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JOGGER MECHANISMS

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2 Sheets-Sheet 1

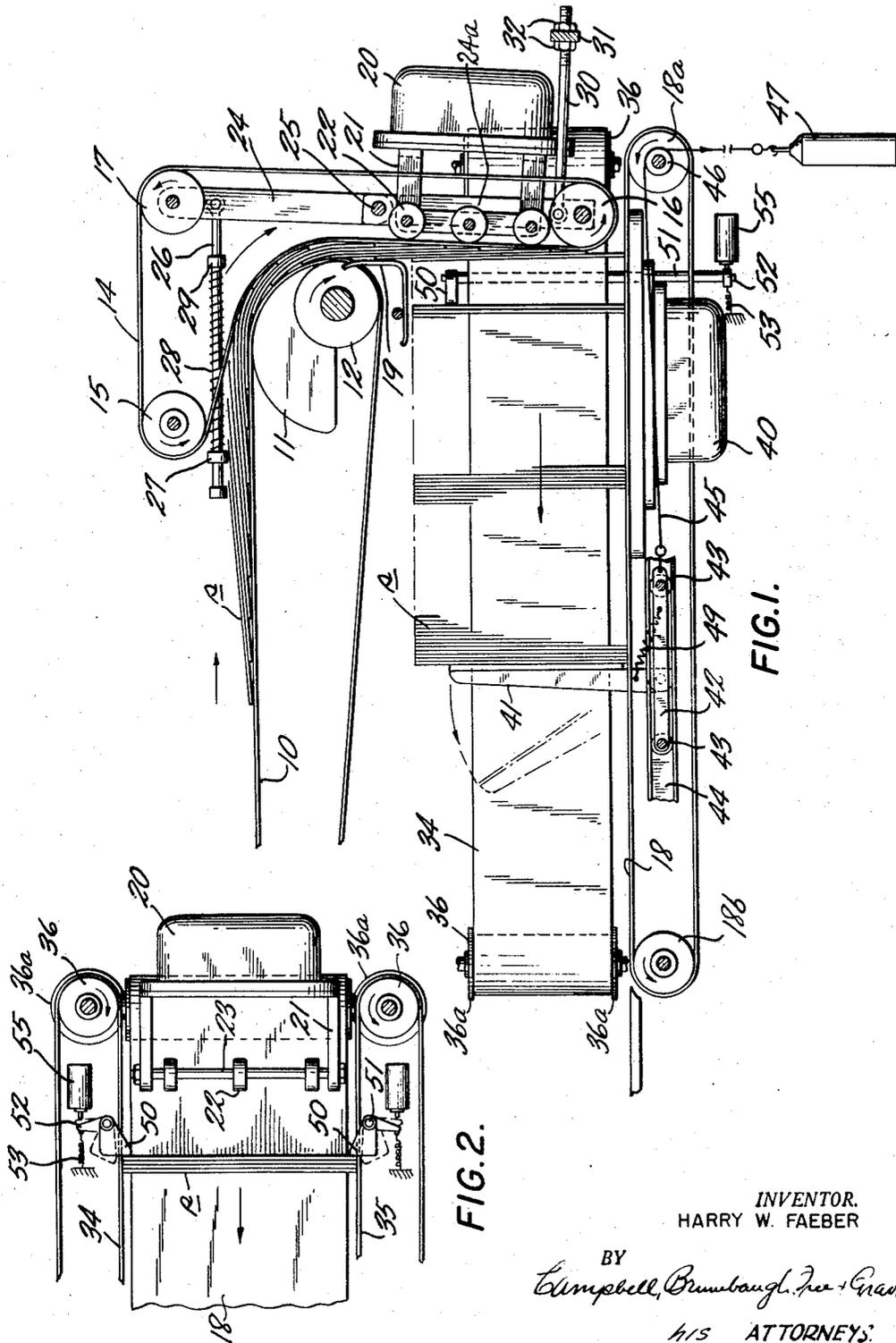


FIG. 1.

FIG. 2.

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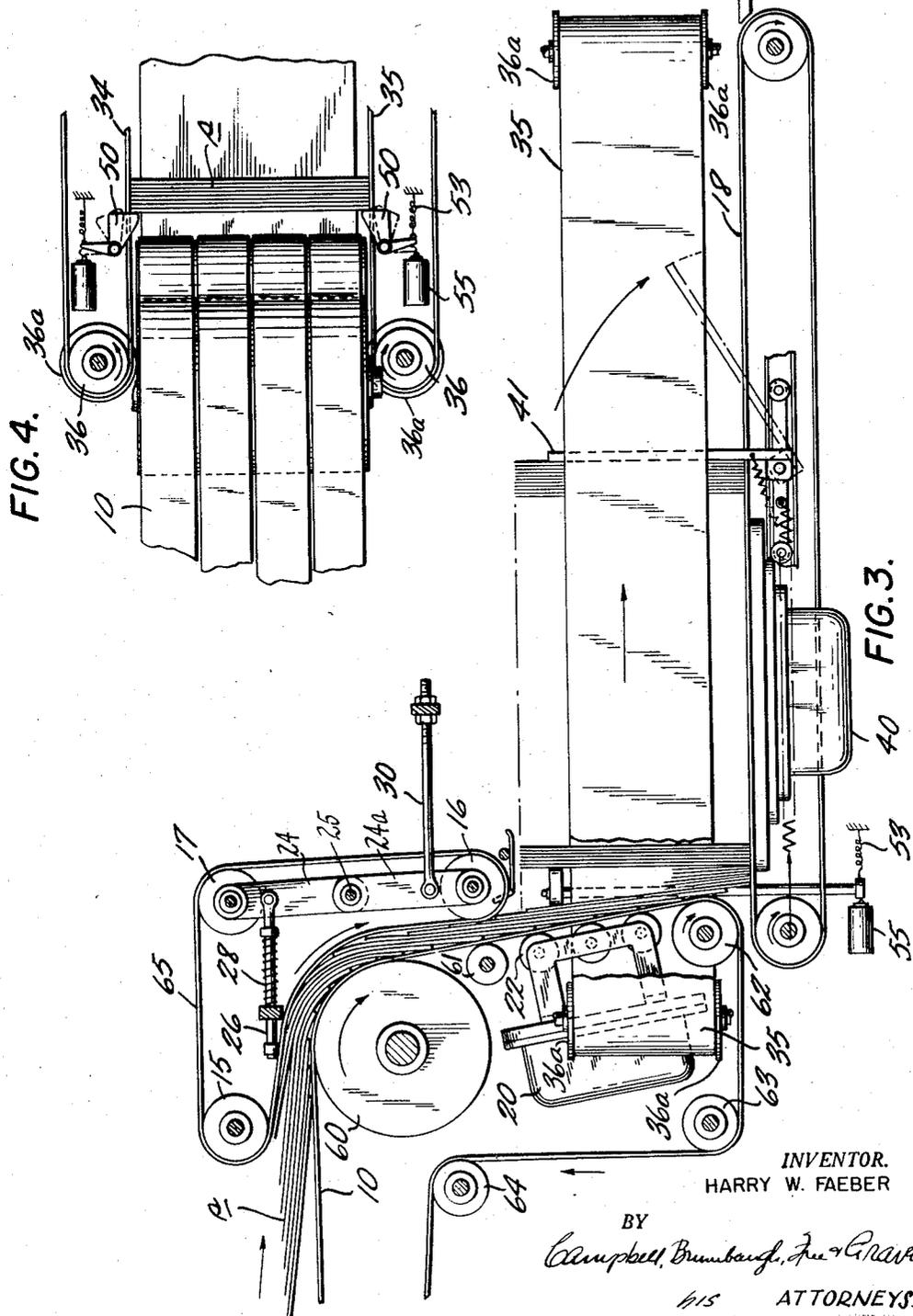
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JOGGER MECHANISMS

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6 Claims. (Cl. 271-87)

This invention relates to a delivery mechanism wherein printed sheets or signatures are assembled and aligned side by side on a moving platform to facilitate subsequent handling.

Mechanism of this general organization has been heretofore proposed, but difficulty has been encountered, principally in the alignment or squaring of the signatures so that their edges are substantially even. The jogging of the signatures to properly align them relative to each other is at present ordinarily done by hand. However, as press speeds increase, it is becoming more and more difficult and costly to provide sufficient manpower for this purpose.

The object of the present invention, therefore, is to provide a mechanism for automatically stacking in the manner stated and jogging the signatures to facilitate the subsequent handling thereof, particularly after the printing and folding of the signatures.

According to the present invention, after the folding operation the signatures are carried in overlapping fashion by a moving conveyor which approaches the moving platform upon which the signatures are to be stacked at a somewhat higher level than the platform. When the conveyor is in proximity to the receiving end of the moving platform, the conveyor travels around a curved guide which deflects the signatures carried by the conveyor toward the receiving end of the moving platform. To prevent the signatures from slipping relative to one another due to the effect of gravity, which slippage could break the continuity in the overlapping relationship of the signatures, the signatures are engaged by an upper moving belt as they are deflected around the curved guide. The signatures are then directed in a substantially vertical plane with the leading edges thereof coming into contact with the moving platform. Because of the overlapping relationship of the signatures, they drop down on to the moving platform one behind another in succession.

Although at a high level above the moving platform slippage of the signatures relative to one another is undesirable, the relative movement therebetween is desirable at a lower level to insure that the bottom edges of all of the signatures fall into registered contact with the platform. To facilitate this relative movement, a vibrating device is provided to jog the signatures just before they come into contact with the moving platform in order to loosen and reduce the friction between adjacent signatures.

In the event that the aforesaid jogging operation is not completely effective in bringing the lower edges of the signatures into registered contact with the moving platform, still another vibrating device is provided at the receiving end of the moving platform. This vibrating device vibrates the moving platform and has an additional jogging action on the signatures received thereon to insure that the lower edges thereof fall into registration with the platform.

The present invention also is equipped with an up-

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standing yielding retainer or end support which engages and supports the leading signature assembled on the moving platform. This retainer end support gradually yields under the influence of the incoming signatures that are received on the moving platform, however, the end support is maintained in contact with the leading signature in the assembled group by means which urges the end support in a retrogressive direction.

The signatures are thus assembled and advanced by the moving platform in stacked array, and as the signatures are transported toward the discharge end of the platform the side edges of the signatures thereon are engaged by moving belts which have a jogging action on the signatures.

As the leading signatures approach the discharge end of the moving platform, groups of the signatures may be removed by hand or other suitable means. To facilitate the removal of the signatures, the yielding retainer or end support is pivoted at its lower end. Of course, as a group of signatures is removed from the moving platform, the retrogressive movement of the end support brings it into contact with the leading signature remaining on the platform to maintain it in upstanding position.

Should the supply of signatures delivered to the moving conveyor be interrupted for any reason, such as by stoppage of the press or the folding mechanism, all of the signatures, including the last one delivered by the press, will be properly jogged, delivered to the moving platform and started on their way towards the discharge end thereof. To prevent the last received signatures from falling backwardly due to the break in the continuous feeding of the signatures to the platform, spring urged latch means are provided adjacent both sides of the moving platform to fall into position behind the last signature assembled for the support thereof. This movement of the spring urged latch means also actuates a switch which stops the further advance of the moving platform and, if desired, the other operating parts of the mechanism.

In one embodiment of the present invention, the conveyor which carries the signatures in overlapping fashion toward the receiving end of the moving platform and the moving platform move in opposite directions, one above the other, saving considerable floor space. This arrangement is particularly feasible when the signatures are delivered by the folding mechanism to the conveyor in overlapping fashion with the leading edges of each signature above the preceding signature. In still another embodiment, the operative lengths of the feed conveyor and the moving platform travel in the same direction. This arrangement occupies greater floor space, however, it is preferred in situations where the signatures are delivered by the folding mechanism to the feed conveyor with the leading edge of each signature beneath the preceding signature.

For a complete understanding of the present invention reference may be had to the detailed description which follows and to the accompanying drawings in which:

Figure 1 is a side elevation of the mechanism of the present invention;

Figure 2 is a plan view of certain parts thereof;

Figure 3 is a side elevation of another embodiment of the present invention; and

Figure 4 is a plan view of certain parts thereof.

Referring to Figure 1 of the drawings, a feed conveyor 10 carries a plurality of signatures *s* thereon in overlapping fashion with the leading edge of each signature overlapping above the preceding signature. The conveyor belt 10 passes downwardly around the curved surface of a shoe 11 of semi-circular cross-section, and the feed conveyor 10 engages a portion of the periphery of a rotat-

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ing roller 12 before beginning its return journey. The flattened base of the semi-circular guide shoe 11 makes it possible to reduce the total vertical height of the mechanism, while still providing a large radius of curvature around which the succession of signatures may be guided.

As the signatures encounter the curved surface of the shoe 11, they are engaged from above by a moving belt or tape 14 which passes around rolls 15, 16 and 17. The belt 14 moves at substantially the same rate of travel as the conveyor 10, and its helps in guiding the signatures around the curved surface of the shoe 11. Also, the belt 14 forms a restricted passage for the signatures as they begin their downward travel toward the moving platform 18 on which they are to be assembled, which restricted passage prevents the signatures from prematurely slipping relatively to each other due to the effect of gravity. The guide 19 disposed beneath the shoe 11 also helps to maintain the signatures in pressure contact with the belt 14 for this purpose.

When, however, the signatures near the platform 18, slippage between the signatures is essential to insure that the leading lower edges thereof come into registered contact with the upper surface of the moving platform 18. For this reason, a vibrating device 20 having arms 21 extending therefrom for the support of a plurality of shafts 23 which carry rolls 22 thereon is interposed adjacent the vertically disposed portion of the belt 14. The vibrator 20 imparts vibration to the rolls 22, and the rolls 22 jog the falling signatures to loosen and facilitate the separation therebetween so that the overlapping signatures will be able to slide relative to each other.

The roll 17 around which the belt 14 passes is supported at opposite ends of a pair of vertically disposed levers 24 which are pivotally mounted on a shaft 25. A rod 26 is pivotally connected to the upper end of at least one of the levers 24, and the rod is guided for a slidable movement within a slot formed in a fixed bracket 27. The rod 26 carries a compression spring 28 thereon which is interposed between the bracket 27 and a collar 29 of the rod and the spring 28 serves to urge the roller 17 into contact with the belt 14 to maintain the belt under tension.

The roller 16 is supported between downwardly disposed levers 24a mounted on the shaft 25. A rod 30 is pivotally connected to the lower end of at least one of the levers 24a, and the rod passes through an opening in a fixed bracket 31. The end of the rod 30 is threaded and carries locking nuts 32 thereon disposed on opposite sides of the bracket 31. By adjusting the position of the nuts 32 on the rod 30, it is possible to adjust the position of the lower rolls 16 relative to the receiving end of the moving platform 18.

The platform 18 is flexible and it is guided around a roller 18a at the receiving end and around a roller 18b at its discharge end. The signatures thus assembled continuously one behind another on the moving platform 18 are transported in a leftward direction, as viewed in Figure 1, toward the discharge end of the platform. While so transported, the signatures move between a pair of jogger belts 34, 35 which are adjacent and in contact with the side edges of the signatures. The jogger belts 34, 35 pass around vertically disposed rolls 36 at each end thereof. Rolls 36 are formed with flanges 36a to retain the jogger belts. The portions of the belts 34, 35 which engage the side edges of the signatures are driven substantially at the same rate of travel as the moving platform 18. Although the side edges of the signatures assembled on the moving platform are in substantial alignment before being received thereby, these moving belts 34, 35 have a jogging effect on the signatures, and they help in further aligning the side edges of the signatures. This effect is accomplished by so spacing rolls 36 as to slightly "squeeze" the signatures, and by driving the belts 34, 35 at slightly lower speed than belt 18, which tends to "arch" the signatures in the middle and

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thus lends them vertical rigidity, also facilitating the vertical jogging action of vibrator 20 to be described presently.

In the event that the vibrator 20 is not completely effective in insuring the registration of the lower edges of the signatures on the moving platform 18, another vibrating device 40 is provided beneath the receiving end of the platform 18 to jog the signatures.

The signatures at the head of the stacked array are supported in upright position by a retainer or end support 41 which yields in the direction of the discharge end of the platform as the signatures move in that direction. The retainer or end support 41 is pivotally mounted at its lower end to a horizontal member 42 having small rollers 43 at each end thereof which are guided in a pair of guideways 44. The one end of the horizontal member 42 is connected to a flexible chain 45 which passes around a pulley 46 and is attached at its opposite end to a counterweight 47. The retainer 41, therefore, yields in a leftward direction under the influence of the signatures which are transported by the moving platform 18. However, the retainer or end support 41 is urged in the opposite direction for retrogressive movement by the counterweight 47.

The signatures at the head of the stacked array may be removed in groups at the discharge end of the platform 18 by hand or by other suitable means. Accordingly, to facilitate the removal of these signatures, the retainer 41, although normally urged by a spring 49 into contact with the leading signature on the platform, is capable of being pivoted in a counterclockwise direction as viewed in Figure 1. As soon as a group of signatures is removed from the platform, the retainer 41 will be pivotally returned to upstanding position by the spring 49 and, in addition, it will be translated in a retrogressive direction by the counterweight 47 into contact with the leading signature remaining on the platform 18.

As best shown in Figures 1 and 2, a pair of sheet retaining members or latches 50 are provided at the receiving end of the platform 18, one on each side thereof. The latches 50 are each mounted at the upper end of a vertically disposed shaft 51, and the lower end of the shaft carries an arm 52 which is acted upon by a spring 53. The springs 53 serve to urge the latch members 50 to the positions shown in solid lines in Figure 2 to lock the last signature to be assembled in upstanding position. The signatures, however, are continuously brushing past the latch members 50, maintaining the latch members in the positions indicated by the broken lines in Figure 2, in which positions the arms 52 at the lower end of the shaft are maintained in contact with a microswitch 55. Should the stream of signatures past the latch members 50 be interrupted, such as by the stoppage of the press or the folding mechanism, the feed conveyor 10 will continue to advance the signatures received thereby and the belt 14 will continue to operate in assembling the signatures on the moving conveyor 18 until all of the signatures, including the very last one, are delivered to the platform 18 and locked in front of the latch members 50. As the last signature passes the latch members 50, they will snap into the position shown in solid lines, and the microswitch 55 will be actuated to stop the feed conveyor 10, the belt 14 and the moving platform 18. The latches 50, of course, serve to prevent the last signature to be assembled from falling back toward the belt 14, thereby maintaining a free passage for additional signatures to be delivered to the moving platform 18 when the press resumes operation without danger of a choke-up at the receiving end of the platform. It may be mentioned at this point that it is a function of the vibrating device 20 to insure that the last signature in line is advanced beyond the latch members 50 so as to be engaged thereby. In the drawings the horizontal distance between the vibrator 20 and the retainer face of the latch 50 was increased beyond the actual distance for the sake of clarity.

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The embodiment of the invention described above is employed advantageously in situations wherein the signatures are delivered to the conveyor 10 with the leading edge of each signature above and overlapping the signature beneath it. The embodiment shown in Figures 3 and 4, however, is employed advantageously where the signatures are delivered to the moving conveyor 10 with the leading edge of each signature disposed beneath the preceding signature.

In the embodiment of the invention shown in Figures 3 and 4, the feed conveyor 10 delivers the signatures to a rotating drum 60, the outer periphery of which serves the same function as the curved shoe 11 of the embodiment shown in Figures 1 and 2. The conveyor 10 also engages rollers 61, 62, 63 and 64 before beginning its return journey. A belt 65 engages the upper sides of the signatures and deflects them downwardly around the curved periphery of the rotating drum 60 toward the moving platform 18. In this embodiment, however, it is the feed conveyor 10 which guides the signatures in their downward travel toward the moving platform 18.

As in the previous embodiment, the signatures moving downwardly toward the upper level of the moving platform 18 are jogged by a plurality of rolls 22 which are connected to and vibrated by a vibrating device 20. The roller 16, around which the belt 65 travels at its lowermost point, is disposed well above the upper edges of the signatures when they are supported on the platform 18 to permit the signatures to be advanced beneath the belt 65. Except for the differences aforesaid, the embodiment of the invention shown in Figures 3 and 4 is identical to that already described in connection with Figures 1 and 2.

The invention has been shown in preferred forms only and by way of example, and obviously many variations and modifications may be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any specified form or embodiment, except in so far as such limitations are set forth in the appended claims.

I claim:

1. Delivery mechanism for stacking sheets comprising a moving platform for receiving the sheets side by side thereon, a conveyor disposed above the moving platform for transporting the sheets in overlapping fashion toward the receiving end of the moving platform, curved guide means for deflecting the conveyor and the sheets carried thereby downwardly toward the receiving end of the moving platform, a driven belt engaging the opposite sides of the sheets as they are deflected by the curved guide means, guide means extending downwardly from the curved guide means toward the moving platform and means for vibrating said downwardly extending guide means, thereby jogging the sheets as they are moving downwardly toward the moving platform to facilitate relative movement of the sheets so that the leading edges of the sheets will be assembled on the platform in registered contact with the platform.

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2. Delivery mechanism as set forth in claim 1 including retaining means adjacent both sides of the receiving end of the moving platform, yielding to permit a sheet to pass therebetween and closing behind the sheet to maintain the sheet in upright position, and a switch actuated by the movement of the retaining means to closed position, the actuation of said switch stopping the movement imparted to the platform before the last sheet passing said retaining means is displaced too great a distance from the retaining means.

3. Delivery mechanism as set forth in claim 1 including vibrating means disposed beneath the receiving end of the moving platform to jog the sheets into registered contact with the platform.

4. Delivery mechanism as set forth in claim 1 including moving belts adjacent both sides of the moving platform to engage and jog the side edges of the sheets carried by the platform.

5. Delivery mechanism for stacking sheets comprising a moving platform for receiving the sheets side by side thereon, a conveyor disposed above the moving platform for transporting the sheets in overlapping fashion toward the receiving end of the moving platform, curved guide means for deflecting the conveyor and the sheets carried thereby downwardly toward the receiving end of the moving platform, a driven belt engaging the opposite sides of the sheets as they are deflected by the curved guide means, means intermediate the curved guide means and the moving platform for jogging the sheets as they are moving downwardly toward the moving platform to facilitate relative movement of the signatures so that the leading edges of the signatures will be assembled on the platform in registered contact with the platform, and retaining means for supporting the leading sheet assembled on the moving platform in upright position on the platform, said retaining means being yieldable in a forward direction.

6. Delivery mechanism as set forth in claim 5 including means for supporting the sheet retaining means, means for guiding said support means for forward and retrograde movement, a pivot carried by the support means for pivoting the sheet retaining means out of contact with the leading sheet in the stacked array, thereby facilitating the removal of a group of signatures from the platform, and spring means for pivotally urging the sheet retaining means into contact with the leading sheet in the stacked array.

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