Nov. 23, 1926. 1,608,296

J. R. BLAINE

MECHANISM FOR FEEDING SHEETS

Filed May 3, 1924 3 Sheets-Sheet 1

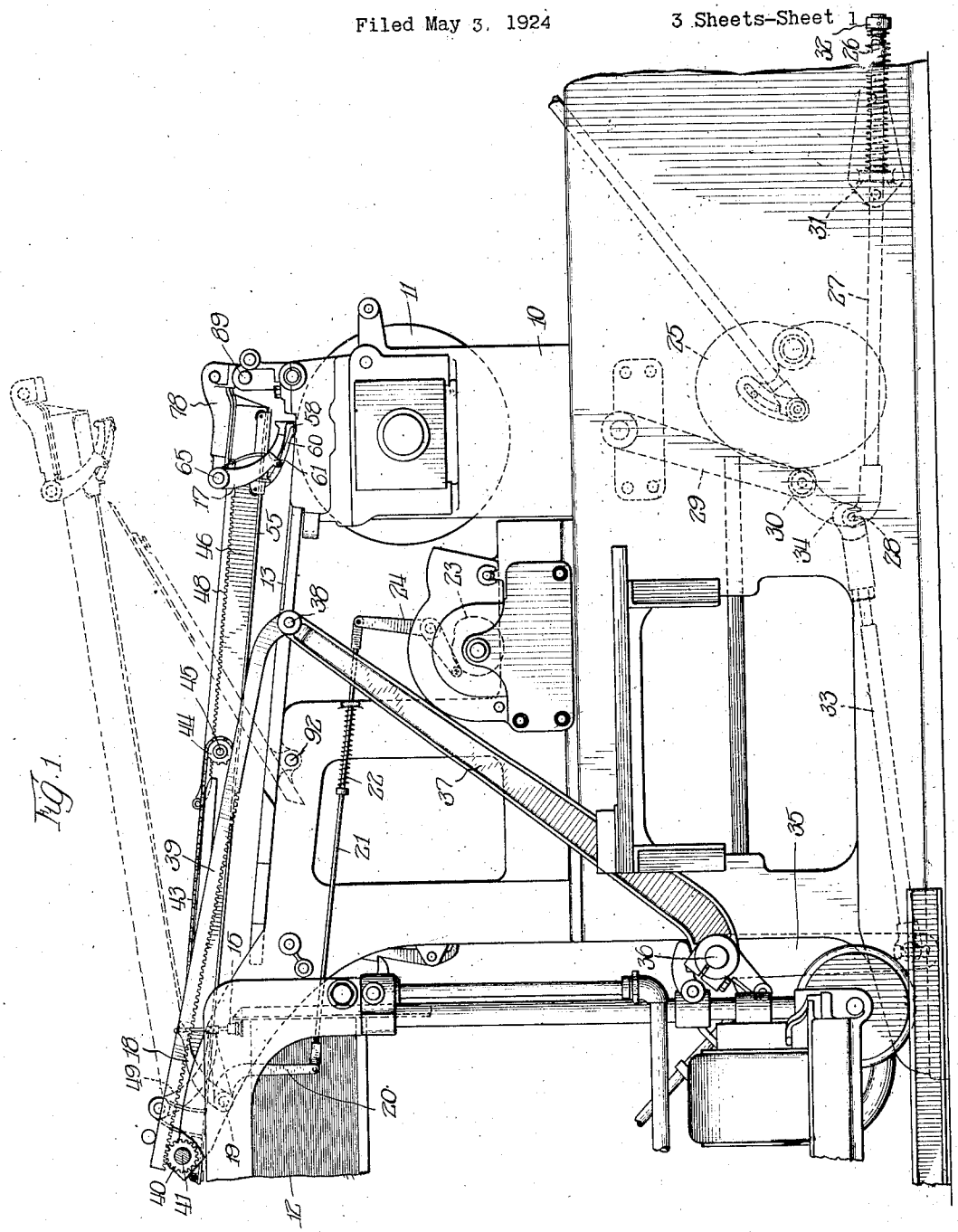


Fig. 1.

Witness:
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Inventor:
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MECHANISM FOR FEEDING SHEETS

Filed May 3, 1924 3 Sheets-Sheet 2

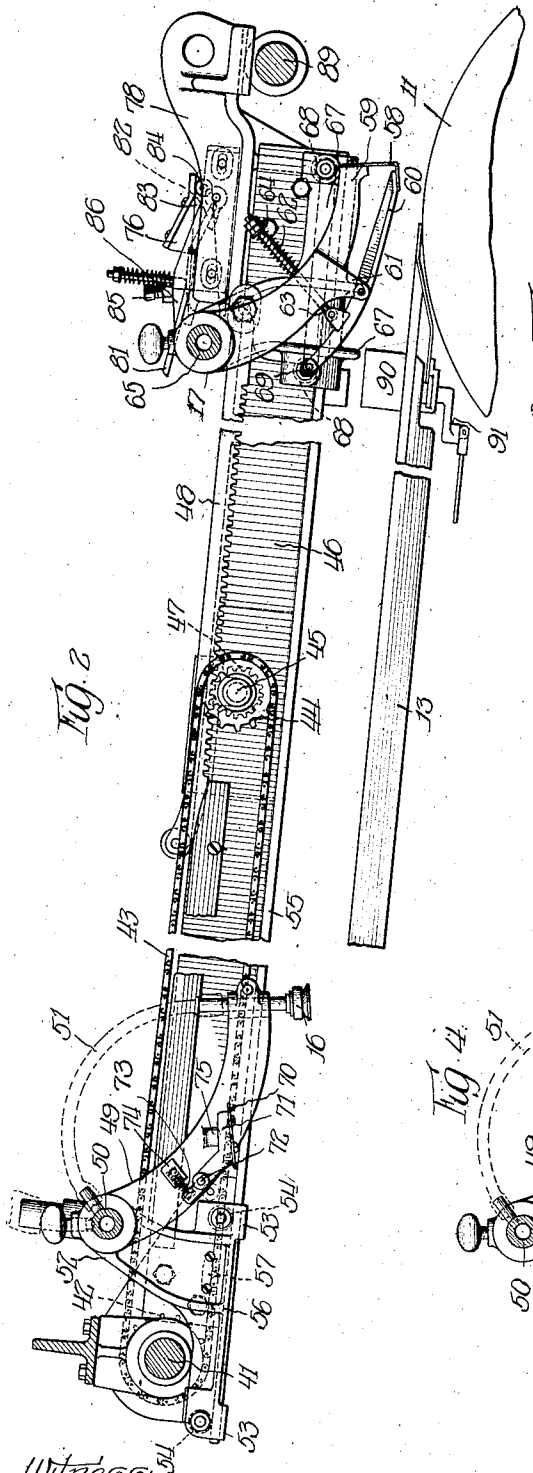


Fig. 2.

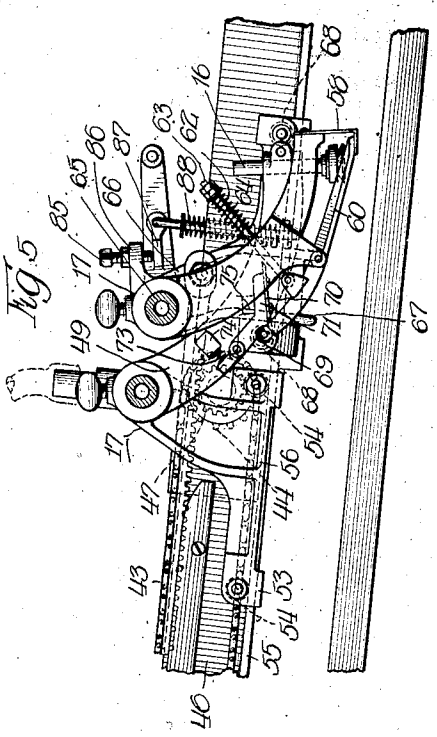


Fig. 5.

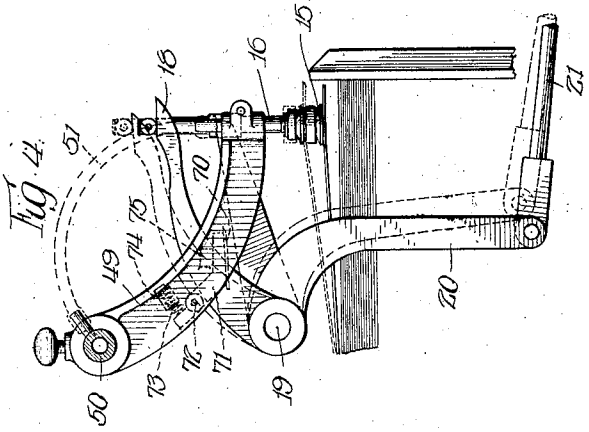


Fig. 4.

Witness:
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MECHANISM FOR FEEDING SHEETS

Filed May 3, 1924 3 Sheets-Sheet 3

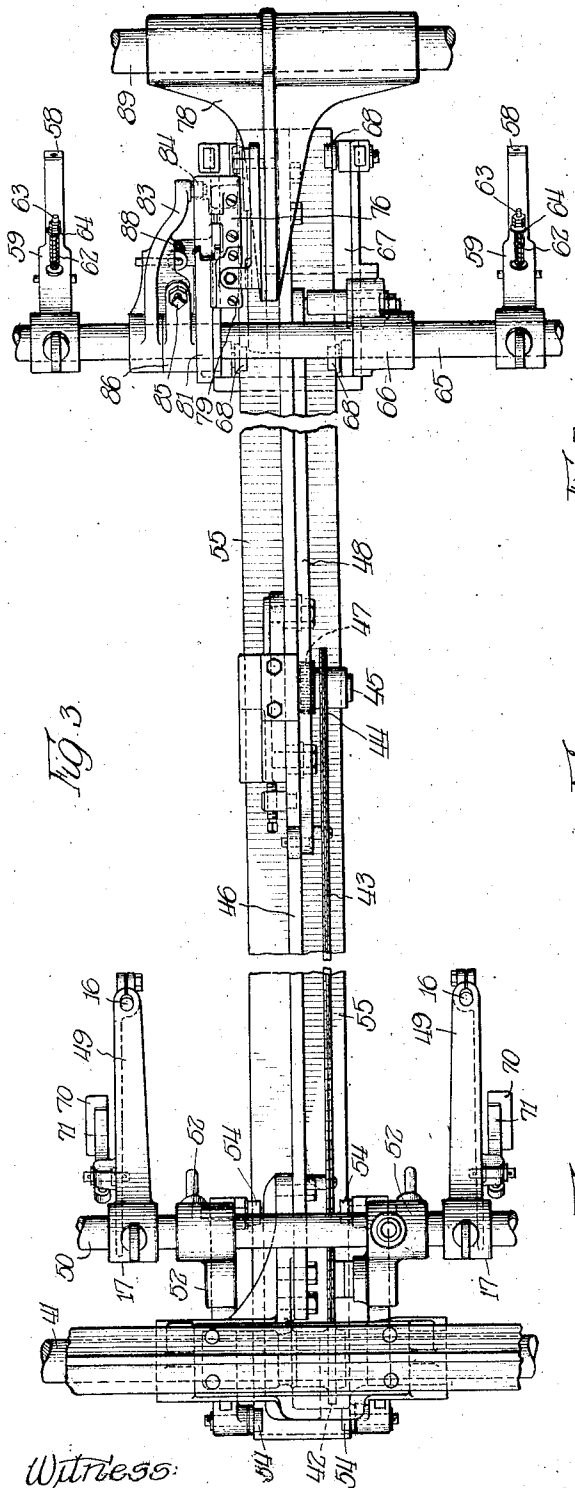


Fig. 3.

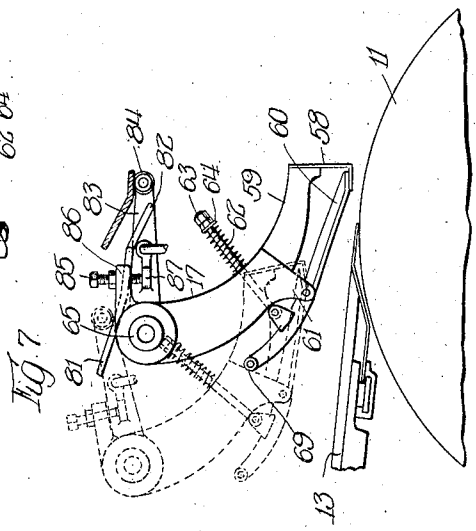


Fig. 7.

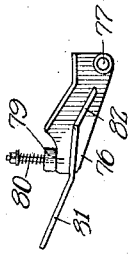


Fig. 8.

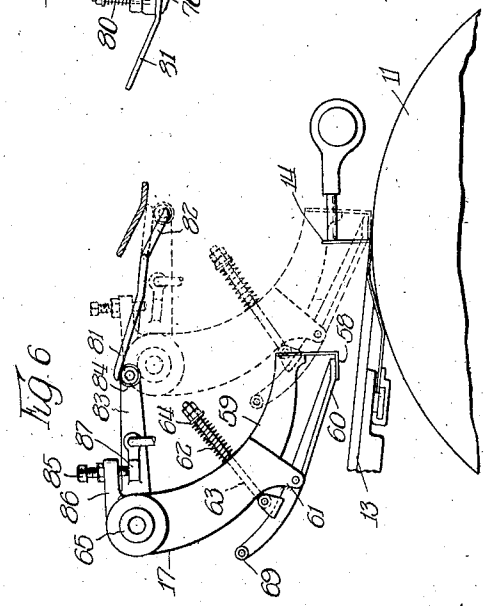


Fig. 6.

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Patented Nov. 23, 1926. 1,608,296

UNITED STATES PATENT OFFICE.

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MECHANISM FOR FEEDING SHEETS.

Application filed May 3, 1924. Serial No. 710,754.

This invention relates to sheet feeding mechanism for use in printing presses and the like.

One object of the invention is to provide simple, efficient and reliable sheet feeding mechanism for feeding sheets which, while it feeds a large number of sheets per minute requires only a relatively slow movement of the parts.

Another object of the invention is to support and control the sheet feeding mechanism in a simple and improved manner.

Another object is to provide a transfer sheet feeding arrangement in which the fed sheet at all times is maintained under the control of the feeding grippers.

Another object is to provide sheet feeding mechanism in which the various parts cooperate in a simple and improved manner whereby all of the requirements under service conditions are met.

These and other objects are accomplished by means of the arrangement disclosed on the accompanying sheets of drawings, in which—

Figure 1 is a fragmentary side elevation of a printing press embodying my invention;

Figure 2 is a detail side elevation of the feeding mechanism and showing the single central support on which said mechanism is carried;

Figure 3 is a fragmentary top plan view of the parts shown in Figure 2;

Figure 4 is a detail side elevation of part of the feeder mechanism showing a pick-up suction gripper and a gripper to which the sheet is transferred by the pick-up gripper preparatory to the sheet being fed forward toward the impression cylinder;

Figure 5 is a fragmentary side elevation of the suction transfer gripper and also the gripper which carries the sheet ultimately to the front register, the grippers being shown at a mid-point in the travel of the sheet, and also showing means whereby the sheet is transferred from the transfer suction gripper to the register gripper;

Figure 6 is a detail side elevation of the register gripper and means for causing the register gripper to dip to properly present the sheet to the front guide;

Figure 7 is a side elevation of the same register gripper after the sheet has been fed to the front guide and the register gripper is on a return movement to receive another sheet from the transfer suction gripper; and

Figure 8 is a detail side elevation of a switch within a switch which switches are effective for giving the register gripper its dipping movement at a point adjacent a front register guide and for again raising said gripper.

The various novel features of the invention will be apparent from the following description and drawings, and will be particularly pointed out in the appended claims.

Referring to the figures of the drawings, it will be noted that the invention is illustrated in connection with a printing press having a main frame 10 which rotatably supports an impression cylinder 11 for cooperation with a horizontally reciprocatory type bed (not shown), sheets being fed one at a time from a feed pile 12, over a transfer table 13 and to the front register guide 14 preparatory to each sheet being drawn onto the impression cylinder 11 by grippers (not shown) carried by the cylinder 11.

In this feeder arrangement each sheet is gripped by grippers, the first set being known as the pick-up suction grippers 15 (only one of which is shown) which raise the top sheet from the pile 12 into a position where said sheet may be gripped by a set of transfer suction grippers 16, the transfer suction grippers being mounted for reciprocatory movement from a point over the feed pile 12 to an intermediate point between said pile and the impression cylinder 11 where, at such intermediate point the fed sheet is transferred from said transfer suction grippers 16 to register grippers 17 which reciprocate between said intermediate point and the impression cylinder 11 for carrying the sheet the balance of the distance to the front register guides 14. As will be pointed out in greater detail hereinafter, the transfer suction grippers and the register grippers are mounted and actuated in a manner whereby they move in opposite directions with respect to each other simultaneously, and at no time is a fed sheet out of control, but, on the other hand, is positively gripped at all times by one of said set of grippers to facilitate proper handling of the sheets and the register thereof. Furthermore, the sheet

is not deposited upon the feed table at any point of its feeding movement between the feed pile and the front grippers and it is deposited on the feed table only at the front gripper guides 14 for an instant preparatory to being taken by the cylinder grippers.

The pick-up suction grippers may be actuated in any suitable manner, and as shown, same are given a vertical reciprocatory movement through a lever arm 18 secured to a shaft 19 to which also is secured a lever arm 20 connected to a link 21 which is actuated in one direction by a spring 22 surrounding said link and in the opposite direction by a cam 23 to which the link 21 is operatively connected by a bell crank lever 24.

The remaining feeder members receive their movements by mechanism including an actuating cam 25 and a spring 26, the latter of which is coiled around a rod 27 having a pivotal connection at 28 to a lever 29 having a roller 30 which is held in engagement with the cam 25 by the spring 26. The spring 26 operates between a suitable guide bearing 31 and a collar 32, the latter of which is secured to the rod 27. A link 33 has a hook portion 34 which is detachably connected to the pin 28 for the purpose of detachment to prevent actuation of the feeder transfer mechanism when such parts as will be pointed out hereinafter are elevated out of their normal operative positions to facilitate "make ready". The link 33 also is connected to a lever arm 35 secured to a shaft 36 to which a lever arm 37 is secured, the latter having pivotally connected thereto at 38 a rack 39. This rack meshes with and drives a gear 40 secured to a shaft 41 to which also is secured a sprocket wheel 42 around which a chain 43 passes, said chain also passing around a sprocket wheel 44 mounted upon a shaft 45 carried in the single central support 46 which carries the transfer suction grippers 16, register grippers 17, and actuating mechanism and control mechanism associated therewith. Also mounted upon the shaft 45 is a pinion 47 which meshes with and drives a rack 48 which, as will be pointed out more in detail hereinafter, is connected to and drives the register grippers 17.

Each transfer suction gripper 16 is carried rigidly in an arm 49, two of which are shown in Figure 3. These arms are secured to a hollow shaft 50 through which suction extends, suction also extending through flexible tubes 51 connected with said shaft 50 and with the transfer suction grippers 16. The hollow shaft 50 in turn is mounted in two vertically extending arms 52 which form parts of the carriage for the transfer suction grippers 16, said carriage including under-straps 53 which connect the arms 52. Mounted in the side walls of the carriage are a plurality of rollers 54 which ride on top of the lower flange 55 of the central support 46. The carriage for the suction transfer grippers 16, which may be designated generally by the reference character 56, is secured by any suitable means 57 to the chain 43, so that as the sprocket wheel 42 is rotated in a counterclockwise direction, as viewed in Figure 2, the carriage 56 with its transfer suction grippers carrying a sheet of paper received from the pick-up grippers 15, will move forwardly to an intermediate point between the feed pile 12 and the impression cylinder 11 for feeding the sheet to the register grippers 17. The suction transfer grippers 16 and the register grippers 17 are shown in their positions of transfer in Figure 5. However, before describing the means by which the transfer of a sheet is made from the transfer suction grippers 16 to the register grippers 17, said register grippers will be described.

Referring particularly to Figures 6, 2 and 3, it will be noted that each register gripper includes a relatively stationary under jaw 58 carried in an arm 59 and a relatively movable upper jaw 60 pivotally mounted in depending portions 61 of the same arm 59, the movable jaw 60 normally being pressed into engagement with the relatively stationary jaw 58 by a spring 62 coiled around a rod 63 pivotally connected to the movable jaw 60, the spring 62 being operative between the arm 59 and any suitable abutment means 64 on the rod 63. Each arm 59, there being two shown in Figure 3, is secured to a rockably mounted shaft 65 which is mounted in arms 66 forming a part of a carriage 67 having rollers 68 which also ride on the lower flange 55 of the central supporting member 46.

Just prior to the transfer of a sheet from the suction transfer grippers 16 to the register grippers 17, the jaws of the latters must be opened. For opening said jaws or for raising the movable jaw member 60, the rear end thereof is provided with a roller 69 (see Figure 5) which cooperates with a plate 70 carried on a switch 71 pivotally mounted at 72 on an arm 49 which carries a transfer suction gripper 16. This switch is more clearly shown in Figure 4. Normally the switch is pressed upwardly in a counterclockwise rotative movement by a spring 73 operative between an abutment 74 on the arm 49 and a portion of the switch 71. The counterclockwise rotative movement of the switch 71 is limited by a lug 75 on the arm 49. Assuming that the register grippers are moving rearwardly and that the roller 69 has just passed into engagement with the front end of the switch plate 70, it will be appreciated that further rearward movement of the register gripper 17 with respect to the transfer suction gripper 16 will cause the relatively movable gripper jaw 60 to rotate in a counterclockwise direction for opening

the register gripper, and while the gripper jaws are thus opened, the sheet will be transferred from the transfer suction gripper 16 to the register grippers 17, and just as soon as the roller 69 passes rearwardly beyond the switch plate 70, the relatively movable gripper jaw 60, under the influence of spring 62 will snap into closed position for gripping the transferred sheet. Upon the forward movement of the register grippers 17 the roller 69 will roll over the top of the switch plate 70 slightly rotating the switch 71 in a clockwise direction against the tension of its backing spring 73.

Upon continued forward movement of the register grippers, which it will be understood is caused by the gear 47, rack 48, which latter is connected to the carriage 67, the transferred fed sheet approaches the impression cylinder 11. Said register grippers are thus shown in Figure 6. As shown in full lines in said figure, it will be noted that the gripper jaws are elevated a given amount above the feed table 13 for floating the sheet down over said feed table. However, just before the sheet is passed into engagement with the front guides 14 the sheet should be lowered to a position directly adjacent to the impression cylinder 11, so that front register may be properly effected and the grippers on the cylinder may properly seize the registered sheet. In order to give the register grippers a proper dipping action further switch mechanism is provided. This switch mechanism includes a main switch member 76 which is pivotally mounted at 77 to a bracket 78 secured to the front end of the central supporting member 46. This switch member 76 is held in its upper position against a stop member 79 by a suitably supported spring 80. This switch member carries an inclined cam plate 81 and also a movably mounted switch member 82 which forms a continuation of the cam member 81. Secured to the rock shaft 65 is an arm 83 in the end of which a roller 84 is mounted. The lever arm 83 is limited in its upward movement by an adjustable screw 85 mounted in a non-rotative arm 86 and which screw 85 engages a lug 87 on the lever arm 83. The lever arm 83 is normally pressed upwardly so that its stop 87 engages the screw 85 by a compression spring 88. When the roller 84 passes into engagement with the cam 81 on switch member 76 during the forward movement of the register grippers, the arm 83 is depressed or rotated in a clockwise direction for causing the register grippers 17 to dip. This dipping action continues as the roller 84 rides down under the cam 81, said grippers reaching their lowermost position, as shown in dotted lines in Figure 6, just about the time that the roller 84 passes onto the inner gravity actuated switch member 82. When the roller 84 passes into engagement with the inner switch member 82 the latter is caused to rise until the roller passes forwardly out of engagement therewith, whereupon the inner switch member 82 falls of its own weight, and then as the roller 84 is moved rearwardly with the register grippers 17, the roller 84 rides upwardly on the upper side of inner switch member 82 for raising the register grippers an amount which is increased upon continued rearward movement of said roller 84 and register grippers, as shown particularly in dotted lines in Figure 7. It will be understood that as the register grippers 17 pass forwardly beyond the front register guides 14 the fed sheet will be stripped from the register gripper 17. Also it will be understood that as the register grippers now move rearwardly, through the gearing hereinabove described, the transfer suction grippers 16 will be moved forwardly through the gearing also described, carrying another sheet of material to be transferred to the register grippers as described particularly in connection with Figure 5.

As shown in Figure 2, the front bracket 78 of the central support 46 is resting upon a supporting shaft 89 for normally supporting the various parts described in operative position. If it is desired to move the feed mechanism out of the way to facilitate "make ready" of the impression cylinder 11, the same may be done by lifting the right hand end of the central support 46 for swinging same in a counterclockwise direction, it being understood that the central support member 46 is pivotally connected to the shaft 41. Not only is the central support 46, which carries the feeder mechanism, swingable upwardly, but also the feed board 13 with the side register 90 and the actuating mechanism 91 for the latter, is pivotally mounted for upwardly swinging movement about the point 92 to facilitate "make ready" of the impression cylinder 11.

From an inspection of the drawings it will be seen that there is but a single supporting member 46 and that it extends longitudinally and centrally over the feed board 13, and that this central supporting member 46 has movably mounted upon it the carriages for the transfer suction grippers 16 and register grippers 17. It also carries the chain 43, rack 48 and connecting transmission and driving mechanism for actuating said carriages.

By means of the feeding arrangement hereinabove described, a press may print at a high rate of speed while the feeding parts may be run at a relatively low speed, and during the entire feeding movement of each sheet, the sheet is under the positive control of one set of grippers or another, the sheet never being placed upon the feed table at a time that it is out of control of the grippers.

The high speed feeding of sheets with relatively slow movement of the feeding parts is accomplished by having the suction transfer grippers 16 and the register grippers 17 move simultaneously in opposite directions, each set of grippers carrying a fed sheet a portion of the distance between the feeder pile and the impression cylinder.

Also by means of the arrangement described the feeder mechanism and the feed table may be swung up out of their normal operative position, as generally indicated in dotted lines in Figure 1, to facilitate "make ready" of the impression cylinder. If desirable, and it is the safe thing to do, the hook portion 34 of the power transmitting link 33 may be disconnected from the pin 28 to prevent driving of the grippers, particularly when the central support, with its gripper mechanism, is raised into an inoperative position.

It is my intention to cover all modifications of the invention falling within the spirit and scope of the following claims.

I claim:

1. In sheet feeding mechanism, the combination of a plurality of sheet feeding members movable simultaneously in opposite directions to facilitate high speed feeding of sheets with a relatively low speed movement of said members.

2. In sheet feeding mechanism, the combination of a plurality of cooperating sheet feeding grippers movable simultaneously in opposite directions to facilitate high speed feeding of sheets with a relatively low speed movement of said grippers.

3. In sheet feeding mechanism, the combination of a plurality of cooperating sheet feeding members movable simultaneously in different directions and feeding a sheet from one to the other to facilitate high speed feeding of sheets with a relatively low speed movement of said members.

4. In sheet feeding mechanism, the combination of a plurality of sheet feeding members, and means whereby one of said members is operable upon the other to permit the transfer of a sheet from one of said members to another.

5. In sheet feeding mechanism, the combination of a plurality of gripping sheet feeding members, and means whereby said members pass into juxta-position at an intermediate point in the feeding movement of a sheet whereby a sheet may be transferred from one of said members to another and maintained in gripped control.

6. In sheet feeding mechanism, the combination of a plurality of sheet feeding members movable simultaneously in opposite directions, each for feeding a sheet a portion of the entire feeding distance between a feed pile and another objective point, and means whereby the sheet is fed directly from one of said members to another without losing control of said sheet by both of said members.

7. In sheet feeding mechanism, the combination of a plurality of cooperating sheet feeding grippers movable simultaneously in different directions, each for feeding a sheet a portion of the entire feeding distance between a feed pile and another objective point, and means whereby a sheet is fed directly from one gripper to another without losing control of said sheet by both of said grippers.

8. In sheet feeding mechanism, the combination of a plurality of sheet feeding members, each for feeding a sheet a portion of the entire feeding distance between a feed pile and another objective point, and means whereby one of said sheet feeding members is operable upon the other for transferring a sheet directly from one of said members to another without losing control of said sheet by both of said members.

9. In sheet feeding mechanism, the combination of a plurality of sheet feeding members movable simultaneously in opposite directions, each for feeding a sheet a portion of the entire feeding distance between a feed pile and another objective point, and means whereby the sheet is fed directly from one of said members to another without losing control of said sheet by both of said members.

10. In sheet feeding mechanism, the combination of means for gripping the top sheet in a pile, a sheet feeding member, means for transferring said sheet to said sheet feeding member, a second sheet feeding member, said first and second sheet feeding members being simultaneously movable in opposite directions, and means whereby a sheet may be transferred from said first sheet feeding member to said second sheet feeding member.

11. In sheet feeding mechanism, the combination of means for gripping the top sheet in a pile, a sheet feeding member, means for transferring said sheet to said sheet feeding member, a second sheet feeding member, said first and second sheet feeding members being simultaneously movable in opposite directions, and means whereby a sheet may be transferred from said first sheet feeding member to said second sheet feeding member at a point intermediate the full feeding path of travel of said sheet without losing control of the sheet.

12. In sheet feeding mechanism, the combination of a pick-up gripper whereby the top sheet in a pile may be elevated, a transfer gripper for taking said sheet from said pick-up gripper, a third gripper, and means whereby said transfer gripper takes said sheet from said pick-up gripper and delivers it directly to said third gripper during a progressive feeding movement of the sheet,

said transfer and third gripper being simultaneously movable in different directions.

13. In a printing press, the combination of a pick-up gripper, a transfer gripper for taking said sheet from said pick-up gripper and giving said sheet a feeding movement, and a third gripper for directly receiving said sheet from said transfer gripper and for giving said sheet a further feeding movement, said transfer gripper and third gripper being simultaneously movable in different directions.

14. In a printing press, the combination of a feed pile, an impression cylinder, and a plurality of sheet feeding members moving simultaneously in opposite directions between said feed pile and cylinder for feeding a sheet from said feed pile to said cylinder by transferring said sheet from one of said sheet feeding members to the other.

15. In sheet feeding mechanism, the combination of a plurality of sheet feeding grippers, means whereby said grippers are simultaneously movable in different directions, means whereby a fed sheet may be transferred directly from one of said grippers to the other at a point intermediate the distance of travel of the sheet, and means for releasing said sheet from the second gripper at the end of the sheet feeding movement.

16. In sheet feeding mechanism, the combination of a plurality of sheet feeding grippers, means whereby one of said grippers is operable upon the other for permitting a direct transfer of a sheet from one of said grippers to the other at an intermediate point in the path of travel of said fed sheet, and means for releasing said sheet from the second gripper at the end of the feeding movement of said sheet.

17. In a printing press, the combination of an impression cylinder, a front guide adjacent said impression cylinder, a plurality of grippers simultaneously movable in opposite directions for successively gripping a fed sheet and each feeding same independently a given distance, and means for giving one of said grippers a dipping movement adjacent said front guide for properly registering said sheet.

18. In a printing press, the combination of an impression cylinder, a front guide adjacent same, a plurality of cooperating grippers simultaneously movable in opposite directions, means whereby one of said grippers is operable upon another for permitting a transfer of a fed sheet from one of said grippers to another at an intermediate point in the path of travel of said sheet, and means for giving one of said grippers a dipping movement adjacent said front guide for properly registering a sheet with respect thereto.

19. In a printing press, the combination of a feed pile, an impression cylinder, a front guide associated therewith, a pick-up gripper adapted to pick up the top sheet from said pile, a plurality of grippers simultaneously movable in opposite directions, one of said grippers receiving the sheet from said pick-up gripper and transferring it directly to said other gripper, and means adjacent said front guide for giving said other gripper a dipping movement to facilitate front registering said sheet.

20. In sheet feeding mechanism, the combination of a support, and a plurality of sheet feeding members carried by said support and simultaneously movable in different directions in a manner to transfer a sheet from one to the other.

21. In sheet feeding mechanism, the combination of a support, and a plurality of sheet feeding members movable upon said support simultaneously in opposite directions whereby a sheet may be transferred from one of said members to another.

22. In sheet feeding mechanism for a printing press, the combination of a pivotally mounted support, extending longitudinally centrally with respect to the press gearing carried by said support, and a plurality of sheet feeding members operatively connected to said gearing whereby said members may be moved to relay a fed sheet.

23. In sheet feeding mechanism, the combination of a support, gearing carried by said support, and a plurality of sheet feeding members operatively connected to said gearing whereby said members are movable simultaneously in opposite directions for feeding a sheet and transferring said sheet from one of said members to another.

24. In a printing press, the combination of a feed board, a single supporting member extending longitudinally over the center of said feed board, and a plurality of sheet feeding members carried by said support and movable in a manner to transfer a sheet from one to the other.

25. In a printing press, the combination of a feed board, a single supporting member extending longitudinally over the center of said feed board, and a plurality of sheet feeding members carried by said support and movable in a manner to transfer a sheet from one to another without permitting the sheet wholly to rest upon said feed board.

26. In a printing press, the combination of a cylinder, a feed board associated therewith, a single support extending longitudinally over said feed board to a point adjacent said cylinder, a plurality of grippers carried by said support, and means whereby a fed sheet may be transferred from one of said grippers to the other in a feeding movement over said feed board toward said cylinder.

27. In a printing press, the combination of a feed board, side registering mechanism carried thereby, a single support extending longitudinally and centrally with respect to said feed board, and sheet feeding mechanism carried by said support, said feed board and said support being pivotally mounted to be swung away from parts of the press to facilitate "make ready."

28. In a printing press, the combination of a feed board, side register mechanism carried thereby, a single support extending longitudinally over the central portion of said feed board, and sheet feeding mechanism carried by said support, said feed board and said support each being pivotally mounted to be swung away from parts of the press to facilitate "make ready."

Signed at Chicago, Illinois, this 8th day of April, 1924.

JOSEPH R. BLAINE.