Aug. 16, 1938. J. L. OBERENDER ET AL 2,127,419

SHEET SEPARATOR FOR ENVELOPE MACHINES

Filed May 25, 1937 3 Sheets-Sheet 1

Fig. 1.

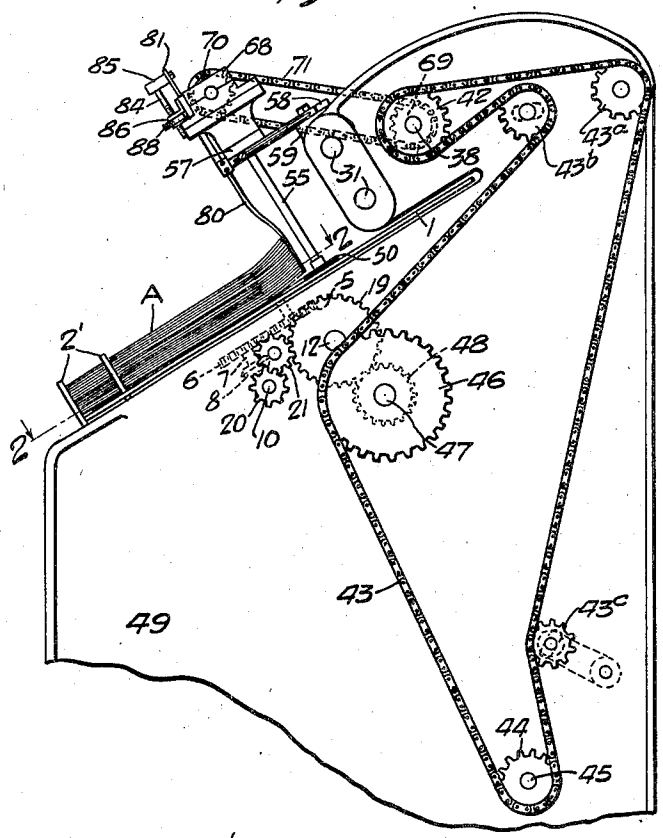


Fig. 13.

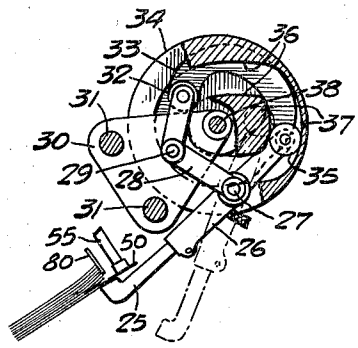


Fig. 14.

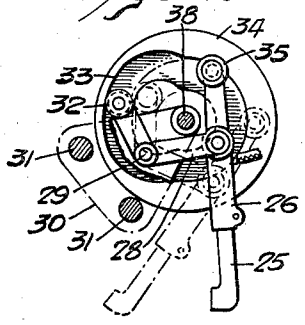
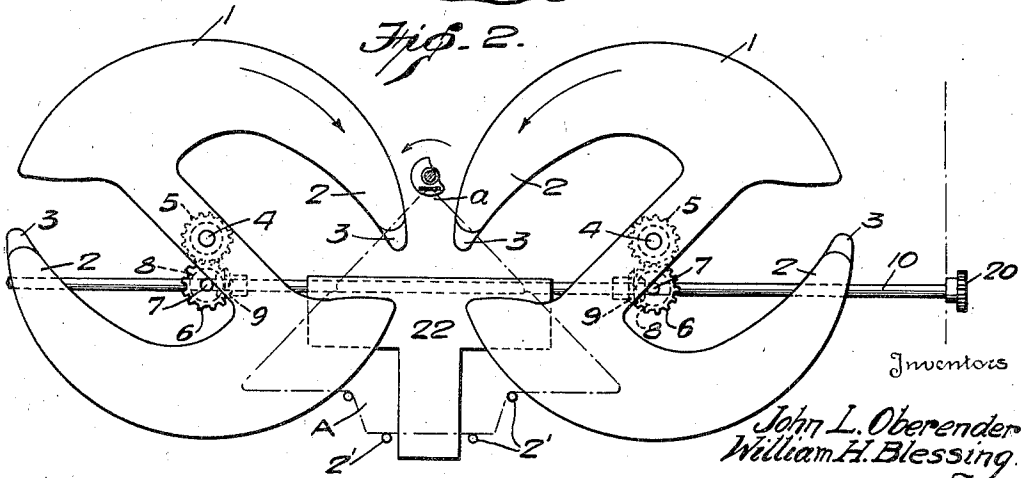


Fig. 2.



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SHEET SEPARATOR FOR ENVELOPE MACHINES

Filed May 25, 1937 3 Sheets-Sheet 2

Fig. 3.

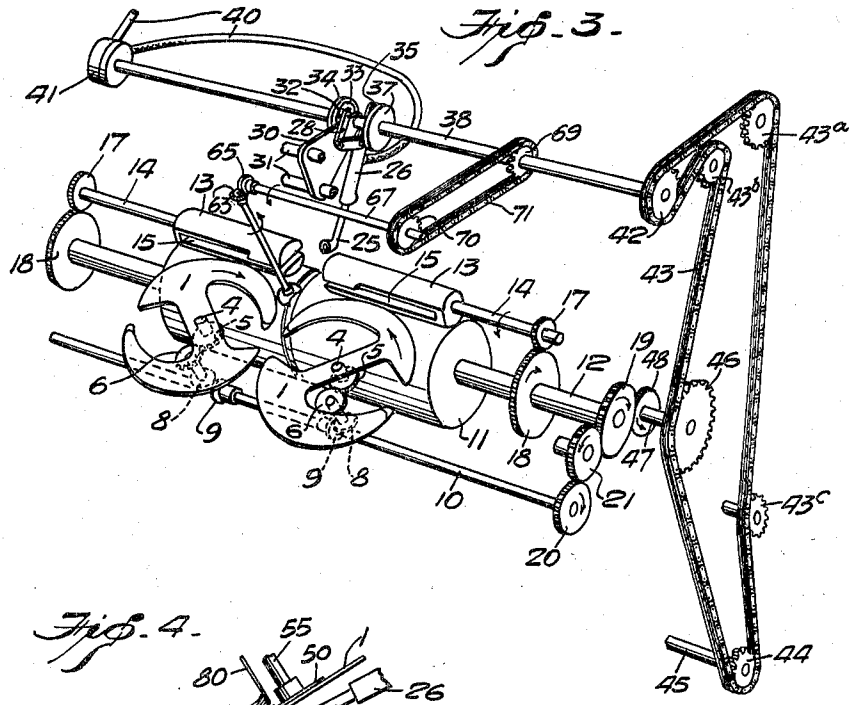


Fig. 4.

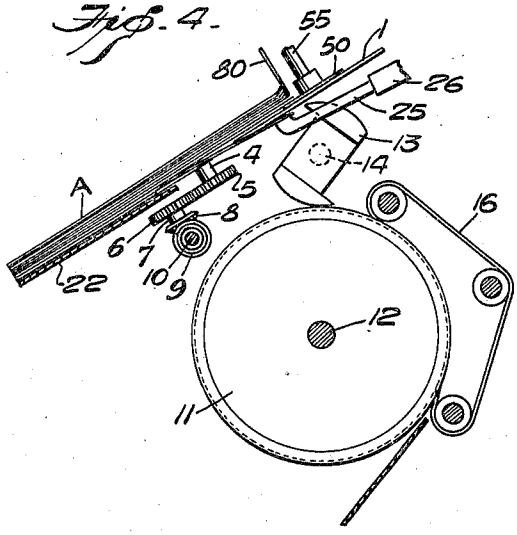


Fig. 6.

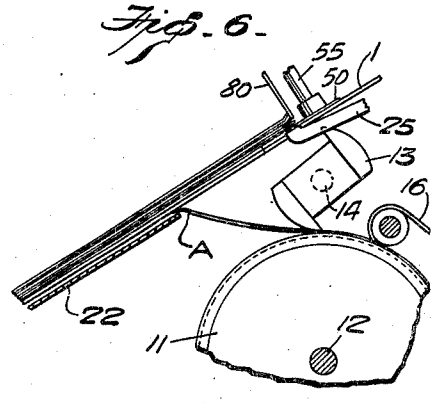
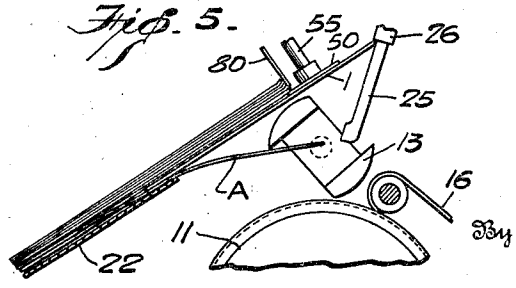


Fig. 5.



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SHEET SEPARATOR FOR ENVELOPE MACHINES

Filed May 25, 1937 3 Sheets-Sheet 3

Fig. 9.

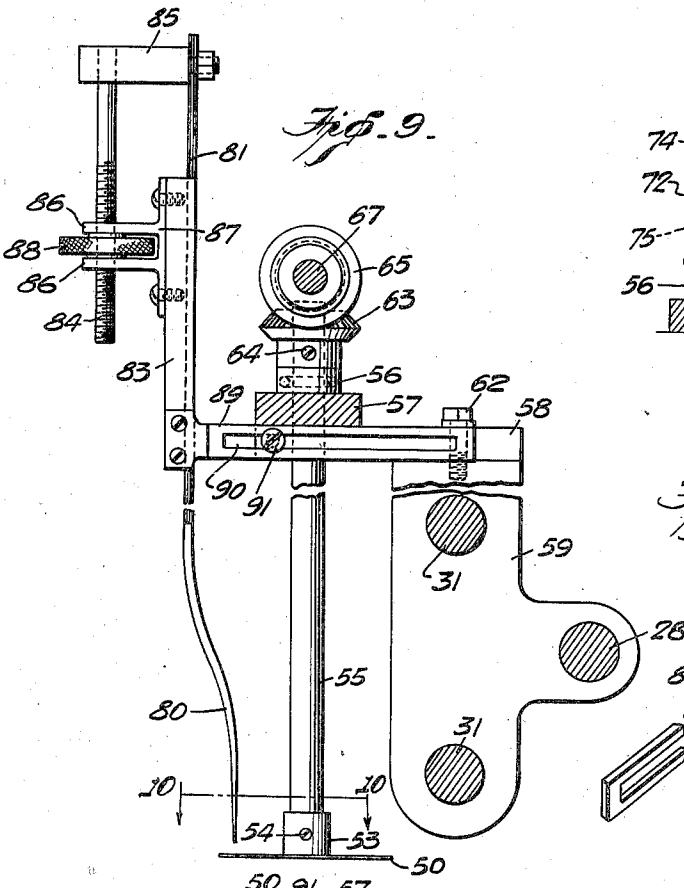


Fig. 12.

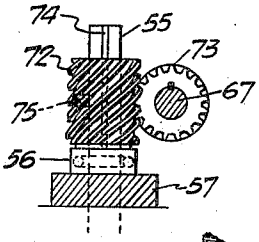


Fig. 11.

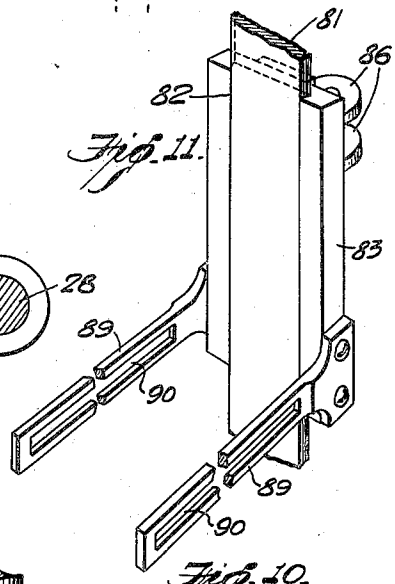
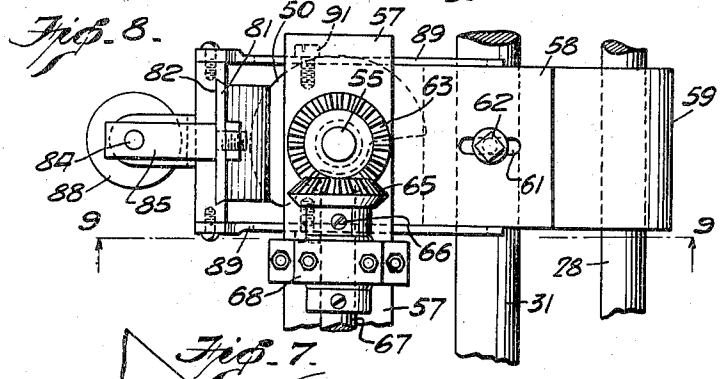


Fig. 10.

Fig. 8.



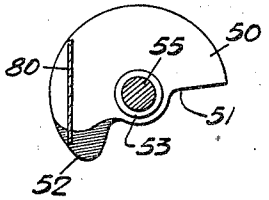
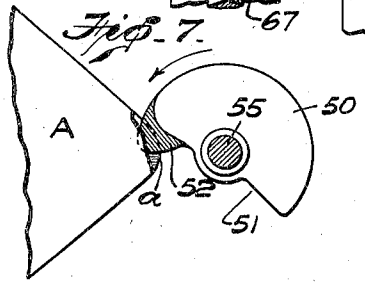


Fig. 7.



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Patented Aug. 16, 1938 2,127,419

UNITED STATES PATENT OFFICE

2,127,419

SHEET SEPARATOR FOR ENVELOPE MACHINES

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Application May 25, 1937, Serial No. 144,718

14 Claims. (Cl. 271—1)

The present invention relates to improvements in sheet feeders and more especially those of the class adapted to feed blanks or sheets of paper into envelope machines and other machines in which the blanks or sheets are fed rapidly.

The invention relates more particularly to means adapted to be employed in a sheet feeder of this class in which the sheets are in a stack and are fed successively from the bottom thereof, for separating the lowermost sheet from the next lowest sheet in the stack effectively and with certainty, thereby insuring the feeding of the sheets and avoiding the feeding of more than one sheet at a time, notwithstanding the relatively high speed at which the feeder may operate.

Heretofore, a reciprocatory finger or blade has been employed for separating the lowermost sheet from the rest of the stack above it, but it has been found that in using such a finger it frequently happens that two instead of one sheet or blank are removed from the stack, particularly when the sheets are in the form of envelope blanks which have been die-cut in a pile so that the points thereof tend to curl downwardly so that a reciprocating finger has a tendency to pass above the downwardly curled point of the next lowest blank in the stack.

The present invention provides a revolving separator which is located to come into position above the point of the lowermost envelope blank and below the point of the next lowest sheet in the pile from a side thereof, thus insuring the proper and certain entrance of the separator above the lowermost sheet and beneath the next lowermost sheet in the stack, thereby insuring feeding of the blanks one at a time although the points thereof may be curled downwardly.

The present invention moreover provides a revolving separator which may be in the form of a peripherally recessed disk which may not only be driven more easily and smoothly at high speed than a reciprocatory finger, but its blank separating action may be readily coordinated with the picker with which it cooperates and which serves to initiate the separation of the lowermost sheet from the stack.

The present invention also provides novel means cooperative with the separator for controlling the blanks in the stack above the separator, it allowing a few of the blanks at a time to rest above the separator, thereby relieving the separator of undue pressure and enabling it to effectively and accurately separate the blanks one at a time.

To these and other ends, the invention consists in certain improvements and combinations and arrangements of parts all as will be hereinafter more fully described, the features of novelty being pointed out more particularly in the claims at the end of this specification.

In the accompanying drawings:

Figure 1 is a side elevation of a sheet feeder embodying a sheet separator according to the present invention;

Figure 2 is a section taken on the line 2—2 in Fig. 1;

Figure 3 is a perspective view of the sheet feeder showing the driving means for the different parts thereof;

Figure 4 is a central vertical section through a portion of the sheet feeder, showing the picker in position to initiate the separation of the lowermost sheet from the stack;

Figure 5 is a view similar to Fig. 4 but showing the lowermost sheet separated from the stack and engaged by the feed roller;

Figure 6 is a view similar to Figs. 4 and 5, showing the lowermost sheet substantially withdrawn from the stack by the feed rollers;

Figure 7 is a top plan view of the revoluble separator, showing diagrammatically the manner in which it separates the lowermost sheet from the next lowest sheet;

Figure 8 is a top plan view, showing the mountings for the revoluble separator and the blade for controlling the descent of the sheets to the revoluble separator and also showing a portion of the driving means for the revoluble separator;

Figure 9 is a vertical section taken on the line 9—9 in Fig. 8;

Figure 10 is a detail horizontal section taken on the line 10—10 in Fig. 9;

Figure 11 is a detail perspective view of the mounting for the sheet controlling blade;

Figure 12 is a detail view showing a modification of the gearing for driving the revoluble separator;

Figure 13 is a detail view, partly in section, showing the means for operating the picker or suction nozzle; and

Figure 14 is a view similar to Fig. 13, showing the picker or suction nozzle in retracted position.

Similar parts are designated by the same reference characters in the different figures.

The present invention is applicable generally to sheet feeders of the class in which sheets are fed or removed successively from the bottom of a stack, although the invention is applicable more particularly to and may be employed most advantageously in connection with sheet feeders for envelope machines in which the sheets are in the

form of blanks and the blanks are fed rapidly. In feeding blanks in an envelope machine, it is important that the blanks be fed singly since if more than one blank is fed from the stack at any feeding operation one or more of the blanks will be wasted, and will be likely to clog the machine.

The feeding of the blanks singly has presented certain difficulties due to the fact that envelope blanks are of approximately triangular form presenting points which are acted upon by the separating means, and these points tend to curl downwardly, especially when the blanks are diecut in a pile, the downward curl of the points of the blanks tending to bring the points of the blanks above the lowermost blank to a level below that at which the separator operates and thereby causing the separator to operate above one or more of the blanks which are above the lowermost blank, this being particularly true when a reciprocatory separating finger is employed which is movable into the stack in line with the points of the blanks or substantially so.

The present invention overcomes these difficulties by providing a revoluble separator which is movable into position between the points of the lowermost blank and the blank next above it by movement in a direction laterally of the points of the blanks, the entrance of the separator between the points from a side thereof insuring entrance of the separator with certainty between the point of the lowermost blank and the point of the blank next above it, notwithstanding that the point of the latter blank may be curled or bent downwardly. The employment of a revoluble separator also affords the advantage that it may be driven more smoothly and with greater facility than a reciprocatory separator, especially at the high speed at which envelope machines usually operate.

The invention is shown in the present instance applied to a sheet feeder for envelope machines in which a stack of envelope blanks A having points *a* are supported on a pair of inclined oppositely revoluble disks 1, the blanks being alined in proper superposed relation by gauge pins 2'. The disks 1 are each formed with diametrically opposite recesses which form diametrically opposite blades 2 the extremities of which are bevelled at their upper sides as indicated at 3. The disks 1 are located one beside the other so that the adjacent portions of their peripheries are adapted to support the stack, and the recesses in these disks, which are opposite to one another as they pass beneath the stack, are of a size to enable the lowermost blank to pass through these recesses to the undersides of these disks while the blades 2 thereof move into position beneath the stack. These disks are suitably supported revolubly in the machine by shafts 4 to which they are fixed, these shafts having gears 5 fixed thereto and said gears meshing with gears 6 on shafts 7 and these shafts have bevel gears 8 fixed thereon which mesh with bevel gears 9 fixed on a cross shaft 10 which is suitably journalled in the machine frame, the arrangement of the bevel gears 8 and 9 being such as to cause the disks to be driven at equal speed and in opposite directions by the shaft 10.

Beneath the disks 1 is mounted a feed roller 11 which is fixed on a shaft 12, the latter being journalled in suitable bearings in the machine frame, the roller 11 being covered with rubber or other suitable material on its surface to enable it to grip and feed the envelope blanks, and above the roller 11 and between it and the disks 1 are mounted a pair of feeder rollers 13 which are mounted in alinement on shafts 14 which are suitably journalled in the machine frame. The rollers 13 are separated at ther inner ends to provide a clearance for the operation of the picker, as will hereinafter appear, and these rollers are split or slotted diametrically as shown at 15 to admit the envelope blank as it is separated from the bottom of the stack. The rollers 13 act upon the separated blank, as shown in Fig. 5, to deflect it against the feed roller 11 as shown in Fig. 5, and the rotation of the roller 11 and the rollers 13 serves to feed the blank between these rollers to a belt 16 which cooperates with the periphery of the roller 11 and is under tension so as to feed the blank around the roller 11 to any suitable and well known means for introducing the blank into the envelope machine. The rollers 13 are driven at the same surface speed as the roller 11 and in a direction to feed the blank between these rollers by gears 17 which are fixed to the ends of the shafts 14 and cooperate with gears 18 of appropriate size fixed on the shaft 12 of the roller 11. The rollers 13 are so driven that they make one revolution to each half revolution of the disks 1, the shaft 12 from which the rollers 13 are driven being connected to the shaft 10 which drives the disks 1 by gears 19 and 20 of appropriate sizes which are fixed to the shafts 12 and 10 respectively and are connected by an idler gear 21 suitably mounted in the machine frame. A guard plate 22 is suitably mounted in fixed position above the shaft 10 and adjacent gearing to protect the gearing from an envelope blank which might become displaced beneath the disks 1.

The blanks are initially separated from the bottom of the stack by a picker which may be in the usual form of a suction nozzle 25 which is mounted to swing to and fro between the inner ends of the rollers 13 into engagement with the underside of the point *a* of the lowermost blank and to pull the point of this blank downwardly into position for engagement with the feeder rollers 13. This suction nozzle and the means for controlling the suction action thereon may be of any usual and well known construction. In the present instance it is mounted in a holder 26 which is pivotally connected at 27 to one arm of a bell crank lever 28, the latter being pivoted at 29 on a bracket 30 which may be supported in a relatively fixed position in the machine by cross rods 31, the other arm of the bell crank lever carrying a roller 32 which travels in a cam groove 33 formed in a cam disk 34. The suction nozzle holder 26 also carries a roller 35 which travels in a cam groove 36 formed in a cam disk 37. The cam disks 34 and 37 are fixed on a shaft 38 suitably journalled in the machine, and the cam grooves 33 and 36 are so shaped and related that during each revolution of the shaft 38, the roller 35 in cooperation with its cam groove 36 will swing the suction nozzle forwardly and rearwardly to and from engagement with the point of the lowermost blank to engage such blank and remove it from the stack and as the nozzle withdraws the blank from the stack the roller 32 on the bell crank lever 28 in cooperation with its cam groove 33 lifts the suction nozzle so that it will clear the upper side of the roller 11. The suction nozzle 25 is connected by flexible tubes 40 to a suitable source of suction or vacuum, and any suitable valve means, such as a rotary valve 41 fixed on the shaft 38, may be employed for controlling the suction or vacuum so that when the suction noz-

zle engages the underside of the point *a* of the lowermost blank it will exert a suction action thereon so that during the downward swing of the suction nozzle, the lowermost blank will be withdrawn or swung downwardly from the bottom of the stack, and the suction action continues until the suction nozzle has brought the lowermost sheet into position for engagement by the feeder rollers 13 whereupon the suction action upon the nozzle is broken, as will be clear from Fig. 5. The shaft 38 controlling the suction nozzle may be driven in any suitable way, it being driven in the present instance by a sprocket wheel 42 fixed thereon and over which a chain 43 passes, this chain being driven from a sprocket wheel 44 fixed on a suitable continuously revolving shaft 45 in the machine frame 49 and engaging a sprocket wheel 46 which is fixed on a short shaft 47 suitably journalled in the machine frame, this shaft having a gear 48 fixed thereto which meshes with and drives the gear 19. The chain 43 is guided by sprocket wheels 43a and 43b, the latter being adjustable, and is tensioned by an idler wheel 43c. The gears 42, 46 and 48 are so proportioned that the shaft 38 controlling the suction nozzle will make one revolution for each revolution of the feeder rollers 13 and each half revolution of the disks 1, thus coordinating the operation of the suction nozzle, feeder rollers and stack supporting disks.

The revoluble separator provided by the present invention cooperates with the suction nozzle or picker and serves to separate the point of the lowermost blank from the point of the next lowest blank in the pile immediately after the suction nozzle or picker has drawn the point of the lowermost blank downwardly away from the pile. The revoluble separator comprises a thin circular disk 50 a portion of the circumference of which is recessed as at 51 to reduce the diameter of this portion of the disk, and the disk at one end of the recess is bevelled on its upper side to form a tapered forwardly directed blade 52 which is adapted to enter between the points of the lowermost and next lowermost blanks in the pile, as shown diagrammatically in Fig. 7 as the disk revolves in the direction of the arrow in that figure. The disk is provided with a hub 53 which may be removably secured, as by a set screw 54, to the lower end of a shaft 55, this shaft being journalled in a bearing 56 supported on a bar or plate 57 supported in a fixed position in the machine, said bar or plate being secured to a plate 58 which rests on a bracket 59, the latter being supported on rods 31 which are fixed in and extend transversely in the machine frame. The plate 58 is adjustable with respect to the bracket 59 in a direction which enables the separator disk 50 to extend more or less into the stack, the plate 58 being provided for this purpose with a slot 61 and a screw 62 which operates in said slot and is threaded into the bracket 59, tightening of said screw serving to clamp the plate 58 in adjusted position. The shaft 55 may be driven by a bevel gear 63 removably and adjustably secured thereto as by a set screw 64, this set screw providing means whereby the shaft 55 may be adjusted vertically in the bevel gear 63 and thereby adjust the separator disk 50 to the proper height with respect to the bottom of the stack of blanks. The bevel gear 63 may be driven by a bevel gear 65 of equal size secured as by a set screw 66 to a shaft 67, the latter being mounted in suitable bearings in the machine, one of which bearings 68 is shown supported on the plate 57. The shaft 67 is driven at the same speed as the shaft 38 by sprocket wheels 69 and 70 of equal size fixed respectively to the shafts 38 and 67 and chain 71 which passes around these sprocket wheels. Instead of driving the separator disk 50 by bevel gears, it may be driven by a pair of spiral gears 72 and 73 as shown in Fig. 12. In such arrangement, the spiral gear 72 may be splined on the shaft 55 by a key in this gear which is movable in a keyway 74 in said shaft, the shaft 55 being secured adjustably at the proper height by a set screw 75 in the gear which clamps the shaft 55 and thus supports it within the gear 72. The other spiral gear 73 is keyed or otherwise fixed to the shaft 67, the gears 72 and 73 being proportioned to drive the shaft 55 through one revolution for each revolution of the shaft 67. In using the spiral gears as just described, the shaft 55 may be readily removed from the machine whenever desired by removing the separator disk 50 from its lower end and then drawing the shaft with the gear 72 thereon upwardly, thereby disengaging the gear 72 from the gear 73.

The present invention also provides a blade to cooperate with the edges of the blanks in the pile and thereby control the descent of the blanks so that the points thereof do not exert undue pressure upon the separator disk 50. This blade which is indicated at 80 in Fig. 9, comprises an upper portion adapted to frictionally engage the edges of the blanks in the upper portion of the stack and thereby support the weight of the pointed ends of these blanks, and a lower portion which is curved or otherwise offset outwardly with respect to the pile so that the frictional support of the blade upon the blanks in the lower portion of the stack will be reduced or relieved, thus allowing the points of the lower blanks in the stack to descend without interference for operation of the separator disk thereon. The outwardly offset lower portion of this blade overlies the separator disk 50, and in order to adjust the height of the blade, its upper portion forms a slide 81 the edges of which may be bevelled, and the slide is fitted to move vertically in a dovetail recess 82 formed in a guide 83. Means is provided for adjusting the blade vertically, such means as shown comprising a screw 84 the upper end of which is attached to a stud 85 which may be bolted or otherwise fixed to the slide 81, the lower portion of the screw passing loosely through a pair of ears 86 forming part of a bracket 87 which is fixed to the guide 83, and a milled nut 88, located between the ears 86, is threaded on the screw. By rotating the nut 88, the screw 84 and, in consequence, the slide 81 and blade 80 will be adjusted vertically. Means is also preferably provided for adjusting the blade 80 in a direction toward and from the stack in order to vary the extent of frictional support afforded by the blade upon the points of the blanks in the stack. For this purpose, the guide 83 is supported by a pair of arms 89 which are fixed to its opposite sides, these arms straddling the plate 58 and having longitudinal slots 90 therein to receive screws 91 which are threaded into the respective sides of the plate 58. By loosening the screws 91, the guide 83 and the blade 80 thereon may be adjusted in a direction toward and from the stack, and by tightening these screws, the blade will be secured in adjusted position.

In operation, the stack of blanks A is placed on the oppositely revoluble disks 1 so that the

blanks rest against the gauge pins 2', the points *a* of the blanks occupying a position between the supporting disks as shown in Fig. 2, and the revoluble separator 50 is adjusted so that the unrecessed portion of its periphery underlies the points *a* of the blanks and the orifice of the suction nozzle will lie directly beneath the recessed portion of the periphery of the separator disk. The blade 80 is also adjusted so that it will exert the proper degree of frictional support upon the points of the blanks in the stack and the blade is adjusted to the proper height above the separator disk 50. During the operation of the machine, the suction nozzle swings forwardly to bring the orifice thereof into engagement with the underside of the point *a* of the lowermost blank in the stack and suction action is applied by the suction nozzle to pull the point of the lowermost blank downwardly, at which time the recess 51 in the separator disk will be directly opposite to the orifice of the suction nozzle. Immediately after the suction nozzle has started to pull the point of the lowermost blank downwardly, the bevelled blade 52 of the separator disk 50 moves into position above the point of the lowermost blank and below the point of the next lowest blank, this blade moving into position laterally or from a side of the points as shown diagrammatically in Fig. 7 and thus effectively separating the point of the next lowest blank from that of the lowermost blank notwithstanding that the points of the blanks may be curled downwardly. As the separator disk continues to revolve, its unrecessed periphery passes under the point of the next lowest blank in the stack and thereby supports the point of that blank and of the rest of the blanks above it. The relative position of the parts at this time is shown in Fig. 4.

As the suction nozzle 25 swings from the position shown in Fig. 4 to the position shown in Fig. 5, the feeder rollers 13 receive the withdrawn edge of the blank and the vacuum action on the suction nozzle is broken, thereby releasing the sheet from the suction nozzle, substantially as shown in Fig. 5. As the feeder rollers 13 continue to revolve, the withdrawn blank is carried into engagement with the rubber faced feed roller 11, and the continued rotation of the feed rollers 13, operating in conjunction with the rotation of the feed roller 11, completes the withdrawal of the blank from the bottom of the stack. The supporting disks 1, 1 are so timed in relation to the operation of the suction nozzle that the blank, as it is drawn downwardly from the bottom of the stack by the suction nozzle, will enter the recesses or notches in the supporting disks, and the blank, as it is withdrawn from the bottom of the stack by the rollers 11 and 13, will pass through the recesses or slots in the supporting disks. The blades 2 on the supporting disks, immediately after the point of the lowermost blank has been pulled downwardly from the bottom of the stack, will pass above the lowermost blank and beneath the stack, thereby providing the necessary support for the stack.

By providing a revoluble separator disk which is movable between the point of the lowermost blank and the point of the blank immediately above by a movement laterally of the points so that the separator disk enters at a side of the points, separation of the lowermost blank from the one next above it is insured with certainty notwithstanding that the points of the blanks may be curled downwardly, since the separator disk will enter between the points back of the tips thereof.

By recessing the side of the periphery of the separator disk which is opposite to the suction nozzle when the latter is in engagement with the underside of the point of the lowermost blank, interference between the separator disk and the suction nozzle is avoided and moreover, the suction nozzle may operate most effectively since the point of the lowermost blank, as the suction nozzle presses upwardly against it, will be backed by the smooth under side of the stack. The forwardly directed blade on the separator disk however will enter between the point of the lowermost blank and the point of the blank immediately above it immediately after the suction nozzle starts to pull the point of the lowermost blank downwardly from the stack, and by bevelling the upper side of the blade on the separator disk, entrance of this blade beneath the point of the next lowest blank will be insured although the edge of the point of this blank may be curled downwardly.

By providing a blade to frictionally engage and support the sheets or blanks in the upper portion of the stack and to release them as they approach the separator disk, packing of the sheets or the points of the blanks above the separator disk is avoided, so that a few of the sheets immediately above the separator disk will be loose or substantially free of compression, thereby facilitating the entrance of the blade of the separator disk between the lowermost sheet or blank and the one next above it.

We claim as our invention:—

1. A sheet separator comprising rotatable members for supporting a stack of sheets thereon and having recesses for the passage therethrough of sheets separated from the bottom of the stack, means operative to initially separate a portion of the lowermost sheet between said members from the bottom of the stack, and a revoluble separator having a bevelled edge movable into position between said separated portion of the lowermost sheet and the bottom of the stack and operative to complete the separation of said portion of the lowermost sheet therefrom.

2. A sheet separator for envelope machines comprising means for supporting a stack of envelope blanks having points thereon, said means being recessed for the passage of the lowermost blank therethrough and having portions movable into position above the lowermost blank in the stack, means operative to initially separate the point of the lowermost blank from that of the next lowest blank in the stack, and a revoluble separator movable into position above the point of the lowermost blank and below the point of the next lowest blank to separate the point of the lowest blank from the stack preparatory to the entrance of said supporting means above the lowermost blank.

3. A sheet separator for envelope machines comprising a pair of recessed rotatable members for supporting a stack of envelope blanks having points thereon, said members having portions movable into position above the lowermost blank after separation thereof from the stack to cause said blank to pass through the recesses therein, a picker engageable with the underside of the point on the lowermost blank and operative to initially separate said point from the point of the next lowest blank in the stack, and a revoluble separator located between said members and having a bevelled edge movable between the point of the

lowermost blank and the point of the next lowest blank in the stack to separate the points of said blanks.

4. A sheet separator for envelope machines comprising a pair of members for supporting a stack of envelope blanks having points thereon, said members being recessed for the passage of the blanks therethrough and having portions movable into position above each lowermost blank when separated from the stack, a picker engageable with the underside of the point on the lowermost blank and operative to initially separate said point from the point of the next lowest blank in the stack, and a revoluble separator located between said members and having a recess in its periphery and a bevelled edge adjacent thereto and movable above the point of the lowermost blank and below the point of the next lowest blank in the stack to separate the points of said blanks.

5. A sheet separator for envelope machines comprising a pair of members for supporting a stack of envelope blanks having points thereon, said members being recessed for the passage of the blanks therethrough and having portions movable into position beneath the stack at opposite sides of the points of the blanks, a picker engageable with the underside of the point on the lowermost blank between said members and operative to initially separate said point from the point of the next lowest blank in the stack, and a revoluble disk having a recess in its periphery directly opposite to the area of engagement of the picker with the point of the lowermost blank and movable between the points of the lowermost and next blanks to separate them.

6. A sheet separator for envelope machines comprising a pair of members for supporting a stack of envelope blanks having points thereon, said members being recessed for the passage of the blanks therethrough and having portions movable into position beneath the stack at opposite sides of the points of the blanks, a picker engageable with the underside of the point on the lowermost blank between said members and operative to initially separate said point from the point of the next lowest blank in the stack, and a revoluble disk having a portion of its periphery of reduced diameter directly opposite to the area of engagement of the picker with the point of the lowermost blank and having a bevelled edge at one end of said reduced diameter movable between the points of the lowermost blank and the next lowest blank to separate them.

7. A sheet separator for envelope machines comprising means including a pair of recessed rotatable disks for supporting a stack of envelope blanks having points thereon, said disks being operative to direct the lowermost blank of the stack through the recesses therein, a picker engageable with the underside of the point on the lowermost blank between said disks and operative to initially separate said point from the point of the next lowest blank in the stack, and a revoluble disk located between said stack supporting disks and having a recess in its periphery and a blade at one end thereof and bevelled on its upper side to enter between the points of the lowermost and next lowest blanks to separate them preparatory to the directing of the lowermost sheet through the recesses in said stack supporting disks.

8. A sheet separator for envelope machines comprising means for supporting a stack of sheets, a picker for detaching the sheets successively from the bottom of the stack, a separator for separating the lowermost sheet from the next lowest sheet in the stack, and a blade frictionally engaging the edges of the sheets in the upper portion of the stack to support them and having its lower portion offset outwardly to reduce its support on the sheets in the lower portion of the stack immediately above the separator.

9. A sheet separator for envelope machines comprising means for supporting a stack of sheets, a picker for detaching the sheets successively from the bottom of the stack, a separator for separating the lowermost sheet from the next lowest sheet in the stack, and a blade having a portion engageable with the edges of the sheets in the upper portion of the stack to support them and having its lower portion curved outwardly and offset to relieve such support upon the sheets in the lower portion of the stack.

10. A sheet separator according to claim 9, wherein said blade is rigid and has means for securing it in different vertical positions with respect to the stack and separator.

11. A sheet separator according to claim 9, wherein said blade is rigid and has means for adjusting and securing it in different positions of adjustment in a direction toward and from the stack to vary its supporting action upon the sheets therein.

12. A sheet separator according to claim 1, wherein said revoluble separator is supported by a shaft which is adjustable vertically.

13. A sheet separator according to claim 1, wherein said revoluble separator is carried by a vertical shaft having a bevel gear at its upper end for driving and supporting it, said shaft being adjustable vertically with respect to said bevel gear.

14. A sheet separator according to claim 1, wherein said revoluble separator is carried by a vertical shaft which is driven by a pair of spiral gears one of which is fixed thereto, the spiral gear fixed to the shaft being disengageable from the other spiral gear and removable with said shaft.

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