

(No Model.)

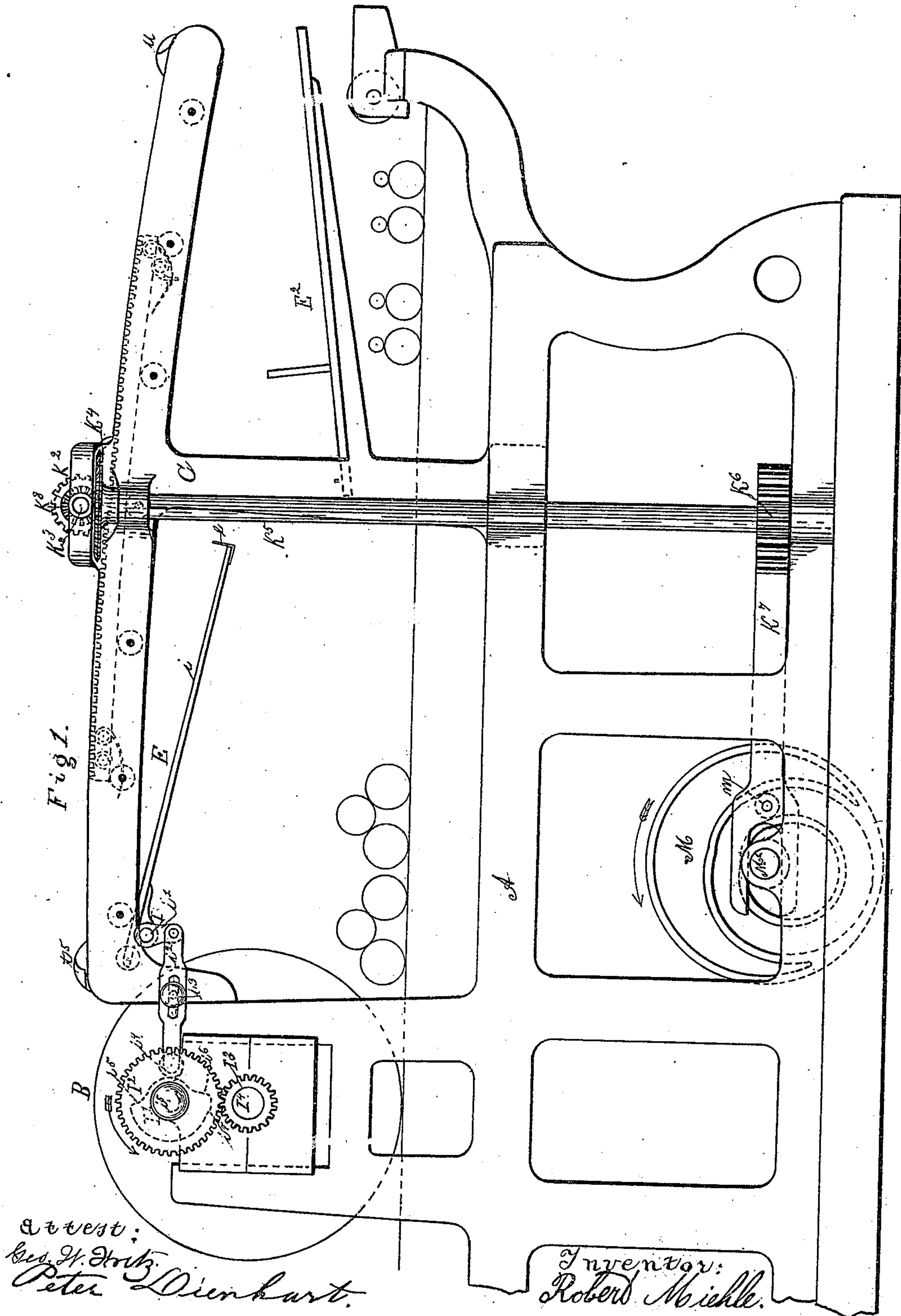
4 Sheets—Sheet .1.

R. MIEHLE.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 352,653.

Patented Nov. 16, 1886.



(No Model.)

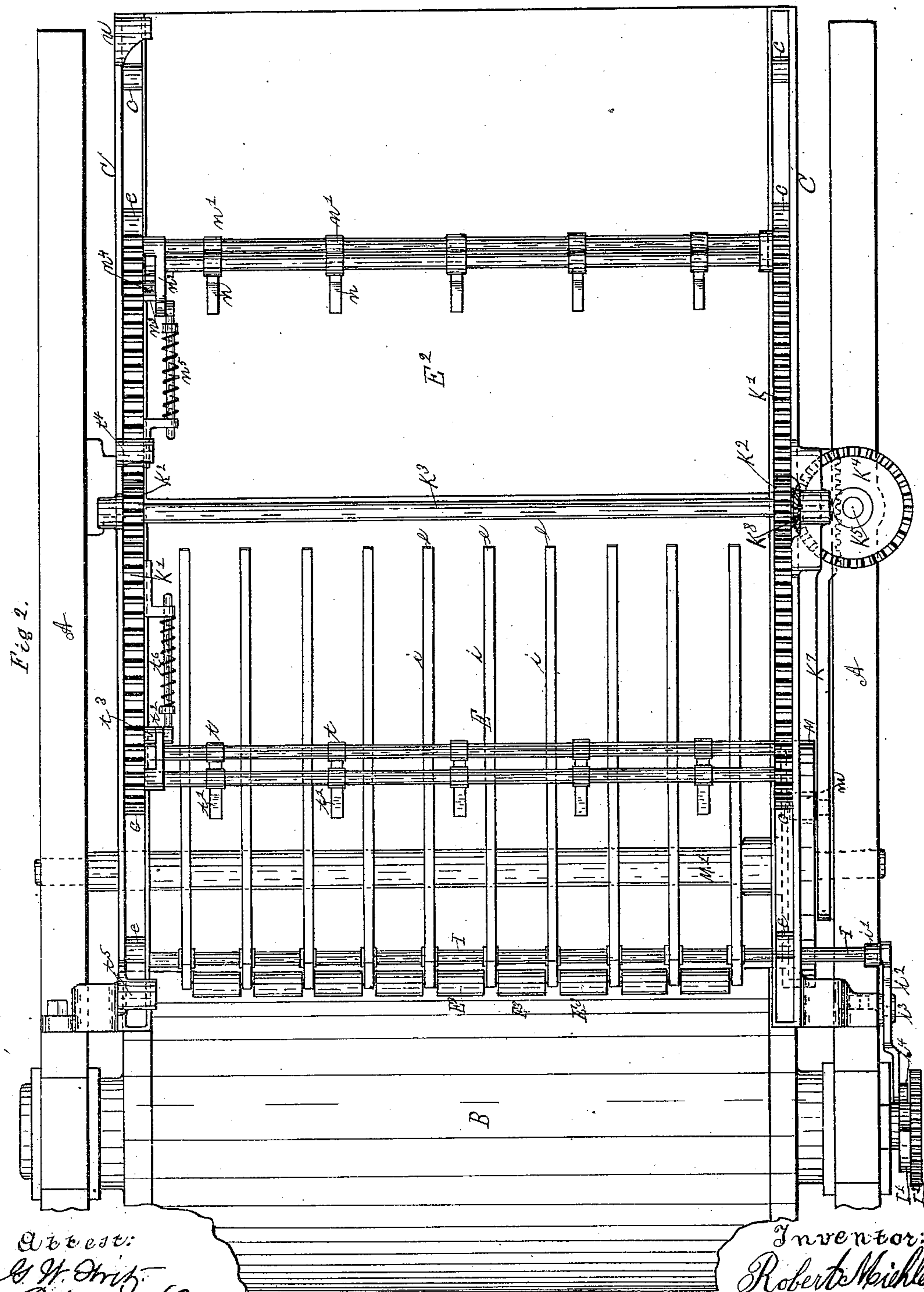
4 Sheets—Sheet 2.

R. MIEHLE.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 352,653.

Patented Nov. 16, 1886.



Abest:  
E. H. Orib  
Peter Dienhart.

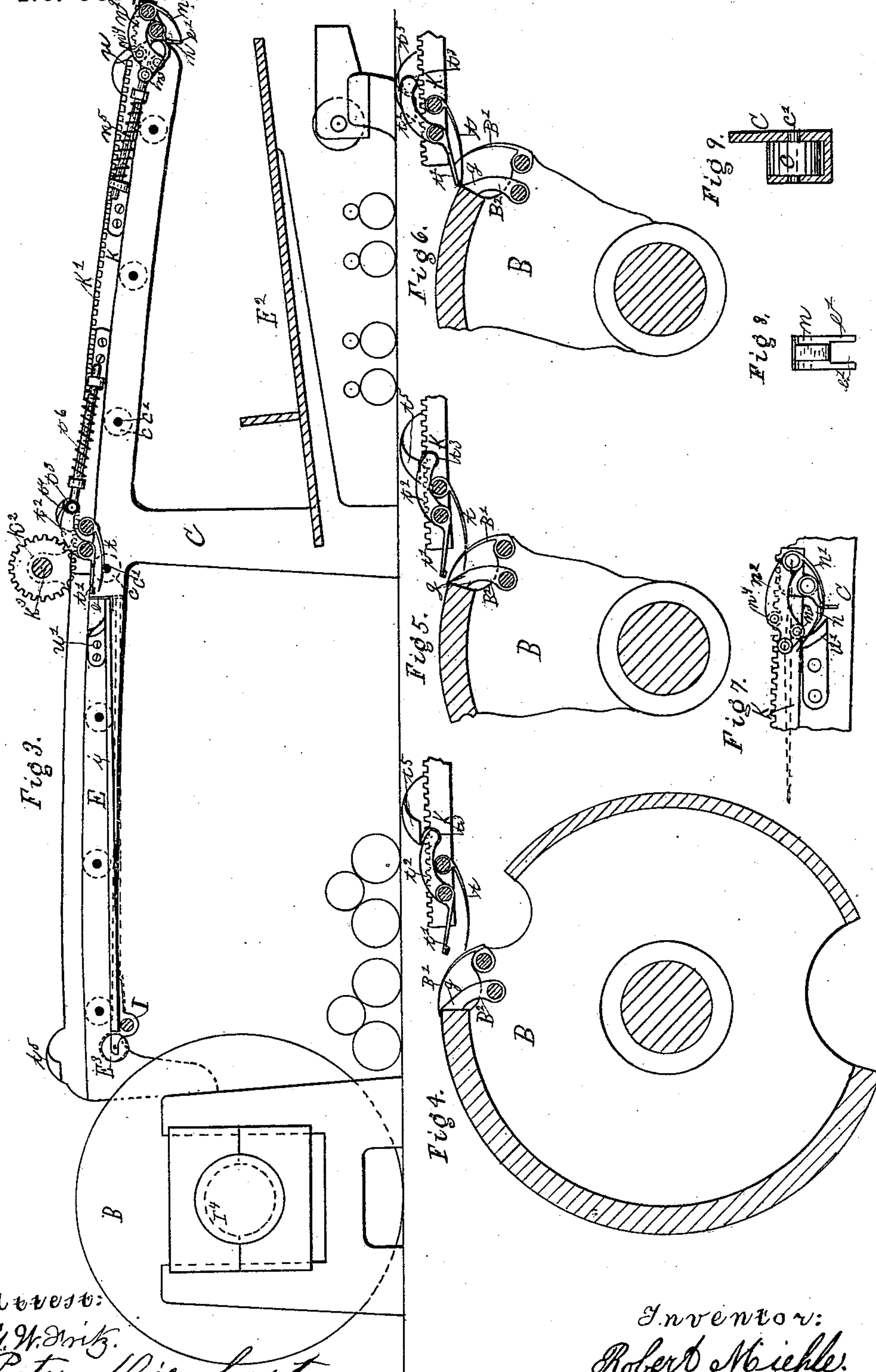
Inventor:  
Robert Miehle.

R. MIEHLE.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 352,653.

Patented Nov. 16, 1886.



Attest:  
G. W. Drick.  
Peter Hienhart.

Inventor:  
Robert Miehle.



(No Model.)

4 Sheets—Sheet 4.

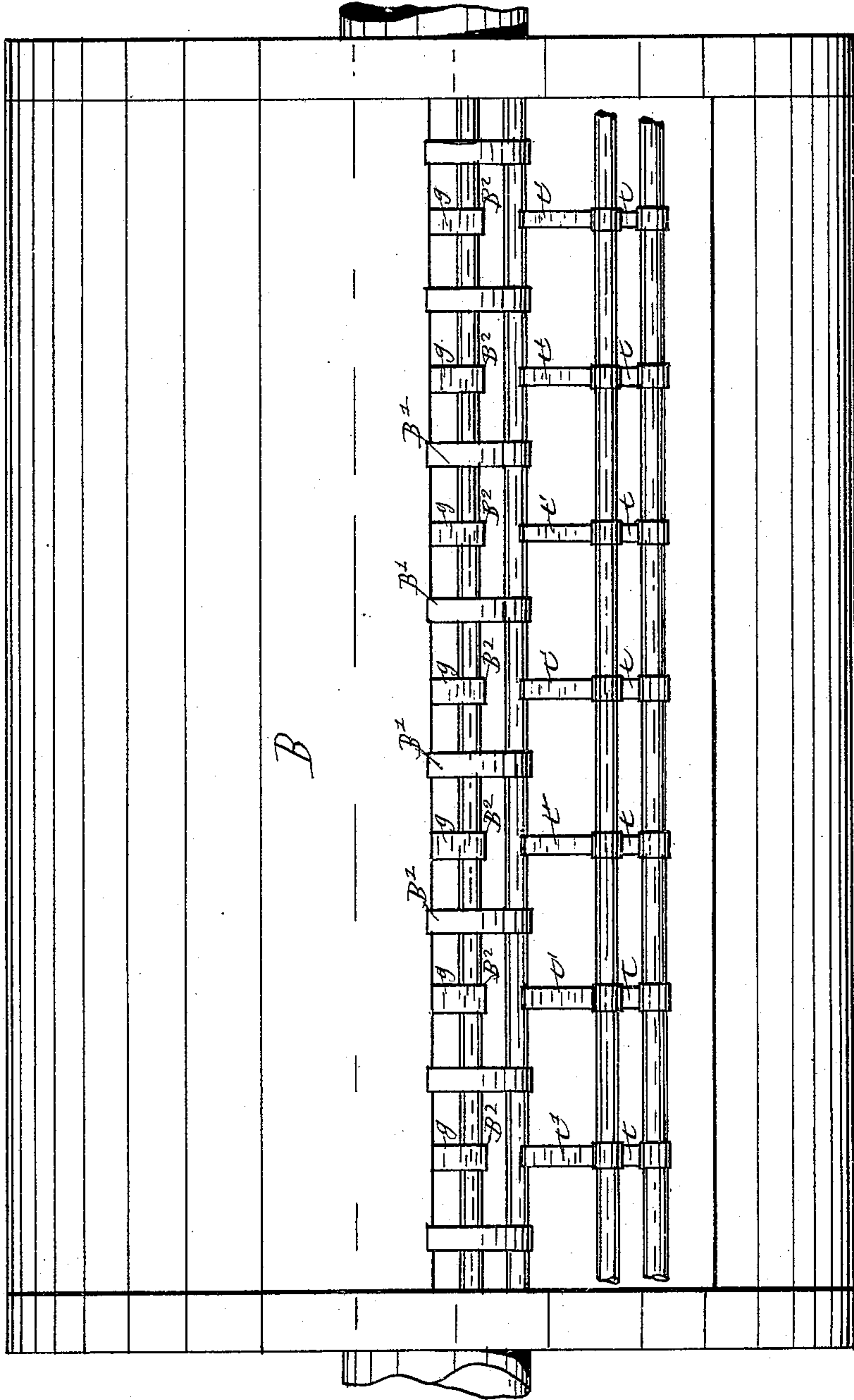
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Patented Nov. 16, 1886.

Fig. 10.



Attest:  
Geo. R. Lang.  
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Inventor:  
Robert Miehle



# UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS.

## SHEET-DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 352,653, dated November 16, 1886.

Application filed December 23, 1885. Serial No. 186,579. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT MIEHLE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Delivery Apparatus for Printing-Machines, of which the following is a specification, to wit:

This invention relates to what are known as "two-revolution cylinder-presses;" and it consists of a device for delivering the sheets to the receiving-table after the same have been printed.

The invention consists in the combination, with the impression-cylinder of a printing-press, of two sets of reciprocating delivery-grippers operating in unison with each other, one set of which transfers the sheet from the cylinder to a point of rest, and the other set delivering the sheet to the receiving-table, substantially as hereinafter described.

It also consists in other combinations hereinafter described and claimed.

In reference to the accompanying drawings, Figure 1 is a side view in elevation of a portion of a two-revolution cylinder printing-press with the delivery apparatus connected thereto. Fig. 2 is a top plan view of the same. Fig. 3 is a sectional side view showing the grippers and operating-cams and springs. Figs. 4, 5, and 6 are enlarged views illustrating the delivery-grippers taking the sheet from the impression-cylinder. Fig. 7 is an enlarged view showing the mode of closing the secondary grippers, which transfer the sheet from the intermediate device to the main receiving-table. Fig. 8 is an enlarged front view showing one part of the secondary grippers. Fig. 9 is an enlarged sectional end view of the frame which contains the supporting-pulleys for the reciprocating arms. Fig. 10 is a plan view of the inclines *g*, showing their relative positions with the cylinder-grippers.

In the drawings, A designates the main frame of a printing-press, which may be of any suitable form; B, the cylinder having the usual grippers, B', also the clamping device B<sup>2</sup>, which serve to hold the packing to the cylinder; other connections to the cylinder it was thought unnecessary to show at this time, as they may be of the usual and well-known forms.

Upon the main frame A is secured the de-

livery supporting-frame C, which is slightly arched at the top; but this may be made in a straight form, or still more arched, as may best suit the style of press to which it be adapted. The said frame is formed with an inner wall and closed at bottom. Between this wall are placed pulleys *c*, for supporting the delivery device. The same are pivoted by the pins *c'*, which are firmly secured in the frame C, as shown in Fig. 9.

Above the pulleys *c* are placed the reciprocating gripper-carrying arms K, which in their movement to and from the cylinder pass freely over said pulleys. Upon the upper side of the arms K is formed a rack, K', which engages with the pinions K<sup>2</sup>, which are secured upon the transverse shaft K<sup>3</sup>, having its bearings in the frame C. At one end of the shaft K<sup>3</sup> is a bevel-gear, K<sup>4</sup>, firmly secured thereon, which is engaged by the large bevel-gear K<sup>5</sup>, secured upon the vertical shaft K<sup>5</sup>, which has its upper bearing in the frame C and its lower bearings in the main frame A. Upon the lower end of said shaft is a small pinion, K<sup>6</sup>, which is engaged by the rack upon the arm K<sup>7</sup>, which is reciprocated through the engagement of the stud *m* with the grooved cam M, which is mounted upon the shaft M', as shown in Fig. 1.

At each end of the arms K is mounted a set of transverse gripper-rods, upon which are placed the delivery-grippers, as shown in Figs. 1 and 3. The forward set farthest from the cylinder is comprised of two rods, one of which is firmly secured in the arms K, and has a series of gripper-jaws, *n*, placed thereon. The other rod is mounted loosely therein and provided with grippers *n'*, also having a crank-arm, *n*<sup>2</sup>, secured upon one end, the crank-arm being provided with two studs, *n*<sup>3</sup> and *n*<sup>4</sup>, which engage with the cams *u* and *u'*. The crank-arm *n*<sup>2</sup> is also provided with a spring, *n*<sup>5</sup>, which acts upon the crank-arm *n*<sup>2</sup> to either keep the gripper *n'* in an open or closed position, hereinafter fully explained. The rear set nearest the cylinder is also comprised of two rods, one of which is firmly secured in the arms K and has a series of long gripper-jaws, *t*. The other rod is mounted loosely in arms K and is provided with grippers *t'*. One end of said rod is provided with a crank-arm, *t*<sup>2</sup>, provided with



a stud,  $t^3$ , which engages with cams  $t^4$  and  $t^5$ . The crank-arm  $t^2$  is also provided with a spring,  $t^6$ , which tends to keep the grippers  $t'$  closed when not actuated by the cams  $t^4$  and  $t^5$ . The device for receiving the sheet when released by the delivery-grippers is placed below the same, the first receiver, E, consisting of a series of fingers,  $i$ , which are held upon the rod I, which is mounted in the frame C. Upon the outer end of rod I is a crank-arm which connects with the slotted arm  $i^2$ , held in position by the pin  $i^3$ . Upon the rear end of the arm  $i^2$  is a stud,  $i^4$ , which engages the cam I' upon the gear I<sup>2</sup>, which is loose upon the stud  $i^5$ , and meshes with the pinion I<sup>3</sup>, secured upon the cylinder-shaft I<sup>4</sup>, as shown in Fig. 1.

The several operations of the device just described are as follows: As the sheet is brought around by the impression-cylinder B to the point shown in Fig. 4, the delivery-grippers have just been started to move away from the cylinder by the action of cam M and intermediate mechanism, which actuates the arms K, upon which are mounted the rods containing the grippers. As the cylinder continues to revolve, it gradually nears the delivery-grippers, as shown in Fig. 5, so that when the cylinder arrives at the point shown in Fig. 6 the edge of the sheet is seized by the delivery-grippers by the closing of the upper jaw,  $t'$ , through the action of the spring  $t^6$ , as the stud  $t^3$  clears the cam  $t^5$ . At this point the delivery-grippers begin to move at the same speed as the cylinder, (or nearly so.) This movement is continued until about two-thirds of its outward stroke has been completed, after which it slows down enough to allow the sheet to settle down upon the receiver E, when the grippers are opened by the engagement of the stud  $t^3$  with the cam  $t^4$  as the grippers arrive at the end of their outward movement. In order to insure the sheet being dropped by the grippers as the same open to release it, the fingers  $i$  are provided with stops  $e$  at their forward end, as shown in Figs. 1 and 3, and to prevent the sheet being rumpled as the latter part is being passed from the cylinder to the receiving-fingers  $i$  at the time the delivery-grippers receive their retarded movement, the fingers are provided at their rear end with a series of broad friction-rollers,  $E^3$ , which revolve as the sheet is drawn over them. The same are set away from the cylinder sufficiently to allow the sheet being drawn down with the cylinder when there is any slack, so that the same will not be wrinkled or cracked as it is drawn over the pulleys  $E^3$  in the delivery. The pulleys are made hollow and of very thin metal, so that the least movement of the sheet over them will revolve the same. As the arms K are moved in the direction toward the cylinder and arrive to almost the end of their stroke the outer set of grippers come into action by engagement of the stud  $n^3$  with the cam  $u'$  on the frame C, which forces the crank-arm  $n^2$  upward, and thereby closes the grippers  $n'$  upon the edge of the sheet on the receiver E, as shown in Fig. 7. The arms K have at this

time arrived at the end of their backward movement, and now start away from the cylinder, as before described, to draw the sheet from the same, as well as the sheet upon the receiver E, now held by the forward grippers, which is deposited upon the receiving-table  $E^2$  as the grippers arrive at their outward movement by the engagement of the stud  $n^4$  with the cam  $u$ , which depresses the crank-arm  $n^2$ , and thereby opens the grippers, which allows the sheet to settle down upon the receiving-table.

The points  $e^2$  upon the lower side of the gripper  $n'$  prevent the sheet entering the grippers too far, as the same have a movement toward the sheet while closing. In order to keep the forward grippers in an open as well as a closed position, the rod of the spring  $n^5$  is placed on a line with the center of the gripper-rod containing the crank-arm  $n^2$ , so that the pressure of the same will be in either direction when the crank-arm  $n^2$  is either depressed or raised by action of cams  $u$  and  $u'$ , as shown in Figs. 3 and 7. At the time the forward grippers begin to move forward with the sheet, the fingers  $i$  are lowered by the action of the cam, which allows the stud to pass down the cammed portion  $t^7$ , which allows the receiver E to fall by its own weight to a position as shown in Fig. 1. The receiver E is kept in this position until the sheet (when of full size) is very nearly removed therefrom and the cam I' arrives with the portion  $i^6$  to engage the stud  $i^4$ , thereby raising the finger to a point, as shown in Fig. 3, to arrest the forward movement of the sheet as the grippers  $t'$  release it, as shown in Fig. 3. The cam I' also comes into action with the stud  $i^4$  on the portion  $i^7$  to vibrate the receiver slightly downward, as shown in dotted lines in Fig. 3. This movement is to insure the sheet being cleared by the delivery-grippers on their return movement to the cylinder. The relation between the gearing I<sup>2</sup> and I<sup>3</sup> in the drawings is two to one, as the cylinder makes two revolutions for one impression to one back and forward movement of the bed. The shaft M' also has but one revolution in the same time. The incline  $g$ , formed upon the clamp B<sup>2</sup>, serves to guide the stationary jaws  $t$  between the sheet and cylinder, to insure the gripper taking the sheet when but a small portion of the same projects over the edge of the cylinder. In order to make this operative the lower jaws,  $t$ , may be made very light, so that when the same glide up the incline  $g$  they may spring somewhat upward if brought to bear too hard upon the incline, so that there be no opening between the incline  $g$  and the point of the jaws  $t$  at the time said jaws are passing below the sheet.

To insure the gripper-jaws  $t$  riding up the incline  $g$  properly, the same may be formed in a straighter line with the cylinder's periphery than herein shown.

It is obvious that only one set of grippers may be used when the distance for delivering the sheet is limited, in which case the re-



ceiving-table  $E^2$  would be placed directly in front of the cylinder; and, also, that if the sheet were directly stripped from the cylinder by the fingers the outward set would only be necessary; and, furthermore, I do not confine myself to the cam M, and vertical shaft  $K^5$ , and bevel-gearing to impart movement to the transverse shaft  $K^3$ . This portion of the device may be of any suitable means for transmitting a turning movement to shaft  $K^3$  to reciprocate the arms K properly.

In some cases, where the delivering device is very narrow, but one of the arms K may be provided with a rack, and one pinion for reciprocating the same; but only in such case, as one rack would not give a steady motion to the arms when spread at any great distance.

In conclusion, it may be stated that when the arch of frame C is made greater than herein shown, and the fingers of the receiver E inclined upward, the sheet-stops  $e$  would be placed at the rear end of the sheet to prevent the same sliding back toward the cylinder; or other devices may be employed instead of the fingers and sheet-stops, as may be deemed best to suit the purpose.

No claim is made upon the inclines  $g$ , or upon the rack and pinion for imparting motion to the reciprocating arms K.

What I claim as new of the devices herein shown, and desire to secure by Letters Patent, is—

1. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of two sets of reciprocating delivery-grippers operating in unison, substantially as described, one of which transfers the sheet from the cylinder to a point of rest, and the other set delivering the sheet to the receiving-table, as set forth.

2. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of the reciprocating gripper-carrying arms K, having two sets of delivery-grippers, and being provided with racks which engage with pinions, and means, substantially as described, for revolving the pinions to impart a reciprocating movement to the gripper-carrying arms K, as set forth.

3. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of delivery-grippers, gripper-carrying arms K, and supporting pulleys and frame in which they are held, the said arms being supported only by said pulleys in their movement to and from the cylinder, the said pulleys being placed at the under side of the arms K only, substantially as and for the purpose set forth.

4. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of delivery-gripper-carrying arms K, being provided with racks and pinions, and the supporting-pulleys  $c$ , for supporting the said arms in their movement to and from the cylinder, substantially as described.

5. In a sheet-delivery for printing-presses,

the combination, with the impression-cylinder, of two sets of reciprocating delivery-grippers, the receiver E, and the receiving-table, substantially as described, and for the purpose set forth.

6. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of two sets of reciprocating delivery-grippers, the receiver E, provided with stops  $e$  to arrest the sheet, and receiving-table, substantially as described, and for the purpose set forth.

7. In a sheet-delivery for printing-presses, the combination, with the impression cylinder, of two sets of delivery-grippers, receiver E, friction-roller  $E^2$ , and receiving-table, substantially as and for the purpose set forth.

8. In a sheet-delivery for printing-presses, the combination of the impression-cylinder, delivery-grippers, reciprocating arms K, the receiver E, and the supporting-pulleys for supporting the said arms while reciprocating to deliver the sheet from the first receiver to the receiving-table, substantially as described.

9. In a sheet-delivery for printing-presses, the combination of the impression-cylinder, two sets of delivery-grippers, the receiver E, friction-rollers  $E^2$ , sheet-stops  $e$ , and the receiving-table, substantially as and for the purpose set forth.

10. In a sheet-delivery for printing-presses, the combination, with the impression-cylinder, of two sets of delivery-grippers and the receiver E, the said receiver having a vibratory movement imparted to the same for delivering the sheet to the second set of delivery-grippers, substantially as described.

11. In a sheet-delivery for printing presses, the combination, with the impression-cylinder, two sets of delivery-grippers, and receiver E, of a cam for imparting a vibratory movement to the said receiver for delivering the sheet to the second set of grippers, substantially as described.

12. In a printing-press, the combination, with the impression-cylinder, of delivery-grippers and receiver E, the said receiver having a downward movement imparted to the same, so that the sheet will be lowered as the same is drawn off by the said delivery-grippers to be deposited upon the receiving-table, substantially as described.

13. In a printing-press, the combination, with the impression-cylinder, of delivery-grippers and receiver E, the said receiver having a downward movement imparted to the same, so that the sheet will be lowered as the same is drawn off by the said delivery-grippers to be deposited upon the receiving-table, and an upward movement to receive the next sheet, substantially as described.

14. In a printing-press, the combination, with the impression-cylinder, of two sets of delivery-grippers and the receiver E, the said receiver having a vibratory movement imparted to the same for delivering the sheets



to the second set of delivery-grippers, and a  
secondary vibratory movement imparted to  
the same receiver, so that the sheet will be  
lowered as the same is drawn off by the second  
5 set of delivery-grippers to be deposited upon  
the receiving-table, substantially as described.

In testimony whereof, witness my hand at

the city of Chicago, State of Illinois, this 19th  
day of December, 1885.

ROBERT MIEHLE.

Witnesses:

GEO. W. FRITZ,  
PETER DIENHART.