(No Model.) 4 Sheets—Sheet 1.

R. BURNET.

PAPER FEEDING MACHINE.

No. 489,925. Patented Jan. 17, 1893.

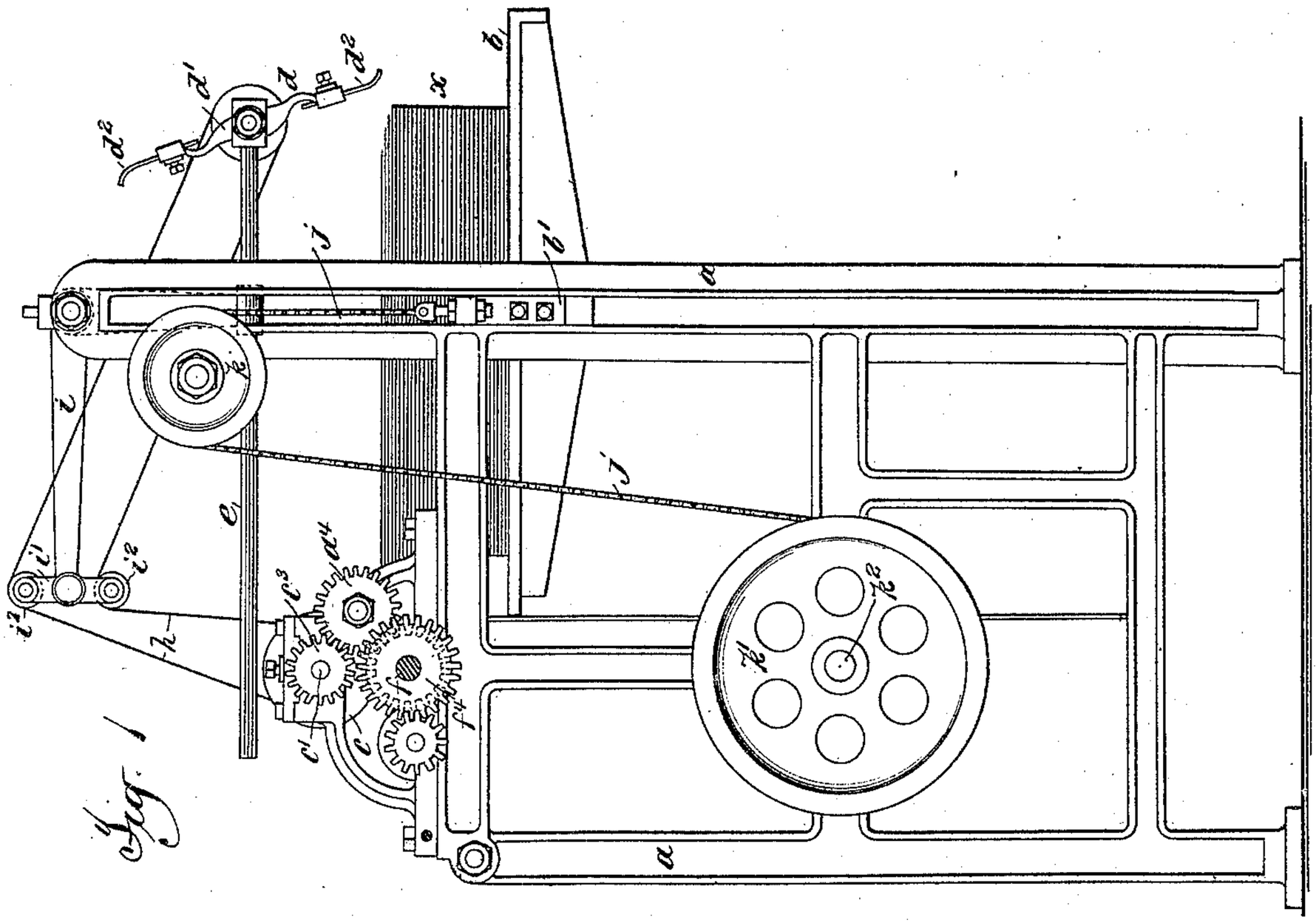

Fig. 1

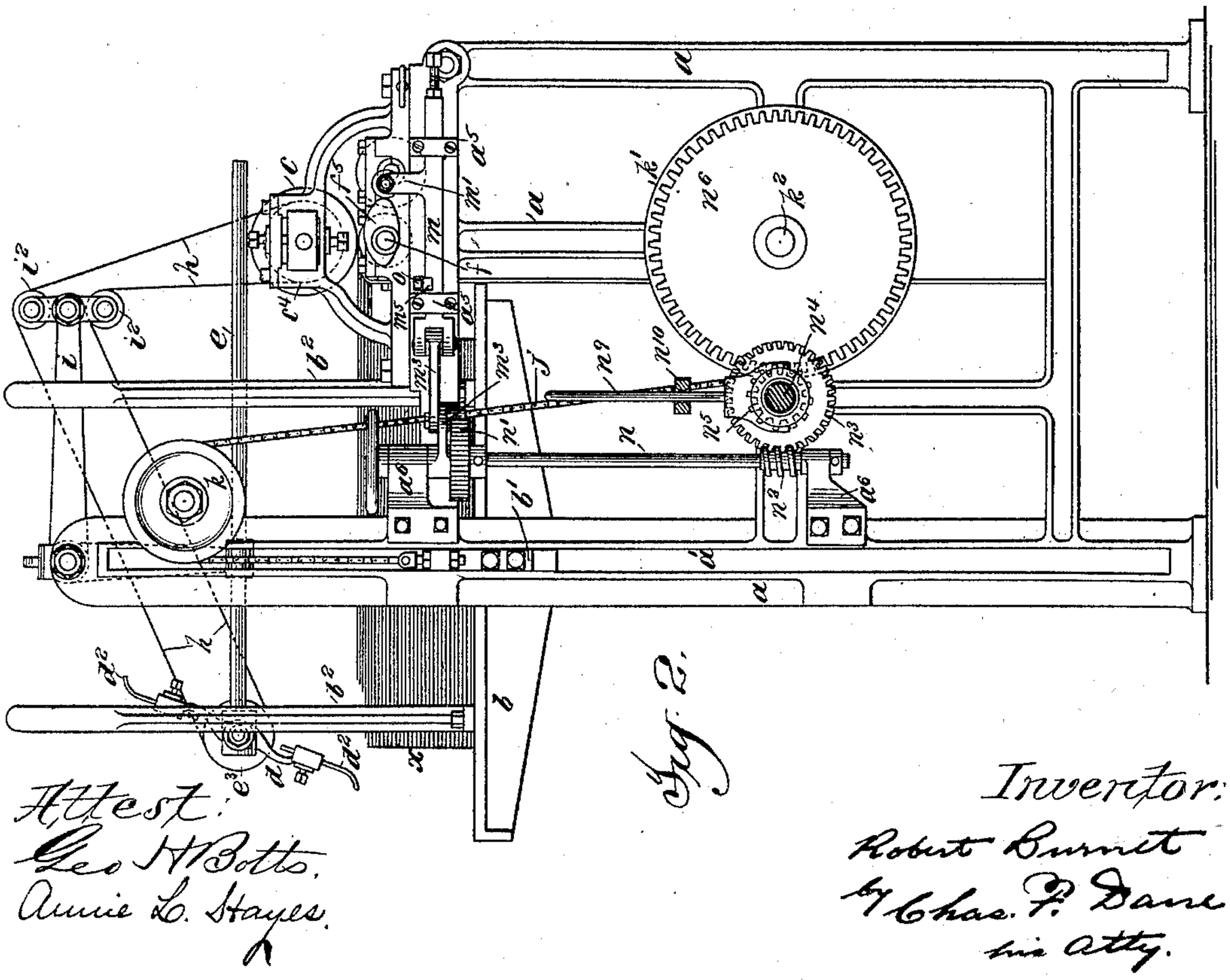

Fig. 2.

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(No Model.)

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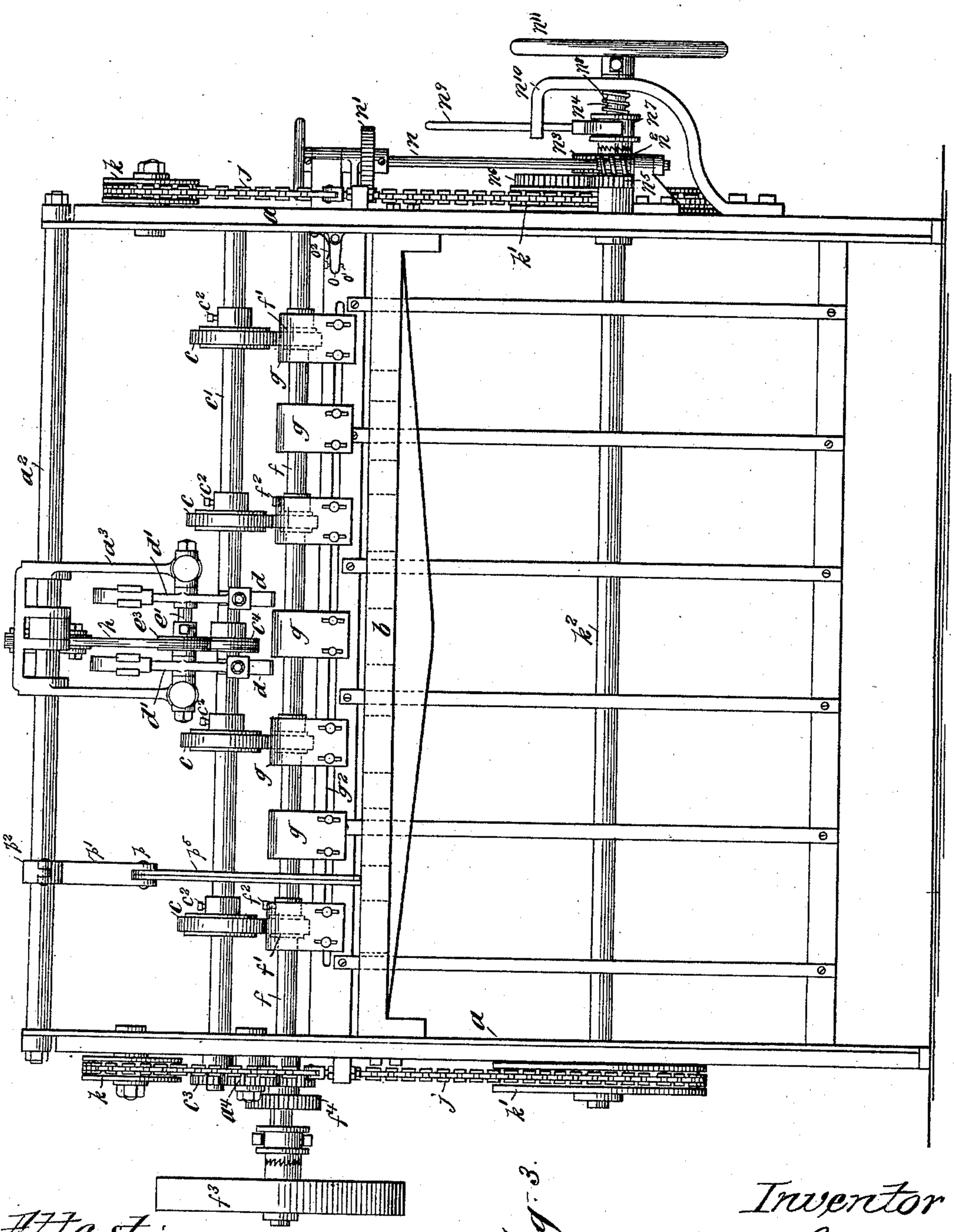

Fig. 3.

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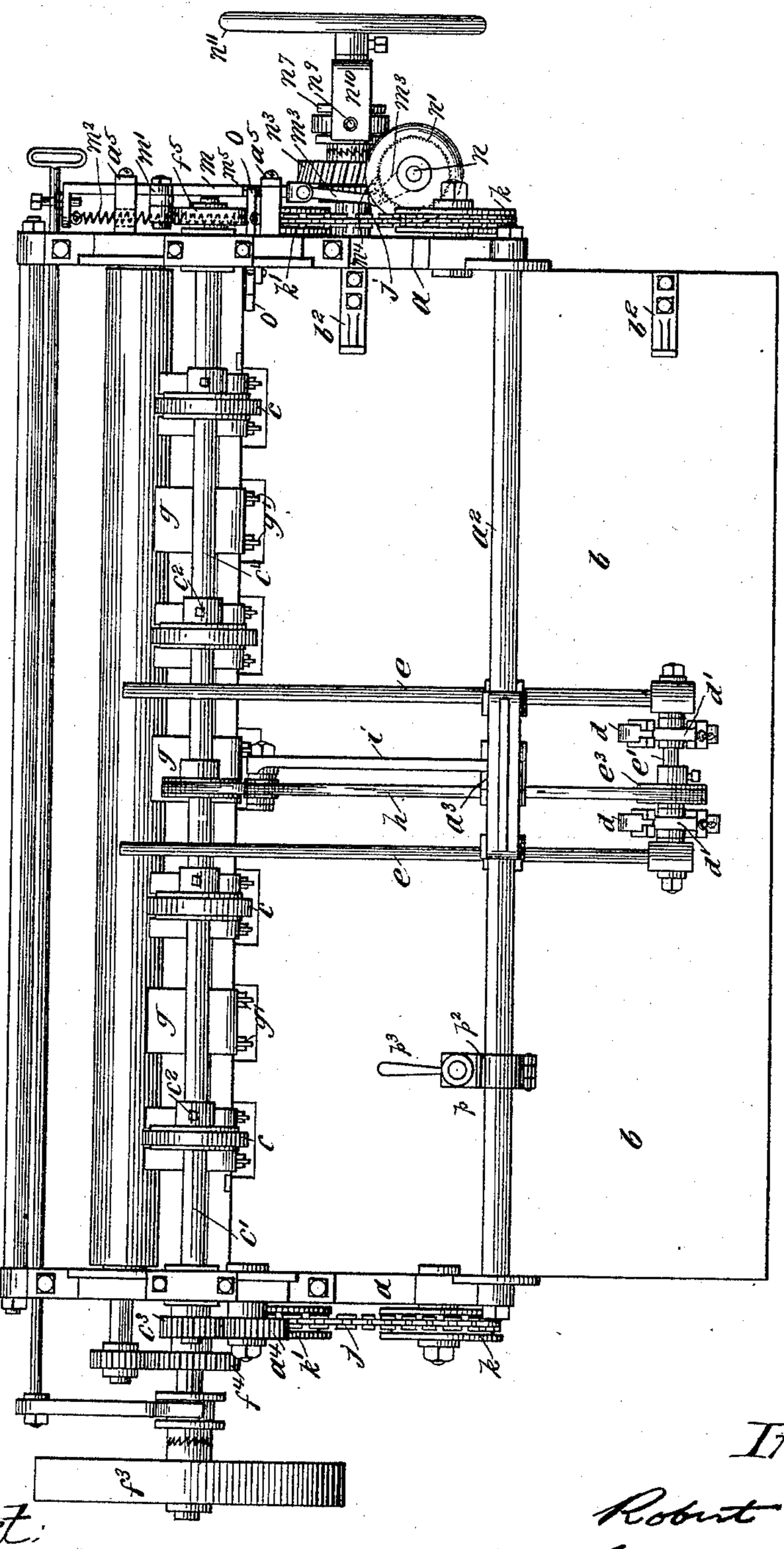

Fig. 4.

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Fig. 6.

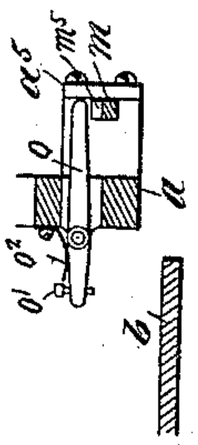
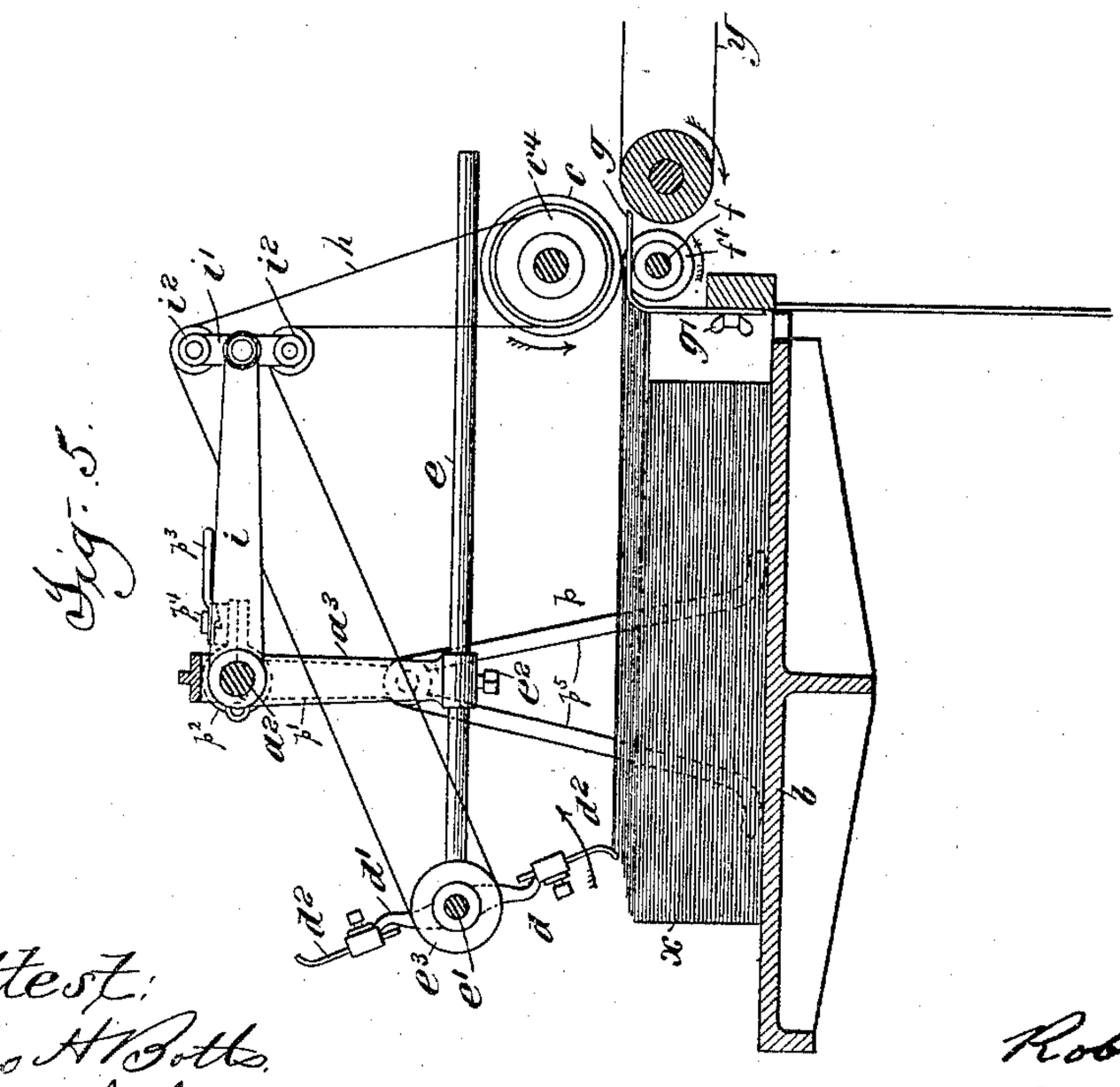


Fig. 5.



Attest:
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UNITED STATES PATENT OFFICE.

ROBERT BURNET, OF EAST ORANGE, NEW JERSEY.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,925, dated January 17, 1893.

Application filed January 5, 1892. Serial No. 417,049. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BURNET, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Paper-Feeding Machines, of which the following description, taken in connection with the drawings herewith accompanying, is a specification.

My invention relates to that class of machines adapted for automatically feeding single sheets of paper from a pile to a printing press, ruling machine, or other mechanism to be operated upon, and which are usually provided with a vertically movable table on which the pile of paper to be operated upon is placed, and with a frictional feeding roll for engaging the successive top sheets of said pile as the same are moved or fed upward and feeding the same therefrom to the machine by which they are to be operated upon.

My present invention consists, first,—in the means for operating or raising and lowering the table, secondly,—in the means for automatically stopping or limiting the upward movement of the table after all the sheets have been fed therefrom, thirdly,—in the means for feeding or moving the successive upper sheets of the pile located on the upwardly moving table, forward into position to be engaged by the feeding device or roll and be fed thereby to the machine by which they are to be operated upon, and fourthly,—in other details of construction and combination of parts as will hereinafter be set forth in detail and pointed out in the claims.

The object of this invention is to insure the regular and continuous supply of successive single sheets from the pile to the machine by which they are to be operated upon, and also simplify the construction and operation of such feeding machines or mechanism and provide for all necessary adjustments of the several parts of the same.

Referring to the drawings:—Figures 1 and 2, represent the opposite ends or sides of a machine embodying my invention. Fig. 3, represents a rear view of the same. Fig. 4, represents a top plan view of the same. Fig. 5, represents a vertical sectional view through the machine, showing an end or side view of the several operating parts for feeding the sheets from the pile, and the edge-guide. Fig. 6, represents a cross-section through a part of the supporting frame, table and reciprocating rod *m*, showing the lever or device for automatically stopping operation of the table raising mechanism when the table has reached its limit.

To explain in detail,—it will be understood that a feeding machine of the character above referred to forms an adjunct or attachment to the machine for which it acts as a feeder, and may therefore be built as a part of the same by having its several parts supported by the same supporting frame, or it may be built as an independent machine and be secured in the proper position adjacent to the said machine for which it acts as a feeder.

In the present instance as illustrated in the drawings, the machine is shown with an independent frame represented at *a*, as being the most convenient way of constructing the same in order that it may be moved or shifted to act as a feeder for different machines.

b, is the table or support upon which the pile of paper (represented at *x*) from which the successive single sheets are adapted to be fed is supported, and is provided with guide lugs *b'* upon opposite sides thereof which extend into vertical slots *a'* in the frame *a* to be guided thereby. As the table *b* is moved or fed upward by mechanism as will hereinafter be described, the upper sheets of the pile *x* are adapted to be moved or fed horizontally therefrom toward the rotating frictional feeding rolls or disk *c* and in position to be engaged thereby and fed to the machine by which they are to be operated upon, by means of one or more rotating "sheet separating and feeding" devices *d* which are supported or suspended above the table *b* and in position to engage the rear upper edge of the pile *x* and feed the sheets toward the feeding rolls in a manner as more clearly shown in Figs. 1, 2 and 5. This device *d* consists of a rod *d'* provided with broadened plates d^2 secured at its opposite ends to form enlarged engaging surfaces, and is centrally mounted on a revolving shaft *e'* which is supported in suitable bearings in one end of two horizontally adjustable rods *e*, *e*. These rods *e*, *e*, are sup-

ported in suitable openings in a hanger or support a^3 held by a cross-bar a^2 forming part of the main supporting frame a as more clearly shown in Figs. 3 and 5. The rods e, e, which might be connected by cross-rods and form a single frame if so desired, are held adjustable in the hanger or support a^3 by means of set-screws e^2, in order that the rotating feeding devices d may be adjusted to the upper position for engaging different sizes of paper at the same and proper point at the rear upward edge of the pile. The feeding devices d are also held laterally adjustable on their revolving supporting shaft e' by means of set-screws, in order that they may be adjusted for the different widths of paper. The broadened ends of the feeding devices d are slightly bent or curved rearwardly from their direction of travel in order to form a smoother and increased surface for contact with the edge of the pile x, as will be readily understood. During the rotation of the feeding device, its ends engage the upper edge of the pile in a small arc of its circle of rotation with a kind of sweeping action which tends to loosen and separate the sheets and at the same time moves or feeds each of the sheets engaged thereby toward the frictional feeding rolls c to a different degree of nearness, as will appear obvious by reason of the circle in which it rotates, and consequently moves the upper or top-most sheet the farthest and a sufficient distance to be engaged by the frictional feeding rolls c and be fed or carried thereby from the pile. This continued action of the feeding devices d on the pile as the same is moved upward causes each succeeding sheet to be moved forward in position to be engaged by the rolls c as soon as the preceding sheet has been carried therefrom, as will be readily understood.

The plates d^2 which form the engaging ends of the feeding devices d, are shown in the drawings as detachably secured to the rod d', although it will be obvious that the same may be formed integral therewith.

The frictional feeding roll which is adapted to engage the sheets on the pile x, after being moved in the proper position by the rotating feeding devices d, and feed the same from the said pile x to the endless apron (represented at y in Fig. 5) or other device adapted for carrying or delivering the sheets to the machine by which they are to be operated upon, is formed of several wheels or disks c located on a revolving shaft c' which is mounted in suitable bearings on the frame a. The peripheries of these wheels are provided with rubber or similar material to produce a suitable frictional surface.

In order to support the sheets as they are drawn from the pile by the frictional feeding roll c and until they have been received by the carrying apron y, I have provided plates or shields g which extend horizontally beneath the rolls c to form a supporting and guiding surface for the sheets, and are secured in a laterally adjustable position (for the purpose as will be described) on the frame a by means of set-screws g' fitted to a longitudinal slot g^2 in the frame a. I have also provided a "separator roll" so-called, which is adapted to act as a supplemental device to the said sheet separating and feeding device d to separate any sheet or sheets from the top-most one that might be drawn or carried thereby when being fed from the pile, which consists of a revolving shaft f mounted in suitable bearings on the frame a and provided with rolls or disks f' located thereon beneath and adjacent to the frictional feed-rolls c with their upper edges projecting slightly above the upper surface of the plates or shields g through slots therein. This separator roll rotates in a direction opposite to the adjacent rotating face of the frictional roll c (as shown by arrows in Fig. 5) and presents a rotating friction surface above the surface of the shields g to the forward edge of the sheets as they are fed by the rotating feeding devices d toward the same, and tends to push back any under sheets that might stick or otherwise be drawn by the top sheet when moved from the pile by the frictional feeding roll c, and thus insure the delivery of single sheets only.

In order to prevent the resistance made by the separator roll to the top or that sheet adapted to be carried forward by the friction feeding roll c, from obstructing such forward movement of the sheet, I have made the engaging surface of the same harder and smoother than the feeding roll c, in such manner they will not materially interfere with the forward movement of the sheet carried by the feeding roll c but only separate and hold back any that might be carried therewith by friction or otherwise.

The separator rolls f' and the frictional feeding rolls c are held laterally adjustable on their supporting shaft, by means of set-screws f^2 and c^2 respectively, as more clearly shown in Fig. 3, in order that the same may be adjusted for paper of different widths.

The plates or shields g, are laterally adjustable on the frame a as hereinbefore set forth, in order that they may be shifted or adjusted with the separating rolls which project through the slots in the same.

The shaft f upon which the separator rolls or disks f' are secured, is provided with a driving wheel f^3 thereon and forms, in the present instance illustrated, the main driving shaft from which the other moving parts of the machine receive their motion through the medium of suitable gearing and connecting mechanism as will be described.

The feed roll shaft c' and separator roll shaft f are each provided with a gear c^3 and f^4 respectively, at one end thereof as more clearly shown in Fig. 1, and the feed roll is operated by the separator roll and in a direction to have their adjacent faces rotate in opposite directions as and for the purpose de-

scribed, through the medium of an intermediate gear a^4 secured on the frame a.

The revolving shaft e' on which the sheet separating and feeding devices d are mounted, is operated or driven by the feed-roll shaft c'; motion being communicated by a connecting driving belt h which operates on pulley wheels located on said shafts, and represented at e^3 and c^4 respectively.

The driving-belt h is adapted to be adjusted to allow for the horizontal movement or adjustment of the shaft e' upon which the feeding devices d are supported, by means of a belt-adjuster or tightener which is supported by the cross-bar a^2 of the supporting frame a. This belt-tightener consists of an arm i which is adjustably supportedat one end on the said cross-bar a^2 of the frame a by means of a set-screw or similar adjusting means, and at or near its opposite end is provided with a block or frame i' attached thereto which is provided with pulley wheels i^2, i^2, mounted therein over which the said driving belt operates. By raising or lowering the outer end of the belt-adjuster the belt may be adjusted to allow for horizontal movement of the shaft e' as will be readily understood.

The table b upon which the paper is adapted to be placed to be fed or raised upward to the frictional feeding rolls c as before described, is raised by chains or other flexible connection j located at each side of the frame, which connect at one end with the side of the table as more clearly shown in Figs. 1 and 2, and pass therefrom over a pulley k secured at opposite sides of the frame a at a point above the top limit of movement of the table b and in such position as to cause the chain to draw in a vertical line with the movement of said table; and at their opposite ends the said chains connect with a drum or wheel k' located on the opposite ends of a shaft k^2 which is supported in suitable bearings on the frame a with its ends projecting the opposite sides of the same as shown. The shaft k^2 is adapted to be revolved or partially so to rotate the drums or wheels k' and wind the connecting ends of the chains j thereon for the purpose of raising the table b, by mechanism as will be described.

The driving shaft f is provided with a cam or eccentric f^5 at or near one end thereof as more clearly shown in Fig. 2, which is adapted to engage an arm m' or a roll supported thereon, which projects from a horizontally arranged shaft m supported in suitable bearings a^5, a^5, at one side of the frame a, and move said shaft positively in one direction; a coiled spring m^2 (as shown in Fig. 4,) being employed to move the same back or in the opposite direction to its usual position. This reciprocating shaft has a loose toggle-link connection, by means of links m^3, m^3, with a vertically arranged shaft n which is supported in bearings a^6, a^6, on the frame a. The links m^3 are held at an angle to each other when the shaft m is in a normal position at one end of its stroke and are moved to a straight line or nearly so when the said shaft is moved to the opposite end of its stroke by the operating cam f^5, thus producing a vibratory movement at their point of connection as will be readily understood. And I have secured a pawl m^4 to said toggle-link to be operated thereby, which is adapted to engage a ratchet wheel n' secured on the said vertical shaft n to operate or rotate the latter. The shaft n when thus operated is adapted to operate the shaft k^2 for the purpose as hereinbefore set forth, through the medium of a worm n^2 located thereon which meshes with and operates a worm-wheel n^3 located on a shaft n^4 supported by the frame a, to operate the latter shaft and cause a gear n^5 which is secured thereon to operate a toothed wheel or disk n^6 with which it meshes and which is secured on the said shaft k^2 to operate the latter. By this described mechanism a positive and uniform upward movement of the table is secured.

When the pile of sheets has been fed or delivered from the table b, the latter is automatically stopped in its upward movement by means of a stop-device o, which consists of a lever pivoted to the frame a or part thereof and having one end project over the reciprocating shaft m, and its opposite end over the table b (as shown in Figs. 3, 4 and 6) in such manner that the latter, when at its upward limit, engages the overhanging end of the lever or an adjusting-screw o' supported therein, and throws its opposite end into a notch or depression m^5 in the upper edge of the reciprocating shaft m when the latter has reached the limit of its forward movement and locks the same from movement, thus stopping operation of the table raising mechanism. That end of the lever o projecting over the shaft m is normally held from engagement with the latter by a spring o^2.

It is desirable that the table b may be lowered quickly and without loss of time after the pile of sheets has been fed therefrom, and to provide for this purpose, I have located the worm-wheel n^3, which is adapted to communicate motion from its driving mechanism to the shaft n^4, loosely upon said shaft, and have provided a clutch n^7 on the latter for detachable connection with the worm-wheel to make same fast and loose on the shaft n^4 as desired. The clutch n^7 is normally held in engagement with the worm-wheel n^6 by a spring n^8 as more clearly shown in Fig. 3, and is adapted to be operated to be moved from engagement therewith by means of a lever n^9 which is supported and pivoted in an arm or bracket n^{10} projecting from the frame a, and has connection at one end with said clutch as clearly shown in Fig. 3. When it is desired to lower the table b, the clutch is disconnected from the worm-wheel n^3 to allow the shaft n^4 to operate independently of the latter and its operating mechanism, and enable the operator to quickly lower the table by turning the shaft

n^4 which has connection with the drum supporting shaft k^2 by gearing n^5 and n^6 as described.

The shaft n^4 is provided with a hand-wheel n'' thereon as a convenient means for operating the same.

The table b is provided with two vertically arranged arms b^2 b^2 on its upper surface and at one end thereof to form an edge-guide for the pile x. And I have also provided an edge-guide p for the opposite side of the pile, which is laterally adjustable for sheets of different sizes and is supported upon the cross-bar a^2 of the supporting frame. This edge-guide p consists of a supporting rod p' provided with a hinged jaw p^2 which is adapted to overlap or embrace the cross-bar a^2 and be adjustably connected with the rod p' or part thereof to clamp the bar a^2, by means of a lever p^3 (as more clearly shown in Fig. 5) having a double cam surface which operates on a corresponding surface on the jaw p^2 and has connection with the rod p' to draw the parts together, by means of a connecting pin or bolt p^4. The supporting rod p' is provided with two guide-arms p^5 pivotally attached thereto which hang downwardly adjacent to the side of the pile x with their lower ends in contact with the table b (as shown in Fig. 5,) in such manner as to spread apart to allow for the upward movement of the table and yet retain their position at the side of the pile.

Having thus set forth my invention what I claim as new, and desire to secure by Letters Patent of the United States, is.—

1. In an automatic paper-feeder, the combination with a support or table for the pile of sheets and a device for engaging and carrying the sheets therefrom located adjacent to the forward edge of said pile, of a feeding device located adjacent to the rear edge of said pile and in position to engage the several upper sheets, to separate and move the same forward different degrees of nearness to the forwardly located feeding or carrying device, substantially as described and for the purpose set forth.

2. In an automatic paper-feeder, the combination with a support or table for the pile of sheets and a friction feeding roll for engaging and carrying the sheets therefrom located adjacent to the forward edge of the said pile; of a rotating feeding device located adjacent to the rear edge of said pile, with its engaging surface or ends engaging the rear edge of the latter in the arc of a circle to separate and move the several upper sheets forward different degrees of nearness to the forwardly located feeding or carrying device, substantially as described and for the purpose set forth.

3. In an automatic paper feeder, the combination of a vertically moving support or table for carrying a pile of sheets, a feed or carrying roll or device located adjacent to the forward edge of the said pile, and a rotating feeding device, consisting of one or more arms supported on a rotating shaft and provided with curved ends extending in a direction from their line of movement, located in a position to engage the rear edge of said pile and separate and move the several upper sheets forward different degrees of nearness to the said carrying device, substantially as described and for the purpose set forth.

4. In an automatic paper-feeder, the combination with a vertically moving table, and mechanism for operating the same comprising a reciprocating rod or shaft, means for operating the latter positively in one direction and yieldingly in the opposite direction, and means connecting said rod or shaft and the said table; of a pivoted lever having one end extend into the path of the vertically moving table to be engaged thereby and operated to throw its opposite end into engagement with a notch or projection in said reciprocating rod or shaft, substantially as described and for the purpose set forth.

5. In an automatic paper feeder, the combination with a support or table for a pile of sheets, a feed roll or device located adjacent to the forward edge of said pile of sheets, and a rotating feeding device consisting of one or more arms supported in a horizontally adjustable position on a rotating shaft and adapted to engage the said sheets at the rear edge thereof, substantially as described and for the purpose set forth.

6. In an automatic paper feeder, the combination with a friction feeding roll, and a vertically movable table for supporting and carrying a pile of sheets upwardly, of a rotating feeding device adapted for engaging one edge of said pile to move the sheets into position to be engaged by the friction roll, supported by a horizontally adjustable frame, a driving belt for operating said rotating feeding device, and a belt-adjuster or tightener to allow for the adjustment of the rotating feeding device, substantially as and for the purpose set forth.

7. In an automatic paper feeder, the combination with a friction feeding roll, and a vertically movable table for supporting and carrying a pile of sheets upwardly, of a feeding device consisting of a rotating shaft supported by a horizontally adjustable frame and provided with one or more arms thereon for engaging one edge of said pile to move the sheets into position to be engaged by the friction roll, substantially as and for the purpose set forth.

8. In an automatic paper feeder, the combination with a support or table for a pile of sheets, a feed roll or device located adjacent to the forward edge of the pile of sheets, and a horizontally adjustable frame supported by the main supporting frame or part thereof and provided with a rotating feeding device supported thereby adapted for engaging the rear edge of said pile of sheets, substantially as described and for the purpose set forth.

9. In an automatic paper-feeder, the combination with a friction feeding roll and a

separator roll located beneath the same with their adjacent faces rotating in opposite directions, and a vertically movable table adapted to support and move a pile of sheets upwardly; of a feeding device, consisting of a rotating shaft carrying one or more arms, located adjacent to the rear edge of said pile for engaging the several upper sheets to separate and move the same forward different degrees of nearness to the said feeding and separating rolls, the friction feeding roll being rotated in a direction to draw the upper sheet forward from the pile, and the separator roll being rotated to push the under sheets backward, substantially as and for the purpose set forth.

10. In an automatic paper feeder, the combination of a feeding roll or device, a vertically movable table for supporting and carrying a pile of sheets upwardly to be engaged by the said feeding roll or device, and having connection with a revolving drum or wheel to be operated thereby through the medium of a chain or other flexible connection, and mechanism for operating said drum, consisting of an operating shaft provided with a cam or eccentric thereon, a reciprocating rod operated by the latter and adapted to operate a pawl carried thereby to cause the same to engage with a ratchet wheel located on a vertical shaft to rotate the latter and communicate motion to the said rotating drum through the medium of connecting gearing, substantially as and for the purpose set forth.

11. In an automatic paper feeder, the combination with a feed roll, of a vertically movable table adapted for supporting and carrying a pile of sheets upward to be engaged by the said feed roll, and operated by a revolving drum or wheel through the medium of a chain or other flexible connection, mechanism for operating said drum or wheel, consisting of a vertically arranged shaft rotated by the main operating shaft through the medium of connecting mechanism, and having connection with the said drum or wheel through the medium of connecting gearing, and a clutch for adjustably connecting or disconnecting the said drum and its operating mechanism, substantially as and for the purpose set forth.

12. In an automatic paper feeder, the combination with a feeding device and a vertically movable table for supporting and carrying a pile of sheets upwardly to be engaged by said feeding device, of an edge guide for said sheets, consisting of a supporting arm or hanger supported in a laterally adjustable position above the said table on a shaft forming part of the supporting frame, and provided with one or more downwardly hanging arms pivotally connected therewith, adapted to move outwardly from a vertical line when engaged by the upwardly moving table, substantially as described and for the purpose set forth.

13. In an automatic paper feeder, the combination with a vertically moving table having connection with a revolving drum or wheel to be operated thereby through the medium of a chain or other flexible connection, of mechanism for operating said drum or wheel, consisting of an operating shaft provided with a cam or eccentric thereon, a reciprocating rod operated by the latter and adapted to operate a pawl carried thereby to cause the same to engage with a ratchet wheel located on a shaft to rotate the latter and communicate motion to the rotating drum through the medium of connecting gearing, and a pivoted lever operated by contact with the vertically moving table to engage said reciprocating rod to stop the same and the connecting table operating mechanism, substantially as described and for the purpose set forth.

14. In an automatic paper feeder, the combination with a feeding device and a vertically movable table for supporting and carrying a pile of sheets upwardly to be engaged by said feeding device, of an edge-guide for said sheets, consisting of a supporting arm or hanger provided with one or more arms pivoted thereto, and supported in a laterally adjustable position above the said table on a shaft forming part of the supporting frame, by means of two hinged clamping jaws, adapted to be adjustably clamped together by a lever having a double cam surface operating on a corresponding surface on one of said jaws and having connection with the other jaw by a connecting pin or bolt, substantially as described and for the purpose set forth.

15. In an automatic paper feeder, the combination of a feed roll or device, a vertically movable table operated by a revolving drum or wheel having connection therewith through the medium of a chain or other flexible connection, and mechanism for operating said drum or wheel, consisting of an adjusting and rotating shaft operated by the driving shaft through the medium of a reciprocating rod and connecting mechanism and having connection with the said drum or wheel to communicate motion thereto through the medium of suitable gearing, substantially as described and for the purpose set forth.

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Witnesses:
CHAS. F. DANE,
ANNIE L. HAYES.