

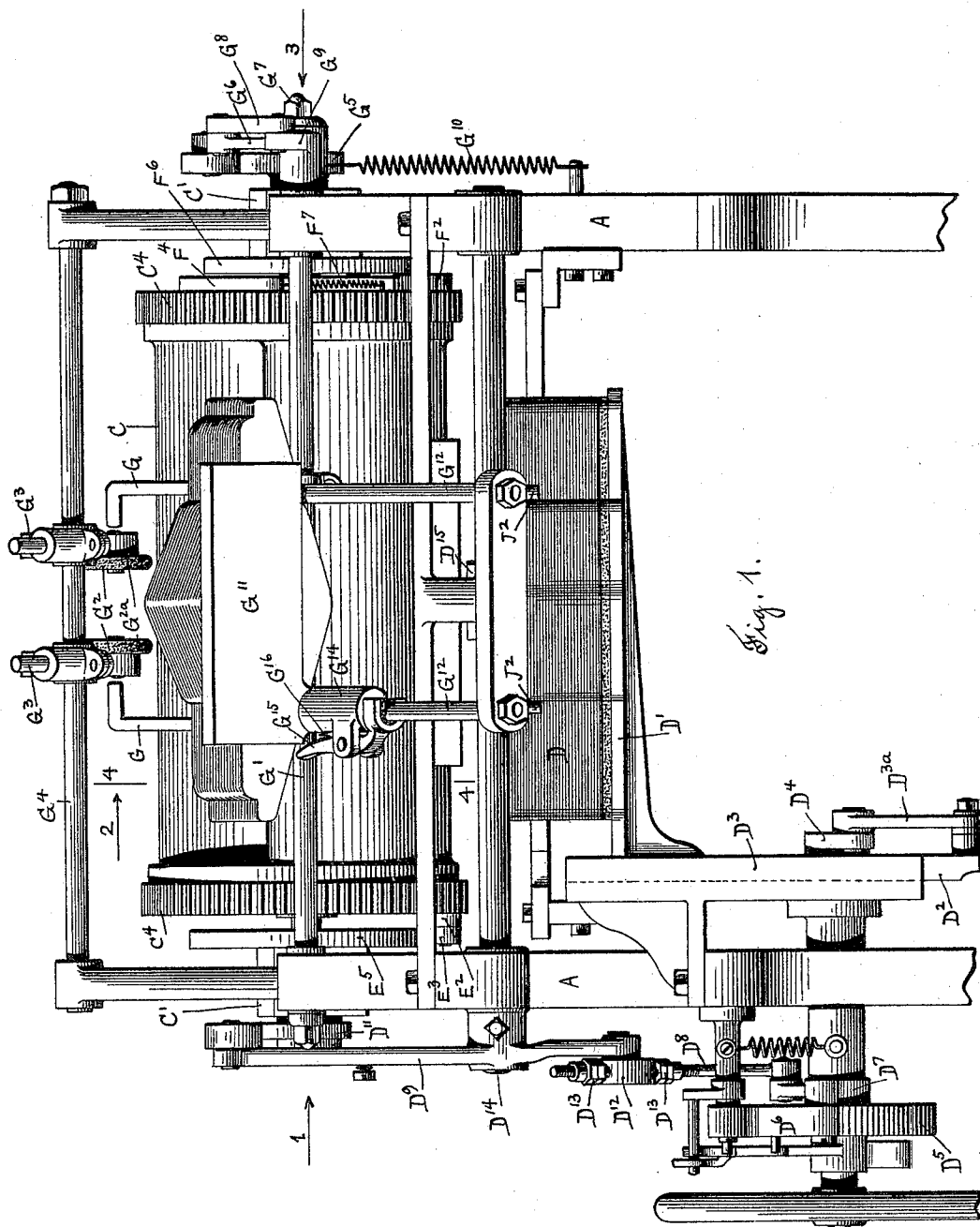
(No Model.)

5 Sheets—Sheet 1.

H. D. & D. W. SWIFT.  
PRINTING MACHINE.

No. 585,296.

Patented June 29, 1897.



Witnesses  
Chas. F. Schuch  
Emma Kester

Inventors  
Henry D. Swift,  
Daniel Wheeler Swift,  
By their Attorney  
Rufus B. Fowler,

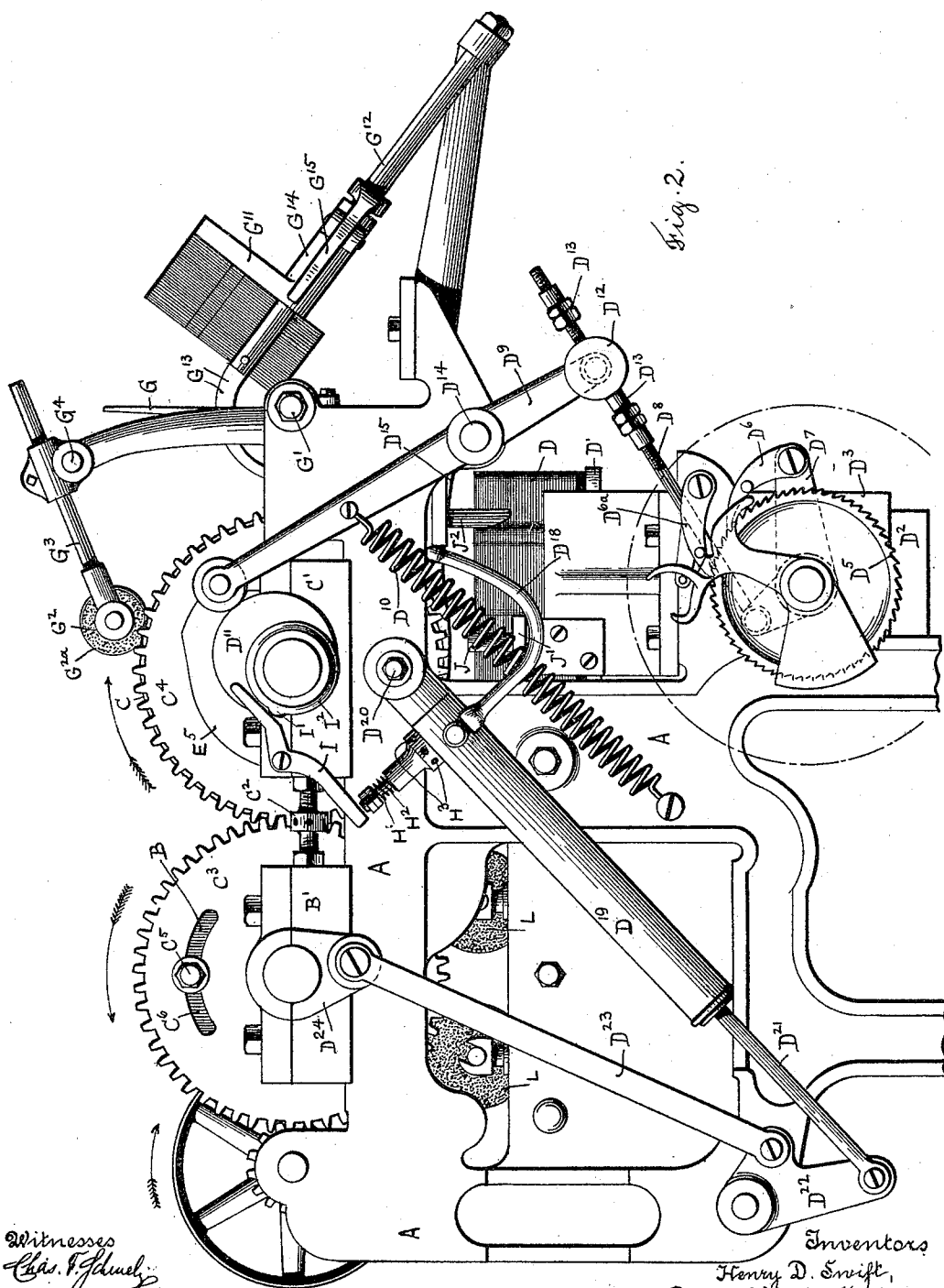
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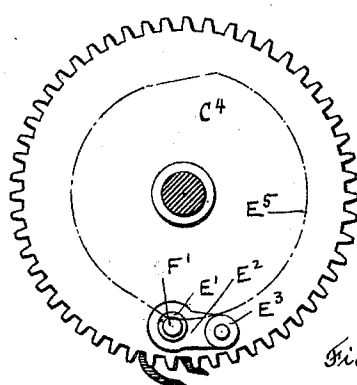


Fig. 3.

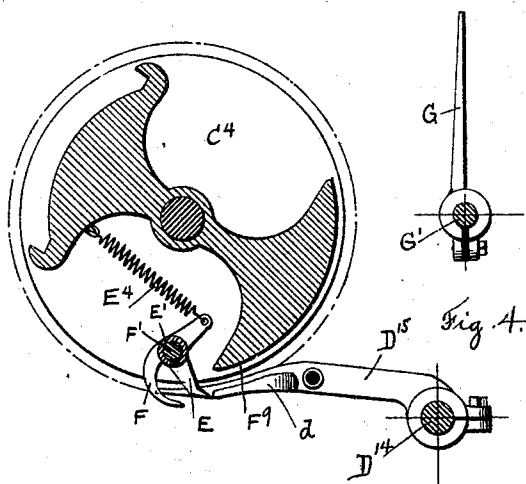


Fig. 4.

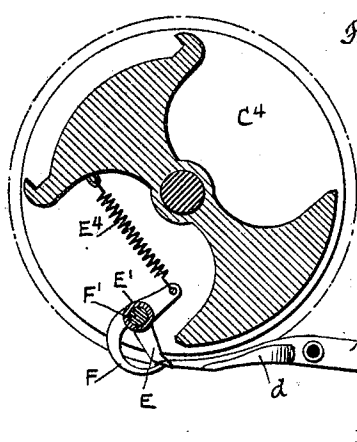


Fig. 5.

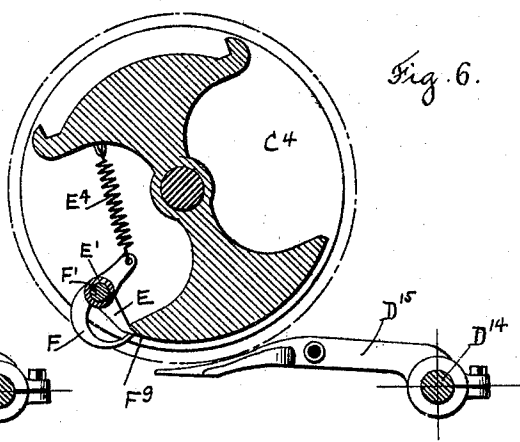


Fig. 6.

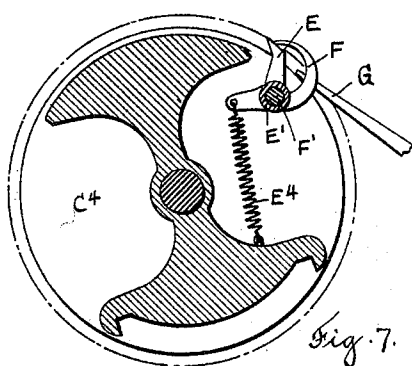


Fig. 7.

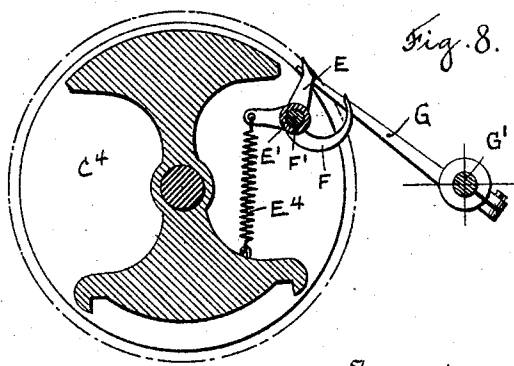


Fig. 8.

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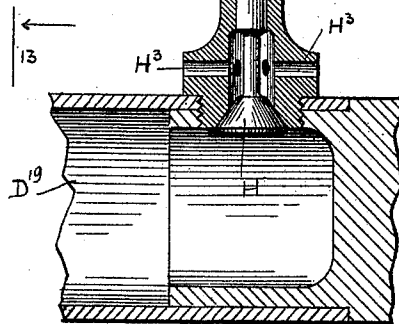
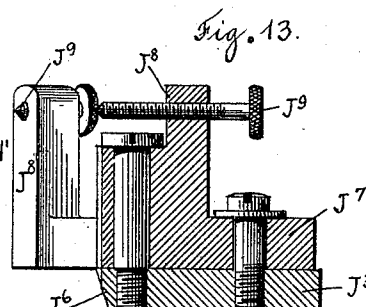
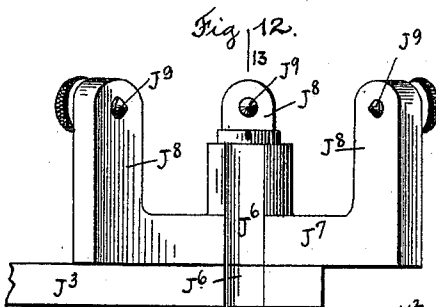
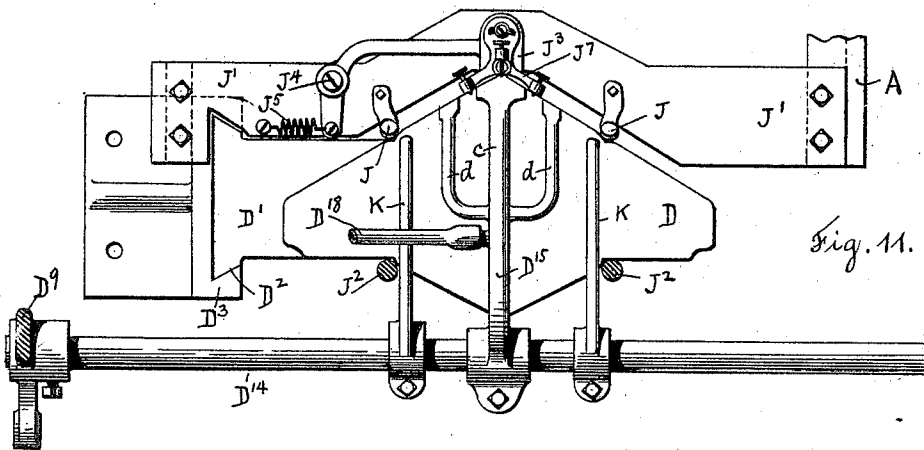
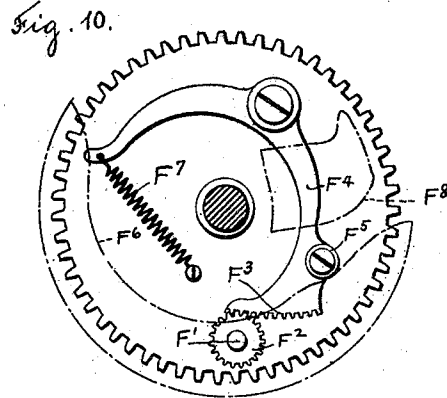
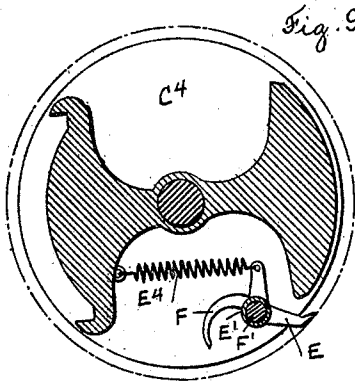
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Patented June 29, 1897.



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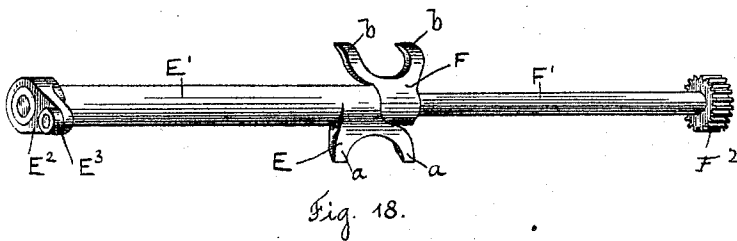
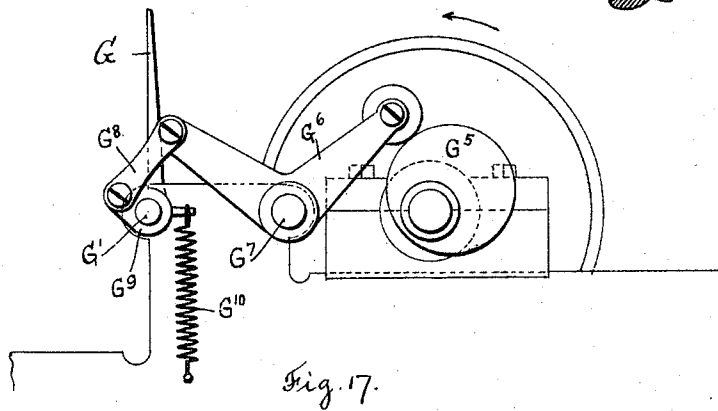
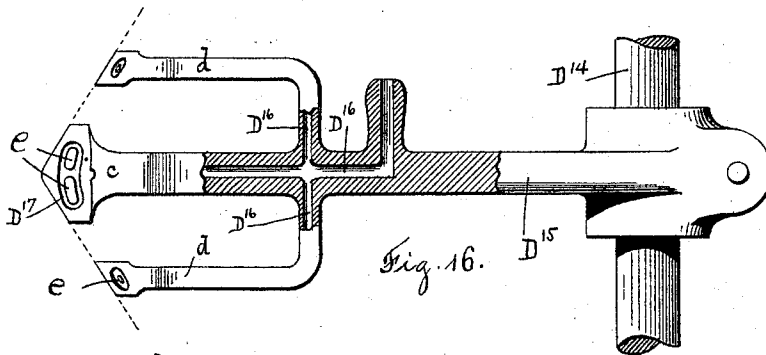
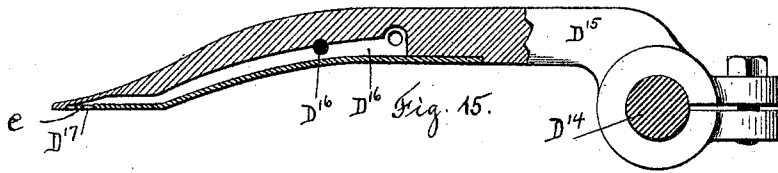
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# UNITED STATES PATENT OFFICE.

HENRY D. SWIFT AND DANIEL WHEELER SWIFT, OF WORCESTER,  
MASSACHUSETTS.

## PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,296, dated June 29, 1897.

Application filed October 29, 1892. Serial No. 450,401. (No model.)

*To all whom it may concern.*

Be it known that we, HENRY D. SWIFT and DANIEL WHEELER SWIFT, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Printing-Presses, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same.

Our present invention relates to that class of printing-presses known as "rotary," which are arranged to print single sheets, instead of a continuous web, of paper; and it relates particularly to that part of the operative mechanism by which the paper is fed to and taken off from the impression-cylinder.

The accompanying drawings represent a printing-press especially designed for printing envelop-blanks and embodying our invention.

Figure 1 is a front view of the machine. Fig. 2 is a side view showing the left side as represented in Fig. 1. Fig. 3 is an end view of the impression-cylinder looking in the direction of the arrow 1, Fig. 1. Figs. 4 to 9, inclusive, represent sectional views of the impression-cylinder on line 4 4, looking in the direction of the arrow 2, Fig. 1, and designed to show the several positions assumed by the grippers during a revolution of the impression-cylinder. Fig. 4 shows the grippers as nearly closed upon the paper blank which has been raised from a pile of blanks by the pneumatic finger. Fig. 5 represents the grippers as closed upon the paper blank. Fig. 6 shows the grippers closed and moved into alinement with the surface of the cylinder. Fig. 7 represents the grippers as carried out in order to raise the printed sheet from the cylinder and allow the ends of the fly-fingers to pass beneath it. Fig. 8 represents the grippers open to release the sheet. Fig. 9 represents the grippers open with the outer jaw moved in toward the center of the cylinder to clear the paper blank held by the pneumatic finger and with the inner jaw moved out so the face of the jaw will correspond with the lower surface of the pneumatic finger when the grippers arrive at the

position shown in Fig. 4. Fig. 10 is an end view of the impression-cylinder looking in the direction of the arrow 3, Fig. 1. Fig. 11 is a top view of the feeding-table and pneumatic finger and showing the pivoted "separator." Fig. 12 is a front view of a portion of the separator. Fig. 13 is a sectional view of the same on line 13 13, Fig. 12. Fig. 14 represents in central sectional view a portion of the air-pump cylinder and valve by which air is admitted to break the vacuum. Fig. 15 is a central sectional view of the pneumatic finger on line 15 15, Fig. 16. Fig. 16 is a view of the under side of the pneumatic finger with a portion broken away to disclose the interior air-passages. Fig. 17 shows in detail the operative mechanism for vibrating the fly-fingers, and Fig. 18 is a perspective view of the grippers and gripper-shafts.

Similar letters refer to similar parts in the different figures.

Referring to the drawings, A denotes the frame of the machine, B the type-cylinder, and C the impression-cylinder, journaled in boxes B' and C'. The boxes B', of which only one is shown, are fixed upon the frame, and the boxes C' are united to the boxes B' by right and left hand screw-threaded bolts C<sup>2</sup>, by which they are adjusted to bring the axes of the cylinders parallel and the proper distance apart.

The cylinders are geared together by gear-wheels C<sup>3</sup> and C<sup>4</sup>, attached to each end of the cylinders, the gears upon one of the cylinders being adjustable by set-screws C<sup>5</sup> and slots C<sup>6</sup>, so the teeth of the gears upon opposite ends of the cylinders can be made to crowd against the teeth of their engaging gears, thereby taking up any lost motion and cause the rotary motion of one of the cylinders to be accurately imparted to the other and prevent any slurring of the printing. The sheets to be printed are placed in a pile D upon a table D', carried by a slide D<sup>2</sup>, held in the vertical ways D<sup>3</sup> and connected by a link D<sup>3a</sup> with a crank-arm D<sup>4</sup> on the shaft of the ratchet-wheel D<sup>5</sup>, which is intermittently rotated by a pawl D<sup>6</sup> on the arm D<sup>7</sup>, pivoted concentrically with the ratchet-wheel and connected by a rod D<sup>8</sup> with a vibrating lever

D<sup>9</sup>, actuated by a spring D<sup>10</sup> and by an eccentric D<sup>11</sup> upon the shaft of the impression-cylinder C.

The action of the vibrating lever D<sup>9</sup> is adjusted by a sleeve D<sup>12</sup>, swiveled upon the lever and loosely inclosing the rod D<sup>8</sup> between the adjustable nuts D<sup>13</sup>. The vibrating lever D<sup>9</sup> is attached to a rock-shaft D<sup>14</sup>, journaled in the frame of the machine, to which is attached the three-pronged finger D<sup>15</sup>, extending over the pile of blanks D, so that when the blanks have been raised into the path of the finger D<sup>15</sup> the rocking motion of the lever D<sup>9</sup> is limited and the feeding motion of the table is checked until the pile of blanks is reduced, allowing the finger D<sup>15</sup> to fall far enough to permit another tooth of the ratchet D<sup>5</sup> to be engaged by the actuating-pawl D<sup>6</sup> and the blanks to be again raised and held by the retaining-pawl D<sup>6a</sup>. The finger D<sup>15</sup> is preferably provided with three prongs containing an air-passage D<sup>16</sup>, Fig. 16, terminating at the ends of the prongs and upon their under side in openings or ducts D<sup>17</sup>. The ends of the prongs are flattened on their under sides, as shown in Figs. 15 and 16, and are arranged to act as pressure-fingers on the pile of blanks, the under surface of the fingers being in the same plane.

The air-passages D<sup>16</sup> are connected by a flexible tube D<sup>18</sup> with an air-pump consisting in the present instance of a cylinder D<sup>19</sup>, pivoted upon a stud D<sup>20</sup> and containing a reciprocating piston whose rod D<sup>21</sup> is connected with an oscillating arm D<sup>22</sup>, actuated through the pitman-rod D<sup>23</sup> by the crank-arm D<sup>24</sup> upon the shaft of the type-cylinder B. The downward movement of the piston exhausts the air from the passages D<sup>16</sup> at the period of contact of the pneumatic finger with the upper blank upon the pile D, causing a vacuum to be produced and the forward edge of the blank beneath the ducts D<sup>17</sup> to be lifted by the upward motion of the pneumatic finger D<sup>15</sup> into the position to be seized by the grippers carried by the impression-cylinder C. The grippers consist of an inner jaw E, carried by the end of a hollow shaft E', and an outer jaw F, carried by a shaft F', concentric with the shaft E', and both journaled in the ends or heads of the cylinder C, which is recessed to receive them.

To the end of the hollow shaft E' and outside the gear-wheel C<sup>4</sup> is a crank-arm E<sup>2</sup>, carrying a roll E<sup>3</sup>, held in contact by a spring E<sup>4</sup> with a cam E<sup>5</sup>, attached to the inner side of one of the boxes C' and which is represented by broken lines in Fig. 3.

To the end of the shaft F', carrying the outer jaw F, we attach a pinion F<sup>2</sup>, engaged by the rack F<sup>3</sup> on the end of a lever F<sup>4</sup>, pivoted on the end of the impression cylinder. The rack F<sup>3</sup> is curved concentrically with the pivot of the lever, and the lever is provided with a cam-roll F<sup>5</sup>, carried by the rotation of the cylinder C into contact with a fixed cam F<sup>6</sup> attached to the inner side of one of the

boxes C', causing the shaft F' to be rocked and the outer jaw opened. A spring F<sup>7</sup> acts against the cam F<sup>6</sup>, causing the jaw to close with pressure upon the paper blank when released from the cam F<sup>6</sup>; but in order to secure a positive action of the jaw in closing independently of the spring F<sup>7</sup> we provide a cam F<sup>8</sup>, also attached to the box C', which serves to close the jaw. The revolution of the cylinder C will cause the jaws E and F to be independently moved into the several positions shown in Figs. 4 to 9, inclusive. As the grippers are brought into position to seize the blank raised by the pneumatic finger D<sup>15</sup> the face of the jaw E is carried into the plane of the under side of the pneumatic finger D<sup>15</sup> and in contact with the blank, as shown in Fig. 4. At that moment the outer jaw F by its release from the cam F<sup>6</sup> is closed in the position shown in Fig. 5, causing the forward edge of the blank to be seized and carried forward by the rotation of the cylinder C. Both jaws are then moved conjointly inward until the face of the inner jaw E is brought tangential with the surface F<sup>9</sup> of the cylinder, upon which a tympan is secured by any of the well-known and practiced methods. After the form has rolled in contact with the blank and the cylinder is brought into the position represented in Fig. 7 the jaws are moved outward conjointly in order to raise the advancing edge of the blank from the surface of the cylinder, so as to allow the ends of the fly-fingers G, carried upon a rocking shaft G', to pass beneath the blank. The outer jaw F is then opened, releasing the blank, which is moved upon the fly-fingers G by the cylinder C and rolls G<sup>2</sup>, held by rods G<sup>3</sup>, adjustably supported by the cross-bar G<sup>4</sup>, and provided with elastic tires G<sup>2a</sup>, between which and the surface F<sup>9</sup> the blank is held after its release by the grippers. The outer jaw F is moved into position (shown in Fig. 9) so it will clear the blank held by the pneumatic finger D<sup>15</sup>. The shaft G' is rocked by the mechanism shown in Fig. 17, consisting of an eccentric G<sup>5</sup> upon the shaft of the impression-cylinder, an elbow-lever G<sup>6</sup>, pivoted upon a fixed stud G<sup>7</sup> and connected by a link G<sup>8</sup> with a crank-arm G<sup>9</sup> upon the shaft G', and a retractile spring G<sup>10</sup>. The printed blank is carried by the fly-fingers G over upon the shelf or "taking-off" board G<sup>11</sup>, slightly inclined from a vertical position and held upon rods G<sup>12</sup>, so that the printed blank as it is delivered by the fly-fingers will rest against the board G<sup>11</sup> with its lower edge in contact with the rods G<sup>12</sup>, which serve as gage-rods to even the printed blanks. The upper ends of the rods G<sup>12</sup> are provided with the guide-rods G<sup>13</sup>, curved concentrically with the axis of the fly-fingers G. The taking-off board G<sup>11</sup> is adjustably held upon the rods G<sup>12</sup> by means of a sleeve G<sup>14</sup>, attached to the board G<sup>11</sup>, and loosely inclosing one of the rods G<sup>12</sup> and provided with lugs to which is pivoted a lever G<sup>15</sup>, pressed by a spring G<sup>16</sup> against the rod

G<sup>12</sup> and preferably having a piece of rubber or leather interposed between it and the rod. The lever G<sup>15</sup> is readily released from the rod G<sup>12</sup>, allowing the board G<sup>11</sup> to be moved on the rod, and the friction of the lever G<sup>15</sup> will maintain the board in position, except as it is pushed down by the movement of the fly-fingers and the accumulation of blanks upon the taking-off board.

In order to cause the blank held by the pneumatic finger D<sup>15</sup> to be released at the instant it is seized by the grippers, we provide the pump-cylinder D<sup>19</sup> with a valve H, held against its seat by a spring H', applied to the valve-stem H<sup>2</sup>, causing the valve to be held normally closed and preventing the admission of air through the ports H<sup>3</sup> to the pump-cylinder D<sup>19</sup>. The valve-stem H<sup>2</sup> is pushed downward at the instant the blank is seized by the gripper-jaws E and F by means of a lever I, pivoted upon a fixed stud and actuated to open the valve H by a spur I' upon the cam I<sup>2</sup>, carried by the shaft of the impression-cylinder C, thereby admitting air to the pump-cylinder D<sup>19</sup> and breaking the vacuum. The pile of envelop-blanks D is placed upon the feeding-table D' with its forward or back-flap edge against the vertical guide-pins J J, held upon the shelf J', forming a portion of the framework. The feeding-table is then raised into the desired position so the upper blank will be struck by the pneumatic finger D<sup>15</sup> as the shaft D<sup>14</sup> is rocked. The pile of blanks D as it is raised is carried behind the registering gage-pins J<sup>2</sup> J<sup>2</sup>, depending from the framework, and in front of the pivoted presser-bar J<sup>3</sup>, pivoted upon a stud J<sup>4</sup>, held in the shelf J' and having a spring J<sup>5</sup> applied to press the face J<sup>6</sup> against the upper blanks and crowd them back against the gage-pins J<sup>2</sup> J<sup>2</sup>.

To the end of the bar J<sup>3</sup> is pivoted the block J<sup>7</sup>, provided with the face J<sup>6</sup> and the three posts J<sup>8</sup>, carrying screws J<sup>9</sup> with pointed tips, which are adjusted to reach slightly over the pile of blanks, so the edges of those blanks which are raised by the pneumatic finger D<sup>15</sup> will be drawn across the tips of the screws, which act as separators to separate the blanks and admit air beneath the upper blank, so it will be raised by the pneumatic finger and the succeeding blanks allowed to fall back upon the pile. The upper ends of the guide-pins J J are slightly tapered, and to the rocking shaft D<sup>14</sup> are attached the fingers K K, with their under sides slightly raised above the under side of the pneumatic finger D<sup>15</sup>. As the fingers K K are carried down by the rocking of the shaft D<sup>14</sup> they press the blanks which may have been lifted by the pneumatic finger D<sup>15</sup> down beside the guide-pins J J, whose tapered sides serve to restore any displaced blanks to their proper alinement with the pile D. The jaws E and F are bifurcated, forming the double jaws a a and b b, Fig. 18, so as to seize the paper blank upon each side of the central prong c and between

the central and side prongs d d of the pneumatic finger D<sup>15</sup>, which is provided with three prongs c d d, so as to hold that portion of the blank to be seized by the jaws E and F in the same plane.

The operation of the machine is as follows: The form is suitably attached to the type-cylinder B in the usual manner, and is inked by the rolls L L, to which the ink is distributed by any of the known mechanisms used for that purpose, but not shown in the drawings, as it forms no part of our present invention. The pile of blanks D is placed upon the feeding-table D' and against the guide-pins J J. The table is then raised, bringing the blanks behind the gage-pins J<sup>2</sup> J<sup>2</sup> and in front of a spring-actuated pivoted bar J<sup>3</sup>, so the face J<sup>6</sup> will press the upper blanks back against the gage-pins J<sup>2</sup> J<sup>2</sup> and insuring accurate registration of the upper blank. The table D' is raised into the path of the fingers K K and the pneumatic finger D<sup>15</sup>, which are brought into contact with the top blank by the rocking shaft D<sup>14</sup>, closing the air-ducts D<sup>17</sup> as the piston of the air-pump is making its downward stroke, exhausting the air from the air-passages D<sup>16</sup>, causing the upper blank to be raised with the finger D<sup>15</sup>, and usually raising several of the succeeding blanks by the clinging together of the edges of the paper. As the blanks are raised their edges are drawn over the projecting pointed screws J<sup>9</sup>, which separate the succeeding blanks from the top blank, so they will fall back upon the pile. The revolution of the cylinder C, carrying the grippers, with their connected mechanism, around the fixed cams E<sup>5</sup> will cause the jaws to be successively moved into the positions already described, seizing the edge of the blank held by the pneumatic finger D<sup>15</sup>, carrying it in toward the center of the cylinder C, so as to bring it into proper alinement with the surface F<sup>9</sup> to receive the impression of the inked form upon the type-cylinder B. The jaws are then raised to lift the edge of the blank over the ends of the fly-fingers G, which have been brought into position tangential with the surface F<sup>9</sup> of the cylinder C. As soon as the edge of the blank has been caught by the tips of the fly-fingers the grippers are opened and the blank is delivered to the fly-fingers by the action of the surface F<sup>9</sup> and the rolls G<sup>2</sup>, and the grippers are brought into proper position to seize the succeeding blank raised by the pneumatic finger D<sup>15</sup>. The fly-fingers G are vibrated by the rocking of the shaft G', carrying the printed blank over with its lower edge sliding upon the curved guide-rods G<sup>13</sup>, and depositing it upon the taking-off board G<sup>11</sup>, with its lower edge resting upon the gage-rods G<sup>12</sup>. As the printed blanks accumulate upon the board G<sup>11</sup> the pressure of the fly-fingers G will push the board down the rods G<sup>12</sup>. The downward motion of the pneumatic finger D<sup>15</sup> is limited by the pile of blanks, and as the blanks are removed the angular motion of the finger D<sup>15</sup> increases

until the vibrating lever D<sup>9</sup> actuates the pawl D<sup>6</sup>, through the intermediate mechanism, as described, to move the ratchet-wheel D<sup>5</sup> forward another tooth and raise the feeding-table D'. The feeding-table D' is raised through one-half a revolution of the crank-arm D<sup>4</sup>, or from its lower to its upper "dead-center," which limits the upward movement of the feeding-table, for when the crank-arm passes the upper dead-center the weight of the table will rotate the crank-arm and ratchet-wheel and allow the table to fall. This arrangement of the ratchet-wheel and crank as connected with the feeding-table we do not claim as a part of our present invention, but the intermediate actuating mechanism between the eccentric D<sup>11</sup> and the ratchet-wheel D<sup>5</sup> we deem to be new. The prongs *c d d* of the pneumatic finger D<sup>16</sup> are provided with small bosses *e*, located within the ducts D<sup>17</sup>, with their faces flush with the under side of the finger in order to prevent the paper from being bent or curved too much into the duct by the air-pressure.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination with a table upon which the blanks are supported, of a rock-shaft D<sup>14</sup>, a finger extending radially in a horizontal plane over said table and having its end forming the prong *c*, provided at its tip with an air-duct, prongs *d, d*, projecting from the side of said finger and having their ends parallel with and shorter than the prong *c* and having air-ducts in their ends arranged in line with the edge of an envelop-blank and having their under surfaces flattened to act as pressure-fingers to bear in the same plane upon the pile of blanks and an air-passage in said central finger communicating with said ducts, substantially as described.

2. The combination of a feeding-table upon which the blanks are supported, of the gage-pins for registering the blanks, a pivoted presser-bar J<sup>3</sup>, spring J<sup>5</sup>, block J<sup>7</sup> pivoted on said presser-bar and having three posts J<sup>8</sup> and screws J<sup>9</sup> carried by said posts and having their tips overhanging the pile of blanks held on said table, substantially as described.

3. The combination of a blank-supporting table, a rock-shaft D<sup>14</sup>, radial fingers extending from said shaft over said table, a vibrat-

ing arm D<sup>9</sup> attached to said shaft, an actuating-eccentric D<sup>11</sup>, retractile spring D<sup>10</sup>, sleeve D<sup>12</sup>, swiveled on said vibrating arm and enclosing a rod D<sup>8</sup>, rod D<sup>8</sup>, nuts D<sup>13</sup> adjustably held on said rod, arm D<sup>7</sup>, connected with said rod, actuating-pawl D<sup>6</sup> carried by said arm, ratchet-wheel D<sup>5</sup>, and intermediate mechanism between said ratchet-wheel and said blank-holding table, whereby the intermittent rotation of said ratchet-wheel will raise the table, substantially as described.

4. The combination of an impression-cylinder, a lifting-finger by which the blanks to be printed are raised singly, a gripping-jaw E, carried upon a shaft, journaled in said cylinder, a crank-arm attached to said shaft and a cam, actuating said crank-arm to rock said shaft and carry said jaw outward and bring its face into alinement with said lifting-finger, gripper F and means for actuating the same, substantially as described.

5. The combination with an impression-cylinder of the gripping-jaw E, hollow shaft E', crank-arm E<sup>2</sup> and actuating-cam by which said hollow shaft is rocked, jaw F, shaft F', pinion F<sup>2</sup>, pivoted lever F<sup>4</sup>, provided with rack-teeth F<sup>3</sup> engaging said pinion spring F<sup>7</sup>, and actuating-cam F<sup>6</sup>, substantially as described.

6. The combination of an impression-cylinder, jaws attached to shafts, journaled in said cylinder, fixed cams E<sup>5</sup> and F<sup>6</sup> and connecting operating mechanism between said cams and said jaws, whereby said jaws are moved in correspondence to successively seize the blank and carry it into alinement with the surface of said impression-cylinder, raise the blank from the surface of said cylinder, and finally release the blank, substantially as described.

7. The combination of rods G<sup>12</sup>, board G<sup>11</sup> having a sleeve G<sup>14</sup>, lever G<sup>15</sup>, pivoted on said sleeve and engaging one of said rods, and a spring G<sup>16</sup>, substantially as described.

Dated this 24th day of October, 1892.

HENRY D. SWIFT.  
DANIEL WHEELER SWIFT.

Witnesses:

RUFUS B. FOWLER,  
EMMA KESTER.