J. WHITE.

SHEET DELIVERY MECHANISM.

APPLICATION FILED MAR. 11, 1913.

1,156,957.

Patented Oct. 19, 1915.

3 SHEETS—SHEET 1.

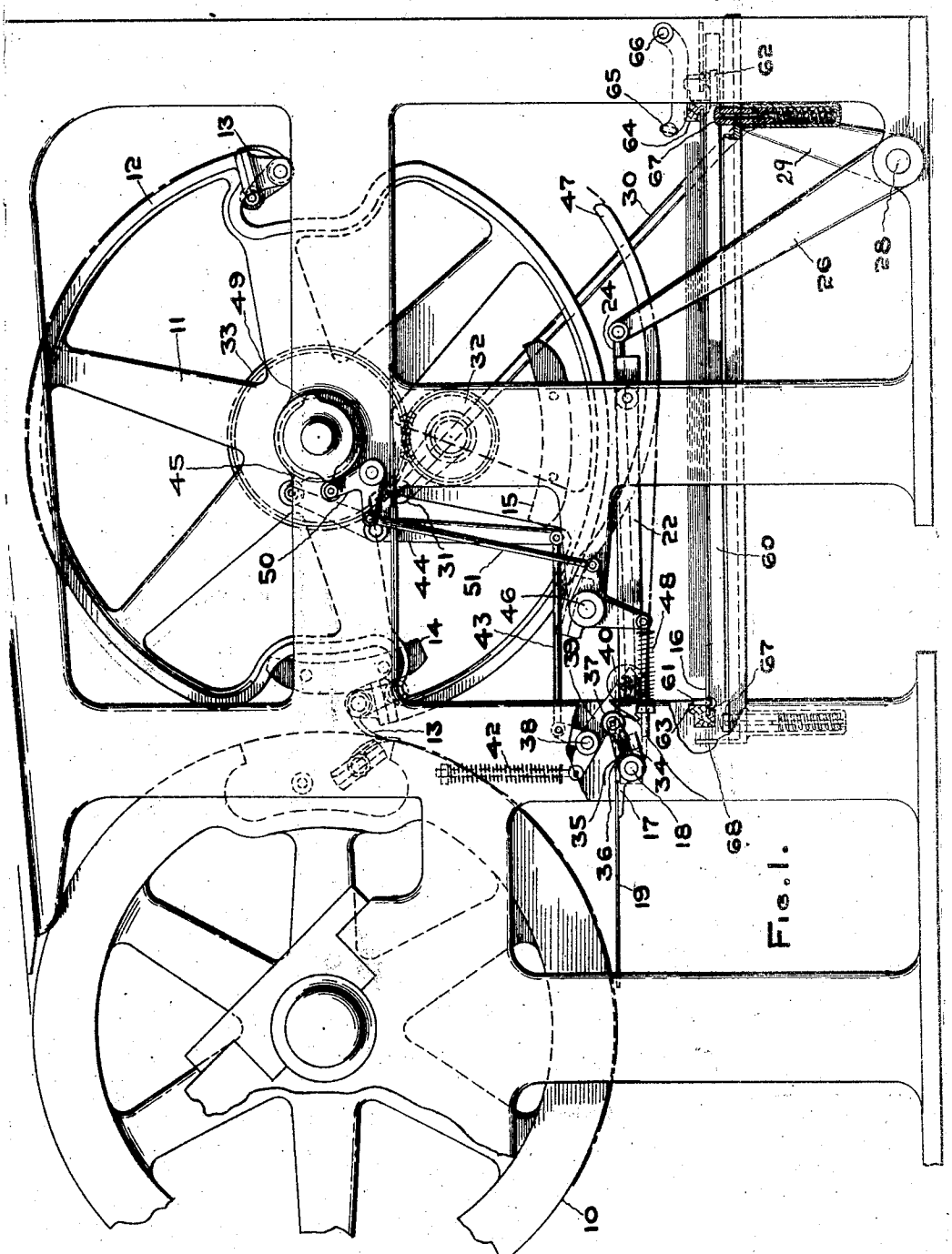


Fig. 1.

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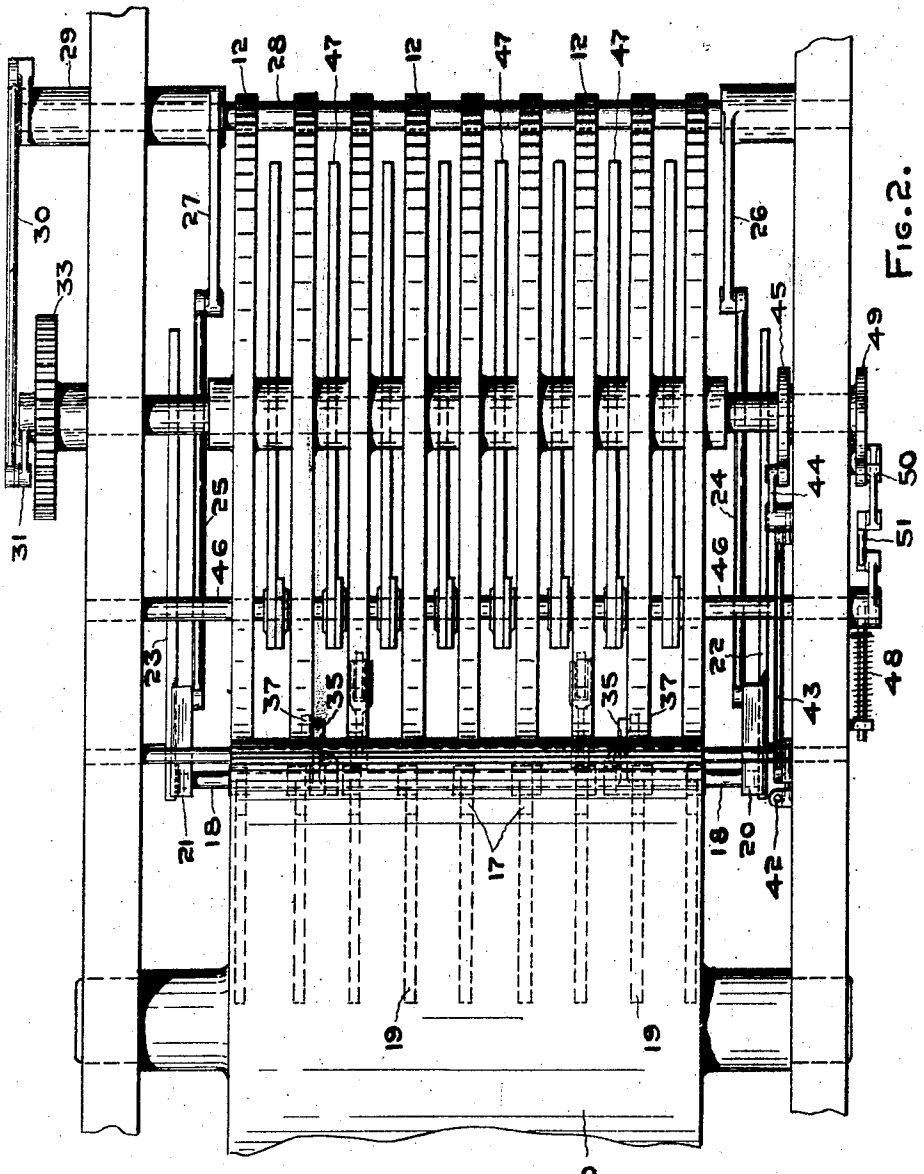


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

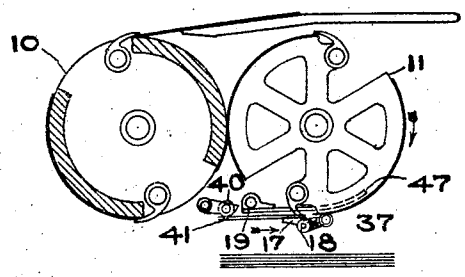


Fig. 4.

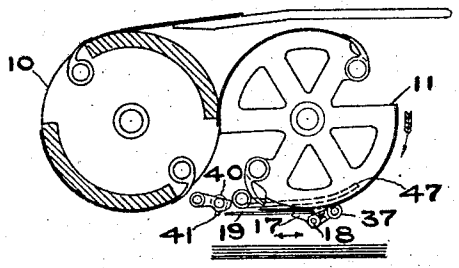
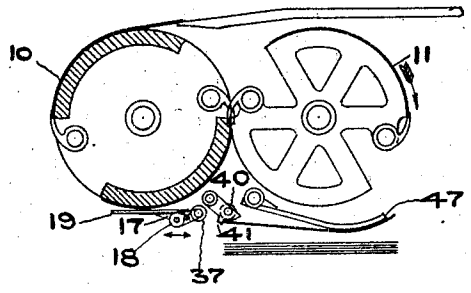


Fig. 5.



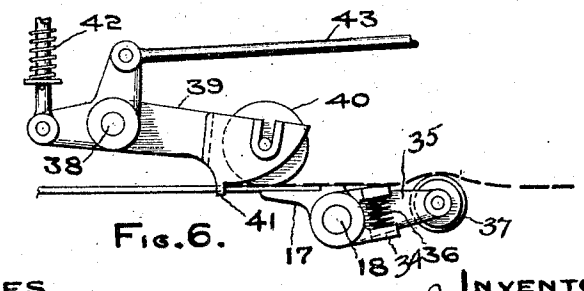


Fig. 6.

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SHEET-DELIVERY MECHANISM.

1,156,957. Specification of Letters Patent. Patented Oct. 19, 1915.

Application filed March 11, 1913. Serial No. 753,475.

To all whom it may concern:

Be it known that I, JOSEPH WHITE, a citizen of the United States, residing in Piscataway township, (post-office address, Bound Brook, New Jersey,) State of New Jersey, have invented certain new and useful Improvements in Sheet-Delivery Mechanism; and I do declare the following to be a full, true, and exact description of the said invention, such as will enable others skilled in the art to which it appertains to make use of the same.

This invention relates to that form of sheet delivery mechanism in which the sheets are laid one by one on the delivery pile, and provides a simple and efficient means by which such sheets may be received in rapid succession from a printing machine or the like, and laid evenly and regularly on the pile.

The mechanism which I have devised is particularly useful in machines from which the sheets are being delivered not only at a high rate of speed but with a very short distance between the successive sheets. When the usual forms of delivery mechanisms are applied to such a machine, they will not work efficiently, particularly if they embody a reciprocating carriage, since the time between the successive presentation of the sheets to such carriage is not sufficient to permit the carriage to deliver the sheet and get back to the starting point before the next sheet arrives.

My present invention is to provide a delivery mechanism, and particularly one using a reciprocating carriage, which is so constructed that it will deliver sheets presented to it in very rapid succession.

With this and other objects in view, my invention consists of certain novel features of construction and arrangement of parts as will be more fully described and pointed out in the appended claims.

In the drawings, Figure 1 represents a side elevation of a preferred form of my delivery mechanism as applied to one kind of printing machine, which I have chosen for purposes of illustration. Fig. 2 is a plan view of Fig. 1. Figs. 3, 4, and 5 are diagrammatic views of different positions of my preferred form of mechanism, Fig. 3 showing the position of the parts as a sheet is about to pass to the delivery carriage, Fig. 4 showing the position of the parts after the sheet is partially on such carriage, and the carriage is about to reverse its motion, and Fig. 5 showing the position of the parts when the sheet is about to drop on the delivery pile and the carriage is about to reverse its motion to take the succeeding sheet. Fig. 6 is an enlarged partial side elevation of some of the mechanism shown in Fig. 1.

The corresponding parts are referred to both in the drawings and the following description by similar reference characters.

In the drawings, 10 represents the impression cylinder of the printing press which I have chosen for purposes of illustration, and 11 a delivery cylinder therefor, the delivery cylinder illustrated being composed of a number of separate rings 12. In the particular form which I have illustrated, this delivery cylinder is provided with two sets of sheet grippers 13—13 caused to operate to take a sheet from the impression cylinder 10 and to deliver it to the delivery mechanism by cams 14—15 in the usual manner. The cylinder 11 is geared to the cylinder 10 to be driven uniformly therewith.

16 is a sheet delivery tray on which the sheets are to be piled and which is supported in a manner to be more fully described hereafter.

Between the delivery tray 16 and the cylinder 11 is mounted a reciprocable carriage 17 composed of a shaft 18 having mounted thereon a support 19 which, in my preferred form, is composed of a plurality of separate members attached to the shaft 18. The shaft 18 is mounted in blocks 20—21, which are slidably mounted on a pair of parallel bars or supports 22—23, secured in any suitable manner to the side frames of the press. To the blocks 20—21 are connected connecting rods 24—25, which in turn, are connected to levers 26—27 attached on either side of the delivery pile to a shaft 28 extending across the side frames of the press. To the shaft 28 is attached a lever 29 connected by a rod 30 to a crank arm 31 mounted on a gear 32 meshing with a gear 33 on the shaft of the cylinder 11. The gear 33 is twice as large as the gear 32, and as will be seen by an inspection of Fig. 1, the carriage 17 moves back and forth twice for each rotation of the cylinder 11, and in timed relation therewith.

To the shaft 18 is attached one or more arms 34 against which is placed an arm 35,

loosely mounted on the shaft 18 and connected to the arm 34 by a spring 36. The arm 35 carries a roller 37. An inspection of Fig. 6 will show that the roller 37 is capable of an up and down motion around the shaft 18, but is normally held in its uppermost position by the spring 36.

Rotatably mounted in the side frames of the machine is a shaft 38 carrying one or more arms 39 attached thereto, such arms carrying rollers 40 and being shaped so as to provide a stop member 41 thereon. The rollers 40 are held normally in the position shown in Fig. 6 by the spring 42 turning the shaft 38 but, through the connecting rod 43 and cam lever 44 moved by the cam 45 attached to the shaft of the cylinder 11, the rollers 40 may be moved to the position shown in Fig. 1.

Rotatably mounted in the side frames of the machine is a shaft 46 to which is attached one or more arms 47, these arms being arranged to pass between the rings 12 of the cylinder 11 and to be held normally within the periphery of these rings by the spring 48. The arms 41 are moved to position shown in Fig. 1 by the cam 49 acting through the cam lever 50 and the connecting rod 51.

Referring now particularly to Figs. 3, 4, and 5, it will be seen that the parts heretofore described are arranged in such a manner that while the carriage 17 is still moving backward or to the right of Fig. 3, the grippers 13 of the cylinder 11 open to permit the head of the sheet to pass to the carriage 17. At this time the roller 37 has been pressed upward against the cylinder 11, and thus acts in coöperation with cylinder 11 to feed the sheet from the cylinder to the carriage. The yielding mounting of the roller 37 enables it to remain in contact with the surface of the cylinder 11 as the carriage 17 moves to the right and to the left of Fig. 3. As shown in Fig. 3, as the sheet begins to pass to the carriage 17, the arms 47 are within the periphery of the cylinder, and therefore do not interfere with the sheet. The rollers 40 and stops 41 are held in their uppermost position by the spring 42, and in this position are arranged to engage the head of the sheet as it moves along the carriage 17. The stops 41 are positioned so that they extend below the surface of the supports 19, and the rollers 40 are positioned so that they run on top of these supports. Thus the front edge of the sheet passes under the rollers 40 and hits against the stops 41 at a time when the carriage 17 is moving in the same direction as the sheet, but at a less speed, the rollers 40 serving to hold the sheet to the carriage 17, and to prevent its rebounding from the stops 41.

The carriage 17 is constructed so that it is much shorter than the length of sheet which would ordinarily be delivered from the cylinder 11, and likewise the total movement of the carriage is much less than the length of such sheet. Fig. 4 shows the position of the carriage at the time when it is about to reverse its motion or begin its motion to the left, at which time, as will be seen, the sheet is partially supported on the carriage. The carriage continues its motion to the left to the position shown in Fig. 5 during which time the front edge of the sheet is tucked under the rollers 40 and against the stops 41, so that the further movement of this edge is prevented. The continued movement of the carriage moves it out from under the sheet when it arrives in the position shown in Fig. 5, at which time the cams 45 and 49 operate to move the rollers 40 and the arms 47 downward, thus forcing the sheet to drop to the pile.

By reason of the short distance which the carriage has to travel backward, or to the right of Fig. 5, in order to receive the head of the next sheet, the sheets may be delivered in rapid succession. In the form illustrated, for instance, the distance between the tail and the head of successive sheets is somewhat less than half the total length of the sheets.

As will be understood from an inspection of Fig. 1, immediately after the rollers 40 and the arms 47 have moved downward to deposit the sheet, they are restored to their original or upward position as shown in Fig. 3. It will also be understood that the backward motion of the carriage 17 to the right of Fig. 5 will bring the roller 37 again in contact with the next sheet on the cylinder 17 to hold it thereagainst, and to compel its delivery to the carriage 17.

It will be understood that the arms 47 are not always required, though I prefer to use them. It will also be understood that the roller 37 may be mounted in any appropriate manner other than the one which I have illustrated, although I prefer the latter since the motion of the carriage provides a ready means by which these rollers may be moved from beneath the sheet to permit it to drop.

One of the principal advantages of my device arises from the fact that the sheet is delivered to the carriage in such a manner that only the front portion thereof is supported by the carriage until it arrives at its proper position over the delivery board and that the carriage is removed from beneath the sheet in the same direction in which the latter was fed to it. This enables me to use a very short carriage and one having a very short stroke, and also enables the sufficiently rapid removal of the carriage from beneath the sheet to enable the carriage to return to the starting point to receive a second sheet, which is closely following the

first. For some purposes a carriage other than a reciprocating one may be used.

While for the tray 16 may be substituted any of the well-known forms of delivery board, I prefer to use the tray arrangement illustrated in Fig. 1, although it forms no part of my present invention, being separately described and claimed in my application for Letters Patent Serial No. 726,592, filed October 19, 1912.

Referring now to Fig. 1, 60 represents one of a pair of narrow supports on either side of the mechanism on which is slidably mounted the tray 16 by means of grooved projections 61 thereon, the rear end of the tray being supported by a projecting ledge 62 attached to the support 60. The tray 16 is provided at either end with an end member 63, 64. The tray 16 may be inserted beneath the cylinder 11 by placing the grooved member 61 on the support 60 and pushing it inward until further progress is prevented by a removable stop 65 pivotally mounted at 66 on the side frame of the machine, it being understood that the stop 65 will normally engage with the inner edge of the end member 64. When it is desired to insert a new tray after the tray 16 is filled, an empty tray, a portion of which is shown in dotted outlines in Fig. 1, is placed on the supports 60 with its grooved members 61 engaging therewith. When this empty tray is moved sufficiently far inward so that its end member abuts the end member 64 of the full tray, the stop 65 will have been raised out of contact with the end member 64 by the engagement of the supporting arm of the stop 65 with a portion of the incoming tray. Further motion of the incoming tray will cause the full tray 16 to move along the supports 60 until its grooved members 61 move beyond the end of the support 60, and its rear portion passes beyond the ledge 62. The filled tray 16 will then fall downward and be caught on a set of spring seated plungers 67. The incoming tray may then be pushed into the place of the full tray, the stop 65 moving downward to engage with the end member 64 of the empty tray to locate it in place. The filled tray 16 may then be moved backward at any convenient time and removed from the press. An end stop 68 is provided to prevent the tray being moved too far to the left in Fig. 1.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

1. A flat reciprocable sheet supporting carriage, means to feed a sheet thereto, a stop, independent of said carriage, to limit the motion of a sheet on said carriage and in relation thereto and means to reciprocate said carriage constructed and arranged to move said carriage from beneath the sheet in the same direction in which the sheet was fed to it, while the head thereof is positioned against said stop and supported on said carriage.

2. A flat reciprocable sheet supporting carriage, means to feed a sheet thereto, means to reciprocate said carriage constructed and arranged to move it in the same direction as the sheet is fed to it and at a less speed, and a stop, independent of said carriage and constructed and arranged to limit the motion of the sheet on the carriage as the sheet is fed to said carriage and to hold the sheet from moving with said carriage as said carriage passes from under the sheet.

3. A flat reciprocable sheet supporting carriage, means to feed a sheet thereto, a stop, independent of said carriage, to limit the motion of a sheet on said carriage and in relation thereto, means to prevent any reverse motion of the sheet, and means to reciprocate said carriage, constructed and arranged to move said carriage from beneath the sheet in the same direction in which the sheet was fed to it, while the head thereof is positioned against said stop and supported on said carriage.

4. A flat reciprocable sheet supporting carriage, means to feed a sheet thereto, a stop, independent of said carriage, to limit the motion of a sheet on said carriage and in relation thereto, a pressure member arranged to press the sheet to said carriage to prevent reverse motion of the sheet, and means to reciprocate said carriage, constructed and arranged to move said carriage from beneath the sheet in the same direction in which the sheet was fed to it, while the head thereof is positioned against said stop and supported on said carriage.

5. A movable sheet carriage, means to feed a sheet thereto at a high speed in relation to said carriage, a stop arranged to contact with the head of the sheet to limit its motion, a pressure member arranged to press the sheet to said carriage to prevent reverse motion of the sheet, means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom and means to move said pressure member downward after said carriage has passed from under the sheet.

6. A sheet carriage, means to feed a sheet thereto, means to limit the motion of the sheet on said carriage, and means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom, said carriage and limiting means being adapted and arranged so that only the front portion of the sheet is supported by said carriage, and means to move the rear portion of the sheet downward as the front portion is being removed from said carriage.

7. A sheet carriage, means to feed a sheet

thereto at a high speed in relation to said carriage, a fixed stop to limit the motion of the sheet on said carriage, a pressure member adjacent said stop to press the sheet against said carriage to prevent reverse motion of the sheet and means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom, said carriage and stop being constructed and arranged so that only the front portion of the sheet is supported by said carriage.

8. A sheet carriage, means to feed a sheet thereto at a high speed in relation to said carriage, a fixed stop to limit the motion of the sheet on said carriage, a pressure member adjacent said stop to press the sheet against said carriage to prevent reverse motion of the sheet, means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom, said carriage and stop being constructed and arranged so that only the front portion of the sheet is supported by said carriage, and means to move said pressure member downward after said carriage has passed from under the sheet.

9. A sheet carriage, means to feed a sheet thereto at a high speed in relation to said carriage, a fixed stop to limit the motion of the sheet on said carriage, a pressure member adjacent said stop to press the sheet against said carriage to prevent reverse motion of the sheet, means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom, said carriage and stop being constructed and arranged so that only the front portion of the sheet is supported by said carriage, and means to move the rear portion of the sheet downward as the front portion is being removed from said carriage.

10. A sheet carriage, means to feed a sheet thereto at a high speed in relation to said carriage, a fixed stop to limit the motion of the sheet on said carriage, a pressure member adjacent said stop to press the sheet against said carriage to prevent reverse motion of the sheet and means to move said carriage in the direction in which the sheet was fed to it, to remove the sheet therefrom, said carriage and stop being constructed and arranged so that only the front portion of the sheet is supported by said carriage, means to move said pressure member downward after said carriage has passed from under the sheet and means to move the rear portion of the sheet downward as said pressure member is being moved downward.

11. A rotary sheet carrier, a reciprocable sheet carriage under said carrier and arranged to receive a sheet passing from said carrier, carriage reciprocating means arranged to move said carriage in the direction of the sheet passing from said carrier, means to limit the motion of the sheet on said carriage, said carriage reciprocating means and said limiting means being adapted and arranged so that the sheet is only partially supported by said carriage.

12. A rotary sheet carrier, sheet taking means thereon, a delivery board under said carrier, a flat sheet supporting carriage horizontally movable between said delivery board and said carrier, means to operate said sheet taking means to permit the head of a sheet to pass from said carrier upon said carriage and means to move said carriage from under the sheet in the same direction in which the sheet was fed to it.

13. A rotary sheet carrier, sheet taking means thereon, a delivery board under said carrier, a flat sheet supporting carriage horizontally movable between said delivery board and said carrier, means to operate said sheet taking means to permit the head of a sheet to pass from said carrier upon said carriage and means to move said carriage from under the sheet in the same direction in which the sheet was fed to it, said carriage and said moving means being adapted and arranged so that the sheet is only partially supported by the carriage at any time.

14. A rotary sheet carrier, sheet taking means thereon, a delivery board under said carrier, a sheet carriage movably mounted between said delivery board and said carrier, means to operate said sheet taking means to permit the head of a sheet to pass from said carrier upon said carriage, means to move said carrier from under the sheet in the same direction in which the sheet is fed to it, said carriage and said moving means being adapted and arranged so that the sheet is only partially supported by the carriage at any time, and means to move the sheet downward toward said delivery board after said carriage has passed from under it.

15. A movable sheet carriage, means to feed a sheet thereto, means to limit the motion of the sheet with said carriage and means to engage the head and the tail of the sheet being fed to said carriage and move it downward after said carriage has passed from under the sheet.

16. A rotary sheet carrier, a delivery board under said carrier, a reciprocable sheet carriage mounted between said board and said carrier and positioned to receive a sheet passing from said carrier, means to move said carriage first in a direction opposite to that of the sheet which is being fed to it and while the sheet is being fed to it, and then in the opposite direction to remove the sheet from said carriage.

17. A rotary sheet carrier, a reciprocable sheet carriage mounted beneath said carrier, means to reciprocate said carriage and a sheet pressure member mounted on said carriage and arranged to press against said

carrier a sheet passing from said carrier to said carriage.

18. A rotary sheet carrier, a reciprocable sheet carriage mounted beneath said carrier, means to reciprocate said carriage and a rotatable sheet pressure member mounted on said carriage and arranged to press against said carrier a sheet passing from said carrier to said carriage.

19. A rotary sheet carrier, a reciprocably mounted sheet carriage beneath said carrier, a pressure member arranged to press a sheet against said carrier to cause it to be fed to said carriage and means to remove said pressure member from said carrier before said carriage has completed its receiving stroke.

20. A sheet feeding means, a sheet stop spaced therefrom, a flat sheet supporting carriage constructed and arranged to support a sheet while it is passing from said feeding means to said stop and means to move said carriage in the same direction as the sheet is fed to it by said feeding means, to remove said carriage from beneath a sheet positioned against said stop.

21. A rotary sheet carrier having sheet taking means thereon, a sheet carriage mounted to reciprocate beneath said carrier, means to operate said sheet taking means to permit a sheet to pass from said carrier to said carriage, a stop to limit the motion of the sheet on said carriage, a roller adjacent said stop and arranged to press the leading edge of the sheet against said carriage and means to reciprocate said carriage, adapted to move it from under the sheet in the same direction that the sheet was fed to it.

22. A rotary sheet carrier having sheet taking means thereon, a sheet carriage mounted to reciprocate beneath said carrier, means to operate said sheet taking means to permit a sheet to pass from said carrier to said carriage, a stop to limit the motion of the sheet on said carriage, a roller adjacent said stop and arranged to press the leading edge of the sheet against said carrier, means to reciprocate said carriage adapted to move it from under the sheet in the same direction that the sheet was fed to it, and means to move said roller downward after the sheet has been removed from said carriage.

23. A rotary sheet carrier composed of rings spaced apart and having sheet taking means thereon, a sheet carriage mounted to reciprocate beneath said carrier, means to operate said sheet taking means to permit a sheet to pass from said carrier to said carriage, a stop to limit the motion of the sheet on said carriage, a roller adjacent said stop and arranged to press the leading edge of the sheet against said carriage, means to reciprocate said carriage, adapted to move it from under a sheet in the same direction that the sheet was fed to it, movably mounted arms arranged to lie normally between said rings and means to move said arms to remove the rear of the sheet from said carrier.

24. A sheet carrier, a reciprocably mounted sheet carriage beneath said carrier, a sheet stop and means to reciprocate said carriage, said carrier and said reciprocating means being constructed and arranged to permit the head of the sheet to pass from said carrier on to said carriage while said carriage is moving in a direction opposite to that of the sheet passing from said carrier and to reverse the direction of motion of said carriage before the head of the sheet reaches said stop.

25. A sheet delivery mechanism including a sheet carrier, a reciprocably mounted sheet carriage beneath said carrier and means to reciprocate said carriage with a stroke considerably shorter than the length of the sheet to be delivered, said reciprocating means and said carrier being constructed and arranged so that the direction of motion of said carriage is reversed while a sheet is passing from said carrier on to said carriage.

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