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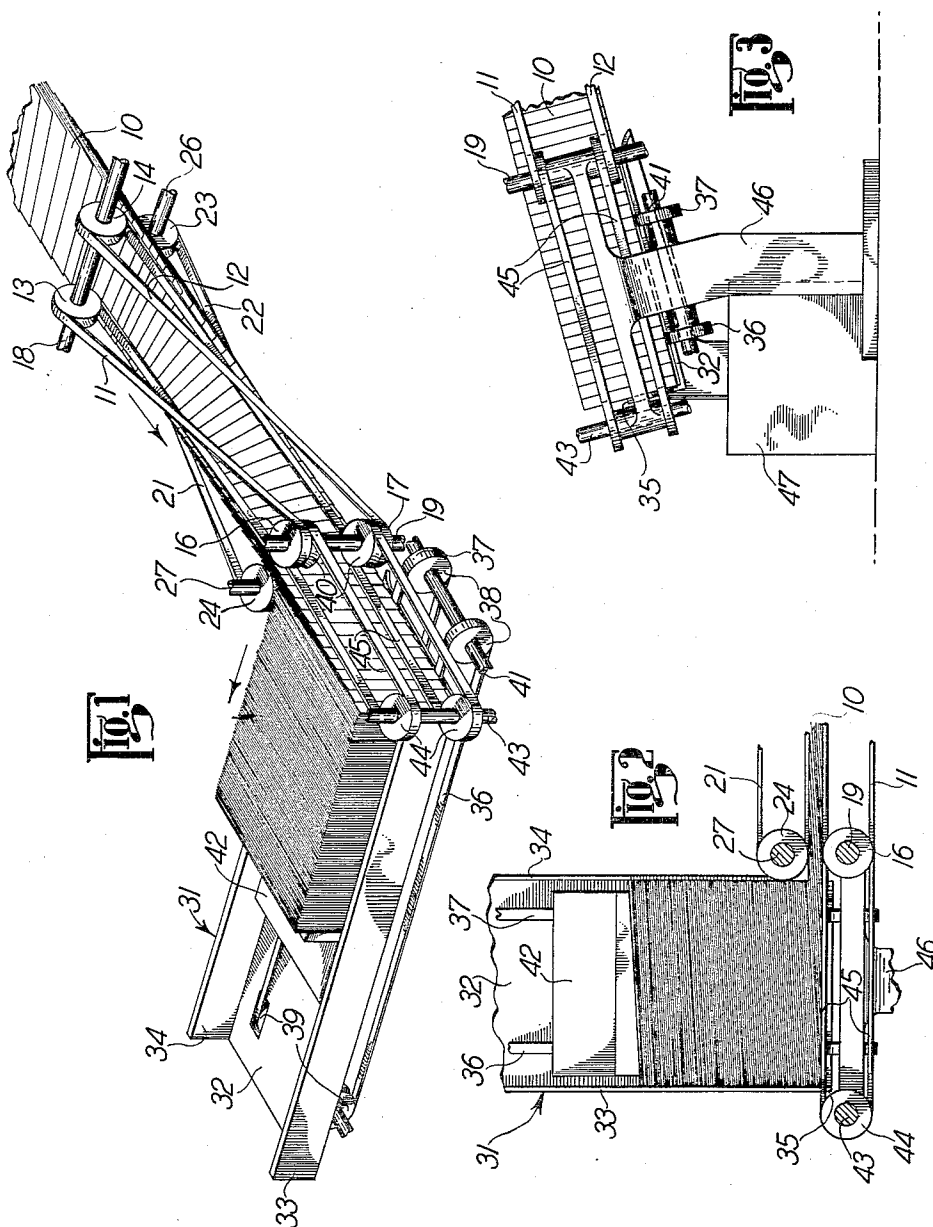
A. R. STOB

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COLLECTOR FOR FLEXIBLE SHEETS

Filed March 23, 1955

2 Sheets-Sheet 1



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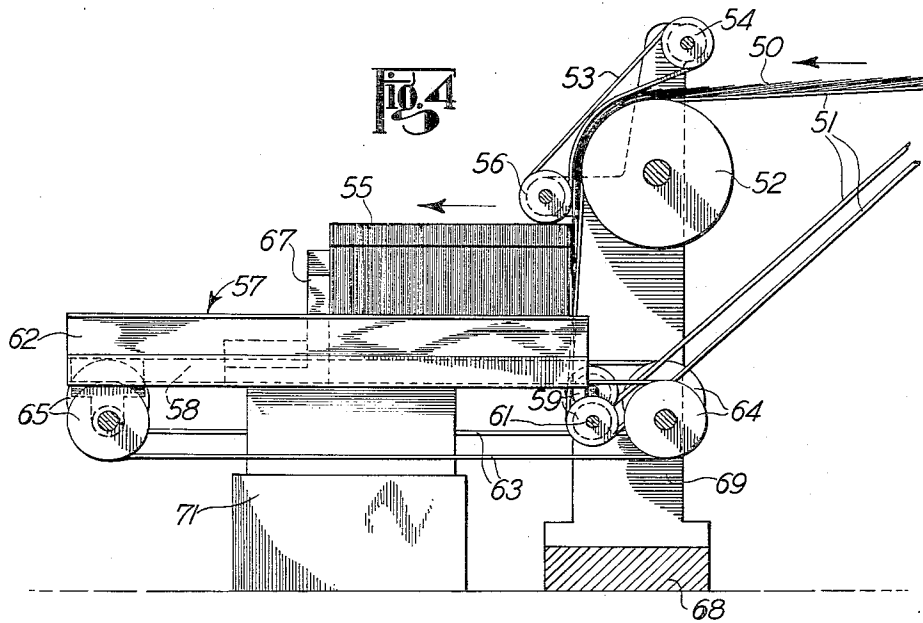
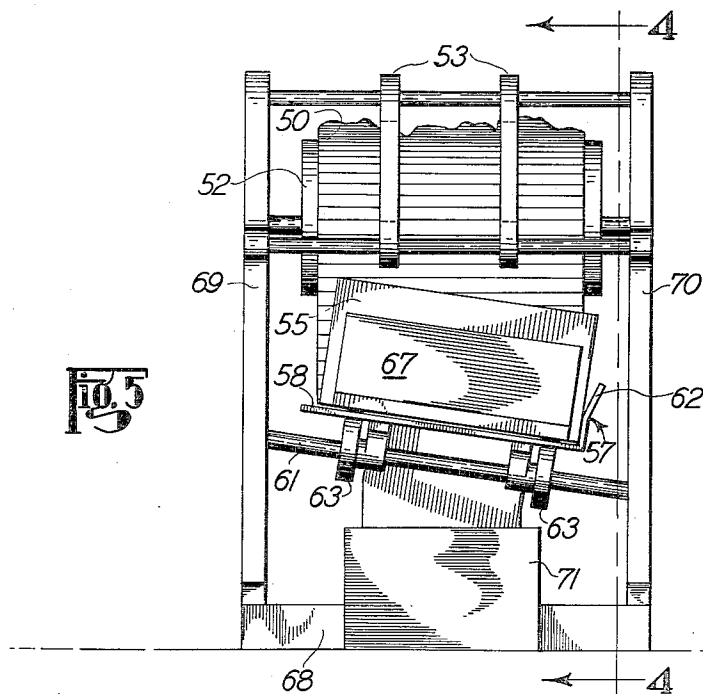
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2 Sheets-Sheet 2



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COLLECTOR FOR FLEXIBLE SHEETS

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9 Claims. (Cl. 271-87)

This invention relates to the delivery and collecting of flexible sheets, and, more particularly, it relates to a collector for flexible sheets such as signatures of magazines, books, newspapers and the like which come from, for example, high speed web printing presses.

This is a continuation-in-part of an application Serial No. 247,113, filed September 18, 1951 and now abandoned.

In high speed web printing presses of modern day, it is customary to deliver the printed and folded sheets onto a conveyor belt operating at a speed synchronized with the press speed. These signatures are generally positioned in an overlapping and stepped or echeloned relation in the order that they come off the press. Usually an attendant then scoops the signatures off the belt, an armful at a time, lines them up, presses them flat, and finally places them onto a truck. Of course, only a limited number of signatures can be handled this way at one time and additional attendants are thus required to keep up with the speed of delivery.

Also, delivery machines have been made, and many are in use at the present time, wherein the signatures are collected in a pile directly after coming out of the machine. This method requires reciprocating pushers which have to be out of the way each time a signature is delivered. The speed of this machine is thus limited.

It is an object of this invention to provide an automatic collector for flexible sheets which are echeloned along a conveyor belt.

Another object of this invention is to provide a collector for flexible sheets, which are echeloned along a conveyor belt, wherein the sheets are automatically stacked in an aligned non-echeloned position.

Still another object of this invention is to provide a collector for flexible sheets, disposed in an echeloned position, wherein the collector is simple, operates efficiently and smoothly, and requires very little attention.

Other objects and advantages will become apparent upon reading the following description in conjunction with the accompanying drawings, wherein;

Fig. 1 is a perspective view of one embodiment of this invention with flexible sheets disposed therein.

Fig. 2 is a top plan view of a fragment of the embodiment shown in Fig. 1 plus an additional part.

Fig. 3 is an end elevational view of the fragment shown in Fig. 2 plus additional parts.

Fig. 4 is a sectional side view of another embodiment of this invention with flexible sheets disposed therein, with the section taken on the line 4-4 of Fig. 5.

Fig. 5 is an end elevational view of the embodiment shown in Fig. 4.

Similar reference numerals refer to similar parts throughout the several views.

The embodiment shown in Figs. 1, 2, and 3 is employed where the flexible sheets are narrower along the leading edge. Thus, flexible sheets 10 are presumed to have left a high speed web printing press which arranges the sheets into separate folded sections or signatures and echelons them, as indicated by each cross-line of the

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stream of sheets. As shown, the sheets are moving downwardly in a level position in the direction of the arrow to where they engage spaced apart and endless conveyor belts 11 and 12 on the top of the sheets 10 and at the opposite sides of the sheets. The belts 11 and 12 are supported at one terminal on pulleys 13 and 14, respectively, and at another point on pulleys 16 and 17, respectively. The pulleys 13 and 14 are suitably mounted on a horizontal shaft 18, while the pulleys 16 and 17 are suitably mounted on an approximately vertical shaft 19. Thus, the belts 11 and 12 are operable around their respective pulleys and are shown to twist from the horizontal to the vertical although that feature is not a factor in this invention.

Fig. 1 further shows spaced apart and endless belts 21 and 22, disposed below the sheets 10, arranged on pulleys 23 and 24, similar to the pulleys for the belts 11 and 12. It should be understood that the belts 21 and 22, and, correspondingly, the pulleys 23 and 24, are spaced apart similar to the spacing of the belts 11 and 12, with a pair of pulleys 23 mounted on a horizontal shaft 26 and a pair of pulleys 24 mounted on an approximately vertical shaft 27. The stream of signatures 10 is then guided between the belts described and moved from the horizontal position to the vertical position.

A packer box or receiver 31 is shown in Figs. 1, 2, and 3 to be mounted immediately beyond the pulleys 24 and disposed perpendicular to the direction of movement of the sections 10. The box 31 consists of a base or bed 32 and opposite sides 33 and 34 which are spaced apart a distance equal to the width of the sections 10, and it is preferred that the side 33 be provided with an extension or stop 35 for a reason mentioned later. The ends of the box 31 are shown open. The bed of the box has endless and spaced apart conveyor belts 36 and 37 extended to travel along the bed above and below it, with the arrow indicating the direction of travel of the belts above the bed. Pairs of pulleys 38 and 39 receive the belts 36 and 37 to guide them along the box, as mentioned, as the pulleys 38 are suitably mounted on a shaft 41 to be powered thereby while the pulleys 39 may be rotatably mounted on the box 31. A weight or movable backstop 42 is freely disposed within the box 31 to be moved by the belts 36 and 37 and to be employed in a manner mentioned later.

The vertical shaft 19 is shown disposed adjacent the shaft 27 to permit their respective pulleys to guide the sections 10 into one end of the box 31. As shown, a plurality of the sections are in the box in a vertical position with the weight 42 supporting one end of the stack. The shaft 19 is shown to contain an additional pair of pulleys 40 and a pair of belts 45 is engaged with the pulleys 40 to extend therefrom to the opposite side 33 of the box 31 where a shaft 43 is located with a pair of pulleys 44. The latter receive the belts 45 to provide the terminal for the belts. Thus, the belts 11 and 12 form a conveyor while the belts 45 form an extension to the conveyor, and the belts 11 and 12, with the pair of belts 45, can be considered to comprise one conveyor.

With this arrangement, flexible sheets can be conveyed from a printing press into a receiver in a stacked and packed condition without the need of an attendant. Of course, when a sufficient number of sections have been received in the box, an attendant can remove a group of them adjacent the weight 42 and re-position the weight against the end of the stack remaining in the box. Since the belts are powered to convey the sections, the belts 11 and 12 and the belts 45 cooperate with the belts 21 and 22 to guide the sections 10 into the end of the box 31 with each trailing section 10 being to the side of its

leading section away from the box 31. This permits the sections to enter the box without interference from the stack already in the box, and movement of each leading section carries its trailing section with it since the sections are overlapped. The belts 45 convey the sections across the box 31 between the shafts 19 and 43 to where the leading edge of each section abuts the box extension or stripper 35 and stops the motion of the sections in their original direction since the stripper is disposed in the path of travel of the sheets. Thus, the stripper 35 is shown disposed between the belts 45 to intercept them from the belts which are preferably firmly supported or stiff at that point to tuck the signatures into the receiver. The pulleys 44 on the shaft 43 are located adjacent the far corner of the box 31 to force the sections 10 all the way into the box as the sections must be tucked into position against the resistance of the stack in the box. The belts or conveyors 36 and 37 are preferably operated at a rate to move the stack along the bed of the box to provide for entry of each section. Also, Fig. 2 shows that pulley 24 is disposed in contact with the stack in the box. Since the drawings show every two succeeding signatures in the stream to be echeloned a distance greater than the thickness of each signature, the speed of the stream is greater than the speed of the stack. Thus, the peripheral speed of the pulley 24 is greater than the speed of the stack. Of course, sections of folded paper are limp material and must, therefore, be guided entirely across the box while supported at their outer edges or sides such as the top and bottom when the sheets are in the vertical position.

Fig. 3 shows that the box 31 and the pulleys and shafts adjacent to it can be supported by a frame 46 which can support the parts in a level position or in the tilted position shown, although the latter position has not been found to be necessary. In some applications, it may also be desired to provide a mechanical vibrator 47 to shake the box and assist in alignment of the folded sections 10. However, neither the tilt nor the vibrator have been found to be necessary in most collecting jobs.

Figs. 4 and 5 show a modification of the construction described above and this modification may be useful in collecting signatures which are wider along the leading edge of travel. Thus, signatures or folded sections 50 are supported and advanced, in the direction of the arrow, by a pair of spaced apart belts 51 to a horizontally disposed and rotatable turning drum 52. The signatures pass thereover and are engaged by a pair of spaced apart drive belts 53 with the belts suitably mounted between pulleys 54 and 56 to align the belts 53 with the belts 51 whereby the sides of the signatures are firmly supported. The signatures eventually are tucked into a receiver or box 57 in a vertical position, as shown.

To accomplish this, it is preferred that the pulleys 56 be located adjacent the top of the stack 55 of the signatures in the box 57 to thus permit the pulleys 56 to force the sections into position. The belts 51 then push the sections 50 to the base 58 of the box 57 as the belts extend from the drum 52 to a pair of rotatable pulleys 59 located adjacent the base of the box on a shaft 61. When the copies come against the bottom of the packer box 57, they are stopped in their downward motion as, of course, the bottom 58 allows the belts 51 to extend therebeyond. The box 57 is shown to contain only one side 62 since the box is tilted toward that side and the sections are thus caused to move to the side 62. Here, also, the tilt and a box side are not necessary to produce properly aligned and stacked sections. Also, a pair of belts 63 is disposed over pairs of pulleys 64 and 65 at opposite ends of the box with the belts extended on the base of the box through the upper part of the belts. The belts 63 thus move the stacked signatures along the box while a stop 67 supports the leading end of the stack and is mov-

able for permitting removal of a group of the stacked signatures.

As shown, all the pulleys, and the drum 52, and the box 57 are mounted on a frame 68 having two sides 69 and 70 for mounting the shafts. Also, a mechanical vibrator 71 is shown attached to the box but it is not found to be necessary in most stacking jobs.

While two specific embodiments of this invention have been shown and described, it should be obvious that certain changes can be made therein, and this invention should, therefore, be limited only by the scope of the appended claims.

I claim:

1. In a collector for flexible sheets such as signatures which are echeloned in overlapping relation and in alignment, the combination comprising a first conveyor for transporting said sheets in the direction of both their alignment and with the leading edge of each of said signatures being in contact with said first conveyor, a receiver for said sheets with said receiver having an entrance for said sheets and being juxtaposed at an angle to said first conveyor on the side thereof where said sheets are disposed, a stripper disposed to project into said first conveyor and into the path of said signatures to intercept said leading edge of each of said signatures whereby the latter are collected in said receiver to form a stack in a non-echeloned aligned relation, a second conveyor horizontally disposed in said receiver and at said angle to said first conveyor to convey in the direction of said angle for supporting said signatures on top of said second conveyor for moving said stack along said receiver away from said entrance thereof.

2. In a collector for signatures or the like, the combination comprising a receiver including a bed disposed in a predetermined direction, a pair of conveyors disposed for transporting said signatures in an echeloned overlapping relation in a direction wherein the part of each of said signatures in contact with one of said conveyors is in a leading direction with the latter said direction being angular to said predetermined direction of said bed, said one of said conveyors extended beyond the other of said conveyors and past said bed, a stop disposed within the path of motion of said signatures to intercept the latter from said one of said conveyors and collect them to form a stack in non-echeloned alignment on said bed in said receiver, said other of said conveyors terminated adjacent said stack on the side of the latter opposite said stop, and said other of said conveyors including means disposed thereon for engaging the side of said stack for moving said side along said bed away from the entrance of said signatures on said bed.

3. In a collector for sections of flexible sheets of limp material, the combination comprising two conveyors operable in a direction and at a predetermined speed to receive said sheets therebetween in overlapping echeloned and aligned relation wherein the edge of each of said sheets in contact with one of said conveyors is a leading edge, said conveyors each being composed of two spaced apart belts for respectively engaging the lateral side margins of said sheets; said one of said conveyors including a length extended beyond the other of said conveyors a distance at least the dimension of said sheets in the direction of travel, a receiver angularly disposed adjacent said length of said one of said conveyors, a member projected into the path of the sections of said sheets between said belts and within said length of said one of said conveyors to intercept said sheets from said one of said conveyors before said sheets pass beyond said length.

4. In a collector for signatures of limp material coming off a printing press in an overlapped echeloned relation, the combination of a first conveyor movable at a certain speed for receiving said signatures, a second con-

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veyor adjacent said first conveyor on the side thereof by said signatures for receiving said signatures from said first conveyor and moving said signatures away from said first conveyor at a speed slower than the speed of the latter, a stripper disposed adjacent the plane of one side of said second conveyor to extend toward said first conveyor within the path of said signatures thereon to intercept the latter from said first conveyor and thereby form a stack with said signatures on said second conveyor, said first conveyor adapted to maintain positive frictional engagement with the leading edges of said signatures thereon until the latter are stacked, and a third conveyor disposed adjacent said first conveyor for supporting said signatures in cooperation with said first conveyor and said third conveyor being disposed in contact with said side of said stack opposite said stripper.

5. In a collector for signatures of limp material coming off a printing press in an overlapped echeloned relation, the combination of two conveyors for transporting said signatures in a direction with the edge thereof in contact with one of said conveyors being the leading edge and with at least a part of said conveyors disposed in a vertical direction to hold said signatures therebetween in a vertical position, said part of said one of said conveyors including a length disposed beyond the extent of the other of said conveyors, a receiver disposed adjacent said length of said one of said conveyors on the side thereof near said signatures, a stripper mounted to extend through said length of said conveyor into the path of said signatures to intercept the latter from said one of said conveyors and thereby cause said signatures to be stacked in said receiver, a third conveyor in said receiver to support said stack on said third conveyor for transporting the latter at a predetermined speed along said receiver away from said one of said conveyors.

6. In a collector for flexible sheets of limp material, the combination comprising a receiver including an elongated base disposed with the longitudinal axis in a given direction and the base width suitable for supporting said sheets along one dimension thereof whereby said sheets can stack on edge along said base, a set of conveyors mounted for securing and transporting said flexible sheets therebetween along a part thereof and toward one end of said receiver transverse to the longitudinal axis thereof with said sheets in overlapping echeloned relation, a first pair of conveyor pulleys operatively disposed on one side of said sheets and adjacent the near side of the stack of said sheets in said receiver with respect to the path of transportation of said sheets, other pulleys disposed on the side of said sheets directly opposite said first pair of conveyor pulleys to guide said conveyors, a second pair of conveyor pulleys operatively disposed on opposite sides of said sheets and adjacent the far side of the stack of said sheets in said receiver with respect to the path of transportation of said sheets, another conveyor tautly mounted in a straight condition between said second pair of pulleys and said other pulleys to guide said sheets a distance at least across the stack of said sheets, means aligned with said far side of the stack of said sheets for intercepting said sheets from said part of said conveyors and prevent further movement of said sheets transverse to the longitudinal axis of said base whereby said sheets are stacked in said receiver in a non-echeloned and aligned relation.

7. A collector for flexible sheets comprising in combination a first conveyor for receiving said sheets in an aligned and echeloned stream, a second conveyor disposed adjacent said first conveyor for securing said sheets between said conveyors, a first pulley rotatably mounted adjacent the terminal end of said first of said conveyors and being spaced therefrom the thickness of said stream, a second pulley rotatably mounted at a location spaced from said first pulley and at a downstream location there-

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from with respect to said stream, said second of said conveyors including a straight length trained between said pulleys and extended beyond said terminal ends of said first of said conveyors, a receiver disposed adjacent said length of said one of said conveyors for intercepting and collecting said sheets from said conveyors whereby said sheets are stacked in said receiver, additional pulleys rotatably mounted for actuating said conveyors and supporting the ends thereof, means associated with said first of said conveyors disposed to be in abutment with the side of the stack of sheets in said receiver at the upstream side of the entrance of said sheets to said receiver, and a stop stationarily disposed at the downstream end of said stream and extending into the plane of said straight length of said conveyors for causing said sheets to stack in said receiver.

8. A method of collecting sheets of paper in a stack as said sheets are being continuously fed from a machine such as a printing press, the steps comprising arranging said sheets in overlapped and echeloned relation in the order and at the speed that they are fed from said machine, moving said sheets in their edgewise direction away from said machine and forming a straight stream of said sheets across the entire width of the stack whereby each of said sheets presents a leading edge and a trailing edge, pulling said sheets by said leading edge across said entire width of said stack, interrupting the movement of said sheets in said edgewise direction by having said leading edge of each of said sheets abut a stop while in the original position in said straight stream, aligning said leading edges in a direction transverse to the plane of said sheets and thereby form said stack to one side of said stream of said sheets, moving said stack in said direction transverse to said stream of said sheets, and contacting said trailing edge of each of said sheets in said stack adjacent said stream of said sheets with a rotary motion of a linear speed in excess of the speed of movement of said stack.

9. A method of collecting sheets of paper into a stack when said sheets are being continuously fed from a machine such as a printing press, the steps comprising arranging said sheets in overlapped and echeloned relation in the order and at the speed that they are fed from said machine, supporting the opposite side edges of said sheets and moving said sheets in their edgewise direction away from said machine and forming a stream of said sheets with said stream being planular in the length thereof across said stack whereby each of said sheets presents a leading edge and a trailing edge and with each said leading edge being disposed on one side of said planular stream and positively pulled to the absolute downstream end of said stream where the far side of said stack exists, interrupting the movement of said sheets in said edgewise direction and at said absolute downstream end of said stream by having said leading edge of each of said sheets abut a stop while said each of said sheets is still in its said relation in said stream, and aligning said leading edges in the direction transverse to the plane of said sheets on the side opposite said one side and thereby form said stack of said sheets to said side opposite said one side of said stream of said sheets, and moving said stack in said direction transverse to said stream of said sheets.

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