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3,388,907

SHEET STACK JOGGING MECHANISM

Filed July 27, 1966

3 Sheets-Sheet 1

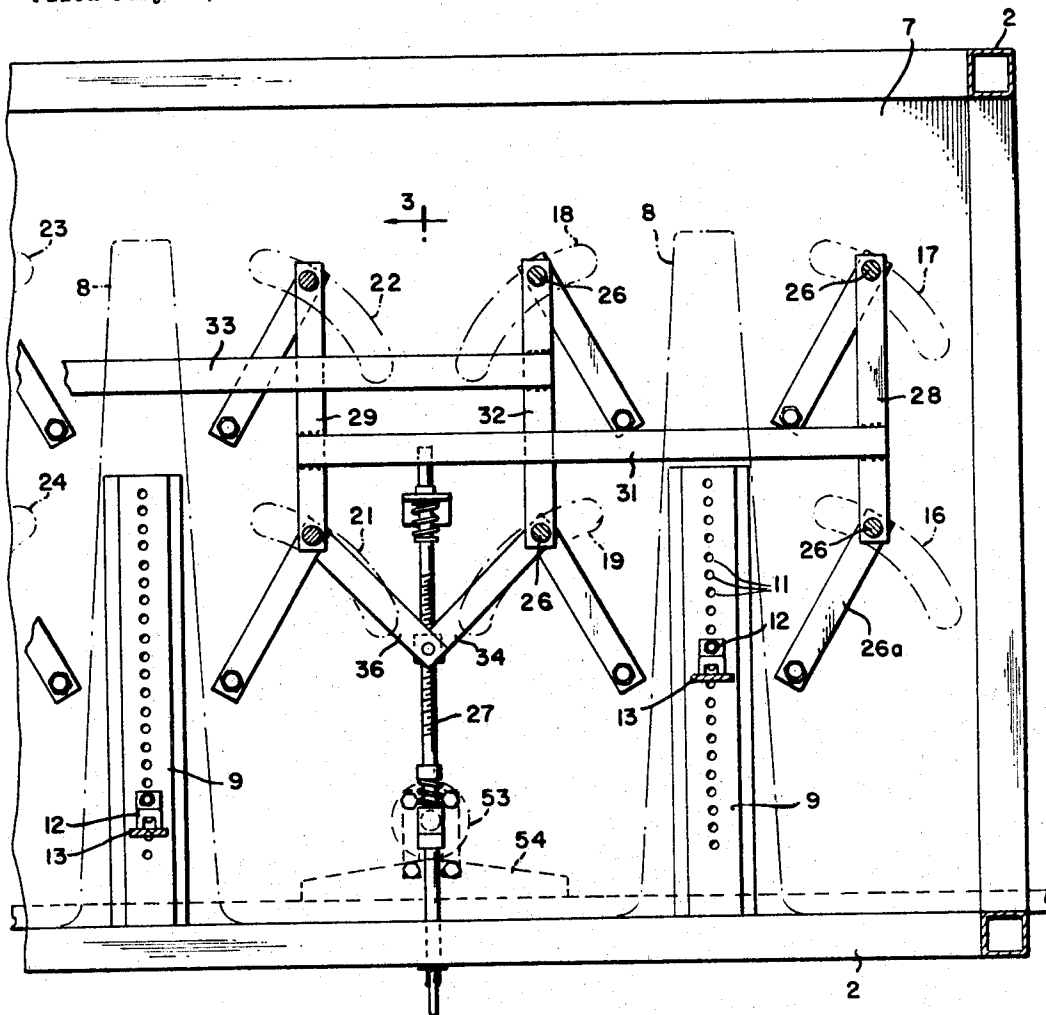


FIG. 2

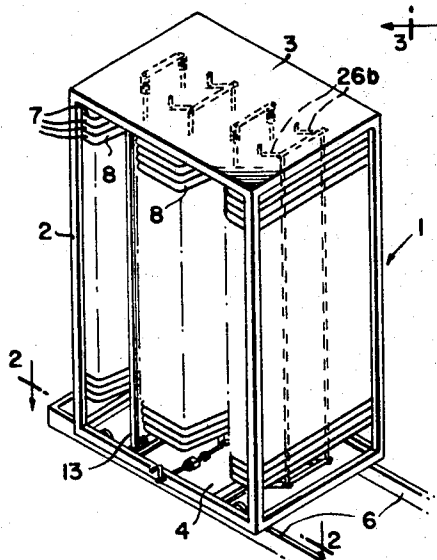


FIG. 1

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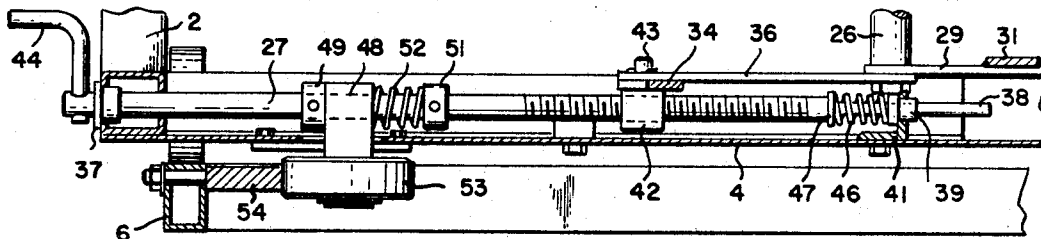


FIG. 3

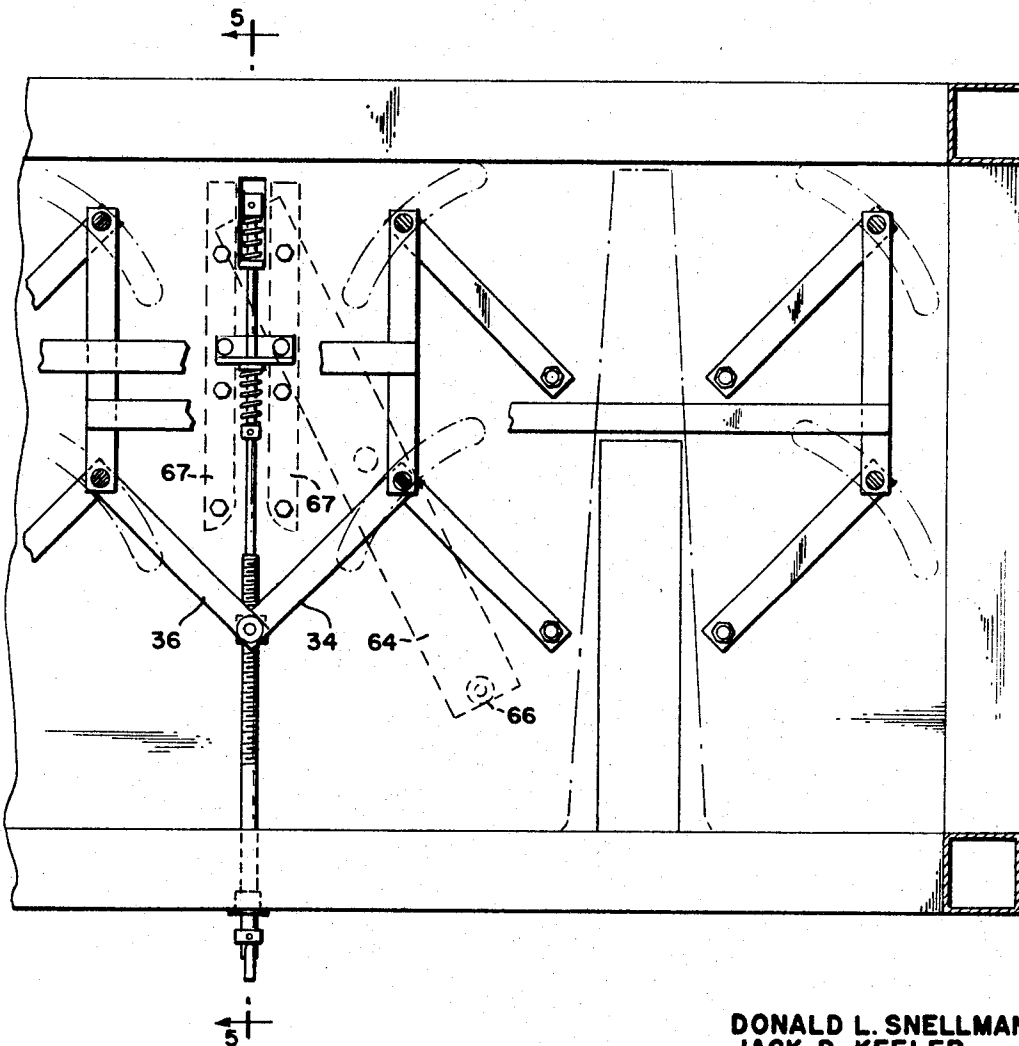


FIG. 4

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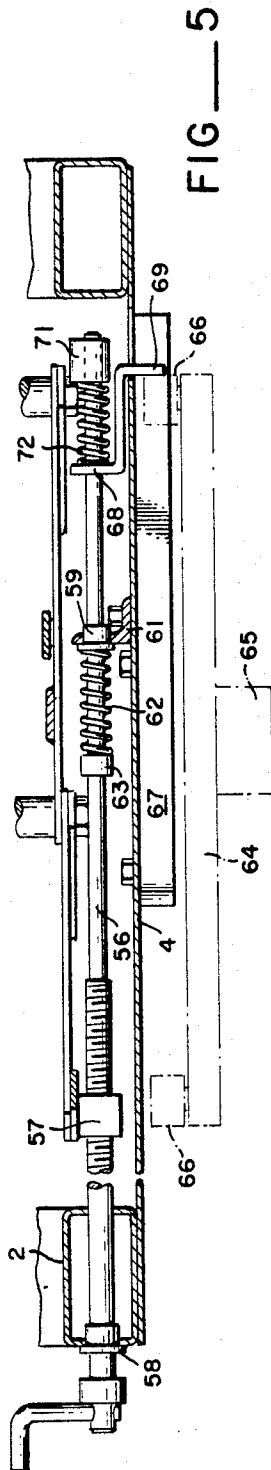
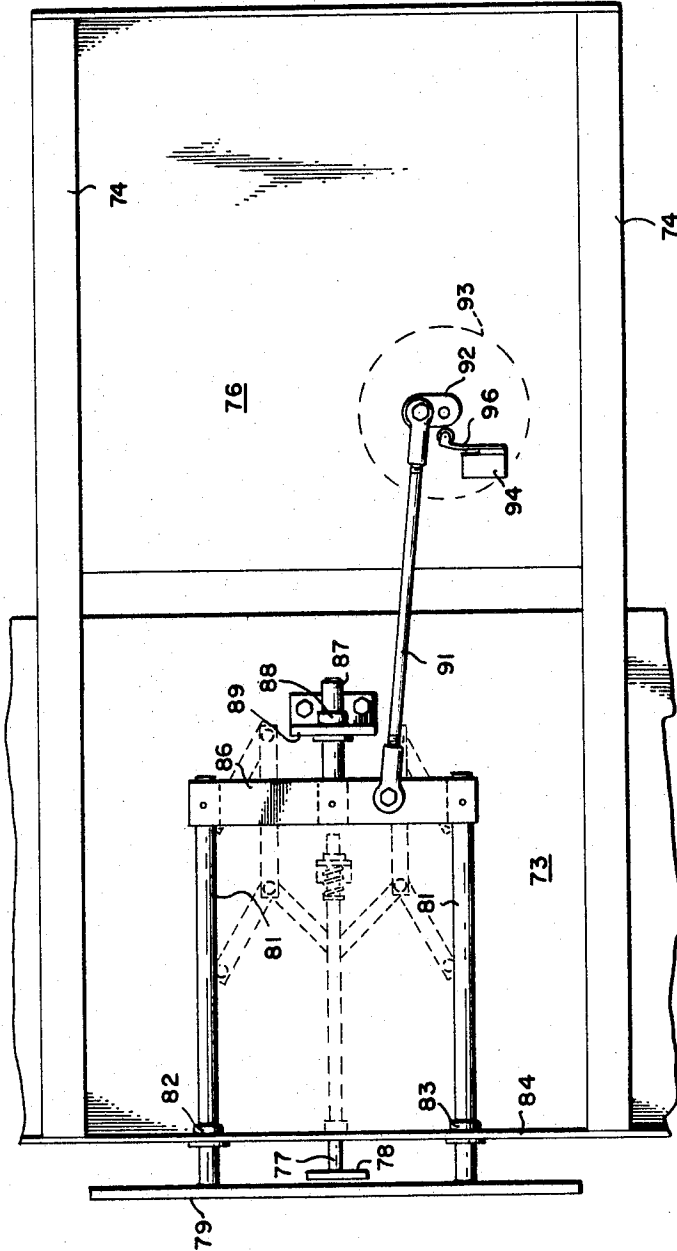
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3 Sheets-Sheet 3



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## SHEET STACK JOGGING MECHANISM

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9 Claims. (Cl. 271-89)

### ABSTRACT OF THE DISCLOSURE

A device for jogging or laterally "tapping" a loosely-formed stack of sheets in order to form neat piles in receiving bins having a plurality of vertical rows of shelves. A plurality of rows of jogging rods divide the shelves into sheet receiving compartments and the jogging rods are caused to move in arcuate paths by swing links and the rods are moved in unison by actuating means as a resulting of shifting of the receiver bins.

### Background of the invention

The present invention relates to sheet stack formers and more particularly to a device for jogging or laterally "tapping" a loosely formed stack of sheets in order to form a neat pile. More particularly, the invention relates to a jogging mechanism for simultaneously jogging a plurality of individual stacks in a vertical row and to the actuating means therefor.

The present invention has particular utility in devices such as collating systems or the like wherein a plurality of stacks of sheets are rapidly formed. In such instances, receiver bins are used which employ one or a plurality of vertical rows of shelves which are successively aligned with a collator distributor which functions to deliver a predetermined number of sheets to each one of a preselected number of vertically arranged receiver trays or compartments. Because of the rapid feeding, which is accomplished automatically, the stack of sheets in the individual trays are extremely uneven. The present invention provides a jogger and sheet guide for receiver bin shelves of the character described. The invention provides a sufficiently wide reception area for the rapidly deposited sheets and, after the loose stacks are formed, laterally taps or jogs the stacks to even up the piles which may then be removed from the rear end or backside of the receiver. The jogging or lateral tapping of the piles may be done simultaneously with and may be a function of the shifting of the receiver bin to align a second set of vertically arranged shelves for reception of succeeding collated sheets.

In the prior art, it has been the practice to provide either fixed shelf walls or laterally adjustable side walls for the reception of different sizes of sheets where receiver trays have been used. With the present invention, the jogging rods which form the lateral guides for the oncoming sheets not only function to tap the pile to obtain a neat stack but are also initially adjustable for any width of paper.

The object of the invention is thus to provide a jogging device of the character described which functions to form neat stacks of sheets and which functions also as an adjustable sheet guide during delivery of the sheets.

Another object of the present invention is to provide a jogging device of the character described which is especially adapted for use with multiple row upright receiver bins wherein the jogging mechanism is actuated upon shifting of the bin and may be accomplished as a function of such shifting.

The means for which the foregoing objects and other advantages which will be apparent to those skilled in the

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art are accomplished are set forth in the following specification and claims and illustrated in the accompanying drawings wherein:

FIG. 1 is a perspective view of a bin receiver equipped with the jogging mechanism of the present invention;  
FIG. 2 is a cross section taken along lines 2-2 of FIG. 1;

FIG. 3 is a cross sectional view taken along lines 3-3 of FIG. 2;

FIG. 4 is a view similar to FIG. 2 illustrating one modification of the actuating means for the jogging mechanism;

FIG. 5 is a cross sectional view taken along line 5-5 of FIG. 4; and

FIG. 6 is a bottom elevational view of a second modification of the actuating mechanism for the jogging mechanism.

Referring now to the drawings wherein like reference numerals indicate identical parts in the various views, as shown in FIG. 1 the receiver bin 1 may consist of a frame indicated generally at 2 comprised of upright posts or angle irons and connecting members and having a top panel 3 and a bottom panel 4. The entire bin 1 may be shiftable along the track member 6, supported by any means such as from a collator base or the like. It will be understood that the exact details of the bin framing, the track support and motive means for shifting the bin form no part of the present invention per se but may be varied from one machine to the other. The bin 1 is provided with closely spaced horizontal shelf members 7 which extend completely across the bin and may be supported from the four corners in any suitable manner. As seen in FIG. 1, the bin 1 is viewed from the back side with each of the shelves 7 being formed with a plurality of cutout portions 8 which enables the stacks of sheets to be removed from the shelves in a rearward direction. As will be understood by those skilled in the art, the sheets are fed into the bin from the front side by means of a collator distributor.

Mounted on the top and bottom walls 3 and 4 respectively and in vertical alignment with the cutout portions 8 of the shelves are the mounting brackets 9 which provide a plurality of vertically aligned holes 11. The holes 11 receive detents or the like carried by the magnetic holders 12, one of which is mounted on each of the brackets 9 on the top and bottom walls of the bin. Since the sheets enter the shelves from the front side, vertical rods 13 are provided as stops for the incoming paper. The top and bottom ends of each of the rods are removably held in place by the magnets 12. After the shelves are loaded, the vertical rods 13 may be removed and the stacks of paper withdrawn from the backside of the bin.

Referring to FIG. 2, each of the shelves is provided with a plurality of arcuate openings which are arranged in groups of four. Thus, the right hand end of the shelf 7 in FIG. 2 shows the openings 16, 17, 18 and 19. It will be understood that each shelf 7 has a like number of arcuate openings with the openings in each shelf being in vertical alignment. In the case of a two row bin as illustrated in FIG. 1, a second group of arcuate openings 21, 22, 23 and 24 are located on the other end of each of the shelves. Each of the arcuate slots is provided with a vertical jogging rod 26 which extends through all of the shelves 7. The bottom end of each rod 26 is pivotally connected to a link 26a pivotally mounted for swinging motion on the bottom panel 4 of the bin and an identical link 26b is connected to the top end and pivotally mounted for swinging action on the top wall 3 of the bin. As will be noted from FIG. 2, the pivot points of the respective links 26a are located on the center of the associated arcuate openings. The arcuate slots or openings thus allow

the rods 26 to move laterally as the links 26a and 26b are swung about the pivot points.

Referring to the right hand end of the shelf shown in FIG. 2, it will be noted that the rods 26 operating in the slots 16 and 17 form the side guides along one side of a sheet and the rods 26 operating in the slots 18 and 19 form the guide means for the opposite side of the same sheet. Thus the position of the respective pairs of rods determine the width of the particular sheet receiving compartment. Likewise, the remaining rods 26 located in slots 21, 22, 23 and 24 form the lateral guides for a second stack and the lateral spacing between the pairs of rods is determined by the angular position of the links 26a and 26b.

Jogging or lateral tapping of the stacks in the various shelves is accomplished by a reciprocal rod 27 which constitutes an actuator rod for all of the jogging rods 26. As will be noted, the rods 26 in the openings 16 and 17 are connected by a connector link 28 which has a rigid connection to the connector link 29 through the rod 31. The rods in the openings 18 and 19 are connected by the connector link 32 which has a rigid connection to a link connecting the remaining two vertical rods on the opposite end of the bin (not shown). Thus the rigidly connected links move in unison upon reciprocation of the actuator rod 27 which is pivotally connected to the adjacent jogging rods 26 by means of the drive links 34 and 36. Considering the right hand group of rods 26 as viewed in FIG. 2, when the rod 27 is moved inwardly the closing pairs of jogging rods will move toward each other and, when the rod 27 is moved outwardly the opposing pairs of jogging rods separate.

Referring to FIG. 3, the rod 27 is rotatably and slidably mounted in a bushing 37 in a frame member 32 at one end a reduced diameter end portion 38 is slidably and rotatably mounted in a bushing 39 fixed to the angle bracket 41 mounted on the bottom panel 4 of the bin. The rod 27 is provided with screw threads which mount the screw threaded collar 42 having an upstanding pivot pin 43 to which the links 34 and 36 are attached. The outer end of the rod 27 is provided with a crank 44 for turning the rod thus adjusting the position of the collar 42 therealong to determine the initial lateral distance between the opposing pairs of jogging rods 26. A compression spring 45 is mounted between the bushing 39 and a shoulder 47 on the rod 27 to dampen the reciprocating movement of the rod 27 and to return the same to its unactuated position. The rod is operated inwardly by means of a cam follower 48 slidably received on the rod 27 between the two stop collars 49 and 51 which are fixed to the rod. A second compression spring 52 dampens the shock of the cam follower as will be explained. The follower 48 mounts a roller 53 beneath the bottom panel 4 of the bin which serves to contact a cam 54 mounted on one of the tracks 6. The cam 54 is so positioned on the track 6 that, when the bin is shifted after completing a collating cycle and before the stacks of collated sheets are removed and the next row of shelves aligned with the distributor, the follower 53 will contact the cam thus actuating the jogging rods 26 to jog the individual stacks of sheets. The actuated position of the jogging rods 26 and the operator rod 27 is shown in FIGS. 2 and 3. As the bin continues its shifting motion, the follower 53 rides off of the cam and the rods 26 return to their spread or open position to permit reception of further stacks in the compartments. It will of course, be necessary to remove the vertical rods 13 in order to remove the stacks of sheets from the compartments.

FIGS. 4 and 5 illustrate a second embodiment of the jogging mechanism having a modified form of actuator for the jogger rods. As seen in FIGS. 4 and 5, the threaded actuator rod 56 mounts a threaded collar 57 which is pivotally connected to the links 34 and 36 in the same manner as described for the actuator rod 27 for operating the jogger rods 26. The rod 56 is rotatably and

slidably mounted in the bushing 58 carried in the frame 2 of the bin and in a second bushing 59 mounted in a bracket 61 fixed to the bottom panel 4 of the bin. A compression spring 62 may be mounted about the rod 56 between the stop collar 63 and the bushing 59 to dampen the reciprocating action of the actuator rod. In the embodiment shown in FIGS. 4 and 5, the shifting mechanism for the bin includes a rotatable crank arm 64 which rotates about the vertical axis of the post 65 when rotated by suitable power means carried on the distributor or within the base structure beneath the shiftable bin. The crank arm 64 includes the roller members 66 on its opposite ends which contact the parallel guide rails 67 mounted on the bottom panel 4 of the bin. As seen in FIG. 4, continued rotation of the crank arm 64 in the clockwise direction, by virtue of the engagement of the roller 66 between the guides 67, will serve to shift the bin to the right. The details of the operation of the crank arm 64 and its control means form no part of the present invention and are fully illustrated and described in our co-pending patent application, Collator Bin Shift Mechanism, Ser. No. 519,073, filed Jan. 6, 1966.

The movement of the roller 66 between the guides 67 in this embodiment is used to actuate the jogging mechanism. Mounted on the inboard end of the rod 56 is a slidable angle bracket 68 having a downwardly directed end portion 69 which is contacted by the roller 66 as it moves between the guides 67. A stop collar 71 is fixed to the end of the rod 56 and a compression spring 72 is located between the brackets 68 and the collar 71. With this arrangement, shifting of the bin by means of rotation of the crank arm 64 causes the roller 66 to operate the jogging actuator rod 56 through the bracket 68.

A third modification of the actuation means for the jogging mechanism is illustrated in FIG. 6 which is a bottom plan view from beneath the supporting platform for the shiftable bin. The platform 73 will be understood to be stationary and may be supported on beams or the like 74 carried by the distributor structure 76. It will be understood that the jogging rods, associated links, and arcuate slots or openings in the shelves may be identical to either one of the preceding embodiments described. The actuator rod 77 corresponds to either the actuator rod 27 or the rod 56 including a spring return which maintains the rod in the outward position shown in FIG. 6. The rod 77 has a contact member 78 on the outer end thereof which is contacted by the actuator bar 79 in a manner to be described.

The actuator bar 79, of course, remains stationary with the support base 73 and the rod 77 and contact member 78 move with the bin when it is shifted. The bar 78 is reciprocated by means of the connecting rods 81 which extend through suitable bushings 82 and 83 in a flange 84 on the support base. The inner ends of the rods 81 are connected by the bar 86 with a guide rod 87 being fixed thereto and extending through a guide bushing 88 in the bracket 89. Reciprocation of the actuator bar 79 is accomplished by means of the connecting rod 91 which is pivotally connected to the bar 86 and to a crank arm 92 which is rotated by means of the motor 93 carried on the distributor. It would of course be possible to rotate the crank arm 92 by any desired drive means such as a chain or belt drive or the like. In order to limit the rotation of the crank arm 92 to one rotation during a shifting of the bin, a limit switch 94 may be suitably located with a contact arm 96 which is actuated by contact with the crank arm 92. The crank arm may be halted in any particular angle of rotation as desired by such means as a motor shaft brake or the like as will be well understood by those versed in the art. In operation, each time the bin is shifted the motor 93 will be actuated to cause the bar 79 to contact the member 78 on the actuating rod 77 for a jogging mechanism. In the case of multiple row bins where a plurality of actuator rods may

be utilized, the particular actuator rod which approaches the bar 79 will be actuated upon shifting of the bin.

It is believed that the invention will have been clearly understood from the foregoing detailed description of the illustrated embodiments. Minor changes in the details of construction will suggest themselves and may be resorted to without departing from the spirit of the invention. Accordingly it is intended that no limitation be implied and that the hereto annexed claims be given a scope fully commensurate with the broadest interpretation to which the employed language fairly admits.

Having thus described the invention, what is new and desired to be secured by Letters Patent is:

1. In combination with a sheet receiving shelf adapted to receive sheets fed thereto to form a stack, a sheet stack jogging mechanism comprising; a plurality of spaced jogging members defining a guide for the side edges of incoming sheets on said shelf, spaced arcuate openings in said shelf, said jogging members passing through said openings so as to allow lateral movement of the members in arcuate paths defined by said openings, a plurality of swing link means connected at one end with respective ones of said jogging members and at the other end being pivotably mounted on an axis coinciding with the center of the circle defined by the associated arcuate opening, connecting link means connecting said jogging members for simultaneous swinging motion, and actuating means to move said jogging members in unison against the side of said sheets to jog the stack after its formation, said actuating means including resilient means to cushion and dampen the movement of said jogging members against the stack.

2. The combination according to claim 1 wherein; said actuating means is provided with a cam follower, and cam means fixed to said bin mounting means and located to contact said follower to operate said actuating means upon a shifting of the bin.

3. The combination according to claim 1, wherein; said bin mounting means includes a rotatable crank arm for shifting said bin, cam follower means on said actuating means, said follower means being positioned to be contacted by said crank arm to operate said actuating means upon shifting of the bin.

4. The combination according to claim 1 wherein; said actuating means includes a reciprocal actuator rod carried by said shiftable bin, an actuator bar on said bin mounting means, means for mounting said bar for reciprocal movement to contact and operate said actuator rod as the bin shifts on the mounting means, and electric motor means to operate said bar.

5. In combination with a sheet receiving shelf adapted to receive sheets fed thereto to form stacks, sheet stack jogging and guide means comprising; a plurality of rows of jogging rods dividing said shelf into at least two separate sheet receiving compartments, each compartment being defined by spaced rows of jogging rods, an arcuate opening in said shelf associated with each rod permitting movement of the rod in an arcuate path to control the width of the compartment, each rod being connected to a swing link pivoted on the center of the circle defined by the associated arcuate slot, connector links connecting the rods in each row to move in unison, and actuating means to move the rows of rods on each side of a stack simultaneously against the sides of said sheets to jog the stack after its formation.

6. The combination according to claim 5 including bin means for mounting a plurality of said shelves in vertical spaced relation, said jogging rods extending through each of said shelves and defining separate vertical

rows of sheet receiving compartments, said actuating means including an actuator rod, means to mount said actuator for reciprocation between adjacent rows of jogger rods forming the adjacent sides of adjacent compartments, drive links pivotally connected to said rod and to corresponding jogger rods in said rows, means for adjusting the point of the pivotal connection of said drive links on said actuator rod to control the initial unactuated position of said jogger rods, spring means to hold said actuator rod in said unactuated position, and means to operate said actuator rod against said spring means.

7. The combination according to claim 6 wherein; the corresponding connector links of the jogger rods for the adjacent compartments are connected whereby the jogger rods are caused to move in unison.

8. In combination with bin means for mounting a plurality of shelves in vertical spaced relation, each shelf being adapted to receive sheets fed thereto to form a stack, a sheet stack jogging mechanism comprising; a plurality of spaced jogging members extending through each of said shelves defining separate vertical rows of sheet receiving compartments and providing a guide for the side edges of incoming sheets on the shelves, spaced arcuate openings in said shelves, said jogging members passing through said openings so as to allow lateral movement of the members in arcuate paths defined by said openings, a plurality of swing link means connected at one end with respective ones of said jogging members and at the other end being pivotably mounted on an axis coinciding with the center of the circle defined by the associated arcuate openings, connecting link means connecting said jogging members for simultaneous motion, actuating means to move said jogging members in unison against the stack after its formation, said actuating means including resilient means to cushion and dampen the movement of said jogging members against the stack, bin mounting means to mount said bin for lateral shifting to align selected rows of receiving compartments with a sheet distributor, and means to operate said actuating means to jog the stack in each compartment of a given row upon shifting of the bin.

9. In combination with a sheet receiving shelf adapted to receive sheets fed thereto to form a stack, a sheet stack jogging mechanism comprising; a plurality of spaced jogging members defining a guide for the side edges of incoming sheets on said shelf, spaced arcuate openings in said shelf, said jogging members passing through said openings so as to allow lateral movement of the members in arcuate paths defined by said openings a plurality of swing link means connected at one end with respective ones of said jogging members and at the other end being pivotably mounted on an axis coinciding with the center of the circle defined by the associated arcuate opening, connecting link means connecting said jogging members for simultaneous swinging motion, and actuating means to move said jogging members in unison against the side of said sheets to jog the stack after its formation.

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