

R. HOE.
SHEET FEEDING MECHANISM FOR PRINTING PRESSES.
APPLICATION FILED JUNE 26, 1913.

1,328,877.

Patented Jan. 27, 1920.

3 SHEETS—SHEET 1.

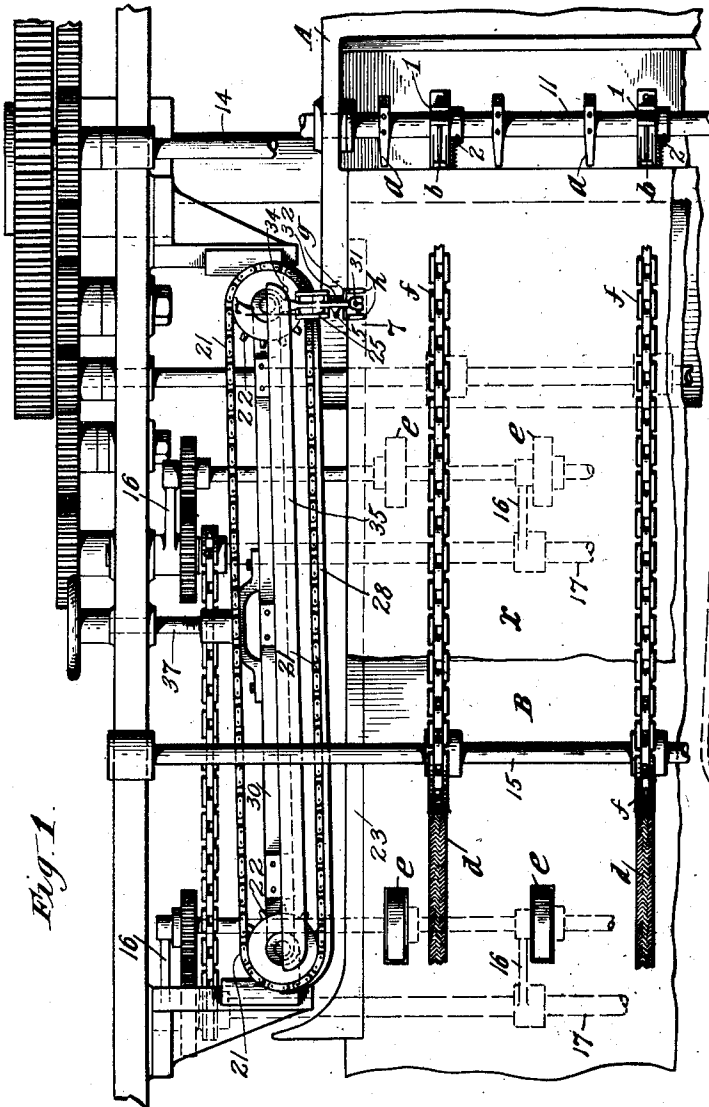


Fig. 1.

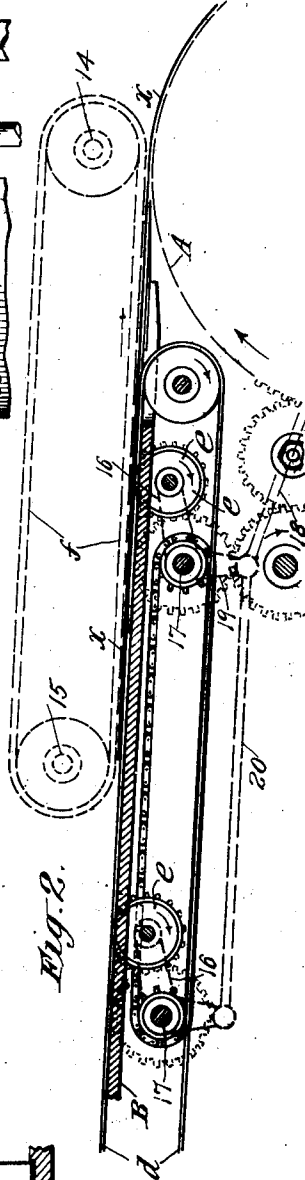


Fig. 2.

WITNESSES.

J. D. Donovan
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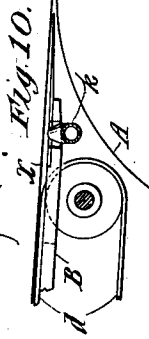


Fig. 10.



Fig. 11.

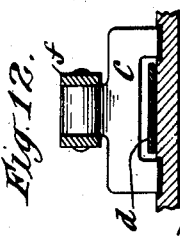


Fig. 12.

INVENTOR.

Robert Hoe

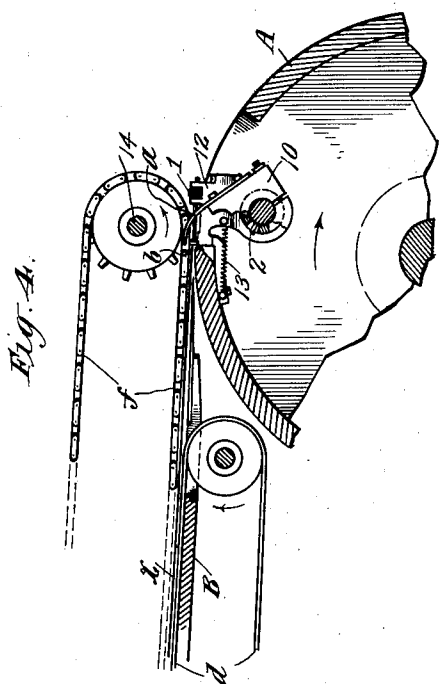
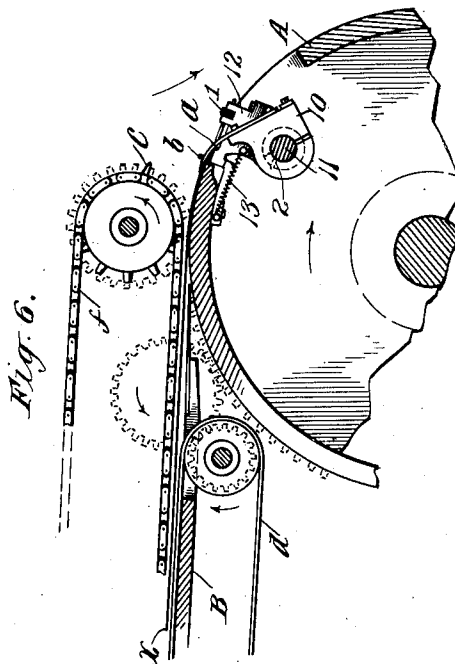
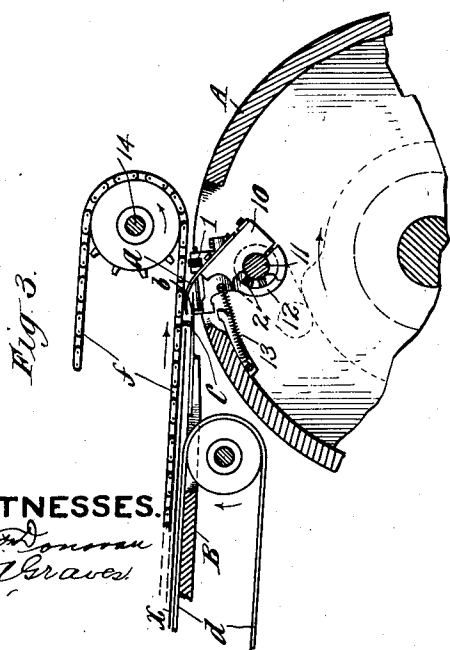
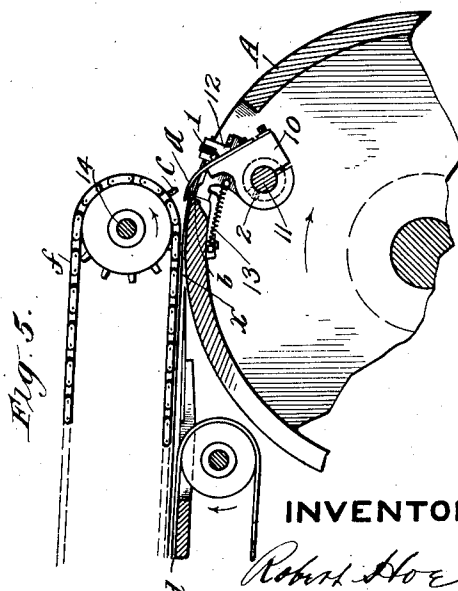
By Philip Casper, Ric. K. K. K.

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3 SHEETS—SHEET 2.



WITNESSES.

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3 SHEETS—SHEET 3.

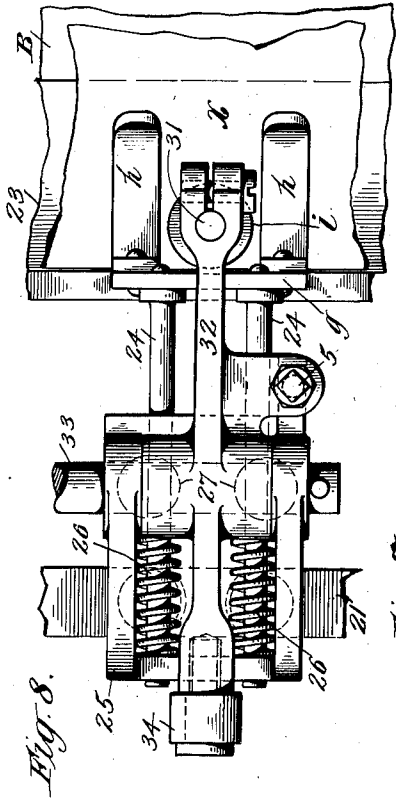


Fig. 7.

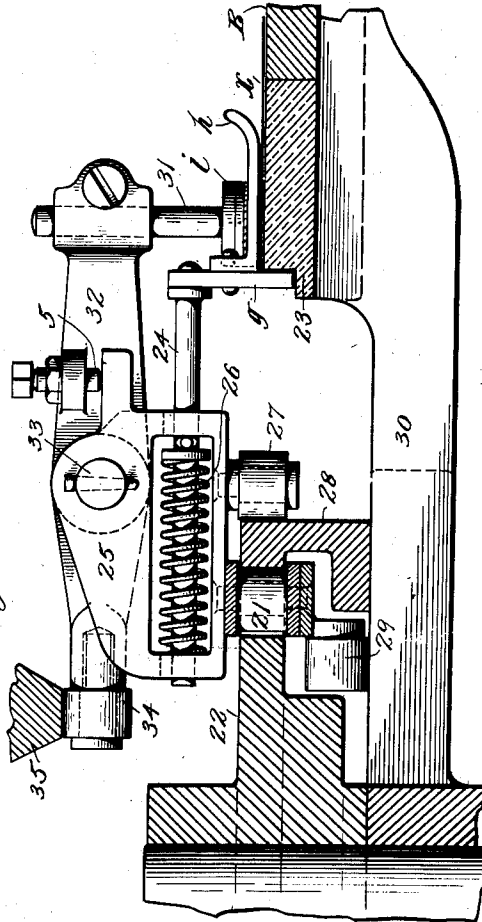
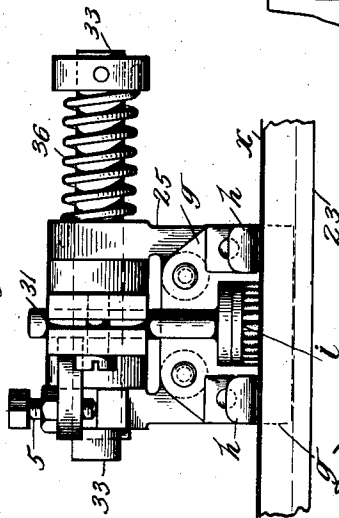


Fig. 9.



WITNESSES.

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UNITED STATES PATENT OFFICE.

ROBERT HOE, OF NEW YORK, N. Y.

SHEET-FEEDING MECHANISM FOR PRINTING-PRESSES.

1,328,877.

Specification of Letters Patent.

Patented Jan. 27, 1920.

Application filed June 26, 1913. Serial No. 775,837.

To all whom it may concern:

Be it known that I, ROBERT HOE, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Sheet-Feeding Mechanism for Printing-Presses, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved sheet feeding mechanism, intended especially for printing presses employing a continuously revolving sheet carrying cylinder, although applicable to other types of presses, the especial object of the invention being to secure accurate registry of the sheets at high speed.

In printing presses with continuously revolving sheet carrying cylinders, great difficulty is found in securing the desired accurate registry of the sheets, and especially for multiple impressions in color printing. The same difficulty exists to a certain extent in stop cylinder presses and, moreover, such stop cylinder presses are too slow to meet the modern requirements of high speed. This difficulty is increased in both continuously revolving and stop cylinder presses employing two feed-boards and requiring the same registry for multiple impressions on a sheet fed alternately from the feed-boards, and one object of the invention is to provide a high speed sheet feeding mechanism which will secure this result.

I secure the desired accurate registry of the sheets endwise at a very high speed, in accordance with the present invention, by avoiding any stop of the sheet during its advance over the feed-board and transfer to the cylinder, so that the movement of the sheet is continuous over the feed-board and with the cylinder, while at the same time the head of the sheet is accurately positioned during and after its seizure by the cylinder grippers. I secure this result, by omitting the usual stationary stop for the head of the sheet and employing moving stops traveling over the feed-board to the cylinder, in combination with feeding devices by which the sheet is pressed forward into proper registry position with its head against the moving stops, and I preferably use in combination therewith, stops carried by the cylinder against which the sheet is pressed forward into proper registry position as the stops

moving over the feed-board pass out of position to control the sheet, the head of the sheet thus being controlled by moving stops throughout its entire feeding over the feed-board to the cylinder and during and after its seizure by the cylinder grippers.

I have provided, also, an improved mechanism for securing the proper registry of the sheet sidewise, this mechanism being arranged to accurately position the sheet sidewise during the forward movement of the sheet over the feed-board to the cylinder.

For a full understanding of the invention, a detailed description of a construction embodying all the features of the invention in their preferred form as applied with a continuously rotating cylinder, will now be given in connection with the accompanying drawings forming a part of this specification, and the features forming the invention then specifically pointed out in the claims.

In the drawings:—

Figure 1 is a plan view of a portion of a feed-board and cylinder, with sheet feeding mechanism embodying the invention, the stop belts being partly broken away at their cylinder end.

Fig. 2 is a diagrammatic vertical section of the same.

Figs. 3, 4, 5 and 6 are detail vertical sections showing the cylinder and gripper and stop mechanisms in different positions.

Fig. 7 is a vertical cross section looking to the right on lines 7—7 of Fig. 1.

Fig. 8 is a plan view of the side registry devices shown in Fig. 7.

Fig. 9 is a detail elevation looking to the left in Fig. 8.

Figs. 10 and 11 are details showing the air current device for side registry.

Fig. 12 is a detail cross section showing the arrangement of the moving sheet stops and feeding belts.

Referring now to the drawings, A is the gripper cylinder carrying grippers *a* and the movable or cylinder sheet stops *b*. B is the feed-board over which the sheets *x* are fed to the cylinder, the sheets being advanced over the feed-board by feeding belts *d* and front and rear feeding wheels *e*, both of which are preferably and as shown arranged below the sheet. Above the feed-board are endless belts *f*, link belts preferably being used as shown, which belts *f* carry the moving sheet stops *c* against which the head of the sheet is pressed dur-

ing its movement over the feed-board and from which the sheets are transferred to the cylinder stops *b* and grippers *a*. Only one feed-board is shown, but it will be understood that a second feed-board may be used as usual, the mechanism illustrated being duplicated for the second feed-board, apart from the devices carried by the cylinder.

The grippers *a* may be mounted in the cylinder and actuated in any usual or suitable manner, being shown as carried by gripper blocks 10 on the usual gripper shaft 11, suitable means being provided for adjusting the grippers to secure the exact action desired, but preferably are timed as described hereafter. The movable or cylinder stops *b* are carried by blocks 12 loosely mounted on gripper shaft 11 and preferably made adjustable therein, being mounted to slide in guides on the block and screw threaded to be turned by finger pieces 1 for adjustment, or made adjustable in any other suitable manner. The blocks 12 carrying the stops *b* are thrown forward into position for holding the head of the sheet in registry while it is taken by the grippers, by springs 13 drawing the stops toward the feed-board, as the gripper moves to take the sheet, and are returned by the opening movement of the grippers, this result being secured by pins 2 on the gripper shaft entering slots in blocks 12, as shown in Figs. 3 to 6, and fully described hereafter.

The sheet stops *c* carried by belts *f* are preferably forked, as shown in Fig. 12, with the feeding belts *d* running between the forks so that a direct feeding of the sheet against the stops is secured and all tendency to sidewise pressure of the sheet against the stops avoided. The belts *f* are carried by belt rolls on the forward and rear shafts 14, 15, the forward belt roll being located directly above the cylinder A, so that the stops *c* control the sheets until, or substantially until, they are fed against the cylinder stops *b*.

The feeding wheels *e* may be of any suitable construction to secure the desired pushing forward of the sheet to press it against the moving stops and cylinder stops, being preferably of rubber or some similar material, the object of these feeding rolls being to keep the sheet pressed forward against the stops *c* and *b*, so as to prevent any back slip of the sheet and secure its accurate head registry in transfer to the grippers. The feeding wheels *e* are preferably driven at a slightly higher surface speed than the cylinder A and the belts *d*. A single feeding wheel *e* at the forward end of the feed-board may be used so as to press the sheet forward just as it is taken by the cylinder, and the belts *d* relied on for feeding the sheet previously, but feeding wheels at the opposite ends of the sheet, as shown,

are preferred. If side registry mechanism is used, as is preferable and shown, although the mechanism thus far described may be used without it, provision will preferably be made for lowering the feeding wheels *e* during side registry. For this purpose, these wheels in the construction shown are carried by arms 16 mounted on rock shafts 17 indicated as actuated from a cam on the shaft of cylinder A, by cam arm 18 and arms 19 on rock shafts 17 connected by link 20, so that the two feeding wheels *e* move up and down together.

All the parts thus far described are preferably driven from the cylinder A so as to move in accurate timing therewith, suitable gearing for this purpose being indicated, which requires no description.

Referring now to the mechanism shown and preferably used for securing the side registry of the sheet, link belt or chain 21 is mounted at one edge of the feed-board on vertical chain wheels 22 so as to run longitudinally of the feed-board but at a slight angle thereto, so as to move the sheet side-wise against side stops in its advance over the feed-board. Carried by the chain 21 is a side stop *g* running on the inner side of a metal bar 23, preferably forming a stop guide on the edge of the feed-board, and two fingers *h* having inclined inner ends and extending over the sheet to hold its edge down smoothly to secure accurate side registry against the stop *g*, the stop *g* and fingers *h* being carried by rods 24 sliding in frame 25 and spring pressed outward by spring 26 to hold the stops and fingers in position at the edge of the feed-board, the frame 25 being mounted on the top of chain 21, and having a roller 27 running on the inner side of guide 28 which extends the length of the feed-board and acts to guide the frame, the chain 21 preferably, also, having a supporting roll 29 running on a supporting table 30, on which the guide bar 28 is mounted.

The pressure on the sheet for moving it sidewise with the inclined chain, is secured by a pressure pad *i* bearing upon the top of the sheet between the fingers *h*, this pad *i* preferably being formed by soft rubber fingers of substantially the same character as the soft rubber points now commonly used on cash trays, flesh brushes, and other articles, it being found that such surfaces admirably secure the desired pressure on the sheet. The pad *i* is carried by a stem 31 vertically adjustable in the inner end of lever 32 carried by rock shaft 33 mounted in carrier 25 and having at its outer end a roller 34 running on the under side of cam bar 35, which is formed so as to raise the pad *i* at the rear end of the feed-board, and thus allow the sheet to be fed beneath it and fingers *h*, then release the lever 32 to permit

it to be rocked to hold the pad *i* against the sheet by coil spring 36 on rock shaft 33, and at the forward end of the feed-board to raise the pad *i* again to release the sheet when taken by the cylinder grippers. Adjustable stop 5 is provided to accurately adjust the downward movement of the pad *i*. The chain 21, wheels 22 and the cams preferably are all carried by the table 30 and this made adjustable by screw 37 mounted in the side frame so that the side registry devices including the side stop may be adjusted as required.

I preferably employ an air current acting sidewise upon the under side of the sheet, as it passes to the cylinder, so as to aid in assuring the proper position of the sheet sidewise. For this purpose, I provide an air pipe located near the upward end of the feed-board beyond the feeding belts *d*, which delivers a current of air upwardly against the under side of the sheet and at the proper angle thereto so as to tend to raise the sheet and press it over against the side stop. This construction is shown in detail in Figs. 10 and 11, in which *k* is the air pipe inclined upward so as to deliver an air current upward and sidewise against the under side of the sheet *x*, through a slot in the edge of the feed-board B. This permits a solid feed-board to be used with the air current. Instead of using a single air pipe and current, it is obvious that a plurality of pipes may be used, arranged in series, either longitudinally of or transversely to the feed-board.

The operation of the mechanism described will be clear from the drawings and a brief description.

The sheet *x* is fed to the feed-board by any suitable feeding mechanism and then advanced over the feed-board by belts *d*, the leading end of the sheet being held in position against moving stops *c* on belts *f*. When the leading end of the sheet reaches the cylinder A, the leading end is controlled by these moving stops *c* until the grippers are about to take the sheet, when the cylinder stops *b* are moved from the position shown in Fig. 3 to the position shown in Fig. 4, so as to control the head of the sheet as the stops *c* are carried away from the cylinder by the belts *f*. This movement of the stops *b* rearward of the cylinder is secured by springs 13, as the gripper block 10 is rocked and moves the pin 2 away from the end of the slot in stop block 12, as shown in Figs. 3 and 4. Just as this operation takes place, the rubber feeding wheels *e* are moved into feeding contact with the underside of the sheet, after side registry, so as to press the sheet forward at a speed slightly greater than that of the cylinder A, so that by this feeding action of the feed wheels the head of the sheet is kept pressed up

against the stops *c*, *b*, and the sheet thus held pressed forward until the grippers have fully seized it, thus assuring accurate end registry of the sheet, although fed at high speed and without any stopping of its forward motion in transferring from the feed-board to the cylinder. The sheet after being seized by the grippers is then fed forward by the cylinder with the sheet head against the stops *b*, until the grippers are opened. The position of the parts during and after the closing movement of the grippers is shown in Figs. 5 and 6.

The operation of the side registry mechanism is as follows:—

The sheet is fed to the feed-board with its side edge over the bar 23 and beneath the fingers *h*, the pad *i* being then raised by the action of cam 35 on lever 32, and the cam 35 then releases the roll 34 so as to permit spring 36 to rock lever 32 and move the pad *i* downward on to the sheet *x*, upon which it presses sufficiently to move the sheet sidewise and keep it up against the side stops *g* as the pad and stops are carried forward by the chain 21. As the chain gradually moves sidewise away from the edge of the feed-board, the pad *i* draws the sheet sidewise and holds it up against the side stop *g*, which with the fingers *h* is moved inward by spring 26 and kept against the edge of the feed-board, as the carriage 25 moves away from the feed-board with the chain, the yielding soft rubber fingers of the pad *i* slipping on the sheet, while at the same time exerting sufficient sidewise pressure to keep the sheet up against the stop *g*. Only one carriage with its pad and stop is shown, but it will be understood that two or more carriages may be mounted on the chain so that a pad and stop will be brought into position for action on successive sheets, according to their length. Before the pad *i* runs off the sheet at the forward end of the feed-board and just as the grippers are about to take the sheet, the inclined air current is thrown on the underside of the sheet from pipe *k*, so as to float the sheet and press it sidewise to assist the pad in drawing the sheet sidewise against stop *g* and thus assure side registry. This air blast may be used with other means for drawing the sheet sidewise, or in some cases may be used alone and relied on for moving the sheet sidewise for side registry. The grippers are preferably actuated and timed, as shown, in Figs. 3 to 6, so that they do not close until the cylinder has moved through quite a space with the sheet fed against the stops *b*. The grippers move through a small arc from the open position shown in Fig. 3, to the position shown in Fig. 4, where they lie just above the sheet, and the latter is held against the stops *b*, and then as the cylinder moves onward to the position shown

in Fig. 6, are closed down upon the sheet. This aids in securing the accurate registry of the sheets against the stops *b*.

It will be understood that the invention is not limited to feeding sheets for printing presses, but may be used in feeding sheets for other purposes, although of especial value in securing the accurate registry desired for printing, and it will be understood, also, that the invention is not to be limited to the exact construction and arrangement of parts shown, but that many modifications may be made by those skilled in the art, while retaining the invention defined by the claims.

What is claimed is:

1. In a sheet feeding apparatus, the combination with a feed-board, of a cylinder carrying sheet stops and sheet seizing devices, means for moving the cylinder stops into position to hold the sheet while it is being taken by the sheet seizing devices and actuating the sheet seizing devices to take the sheet, sheet stops moving over the feed-board with the sheet and controlling the head of the sheet for transfer to the cylinder stops, sheet feeding means for advancing the sheet over the feed-board with its head controlled by the feed-board stops, and separate sheet feeding devices moving at a higher speed than the feed-board stops and cylinder and acting to press the sheet against the stops before and during the taking of the sheet by the cylinder.

2. In a sheet feeding apparatus, the combination with a feed-board, of a cylinder carrying sheet stops and sheet seizing devices, means for moving the cylinder stops into position to hold the sheet while it is being taken by the sheet seizing devices and actuating the sheet seizing devices to take the sheet, sheet stops carried by endless belts moving with the sheet over the feed-board and acting to control the head of the sheet for transfer to the cylinder stops and arranged to be raised and moved out of stopping position for transfer of the sheet to the cylinder stops, and sheet feeding means acting to press the head of the sheet against the feed-board stops and against the cylinder stops before and during the taking of the sheet by the cylinder.

3. The combination with a feed-board and sheet feeding means for advancing a sheet over the feed-board, of a friction device acting on the sheet and moving forward with the sheet and at an angle to the sheet to draw it sidewise for side registry, said device being constructed to slip on the sheet to permit the sheet to be held by a side stop.

4. The combination with a feed-board and sheet feeding means for advancing a sheet over the feed-board, of a friction device acting on the sheet at the side edge, an endless belt carrying said friction device and mov-

ing at an angle to the feed-board to draw the sheet sidewise by the frictional device, and a side stop carried by the belt and mounted to move parallel with the feed-board, said friction device being constructed to slip on the sheet to permit the sheet to be controlled by the side stop.

5. The combination with a feed-board and sheet feeding means for advancing a sheet over the feed-board, of a friction device acting on the sheet and moving forward with the sheet over the feed-board and at an angle to the sheet to draw it sidewise for side registry, said device being constructed to slip on the sheet to permit the sheet to be held by a side stop, a lever carrying said friction device, and a cam controlling said lever to move the friction devices transversely to the sheet to engage and release the sheet.

6. The combination with a feed-board and sheet feeding devices, of a pad moving forward with the sheet over the feed-board and at an angle to the sheet and acting on the top of the sheet to press the sheet sidewise on the feed-board for side registry, said pad having a sheet engaging surface formed of soft rubber fingers.

7. The combination with a feed-board and sheet feeding devices below the sheet, of an air pipe arranged to deliver an air current upward at an angle on the underside of the sheet to raise the sheet and press it sidewise for side registry, and a side stop moving with the sheet.

8. The combination with a feed-board and sheet feeding means, of belt 21 moving at an angle to the feed-board, carriage 25 on said belt, side stop *g* mounted in the carriage and spring pressed toward the feed-board, friction pad *i*, lever 32 mounted in the carriage and carrying said pad, and cam 35 and spring 36 for raising and lowering said pad.

9. The combination with a feed-board and sheet feeding means, of belt 21 moving at an angle to the feed-board, carriage 25 on said belt, side stop *g* and fingers *h* mounted in the carriage and spring pressed toward the feed-board, friction pad *i*, lever 32 mounted in the carriage and carrying said pad, and cam 35 and spring 36 for raising and lowering said pad and fingers.

10. The combination with cylinder grippers *a*, of sheet stops *b* mounted to move to and from the head of the sheet, a lost motion connection for moving the stops by the grippers, and spring 13 pressing the stops toward the head of the sheet.

11. The combination with a feed-board and sheet feeding means for advancing a sheet over the feed-board, of a friction device acting on the sheet and moving forward over the feed board with the sheet and at an angle to the sheet to draw it sidewise for side registry, said device being constructed to slip on the sheet to permit the

sheet to be held by a side stop, and an air pipe arranged to deliver an air current upward on the underside of the sheet to raise the sheet to aid the friction device in securing side registry.

12. The combination with a feed-board and sheet feeding means for advancing a sheet over the feed-board, of a friction device acting on the sheet and moving forward over the feed board with the sheet and at an angle to the sheet to draw it sidewise for side registry, said device being constructed to slip on the sheet to permit the sheet to

be held by a side stop, and an air pipe arranged to deliver an air current upward at an angle on the under side of the sheet to raise the sheet and press it toward the friction device to aid the friction device in securing side registry.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

ROBERT HOE.

Witnesses:

A. WHITE,
C. J. SAWYER.