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Patented Apr. 30, 1901.

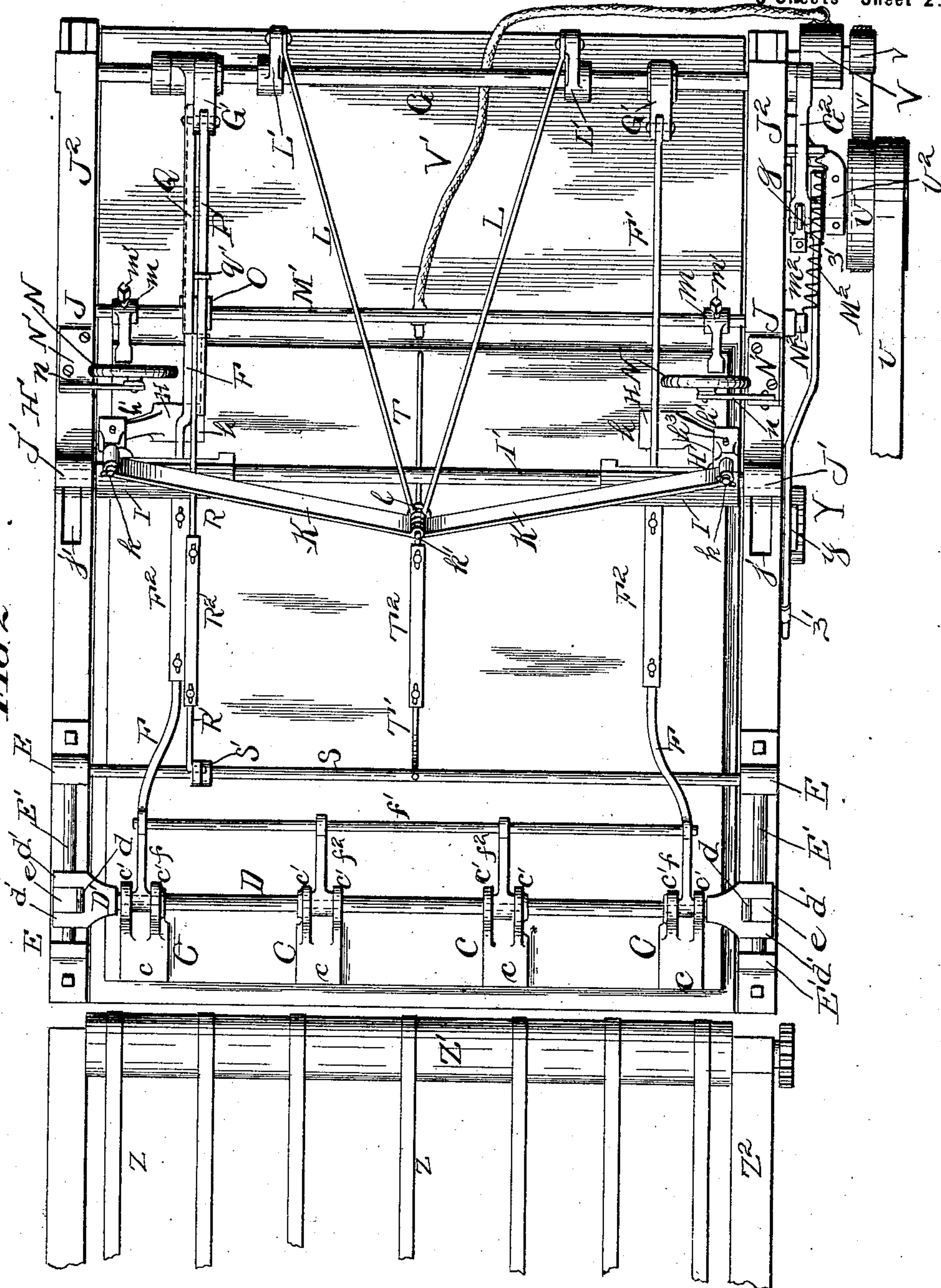
A. B. GRAHAM.
SHEET DELIVERY MECHANISM.

(Application filed July 21, 1899.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2



Witnesses:
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SHEET-DELIVERY MECHANISM.

SPECIFICATION forming part of Letters Patent No. 673,002, dated April 30, 1901.

Application filed July 21, 1899. Serial No. 724,679. (No model.)

To all whom it may concern:

Be it known that I, ALVARO B. GRAHAM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sheet-Delivery Mechanism, of which the following is a specification.

The object of my invention is to provide mechanism for delivering and feeding paper from a pile or stack to a printing-press, folding-machine, or other machinery; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my improved sheet-delivery mechanism; Fig. 2, a top or plan view of the same; Fig. 3, a rear end elevation; Fig. 4, a detail showing one side of the presser-feet; Fig. 5, a detail, partly in section, showing the means for increasing the friction for the forward or delivery presser-feet, and Fig. 6 a detail showing the upper end of the upright or standard.

According to the present practice sheets of paper are usually delivered from a table to a printing-press or folding-machine by hand; but in some cases they are delivered by suction apparatus or by feed mechanism employing nippers and feeding fingers and tapes. In both of these constructions, however, the mechanism is complicated and expensive and the delivery not positive or reliable. My invention is intended to overcome these objections by providing a simple inexpensive mechanism at all times positive and certain in its operations.

In constructing my improved delivery mechanism I provide a suitable frame A, on which is mounted the delivery mechanism proper and in which is located the sheet-receiving platform or table B. Delivery presser-feet C are at the forward or delivery end of the platform, each foot having a toe portion c , provided with a pad c^2 , of rubber or other soft material, for grasping the sheet, and each foot has a shank c' , by means of which it is mounted upon a shaft D. The shaft is carried in heads D' , which slide on a rod E' , mounted in the side piece E, bolted onto each top rail a of the frame. Each head has a fork d' , be-

tween which on the rod is a clamping-block e , the pressure of which on the rod is controlled by a spring d , which is preferably U-shaped, so that by means of the clamping-block friction can be applied to increase or decrease the pressure of the feet upon the sheets.

The presser-feet are rocked by rods extending back to the operating-shaft G, and these rods are preferably made of a front section F, a rear section F' , and a tube F^2 , in which the ends of the rods may be adjusted in and out for shortening or lengthening the rods to adapt the mechanism to different-sized sheets. The rod F has an extension f , forming an arm for rocking the outer feet, and intermediate arms f^2 are provided for the intermediate feet, the several arms being connected by a common rod f' , so as to move in unison. The rear end of each side rod is pivotally connected with an arm G' on the operating-shaft G, and this shaft is rocked or oscillated by an arm G^2 , a pitman-rod g , and an eccentric g' , operated from the driving-shaft.

Sheet-lifting presser-feet H are located at the rear of the platform or table, one on each side, each carried by a head H' . Each foot has a toe portion h , with a pad h^4 , of soft material, and an extension or neck h' , which enters a recess in the head H' and is pivoted therein at h^3 , so that the feet can rock on the pivot to its head and be raised and lowered slightly to properly coact with the sheet. Each foot is pivoted at h^2 to a depending portion i of a slide I, mounted on a rod I' , so that the slides in moving inward and outward carry with them the presser-feet.

Each head H' has a stem or pin k , which receives one member of a toggle-joint K, the two members coming together at the center and having a pivot k' . Two rods L, each having an eye l for attachment to the pivot k' , extend rearward and are connected to arms L' on the operating-shaft, the connection at this point being preferably pivotal.

The rod I' is mounted at each end in a support J' on a sliding piece J, and the operating-shaft is mounted at each end in an arm J^2 of the sliding piece. Each of these sliding pieces moves on the top rail a and can be connected thereto by a dovetail j , which enters

a dovetail groove j' in the rail or in any other suitable manner, so as to permit the rear portion of the mechanism to be adjusted forward or back, as desired.

5 A clamp or pressure finger M is located at each rear corner and is fixed to a rock-shaft M', preferably by a head or socket m on the finger and a set-screw m' , so as to adjust the finger to enable it to properly do the clamp-
 10 ing. The clamping-fingers will ordinarily be all that is required for holding the rear end of the sheet on the table; but in case of a release of these fingers with the operation of the side presser-feet additional security for
 15 holding the rear end of the sheet may be provided by revolving weights N, one on each side, each carried by a pivotal arm n from a support N' on the slide J. The shaft M' is rocked by a standard or upright O, the up-
 20 per end of which has a tooth o and a finger o' . The standard or upright is carried back or receded by the engagement of a catch p' on a latch P with the tooth o , and the latch P is carried back by its pivotal connection
 25 with one of the arms G' of the operating-shaft. The receding movement continues to its limit, at which time the standard or upright is caught and held in that position by a catch q on a pivotal latch Q, which engages with the
 30 tooth o and is held in engagement, holding the upright in its receded position, at which time the latch P is thrown out of engagement with the tooth by the finger o' , which raises the free end of the latch with the continued
 35 receding movement thereof. The upright is held receded until the pin q' on the latch Q is engaged by the face or cam p' , which raises the latch Q from engagement, so that the up-
 40 right or standard can be thrown forward, and the standard is thrown forward by means of a spring m^2 , preferably a coiled spring, one end of which is attached to a pin m^3 on the frame and the other to an arm M² on the end of the rock-shaft M'.
 45 The latch P is pivoted to its arm G' of the rock-shaft and has a reciprocating and a rising-and-falling movement. The latch Q is pivotally mounted on the rock-shaft and has only a rising-and-falling movement. The two
 50 latches are located side by side, and both overlie the catch o when the standard O is at the limit of its return movement. The catch o is of sufficient width to be engaged by the respective catches of both latches. The catch
 55 p of the latch P, when the latch and standard are at their advanced position, engages the catch o as the latch begins its receding movement for such movement to carry the standard backward. When the standard
 60 reaches the point where the catch o is beneath the catch q of the latch Q, that latch drops and the catches o and q engage, at which time the finger o' engages the end of the latch P and raises that latch and disengages the
 65 catches o and p , which leaves the standard held in its receded position by the catches o and q and the latch Q and free from the latch

P. The latch P continues its receding movement, causing the cam-face p' on the latch to engage the pin q' of the latch Q and raise that
 70 latch, disengaging the catches o and q and permitting the standard to be returned to its advanced or normal position by the action of the return-spring, to be again caught by the latch P and receded, as above described. 75

The standard or upright has pivoted thereto one end of a connecting-rod, preferably formed in two sections or pieces R and R', with a tube connection R², which permits the rod to be shortened or lengthened, as required, 80 for the adjustment of the mechanism. The forward end of the connecting-rod is pivoted to an arm S' on a rock-shaft S, supported in the side pieces E, and this rod has a pressure-finger, which extends rearward and presses 85 on the sheets between the presser-feet H. This pressure-rod is formed for adjusting purposes in two pieces T and T', with a connecting-tube T². The receding movement of the upright or standard O turns the rock-shaft 90 S, through its arm and connecting-rod, to force the pressure-finger positively onto the sheet, and with the return of the upright or standard through the action of the spring the shaft S is carried in the opposite direction, lifting 95 the pressure-finger from the sheets. The fingers M are forced down tightly onto the paper by the action of the spring in returning the upright or standard, and it will be seen that at no time in the operation of the mech- 100 anism is the sheet free from a holding pressure, as when the fingers M are up the finger T is down and when the finger T is up the fingers M are down, it being the purpose to have either one or the other pressure-apply- 105 ing means in use at all times.

Power for operating the shaft G can be applied in any well-known manner to the arm G² or other suitable device. As shown, a pulley U, driven by a belt u , preferably a 110 link-belt, drives a shaft U', which shaft is carried in a suitable box or bearing on a standard U², attached to the frame, and furnishes the power for operating the arm G² through the pitman-rod g . The pulley U can be utilized for operating a blast-fan for producing a 115 blast of air to assist in separating the top sheet, if so desired, and for this purpose a fan-casing V is attached to the frame of the machine, with an air-pipe V' leading to the 120 rear of the pile of sheets, and the fan is driven by a pulley v and a belt v' , as usual.

The pile or stack of paper in sheets is placed on the table or platform, and this table or platform must be adjustable coincident with 125 the removal of a sheet, so as to bring the sheets successively into position for the first sheet to be delivered, and some means must be provided to secure this adjustment. The construction shown provides a screw-thread- 130 ed shaft W on each side, passing through a screw-threaded boss or head w on the platform, and the shafts are rotated by a cross-shaft X, having at each end a bevel-gear x ,

which meshes with a corresponding gear on the upright shaft W. The shaft X is driven by means of a ratchet Y, engaged by a pawl y on a reciprocating rod z, operated by an eccentric from the shaft U' and having its free end passed through a guide z', so that each advance of the ratchet turns the screw-shafts sufficient to raise the platform the distance for one sheet, and each raising of the platform occurs with the delivery of a sheet and return of the mechanism into position for the delivery of the next sheet. It is to be understood, however, that the means shown illustrate an arrangement for operating the platform or table; but any other suitable raising devices may be employed, if preferred.

The mechanism is to be located in proper relation to a printing-press or intermediate delivery mechanism, and, as shown, the arrangement is one for supplying a sheet from the stack or pile to a point between the carrying-tapes Z and feed-rollers Z', mounted in a frame Z² and constituting portions of an intermediate carrier. The timing of the several parts is such that when the rear corner pressure-fingers M are released or raised the center finger or fingers T come into use and hold the sheet. Then the side presser-feet begin their inward movement, carrying the rear end of the sheet at the corners inward, raising the top sheet between each foot and the center pressure-finger, during which time the forward or delivery presser-feet are returning to their normal or starting position out of contact with the sheaves. At the completion of the inward movement of the side presser-feet the corner retaining-fingers return to normal position and grasp the sheets at the corners, and at the same time the middle finger or fingers rise and the delivery presser-feet have returned to their normal position, engaging the top sheet and ready for an advance movement. With the commencement of the advance movement of the delivery-feet the side feet begin their return movement free of the paper, so that the top sheet is perfectly free to be carried forward and discharged by the movement of the delivery-feet, the remaining sheets on the pile being held during such discharge of the top sheet by the corner-fingers, as described. The delivery-feet project the forward or head end of the top sheet far enough to be caught by the feed-rollers of the intermediate delivery or by the nippers or fingers of a printing-press or other mechanism for such delivery devices to complete the withdrawal of the top sheet from the pile. These movements of the retaining-fingers, side presser-feet, and delivery-feet continue with each operation of the mechanism until the entire number of sheets have been delivered, it being understood that with each delivery of a sheet the feed-table is automatically raised by proper elevating means.

While I have described my invention with more or less minuteness as regards details, I

do not desire to be limited thereto unduly or any more than is pointed out in the claims. On the contrary, I contemplate changes in form and construction, the omission of parts, and substitution of equivalents, as circumstances may suggest or render expedient.

I claim—

1. In a sheet-delivery mechanism, presser-feet at the delivery end of the mechanism having a rocking and a reciprocating movement, and actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, substantially as described.

2. In a sheet-delivery mechanism, side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, and actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, substantially as described.

3. In a sheet-delivery mechanism, presser-feet at the delivery end of the mechanism having a rocking and a reciprocating movement, side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, and separate means actuated from a common motive power for rocking and reciprocating each set of feet, the actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, substantially as described.

4. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a lateral reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, and a retaining-finger at each rear corner releasing their grip at the commencement of the initial advance of the feet and during the continued advance of the feet and again grasping the pile of sheets at the terminus of the advance and during the return movement of the feet, substantially as described.

5. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, retaining-fingers, one at

each rear corner of the pile of sheets, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, and means for raising the retaining-fingers from the pile of sheets with the first advance of the feet releasing the top sheet to be moved inward by the action of the feet and remaining raised during the advance of the feet and returning at the terminus of the advance of the feet to grasp and retain the remaining sheets of the pile during the receding movement of the feet, substantially as described.

6. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, retaining-fingers, one at each rear corner of a pile of sheets, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, means for raising the retaining-fingers from the corner of the pile of sheets with the first advance of the feet to release the top sheet to be moved inward by the action of the feet and remaining raised during the advance of the feet and returning at the terminus of the advance of the feet to grasp and retain the remaining sheets of the pile during the receding movement of the feet, and an air-blast operating at the cessation of the advance of the feet and when the sheet has been elevated centrally for lifting the rear end of the top sheet and maintaining the sheet free of the pile of sheets during its delivery, substantially as described.

7. In a sheet-delivery mechanism, the combination of side presser-feet, each consisting of a foot and a head to which the foot is pivoted, a slide carrying the head, and actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, substantially as described.

8. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, retaining-fingers at the rear corners of the pile of sheets releasing their grip with the initial advance of the feet and

continuing their release during the advance and returning and grasping the corners of the pile of sheets at the terminus of the advance movement of the feet and grasping the pile of sheets during the return, and an intermediate presser-finger between the side presser-feet holding down the top sheet when released by the corner-retaining fingers and during the advance of the feet and releasing the top sheet with the initial return movement of the feet for the delivery of the top sheet, substantially as described.

9. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, separate actuating means operated from a common motive power for rocking and reciprocating the feet, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, retaining-fingers for the rear corners of the pile of sheets releasing their grip with the initial advance of the side presser-feet and continuing their release during the advance and returning and again grasping the corners of the pile of sheets at the terminus of the advance of the side feet and continuing their grasp during the return of the feet, and an intermediate pressure-finger between the side presser-feet holding down the top sheet when released by the corner-retaining fingers and during the advance of the side feet and releasing the top sheet with the initial return of the side feet, the retaining corner-fingers and the intermediate pressure-finger operating alternately in the delivery of the top sheet, substantially as described.

10. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, a vertically-movable sheet-carrying platform or table, and means coacting with the front delivery-foot for releasing the top sheet for delivery by the feet, substantially as described.

11. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the

actuating means, a vertically-movable sheet-carrying platform or table, and means coacting with the side presser-feet for permitting the feet to centrally raise the top sheet of the pile of sheets for delivery of the top sheet, substantially as described.

12. In a sheet-delivery mechanism, the combination of presser-feet at the delivery end of the mechanism having a rocking and a reciprocating movement, side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, separate actuating means for rocking and reciprocating each set of feet, each actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, a vertically-movable sheet-carrying platform or table, and means coacting with both sets of feet for releasing a top sheet and permitting the delivery of the sheet by the action of the feet, substantially as described.

13. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, side presser-feet having a rocking and a reciprocating movement, separate actuating means operated from a common motive power for rocking and reciprocating each set of feet, each actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, retaining-fingers for the rear corners of a pile of sheets releasing the sheets with the forward action of the side feet and grasping the pile of sheets with the forward action of the delivery-feet, an intermediate pressure-finger between the side presser-feet grasping the pile of sheets with the advance of the presser-feet and releasing the pile of sheets with the advance of the delivery presser-feet, and a vertically-movable platform or table carrying the pile of sheets for the action of the pressure-fingers thereon in the delivery of the top sheet of the pile, substantially as described.

14. In a sheet-delivery mechanism, the combination of side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, means for rocking and reciprocating the feet, and side rolling weights engaging the sheets at the rear corners, substantially as described.

15. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the

rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, side presser-feet having a rocking and a reciprocating movement, actuating means operating directly on and through the feet to impart to them, as the actuating means commence to act, a rocking movement, and, on the cessation of the rocking movement, a reciprocating movement, caused by the continued action, in the same direction, of the actuating means, rear corner-retaining fingers, means for operating such fingers to release the sheet at the corners with the advance of the side presser-feet and grasp the sheets at the corners with the advance of the delivery presser-feet, an intermediate pressure-finger, means for operating such finger to grasp the sheets with the advance of the side presser-feet and release the top sheet with the advance of the delivery presser-feet for the action of the feet to deliver the top sheet, substantially as described.

16. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, side presser-feet at the rear end of the mechanism having a rocking and a reciprocating movement, retaining-fingers at the rear corners of the sheet, an intermediate pressure-finger, an upright or standard, pivoted latches coacting with the upright or standard, means for reciprocating both sets of feet, and means for rocking the retaining-fingers and the upright or standard, substantially as described.

17. In a sheet-delivery mechanism, the combination of front delivery presser-feet having a rocking and a reciprocating movement, sliding heads carrying such feet, rods on which the heads slide, a clamp-block for each head on its rod, and a pressure-spring for each clamp-block for increasing the pressure of the delivery-feet on the sheet, substantially as described.

18. In a sheet-delivery mechanism, presser-feet at the delivery end of the mechanism, a reciprocating shaft having the feet pivotally mounted thereon, and actuating means operating directly on and through the feet for rocking the feet initially and reciprocating the shaft at the cessation of the rock for forcing and holding the feet down with the advance movement and raising and holding them raised with the return movement, substantially as described.

19. In a sheet-delivery mechanism, side presser-feet at the rear end of the mechanism, laterally-sliding heads having the feet pivoted thereto, a fixed shaft on which the heads slide, and actuating means for reciprocating the heads for the inward movement to force and hold the feet down and the outward movement to raise and maintain the feet raised, substantially as described.

20. In a sheet-delivery mechanism, a presser-foot comprising a toe and a shank rig-

idly united one with the other and pivotally
mounted by and rocked from the shank, and
actuating means operating to initially rock
and at the stoppage of the rock to reciprocate the feet, substantially as described.

5 21. In a sheet-delivery mechanism, a side
presser-foot comprising a toe and a shank, a
head having a foot pivotally attached thereto

at the shank, a slide carrying the head, and
actuating means for reciprocating the slide 10
through the head for rocking and reciprocating the foot, substantially as described.

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