July 9, 1957 L. H. MORSE 2,798,720

REGISTER DEVICE FOR SHEET FEEDING MECHANISM

Filed Sept. 9, 1955 3 Sheets-Sheet 1

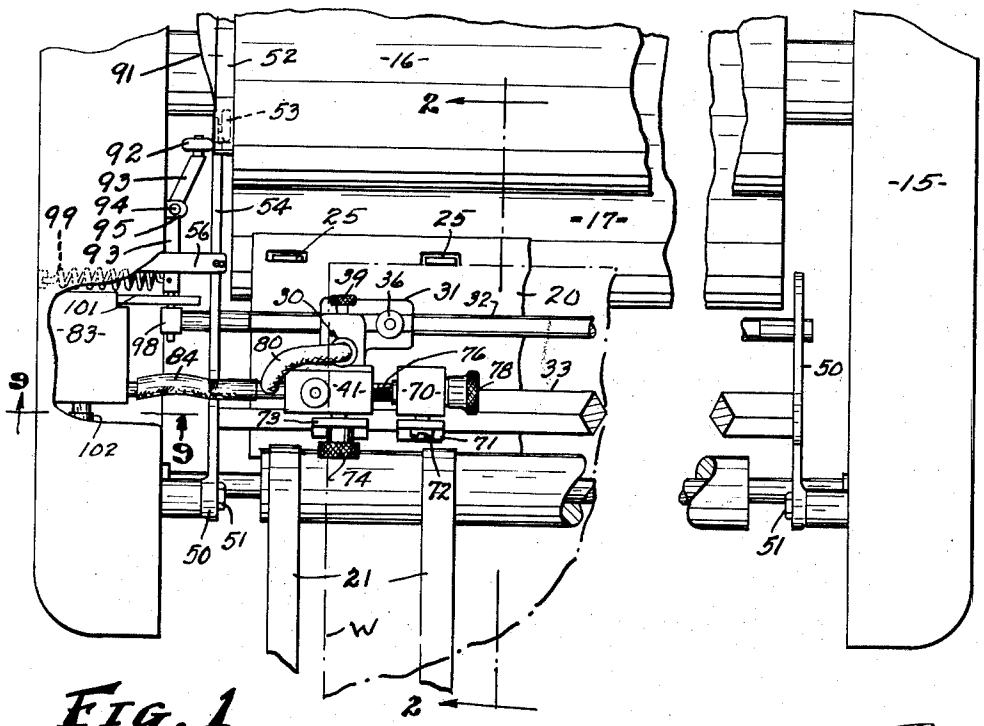

FIG. 1

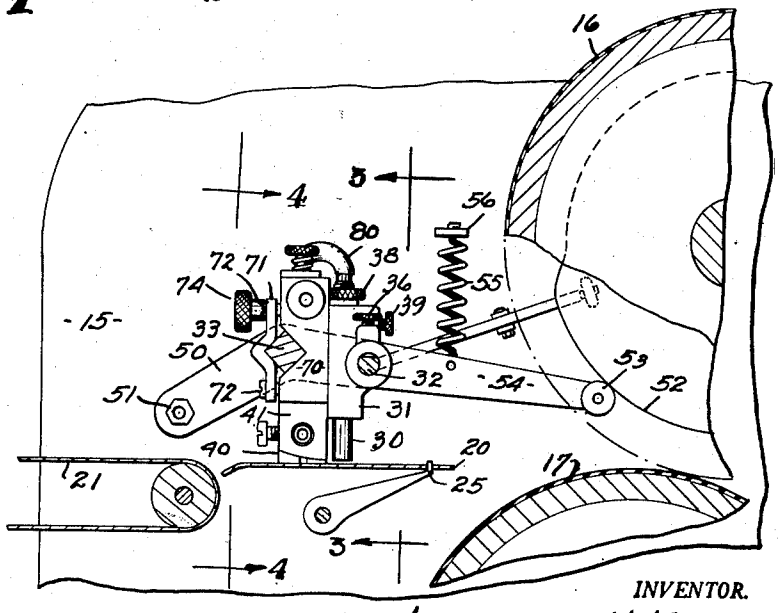

FIG. 2

INVENTOR.
LAWRENCE H. MORSE
BY
Bates, Teare, & McBean
ATTORNEYS

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REGISTER DEVICE FOR SHEET FEEDING MECHANISM

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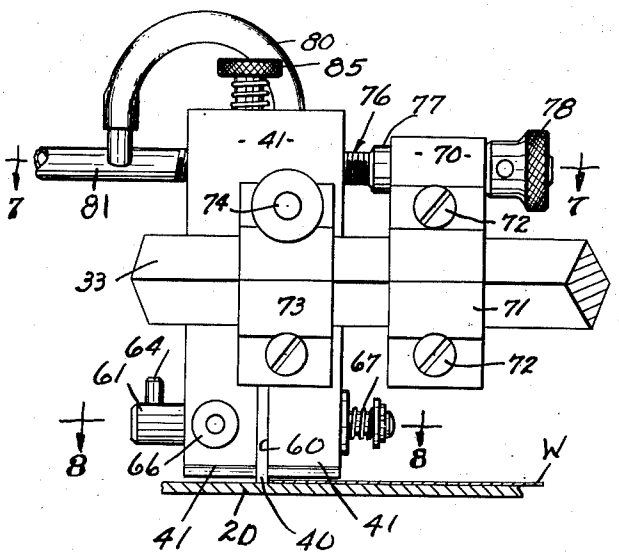


FIG. 4

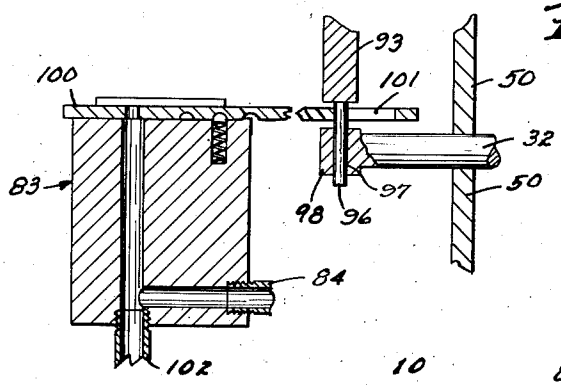
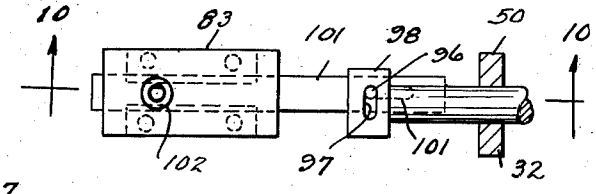


FIG. 10

FIG. 9



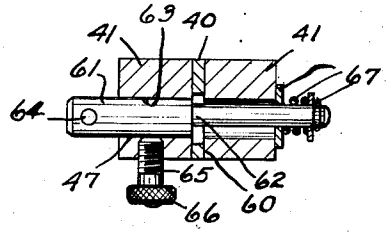


FIG. 8

INVENTOR.
LAWRENCE H. MORSE
BY
Bates, Teare, & McBean
ATTORNEYS

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REGISTER DEVICE FOR SHEET FEEDING MECHANISM

Filed Sept. 9, 1955 3 Sheets-Sheet 3

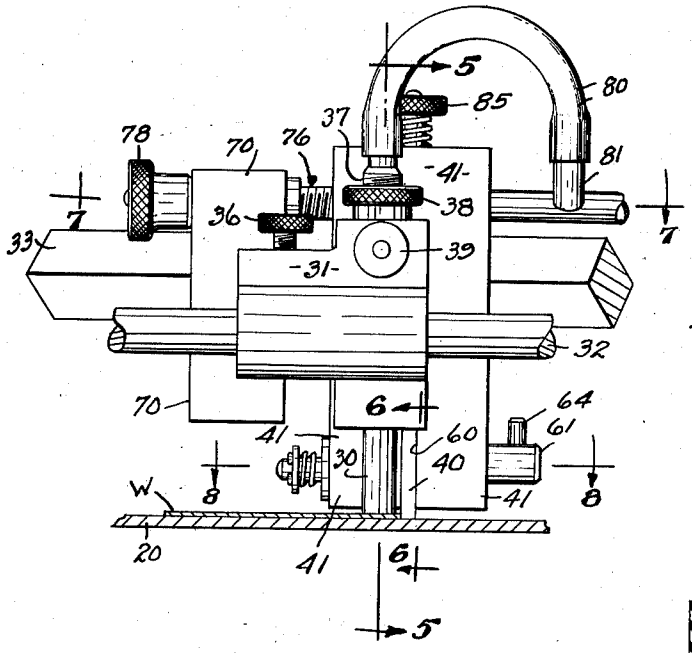


FIG.-3

FIG.-6

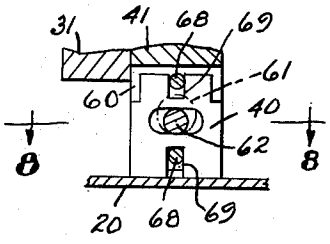
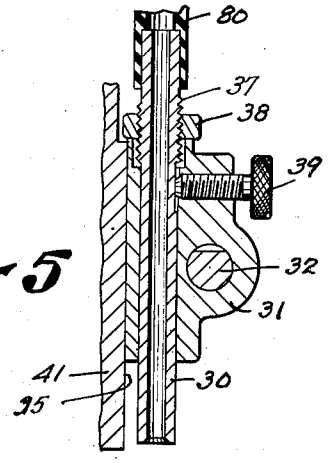


FIG.-5



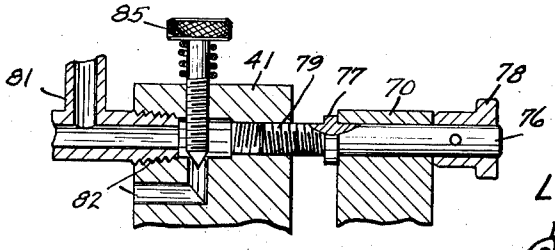


FIG.-7

INVENTOR.
LAWRENCE H. MORSE
BY
Bates, Teare, & McBean
ATTORNEYS

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2,798,720

REGISTER DEVICE FOR SHEET FEEDING MECHANISM

Lawrence H. Morse, Mentor, Ohio, assignor to Addressograph-Multigraph Corporation, Cleveland, Ohio, a corporation of Delaware

Application September 9, 1955, Serial No. 533,408

10 Claims. (Cl. 271—49)

This invention is concerned with improvements in or relating to a mechanism for accurately registering sheets fed to a printing machine and more particularly to a side register device to accurately register sheets laterally while they abut front stops of a rotary printing machine against which stops the sheets are fed either manually or automatically. These, therefore, are the general objects of the present invention.

This invention provides an efficient device for the registration of sheets laterally by means of a suction member which pulls the sheets against a side lay or abutment, the suction member being arranged to move laterally above a feed board and in a plane parallel thereto and being capable of continuing its lateral movement after the sheet has been arrested by the side lay. The device is constructed and arranged to enable it to be positioned at either side of the printing machine to facilitate cooperation with either side of the sheet as desired.

Other objects and advantages of the invention will become more apparent from the following description of an embodiment thereof illustrated in the accompanying drawings in which:

Fig. 1 is a plan view of a portion of a rotary printing machine incorporating the side register of this invention;

Fig. 2 is a vertical section through the printing machine illustrating the register in side elevation, the plane of the section being indicated by the lines 2—2 of Fig. 1;

Fig. 3 is a sectional view through the printing machine illustrating the front of the registering device, the plane of the section being indicated by the lines 3—3 of Fig. 2;

Fig. 4 is a sectional view through the printing machine, the plane of the view being indicated by the lines 4—4 of Fig. 2;

Fig. 5 is a sectional view through the register, the plane of the section being indicated by the lines 5—5 of Fig. 3;

Fig. 6 is a sectional detail taken through the register, the plane of the section being indicated by the lines 6—6 of Fig. 3;

Fig. 7 is a sectional view taken along the lines 7—7 of Fig. 4 and illustrates an adjustment for the side lay or sheet abutment;

Fig. 8 is a sectional detail, the plane of which is indicated by the lines 8—8 of Figs. 4 and 6;

Fig. 9 is a sectional detail of a valve actuating mechanism used in connection with the register, the plane of the section being indicated by the lines 9—9 of Fig. 1; and

Fig. 10 is a sectional detail, the plane of which is indicated by the lines 10—10 of Fig. 9.

The invention has been illustrated in connection with a rotary printing machine having a pair of side frame members 15 spaced apart by suitable cross frame members, not shown, and between which coacting printing cylinders 16 and 17 are mounted for rotation in the usual manner. The frame supports a horizontally extending feed table 20 which projects toward the bite of the cylinders 16 and 17 and across which sheets to be engaged and imprinted by said cylinders are fed either manually

or by a suitable power operated mechanism such as endless feed belts generally indicated at 21. As is customary, the printing machine includes a set of stop fingers 25 which project upward through suitable openings formed in the feed table 20.

A sheet to be imprinted is moved forward (toward the right in Fig. 2) one at a time either manually or by the power driven feed belts 21 until forward edge is arrested by stop fingers 21. At the proper time these fingers are swung out of the path of the sheet which is then automatically advanced to the bite of the printing cylinders 16 and 17 either by the belts 21 or by feed rollers (not shown). A detailed description of such a printing machine, including an operating mechanism for the stop fingers and suitable feed rollers is illustrated and described in Patent No. 1,968,849.

The side register with which the present invention is concerned is positioned above the feed table 20 and to the rear of the stop fingers 25. Such mechanism includes a suction foot 30 arranged to grip a sheet and move it laterally of the feed table until the edge of such sheet engages a side lay or abutment 40 which arrests the movement of the sheet when its longitudinal edge is in registration relative to the printing cylinders.

The suction foot 30 and the lay 40 are mounted to be swung to and from the surface of the feed table 20. To this end these members are mounted in respective blocks 31 and 41 which are secured to respective cross bars 32 and 33 extending laterally above the table 20. The opposite ends of these bars are mounted in arms 50 which are pivoted at 51 to respective side frame members 15 of the printing machine.

The suction foot 30 and the lay 40 are periodically swung about the axis of the pivots 51 to and from the feed table 20. This may be accomplished by a cam 52 secured to the cylinder 16 and which engages a roller 53 carried by a forwardly extending portion 54 of one of the supporting arms 50. A spring 55, interconnected between a frame bracket 56 and the arm 50, serves to retain the roller 53 in engagement with the periphery of the cam 52. Accordingly, the suction foot 30 and the lay 40 are moved to and from the table 20 in timed relation to the rotation of the printing cylinders 16 and 17.

The lay or abutment 40 against which the side of the sheet is to be positioned by the suction foot comprises a plate-like member mounted in a vertically extending slot 60 (Figs. 3, 4 and 8) formed in the lower end of the block 41 which is adjustably secured to the rectangular bar 33 as will hereinafter be more fully described. The bar 33 is fixed to the respective arms 50 and moves as a unit therewith. When such bar is swung to its lowermost position, the lower end of the block 41 is spaced above the feed table 20 a distance sufficient to accommodate the thickest sheet with which the device is to be used.

The lay 40 is adjustable vertically in the block 41 so that it may be positioned to engage a longitudinal edge of the thinnest sheet to be imprinted. To this end a rod 61 is rotatably mounted in a horizontally extending opening 47 in the block 41 and is provided with an eccentric portion 62 which passes through a horizontal slot 63 in the lay. The rod 61 is provided with an operating pin 64 and is retained in an adjusted position by a set screw 65 threadingly carried by the block 41 and provided with a knurled head 66 by means of which it may be readily tightened by the operator. A spring and washer assembly generally indicated at 67 retains the rod in position in the block 41 when the screw 65 is moved out of clamping engagement with the rod 61. Vertical movement of the lay 40 is insured by a pair of pins 68 (Fig. 6) carried by the block 41 and passing through vertically extending slots 69 formed in the lay 40.

The lay 40 is adjustable laterally of the feed table 20

to facilitate accurate determination of the lateral position of the abutting edge of the work sheet. To this end a third block 70 is provided. This block is illustrated in Figs. 1 to 4 and 7 and is clamped to the rectangular bar 33 some distance to one side of the desired lateral position of the lay block 41 by a bracket 71 which is secured to the block by machine bolts 72. The lay block 41 is similarly clamped in position on the bar 33 by a bracket 73 and bolts, one of which, 74, is provided with a knurled head by means of which the clamping bracket may be readily loosened to permit the block 41 to slide axially of the bar 33.

Accurate lateral adjustment of the lay 40 is accomplished by rotation of a micrometer screw 76. This screw is best illustrated in Fig. 7, and is rotatably mounted in the block 70. The screw 76 is restrained from axial movement relative to the block 70 by a shoulder 77 which abuts one side of the block and an operating knob 78 secured to the screw and engaging the opposite side of the block. A threaded portion 79 of the screw extends laterally from the block 70 and threadingly engages the lay block 41. To adjust the lay laterally, the operator loosens the retaining screw 74 of the lay block 41 rotates the micrometer screw 76 until the block 41 is moved axially of the bar 33 a distance sufficient to bring the lay 40 to the desired position whereupon the retaining screw 74 is again tightened to secure the lay in position.

The suction foot 30, as shown in Figs. 2, 3 and 5, comprises a vertically extending tube mounted in the block 31. This block is adjustably secured to the bar 32, the ends of which are mounted in the arms 50 for lateral reciprocation relative to the feed table 20. The block 31 is positioned with its rear face slidably engaging the forward face 35 of the lay block 41 and is retained in such position axially of the bar 32 by a set screw 36.

The suction foot 30 is adjustable to enable its lower end to be brought into a predetermined position and spaced above the work sheet W. To this end the tube is mounted for vertical movement in its supporting block 31 and is provided at its upper end with threads 37 which are engaged by a knurled nut 38, the lower face of which abuts the upper face of the block 31. A clamping screw 39 threadingly mounted in the block 31 coacts with a flattened portion of the tube serving to prevent rotation of the tube when the nut 38 is adjusted and to clamp the foot in its desired position.

Suction is applied to the upper end of the foot 30 through a flexible conduit 80 which connects the foot with a T 81 (Figs. 3 and 7). This T is threaded in a passageway 82 formed in the lay block 41, and is connected with a source of supply including a control valve 83 (Fig. 1) by a flexible conduit 84. The passageway 82 extends from the T 81 to the exterior of the block 41 and the flow of air therethrough is controlled by a needle valve 85 threadingly mounted in the block 41 and provided with a knurled operating head to facilitate manual control of vacuum applied to the foot 30.

Any suitable means may be used to reciprocate the bar 32 laterally in the arms 50. For example, one end of the printing cylinder 16 may be provided with a face cam 91 which, as shown in Fig. 1, is engaged by a roller 92 carried by a bell crank 93 pivoted as at 94 to a suitable frame bracket 95. The other arm of the bell crank 93 is provided with a pin 96 which engages the walls of a vertically extending slot 97 formed in a block 98 secured to the adjacent end of the bar 32. A spring 99 (Fig. 1) retains the roller 92 in contact with the surface of the cam.

In operation the bar 32 is moved to the right (Fig. 1) a distance sufficient to place the suction foot 30 above the sheet W which is to be registered. The cam 52 then acts to swing the suction foot 30 and the lay 40 downward until the foot picks up the work sheet and the lay is in position to engage the side of the sheet. The cam 91 then acts to return the bar 32 moving the sheet W and

suction foot 30 toward the left. The lateral movement of the sheet is arrested in accurate registration with the printing cylinders by its engagement with the lay 40. However, the suction foot continues in its movement sliding along the surface of the arrested sheet until it passes the edge of the sheet. The adjustment of the relief valve 85 enables regulation of the suction applied to the foot to that required to move the sheet and yet permit the relative sliding movement between the sheet and foot when the sheet is arrested by the lay 40 as above described. The foot and lay are then raised by the cam 52 whereupon the sheet is forwarded to the printing cylinders and the operation repeated on another worksheet.

If desired the application of suction to the foot 30 may be released when the foot reaches its extreme left hand position and maintained released until the foot reaches its extreme right hand position and has been lowered to engage the sheet. For this purpose the valve 83 may comprise a relief valve connected to a suitable source of suction by a conduit 102 and having its operating member 100 connected with the lever 93 by a lost motion connection 101. However, it has been found that for most applications the sliding of the foot out of engagement with the work sheet eliminates the need for such a relief valve.

The register may be used to engage either side of the sheet as desired. For this purpose the blocks 30, 40 and 70 may be positioned on the bars 32 and 33 in any desired position. The lay 40 being mounted intermediate the sides of the block 40 provides an overhanging portion of the block at either side of the lay to overhang the sheet. The cam 52 is made adjustable relative the cylinder 16 in any well known manner and the valve block 83 may be laterally adjusted relative to its operating arm 100 to cause a reversal of the action of the relief mechanism.

I claim:

1. In a side register device for sheets fed to a printing machine or the like having a table across which the sheets are fed, a suction member, an abutment to be engaged by a side edge of a sheet, said suction member being mounted above and movable toward and from the table and reciprocable laterally relative thereto, a source of suction for said member, actuating means to move said member laterally of the table and in timed relation with its to and fro movement, whereby said member may be moved toward the table to engage a sheet thereon and then moved laterally to draw the sheet into engagement with said abutment, said actuating means continuing the lateral movement of said member after the movement of the sheet has been arrested by said abutment and thereafter acting to return said member to its original position, said abutment being mounted above and movable to and from the table, an operating connection between said actuating means and said abutment to move said abutment to and from the table as a unit with said suction member, and means to prevent lateral movement of said abutment.

2. In a side register device according to claim 1, a pair of spaced arms adapted to be pivotally connected with a printing machine, a rod secured to and extending between said arms above the table and spaced from the axis of the pivotal connection between said arms and the printing machine, said abutment being supported by said rod, a second rod mounted in said arms for axial reciprocation with its axis parallel with but spaced from said first-named rod, said suction member being mounted on said second rod, and wherein said actuating means includes means acting on said arms to rock them about their pivots and means to reciprocate said second-named rod.

3. In a side register device according to claim 2, means supporting said suction member and said abutment on their respective rods for vertical movement to and from the table and relative to each other, and means to secure

said suction member and said abutment in adjusted vertical positions relative to the respective rods.

4. In a side register for sheets fed to a printing machine having a table across which sheets are fed one at a time to the printing mechanism, a frame extending laterally above the table and pivoted to the printing machine for swinging movement to and from the table, a bar secured to said frame and extending laterally above said table, a block mounted on said bar for movement laterally thereof, a releasable clamp to secure said block in position on said bar, said block having a bottom face spaced above the table to permit a sheet to be registered to pass therebetween when the frame is swung to its lowermost position, the lower end of the block being bifurcated longitudinally relative to the table, an abutment to engage an edge of a sheet and comprising a plate-like member slidably mounted for vertical movement in said bifurcation, means carried by said block to adjust said member vertically thereof, a second bar extending laterally of and mounted in said frame for lateral reciprocation relative thereto, a suction member to engage sheets, said suction member being adjustably mounted on said last-named bar for movement laterally relative to said frame, releasable means to secure said suction member in position on said bar, actuating means to rock the frame about its pivots and thereby move the said suction member and said block to and from the table as a unit, and means to reciprocate said last-named bar laterally relative to said frame.

5. A side register according to claim 4 having a second block mounted on the first named bar for movement axially thereof, a releasable clamp to secure said second block in position on said first-named bar and spaced from the first-named block, a pin rotatably mounted in said second block and extending axially toward said first-named block and threadingly engaging the same, means to restrain axial movement of said pin relative to said second block, and means whereby said pin may be rotated manually to adjust the position of the first-named block and the abutment laterally relative to the table.

6. In a side register for sheets fed to a printing machine having a table across which sheets are fed one at a time to the printing mechanism, a frame adapted to be pivotally connected to the printing machine and extending laterally above the feed table, an abutment member to engage an edge of a sheet mounted on said frame and adjustable laterally thereof, releasable means to secure said abutment member in an adjusted position laterally of

said frame, a bar extending laterally of and mounted in said frame for lateral reciprocation relative thereto, a suction member to engage sheets, said suction member being adjustably mounted on said bar for movement laterally relative to said frame, releasable means to secure said suction member in position on said bar, actuating means to rock the frame about its pivots and thereby move the members to and from the table as a unit, and means to reciprocate said bar laterally relative to said frame.

7. In a side register according to claim 6, wherein said abutment member is mounted for movement in said frame to and from the table, and releasable means is provided to secure said abutment member in an adjusted position relative to said frame.

8. In a side register according to claim 6, wherein said suction member is mounted on said bar for movement to and from said table independent of the movement of said frame, and releasable means to secure said suction member in an adjusted vertical position relative to said bar.

9. In a side register for sheets fed to a printing machine having a printing couple, a feed table across which sheets may be fed one at a time and a withdrawable stop to engage the forward edge of the sheets while they are on the feed table, said register including a frame adapted to be positioned above the table and movable to and from the sheet supporting surface thereof, a sheet abutment member mounted on said frame and adjustable laterally and vertically relative thereto, a laterally extending bar mounted in said frame for lateral movement, a sheet gripping member mounted on said bar and adjustable vertically and laterally relative to said frame, means to move said frame to and from the table, and means including said bar to move the gripping member laterally of the frame to bring the edge of the sheet into contact with said abutment, and thereafter return the gripping member to its sheet gripping position in timed relation to the movement of the frame to and from the table.

10. In a side register according to claim 9, a sheet gripping member comprising a suction foot, a source of suction therefor, and means to control the application of suction to the foot in timed relation with the lateral movement thereof.

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