Nov. 22, 1966 B. B. PASQUINELLI 3,287,014

ADJUSTABLE FEED ROLLER ASSEMBLY

Filed Oct. 9, 1964 4 Sheets-Sheet 1

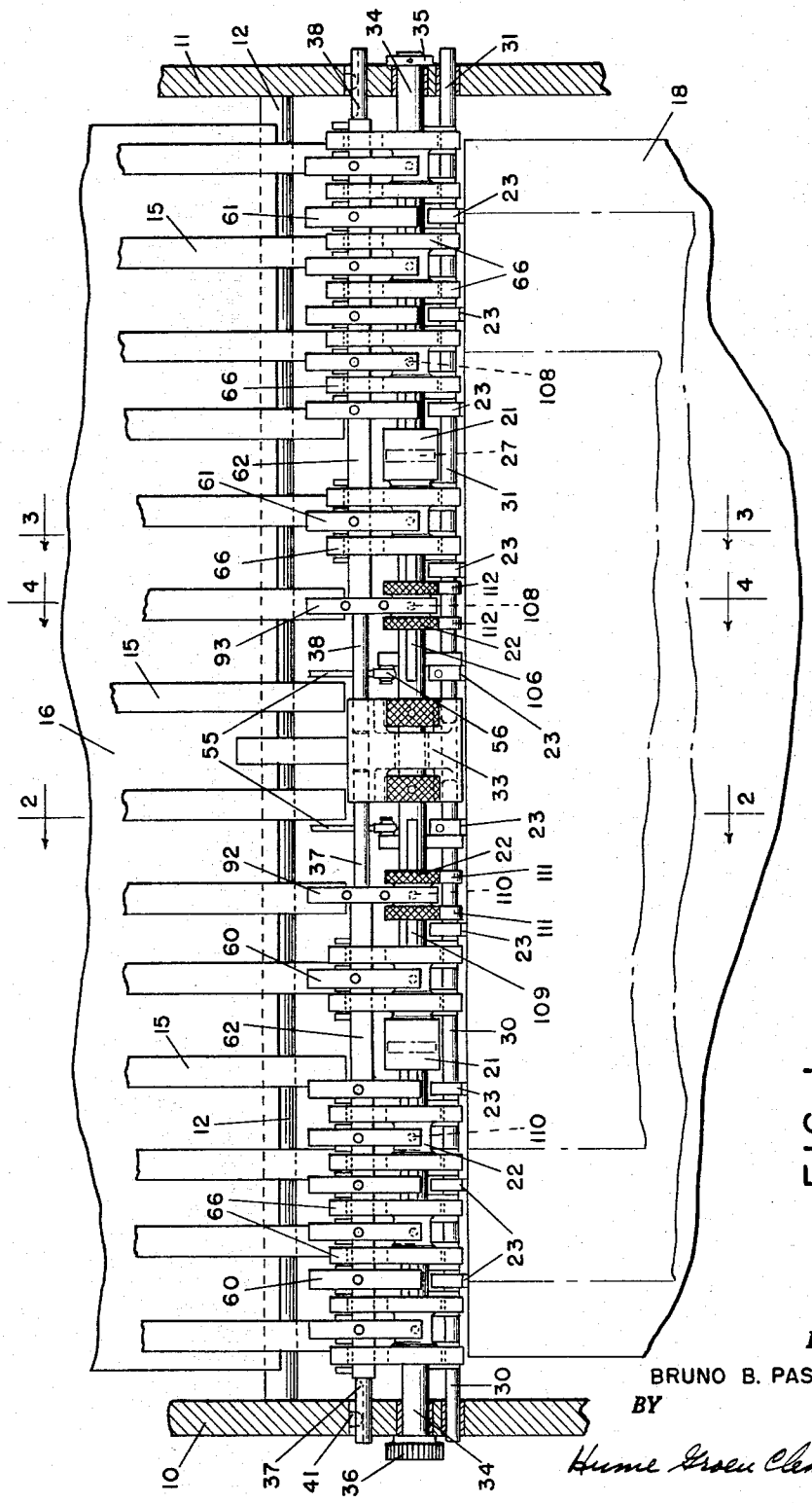

FIG. 1

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Filed Oct. 9, 1964 4 Sheets-Sheet 2

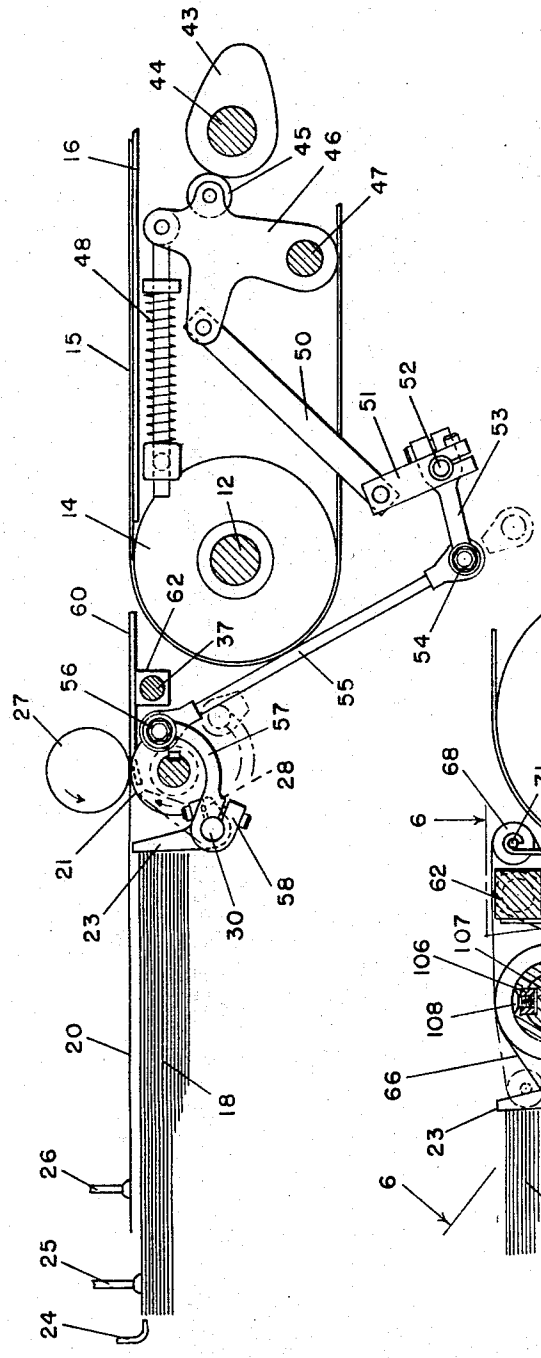

FIG. 2

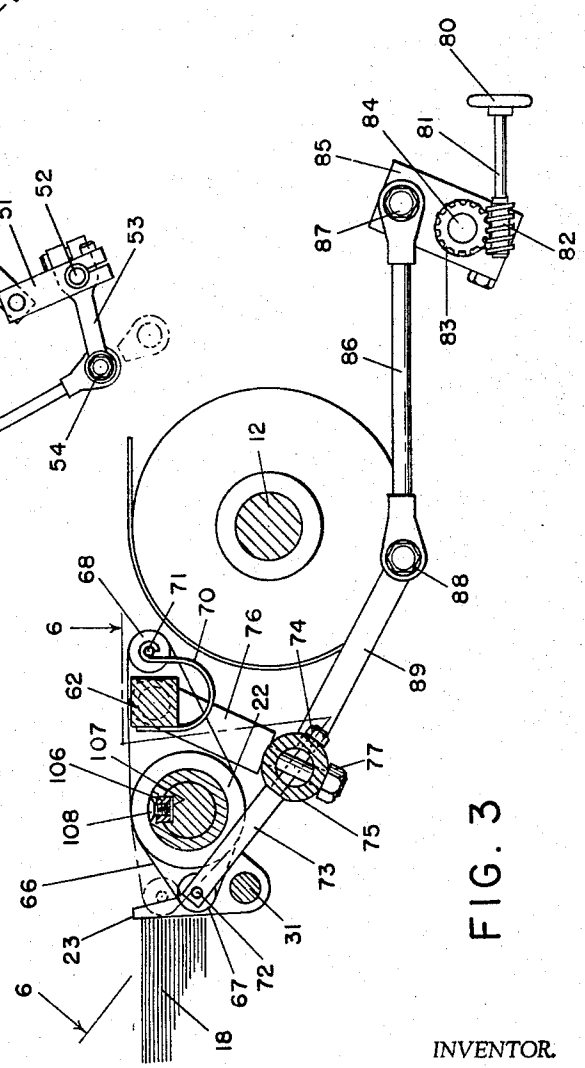

FIG. 3

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ADJUSTABLE FEED ROLLER ASSEMBLY

Filed Oct. 9, 1964 4 Sheets-Sheet 3

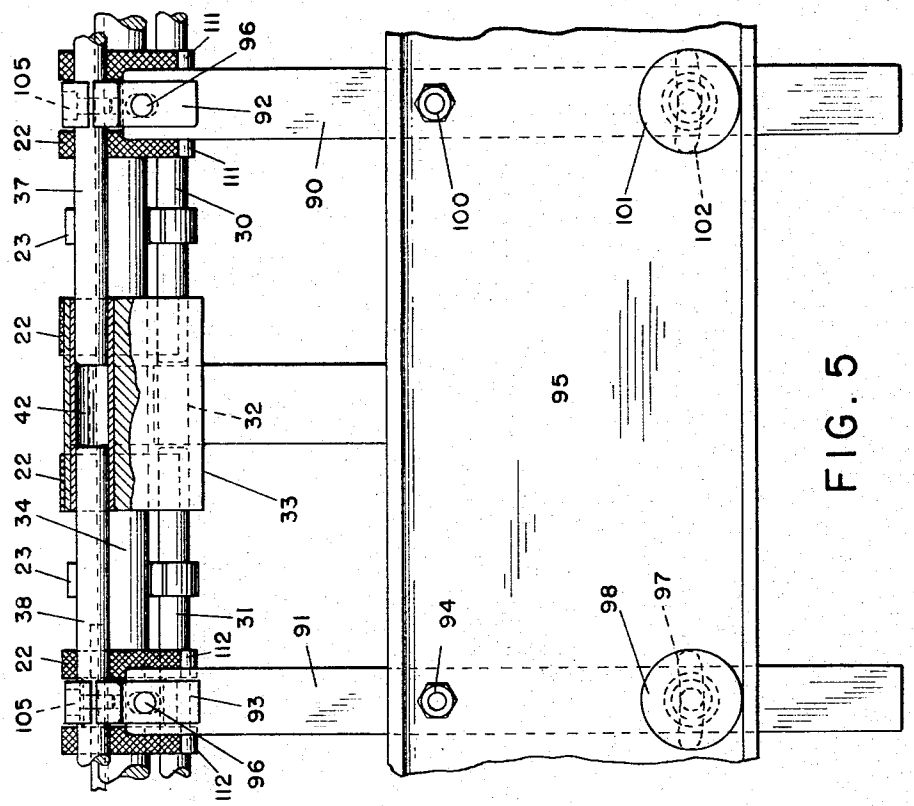

FIG. 5

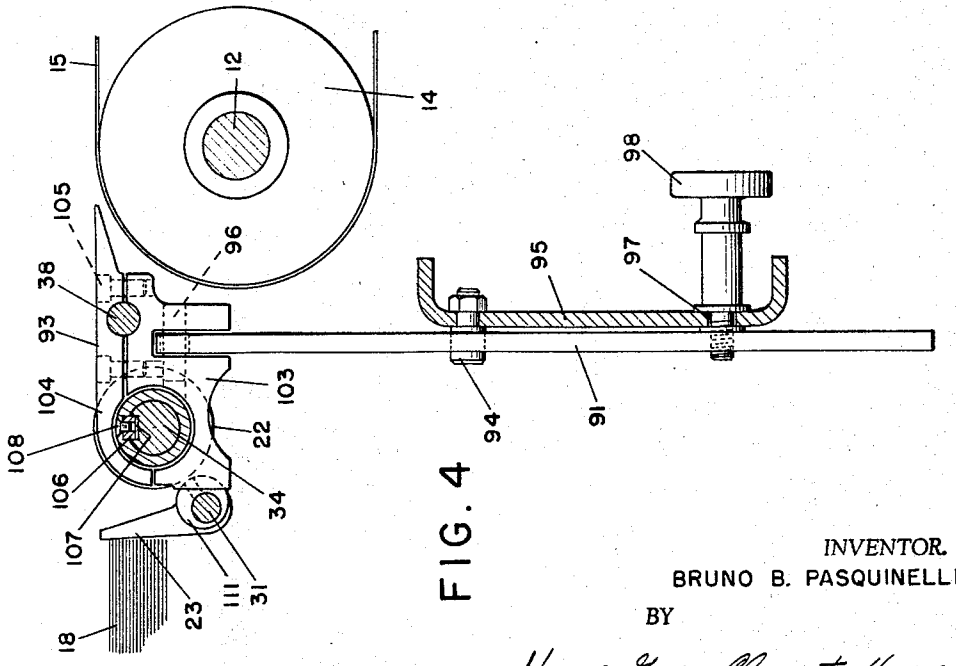

FIG. 4

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ADJUSTABLE FEED ROLLER ASSEMBLY

Filed Oct. 9, 1964 4 Sheets-Sheet 4

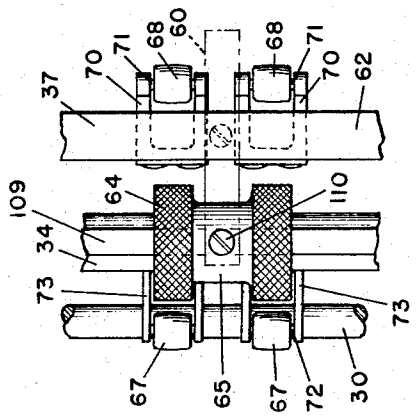

FIG. 7

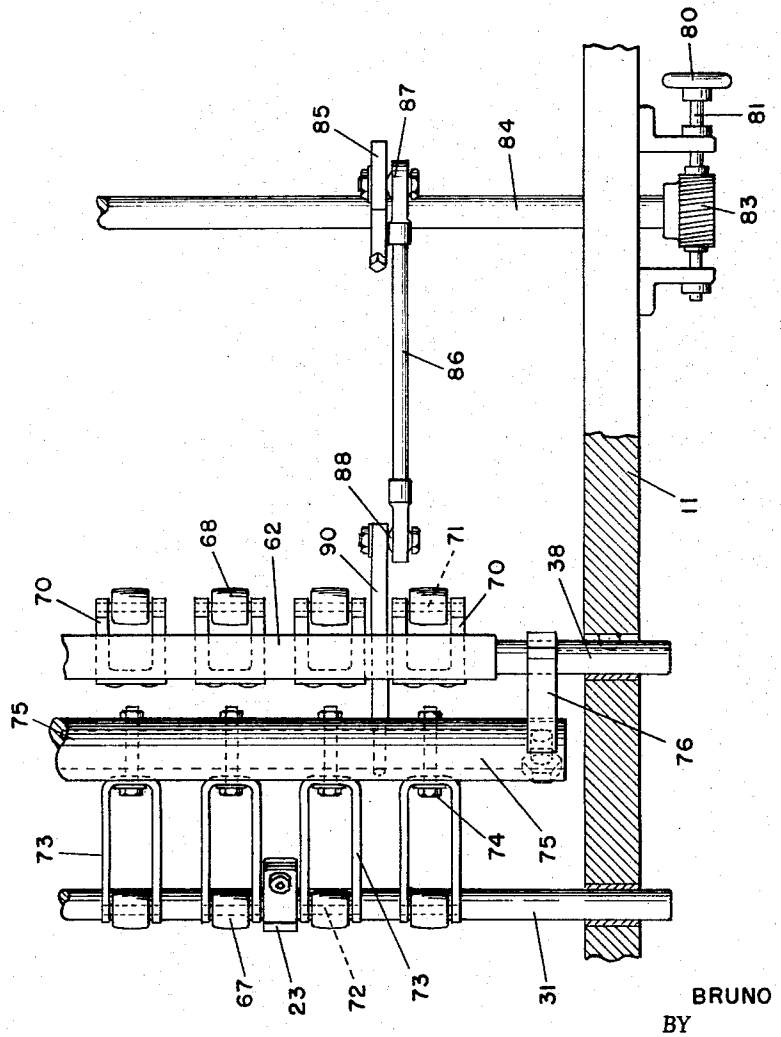

FIG. 6

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3,287,014

ADJUSTABLE FEED ROLLER ASSEMBLY

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14 Claims. (Cl. 271—51)

The invention relates to feeding mechanism for feeding sheets to rotary printing presses, and has reference more particularly to a laterally adjustable feed roller assembly having operative associated relation with the sheet conveyor tapes of a feed table.

In sheet feed printing presses the sheets to be printed are arranged in a stack on a pile supporting table located at one end of the press. The successive top sheets are separated in rapid order from the pile by means of air blasts and pneumatic separators which engage the sheet near its rear edge and which serves to advance or float the leading edge thereof between feed rollers and thence onto endless tapes which convey the sheets to the register table. There is a gap between the pipe of sheets and the conveyor tapes and therefore, in order to guide the leading edge of the sheet across the gap it is necessary to provide bridges and feed rollers at spaced intervals transverely of the path of the sheet. Moreover it is essential that a feed roller be aligned with each side edge of the sheet to provide support for the corners thereof to prevent the front corners of the sheets from becoming bent over and creased or damaged in any manner. If this should happen, not only is the sheet wasted, but if such sheet passes through the press the double thickness at the corners thereof may damage the plate of a typographic press or the blanket of an offset press.

Heretofore, it has been necessary to adjust the feed rollers and bridges separately and individually on each side of the center line of the press in order to align a feed roller with each side edge of the sheet. Not only is it difficult to effect such individual adjustments because of the limited space available for the operator, but such adjustments must be made while the press is stopped and thus the time required for this operation adds considerably to the down time of the press.

It is an object of this invention, therefore, to provide a feed roller assembly of novel and improved construction and wherein the feed rollers, the bridging elements and the joggers associated therewith are all adjustable laterally as a unit from a remote and convenient position.

The lateral adjustability of the feed roller assembly of the invention enables the operator to readily align the feed rollers with the side edges of the sheets to be printed so as to provide the necessary support for the forward corners of each sheet. The time required for making ready is accordingly reduced.

Another and more specific object of the invention is to provide a feed roller assembly including feed rollers having ramp tapes, joggers and bridging elements associated therewith and wherein the several elements are laterally adjustable as a unit as the result of lateral adjustment of control brackets provided for the purpose.

Another object of the invention is to provide a feed roller assembly including endless ramp tapes having associated relation with feed rollers respectively, the said ramp tapes passing over guide rollers at the end adjacent the joggers and passing over tension rollers at their opposite end adjacent the bridging elements.

Another object is to provide endless ramp tapes as elements of a feed roller assembly which will have location between the joggers and the rollers for the sheet conveyor tapes of the feed table and wherein the guide rollers for the ramp tapes which are located adjacent the joggers are adjustable in a direction vertically of the height of the stack of sheets on the feed table.

A further object of the invention resides in the provision of sheet feeding mechanism of the character described wherein means are provided for oscillating the joggers and for producing feeding movement of the endless ramp tapes while additionally providing for lateral adjustment of the elements in order to accommodate sheets of different widths.

With these and various other objects in view the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended thereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

FIGURE 1 is a top plan view of sheet feeding mechanism incorporating the adjustable feed roller assembly of the invention;

FIGURE 2 is a vertical sectional view taken substantially along line **2—2** of FIGURE 1;

FIGURE 3 is a vertical sectional view taken substantially along line **3—3** of FIGURE 1;

FIGURE 4 is a vertical sectional view taken substantially along line **4—4** of FIGURE 1;

FIGURE 5 is an elevational view, parts being shown in section, and which illustrates the action of the shifting levers for shifting the control brackets and associated elements with respect to the center frame member;

FIGURE 6 is a sectional view taken substantially along line **6—6** of FIGURE 3; and

FIGURE 7 is a fragmentary top plan view on an enlarged scale showing certain structural details which provide for lateral adjustment of the feed roller assembly.

For illustrating the invention, the drawings show certain parts of a conventional feed table for feeding sheets to a printing press or the like. For example, in FIGURE 1 the side frames of a feed table are shown and which are indicated by the numerals **10** and **11**. The shaft **12** is suitably journalled by the side frames and the rollers **14** are fixed to the shaft so as to rotate therewith. The sheet conveyor tapes **15** pass over and around the rollers **14** and it will be observed that the top run of the tapes which travel from left to right in FIGURE 2 are located above and in sliding contact with the top surface of the feed table **16**.

The numeral **18** indicates a stack of sheets **20** which are to be fed by the sheet feeding mechanism, the same including the conveyor tapes **15**. The stack of sheets are spaced a distance from the conveyor rollers **14** and the feed rollers **21** and **22** and the joggers **23** are located in said space. The sheets **20** are initially separated from the stack by a blast of air which issues from the jet **24**. The suckers **25** function to separate the top sheet from the stack, and the suckers **26** move the top separated sheet in a direction forwardly toward the feed roller assembly. At this point in the feeding operation, the joggers **23** are in their retracted position as shown in dotted lines in FIGURE 2 and the forward edge of the sheet is accordingly presented to the nip provided by the drop rollers **27** and the feed rollers **21**. The drop rollers hold the sheets in contact with the feed rollers **21** and the rotating action of the rollers together with the forward travel of ramp tapes, to be presently described, feed the sheets over bridging elements and onto the conveyor tapes **15** which continue the forward feeding motion of the sheets to the printing couple of the printing press. The joggers are thereupon returned to their upright position as shown in full lines in FIGURE 2, and the operation is repeated with the next top sheet from the stack **18**.

The joggers 23 have a split hub portion 28, FIGURE 2, by means of which they are fixed in desired position on one of the jogger shafts either 30 or 31. The said shafts extend between side frames 10 and 11 being journalled at their outer ends in the side frames, respectively, FIGURE 1. The inner end of each jogger shaft is rotatably supported by being mounted in a bore 32 provided for the purpose in a center frame member 33. Thus it is possible for each jogger shaft to have independent sliding movement in a lateral direction with respect to the center frame member. Although this sliding movement is limited in extent, it is sufficient for lateral adjustment purposes and the said adjusting movement is also independent of the oscillating movement which is given to each jogger shaft.

A feed roller shaft 34 is also journalled by the side frames and by the center frame member and the said shaft extends parallel to the jogger shafts. The shaft 34 is held in place at its right hand end by the pinned collar 35 and at its left hand end by the pinion gear 36. A suitable driving gear, not shown, is adapted to mesh with the pinion gear 36 for producing the necessary feeding rotation of the feed roller shaft 34 and thus the feed rollers mounted on the same.

Additional shafts 37 and 38 are provided for supporting the bridging elements which also comprise part of the present feed roller assembly. The shafts 37 and 38 extend from side frame 10 to side frame 11, having their outer ends mounted in the side frames respectively for axial movement in said frames but they are prevented from rotating by means such as the keys 41 which slidably engage in a keyway slot formed in the respective shafts. It will also be observed from FIGURES 1 and 5 that shaft 37 extends from side frame 10 to the center frame member 33, the right hand end of the shaft, as seen in FIGURE 1, being received in a bore 42 provided for the purpose in the center frame member. In a similar manner the shaft 38 extends from side frame 11 to the center frame member 33 and the said shaft has its left hand end mounted in the bore 42.

The shafts 30 and 31 which carry the joggers 23 are adapted to be oscillated in order to move the joggers to and from an upright and a retracted position. Said oscillating movement of the joggers is accomplished by the jogger cam 43 fixed to a drive shaft 44 and having contact with the roller 45 on the jogger cam lever 46. Said cam lever 46 is able to oscillate on shaft 47 and the roller 45 of the lever is yieldingly maintained in contact with the jogger cam by means of the coil spring and rod arrangement 48. The link 50 joins the cam lever 46 to the arm 51 which is adapted to rotate on the pivot axis provided by the shaft 52. The lever 53 is also fixed to the shaft 52 and said lever at its outer free end has a ball and socket connection 54 with the link 55. The opposite end of said link 55 is connected by a second ball and socket joint 56 to an arcuate lever 57 which is fixed at 58 to a jogger shaft such as 30.

Rotating action of the cam 43 will oscillate the cam lever 46 and through the linkage connections similar motion is imparted to the arcuate lever 57 and to the joggers 23. The motion is timed so that the joggers are retracted into the dotted line position of FIGURE 2 as a sheet is forwarded by the suckers 26. Following this action the joggers are returned to their upright position. Mechanism similar to that as shown and described for jogger shaft 30 is provided for jogger shaft 31. The ball and socket connections 54 and 56 are required since the joggers, as elements of the feed roller assembly are adapted to be adjusted laterally along with the ramp tapes and bridging elements as will be more fully understood as the description proceeds.

The shafts 37 and 38 function as supports for bridging elements 60 and 61, respectively. Intermediate the length of each shaft the same is formed to provide a base portion 62 which is substantially square in cross section. The bridging elements are suitably fixed to the flat top surface of the square base portion of the respective shafts. As shown in FIGURE 1 a plurality of bridging elements 60 are located on the left hand side of the feed table, being supported by shaft 37, and in a similar manner a plurality of bridging elements 61 are located in the right hand side of the table being supported by the shaft 38.

A plurality of feed rollers 22 are mounted in spaced relation on the feed roller shaft 34. The said feed rollers are so mounted on the shaft 34 as to rotate with the shaft, although the feed rollers are adjustable longitudinally along the shaft as are also the joggers and the bridging elements. Each feed roller 22 has a roller portion 64 on respective sides of a center section 65 which is reduced in diameter. An endless ramp tape 66 is associated with each roller portion 64 of the feed roller 22 as best shown in FIGURES 3 and 7. At the end adjacent the joggers, the ramp tape passes over a rear guide roller 67, and at the opposite end the ramp tape passes over a tension roller 68. At an intermediate point the top run of each ramp tape has contact with its feed roller 22 and in a similar manner the bottom run of each ramp tape also has contact with the same feed roller. Accordingly, the feed rollers function as a driving element for the particular ramp tapes associated therewith.

Each tension roller 68 is carried by a pair of supporting springs 70 which journal the shaft 71 of the roller, the said supporting springs being fixed at their opposite end to the square base section 62 of one of the shafts either 37 or 38. Each guide roller 67 is provided with a journalling shaft 72, the projecting ends of which are mounted in a yoke 73 as shown in FIGURE 6. The base of each yoke is secured by a bolt 74 to the supporting rod 75. Such a rod is suspended from each of the shafts 37 and 38 for supporting its respective yokes 73, and thus the guide rollers 67 journalled by the yokes. The members for suspending the rod 75 are indicated in FIGURES 3 and 6 by the numeral 76 and it will be observed that the member is secured to the rod by a bolt 77 and that said member at its opposite end is carried by the circular end portion of its respective shaft either 37 or 38.

Bodily movement of a supporting rod 75 must therefore take place with respect to its supporting shaft either 37 or 38 as an axis of rotation. In accordance with the invention said bodily movement of the supporting rods is effected for adjusting the vertical positioning of the rear guide rollers 67 of the ramp tapes. In FIGURE 3 the full line position of the guide rollers as shown provide considerable slope in a downward direction towards the stack 18 for the rear top section of the ramp tapes. In the dotted line position the rear guide rollers have been elevated to decrease the extent of the slope and thus the rear top section of the ramp tapes is more nearly horizontal. This adjustment of the rear sloping portion of the ramp tapes is required for feeding sheets of different thickness and different flexibility, as for example, sheets of very thin paper and sheets of fairly stiff cardboard.

For adjusting the vertical positioning of the guide rollers 67 the operator need only rotate the hand wheel 80 fixed to shaft 81, FIGURES 3 and 6. A worm gear 82 is fixed to shaft 81 and said worm gear meshes with a gear 83 on shaft 84. The arm 85 on shaft 84 is thus actuated to impart movement to the link 86 pivotally connected thereto at 87. At its opposite end link 86 is pivoted at 88 to a second link 89 which is in turn fixedly secured to the supporting rod 75. Since the entire feed roller assembly is laterally adjustable, the pivot connections 87 and 88 are on the order of ball and socket structures and thus limited movement in a lateral direction of the ramp tape assembly with respect to the adjusting shaft 84 is possible.

The structure for laterally adjusting the feed roller assemblies is shown in FIGURES 4 and 5, the same in-

cluding the adjusting levers **90** and **91** and the control brackets **92** and **93**. The lever **90** and control bracket **92** are associated with shaft **37**, whereas lever **91** and control bracket **93** are associated with shaft **38**. An understanding of the structure and mode of operation of an adjusting lever and control bracket can be obtained from FIGURE 4 which shows the lever **91** as pivoted at **94** to a fixed cross brace **95**. The lever has a pivotal connection at **96** with the control bracket **93**. Below the pivot connection **94** the cross brace is provided with an arcuate slot **97** and a locking handle **98** extends through the arcuate slot and has a threaded connection with the lever **91**. By releasing the locking handle the lever **91** can be oscillated either to the right or to the left and then the lever can be locked in the desired adjusted position. Lever **90** for control bracket **92** is pivoted at **100** to the cross brace and has a locking lever **101** operating in the arcuate slot **102**.

The control brackets **92** and **93** each consist of a base section **103** and a top section **104**, the two sections being clamped together in clamping relation with the shaft **37** or with the shaft **38**. In FIGURE 4 the bracket **93** is shown as clamped to shaft **38** by means of the screws **105**. The bracket is associated with a feed roller **22** and the top and bottom sections of the bracket have encircling relation with the feed roller at a location in alignment with the center section of reduced diameter. It will be seen from FIGURE 4 that the bracket sections are spaced from the feed roller and thus the feed rollers shaft **34** and the rollers on the shaft are able to rotate for sheet feeding purposes. Considering first the feed rollers **22** on the right side of the feed table, FIGURES 1 and 3, it will be seen that the shaft bore extending through each said feed roller is grooved for receiving the key **106**. The key in turn rides in a keyway **107** formed in the right hand section of the feed roller shaft. Each feed roller is secured to the key by a screw **108**. Thus when the control bracket **93** is shifted laterally by adjustment of the lever **91**, the shaft **38** is shifted and likewise the bridging elements **61** carried by the shaft. Also, the lateral movement of control bracket **93** will move the feed roller associated therewith in a direction axially of the feed roller shaft **34**. This imparts similar sliding movement to the key **106**, and thus the positioning of all of the feed rollers fixed to the key is similarly adjusted with respect to shaft **34**.

The structure for control bracket **92** which is clamped to shaft **37** is similar. The numeral **109**, FIGURES 1 and 7, indicates the key located in the keyway formed in the left hand section of the feed roller shaft **34**, and **110** indicates the screw which fixes the feed rollers to the key. Thus actuation of the lever **90** will move the feed roller **22** associated therewith and the key **109** is, in turn, adjusted laterally for positioning all of the elements of the feed roller assembly on this left hand side of the feed table.

Lateral adjustment of the jogger shafts **30** and **31** together with the joggers **23** fixed to said shafts is effected by the movement of the control brackets **92** and **93** respectively. As shown in FIGURES 1 and 4 an eccentric collar **111** is secured on shaft **30** on each side of the control bracket **92**, and likewise for shaft **31** an eccentric collar **112** is secured to said shaft on each side of the control bracket **93**. Thus the shafts **30** and **31** will move laterally in unison with the respective control brackets **92** and **93** to position the joggers on the respective sides of the assembly and the eccentric collars will not interfere with the oscillating motion of the shafts **30** and **31**.

The invention is not to be limited to or by details of construction of the particular embodiment thereof illustrated by the drawings as various other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

What is claimed is:

1. In sheet feeding mechanism for feeding sheets seriatim from the top of a pile thereof to sheet conveying means on a feed table spaced from said pile, the provision of a feed roller assembly for supporting and guiding each succeeding sheet across the space between the pile and the feed table including a rotatable shaft disposed horizontally and transversely of the path travelled by the sheets, a plurality of feed rollers mounted on said shaft at spaced intervals across the width of the sheet path, means connecting the feed rollers on one side of the center line of said assembly together to form an integral unit which is constrained to rotate with said shaft being slidable axially thereon, means connecting the feed rollers on the other side of the center line of said assembly together to form a second integral unit which is constrained to rotate with said shaft while being slidably axially thereon, a separate control bracket connected to each of said units for maintaining said units in predetermined positions axially on said shaft, and manually operable means for adjusting said control brackets and therewith said units independently of one another whereby to align a feed roller of each unit with the respective lateral edges of the sheets.

2. A feed roller assembly as set forth in claim **1** wherein said means for connecting the feed rollers of a respective unit comprises an elongated key slidably mounted in a keyway in said shaft, said key having tapped holes therein at predetermined spaced intervals, and bolt means on each feed roller adapted to be inserted into the respective tapped holes whereby each feed roller of a unit is fixedly secured to said key.

3. A feed roller assembly as set forth in claim **1** additionally including a plurality of bridge elements alternating with said feed rollers for supporting and guiding the sheets from the feed rollers to the sheet conveying means, support means for said bridge elements including a separate bar on each side of the center line of the assembly, said bars being disposed parallel to the rotatable shaft and in a manner that they can be moved laterally relative to the center line of said assembly, and means connecting the control brackets to the respective bars whereby said bridge elements are caused to move laterally in unison with the respective feed roller units when the latter are adjusted.

4. A feed roller assembly as set forth in claim **1** additionlly including a pair of coaxial shafts arranged parallel to said rotatable shaft, means mounting said coaxial shafts for independent lateral motion on respective sides of the center line of the assembly, a series of jogger elements secured to each coaxial shaft in a manner that they project between selected feed rollers, means for oscillating said coaxial shafts and therewith said jogger elements to thereby maintain the sheets on said pile in alignment, and means connecting said coaxial shafts to the respective control brackets whereby said shafts and therewith the jogger elements are adjustable laterally in unison with the feed roller units notwithstanding the oscillating motion of said shafts.

5. In sheet feeding mechanism, in combination with a feed table having sheet conveyor means of the conventional type, of a feed roller assembly located in advance of the sheet conveyor means and including a feed roller shaft journalled for rotation, a plurality of feed rollers on said shaft and which have rotation along with the shaft, at least one endless ramp tape operatively associated with each feed roller so that the ramp tape has movement for assisting the sheet conveyor means, a guide roller located in advance of each feed roller and over which the ramp tape passes, a tensioning roller located beyond each feed roller and over which the ramp tape passes, the top run of the ramp tape having contact with is feed roller at an intermediate point, and the bottom run of the ramp tape also having contact with its feed roller at an intermediate point, whereby the feed rollers upon rota-

tion thereof impart movement to the endless ramp tapes respectively.

6. Sheet feeding mechanism as defined by claim 5, additionally including a pair of spring members for each tensioning roller, said spring members being fixed to a support at one end and journalling a tensioning roller at their opposite free end, and a journalling yoke for each guide roller.

7. Sheet feeding mechanism as defined by claim 5, additionally including a pair of spring members for each tensioning roller, said spring members being fixed to a support at one end and journalling a tensioning roller at their opposite free end, a journalling yoke for each guide roller, a supporting rod for the journalling yokes, and means suspending the supporting rod from the support to which the spring members are fixed.

8. In sheet feeding mechanism, in combination with a feed table having sheet conveyor means of the conventional type, of a feed roller assembly located in advance of the sheet conveyor means and including a feed roller shaft journalled for rotation, a plurality of feed rollers on said shaft and which have rotation along with the shaft, at least one endless ramp tape operatively associated with each feed roller so that the ramp tape has movement for assisting the sheet conveyor means, a guide roller located in advance of each feed roller and over which the ramp tape passes, a tensioning roller located beyond each feed roller and over which the ramp tape passes, the top and bottom runs of each ramp tape having contact with its feed roller, whereby the feed rollers upon rotation thereof impart movement to the endless ramp tapes respectively, a journalling yoke for each guide roller, a supporting rod to which the journalling yokes are secured, means pivotally suspending the supporting rod and thus the journalling yokes for bodily movement, and means adapted to be manually actuated for adjusting the position of the supporting rod to vary the positioning of the guide rollers with respect to the feed rollers.

9. Sheet feeding mechanism as defined by claim 8, additionally including a pair of spring members for each tensioning roller, said spring members at one end being fixed to a support and journalling a tensioning roller at their opposite free end, and wherein the supporting rod for the journalling yokes is pivotally suspended from the said support.

10. In sheet feeding mechanism, in combination a feed table having moving tapes providing sheet conveyor means, a feed roller assembly located in advance of the sheet conveyor means, said assembly including a feed roller shaft journalled for rotation, a plurality of feed rollers slidably mounted on the shaft for axial adjustment but having rotation with the shaft, a guide roller located in advance of at least one of said feed rollers, a tensioning roller located beyond said at least one feed roller, and endless ramp tape in operative associated relation with each of said guide, feed and tensioning rollers, each endless ramp tape passing around the guide roller at one end and around the tensioning roller at its other end, said ramp tapes each having contact at an intermediate point with its feed roller, whereby the feed rollers upon rotation thereof impart movement to the endless ramp tapes respectively, and means operative when actuated for effecting lateral sliding movement of the feed rollers and the ramp tape assemblies as a unit for adjustment purposes.

11. Sheet feeding mechanism as defined by claim 10, wherein the means slidably mounting the weed rollers on the feed roller shaft includes a keyway formed in the said shaft longitudinally of the same, a key located in the keyway and slidable therein, and means securing each feed roller to the said key.

12. In sheet feeding mechanism, in combination, a feed table having moving tapes providing sheet conveyor means, a feed roller assembly located in advance of the sheet conveyor means, said assembly including a feed roller shaft journalled for rotation, a plurality of feed rollers slidably mounted on the shaft for axial adjustment but having rotation with the shaft, a guide roller located in advance of at least one of said feed rollers, a tensioning roller located beyond said at least one feed roller, an endless ramp tape in operative associated relation with each of said guide, feed and tensioning rollers, each endless ramp tape passing around the guide roller at one end and around the tensioning roller at its other end, said ramp tapes each having contact at an intermediate point with its feed roller, whereby the feed rollers upon rotation thereof impart movement to the endless ramp tapes respectively, a journalling yoke for each of the guide rollers, a supporting rod to which the journalling yokes are secured, and means pivotally suspending the supporting rod, whereby bodily movement of the supporting rod, the journalling yokes and the guide rollers as a unit is possible for adjustment purposes.

13. Sheet feeding mechanism as defined by claim 12, additionally including a pair of resilient members for journalling each tensioning roller, a support to which the resilient members are secured, and wherein the supporting rod for the journalling yokes is pivotally suspended from the said support.

14. In sheet feeding mechanism for feeding sheets from a stack thereof onto a feed table having sheet conveying means, the combination comprising a feed roller assembly located in advance of the table for advancing the sheets onto said conveyor means, said feed roller assembly including a shaft journalled for rotation, a plurality of feed rollers mounted for rotation with the shaft, a guide roller located in advance of each feed roller, an endless ramp tape tracked about each guide roller and its respective feed roller in a manner whereby rotation of the feed roller imparts motion to the ramp tape in directions parallel to that of the sheet conveying means, adjustable supporting means for said guide rollers, and control means connected to said supporting means for adjusting the guide rollers vertically relative to said feed rollers.

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