

(No Model.)

5 Sheets—Sheet 1.

L. A. FERNON.

COMBINED PAPER SIZING AND DRYING MACHINE.

No. 308,408.

Patented Nov. 25, 1884.

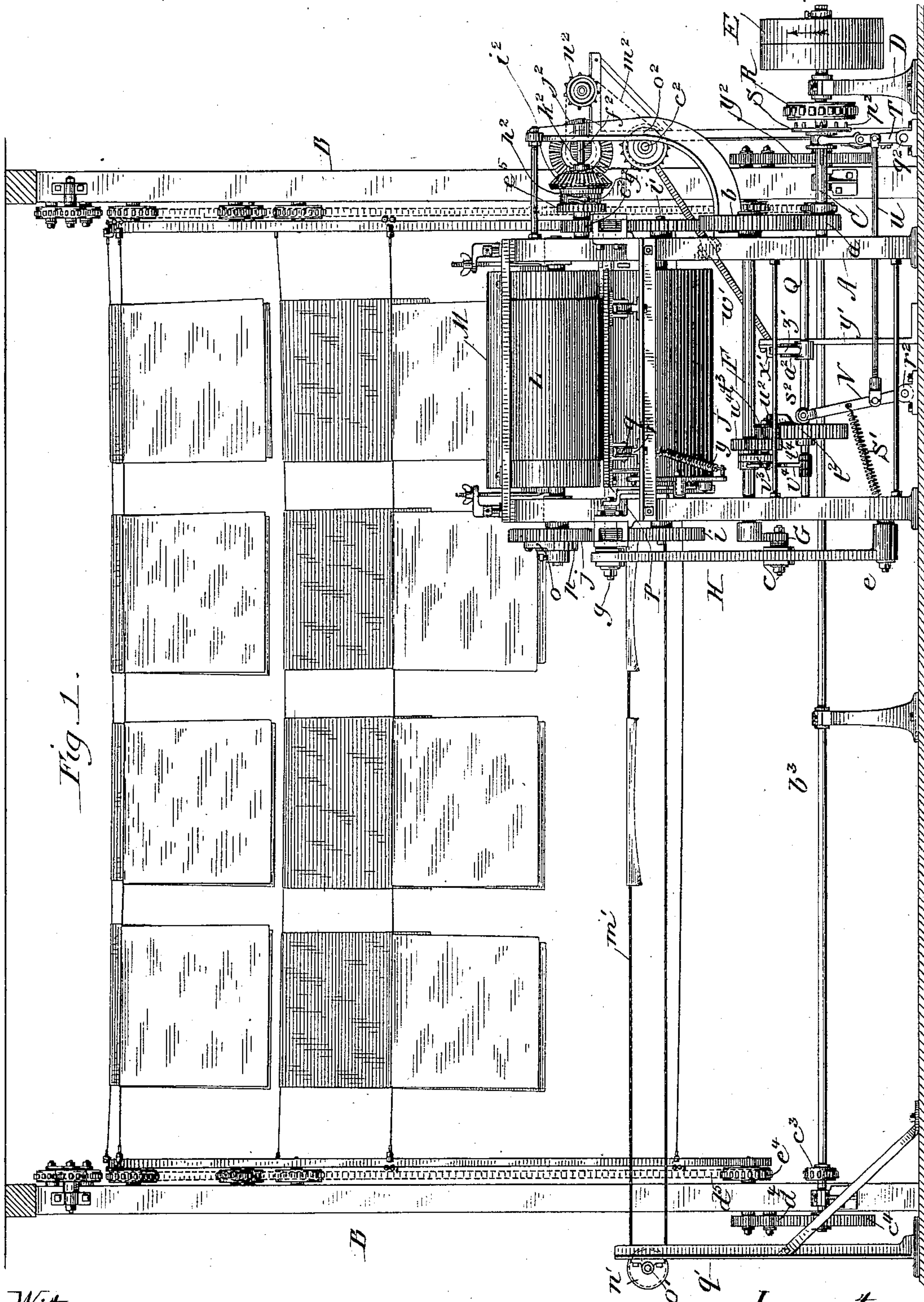


Fig. 1.

Witnesses:
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Louis Notting

Inventor:
Louis A. Fernon
By *Wm. H. Lotz*
Attorney

(No Model.)

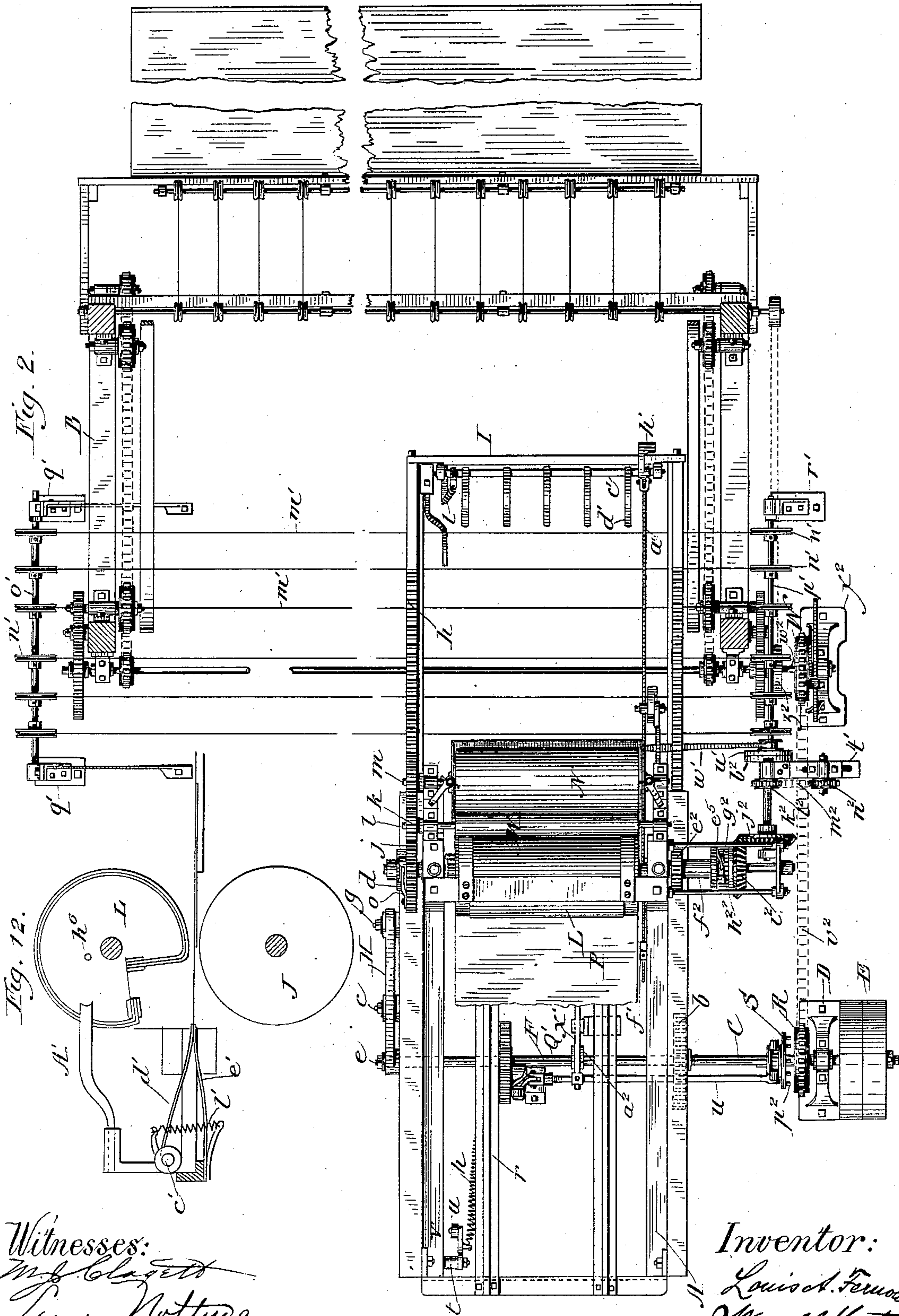
5 Sheets—Sheet 2.

L. A. FERNON.

COMBINED PAPER SIZING AND DRYING MACHINE.

No. 308,408.

Patented Nov. 25, 1884.



Witnesses:
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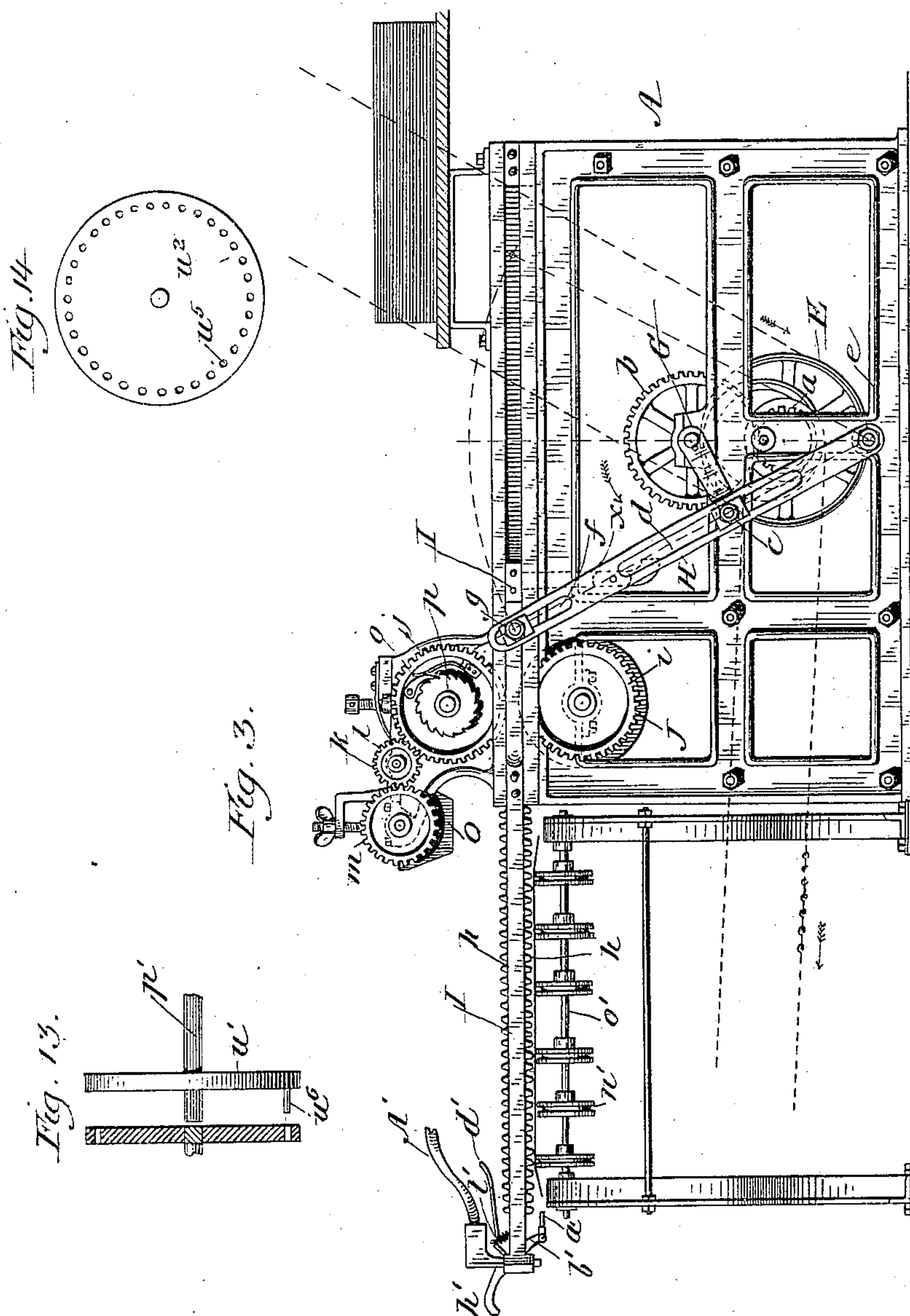
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Witnesses:

M. J. Claggett
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(No Model.)

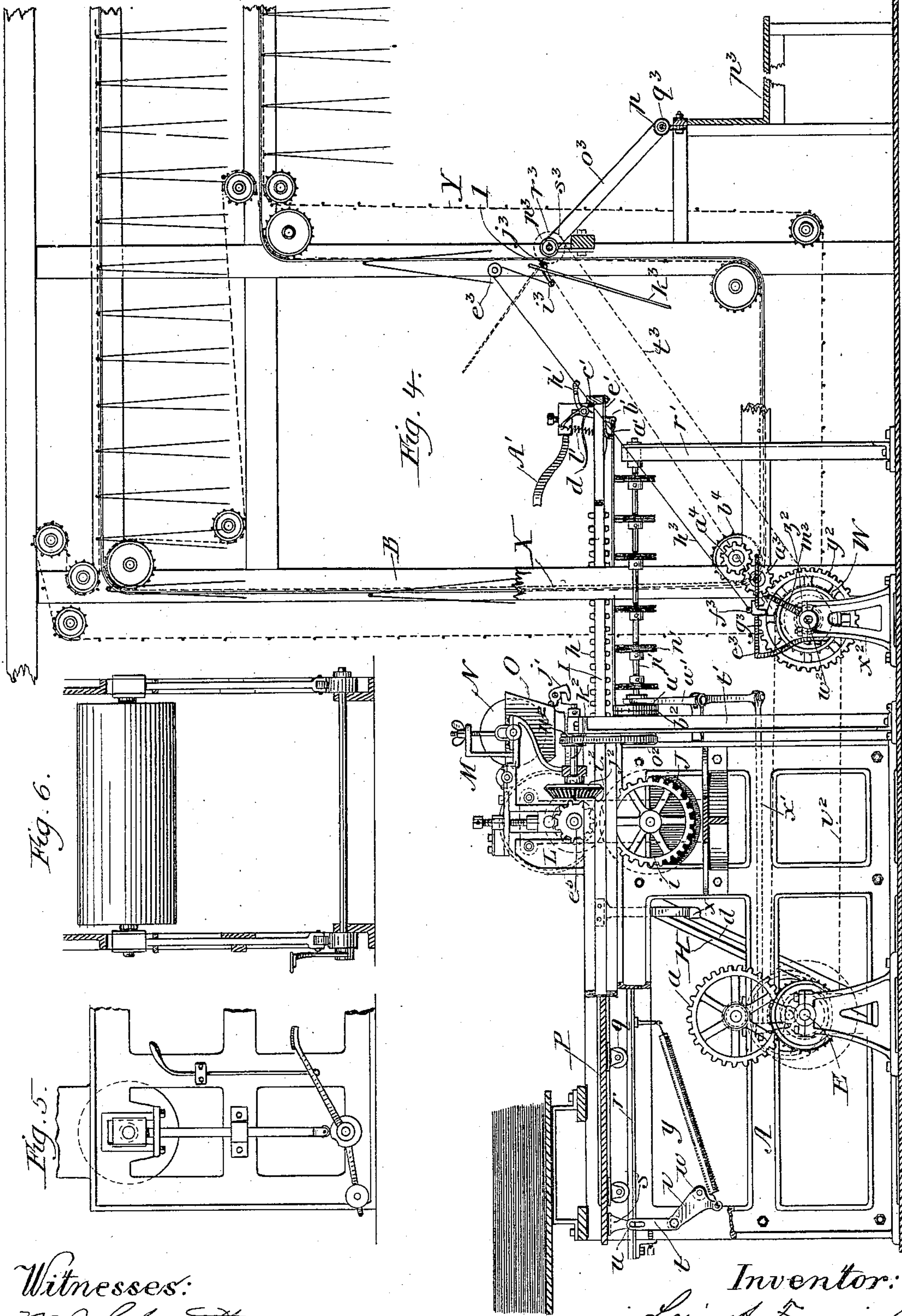
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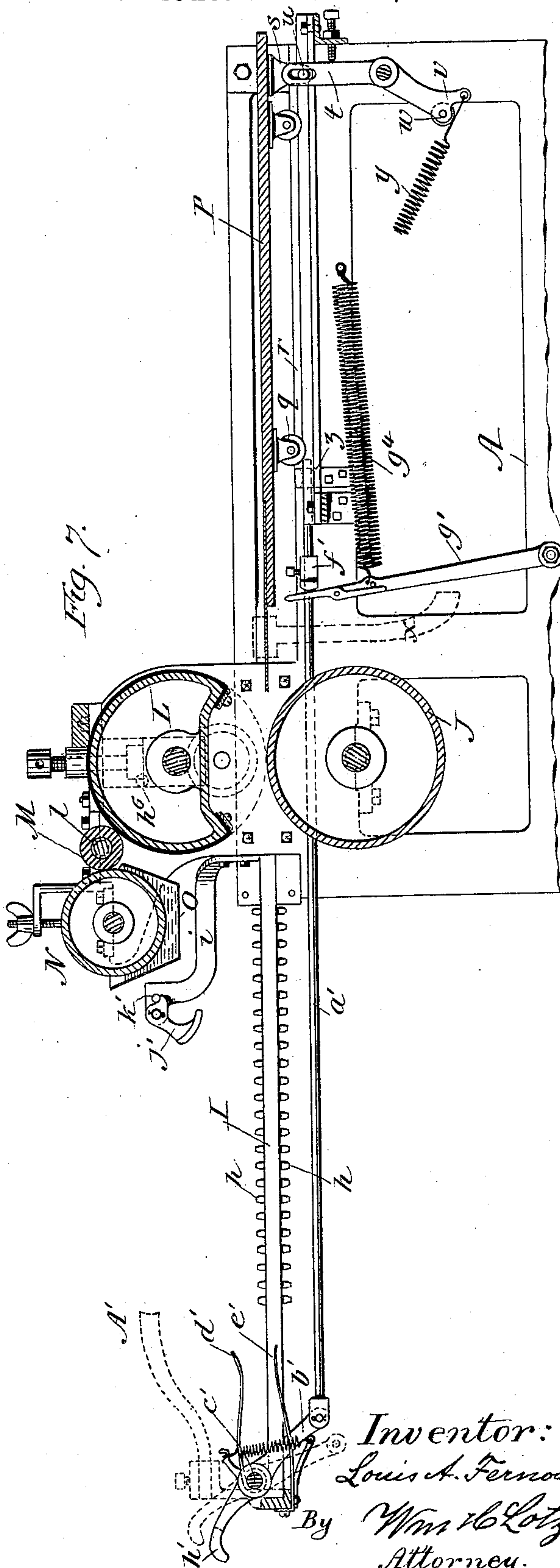
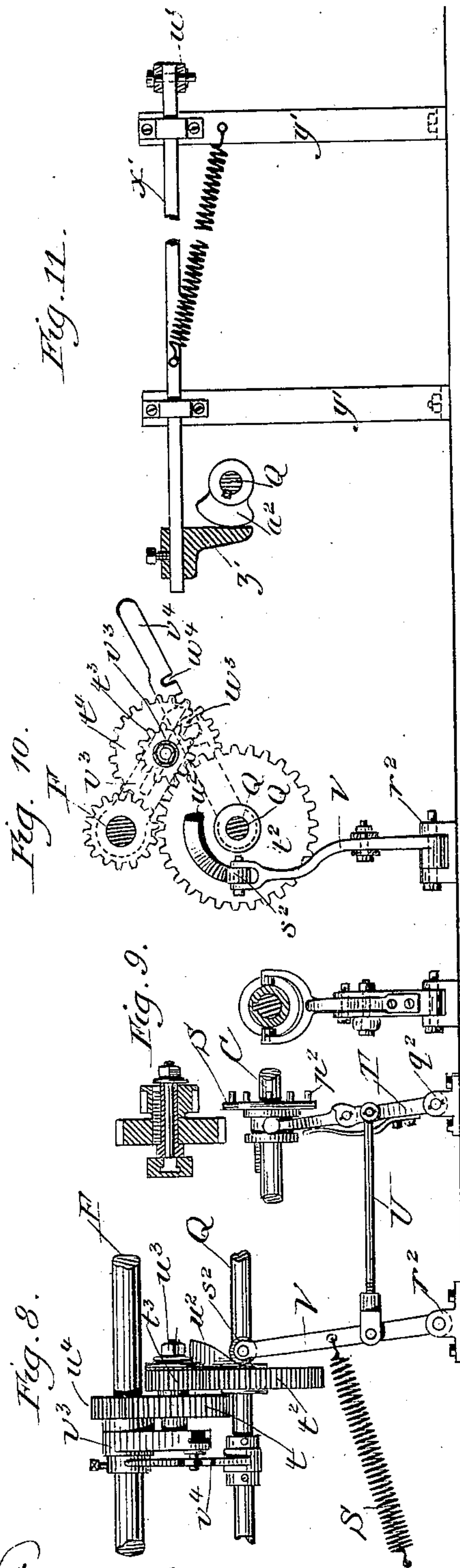
5 Sheets--Sheet 5.

L. A. FERNON.

COMBINED PAPER SIZING AND DRYING MACHINE.

No. 308,408.

Patented Nov. 25, 1884.



Witnesses:
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UNITED STATES PATENT OFFICE.

LOUIS A. FERNON, OF CHICAGO, ILLINOIS.

COMBINED PAPER SIZING AND DRYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 308,408, dated November 25, 1884.

Application filed March 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, LOUIS A. FERNON, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Combined Paper Sizing and Drying Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a machine for drying printed, varnished, gummed, wet, or coated sheets, more especially designed for the use of printers, lithographers, gummers, mounters, paper-mills, &c., and is an improvement upon the machines for this purpose for which Letters Patent were granted to me April 20, 1880, and February 22, 1881. In both of the patents referred to, the machines therein described were provided with no automatic means for feeding the sheets to be dried from the varnishing-rolls to the drier, nor with automatic means for discharging the dried sheets therefrom, and consequently the use of such machines necessitated the employment of suitable help to perform those functions.

The object of this invention is to provide suitable automatic feed and discharge; and, further, to improve the mechanism for feeding the sheets to the rolls; and, further, to provide more perfect rolls; and to the accomplishment of the above the invention consists of the following features, to wit: first, in providing the roll through the medium of which the varnish, gum, &c., is imparted to the sheet with a removable blanket, the size of which may be varied according to the size of the sheets or to the surface to which the varnish or coating is to be applied; second, in the novel means employed for feeding the sheets to the rolls, which consists of a table which at proper intervals is moved to and from said rolls and is driven from the main shaft; third, in the novel mechanism employed for drawing the sheets between the rolls, which is accomplished through the medium of a horizontally-moving frame driven by suitable gearing, and provided at one end with suitable claws or fingers which at proper intervals open and close to clasp or release the sheets; fourth, in the mechanism employed for operating said claws; fifth, in the novel means employed for carrying the sheets from the varnishing apparatus and depositing them in position to be taken up by the drying-chains,

which consist of a series of endless cords passed over pulleys driven at proper intervals through the medium of suitable gearing and clutch mechanism; sixth, in the novel means employed whereby at proper intervals the sheets resting upon the endless cords referred to are taken up by the transverse rods or wires described in my former patents as connecting the fast and slow moving drying-chains; seventh, in the novel means employed whereby the sheets, after being carried around by said fast and slow moving chains and thoroughly dried, are discharged therefrom ready for packing; and, eighth, in the several novel devices and combination of devices employed for carrying out and accomplishing the several results hereinbefore referred to.

In the accompanying drawings, Figure 1 is a front view of the machine complete; Fig. 2, a top plan thereof; Fig. 3, a side elevation of the varnishing apparatus; Fig. 4, an elevation from the opposite side, showing part of the drying apparatus; Figs. 5 and 6, views showing means for adjusting the feed-roll; Fig. 7, a sectional view of the varnishing apparatus, and Figs. 8, 9, 10, 11, 12, 13, and 14 views in detail of parts of the machine.

Like letters refer to like parts in each view.

A represents a suitable frame, in which the operative parts of the varnishing apparatus are situated, and B the frame-work of the drying apparatus; or, as described in my former patents, B may represent the sides of the room in which the apparatus is situated.

C is the main driving-shaft of the varnishing apparatus, and has bearings in the frame A and a bracket or support, D, as shown in Fig. 1. Keyed to the outer end of shaft C is a driving-pulley, E, through which motion is imparted thereto. Keyed to the opposite or inner end of shaft C is a cog, *a*, which meshes with a cog, *b*, keyed to one end of a shaft, F, which has bearings in the frame A. To the opposite end of shaft F is secured a crank-arm, G, the pin *c* of which moves in a slot, *d*, of an arm, H, the lower end of said arm being mounted on a stud, *e*, situated at a point near the bottom of frame A, while at its upper end arm H is provided with a slot, *f*, into which a pin, *g*, is inserted, said pin being attached to one side of a frame, I, which is mounted in a suitable guideway formed in frame A, and which will be described, the parts thus far referred to by letters of reference being all

clearly shown in Figs. 1 and 3. By this arrangement of parts it will be seen that upon the revolution of shaft C the frame I will be moved backward and forward. The side rails of frame I are notched to form teeth *h* both upon their upper and lower faces. As the frame is moved backward or forward by the mechanism described the teeth on the lower face of the side rails mesh with cogs *i*, keyed one to each end of a shaft, upon which is mounted a feed-roll, J, said shaft having suitable bearings in the sides of frame A and revolve said feed-roll.

Mounted upon a suitable shaft, which has bearings in frame A at a point directly above the feed-roll J, is a roll, L, through the medium of which the varnish, gum, &c., is imparted to the paper which is fed between said varnishing and feed rolls, as will be described. Roll L is covered by a removable blanket, *s*, or by an arch-shaped metal plate, the ends of said blanket or plate being secured to the roller by pins or otherwise, as shown in Fig. 12. As shown in that figure, the roll is cut away at a certain point, this arrangement being made to prevent certain paper-clutching fingers, to be hereinafter described, from contacting with said roll upon the rearward movement of the frame upon which they are mounted.

Loosely mounted upon the varnishing-roll shaft, and at a point near one end thereof, is a cog, *j*, which meshes with a cog, *k*, keyed to a shaft, *l*, upon which a roll, M, is mounted, said roll contacting with roll L and transferring the varnish, &c., to said roll from a roll, N, which revolves in a varnish-receptacle, O, as shown. To the outer end of the shaft upon which roll N is mounted is keyed a cog, *m*, which meshes with cog *k*, referred to. The teeth of cog *j* mesh with the teeth *h*, formed on the upper face of one side rail of frame I, and secured to one side of said cog is a spring-depressed pawl, *o*, which engages with a ratchet, *p*, keyed to the same shaft upon which cog *j* is loosely mounted. The teeth of ratchet *p* are so arranged with respect to pawl *o* that upon the forward movement of frame I said ratchet will be revolved, and with it, through the connections described, the several rolls; but upon the rearward movement of said frame the varnishing-roll L will not be operated. A table, P, (shown clearly in Fig. 7,) is situated to the rear of the feed and varnish rolls at a point between the uprights of frame A, said table being mounted on rollers *q*, which move on tracks *r*.

Secured to one rear corner of table P is a depending arm, *s*, formed with a pin or stud, *u*, which is inserted into a slot formed in the upper end of a pivoted arm, *t*, said arm being pivoted on a pin or stud secured to one upright of frame A. At its lower end arm *t* is provided with a cam-head, *v*, and a pin, *w*.

Secured to the inner face of one side rail of frame I is a depending arm, *x*, Fig. 4, and dotted lines, Fig. 7. As the frame I is car-

ried back the arm *x* is brought into contact with pin *w* and the arm *t* operated, whereby, through the connections described, table P is moved forward, and the papers which are designed to be placed thereon are carried to a point between the varnishing and feed rolls. As the frame I is again moved forward the arm *t* is released, and through the medium of a spring, *y*, the table P is carried back to its normal position.

Secured to the rear inner end of one side rail of frame I is a projection, *z*, (still referring to Fig. 7,) through an opening formed in which one end of a rod, *a*', is passed, the opposite or front end of said rod being secured to a crank-arm, *b*', secured to a shaft, *c*', which is mounted in brackets secured to the front cross-piece of frame I.

Secured to the shaft *c*' are a series of projecting arms or fingers, *d*', which, together with a series of stationary arms, *e*', secured to said frame I at points directly below those *d*', form claws to grasp the sheets, as will be described.

Secured upon rod *a*' is a projecting lug, *f*'.

Pivoted to one inner face of frame A is an arm, *g*', held in position by a spring, *g*', so situated that its free upper end will contact with lug *f*' at certain intervals.

Cast upon the upper end of crank-arm *b*' is a plate, *h*', formed as the arc of a circle, while in a suitable bracket, *i*', there is mounted a hook-shaped arm, *j*', formed with a cam-surface and bearing against a pin or projection, *h*', formed in bracket *i*'. As the frame I is carried back to the feed and varnish rolls the plate *h*' contacts with the lower end of arm *j*' and the shaft *c*' is partly revolved, carrying with it the fingers *d*'. This revolution of shaft *c*' continues until plate *h*' passes arm *j*', when the shaft is released, and, through the medium of a spring, *l*', is carried to its normal position, thus closing the fingers *d*' over fingers *e*', the table P, during the interval in which said fingers were separated, having been pushed forward between the feed and varnish rolls, whereby the sheet on said table is caught between the fingers *d*' *e*'. At the end of the rearward movement of frame I the outer end of a curved arm, *A*', contacts with a pin, *h*', formed upon one end of roll L, and causes said roll and the cap secured to its shaft to revolve a fraction of a tooth. I have by experiment found it necessary to provide this mechanism, in order that the parts may move all at proper intervals and without becoming disarranged. The frame I, through the medium of the mechanism described, is then again moved forward, the paper sheet being drawn forward by fingers *d*' *e*', said fingers remaining closed until the projecting lug *f*', described as secured to rod *a*', is brought into contact with the upper free end of pivoted arm *g*', before referred to. The resistance offered by arm *g*' again causes a partial revolution of shaft *c*', and the consequent opening of fingers *d*' *e*', whereby the sheet held therebetween is allowed to fall on transverse cords *m*', Figs. 1 and 2, situated

directly below the point where the fingers are thus separated. The endless cords m' are passed over pulleys n' , which are keyed to shafts $o' p'$, (shown clearly in Fig. 2,) situated on opposite sides of the machine. Shaft o' has bearings in uprights q' , while shaft p' has bearing at one end in an upright, r' , and at the opposite end in a bracket which is secured to an upright, t' .

To one end of shaft p' is secured a clutch-wheel, u' , provided with one or more projecting pins, w' , Fig. 13, and connected to an inclined arm, w' , which at its lower end is secured to one end of a horizontal rod or arm, x' , Figs. 1, 4, 11. Rod x' has free bearing in brackets formed on uprights y' , and at its rear end is provided with a downwardly-projecting arm, z' .

Keyed to a shaft, Q , which has bearing in the same uprights of frame A as the shaft F referred to, is a cam, a^2 . By the arrangement of parts as last described, when upon the revolution of shaft Q the cam a^2 is not in contact with depending arm z' , the inclined arm w' , which was described as connected to rod x' , occupies such a position that the pin of clutch u' will enter one of a series of openings, w^3 , Fig. 14, formed in a wheel, b^2 , which is keyed to a shaft, c^2 , Fig. 4; but when said cam a^2 is brought into contact with depending arm z' the position of the parts will be changed and the clutch u' carried from wheel b^2 through the medium of rod x' and inclined arm w' , the object of which arrangement will be set forth. The upper rack of frame I, on the side opposite to that on which the cogs for driving the several rolls were described as situated, meshes with a cog, e^2 , Figs. 1 and 2, keyed on a shaft, f^2 , which has suitable bearings in frame A, and keyed upon the same shaft is a cog, e^3 , carrying a spring-depressed pawl, g^2 , which engages with a ratchet, h^2 , loosely mounted on said shaft f^2 . The teeth of ratchet h^2 are so arranged with respect to pawl g^2 that when the frame I is being moved backward said pawl will engage therewith and revolve it, but, upon the forward movement of said frame, will slide over the ratchet and impart no motion thereto.

Cast with ratchet h^2 is a bevel-gear, i^2 , which in its revolution meshes with a similar gear, j^2 , keyed to shaft k^2 , Figs. 2 and 4.

Keyed to shaft k^2 is a sprocket-wheel, l^2 , around which an endless chain, m^2 , is passed, said chain being also passed around a sprocket-wheel, n^2 , mounted as shown, and around a sprocket-wheel, o^2 , keyed to shaft c^2 , before referred to.

By the last-described arrangement of parts it will be seen that upon each forward movement of frame I the shaft c^2 will remain stationary, and upon each rearward movement of said frame said shaft, with its wheel b^2 , will be revolved; and it will further be understood that because of said arrangement and that previously described in connection with clutch u' and the means employed for throwing said

clutch into or out of gear with said wheel b^2 , upon each rearward movement of frame I when the cam a^2 is not in contact with depending arm z' , the pulleys n' are revolved, and with them the endless cords m' , whereby each sheet deposited upon said cords upon the forward movement of frame I is carried slightly to one side as the movement of said frame is reversed. It is necessary that the sheets deposited on cords m' should be thus moved in order that the several sheets collected thereon may not be deposited all in one place. When, however, the cam a^2 comes in contact with the depending arm, the clutch mechanism described is thrown out of gear and the cords remain stationary. This is arranged to take place when the last sheet has been deposited, in order that the first sheet may not be carried against the side of the machine, and the entire length of the cords utilized.

Referring now to Figs. 1, 8, 9, and 10, it will be seen that upon the main shaft C there is loosely mounted a sprocket-wheel, R, and upon the same shaft a sliding clutch, S, provided with one or more pins, p^2 , which at certain intervals are adapted to enter openings formed in the side face of wheel R, whereby motion is imparted to said wheel. An arm, T, is pivoted in a bracket, q^2 , and at its upper end, which is forked, surrounds the collar of clutch S, whereby the necessary lateral movement is imparted to said clutch when said arm is operated. Arm T is connected by a rod, U, with a bent arm, V, which is pivoted in a bracket, r^2 , as shown, and in the forked upper end of which is mounted a roller, s^2 .

Keyed to the shaft Q, before referred to, is a cog, t^2 , upon one side face of which there is formed a cam, w^2 , which at certain intervals is brought into contact with rollers s^2 , and through the medium of the arms and rods described forces the clutch S into gear with sprocket-wheel R, a spring, S' , carrying the parts to their original position when released. Motion is imparted to cog-wheel t^2 through the medium of a cog, t^3 , mounted upon a stud, w^3 , upon which a cog, t^4 , is also mounted, said last-named cog meshing with a cog, w^4 , keyed to shaft F, before referred to.

Pivoted to shaft F is a slotted arm, v^3 , carrying a pin, w^3 , and to shaft Q an arm, v^4 , provided with a series of notches, w^4 . The cog t^3 may be removed and a larger or smaller wheel substituted therefor, whereby the speed of wheel t^2 may be changed and the clutch be thrown into gear oftener, if desired, or less frequently, the pin or arm v^3 being placed in a different notch of arm v^4 .

Passed around sprocket-wheel R is an endless chain, v^2 , which is also passed around a similar wheel, W, keyed to a shaft, w^2 , which has bearing in one upright of frame B and in an upright, x^2 , Fig. 4; also, keyed to shaft w^2 is a cog, y^2 , and a sprocket-wheel, z^2 . Cog y^2 meshes with a cog, a^3 , which is mounted upon one end of a shaft, b^3 , which extends entirely

across the drying-frame, Fig. 2, and at points near each end of which is mounted a sprocket-wheel, c^3 , around which the fast-moving chains X are passed. Cog a^3 meshes with a cog, a^4 , mounted upon a stud with a sprocket-wheel, b^4 , around which one slow-moving chain, Y, is passed, and a cog, c^4 , mounted upon the opposite end of shaft b^3 , through the medium of cogs d^4 d^5 , imparts motion to a sprocket-wheel, e^4 , around which the other slow-moving chain is passed. These fast and slow moving chains, together with their mode of operation, have been fully described in my 1881 patent referred to, and therefore will not be particularly described herein.

By the arrangement of parts thus far described it will be understood that at certain intervals the clutch S will be thrown into gear with sprocket-wheel R, and through the medium of the connections described the fast-moving chains with their cross-wires will be carried up. As this movement is accomplished the sheets which have been deposited on the transverse cords are lifted and carried around by the fast and slow moving chains until they reach the point 1, Fig. 4, where they are removed from said chains, as will be described.

Upon the upper end of upright x^2 , Fig. 4, is an arm, e^3 , upon which is mounted a sliding collar, f^3 , provided with a depending arm, g^3 , and connected by a cord or wire, h^3 , with a crank-arm, i^3 , attached to one end of a shaft, j^3 , which extends across the drying-frame, and to which is secured a frame, k^3 , said cord h^3 passing over a pulley, l^3 , and the position of frame k^3 being as shown in full lines in Fig. 4.

Keyed to shaft w^2 is a cam, m^3 , which, upon the revolution of said shaft, contacts with depending arm g^3 of collar f^3 , and through the connections described causes the rod j^3 to be partly revolved, whereby the frame k^3 is carried to the position shown in dotted lines, and the sheets are removed from the chains and discharged down a suitable incline to a table, n^3 ; or they may be thus discharged onto a series of inclined endless cords, o^3 , which are passed around pulleys p^3 , mounted on shafts q^3 r^3 , a sprocket-wheel, s^3 , being also mounted on shaft r^3 , and connected by an endless chain, t^3 , with the sprocket-wheel z^2 , before referred to, whereby motion is imparted to said cords o^3 , and the sheets deposited thereon are carried to table n^3 .

It will be understood that the mechanism herein described for imparting motion to the drying-chains and for removing the dried sheets therefrom is only in motion at intervals when the clutch mechanism of the main shaft is in gear; and it will further be understood that by the means described the intervals at which said clutch mechanism is to be in gear may be determined; and, further, that the connecting-wires of the drying-chains are so arranged that a wire will always be in position to remove the papers from the transverse cords when the proper number has been collected thereon; and, further, that the mechanism is

to be so arranged that the connecting-wires of the chains are elevated past the plane upon which the frame I moves during the rearward movement of said frame.

The operation is briefly as follows: The sheet to be acted upon is placed on the table P, and the machine being then set in motion, the table is carried to a point between the feed and varnishing rolls, at which point the sheet is seized by the fingers of frame I and drawn between the feed and varnishing rolls, thereby receiving the varnish on its surface. At a proper time and by the means described the sheet is released from the fingers and deposited on the transverse cords referred to. As the frame I is carried back the transverse cords are moved and the space upon which the next sheet is to be deposited left free. This is continued until a sufficient number of sheets have been collected on the transverse cords, said cords remaining stationary during the last rearward movement of frame I, to prevent the sheets being carried against the side of the machine, this result being accomplished by releasing the clutch mechanism described. At this point, other suitable clutch mechanism being thrown into gear by the means described, the drying-chains are set in motion, and one connecting-wire thereof passing between the transverse cords comes in contact with the several sheets at points about their centers, whereby they are folded over said wires and elevated thereby. They are thus carried around the drying-machine, as described in my former patent, and at a suitable point are discharged from the drying-chain by the mechanism described, thoroughly dry and ready for packing.

What I claim is—

1. In the machine described, a varnish or gum imparting roller provided with a removable blanket or arch-shaped metal plate, as and for the purpose set forth.

2. In the machine described, the combination, with a feed-roller, a varnish or gum imparting roller, and means for imparting motion thereto, of a movable paper-carrying table and means for moving said table to or from said rollers at suitable intervals, as and for the purpose set forth.

3. In the machine described, the combination, with a feed-roller, a varnish or gum imparting roller provided with a removable blanket, and means for imparting motion thereto, of a movable paper-carrying table and means for moving said table to or from said rollers, as and for the purpose set forth.

4. In the machine described, the combination, with suitable feed and varnish or gum imparting rollers, a movable paper-carrying table, and means for imparting motion to said parts, of a horizontally-moving frame provided with suitable claws and adapted to draw between the rollers the papers fed thereto by the table described.

5. In the machine described, the combination, with suitable feed and varnish or gum imparting rollers, a movable paper-carrying

table, and means for imparting motion to said parts, of a horizontally-moving frame provided with the claws described for drawing the papers between said rolls, and means whereby said claws are alternately opened and closed, as and for the purpose set forth.

6. In the machine described, the combination, with suitable feed and varnish or gum imparting rollers, a movable paper-carrying table, and means for imparting motion to said parts, of a horizontally-moving frame provided with claws for drawing the papers between said rolls, endless transverse cords, and means for imparting motion to said cords at suitable intervals.

7. In the machine described, the combination, with feed and varnish or gum imparting rollers, a movable paper-carrying table, a horizontally-moving frame provided with claws for drawing the papers between the rollers, transverse endless cords, and means for imparting motion to the several parts as and at the intervals described, of a series of endless drying-chains and means for operating the same, as and for the purpose set forth.

8. In the machine described, the combination, with a series of fast and slow moving drying-chains, of means for automatically-displacing therefrom at certain intervals the papers fed thereto, as described.

9. The combination, with a series of fast and slow moving drying-chains, of a pivoted frame for displacing the papers therefrom and means for operating said frame, as described and shown.

10. In the machine described, the combination of main shaft C, shaft F, provided with crank-arm G, slotted arm H, frame I, and intermediate gearing for imparting a reciprocating motion to said frame from the main shaft, as and for the purpose set forth.

11. In the machine described, the combination of main shaft C, shaft F, provided with crank-arm G, slotted arm H, frame I, provided with notched side rails, feeding-roll J, and intermediate gearing for imparting motion to said frame and feed-roller from the main shaft, as and for the purpose set forth.

12. In the machine described, the combination of main shaft C, shaft F, provided with crank-arm G, slotted arm H, frame I, provided with notched side rails, feeding-roll J, varnish-roll L, and intermediate gearing for imparting motion to frame I and the feed and varnish rollers from the main shaft, as and for the purpose set forth.

13. In the machine described, the combination of main shaft C, shaft F, provided with crank-arm G, slotted arm H, frame I, provided with notched side rails, varnish-roller L, and intermediate gearing, whereby motion is imparted to roller L from the main shaft only upon the rearward movement of frame I, as and for the purpose set forth.

14. In the machine described, the combination of main shaft C, shaft F, provided with crank-arm G, slotted arm H, frame I, provided

with notched side rails, rollers J L M N, intermediate gearing for imparting motion to roller J from the main shaft upon the forward and backward movement of frame I, and to rollers L M M only upon the backward movement thereof, as and for the purpose set forth.

15. In the machine described, the combination of frame I, provided with depending arm x , means for imparting a reciprocating motion to said frame from the main shaft, table P, mounted as described, and pivoted arm t , provided with cam-head v and pin w , as and for the purpose set forth.

16. In the machine described, the combination of frame I, provided with notched side rails and depending arm x , means for imparting a reciprocating motion to said frame from the main shaft, feed-roll J, table P, mounted as described, and pivoted arm t , provided with cam-head v and pin w , as and for the purpose set forth.

17. In the machine described, the combination of frame I, provided with notched side rails and depending arm x , means for imparting a reciprocating motion to said frame from the main shaft, rollers J L M N, table P, mounted as described, and pivoted arm t , provided with cam-head v and pin w , as described and shown.

18. In the machine described, the combination of frame I, provided with notched side rails and depending arm x , means for imparting a reciprocating motion to said frame from the main shaft, roller J, revolved by said frame during both its forward and rearward movements, rollers L M N, operated only during the rearward movement thereof, table P, and pivoted arm t , provided with cam-head v and pin w , as and for the purpose set forth.

19. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, pivoted arm g' , spring g^t , rod a , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, and stationary fingers e' , secured to frame I, the parts arranged as and for the purpose set forth.

20. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, pivoted arm g' , spring g^t , rod a' , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, stationary fingers e' , secured to frame I, and spring l' , the parts arranged as and for the purpose set forth.

21. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, stationary fingers e' , shaft c' , carrying-fingers d' , crank-arm b' , provided with plate h' , hook-shaped arm j' , and pin or projection k' , the parts arranged as and for the purpose set forth.

22. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, stationary fingers e' , spring l' , shaft c' , carrying fingers d' , crank-arm b' , provided with

plate h' , hook-shaped arm j' , and pin or projection k' , the parts arranged as described and shown.

23. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, the table P, means for operating said table by frame I, pivoted arm g' , spring g^4 , rod a' , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, and stationary fingers e' , secured to frame I, as and for the purpose set forth.

24. In the machine described, the combination of frame I, means for imparting motion thereto from the main shaft, table P, means for operating said table by frame I, pivoted arm g' , spring g^4 , rod a' , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, stationary fingers e' , secured to frame I, and spring l' , the parts arranged as and for the purpose set forth.

25. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, table P, means for operating said table by frame I, stationary fingers e' , shaft c' , fingers d' , secured thereto, crank-arm b' , provided with plate h' , hook-shaped arm j' , and pin or projection k' , as and for the purpose set forth.

26. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, table P, means for operating said table by frame I, stationary fingers e' , spring l' , shaft c' , fingers d' , secured thereto, crank-arm b' , provided with plate h' , hook-shaped arm j' , and pin or projection k' , as and for the purpose set forth.

27. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, table P, and rollers J L M N, operated by said frame, pivoted arm g' , spring g^4 , rod a' , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, and stationary fingers e' , secured to frame I, as and for the purpose set forth.

28. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, table P, and rollers J L M N, operated by said frame, pivoted arm g' , spring g^4 , rod a' , provided with lug f' , crank-arm b' , shaft c' , fingers d' , formed thereon, stationary fingers e' , secured to frame I, and spring l' , as and for the purpose set forth.

29. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft, table P, and rollers J L M N, operated by said frame, stationary fingers e' , shaft c' , carrying fingers d' , crank-arm b' , provided with plate h' , hook-shaped arm j' , and pin or projecting hook k' , as and for the purpose set forth.

30. In the machine described, the combination of frame I, means for imparting a reciprocating motion thereto from the main shaft,

table P, and rollers J L M N, operated by said frame, stationary fingers e' , spring l' , shaft c' , carrying fingers d' , crank-arm b' , provided with plate h' , hook-shaped arm j' , and pin or projection k' , as and for the purpose set forth.

31. In the machine described, the combination of frame I, provided with notched side rails, means for imparting motion thereto from the main shaft, shafts $f^2 k^2 c^2 p'$, intermediate gearing for driving said shafts from each other and frame I, and endless cords m' , as and for the purpose set forth.

32. In the machine described, the combination of shaft Q, means for driving said shaft from the main shaft, cam a^2 , mounted thereon, rod x' , provided with depending arm z' , inclined arm w' , clutch-wheel u' , and wheel b^2 , as and for the purpose set forth.

33. In the machine described, the combination of frame I, provided with notched side rails, means for imparting motion thereto from the main shaft, table P, means for imparting motion thereto from frame I, shafts $f^2 k^2 c^2 p'$, intermediate gearing for driving said shafts from each other and frame I, and endless cords m' , as and for the purpose set forth.

34. In the machine described, the combination of frame I, provided with notched side rails, means for imparting motion thereto from the main shaft, table P, rollers J L M N, and means for imparting motion thereto from frame I, shafts $f^2 k^2 c^2 p'$, intermediate gearing for driving said shafts from each other and frame I, and endless cords m' , as and for the purpose set forth.

35. In the machine described, the combination of cog t^2 , provided with cam u^2 , means for driving said cog from the main shaft, pivoted arm V, carrying roller s^2 , rod U, pivoted arm T, clutch S, sprocket-wheel R, fast and slow moving drying-chains X Y, and intermediate gearing for driving said chains from wheel R, as described and shown.

36. In the machine described, the combination of slotted arm v^3 , carrying pin w^3 , notched arm v^4 , adjustable stud u^3 , carrying a removable cog, t^3 , means for revolving said cog from the main shaft, cog t^2 , provided with cam u^2 , pivoted arm V, carrying roller s^2 , rod U, pivoted arm T, clutch S, sprocket-wheel R, fast and slow moving chains X Y, and intermediate gearing for driving said chains from wheel R, as described and shown.

37. In the machine described, the combination of fast and slow moving chains X Y, rod j^3 , frame k^3 , and crank-arm v^3 , secured to said rod, cord h^3 , sliding collar f^3 , provided with depending arm g^3 , shaft w^3 , cam m^3 , secured to said shaft, and means of driving said shaft from the main shaft, as described and shown.

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

LOUIS A. FERNON.

Witnesses:

M. J. CLAGETT,
LOUIS NOLTING.

It is hereby certified that the name of the patentee of Letters Patent No. 308,408, granted November 25, 1884, for an improvement in a Combined Paper Sizing and Drying-Machine, should have been written and printed *Louis A. Fernow* instead of "Louis A. Fernon;" and that the Letters Patent should be read with this correction therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 27th day of January, A. D. 1885.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.