

Sept. 3, 1946.

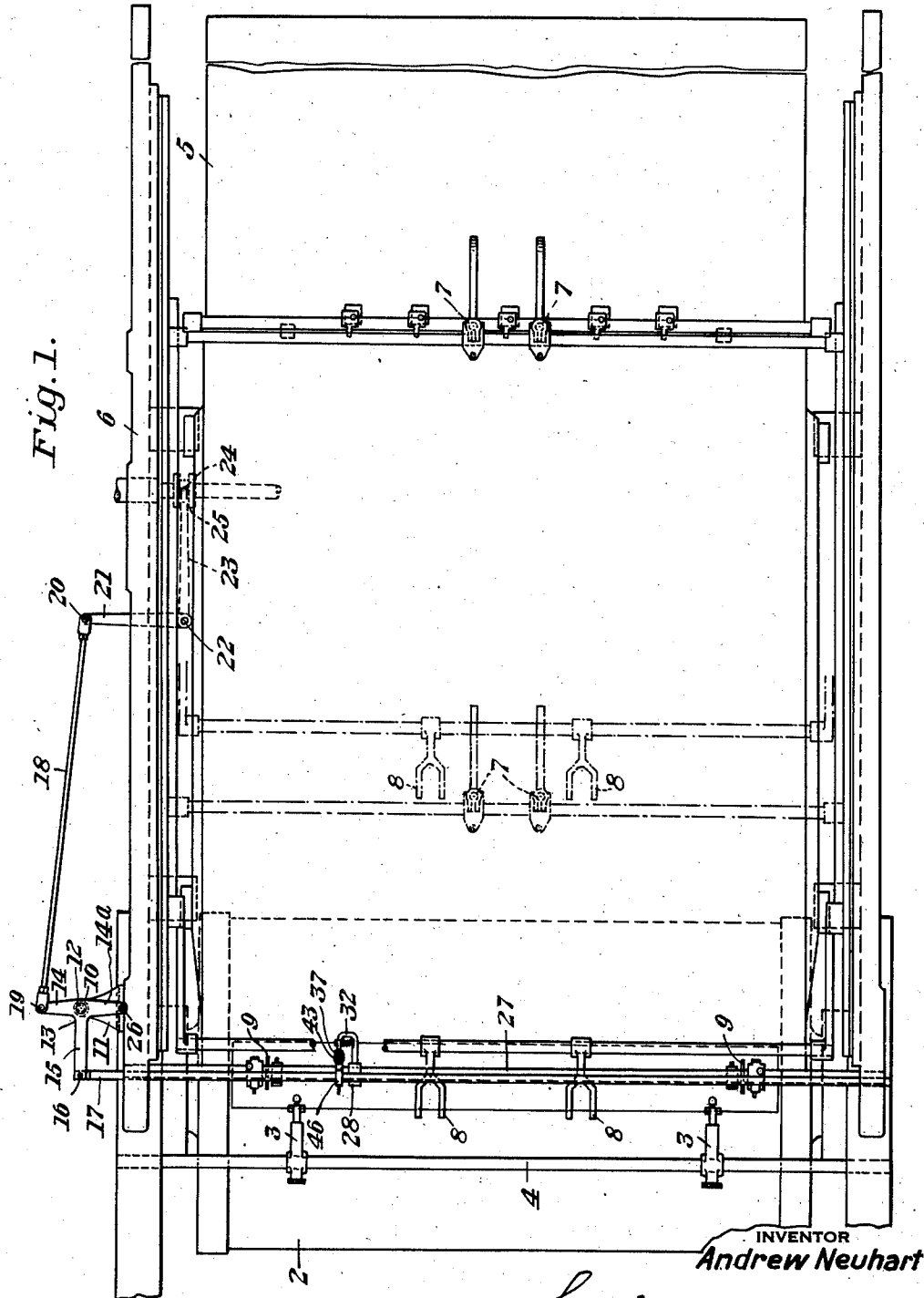
A. NEUHART

2,406,847

REGISTERING SHEETS

Filed June 30, 1941

2 Sheets-Sheet 1



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REGISTERING SHEETS

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2 Sheets-Sheet 2

Fig. 2.

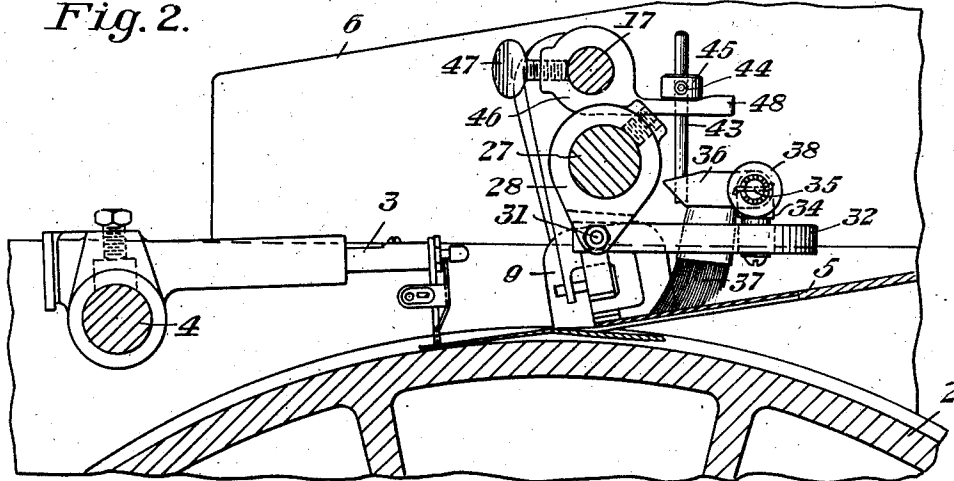


Fig. 3.

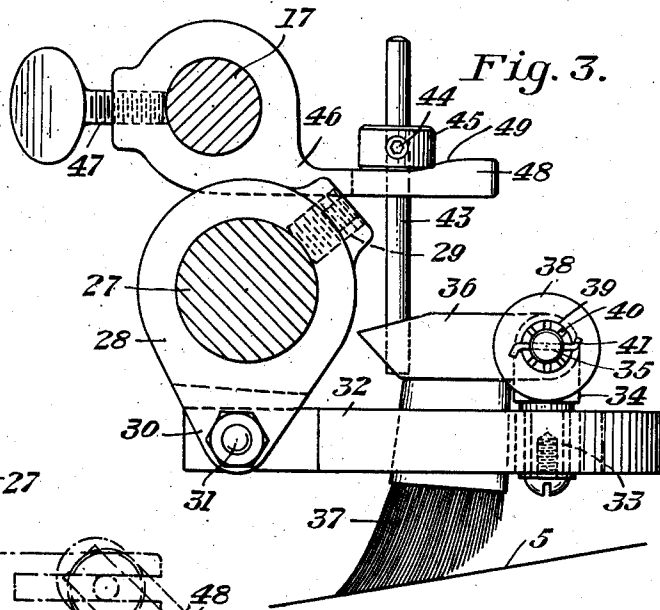
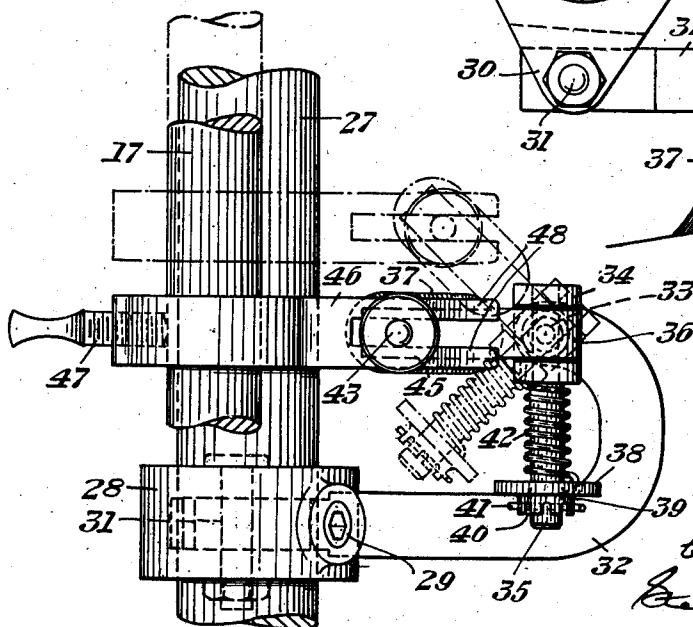


Fig. 4.



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UNITED STATES PATENT OFFICE

2,406,847

REGISTERING SHEETS

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Application June 30, 1941, Serial No. 400,367

43 Claims. (Cl. 271—58)

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This invention relates to registering sheets. It relates to a method of and apparatus for registering sheets to front and side guides as is done preparatory to operating upon the sheets as, for example, in a printing press or the like. The invention further relates to a method of and means for insuring proper registry of sheets whereby each sheet will be taken by the operating means in proper relationship thereto and successive sheets will be taken in practically identical relationship as to both position and orientation.

The invention is primarily, although not exclusively, adapted for registering sheets to be taken by the cylinder grippers of a printing press, a cutting and creasing press or the like. Such presses are commonly equipped with feeders which deliver the sheets successively to the drop guides of the press and also side register the sheets whereby to attempt to insure their being properly positioned and oriented before being taken by the cylinder grippers.

One type of feeder to which the present invention may readily be applied comprises means for forwarding sheets successively to the drop guides, side guides and means for side registering the sheets, i. e., moving them laterally so that a side edge of each sheet lies against a side guide. Ordinarily each sheet is first forwarded until its front edge strikes the drop guides, whereupon it is taken by the side register means and moved laterally into engagement with the side guide, this constituting side registry. Since prior to commencement of side registry the sheet is presumed to have been registered to the drop guides, any tendency of the side register means to tilt the sheet or move it away from the drop guides results in faulty positioning or orientation of the sheet.

There is also a tendency for sheets as they move into front registry, i. e., into registry with the drop guides of the press, to bounce back somewhat from the drop guides and in so doing to skew somewhat so that proper registry is disturbed not only with respect to the longitudinal position of the sheets but also with respect to their orientation. So-called register brushes have heretofore been employed in an effort to obviate the tendency of sheets being forwarded to bounce back from the drop guides. These brushes have ordinarily been positioned stationarily a short distance from the drop guides and tilted so that the bristle ends extend somewhat toward the drop guides so that the sheets may pass freely toward the drop guides but so that any attempt of a

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sheet to move back away from the drop guides is counteracted by the bristles. However, such brushes have not in all cases been entirely successful in holding sheets against the drop guides and in proper orientation and they have in some cases interfered with proper side registry. Attempts have also been made to employ brushes similar to the so-called register brushes just mentioned but which partake of an oscillatory movement parallel to the direction of feed, that is, directly toward and away from the drop guides. Such brushes were caused to advance toward the drop guides during side registry of a sheet in an effort to insure accurate simultaneous front registry and side registry. However, such brushes were found to tend to buckle the front edges of the sheets against the drop guides and they also had at times a tendency to disturb proper side registry.

I have devised a method of and apparatus for registering sheets obviating the disadvantages above pointed out. I provide for registering sheets to front or drop guides and side guides and insuring proper positioning of each sheet with respect to both sets of guides and also obviating skewing of the sheets resulting in loss of proper orientation. I preferably act upon each sheet as it is being registered by means frictionally engaging the sheet and moving relatively thereto in a direction at an angle to the direction of advance of the sheet toward the drop guides. I preferably frictionally engage the sheet and thereby urge it toward the side guide and I find it highly desirable to simultaneously urge the sheet toward the front guides and toward the side guide. I preferably employ a brush mounted above the feed board or sheet support and movable with the ends of its bristles in contact with the upper surface of the sheet as the sheet rests upon the feed board. I preferably swing the brush through an arc directed generally toward the drop guides and the side guide.

I also provide novel means for mounting and operating the sheet engaging means. Ordinarily the sheet support or feed board is inclined to the horizontal. I provide for mounting and operating the sheet engaging means in such a way as to insure substantially uniform pressure upon the sheet as the sheet engaging means moves thereover, although the sheet engaging means may be mounted to swing about a pivot non-perpendicular to the feed board. I find it preferable to cause the sheet engaging means to operate upon each sheet during side registry of the sheet and it is convenient to employ a portion of the side

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register means for operating the sheet engaging means.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment of the invention and a present preferred method of practicing the same proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention and have illustrated a present preferred method of practicing the same, in which

Figure 1 is a plan view, with portions broken away, of a sheet feeder arranged for feeding sheets successively to the cylinder of a press;

Figure 2 is a fragmentary vertical longitudinal cross-sectional view, to enlarged scale, of a portion of the feeder mechanism showing the sheet engaging means and its operating mechanism;

Figure 3 is a fragmentary vertical longitudinal cross-sectional view to further enlarged scale of a portion of the mechanism shown in Figure 2; and

Figure 4 is a fragmentary plan view of the mechanism shown in Figure 3.

Referring now more particularly to the drawings, there is shown at 2 the cylinder of a flat bed and cylinder type printing press, which press is provided with the usual drop guides 3. The drop guides are mounted upon a transverse oscillatory shaft 4. Sheets are advanced to the drop guides 3 upon a feed board 5 forming a part of a sheet feeder designated generally by reference numeral 6 and which may be of the type disclosed and claimed in copending application Serial No. 319,862. The sheet advancing or forwarding means constitute no part of the present invention and are not shown in detail. However, such means comprise a pair of oscillatable carriages one of which carries rear suckers 7 and the other of which carries front suckers 8. The carriages move at all times in opposite directions so that the suckers 7 move toward the left while the suckers 8 move toward the right and vice versa. The suckers 7 take a sheet from the solid line position of such suckers in Figure 1 to the chain line position thereof where the sheet is transferred to the suckers 8 when in their chain line position. The suckers 8 then advance the sheet to the solid line position of such suckers when the forward edge of the sheet contacts the drop guides 3, at which time the suckers 8 leave the sheet and move back toward their chain line position in readiness to take another sheet.

Side guides 9 are also provided, there being one such guide at each side of the path of the sheets as they advance toward the drop guides, although only one side guide is employed at any given time. Side register means operate upon each sheet immediately after it has been registered to the drop guides to move the sheet toward the side guide at the side of the feeder toward which the sheet is to be side registered. The side register means is designated generally by reference numeral 10 and comprises a bracket 11 fastened to the feeder frame and carrying a pivot 12. Mounted for pivotal movement about the axis of the pivot 12 is a double bell crank lever 13 having a pair of opposed arms 14 and 14a and an intermediate arm 15 projecting at right angles to the arms 14 and 14a as shown in Figure 1. Pivoted to the arm 15 at 16 is an operating rod 17 which extends transversely of the feeder for operating the means which engage the sheet to effect the side registry thereof. Since such specific means form no part of the present invention

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they are not illustrated in detail. A link 18 is pivoted to the arm 14 at 19 and is pivoted at 20 to an arm 21 of another bell crank lever which is pivoted to the frame at 22 and has an arm 23 extending substantially at right angles to the arm 21 and carrying a roller 24. The bell crank lever 21—23 is oscillated by any suitable means such as a barrel cam 25 in which the roller 24 rides as shown in Figure 1. Such oscillation is transmitted through the mechanism shown and described to the operating rod 17. In the position of the parts as shown the sheets are to be side registered to the side guide 9 which is nearest the bottom of Figure 1. If the sheets were to be side registered to the upper side guide 9 viewing Figure 1 the link 18 would be disconnected from its pivotal connection to the arm 14 at 19 and would be connected to the arm 14a at 26. As the parts are shown in solid lines in all the figures of the drawings a sheet (not shown) has just been registered and the parts are ready to return to their initial position in readiness for registry of the next sheet. The roller 24 in Figure 1 is in its uppermost position viewing that figure and as the barrel cam 25 rotates it moves the roller downwardly which swings the bell crank lever 13 in the clockwise direction about the axis of its pivot 12.

Extending transversely of the feeder is a supporting rod 27. Fastened to such rod in fixed position is a supporting member 28. Such member is in the form of a collar having a bore of such size as to snugly receive the supporting rod 27, a set screw 29 threaded through the member 28 engaging the rod 27 as shown in Figures 2, 3 and 4 to fixedly position the member 28 on the rod. The member 28 has a downward projection 30 to which is fixedly connected at 31 a generally horizontally extending J-shaped bracket 32 shown in plan in Figures 1 and 4. The connection between the member 28 and the bracket 32, although adjustable, is a fixed connection so that the member 28 and the bracket 32 are in effect unitary with each other and with the supporting rod 27.

The J-shaped bracket 32 carries near the end of its shorter leg a vertical pivot 33 freely rotatable therein. Integral with the pivot 33 is a yoke 34 which rotatably carries a horizontal pivot pin 35. Pivotaly carried by the yoke 34 upon the pin 35 and fixed to such pin is a brush carrier 36 carrying a brush 37. The pin 35 extends laterally from the yoke 34, as most clearly shown in Figure 4, and carries adjacent its outer end a collar 38. The collar has a hub portion 39 provided with spaced slots 40 which extend into the hub portion in a direction generally parallel to the axis of the pin 35. A smaller pin 41 passes through the pin 35 and enters certain of the slots 40 in the collar 38 as shown in Figures 3 and 4. Thus the collar 38 is held against rotation relatively to the pin 35, although its rotative position on such pin may be altered at will. A coil spring 42 is coiled about the pin 35 between the yoke 34 and the collar 38 and has one end connected with the yoke and the other end connected with the collar and tends at all times to turn the collar 38 and, consequently, the pin 35 and the brush carrier 36, in the counter-clockwise direction about the axis of the pin 35, viewing Figure 3, relatively to the yoke 34. Thus the effect of the spring 42 is to at all times urge the brush 37 toward the feed board 5.

The axis of the vertical pivot 33 intersects the feed board 5 at an acute angle as shown in Fig-

ures 2 and 3 since the feed board is inclined downwardly and toward the left viewing such figures. Consequently the mechanism thus far explained mounts the brush for swinging movement about the axis of the pivot 33 in a generally horizontal plane, that is to say, in a plane intersecting the feed board 5. Connected with the brush carrier 35 and extending upwardly therefrom is a pin 43. Mounted upon the pin 43 and adapted to be fastened thereto in desired adjusted position by a set screw 44 is a collar 45. Connected with the transversely oscillatory operating rod 17 is a fork 46 which is held in fixed position on the rod 17 by a set screw 47. The fork 46 has two prongs 48 between which lies the pin 43 as shown in Figures 3 and 4. The upper surfaces of the prongs 48 of the fork 46 are formed as cams 49 extending upwardly and outwardly away from the portion of the fork nearer the rod 17. The collar 45 rests upon the upper surfaces of the prongs 48 of the fork 46 as shown in Figures 2 and 3. Since the spring 42 tends to swing the brush 37 downwardly toward the feed board 5 about the axis of the pin 35 the downward movement of the brush is limited by engagement of the collar 45 with the form 46.

The operation of the device will now be described. As above mentioned, the suckers 7 move toward the left, viewing Figure 1, carrying a sheet by its forward edge, such edge being the left-hand edge of the sheet viewing Figure 1. When the suckers 7 reach their chain line position of Figure 1 they transfer the sheet to the suckers 8 which are then in their chain line position. The suckers 8 then advance the sheet toward the left until such suckers reach their solid line position viewing Figure 1, at which time the forward edge of the sheet engages the drop guides 3. As each sheet thus approaches the drop guides they are down in operative position as shown in Figure 2. The drop guides and their operating mechanism are of standard construction and, as is usual in the art, after a sheet has been registered the shaft 4 carrying the drop guides 3 is turned through a small angle in the counter-clockwise direction, viewing Figure 2, to raise the drop guides and allow the sheet to be taken by the cylinder grippers. The cylinder 2 turns in the counter-clockwise direction, viewing Figure 2, and about the time the drop guides 3 rise the grippers take the sheet and carry it around with the cylinder. The sheet is printed as it engages the type bed and as its forward edge again reaches the top of the cylinder it is stripped from the cylinder and delivered away as well known in the art.

As soon as the sheet has been deposited at the drop guides 3 and released by the suckers 8 as above explained the side register means operates to register the sheet to one of the side guides 9. In the example illustrated in the drawings the sheet is to be registered to the lower side guide 9, viewing Figure 1. Prior to operation of the side register means the operating rod 17 is in its uppermost position, viewing Figures 1 and 4, such position being that in which the fork 46 will assume the chain line position indicated in Figure 4. When the fork is in such position the brush extends at an angle of approximately 45° toward the drop guides and away from the lower side guide 9, viewing Figure 1. When the brush is in such position the collar 45 is in engagement with raised portions of the upper cam surfaces 49 of the prongs 48 of the frame 46. Consequently when the brush is in the position

corresponding to the chain line position of Figure 4 it is raised somewhat from the position shown in Figure 3, the amount of such raising being determined by the relationship of the parts and particularly by the shape of the upper surfaces of the prongs of the fork. The parts are so designed and constructed that as the brush is swung by the fork from the position shown in Figure 3 to the position corresponding to the chain line position of Figure 4 it will rise just enough so that the movement of the brush is substantially parallel to the inclined feed board 5. Thus the brush will at all times exert a substantially constant pressure upon the feed board and, consequently, upon a sheet lying upon the feed board.

The sheet having been registered to the drop guides 3, the operating rod 17 moves downwardly, viewing Figures 1 and 4, operating the usual side register means which engage the sheet to pull it positively into registry with the lower side guide 9 viewing Figure 1. However, since the fork 46 is fixed to the rod 17 such fork also moves from the chain line position to the full line position of Figure 4, swinging the brush through an arc of about 45° about the axis of the pivot 33 and so as to tend to sweep the sheet toward the drop guides 3 and toward the lower side guide 9 viewing Figure 1. The position of the brush at the beginning of such swinging movement is at an angle of approximately 45° toward the drop guides and away from the side guide toward which the sheet is being registered. As the brush commences its swinging movement it swings toward both the drop guides and the lower side guide, viewing Figure 1, i. e., the side guide toward which the sheet is being registered. As the brush continues to move it moves less toward the drop guides and more toward the side guide until in its final increment of movement it is moving substantially straight toward the side guide. Thus the brush 37 frictionally urges the sheet toward the front or drop guides 3 and also toward the side guide 9 to which the sheet is being registered. The brush insures proper registry of the sheet to both the drop guides and the side guide. Likewise the brush prevents bouncing back of the sheet from the drop guides or, if there has been any slight rebounding of the sheet from the drop guides, it urges the sheet back toward the drop guides to insure that the sheet is properly registered.

After the sheet has thus been registered to the drop guides and the side guide it is ready to be taken by the cylinder grippers and just before the grippers take the sheet the drop guides 3 rise to allow the sheet to pass thereunder and follow around with the cylinder to the printing position in engagement with the type bed which reciprocates back and forth below the cylinder. As soon as the sheet has been taken by the the cylinder grippers the operating rod 17 moves upwardly, viewing Figures 1 and 4, to prepare for side registry and frictional engagement by the brush 37 of the succeeding sheet. Such upward movement of the rod 17 results in swinging of the brush 37 from the position of Figure 3 in which it is pointing straight down the feed board toward the drop guides to the position corresponding to the chain line position of Figure 4 in which it is pointing at an angle of approximately 45° toward the drop guides and away from the side guide 9 to which the sheets are being registered. At the same time as the brush swings about the vertical pivot 33 it is also

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cammed upwardly about the axis of the pin 35 by reason of the fact that as the fork 46 moves upwardly, viewing Figure 4, the pin 43 moves outwardly along the fork and consequently engages portions of the upper surfaces of the prongs 48 which are successively higher and higher. As above stated, this results in movement of the brush 37 substantially parallel to the inclined feed board 5 despite the fact that the brush is mounted to turn about the vertical pivot 33.

The pressure of the brush upon the feed board and upon the sheets being fed is regulated by turning the collar 38 upon the pin 35 to apply the desired tension to the spring 42 and then by hand adjusting the brush to the desired angular position about the axis of the pin 35 and while holding the brush in such position bringing the collar 45 on the pin 43 into engagement with the upper surfaces of the prongs 48 of the fork 46 and then tightening the set screw 44 to hold the collar 45 in such position. Thus the collar 45 bearing on the fork limits downward movement of the brush but any tendency to move the brush upwardly is counteracted by the spring 42.

Ordinarily it is desirable that the brush 37 be positioned on the opposite side of the longitudinal center line of a sheet being registered from the side guide to which the sheet is being registered. In Figure 1 the sheets are being registered to the lower side guide 9 and the brush is positioned relatively close to the upper side guide. If the sheets were being registered to the upper side guide the brush would be moved to a position relatively remote from the upper side guide and relatively near the lower side guide. The bracket 32 which, as above described, is of generally J-shape, is designed so that the brush may be swung in either direction. This is to make the bracket and the structure carried thereby universally applicable regardless of which side guide the sheets are being registered to.

As above pointed out, important advantages are obtained by operating upon the sheet frictionally to urge it toward the side guide. The previous attempts to operate frictionally upon sheets by register brushes moved straight toward the drop guides were not successful for reasons above explained. By the use of my sheet registering apparatus as explained proper front and side registry of sheets is insured at all times and the disadvantages of the prior structures are obviated.

While I have shown and described a present preferred embodiment of the invention and a present preferred method of practicing the same it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. A method of registering a sheet to front and side guides comprising moving the sheet toward said guides and operating upon the sheet by a brush moving relatively to the sheet and having certain bristles continuously in engagement therewith in a direction generally toward both of said guides.

2. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and brush means having certain bristles continuously engaging the sheet and movable to sweep over the sheet generally toward both front and side guides.

3. Sheet registering apparatus comprising a support upon which a sheet is adapted to move

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toward front and side guides and a pivotally mounted brush having certain bristles continuously frictionally engaging the sheet and swingable in a plane generally parallel to the plane of the sheet to urge the sheet toward both front and side guides.

4. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means movably mounted in position to engage a sheet on the support, spring means urging the sheet engaging means toward the support and means movable generally transversely of the support for moving the sheet engaging means to urge the sheet toward the side guide.

5. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and means resiliently urged toward and having a certain portion continuously frictionally engaging the sheet and movable relatively thereto to urge the sheet toward the side guide.

6. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and sheet engaging means movable generally transversely of the support, said means being swingable upwardly away from the support and resiliently urged downwardly toward the support.

7. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis intersects the support, a mounting turnable about the axis of the pivot and sheet engaging means for frictionally engaging said sheet during its movement toward said guides carried by the mounting and turnable relatively thereto in a plane intersecting the support.

8. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis intersects the support, a mounting turnable about the axis of the pivot, sheet engaging means carried by the mounting and movable relatively thereto generally toward and away from the support and means resiliently urging the sheet engaging means toward the support.

9. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis intersects the support, a mounting turnable about the axis of the pivot, sheet engaging means carried by the mounting and movable relatively thereto generally toward and away from the support, means resiliently urging the sheet engaging means toward the support and means for altering the effectiveness of said last mentioned means for different grades of stock.

10. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush mounted above the support and having certain bristles continuously engaging the sheet and operating means for the brush for swinging the same in sheet engaging movements, the operating means having a slip connection with the brush.

11. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush mounted above the support for sheet engaging movements to urge the sheet toward at least one of the guides, an operating member oscillatable transversely of the support and a

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sliding pin and slot connection between the brush and operating member.

12. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush mounted above the support for sheet engaging movements to urge the sheet toward at least one of the guides, means for urging the brush toward the support and oscillatable means having a slip connection with the brush for moving the brush in sheet engaging movements.

13. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted above the support for sheet engaging movements and means for causing the sheet engaging means to partake of sheet engaging movement and determining the relative positioning of the sheet engaging means and support in a direction generally normal to the support during such movements.

14. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis extends at an acute angle to the support, sheet engaging means mounted to turn about the axis of the pivot and means determining the relative positioning of the sheet engaging means and support in a direction generally normal to the support during such turning of the sheet engaging means.

15. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis extends at an acute angle to the support, sheet engaging means mounted to turn about the axis of the pivot in sheet engaging movements, means for urging the sheet engaging means toward the support and means cooperating with the last mentioned means insuring movement of the sheet engaging means in a path substantially parallel to the support.

16. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, said support being inclined to the horizontal, sheet engaging means mounted for sheet engaging movements non-parallel to the support and means for translating the sheet engaging movements of the sheet engaging means into movements which are substantially parallel to the support.

17. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and brush means having certain bristles continuously engaging the sheet and movable thereover in a path having a portion extending generally toward the front guide and a portion extending generally toward the side guide.

18. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted for frictional sheet engaging movements over the support and having a certain portion continuously engaging the sheet and cam means insuring movement of the sheet engaging means in a path substantially parallel to the support.

19. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means pivotally mounted over the support, reciprocable operating means, a pin on one of the sheet engaging means and operating means and a fork on the other of said means receiving said

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pin for transmitting motion from the operating means to the sheet engaging means upon reciprocation of the operating means.

20. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means pivotally mounted over the support and having a certain portion continuously frictionally engaging the sheet, operating means, a cam on one of the sheet engaging means and operating means and a follower on the other of said means engaging said cam for transmitting motion from the operating means to the sheet engaging means upon movement of the operating means.

21. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted over the support and operating means therefor, the sheet engaging means and operating means having cooperating portions whereby upon movement of the operating means the sheet engaging means is moved both in a direction generally parallel to the support and in a direction generally perpendicular to the support.

22. Sheet registering apparatus comprising an inclined support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted over the support and operating means therefor, the sheet engaging means and operating means having cooperating motion transmitting portions for moving the sheet engaging means generally horizontally and other cooperating motion transmitting portions for moving the sheet engaging means generally vertically.

23. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means pivoted for sheet engaging movements over the support, and an operating member having a portion engaging a portion of the sheet engaging means for moving the sheet engaging means about its pivot over the support, the operating member and sheet engaging means also having cooperating cam and follower portions for moving the sheet engaging means generally vertically during its sheet engaging movements.

24. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted for sheet engaging movements over the support, means for urging the sheet engaging means toward the support and means for moving the sheet engaging means over the support, said last mentioned means having a portion limiting movements of the sheet engaging means toward the support in response to said urging means.

25. Sheet registering apparatus comprising a support inclined to the horizontal upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush pivoted about a substantially vertical axis, means for urging the brush toward the support and means for swinging the brush about said substantially vertical axis, limiting movement of the brush toward the support in response to said urging means and moving the brush generally vertically so that its path of movement is generally parallel to the support.

26. Sheet registering apparatus comprising a support inclined to the horizontal upon which a sheet is adapted to move toward front and side

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guides, sheet engaging means pivoted about a substantially vertical axis and means for swinging the sheet engaging means about said substantially vertical axis, said last mentioned means having an upwardly facing cam cooperating with a follower on the sheet engaging means for moving the sheet engaging means generally vertically simultaneously with its pivotal movement so that its path of movement is generally parallel to the support.

27. Sheet registering apparatus comprising a support inclined to the horizontal upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush pivoted about a substantially vertical axis, the brush also being pivoted about a substantially horizontal axis, and means for swinging the brush about said substantially vertical axis, said last mentioned means having an upwardly facing cam cooperating with a follower on the brush for swinging the brush about its substantially horizontal axis.

28. Sheet registering apparatus comprising a support inclined to the horizontal upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush pivoted about a substantially vertical axis, the brush also being pivoted about a substantially horizontal axis, means urging the brush to turn about said substantially horizontal axis toward the support, the brush having an upwardly projecting pin, a collar on said pin and means including a fork movable generally transversely of the support, said fork having prongs between which said pin is received, said prongs lying against the under face of said collar, the upper faces of said prongs being provided with cams whereby upon movement of said fork the brush is swung about its substantially vertical axis and cammed to move about its substantially horizontal axis so that its path of movement is generally parallel to the support.

29. A method of registering a sheet to front and side guides comprising moving the sheet over a support toward said guides, operating upon the sheet by friction means movable relatively to the support generally in the plane of the sheet while a certain portion thereof is continuously in contact with the sheet pressing the sheet against the support to urge it toward the side guide and stopping the friction means in contact with the sheet to maintain the sheet in registered position free from forces which might disturb registry.

30. A method of registering a sheet to front and side guides comprising moving the sheet over a support toward said guides, operating upon the sheet by friction means having a certain portion continuously in contact with the sheet pressing the sheet against the support to urge it toward the front and side guides and stopping the friction means in contact with the sheet to maintain the sheet in registered position free from forces which might disturb registry.

31. A method of registering a sheet to front and side guides comprising moving the sheet toward said guides, operating upon the sheet by a brush having certain bristles continuously in contact with the sheet to frictionally urge it toward the front and side guides and stopping the brush in contact with the sheet to maintain the sheet in registered position free from forces which might disturb registry.

32. A method of registering a sheet to front and side guides comprising moving the sheet over a support toward said guides and operating upon the sheet frictionally by an operating device having a certain portion continuously in contact with

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the sheet pressing the sheet against the support which is oscillated in a path portions of which are respectively directed generally toward said guides.

33. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and means having a certain portion continuously in contact with the sheet frictionally engaging the sheet, pressing it against the support and movable relatively to the sheet to urge the sheet toward both front and side guides, said means assuming stationary position in contact with the registered sheet to maintain it in registered position free from forces which might disturb registry.

34. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and means having a certain portion continuously in contact with the sheet frictionally engaging the sheet, pressing it against the support and movable relatively to the sheet to urge the sheet toward the side guide, said means assuming stationary position in contact with the registered sheet to maintain it in registered position free from forces which might disturb registry.

35. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and pivotally mounted means frictionally engaging the sheet and having a certain portion continuously in contact with the sheet, pressing it against the support and oscillatable in a plane generally parallel to the plane of the sheet to urge the sheet toward both front and side guides.

36. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a pivot whose axis intersects the support, sheet engaging means carried by the pivot and having a certain portion continuously in contact with the sheet and means for oscillating the sheet engaging means about the axis of the pivot to press the sheet against the support and frictionally urge the sheet toward both front and side guides.

37. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted in position to engage a sheet on the support and having a certain portion continuously in contact with the sheet and movable relatively to the support generally in the plane of the sheet while in contact with the sheet and means movable generally transversely of the support for oscillating the sheet engaging means to frictionally urge the sheet toward the side guide.

38. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides and brush means having certain bristles continuously engaging the sheet and movable relatively to the support generally in the plane of the sheet while in contact with the sheet to sweep over the sheet generally toward the side guide.

39. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted above the support for swivelling frictional sheet engaging movements in which the sheet engaging means presses the sheet against the support, the sheet engaging means having a certain portion continuously in contact with the sheet being movable relatively to the support generally in the plane of the sheet while in contact with the sheet, and rectilinearly os-

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oscillatable means for operating the sheet engaging means.

40. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, a sheet engaging brush mounted above the support and movable relatively to the support generally in the plane of the sheet while having certain bristles continuously in contact with the sheet and means movable generally transversely of the support for moving the brush in sheet engaging movements.

41. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted above the support and having a certain portion continuously in frictional contact with the sheet and operating means for the sheet engaging means for moving the same generally parallel to the support toward the front and side guides, the operating means being movable in a direction substantially perpendicular to the side guide.

42. Sheet registering apparatus comprising a support upon which a sheet is adapted to move

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toward front and side guides, sheet engaging means mounted above the support for sheet engaging movements toward the front and side guides and having a certain portion continuously in frictional contact with the sheet, means movable in a direction substantially perpendicular to the side guide for operating the sheet engaging means and a sliding pin and slot connection between the operating means and the sheet engaging means.

43. Sheet registering apparatus comprising a support upon which a sheet is adapted to move toward front and side guides, sheet engaging means mounted above the support for swinging sheet engaging movements about a pivot non-perpendicular to the support and having a certain portion continuously in frictional contact with the sheet, means for operating the sheet engaging means oscillatable in a direction substantially perpendicular to the side guide and a sliding pin and slot connection between the operating means and the sheet engaging means.

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