

No. 850,313.

PATENTED APR. 16, 1907.

T. M. NORTH.
SHEET DELIVERY MECHANISM OF PRINTING MACHINES.
APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 1.

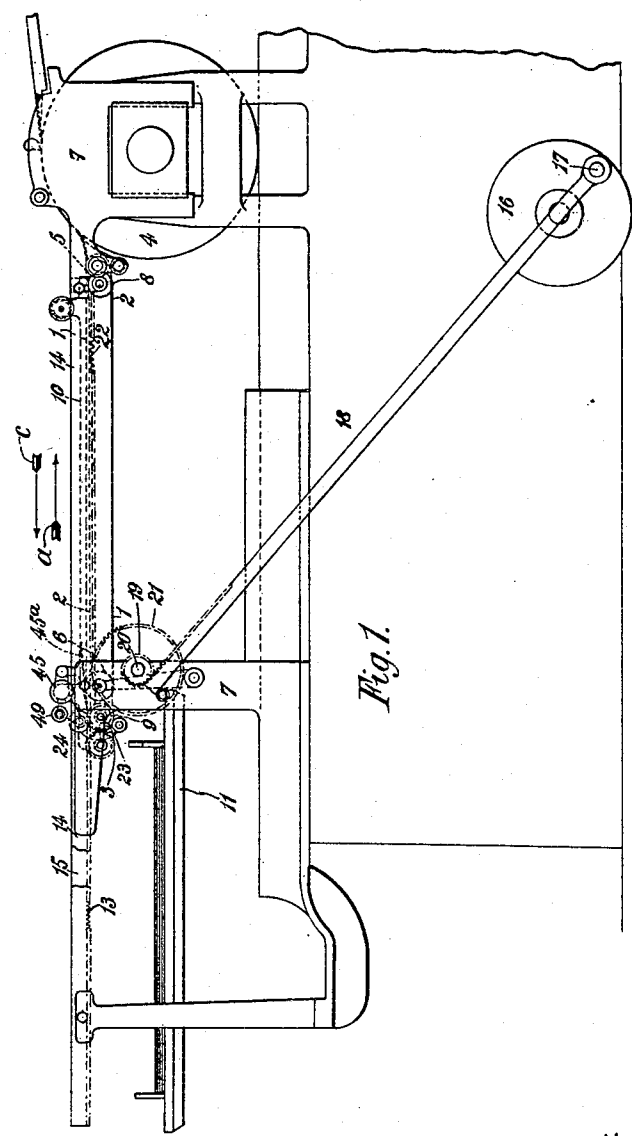


Fig. 1.

Witnesses
W. S. S. and R. S. S.
Warwick Thyl Williams

Thomas Merrifield North.
Inventor

per Chas. S. Woodroffe
Attorney

THE

No. 850,313.

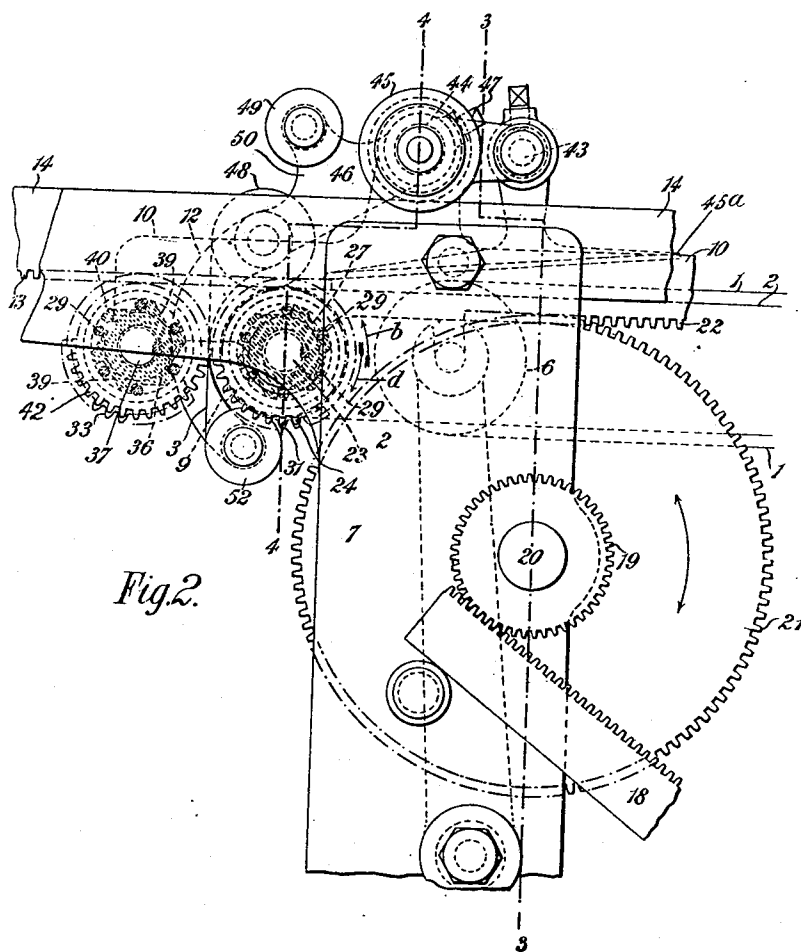
PATENTED APR. 16, 1907.

T. M. NORTH.

SHEET DELIVERY MECHANISM OF PRINTING MACHINES.

APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 2.



Witnesses
W. C. Ireland & Son
Warwick Thyl & Sons

Thomas Merrill North.
Inventor

per Chaas Woodroffe
Attorney

No. 850,313.

PATENTED APR. 16, 1907.

T. M. NORTH.

SHEET DELIVERY MECHANISM OF PRINTING MACHINES.

APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 3.

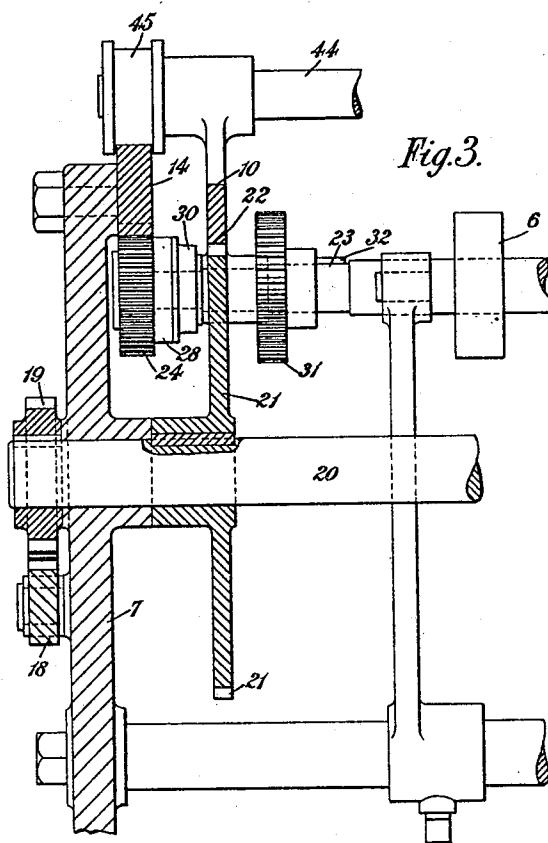


Fig. 3.

Witnesses
W. E. H. H. H. H.

Warwick H. Williams

Thomas M. North
Inventor

per Charles Woodroffe
Attorney

No. 850,313.

PATENTED APR. 16, 1907.

T. M. NORTH.
SHEET DELIVERY MECHANISM OF PRINTING MACHINES.

APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 4.

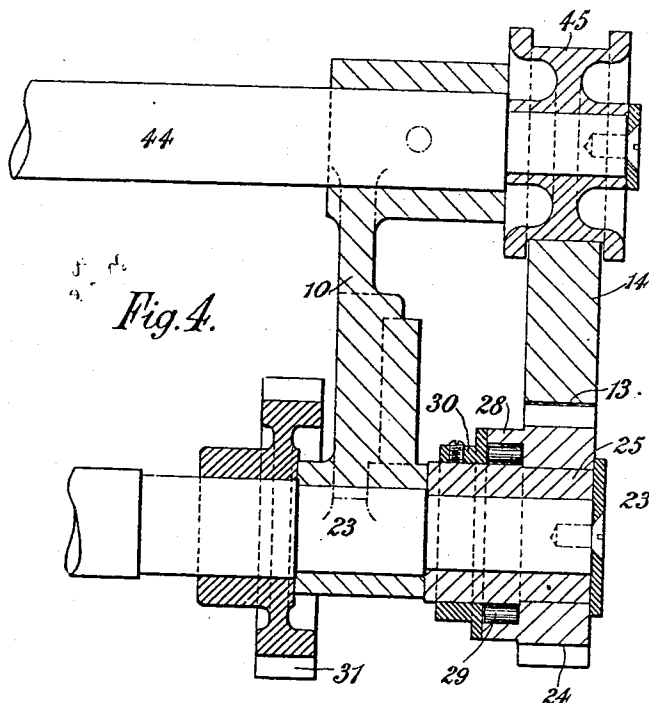


Fig. 4.

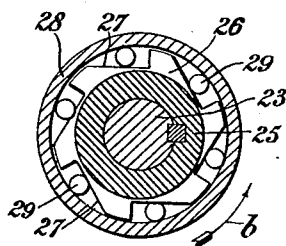


Fig. 6.

Witnesses
W. S. Schuchman
Warwick H. Williams

Thomas M. North
Inventor

per Charles Woodroffe
Attorney

Draftman

No. 850,313.

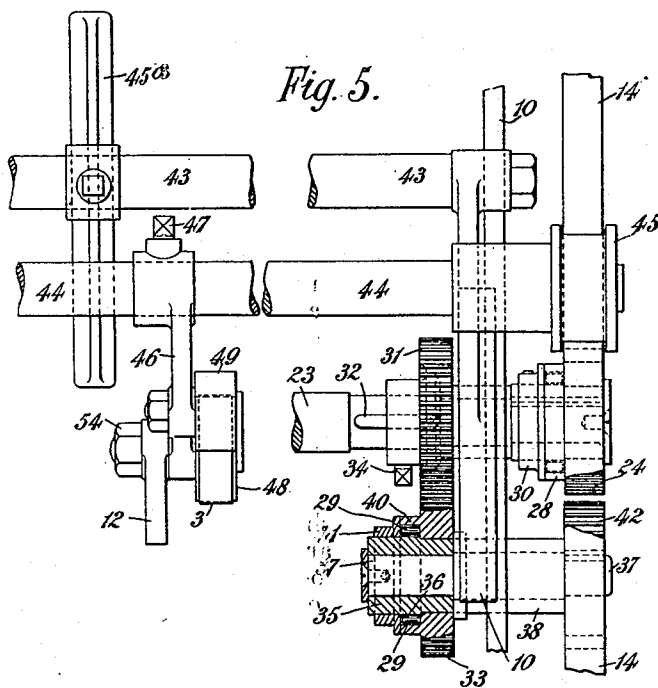
PATENTED APR. 16, 1907.

T. M. NORTH.

SHEET DELIVERY MECHANISM OF PRINTING MACHINES.

APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 5.



Witnesses
W. Sutherland & Sons
Keweenaw, Mich. Williams

Thomas Merrifield North
Inventor

per Chas S Woodruff
Attorney

No. 850,313.

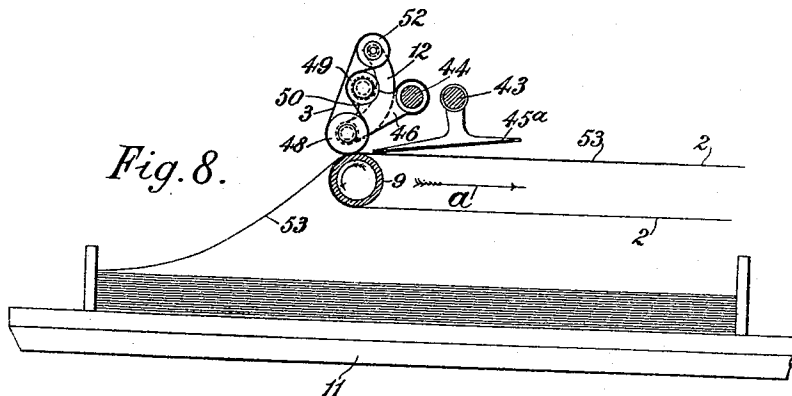
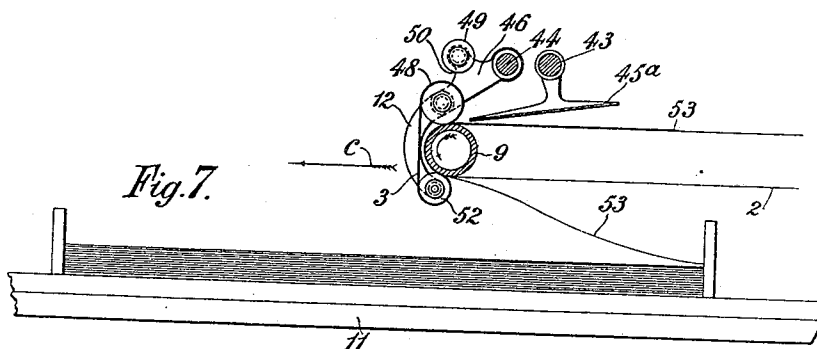
PATENTED APR. 16, 1907.

T. M. NORTH.

SHEET DELIVERY MECHANISM OF PRINTING MACHINES.

APPLICATION FILED MAR. 20, 1906.

6 SHEETS—SHEET 6.



Witnesses
Wm. H. Williams
Wm. H. Williams

Thomas Charles North.
Inventor
per Chas. Woodroffe
Attorney

UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF LONDON, ENGLAND, ASSIGNOR TO LINOTYPE AND MACHINERY LIMITED, OF LONDON, ENGLAND.

SHEET-DELIVERY MECHANISM OF PRINTING-MACHINES.

No. 850,313.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed March 20, 1906. Serial No. 307,102.

To all whom it may concern:

Be it known that I, THOMAS MERRIFIELD NORTH, of 188 and 189 Fleet street, in the city of London, England, have invented new and useful Improvements in Sheet-Delivery Mechanism of Printing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to sheet-delivery mechanism of the class which is capable of being adjusted to deliver the sheets with the printed sides either up or down; and it has for its object to provide a mechanism which, as compared with those hitherto in use, shall be of simpler and more economic construction and capable of being more readily adjusted to effect the above-named changes of delivery.

In the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a side elevation of sufficient of a printing-machine, seen from the feeder side thereof, to show the application of the present invention thereto. Fig. 2 is a similar side elevation, drawn to a larger scale, of part of the mechanism shown in Fig. 1. Fig. 3 is a transverse section on the line 3 3 of Fig. 2 looking toward the left of the last-named figure. Fig. 4 is a vertical section on the line 4 4 of Fig. 2, but drawn to a larger scale than that to which the said Fig. 2 is drawn. Fig. 5 is a plan, partly in horizontal section, of part of the mechanism shown in Fig. 2. Fig. 6 is a sectional elevation of one of the automatic clutches; and Figs. 7 and 8 are diagrammatic views illustrating adjustments for the printed side down and up deliveries, respectively.

According to this invention the complete delivery is effected by three sets of endless tapes 1, 2, and 3. The first set of tapes 1 receives the sheets from the impression-cylinder 4, Fig. 1, travels around rollers 5 6, turning about two stationary axes, and delivers the sheets upon the second set 2. The shafts of the rollers 5 6 are supported in bearings provided on the two side frames 7 of the machine. Only one of such frames is shown in the drawings. The tapes 2 of the second set are led round two rollers 8 9, revolvably supported in the opposite ends of a reciprocating carriage 10, and are adapted to convey the

sheets to the delivery-table 11. The third set of tapes 3 is carried on the delivery end of the carriage 10, there being one such tape for each side margin of the sheets received on the carriage. These margin-tapes 3 are driven positively or by friction with the carriage-tapes 2 or the sheets on them and are each mounted on an arm 12, pivotally connected to the carriage 10 and capable of being adjusted to two positions, (shown, respectively, in Figs. 7 and 8,) each characterized by a different type of engagement with the sheets on the carriage-tapes, which positions, in conjunction with the direction of the travel of the carriage, decide the kind of delivery—that is to say, whether printed side up or down.

The rollers 5 6 of the first set of tapes 1 are or may be constantly rotated by any suitable means, while the rollers 8 9 of the carriage-tapes 2 are intermittently rotated from a stationary toothed rack 13, relatively to which the said carriage is moved.

The carriage 10 is reciprocated along two horizontal track-bars 14 15, one at each side of the machine and extending over the delivery-table 11, and one of these bars—viz. the bar 14—at its under side is provided with the before-mentioned toothed rack 13. The reciprocating motion of the carriage 10 may be obtained by any convenient means—such for example, as the crank-operated pinion and rack-gear shown in Figs. 1 and 2. This gear comprises the crank-disk 16, the crank pin 17 of which is pivotally attached to the lower end of the inclined rack-bar 18, whose upper end is in gear with a spur-pinion 19 fast to a shaft 20, on which are also rigidly secured two gear-wheels 21, each engaging toothed rack 22 on the under side of the respective side bar of the carriage 10. Only one of these wheels 21 and racks 22 are shown in the drawings.

The tape-roller 9 at the delivery end of the carriage 10 has mounted on one end of its shaft 23 a spur-pinion 24, engaging with the toothed rack 13 on the under side of the adjacent track-bar 14, this pinion, by means of suitable automatic clutch or equivalent mechanism, such as that next described, rotating as if in one piece with its shaft 23 during the travel of the carriage 10 in one direction and rotating freely upon the said shaft during the travel of the carriage in the

verse direction. The spur-pinion 24 (see particularly Figs. 4 and 6) is mounted so as to be free to rotate on the boss 25 of a disk or wheel 26, which by the said boss is secured upon the shaft 23. The disk 26 is formed with a series of inclined or tangential cam-surfaces 27, loosely surrounded by a cylindrical sleeve or flange 28, integral with the said surfaces 27 are provided a series of rollers 29, one for each of the surfaces 27, the said rollers being retained in this position by a collar 30, secured on the boss 25. By the last-described mechanism the shaft 23 is caused to rotate during the travel of the carriage 10 only in the direction indicated by the arrows *a* in Figs. 1 and 8, because at the commencement of such travel the rotation of the spur-pinion 24 in the direction indicated by the arrow *b* in Figs. 2 and 6 causes the rollers 29 by frictional contact with the surrounding flange 28 to run outward on the inclined surfaces 27 and to be jammed between them and the said flange, as indicated in Fig. 6. When the carriage travels in the direction indicated by the arrows *c* in Figs. 1 and 7 and the spur-pinion 24 consequently rotates in the direction indicated by the arrow *d*, Fig. 2, the rollers 29 are caused to run inward on the inclined surfaces 27, and thereby operatively release the spur-pinion 24 from the shaft 23, as shown in dotted lines in Fig. 2. On the shaft 23 there is also mounted a spur-wheel 31, Figs. 3, 4, and 5, which by a feather 32 is prevented from rotating independently of said shaft, while at the same time it is capable of being shifted longitudinally thereon, so as to place it into and out of gear with a spur-wheel 33, Figs. 2 and 5, in either of which positions it may be secured by means of a pinching-screw 34 in the boss of the said wheel 31.

The spur-wheel 33, as shown in Fig. 5, is mounted so as to be free to rotate on the boss 35 of a disk or wheel 36, which by the said boss is rigidly secured upon a short counter-shaft 37 free to rotate in a bearing 38, formed in the adjacent side rail of the carriage 10. The disk 36 is formed with a series of inclined or tangential cam-surfaces 39, (shown in dotted lines in Fig. 2,) loosely surrounded by a cylindrical sleeve or flange 40, (see particularly Fig. 5,) integral with the spur-pinion 33, and between which and the said surfaces 39 are provided a series of rollers 29, one for each of the surfaces 39, the said rollers being retained in this position by a collar 41, fast on the boss 35. On the counter-shaft 37 there is rigidly secured a spur-pinion 42 in constant gear with the before-described rack 13, this pinion being preferably of the same diameter as that of the pinion 24, and the diameter of the pitch-circles of both of these pinions preferably corresponds with the diameter of the tape-roller 9.

The front part of the carriage 10 carries two shafts or bars 43 44, which extend completely across the machine, the bar 43 serving to support one or more sheet-guides 45 which prevent the front end of the sheet from rising up and directing them onward toward their delivery-point, and the bar 44 serving to carry both the front track-rollers 4 of the carriage 10 and a series of margin-tape devices, now to be described. These devices are independently adjustable along the bar 44, and each comprises a bracket 46, suitably clamped—as, for example, by a pinching screw 47—on the said bar and carrying two tape-rollers 48 49, the former on its end and the latter, herein termed the "bight-roller," on an arm 50, projecting therefrom at about the middle of its length. Each of the before-mentioned arms 12 is pivoted to one of the brackets 46 concentrically with the roller 4 thereon and carries a further tape-roller 52 which is situated in the same vertical plane as the rollers 48 49, and around this roller 52 and the roller 48 one of the before-mentioned margin-tapes 3 is loosely mounted. The roller 48 occupies such a position that it holds the margin-tape 3 in frictional driving contact with the adjacent carriage-tape 2 or the sheet 53, Figs. 7 and 8, which at the time being is fed over it. The pivoted arm 12 is capable of being secured—for example, by tightening the nut 54, Fig. 5—in two different positions, in one of which, as shown in Fig. 8, the roller 52 is above the adjacent carriage-tape 2 and the sheets are delivered by the tapes 2 and 3 printed side up, the slackness or bight of the margin-tape 3 being then taken up by the bight-roller 49, with which it is at that time in contact. In the other of the two positions as shown in Figs. 2 and 7, the roller 52 is below the carriage-tape 2, the bight of the margin-tape 3 then being taken up by the portion of the adjacent carriage-tape 2 which is at the front of the tape-roller 9, the margin-tape 3 being then in operative driving contact with either that part of the said carriage-tape or the sheet 53 passing over it. By this last-described arrangement the sheet is deflected around the front of the roller 9 away from the delivery end of the machine and is deposited on the delivery-board 11 printed side down.

As it is necessary for the carriage-tapes 2 to be operated during the forward stroke of the carriage 10, (the direction of which stroke is represented by the arrows *c* in Figs. 1 and 7,) when the mechanism is arranged to deliver the sheets printed side down, and during the return stroke, (represented by the arrow *a*, Figs. 1 and 8,) when the mechanism is arranged to deliver the sheets printed side up, it becomes necessary to provide for this reversal of action, and it is for this purpose that the before-described spur-wheel 31 must be shifted laterally, so that for the printed-side-up delivery it is out of gear with

the pinion 33, and thereby inoperative, and for the printed-side-down delivery it is in gear with the said pinion 33. When the mechanism is arranged for delivering the sheets printed side down, the carriage-tapes 2 are operated in the same direction during both the forward and backward strokes of the carriage, but as the upper flights of the cylinder-tapes 1 are, as is usual in similar tape arrangements, situated in a higher plane than that containing the upper flights of the carriage-tapes, the said carriage-tape operation during the return stroke of the carriage has no effect on the sheets.

15 I claim—

1. In a sheet-delivery mechanism the combination of a first set of endless tapes adapted to receive the sheet from the impression-cylinder, a carriage adapted to travel in a direction parallel with the direction of travel of the first set of tapes, tape-rollers rotatable in the two ends of the carriage, endless tapes on and rotated by the said rollers, margin-tapes adapted to make frictional contact with the carriage-tapes or sheets on the said tapes, rollers around which the margin-tapes rotate, one of said rollers rotating about an axis which is fixed relatively to the carriage and the other rotating about an axis adjustable above and below the carriage-tapes.

2. In a sheet-delivery mechanism the combination with the delivery-board, of a carriage adapted to travel backward and forward thereover in the direction of the travel of the sheets, tape-rollers rotatable in the two ends of the carriage, endless carriage-tapes on and rotated by the said rollers, and margin-tapes adapted to make frictional contact with the carriage-tapes or the sheets on the said tapes, rollers around which the margin-tapes rotate, one of said rollers rotating about an axis which is fixed relatively to the carriage and the other rotating about an axis adjustable above and below the carriage-tapes.

3. In a sheet-delivery mechanism the combination of a carriage, means for reciprocating the carriage in the direction of the travel of the sheets, tape-rollers rotatable in the two ends of the carriage, endless carriage-tapes on and rotated by the said rollers, margin-tapes adapted to make frictional contact with the carriage-tapes or the sheets on such tapes, rollers around which the margin-tapes rotate, one of said rollers rotating about an axis which is fixed relatively to the carriage, an arm angularly adjustable about the said relatively fixed axis and carrying the second of the margin-tape rollers on its adjustable end so that the said roller may be adjusted above and below the carriage-tapes.

4. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of the

travel of the sheets, tape-rollers rotatable in the two ends of the carriage, endless carriage-tapes on and rotated by the said rollers, margin-tapes adapted to make frictional contact with the carriage-tapes or the sheets on such tapes, rollers around which the margin-tapes rotate, one of said rollers rotating about an axis which is fixed relatively to the carriage, and the other roller rotatable on an arm pivoted to the carriage coaxially with the relatively fixed axis, and the said arm, this arm being capable of adjustment so as to bring the last-mentioned roller above or below the adjacent carriage-tape.

5. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of the travel of the sheets, tape-rollers rotatable in the two ends of the carriage, endless carriage-tapes on and rotated by the said rollers, margin-tapes adapted to make frictional contact with the carriage-tapes or the sheets on such tapes, rollers around which the margin-tapes pass, but loosely, so as to form a bight, one of the said rollers rotating about an axis which is fixed relatively to the carriage, and the other roller rotatable on an arm pivoted to the carriage coaxially with the relatively fixed axis, and the said arm, this arm being capable of adjustment so as to tighten the margin-tape upon its rollers by causing the front carriage-roller to occupy the bight in such tape.

6. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of the travel of the sheets, a roller rotatable in the front end of the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape passes, but loosely, so as to form a bight, one of the said rollers rotating about an axis which is fixed relatively to the carriage and the other roller rotatable on an arm pivoted to the carriage coaxially with the relatively fixed axis, and the said arm, this arm being capable of adjustment so as to tighten the margin-tape upon its rollers by causing the bight in such tape to be occupied by the carriage-roller.

7. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of travel of the sheets, a tape-roller rotatable in the front end of the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape passes, but loosely, so as to form a bight, one of the said rollers rotating about an axis which is fixed relatively to the carriage, and the other roller rotatable on an arm pivoted to the carriage coaxially with the relatively fixed axis, the said arm, and a bight-roller free to rotate about a relatively fixed axis and so located that in one

position of the pivoted arm the said bight-roller occupies the bight of the margin-tape, which bight in the other position of the pivoted arm is occupied by the roller in the front end of the carriage.

8. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of travel of the sheets, a roller rotatable in the carriage, a spur-wheel on the shaft of the carriage-roller, a counter-shaft rotatable in the carriage, a spur-wheel on the counter-shaft gearing with the before-mentioned spur-wheel, a spur-pinion on the counter-shaft, a stationary toothed rack gearing with the spur-pinion, and means intermediate the spur-pinion and the carriage-roller shaft, adapted to automatically release this shaft from and operatively connect it with the rack during the travel of the carriage in respectively opposite directions.

9. In a sheet-delivery mechanism the combination of a carriage adapted to travel backward and forward in the direction of travel of the sheets, a tape-roller rotatable in the carriage, a spur-pinion on the shaft of the carriage-roller, gearing with a fixed rack, the said rack, a spur-wheel "feathered" to the said shaft, a counter-shaft rotatable in the carriage, a spur-wheel on this counter-shaft, adapted to gear with the "feathered" wheel, a spur-pinion on the counter-shaft gearing with the fixed rack, and means intermediate the rack and the carriage-roller shaft adapted to automatically release that shaft from and operatively connect it with the rack during the travel of the carriage in either direction.

10. In a sheet-delivery mechanism the combination of a carriage adapted to reciprocate in a direction parallel with the direction of travel of the sheets, a roller rotatable in the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape rotates, one of said rollers rotating about an axis which is fixed relatively to the carriage, the other rotating about an axis adjustable above and below the carriage-roller, and means adapted to rotate the carriage-roller during either the backward or forward travel of the carriage and always in one and the same direction.

11. In a sheet-delivery mechanism the combination of a carriage adapted to reciprocate in a direction parallel with the direction of travel of the sheets, a tape-roller rotatable in the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape rotates, one of said rollers rotat-

ing about an axis which is fixed relatively to the carriage, and the other roller is adjustable above and below the carriage-roller, a spur-pinion on the shaft of the carriage-roller, means adapted to automatically clutch this pinion to and release it from its shaft during the travel of the carriage in respectively opposite directions, and a stationary toothed rack gearing with the spur-pinion.

12. In a sheet-delivery mechanism the combination of a carriage adapted to reciprocate in a direction parallel with the direction of travel of the sheets, a tape-roller rotatable in the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape rotates, one of said rollers rotating about an axis which is fixed relatively to the carriage, and the other adjustable above and below the carriage-roller, a spur-wheel on the shaft of the carriage-roller, a counter-shaft rotatable in the carriage, a spur-wheel on the counter-shaft gearing with the before-mentioned spur-wheel, a spur-pinion on the counter-shaft, a stationary toothed rack gearing with the spur-pinion, and means intermediate the spur-pinion and the carriage-roller shaft adapted to automatically release this shaft from and operatively connect it with the rack during the travel of the carriage in respectively opposite directions.

13. In a sheet-delivery mechanism the combination of a carriage adapted to reciprocate in a direction parallel with the direction of travel of the sheets, a tape-roller rotatable in the carriage, a margin-tape adapted to make frictional contact with the sheets passed over the carriage-roller, rollers around which the margin-tape rotates, one of said rollers rotating about an axis which is fixed relatively to the carriage, and the other adjustable above and below the carriage-roller, a spur-pinion on the shaft of the carriage-roller, gearing with a fixed rack, the said rack, a spur-wheel "feathered" to the said shaft, a counter-shaft rotatable in the carriage, a spur-wheel on this counter-shaft, adapted to gear with the "feathered" wheel, a spur-pinion on the counter-shaft gearing with the fixed rack, and means intermediate the rack and the carriage-roller shaft adapted to automatically release that shaft from and operatively connect it with the rack during the travel of the carriage in either direction.

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

THOMAS M. NORTH.

Witnesses:

WM. SUTHERLAND ROBINSON,
WARWICK HY WILLIAMS.