adjustable up and down by screws passing vertically through the blocks and bearing on the ledges e^4 , so as to regulate its pressure on the paper and to govern the pressure of the separator on the paper, or about the same result will attain if the separator itself be made adjustable up and down in its bearings. The front resisting-bar, c , is secured to the arms $c^2 c^2$, and they are secured to the shaft c^3 . One end of the shaft c^3 projects beyond the frame, to which is secured the tappet or wiper c^4 , which is acted on by the side cam, c^5 , secured to the shaft m in such a manner that after the end of the bottom sheet is thrown down by the front separator the bar c falls, as shown in Fig. 2, the dotted lines showing it in its raised position bearing against the pile of paper. The freed part of the sheet is thus better acted upon by the grippers k' of the cylinder k than it would be if the resisting-bar remained up all the time, as the angle of the freed end of the paper is less obtuse to the horizontal than if it were held up by the resisting-bar when bearing against the pile, as this angle is now governed by the position occupied by the front supporting-roller, b , thereby facilitating the drawing out of the sheet clear of the pile. The separator is made segmental to favor this point in drawing out the sheet and to allow the feeder to be placed nearer the cylinder than it could otherwise be without the paper rubbing against some of the parts of the feeder as it is being pulled out. The screws which secure the resisting-bar c to the arms c^2 pass through slots in the bar, so that it may be adjusted to vary the opening between it and the separator, for the purpose explained in describing the rear resisting-bar. Its pressure on the paper is regulated by moving the cam c^5 along the shaft m or by turning the wiper c^4 on the shaft c^3 . Instead of this front resisting-bar being constructed to drop down,

it may be operated as shown at Fig. 5—that is, to move horizontally away from the separator, which is accomplished by means of cams n , secured to the separator-shaft, acting against a roller on the sliding boxes n' , in which the resisting-roller has its bearings, the boxes being pressed forward against the action of the cams by means of cords and weights or springs, or by making the cams closed cams.

It is found advantageous sometimes, when very large sheets of paper are being fed by the machine, to have a moving resisting-bar at the rear end of the pile, so as to release a greater length of the sheet and leave less of it bearing on the supporting-rollers b . It is also found, under some circumstances, unnecessary to use the moving lifting-bar, the presentation of the end of the sheet being made at the right angle by using at the front end a similarly-constructed lifting-bar to that shown at the rear end, the rotating separator being then of small diameter and cut away beyond the center, leaving it crank form.

In making the feeder to feed very stiff paper or card-board the rear separator, with its attendant devices, may be dispensed with.

The supporting and lifting bars $d d$ work in guides against the end boards, $e e'$. They are covered with rubber, and are provided at their ends with upright notched projections $d' d'$, into which fit the ends of the levers $d^2 d^2$. The other ends of these levers are pivoted to the frames at d^3 , and they are acted upon so as to raise and drop the lifting-bars by the cams d^4 , secured to the ends of the separators. The cams d^4 are so shaped that they drop the lifting-bars and the front and rear ends of the pile of paper just before the separators are in position to act on the bottom sheet, and after the edges of the sheet are drawn away clear of the lifting-bars the bars are raised by the cams, thus taking the weight of the ends of the pile of paper off the separating devices and some of the weight of the center of the pile off of the supporting and discharging rollers.

When thin paper is being fed by the machine it becomes necessary to employ some device to keep the pile level and to enable the ends of the pile to be firmly gripped, so that the discharging of the bottom sheet shall not disturb the rest of the paper. This we accomplish by placing the follower o , made of wood or heavy mill-board, on the top of the pile of paper, and on the top of it is the vertical ratchet-stem o' , provided with a flange, o^2 , and pins o^3 , which pass into holes in the follower to retain it in place. The stem o' passes up through the socket o^4 , in the upper part of which are placed the pawls $p p$. The socket o^4 slides in the bar q , which is held by the set-screws $q' q'$ in the standards $r r$, projecting upward from the central part of the end boards, $e e'$. By this arrangement the stem o' may be placed over the center of the pile as the end board, e' , is adjusted for the various sizes of paper. An equivalent gripping device may be placed directly over the lifting-bars. The

socket o^4 is prevented from turning round by two pins, $o^5 o^5$, which pass up through holes in the bar q , and it is pressed down by the springs $s s$, one end of each of them being fastened to the bar q , and the other ends bear on the top of the pins $o^5 o^5$. The strength of the springs is regulated by the set-screws $s' s'$. The reverse ratchet-notches $o^6 o^6$ are for the purpose of allowing the reverse dogs $p' p'$ of the pawls $p p$ to catch therein, so as to hold the stem o up out of the way while a fresh pile of paper is being placed in the machine.

The operation of this part of the machine is as follows: When the lifting-bars $d d$ are down the weight of the follower and the stem bear on the central part of the pile over the supporting-rollers and the resisting-bars and assist to hold the pile steady while the separation of the ends of the bottom sheet is taking place. When the lifting-bars $d d$ rise the pawls $p p$ catch into the adjacent ratchet-teeth on the stem, and the socket o^4 is lifted up with the stem against the action of the springs $s s$. The strength of these springs determines the amount of gripe between the ends of the follower o and lifting-bars $d d$ on the pile. Instead of the ratchet-teeth and pawls $p p$, friction-pawls may be used. When the pile has diminished in height equal to the pitch of the ratchet-teeth the pawls $p p$ catch into the succeeding teeth, and so on until the whole of the pile has been removed, and by covering the under side of the follower o with some material whose adhesion to the paper is greater than the mutual adhesion of the paper the pile of paper may be entirely fed to the last sheet. Springs o^8 contribute to this result.

The supporting-rollers $b b$, which are partly or wholly covered with rubber, revolve in boxes $b' b^2$, which are secured to the side bars, $f f$, by screws in such a manner that they may be readily removed and replaced when it is required to adjust the rear end of the machine. On one end of each of the supporting-roller shafts is a pinion, b^3 , which meshes into a pinion, b^4 , running on a stud from the box b^2 , and these intermediate pinions mesh into the pinion on the preceding roller, so that they are all connected together to revolve in the same direction. Motion is imparted to them at the right time by means of the pinion t , which meshes into a pinion, t' , on the front supporting-roller, b , and it is driven by a segmental gear, u , secured to the end of the cylinder k . The whole of these gears may be made with either toothed or friction surfaces. They are so proportioned as to size that the surface speed of the rollers is the same as the surface speed of the cylinder k , or to the speed of whatever machine the feeder is applied to. The segmental gear u is so placed on the cylinder that it imparts motion to the rollers $b b$ at the instant the grippers k' take the paper, and so assist the grippers in drawing out the bottom sheet. With certain kinds of paper it is found unnecessary to impart motion by gears to the rollers $b b$, as the gripe of the grippers is

sufficient to draw out the sheet without assistance; and to give these grippers a firmer hold than has heretofore been done we cover them with india-rubber or other suitable elastic material. The end k^2 of the arm secured to the gripper-shaft, by coming in contact with the projection k^4 from the standard h^2 , opens the grippers against the action of the closing-spring on the other side of the cylinder. The grippers are closed by the arm k^3 striking a pin on the under side of the feeder-frame.

The modification of the rotating separator shown at Figs. 4 and 6 consists in making the cylindrical surface v smooth, so as to be anti-frictional, except in such parts as the elastic frictional strips v' are placed, so that the paper may bear continually on the roller without being affected or disturbed when bearing on the smooth parts. The strips v' separate the bottom sheet, as shown.

At Fig. 6 is shown presser-fingers w , which are operated so as to press the edge of the sheet down near to but not on the cylinder, thereby presenting the edge of the sheet under all circumstances so as to be properly taken by the grippers. They are secured to the guide-shaft w' and operated by the guide-cam w^2 of the ordinary cylinder-presses.

In the application of this feeder to certain classes of machines, after the edge of the sheet is thrown down by the separator it is drawn and discharged from the pile by means of an endless apron, x , (see Fig. 7,) which passes over the supporting-rollers $x' x'$, and which is caused to move as soon as the edge is separated, so as to discharge the sheet clear of the pile or present it to the feed-rollers x^2 of the machine. The guide x^3 guides the edge to the bite of the rollers. The separator here shown is similar to that shown at Fig. 4, but with only one separating-strip. The rear end of the bottom sheet of a pile of thin paper would have to be thrown down to enable the pile to be gripped so that it would not be disturbed when the bottom sheet is being discharged by the apron.

It is obvious from the foregoing description of our paper-feeding machine that if the various separating devices were arranged to operate on the top of the pile and the paper pressed upward against them by any of the well-known methods the top sheet would be separated from the pile in substantially the same manner as the bottom sheet now is.

Having now described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a paper-feeding machine, a rotating separator arranged at each end of a pile of paper, in combination with one or more supporting-rollers placed between the separators and in the same, or in about the same, horizontal plane therewith, substantially as and for the purposes hereinbefore set forth.

2. The rotating separator i , in combination with the elliptical gears $h h'$, by means of which the separator is caused to revolve slowly

while separating the bottom sheet and drawing it back from the end of the pile, and quickly while carrying the end of the sheet around with it into position to be gripped by the taking mechanism of the machine being fed, substantially as hereinbefore set forth.

3. In a paper-feeding machine, in combination, the separator *i*, the cylinder *k*, provided with the grippers *k'*, and the presser-fingers *w*, constructed and operated substantially as and for the purpose hereinbefore set forth.

4. In a paper-feeding machine, a rotating separator, in combination with the vertically and horizontally adjustable resisting-bar *c'*, substantially as and for the purposes hereinbefore set forth.

5. The combination of the rotating separator *i*, swinging resisting-bar *c*, and supporting-roller *b*, substantially as hereinbefore set forth.

6. In a paper-feeding machine, the rotating separators *i i*, the adjustable resisting-bars *c c'*, and the series of supporting-rollers *b b*, all parallel with one another and in the same horizontal plane, constructed and operating so as to separate the bottom sheet from a pile of paper, substantially in the manner hereinbefore set forth.

7. The combination of the lifting-bars *d d* with the follower *o*, provided with an automatic locking device, substantially as hereinbefore specified.

8. The combination of the ratchet-stem *o'* with the yielding sleeve or socket *o⁴*, springs *s*, and pawls *p*, substantially as set forth.

9. The combination of the ratchet-stem *o'*, provided with the reverse notches *o⁶*, and the pawls provided with the reverse dogs *p' p'*, operating substantially as described, so as to

hold up the follower at one time and prevent it rising at another, as hereinbefore set forth.

10. The notched stem *o'*, socket *o⁴*, pawls *p p*, springs *s s*, and adjustable bar *q*, combined and operating substantially in the manner hereinbefore set forth.

11. The combination of the lifting-bar *d*, operated by the cams *d⁴* on separator *i*, with the separator and resisting-bar *c*, substantially as set forth.

12. In a paper-feeding machine, the discharging and supporting rollers *b b*, in combination with separating devices at either end of a pile of paper, and operating in unison therewith, substantially as described, so as to discharge the bottom sheet clear of the pile after the separating devices have thrown down the two ends, substantially as hereinbefore set forth.

13. In a paper-feeding machine, the combination of the supporting and discharging rollers *b b* with the grippers *k'* and presser-fingers *w*, substantially as hereinbefore set forth.

14. The combination of the removable supporting-rollers *b b*, provided with the connecting pinions *b³ b⁴*, with the pinion *t* and segmental gear *w*, attached to the cylinder *k*, substantially as hereinbefore set forth.

15. In a paper-feeding machine, the adjustable rear end separating devices, in combination with the removable supporting-rollers *b b*, substantially as hereinbefore set forth.

In witness whereof we have hereunto set our hands this 25th day of September, 1878.

FREDK. WM. GRIFFITH.
GEO. P. BYRNE.

Witnesses:

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H. D. WILLIAMS.