

No. 648,423.

Patented May 1, 1900.

T. M. NORTH.

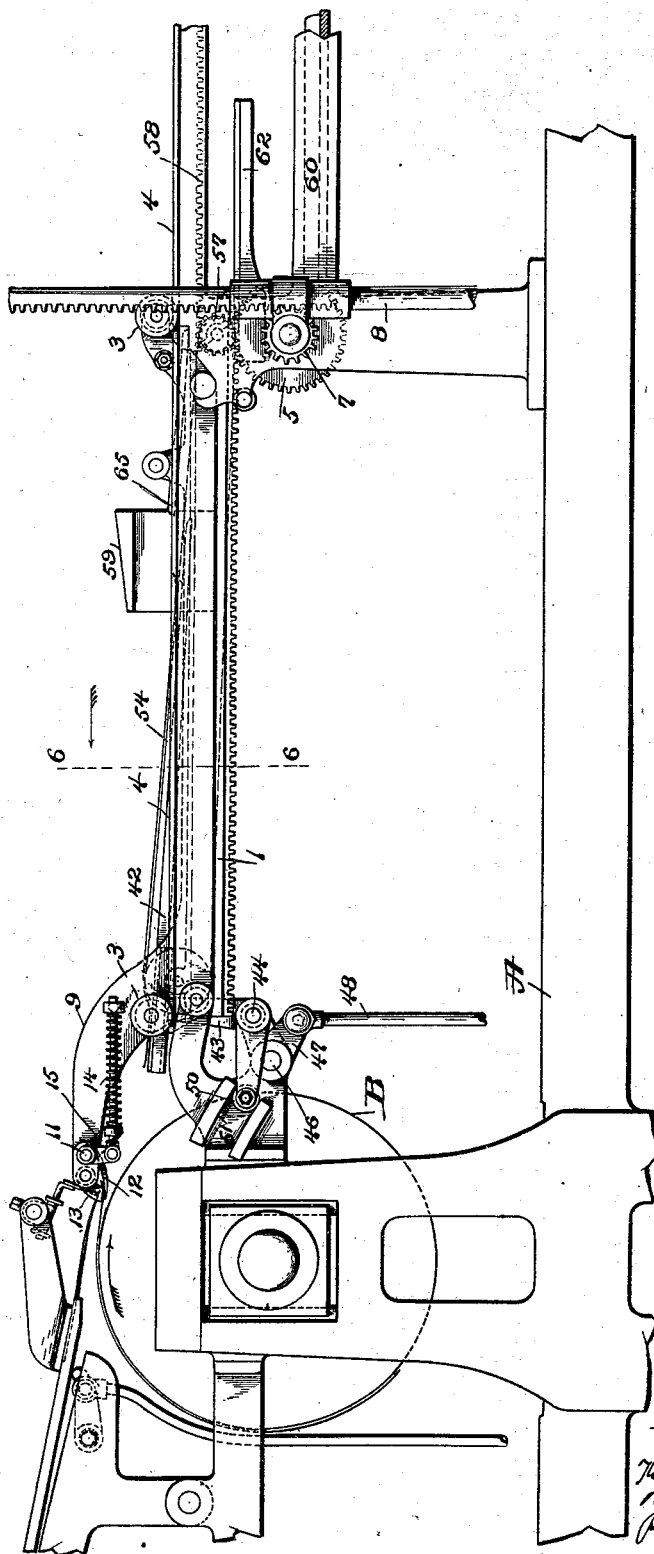
SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

(Application filed Feb. 24, 1898.)

(No Model.)

7 Sheets—Sheet 1.

Fig. 1.



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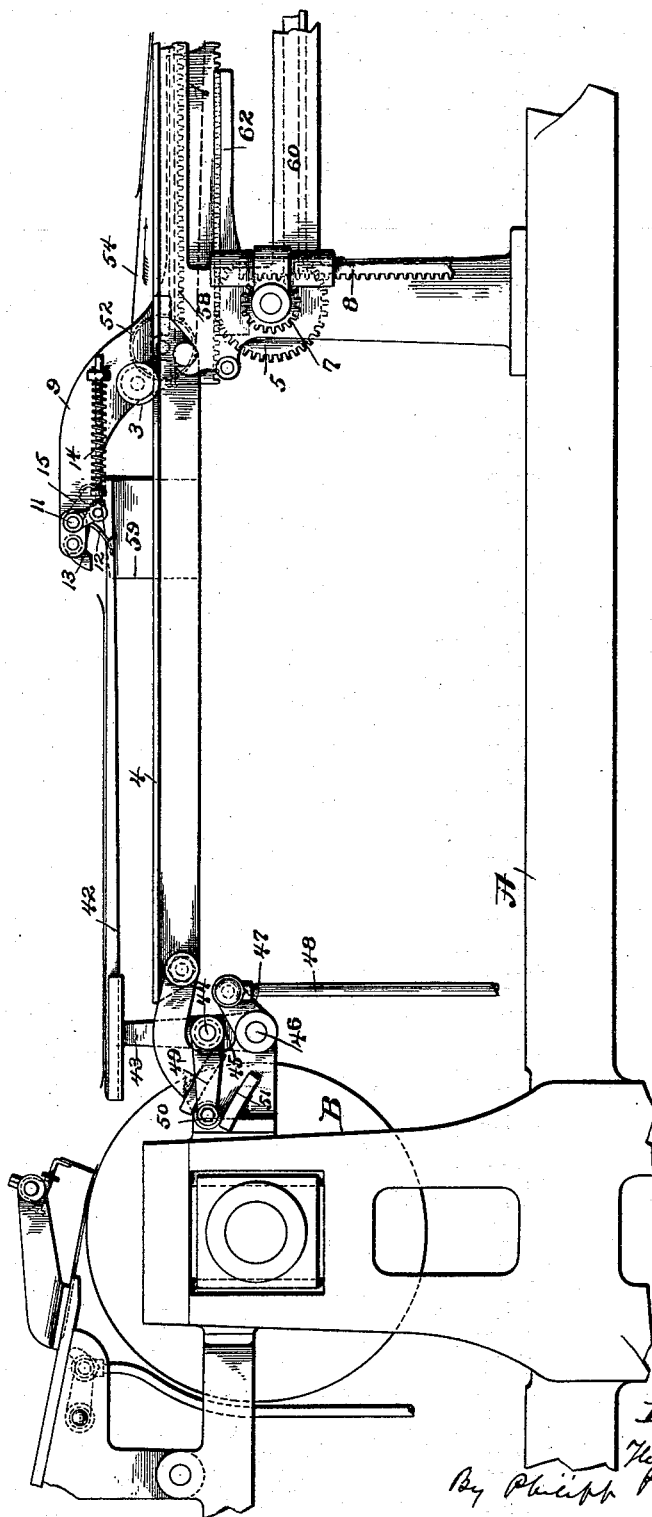
SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

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(No Model.)

7 Sheets—Sheet 2

Fig. 2.



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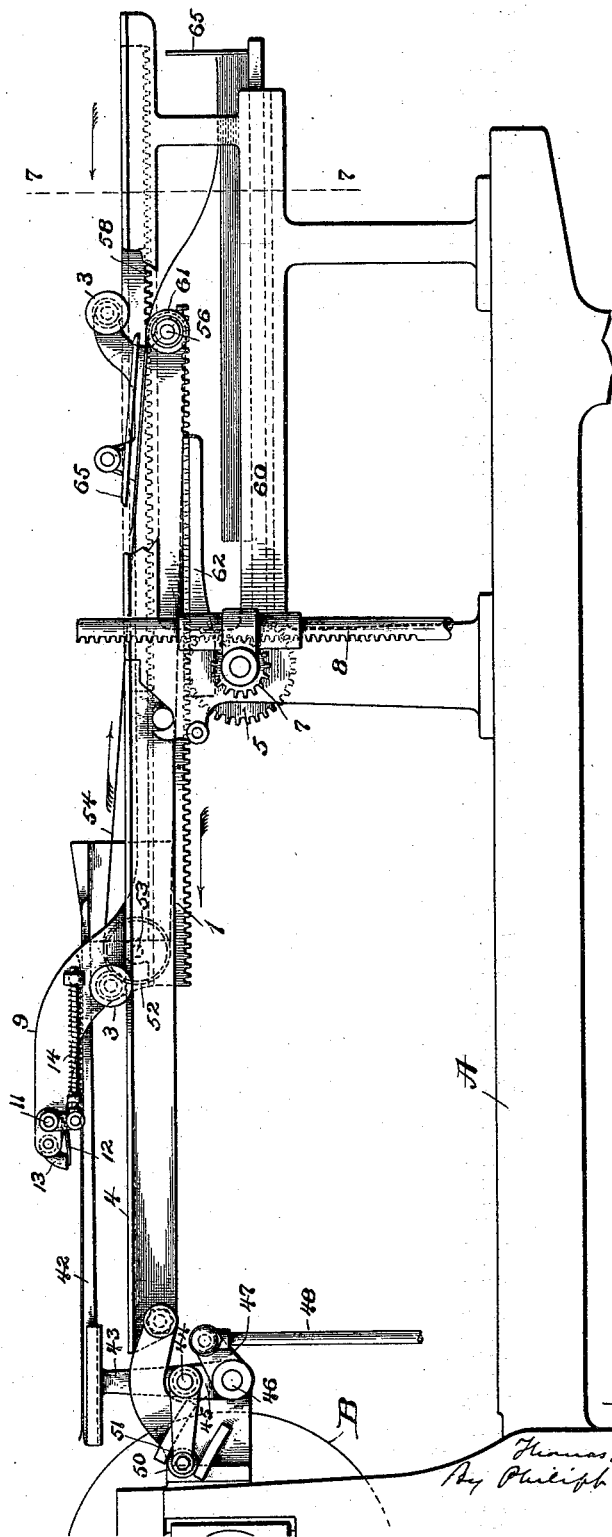
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## SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

(Application filed Feb. 24, 1898.)

(No Model.)

**7 Sheets—Sheet 3.**



Attest  
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(No Model.)

7 Sheets—Sheet 4.

Fig. 5.

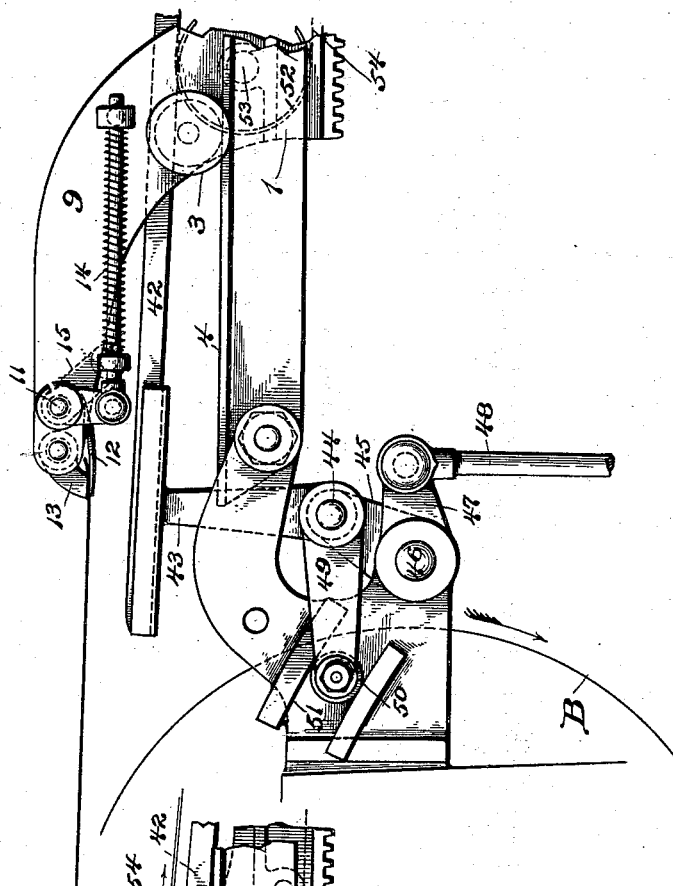
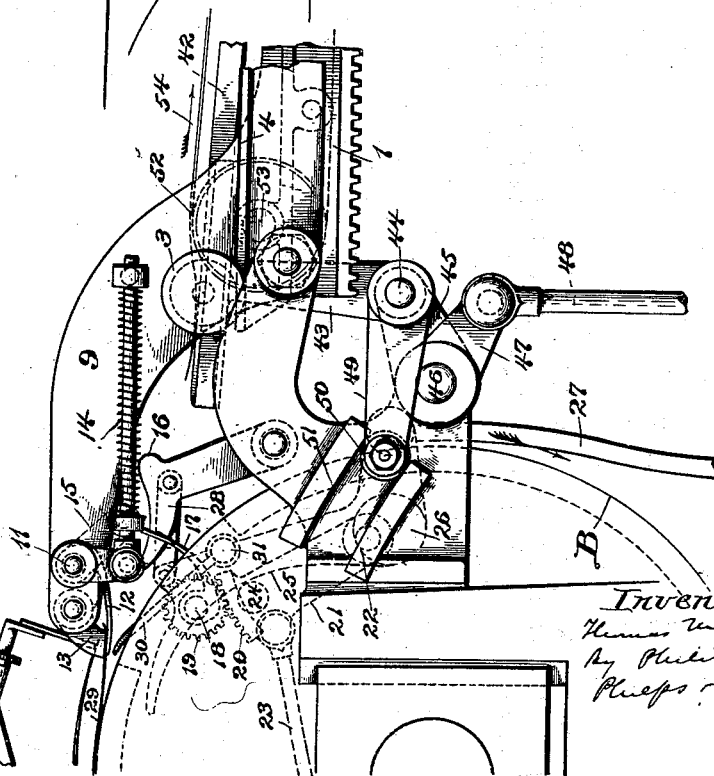


Fig. 4.



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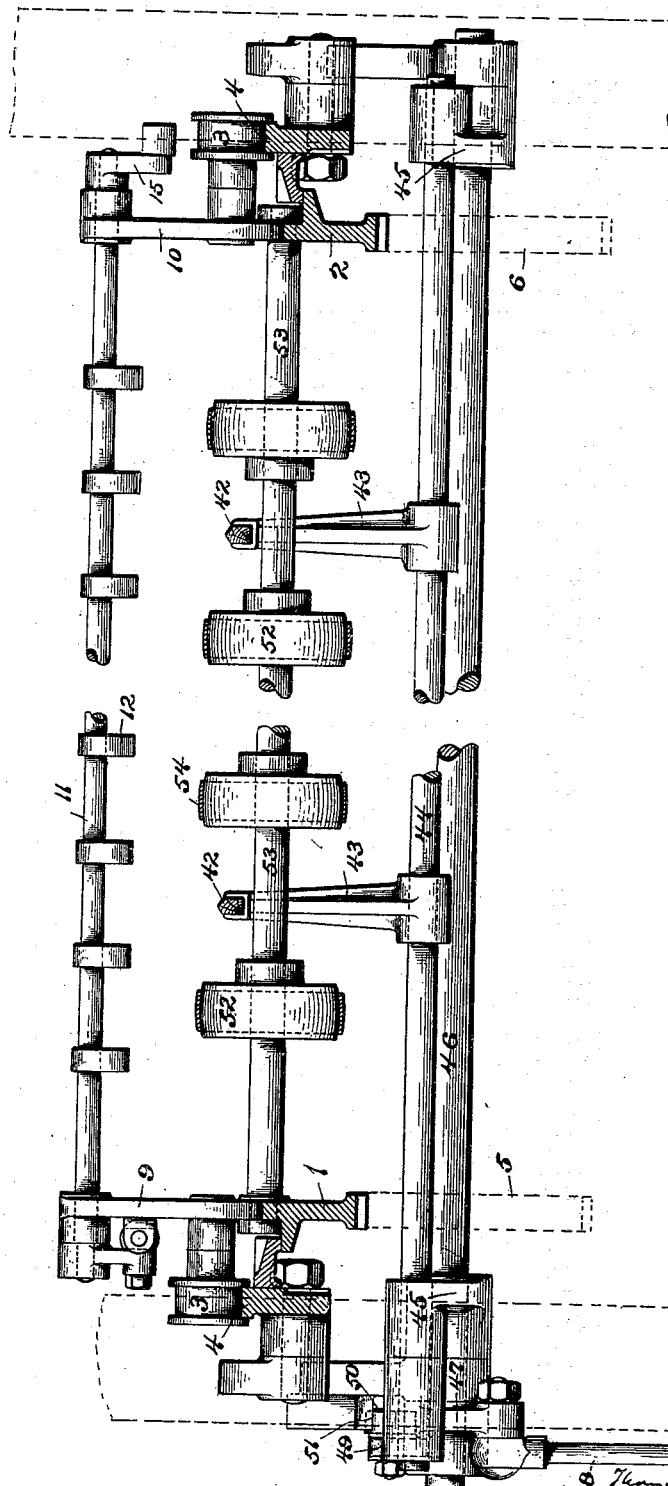
SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

(Application filed Feb. 24, 1898.)

(No Model.)

7 Sheets—Sheet 5.

Fig. 5.



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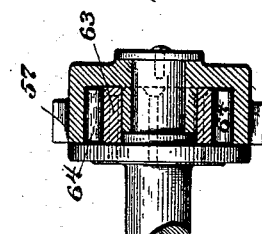
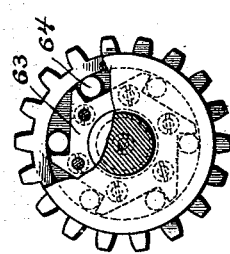
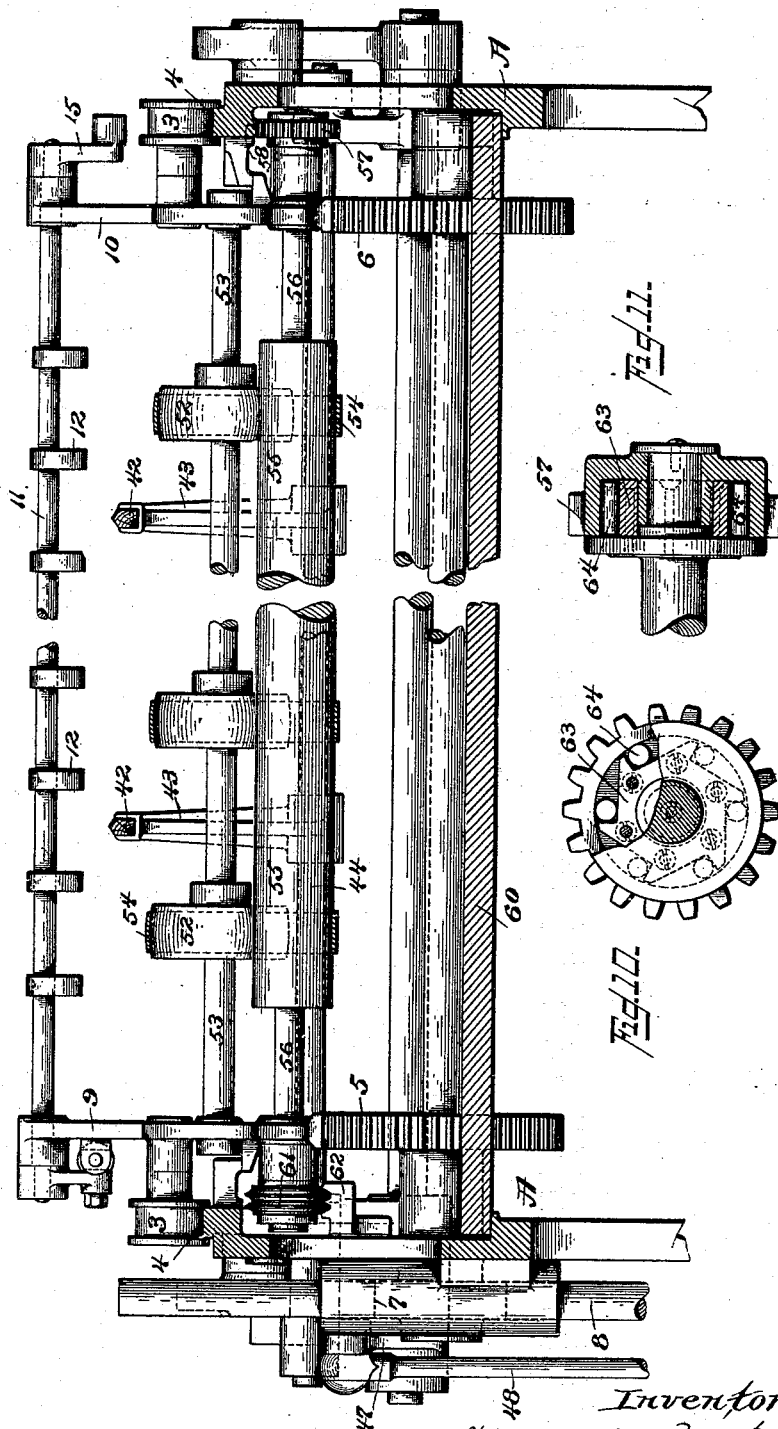
SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

(Application filed Feb. 24, 1898.)

(No Model.)

7 Sheets—Sheet 6.

Fig. 7-



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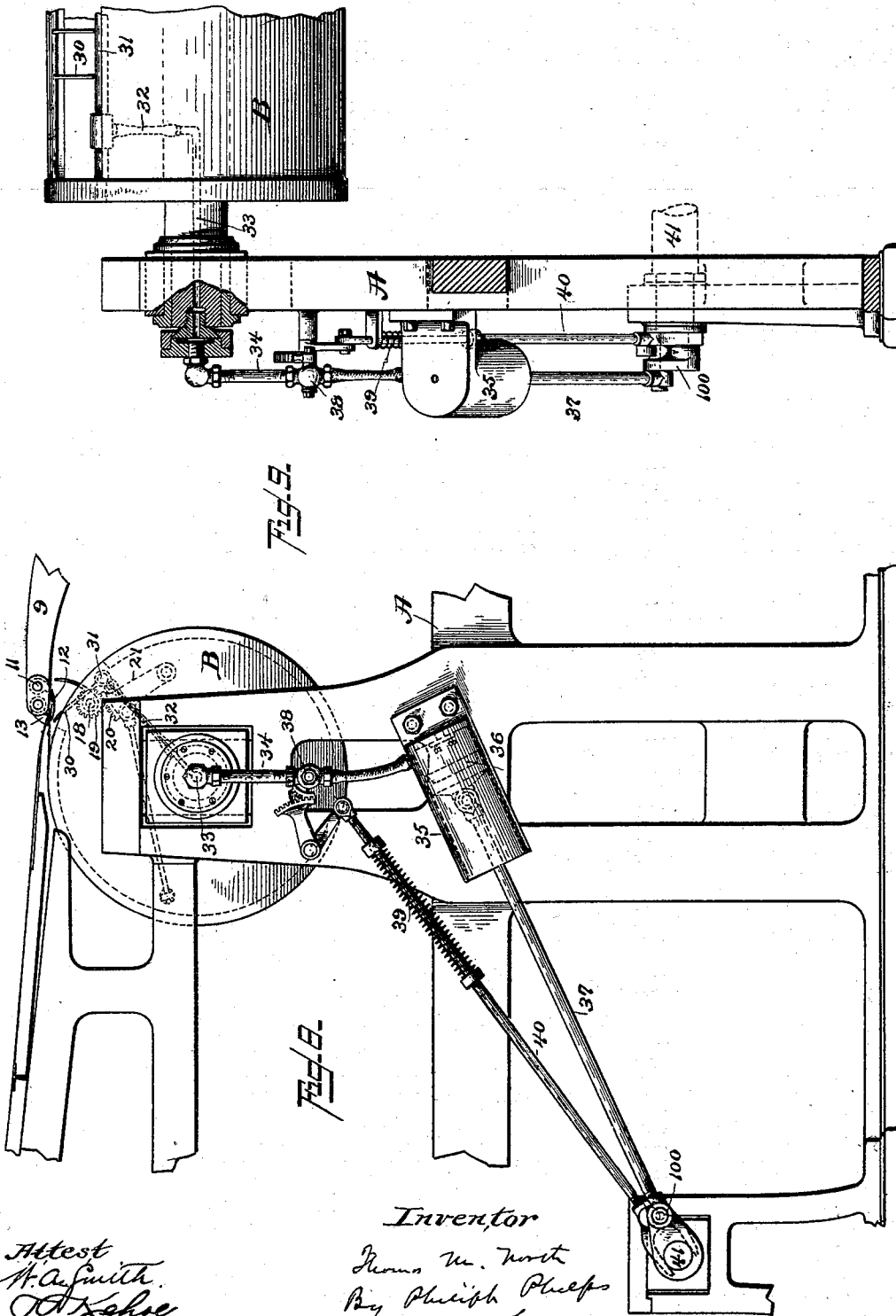
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SHEET DELIVERY APPARATUS FOR PRINTING PRESSES.

(Application filed Feb. 24, 1898.)

(No Model.)

7 Sheets—Sheet 7.



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# UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE,  
THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF SAME PLACE.

## SHEET-DELIVERY APPARATUS FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 648,423, dated May 1, 1900.

Application filed February 24, 1898. Serial No. 671,439. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS M. NORTH, a subject of the Queen of Great Britain, residing at New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Sheet-Delivery Apparatus for Printing-Presses, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates chiefly to deliveries for printing-presses. Its especial object is to provide an efficient front delivery for a stop-cylinder press. Since the sheets in these presses are taken from the impression-cylinder while the latter is at rest, they cannot be advanced by the movement of the cylinder, and therefore must be removed from the cylinder by grippers or equivalent mechanism. It is desirable in these presses to cause the delivery to carry the sheet to such a distance from the impression-cylinder as to clear the inking-rollers and other parts of the press. A movement of reciprocation of the carriage throughout this distance, however, would consume more than the interval of time between successive presentations of printed sheets by the impression-cylinder. In order to secure a sufficient distance of movement of the sheet in delivering the same and to effect this within the time allowed by the operation of the printing mechanism, I have herein arranged devices whereby each sheet receives two successive forward movements from the reciprocating delivery-carriage substantially equal in length to the distance through which the carriage reciprocates, whereby each sheet is carried in its delivery substantially twice as far as the carriage moves in one reciprocation, and in order to further increase the distance of movement without increasing the time I have provided means whereby the sheet is moved forward on the carriage itself while the carriage is performing its forward movement. I thus secure delivery of the sheet at a distance from the impression-cylinder fully sufficient to meet the requirements of a convenient delivery, and I effect this delivery well within the time allowed between the successive operations of the printing mechanism.

My invention also includes the use of an air-blast for facilitating the separation of the sheet from the impression-cylinder. It ordinarily requires considerable strain upon the paper to draw a sheet from the impression-cylinder while the latter is at rest, and it is therefore desirable to aid the separation. I find that this can be effectively accomplished by the use of the air-blast.

Referring to the drawings annexed to this specification, Figure 1 is a side elevation of the delivery, showing the parts in the position in which they are when the sheet has just been nipped by the grippers of the delivery. Fig. 2 is a similar view showing the parts in the position in which they are when the sheet has just been released by the grippers of the delivery. Fig. 3 is a similar view showing the position of the parts as the traveling carriage is moving back from the position shown in Fig. 2 to the position shown in Fig. 1. Fig. 4 is a view, on an enlarged scale, of part of the mechanism shown in Fig. 1, the position of the parts being the same as that shown in that figure. Fig. 5 shows a part of the mechanism on an enlarged scale, the position of the parts being that in which the carriage is moving forward from the position shown in Fig. 1 to the position shown in Fig. 2. Fig. 6 is a sectional view, on an enlarged scale, on the line 6 6 of Fig. 1. Fig. 7 is a sectional elevation, on like scale, on the line 7 7 of Fig. 3. Figs. 8 and 9 are side and sectional elevations of mechanism for producing the air-blast. Figs. 10 and 11 are detail views illustrating the construction of the one-way clutch by which the gear on one of the tape-rolls is connected to its roll.

Referring to the drawings, A is the frame to which the delivery is attached, and B the impression-cylinder. The delivery consists of the traveling carriage composed of side pieces 1 2, properly joined together and supported by four rollers 3 upon tracks 4, which are a part of the frame of the machine. The side pieces are provided with teeth on their under sides, with which mesh gear-wheels 5 6, driven through a pinion 7, by a vertically-reciprocating rack-bar 8. The delivery-carriage is thus made during the operation of the machine to continuously reciprocate forward and back



along the track-rails. From the rear edge of the carriage rise the extensions 9 10, carrying the gripper-rod 11, provided with the grippers 12, cooperating with the abutments 13, also carried by the extensions 9 10. The gripper-rod 11 is normally held with its grippers in a closed position by the pressure of the spring 14. The gripper-rod is also provided with an arm 15 and cam-roll, (shown in broken lines in Fig. 4,) whereby the grippers are opened by contact of the cam-roll with the pivoted cam 16. The mechanism for operating the grippers of the impression-cylinder may be of any suitable construction, a form of such mechanism now in use being shown partly in broken lines in Fig. 4. The cylinder-grippers are mounted upon the gripper-shaft 18, having at its end a pinion 19, with which meshes a segment 20, carried upon a lever 21, pivoted at 22 to the cylinder, normally held in that position in which the grippers are closed by the spring-rod 23. The lever 21 carries a stud 24, which is engaged by a lever 25 at the proper time to push back the lever 21, and thereby rotate the gripper-shaft 18 and open the grippers. The lever 25 is pivoted at 26 to the frame of the machine and is connected by a link-arm 27 to a cam. (Not shown.) The upper end of this lever is at other times in the operation of the machine in a position to the right of that shown in broken lines in Fig. 4. When the impression-cylinder comes to a stop and the grippers 17 are to be opened, the link 27 is moved by its cam to push the upper end of the lever 25 forward into the position shown in broken lines in Fig. 4, thereby through stud 24 swinging the lever 21 and rotating the gripper-shaft 18. The cam 16 is connected with the lever 25 by a link 28, so that as the lever 25 moves forward, as just described, the cam 16 is carried with it and is therefore moved out of the position in which it is in contact with the bowl on arm 15, the grippers 12 being then permitted to come to their closed position, as shown in Fig. 4. The forward edge of the sheet shown at 29 in Fig. 4 is lifted at the proper moment into the position to be grasped by the grippers 12 by the fingers 30, mounted upon shaft 31, which is appropriately moved at the proper time by a cam and suitable connections. (Not shown.)

As a means for facilitating the detachment of the sheet from the impression-cylinder it is desirable to provide an air-blast, which may be directed against the under side of the sheet in any suitable manner and between the sheet and the cylinder. A blast of air thus directed between the sheet and the cylinder relieves the friction between the two and enables the sheet to be very easily withdrawn. A convenient means for the purpose is secured by making the arms 30 and the shaft 31 hollow and connecting them with a source of compressed air, as shown in Figs. 8 and 9. Referring to those figures, it will be seen that the hollow shaft 31 is connected by flexible tubing 32 with an axial opening 33 through

the shaft of the impression-cylinder, which connects with a tube 34, and thereby with a cylinder 35, in which an air-compressing piston 36 is operated by a connecting-rod 37, which in turn is moved by a crank 100 on the shaft 41. A cock 38 is provided in the tube 34, which is normally held in its closed position by the spring 39 (see Fig. 8) and is opened at the point where an air-blast is required by the cam-shaft 40, operated at the proper time by a cam (not shown) on the shaft 41. The parts are shown in Fig. 8 with the cock 38 open. In this position of the parts the blast is directed through the hollow fingers 30 against the under portion of the sheet and the air is forced between the sheet and the impression-cylinder throughout a considerable portion of the area of contact of the sheet and the impression-cylinder. The movement of the sheet under the pull of the carrier and its grippers is thus very substantially facilitated. As the carriage moves forward, drawing the sheet with it, the sheet is drawn over and supported by a series of fingers 42, free at their forward ends and mounted at their rear ends on holders or arms 43, fixed to a shaft 44. These fingers are given a reciprocating movement vertically and also a variable inclination, for a purpose hereinafter pointed out, by the following means: The shaft 44 is mounted so as to rotate in arms 45, fixed to shaft 46, journaled in the frame. The shaft 46 has fastened upon it another arm 47, connected by link 48 with a cam. (Not shown.) The shaft 44 has fixed upon it an arm 49, provided with a bowl 50, adapted to travel in a short path-cam 51. In this construction it will be seen that as the cam-link 48 rises the shaft 44 will be lifted, and with it the fingers 42. At the same time the inclination of the fingers will be changed by the movement of the arm 49 under the control of the path-cam 51. Thus when the cam-link 48 is in its lower position, as shown in Fig. 4, the fingers 42 will be in the position shown in Fig. 4—that is, depressed and inclined downwardly toward the front of the machine. When the cam-link 48 is in its upper position, the parts will be as shown in Fig. 3, the fingers 42 being in their highest position and also being horizontal. In Fig. 5 the parts are shown about midway between the positions of Figs. 3 and 4.

The traveling carriage is provided with a number of tape-pulleys 52, mounted upon a shaft 53 at the rear end of the carriage. The tapes 54 pass about these pulleys and also about a roll 55, journaled in the forward end of the carriage. The shaft 56 of the roll 55 carries at one end a gear-wheel 57, which engages with a rack 58, formed on the under side of one of the rails 4. This gear-wheel is connected with the shaft 56 by a one-way clutch, (shown on an enlarged scale in Fig. 10,) so that the shaft 56 will be rotated by the gear-wheel 57 as the carriage moves backward and will not be moved thereby as the

carriage moves forward. In the figure referred to 63 is a toothed wheel secured to the shaft and 64 are rollers.

When the sheet has been carried by the forward movement of the carriage to the position shown in Fig. 2, the gripper-rod 11 is operated by the fixed cam 59 (see Figs. 1 and 2) to open the grippers and release the sheet, which then rests upon the fingers 42, as shown in Fig. 2. The carriage now retreats and the fingers 42 continue to hold the sheet in its elevated position until the tapes 54 pass under the sheet, when the fingers are caused to descend by the operation of the cam-link 48, depositing the sheet upon the tapes 54. The next forward reciprocation of the carriage carries the sheet now resting upon the tapes forward over the delivery-board 60.

It is desirable to make the distance between the tape-shafts 53 and 56 greater than the length of the sheet, and it is therefore desirable to provide a means for causing the tapes to move forward during a portion of the forward movement of the carriage, so as to bring the forward edge of the sheet even with the forward end of the carriage when the latter reaches its forward position. To accomplish this, the end of the shaft 56 opposite to that on which the gear-wheel 57 is mounted is provided with a friction-disk 61, which engages with a friction-arm 62 of appropriate length. The friction-disk 61 is, like the gear-wheel 57, connected to the shaft 56 by a one-way clutch, so that it will only cause the shaft 56 to rotate while the carriage is moving forward. By this mechanism the forward edge of the sheet will be brought to the forward end of the carriage before the carriage reaches its forward position, and as the carriage retreats the sheet will be fed forward by the tapes and deposited upon the delivery-table, as shown in Fig. 3.

65 are guide-rods for preventing displacement of the sheet.

What I claim is—

1. In a sheet-delivery, the combination with a reciprocating carriage provided with grippers, of tapes mounted upon the carriage, means for transferring the sheet from the grippers to the tapes, and means for moving the tapes on the backward movement of the carriage to deliver the sheet, substantially as described.

2. In a sheet-delivery, the combination with a reciprocating carriage provided with grippers, of tapes mounted upon the carriage, means for transferring the sheet from the grippers to the tapes, means for moving the tapes on the forward movement of the carriage sufficiently to bring the sheet to position for convenient delivery, and means for moving the tapes on the backward movement of the carriage to deliver the sheet, substantially as described.

3. The combination of a stop impression-cylinder, a reciprocating carriage provided with grippers, means for causing the grip-

pers to grasp the sheet while the impression-cylinder is at rest, convey it forward and deposit it, and means for relieving the friction between the sheet and the cylinder as it is withdrawn, substantially as described.

4. The combination of a stop impression-cylinder, a reciprocating carriage provided with grippers, means for causing the grippers to grasp the sheet while the impression-cylinder is at rest, tapes mounted upon the carriage, means for transferring the sheet from the grippers to the tapes, and means for moving the tapes to deliver the sheet, substantially as described.

5. The combination of a stop impression-cylinder, a reciprocating carriage provided with grippers, means for causing the grippers to grasp the sheet while the impression-cylinder is at rest, tapes mounted upon the carriage, means for transferring the sheet from the grippers to the tapes, and means for moving the tapes on the backward movement of the carriage to deliver the sheet, substantially as described.

6. The combination of a stop impression-cylinder, a reciprocating carriage provided with grippers, means for causing the grippers to grasp the sheet while the impression-cylinder is at rest, tapes mounted upon the carriage, means for transferring the sheet from the grippers to the tapes, means for moving the tapes on the forward movement of the carriage sufficiently to bring the sheet to position for convenient delivery, and means for moving the tapes on the backward movement of the carriage to deliver the sheet, substantially as described.

7. A reciprocating sheet-delivery carriage provided with means for grasping a sheet and conveying it forward a distance equal to the reciprocation of the carriage, means for supporting the sheet while the carriage makes a return reciprocation, means for causing the sheet to be again engaged by the carriage and carried forward toward the point of final delivery, and means on the carriage for advancing the sheet with reference to the carriage, substantially as described.

8. A reciprocating sheet-delivery carriage provided with means for grasping a sheet and conveying it forward a distance equal to the reciprocation of the carriage, means for supporting the sheet while the carriage makes a return reciprocation, means for causing the sheet to be again engaged by the carriage and carried forward toward the point of final delivery, tapes on said carriage, and means for causing the tapes to advance the sheet with reference to the carriage, substantially as described.

9. A reciprocating sheet-delivery carriage provided with means for grasping a sheet and conveying it forward a distance equal to the reciprocation of the carriage, means for supporting the sheet while the carriage makes a return reciprocation, means for causing the sheet to be again engaged by the carriage and

carried forward toward the point of final delivery, tapes on said carriage, and means for causing the tapes to move in order to deliver the sheet from the carriage to the piling-table, substantially as described.

10. A reciprocating sheet-delivery carriage provided with means for grasping a sheet and conveying it forward a distance equal to the reciprocation of the carriage, means for supporting the sheet while the carriage makes a return reciprocation, means for causing the sheet to be again engaged by the carriage and carried forward toward the point of final delivery, tapes on said carriage, and means for causing the tapes to move to advance the sheet with reference to the carriage and to deliver the sheet from the carriage to the piling-table, substantially as described.

11. The combination with a reciprocating sheet-delivery carriage, of means for grasping the sheet and conveying it forward a distance equal to the reciprocation of the carriage, a vertically-reciprocating support for the sheet while the carriage is making its return reciprocation, means for causing the support to rise at the proper time to receive the sheet from the carriage, and means for causing it to descend and deposit the sheet upon the carriage at the proper time, substantially as described.

12. In a delivery mechanism, the combination of a sheet-support movable vertically, and a carriage supporting a set of tapes, the mechanism being so arranged that the sheet-support will deposit the sheet upon the tapes and that the latter will carry the sheet to the point of final delivery, substantially as described.

13. In a delivery mechanism, the combination of sheet-supporting fingers or bars movable in vertical planes, a carriage supporting a set of tapes, the mechanism being so arranged that the sheet-supporting fingers or bars will deposit the sheet upon the tapes and that the latter will carry the sheet to the point of final delivery, substantially as described.

14. In a delivery mechanism, the combination of a reciprocating carriage a set of tapes carried thereby, a sheet-support mounted independently of the carriage, means for depositing a sheet upon the support, and means for transferring the sheet from the support to the set of tapes on carriage by which it is carried forward toward the point of final delivery, substantially as described.

15. In a delivery mechanism, the combination of a reciprocating carriage, grippers carried thereby, and traveling tapes also carried by the carriage for conveying the sheet from

the position to which it is carried by the grippers, substantially as described.

16. The combination of a stop impression-cylinder, a sheet-delivery carriage provided with grippers, means for causing the grippers to grasp a sheet while the impression-cylinder is at rest, means for reciprocating the carriage between the sheet-receiving position and a position over the piling-table, and a set of tapes operating to support the sheet during the forward movement of the carriage and then to feed the sheet therefrom during the return of the carriage, substantially as described.

17. The combination of an impression-cylinder, means for receiving a sheet therefrom, and an air-blast for facilitating the separation of the sheet from the impression-cylinder, said air-blast being directed between the sheet and the cylinder and operating to relieve the friction between the two, substantially as described.

18. The combination of a stop impression-cylinder, means for taking a sheet therefrom while the cylinder is at rest, and an air-blast for facilitating the separation of the sheet from the impression-cylinder, said air-blast being directed between the sheet and the cylinder and operating to relieve the friction between the two, substantially as described.

19. The combination with a sheet-carrying cylinder, of means for withdrawing a sheet therefrom, and means for delivering a blast of air between the sheet and the cylinder while the sheet is being withdrawn, substantially as described.

20. The combination with a sheet-carrying cylinder, of means for directing a blast of air between the sheet and the cylinder, and means for withdrawing the sheet, said means operating to withdraw the sheet in a plane cutting the plane in which the air-blast is delivered, substantially as described.

21. The combination with a stop impression-cylinder, of a set of grippers for removing a sheet from the cylinder, and an air-blast operating to deliver a blast of air between the sheet and the cylinder in such a manner as to relieve the friction between the two as the sheet is being withdrawn, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

THOMAS M. NORTH.

Witnesses:

F. W. H. CRANE,  
E. L. SPEIR.