Nov. 7, 1950 A. J. ALBRECHT 2,529,273

SHEET REGISTER MECHANISM

Filed June 18, 1947 4 Sheets-Sheet 1

FIG 1

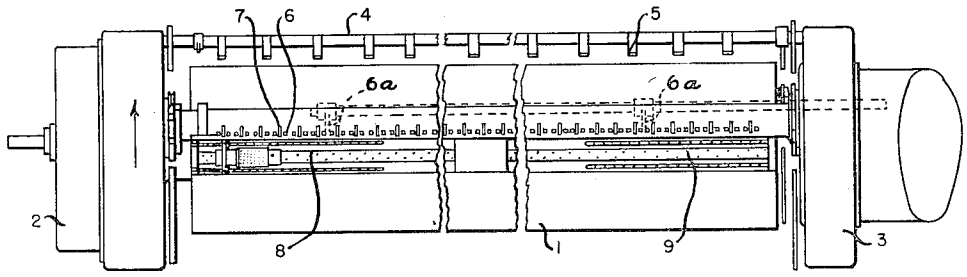


FIG 2

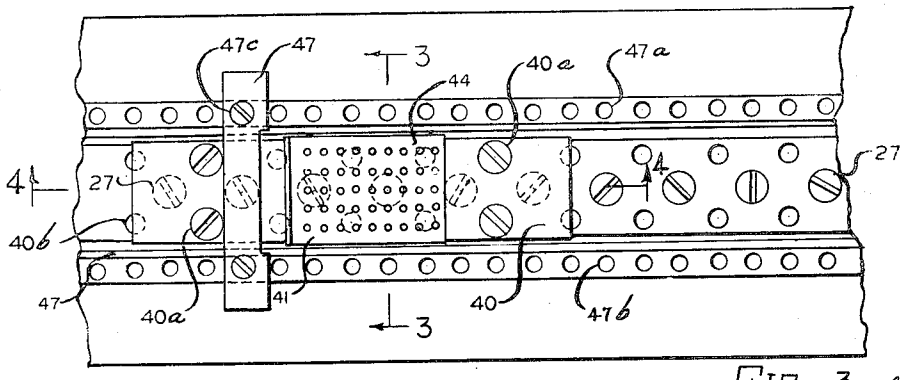


FIG 3

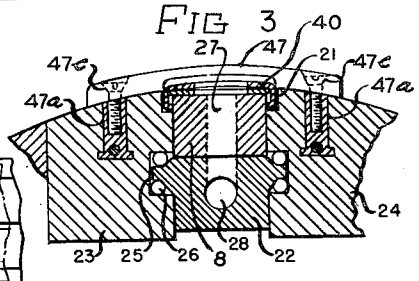
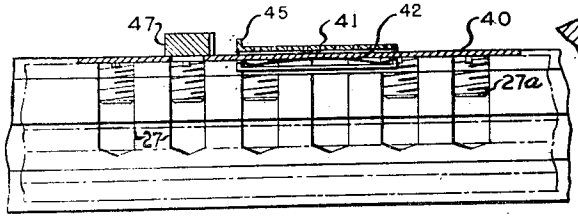


FIG 4



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SHEET REGISTER MECHANISM

Filed June 18, 1947 4 Sheets-Sheet 2

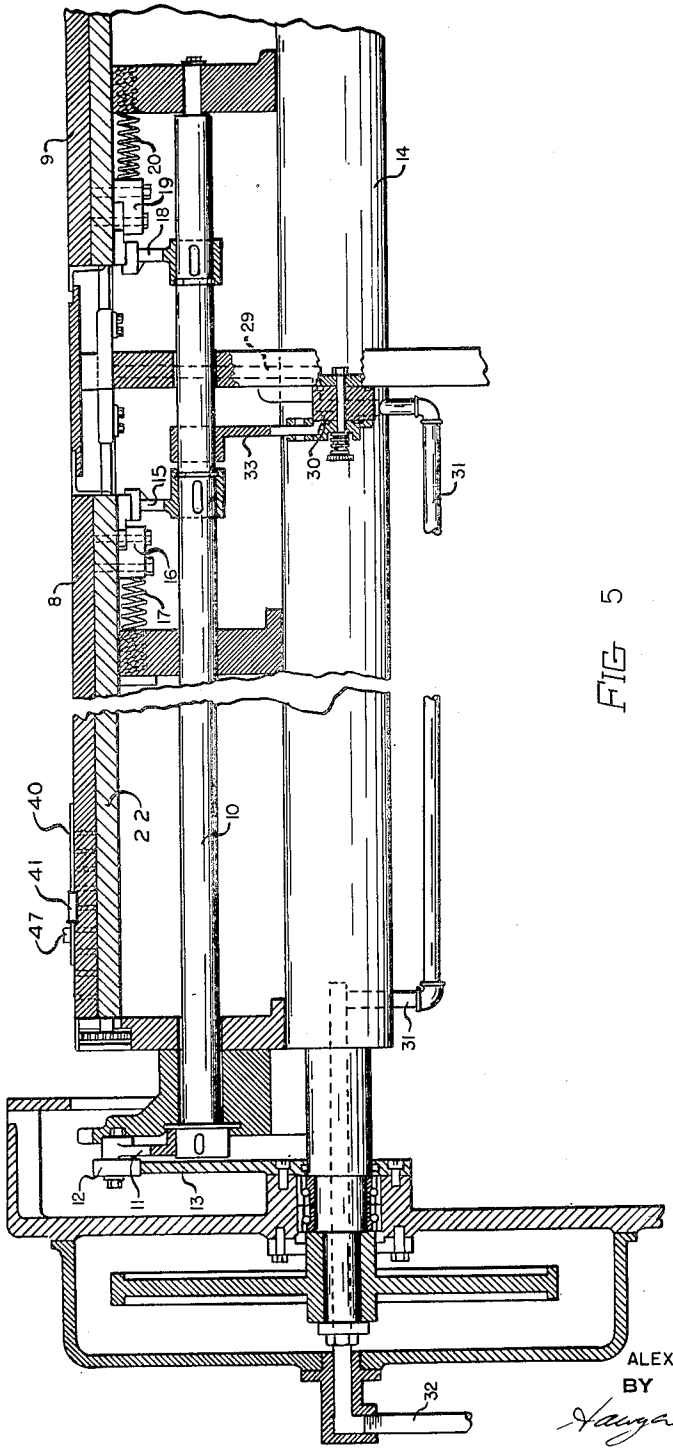

FIG 5

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SHEET REGISTER MECHANISM

Filed June 18, 1947 4 Sheets-Sheet 3

FIG. 6

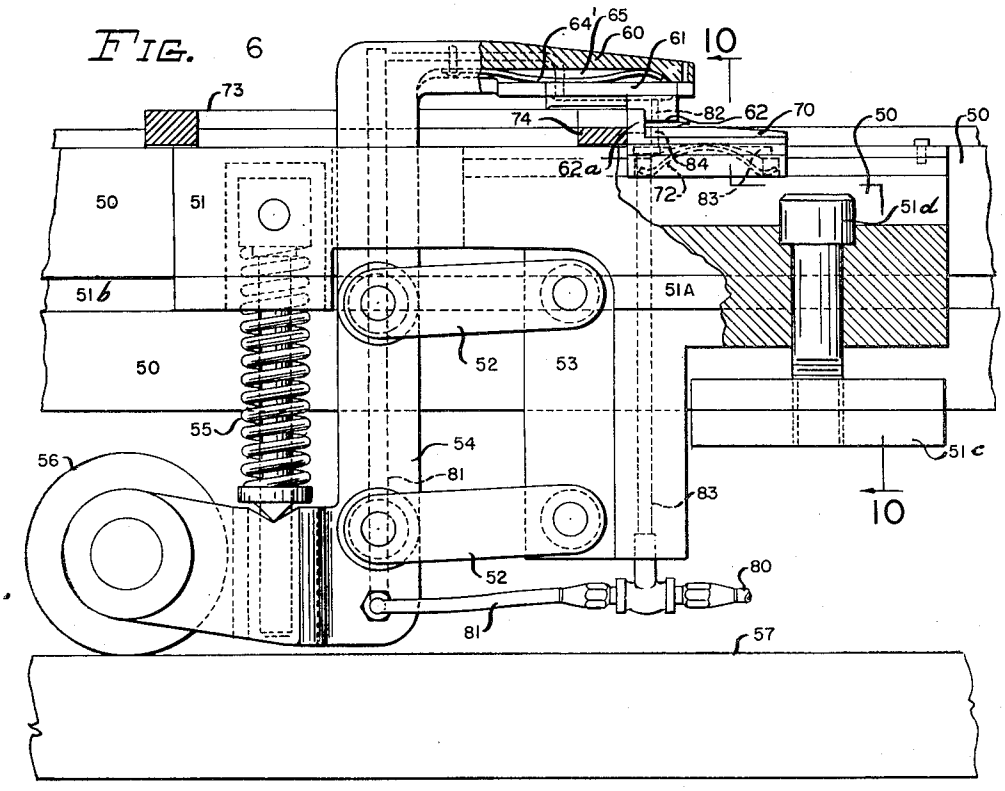


FIG. 8

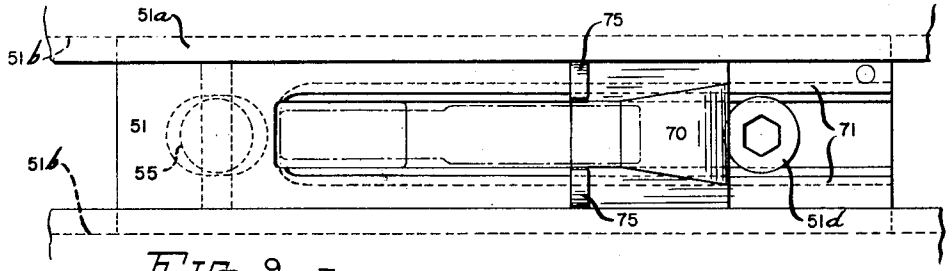
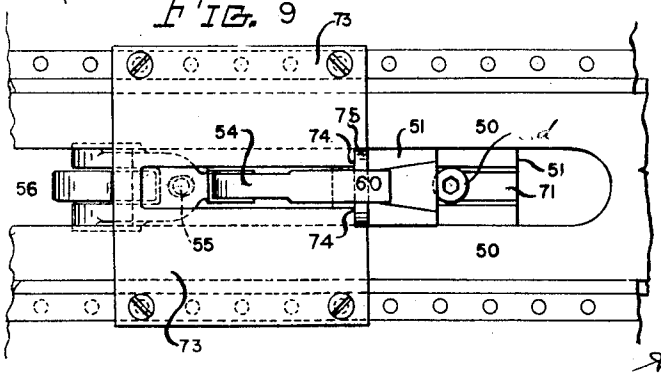


FIG. 9



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Nov. 7, 1950 A. J. ALBRECHT 2,529,273

SHEET REGISTER MECHANISM

Filed June 18, 1947 4 Sheets-Sheet 4

FIG. 7

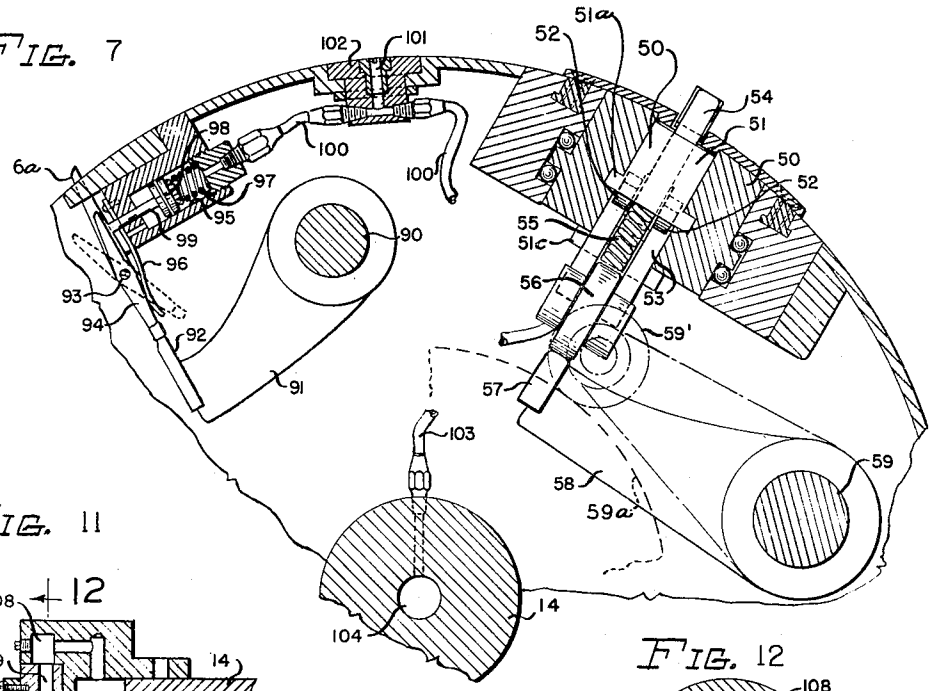


FIG. 11

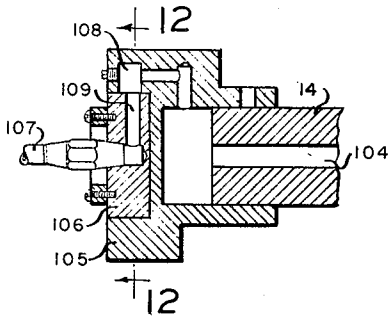


FIG. 12

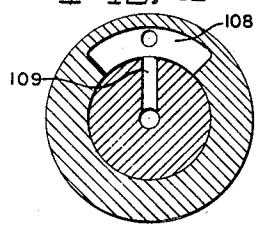
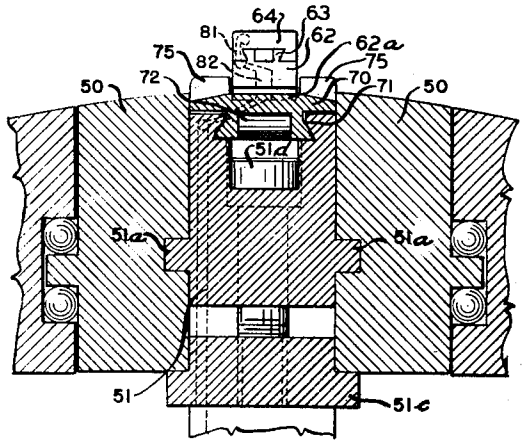


FIG. 10



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Patented Nov. 7, 1950 2,529,273

UNITED STATES PATENT OFFICE

2,529,273

SHEET REGISTER MECHANISM

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Application June 18, 1947, Serial No. 755,327

20 Claims. (Cl. 271—58)

1

This invention relates to sheet feeding machines and more particularly to the registering of sheets and the detection of improperly positioned or registered sheets.

The feeding and registering of sheets is necessary in a variety of applications, but is probably of greatest importance in connection with printing machines, and the present invention will be described in a form intended primarily for use with such machines. In sheet fed printing machines, the successive sheets which are presented to the printing unit, or to the first unit of a plurality of printing units, are normally registered, both in the direction of travel and laterally, by a registering cylinder or other device which registers the sheets and detects an improperly registered sheet for controlling the tripping off of the printing unit or units and causing rejection of such sheets. Registering and detecting elements may be incorporated in a printing unit itself but are more customarily embodied in a separate registering device, such as a registering cylinder, and the present improvements will be disclosed in connection with such a separate registering cylinder.

Sheet fed printing machines and registering devices therefor are well known in themselves, one such machine of the chain conveyor type being disclosed in Huck Patent No. 2,231,914. In prior registering devices such as that disclosed in the Huck patent, lateral register has been effected by applying a traction to the sheet by suction or other means and bringing an edge of the sheet up against a stop so as to stop its lateral movement when in properly registering position. Alternatively, the lateral registry gauge means may abut against the trailing edge of the sheet. In either case, difficulty is experienced due to the relatively flimsy nature of the sheet edge and due to the possibility that its contour may have been disturbed by damage during handling.

It is an object of the present invention to provide an improved registering device which positions the sheet without tending to bend or damage the edge thereof.

Another object of the invention is to provide a sheet reinforcing element which is positioned under a sheet to be registered adjacent its edge and reinforces the same so that the reinforced edge may be caused to engage a registering stop without injury to the sheet or inaccuracy of registration due to irregularity of the edge of the sheet.

Another object of the invention is to provide an improved means for detecting improperly registered sheets.

Another object of the invention is to provide an improved means for detecting double sheets.

A further object of the invention is to provide an improved means for coordinating sheet detector mechanisms with a reject control member.

2

With these, and still other objects which will appear from the accompanying specification in mind, the invention consists in the combinations and arrangements of parts and details of construction which will be first described in connection with the accompanying drawing, and the features forming the invention will then be specifically pointed out in the claims.

In the drawing:

Figure 1 is a schematic plan view of a registering cylinder embodying the invention in a preferred form;

February 2 is a much enlarged view of a portion of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 2;

Figure 5 is a central longitudinal section of one end of the cylinder of Figure 1;

Figure 6 is a view on an enlarged scale of a modified form of sheet moving and registering device;

Figure 7 is a cross section through a registering cylinder embodying the device of Figure 6 on a somewhat reduced scale;

Figure 8 is a plan view of the device of Figure 6 with certain parts removed;

Figure 9 is a plan view on a reduced scale of the device of Figure 6, showing additional elements;

Figure 10 is a cross section on the line 10—10 of Figure 6;

Figure 11 is a longitudinal section through a valve employed with the device of Figures 6 and following; and

Figure 12 is a section on the line 12—12 of Figure 11.

The present invention is disclosed as applied to a device such as shown in detail in the Huck patent, above referred to, and the following description is confined to the novel elements and such of the old elements as are necessary for an understanding of the invention.

In Figure 1, the registering cylinder 1 is rotatable in the direction of the arrow, while the housing elements 2 and 3 at the ends thereof are stationary. The sheet is propelled toward the printing machine by the rotation of the cylinder and may creep forwardly thereon under the influence of tapes or other sheet advancing means. A rejecting device comprising a shaft 4 having stripper fingers 5, is provided for throwing out improperly registered sheets. The sheet is registered against front stops 6, improper registry being detected by fingers 6a, and interspersed between the stops, are grippers 7 carried on a gripper bar, as shown in the Huck patent. Lateral registry is effected by suction bars 8 and 9

moveable longitudinally or axially of the cylinder for moving the sheet laterally into register. As shown in Figure 5, a cam shaft 10 is journalled within the registering cylinder and one end of this shaft carries an arm 11 and cam roller 12 which follows the contour of the stationary cam 13 for rocking the shaft 10 to actuate the lateral registering mechanism as the registering cylinder and its shaft 14 rotate. The cam shaft 10 carries a cam arm 15 cooperating with a cam block 16 which is fixed to the bar 8, the cam 15 acting against the spring 17. The lateral registering bar 9 is similarly actuated by a cam arm 18, cam block 19 and spring 20. The springs 17 and 20 serve to hold the cam roller 12 against the cam 13, thus accurately controlling the movements of the bars 8 and 9.

The bar 8 comprises an upper member 21 (Figure 3) and lower member 22 which are bolted or otherwise fastened together and the lower member 22 is formed with ribs 25 which cooperate with balls 26, providing antifriction sliding bearings within grooves or channels formed in the blocks 23 and 24 which are fastened in the cylinder. A number of suction holes 27 are formed in the bar 8 and are arranged to receive removable plugs 27*a* which are inserted in most of the holes to render the suction ineffective in areas on the cylinder other than that which is directly beneath the side edge of the sheet that is registered. The hole 27 nearest to the area that receives the registering edge of the sheet is left open. These suction holes communicate with the longitudinal passage 28 in the lower member 22 of bar 8 and thence (Figure 5), through a connection 29 with a valve 30 which controls the application of suction to the bar from suction line 31, which is connected to the external suction line 32. The valve movements are controlled by means of a valve operating arm 33 actuated by the cam shaft 10.

Suction bar 9 may be provided with similar suction apparatus and both bars may be utilized together, as in the Huck patent, or one bar may be utilized at a time.

The mechanism as thus far described does not differ substantially from that disclosed in the Huck patent. The contour of cam 13 and the construction of valve 30 are, however, modified so as to provide for a different cycle of movements of the bar 8. In the Huck patent, the bar 8 may be moved axially inward from the end of the cylinder toward its middle at any convenient time in the cylinder rotation, after a sheet has been registered, and the suction is then applied and the bar moved back as described therein. In view of the action described below, however, the movement of the parts in the present device is somewhat different, the bar 8 moving inwardly toward the middle of the cylinder and toward the sheet after the sheet is in position thereover and the suction being then applied and the bar retracted for registering the sheet. As shown herein, the bar 8 carries a plate 40 (Figures 2 to 4) which is secured thereto at any place along the bar as may be required to accommodate different size sheets, by screws 40*a* which fit into holes 40*b* spaced along the bar. The edges of the plate 40 overhang slightly and a slidable member or shoe 41, which forms a reinforcement for the edge of the sheet, is carried thereby. The sheet gripping and reinforcing member 41 has downwardly extending side flanges that are turned under, and springs 42 are interposed between the inwardly turned flanges 43 and the edges of the plate 40, so that the slidable member 41 is held down against the plate 40 by the springs and is frictionally slidable therealong, the sliding movement being opposed by friction created by pressure of springs 42. Member 41 is adapted to engage the sheet under a substantial area thereof adjacent the edge to be registered and prevent buckling thereof by the registering stop which may, and preferably does, engage the member 41. In the embodiment of Figures 1 to 5, the member 41 has a sheet supporting and reinforcing surface which is perforated to provide a number of suction holes 44 and has an upwardly extending flange or abutment 45 for engaging and registering the edge of the sheet. The plate 40 overlies a suction hole 27 in which no plug 27*a* is placed, and hence, when the valve 30 is opened, suction will be applied through the holes 44 to a sheet of paper overlying the slidable element 41. The element 41 is preferably made slightly convex as indicated to insure good contact with the sheet. A stop bar 47 is attached to T shaped bars 47*a* which, like those shown in the Huck patent, are provided with many spaced threaded holes 47*b* to receive screws 47*c* securing the stop bar 47 in any desired position on the cylinder as required to properly register the sheets.

The operation of the lateral registering device is as follows: A sheet having been presented to the registering cylinder and moved therealong for registering at its front edge, as in the Huck patent, the bar 8 is moved axially inward of the registering cylinder, without any suction being applied. During this inward movement the flange abutment 45 will engage the edge of the sheet and thereafter the bar 8 will continue to move, but the shoe 41 will be held from movement by the sheet. The friction between the shoe 41 and plate 40 may be very slight, so there will be no tendency to deform the edge of the sheet. After the shoe 41 has been stopped, the bar 8 continues to move to the end of its stroke as determined by the cam 13 and associated parts. At this point valve 30 will open and apply suction through the bar 8 and the shoe 41, thus holding the sheet down against the shoe and holding the sheet and the shoe 41 down against the plate 40, which is secured to the bar 8. This greatly increases the friction between shoe 41 and plate 40. The cam 13 and associated parts now retract the bar 8, pulling the sheet along with it, until the flange abutment 45 on the shoe 41 engages the registering stop 47. At this point further movement of the shoe and the sheet is prevented, but the bar 8 continues to move until it has completed its return stroke. It will be observed that the sheet movement is stopped, not by the edge of the sheet alone, but mainly by stopping the shoe 41, and the flange abutment 45 is not required to stop the sheet by pressure against its edge, for the suction exerted through the shoe 41 holds the sheet down against the surface of shoe 41 over a substantial area adjacent its edge, which is thus reinforced and prevented from being bent or injured by contact with the stop bar 47.

If it is desired to register the opposite edge of the sheet, similar devices are employed in conjunction with the bar 9. Either bar 8 or 9 may also be utilized as in the Huck patent referred to for applying a counter traction to the sheet so as to hold the same flat against the cylinder and prevent wrinkling.

In the embodiment of Figures 1 to 5, just described, the sheet is moved for lateral registry

by a suction bar having a frictionally and slidably carried sheet gripping element to which the sheet is held by suction, and the friction of which against the suction bar is increased when suction is applied. Traction may also be applied to a sheet for registering the same laterally by utilizing a mechanically moveable member for exerting pressure on the upper surface of the sheet to hold it against a surface supporting an area of the sheet from below and such mechanical gripper elements may be slidably and frictionally moved in a manner similar to that just described.

Figures 6 to 12 show the invention as embodied in such modified form and also show certain improved detecting and reject control mechanisms.

In the embodiment of Figures 6 and following, a bar **50** is substituted for the bar **8**, previously described. This bar is slidably mounted in the cylinder in a similar way and may be reciprocated by the same means as shown or by any other convenient means. Its reciprocation cycle being the same as in the case of the bar **8**, this cycle and the means for producing it will not be described in detail. The bar **50** has an aperture for accommodating a sheet gripping mechanism carried by a frame **51**, having gibs **51***a* fitting slidably in guideways **51***b* in the member **50**, and fastened to the member **50** by plate **51***c* and bolt **51***d*. The frame **51** may thus be moved along bar **50** and fastened in the desired position. Arms **52** (Figures 6 and 7) which are pivotally suported by a downward projection **53** of the frame **51** are pivotally connected at their other ends to a moveable jaw frame **54**, thus carrying the same for movement radially inward and outward of the cylinder. The jaw frame **54** is urged inwardly by a spring **55** and its motions are controlled by means of a roller **56** engaging with a bar **57** which is carried by means of arms **58** on a rock shaft **59**. The shaft may be rocked by means of a cam roller **59'** indicated in phantom in Figure 7, which is operated by a suitable cam **59***a*, for bringing the jaw frame **54** radially inward of the cylinder to grip a sheet at the end of the stroke of bar **50** toward the sheet, and for moving the jaw frame **54** radially outward at or near the end of the return stroke of the bar **50**. The radial movements of the jaw frame **54** for gripping and releasing a sheet, thus correspond to the application and release of suction as previously described in connection with the embodiment of Figures 1 to 5. The outer end **60** of the jaw frame **54** (Figure 6) overhangs the cylinder surface in position for overhanging a sheet when the bar **50** is reciprocated toward the same and carries a slidable upper sheet gripping member **61** for pressing against the upper surface of a sheet. The member **61** comprises a downward sheet engaging projection **62** and an upper portion formed as a tenon **63** (Figure 10) for sliding within a corresponding mortise **64** in the overhanging portion **60** of the jaw frame **54**. A spring **64'** carried in a channel **65** formed in the jaw frame **54** urges the member **61** downwardly or inwardly of the cylinder, creating the desired light friction between the engaging surfaces of the tenon and mortise **63**, **64**. The projection **62** has a downwardly extending flange **62***a* which engages the edge of a sheet. The frame **51** forms an opposed or lower jaw frame, having a lower sheet gripping member **70** slidable in a guideway **71** and pressed upwardly, to create the desired friction, by a spring **72**. A plate **73**, cut out as indicated in Figures 6 and 9 for accommodating the jaw frame **54**, is adjustably fastened to the

cylinder and forms a stop **74** to be engaged by the flange **62***a*. The lower gripping member **70** has shoulders **75** for abutting against the edge of a sheet, and for also abutting against the stop **74** in registering the sheet. The shoulders **75** are spaced apart, as indicated in Figure 10, to accommodate the projection **62** of the upper sheet gripping member and its flange **62***a*.

In this form of the invention, the bar **50** moves from a position to the left of that shown in Figure 6, axially inward, carrying the jaw frame **54** which is in its radially extended position, toward the sheet. When the shoulders **75** of the lower sheet gripping member **70** engage the edge of the sheet, the member **70** is stoppd, but the bar **50** and other elements continue to move, this action being permitted by the sliding of member **70** within the guideway **71** in the bar **50**. As the bar **50** continues to move, the jaw frame **54** is lowered to the position shown in Figure 6 and the flange **62***a* of the gripper member **61** will engage the edge of the sheet at a point between the shoulders **75**, and further motion of the member **61** is then prevented by the edge of the sheet, as bar **50** completes its inward motion.

As soon as the bar **50** has completed its inward stroke, the jaw frame **54** moves radially inward further, so the sheet is gripped between the projection **62** of the member **61** and the sheet supporting surface of the member **70**. The frictional grip thus created is sufficient to carry the sheet back during the return stroke of bar **50** until the member **70** and the flange **62***a* engage the stop **74**, thus bringing the sheet into register. Thereafter, the sheet gripping elements **70** and **61** will be held so as to prevent movement of the sheet until it is taken by the grippers **7**. On the completion of the return stroke, jaw frame **54** moves outwardly releasing the sheet, after which the jaw frame **54** is raised sufficiently, so the flange **62***a* will clear the stop **74** as the bar **50** is moved back to the starting position, where the overhanging parts of the frame **54** are beyond the edge of the sheet, which by this time is being taken from the cylinder.

It will be understood that by using a suitably proportioned cam **59***a*, it is possible to lower the projecting parts of the frame **54** so they will be entirely below the periphery of the registering cylinder, if it is necessary to run them in close proximity to the periphery of a coacting cylinder.

Means for detecting faulty lateral register and a double sheet detector are also incorporated in the embodiment of Figures 6 and following, such devices being vacuum operated in the embodiment disclosed. The double sheet detector is associated with the sheet gripping jaw mechanism of Figures 6 to 12. As shown in Figure 6, the vacuum line **80** has a branch **81** connecting through the jaw frame **54** to a port **82** in the projection **62** of the member **61**. A second vacuum line **83** connects to a port **84**, in the upper surface in the lower jaw member **70**. Vacuum line **81** comprises, as indicated, a section leading through jaw frame **54**, a section leading through the slidable gripping element **61** and an intermediate passage connecting these two sections when element **61** is in any position between predetermined limits. Line **83** comprises similar sections in the frame **51** and slidable element **70**, connected by an intermediate passage, as indicated. If vacuum is applied to line **80** at the time when upper jaw frame **54** is raised after the registering of a sheet, and a registered sheet is in position, such sheet may block the port in either

the upper or lower jaw member, but will not be able to block both ports. If, however, two superposed sheets or a doubled sheet are in position, the lower sheet will be sucked against the lower jaw, closing the port 84, and the upper sheet will be sucked against the upper jaw, closing port 82, so that the vacuum in the line 80 will not be broken and the suction of this line may be utilized for operating sheet rejecting and trip control mechanisms as is well known in the art. The reject and trip control mechanisms may be operated by a shaft 90 (Figure 7), resiliently urged in a clockwise direction at an appropriate point in the registering cylinder rotation, as fully disclosed in the Huck patent, above referred to, the movement of such shaft causing the acceptance of the sheets and its failure to move, causing their rejection. The movement of the shaft 90 is controlled with relation to the front registry detector in the same way as in the Huck patent referred to. Arms 91 fixed to shaft 90 carry bar 92 which is engageable by the usual front registry detector fingers 6a, to prevent movement of the shaft 90. The various front registry detectors are pivoted on an axis 93 and will all be rotated counterclockwise by a properly registered sheet so as to permit a clockwise rocking movement of the shaft 90. There is also associated with the shoe 92 and pivoted about the same axis 93 as the fingers 6a, a vacuum operated finger 94 at each edge of the cylinder, each finger 94 being controlled by a vacuum cylinder 95 and spring 96. The vacuum cylinder 95 contains a spring 97 and piston 98 having a piston rod 99 abutting against the upper arm of the lever or finger 94. When vacuum is applied to the cylinder 95 through line 100, the piston rod 99 will be retracted, permitting the spring 96 to hold the finger 94 in position for interfering with movement of the bar 92 and shaft 90. If, however, vacuum is not applied to the cylinder 95, the spring 97 therein will force the rod 99 outwardly, moving the finger 94 into the dotted line or non-interfering position. There is associated with the vacuum line 100, an aperture or port 101 opening through the surface of the cylinder, and which may be formed in a member 102 adjustable axially of the cylinder. When the port 101 is covered by paper, and vacuum is applied to the line 100, such vacuum will cause the vacuum cylinder 95 and finger 94 to operate, to cause rejection of the sheet and operation of the trip control apparatus. The member 102 and a corresponding member on the opposite end of the cylinder may, therefore, be adjusted so as not to be covered by a properly registered sheet of proper width and so that the covering of either of these ports by an improperly registered sheet or sheet of excess width will cause the rejection of the sheet and operation of the trip mechanism for the printing machine. The double sheet detector vacuum line 80 may be similarly connected to a vacuum cylinder 95 and finger 64 operated thereby. Vacuum is applied to the detector devices just described by a line 103 leading to a passage 104 in the cylinder shaft 30 and connecting at the end thereof to a valve (Figures 11 and 12) comprising a member 105 rotating with the shaft 14 and a stationary member 106 cooperating therewith and to which a vacuum pump connection 107 is made. As will be apparent from Figures 11 and 12, a port 108 in the rotary member 105 will communicate with a port 109 in the stationary member 106 through a limited arc of movement of the cylinder and may, hence, be arranged to apply vacuum to the lines 80 and 100 at the proper time in the registering cylinder rotation cycle for rejecting or accepting a sheet, according to whether all vacuum lines are broken or one or more remains closed.

What is claimed is:

1. In a sheet registering mechanism, a sheet gripping member having a perforated sheet supporting surface and an abutment for engaging an edge of a sheet, a vacuum bar frictionally carrying the said member, means for moving the vacuum bar in one direction to bring the said abutment against the edge of a sheet overlying said sheet supporting surface and in the reverse direction for registering a sheet held against the said sheet supporting surface, and means for applying suction through said vacuum bar and perforated sheet supporting surface to hold a sheet against said surface.

2. In a sheet registering mechanism, a sheet gripping member having a perforated sheet supporting surface and an abutment for engaging an edge of a sheet, a vacuum bar frictionally carrying the said member, means for moving the said vacuum bar to bring the said abutment into engagement with the edge of a sheet overlying the said sheet supporting surface and for thereafter moving the vacuum bar for registering a sheet held on the said sheet supporting surface, means for applying suction through said vacuum bar and perforated sheet supporting surface to hold a sheet against said surface and increase the friction between said member and vacuum bar, and a stop for preventing further movement of said sheet gripping member when the said edge of the sheet is in registered position.

3. In a sheet registering mechanism, a sheet gripping member having a perforated sheet supporting surface and an abutment for engaging an edge of a sheet, a vacuum bar frictionally carrying the said member, means for moving the said vacuum bar to bring the said abutment into engagement with the edge of a sheet overlying the said sheet supporting surface and for moving said vacuum bar in the reverse direction for registering a sheet held on the said sheet supporting surface, means for applying suction through said vacuum bar and perforated sheet supporting surface to hold a sheet against said surface, and a stop for preventing further movement of the said member when the said edge of the sheet is in registered position.

4. In a sheet registering mechanism, a gripper comprising upper and lower jaws and an abutment for engaging the edge of a sheet between said jaws, means for frictionally moving the said gripper toward a sheet to be registered to bring the said abutment into engagement with an edge thereof and for frictionally moving the gripper and a sheet held thereby for registering the said edge of the sheet, means for closing the jaws to grip the sheet with the abutment in engagement with the said edge and preliminary to the said registering movement, and a stop for limiting movement of the said gripper and a sheet held thereby for registering the said edge of the sheet.

5. In a sheet registering mechanism, a gripper comprising upper and lower jaws and an abutment for engaging the edge of a sheet between said jaws, means for frictionally moving the said gripper toward a sheet to be registered to bring the said abutment into engagement with an edge thereof and for frictionally moving the said gripper and a sheet held thereby in the reverse direction for registering the said edge of the sheet, means for closing the jaws to grip a sheet with

the abutment in engagement with its said edge and preliminary to the registering movement in the reverse direction, and a stop for limiting movement of the said gripper and a sheet held thereby in the reverse direction for registering the said edge of the sheet.

6. In a sheet registering mechanism, a gripper comprising upper and lower jaw frames, an abutment for engaging the edge of a sheet between said jaw frames and sheet gripping elements slidably and frictionally carried by said jaw frames, means for moving the said gripper toward a sheet to be registered to bring the said abutment into engagement with an edge thereof and for moving the said gripper and a sheet held thereby for registering the said edge of the sheet, means for closing the jaw frames to grip a sheet between the gripping elements with the abutment in engagement with the said edge and preliminary to the registering movement thereof, and a stop preventing further movement of said gripping elements and abutment when the edge of the sheet reaches registered position.

7. In a sheet registering mechanism, a gripper having upper and lower jaws, a supporting structure, a register stop fixed thereon, and means movably mounting the gripper on said supporting structure means for moving said gripper and closing the jaws thereof to grip a sheet to be registered, means for thereafter moving said gripper to register the sheet against said stop, and means for thereafter opening the said jaws to release the sheet, each said jaw having a suction passage opening into its sheet engaging surface, and double sheet detecting means comprising means for applying suction to said passages and means for detecting the presence of a double sheet by the closing of both of said passages when said jaws are open.

8. Sheet registering mechanism according to claim 7, in which the said upper and lower jaws comprise jaw frames and slidable sheet gripping elements carried therein, and the said suction passages comprise suction passage sections in the said jaw frames and in the said slidable elements and intermediate passages for connecting the said passage sections.

9. In a sheet handling mechanism, a gripper having opposed jaws for holding a sheet, means for opening said jaws to receive a sheet and for closing said jaws to grip the sheet, the said jaws having vacuum passages opening into their sheet engaging surfaces, and double-sheet detecting mechanism comprising means for applying suction to the said passages and means for detecting a double sheet by the closing of both said passages by a sheet when the said jaws are open.

10. Sheet handling mechanism according to claim 9, in which the said opposed jaws comprise jaw frames and slidable sheet gripping elements carried therein, and the said suction passages comprise suction passage sections in the said jaw frames and in the said slidable elements and intermediate passages for connecting the said passage sections.

11. In a sheet registering mechanism having a registering cylinder for supporting a sheet to be registered and an axially reciprocable member for laterally registering the same, sheet gripping means comprising a shoe slidably and frictionally carried by the reciprocable registering member for travel therewith under a sheet, the said shoe having an abutment for engaging against the edge of a sheet and preventing further travel of the shoe while the reciprocable member is permitted to complete its stroke, means for gripping the sheet to the said shoe and for increasing the frictional grip between the shoe and the reciprocable member during its return stroke, and a stop for preventing further movement of said shoe after the sheet has reached registered position, while permitting completion of the return stroke of the said reciprocable member.

12. In a sheet registering mechanism having a registering cylinder for supporting a sheet to be registered and an axially reciprocable member for laterally registering the same, sheet gripping means comprising a shoe slidably and frictionally carried by the reciprocable registering member for travel therewith under a sheet, the said shoe having an abutment for engaging against the edge of a sheet and preventing further travel of of the shoe while the reciprocable member is permitted to complete its stroke, means for gripping the sheet to the said shoe and for increasing the frictional grip between the shoe and the reciprocable member during its return stroke, and an adjustable stop for preventing further movement of said shoe after the sheet has reached registered position, while permitting completion of the return stroke of the said reciprocable member.

13. In a sheet registering mechanism having a registering cylinder for supporting a sheet to be registered and an axially reciprocable suction bar for laterally registering the same, sheet gripping means comprising a perforated shoe slidably and frictionally carried by the suction bar registering member for travel therewith under a sheet, the said shoe having an abutment for engaging against the edge of a sheet and preventing further travel of the shoe while the suction bar is permitted to complete a stroke, means applying suction to the suction bar for gripping the sheet to the said shoe and for increasing the frictional grip between the shoe and the suction bar during its return stroke, and a stop for preventing further movement of said shoe after the sheet has reached registered position, while permitting completion of the return stroke of the said suction bar.

14. In a sheet registering mechanism having a registering cylinder for supporting a sheet to be registered and an axially reciprocable suction bar for laterally registering the same, sheet gripping means comprising a perforated shoe slidably and frictionally carried by the suction bar for travel therewith under a sheet, the said shoe having an abutment for engaging against the edge of a sheet and preventing further travel of the shoe while the suction bar is permitted to complete a stroke and being shorter than the suction bar to permit application of suction to the sheet directly by said bar as well as through said shoe, means for applying suction to the suction bar for griping the sheet to the said shoe and suction bar and for increasing the frictional grip between the shoe and the suction bar during its return stroke, and a stop for preventing further movement of said shoe after the sheet has reached registered position, while permitting completion of the return stroke of the said suction bar.

15. In a sheet registering mechanism, a sheet registering cylinder having a sheet supporting surface and comprising a plurality of front registry detector fingers moveable into and out of interfering position with a common sheet rejecting control member and being held out of such

interfering position by the front edge of a properly registered sheet, the said cylinder having apertures in its sheet supporting surface for detecting improper lateral registry, a pneumatic system connected to said apertures, and controlled by the position of the sheet with reference thereto and including pneumatic cylinder means for interfering with movement of the said sheet rejecting control member when a sheet is in improper lateral position relative to the said apertures.

16. Sheet registering mechanism according to claim 15, comprising also means for applying suction to the upper and lower surface of a sheet for detecting double sheets and pneumatic cylinder means operable thereby for interfering with movement of the said sheet rejecting control member when a double sheet is on the registering cylinder.

17. In a sheet handling mechanism having sheet propelling means, a double sheet detector comprising members having suction apertures, means for moving said members along with a sheet during its propulsion by the said propelling means and for bringing the said members together, while so moving, with their suction apertures in suction gripping relation to the two surfaces of the sheet, means for applying suction to the said suction apertures, means for separating the two said members, and a pneumatic system for detecting a double sheet by the blocking of both said apertures upon such separation of said members.

18. In a sheet registering cylinder having a surface for supporting a sheet, double sheet detecting mechanism comprising upper and lower suction members moveable with the cylinder as it rotates, and means for bringing said suction members together for engaging the two surfaces of a sheet and for thereafter separating the two suction members, whereby a double sheet is detected by the maintenance of suction by both said members upon such separation.

19. In a sheet registering mechanism, a member moveable for registering a sheet, a sheet reinforcing element slidably mounted thereon and having a sheet reinforcing supporting surface, means for positioning the said reinforcing element under a sheet to be registered with its reinforcing surface underlying the sheet adjacent its edge, means for frictionally holding the said reinforcing member to the first said moveable member, means for moving the moveable member to move the sheet reinforcing element and the sheet, and a stop for engaging the thus reinforced sheet to prevent further movement thereof when the reinforced edge is in registered position while permitting continued movement of the first said moveable member.

20. Sheet registering mechanism according to claim 19, in which the reinforcing element comprises an abutment engageable against the edge of the sheet for positioning the reinforcing element and the sheet with relation to each other.

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