June 26, 1934. E. J. BRASSEUR 1,964,498

SHEET FEEDING DEVICE

Filed Oct. 30, 1931 2 Sheets-Sheet 1

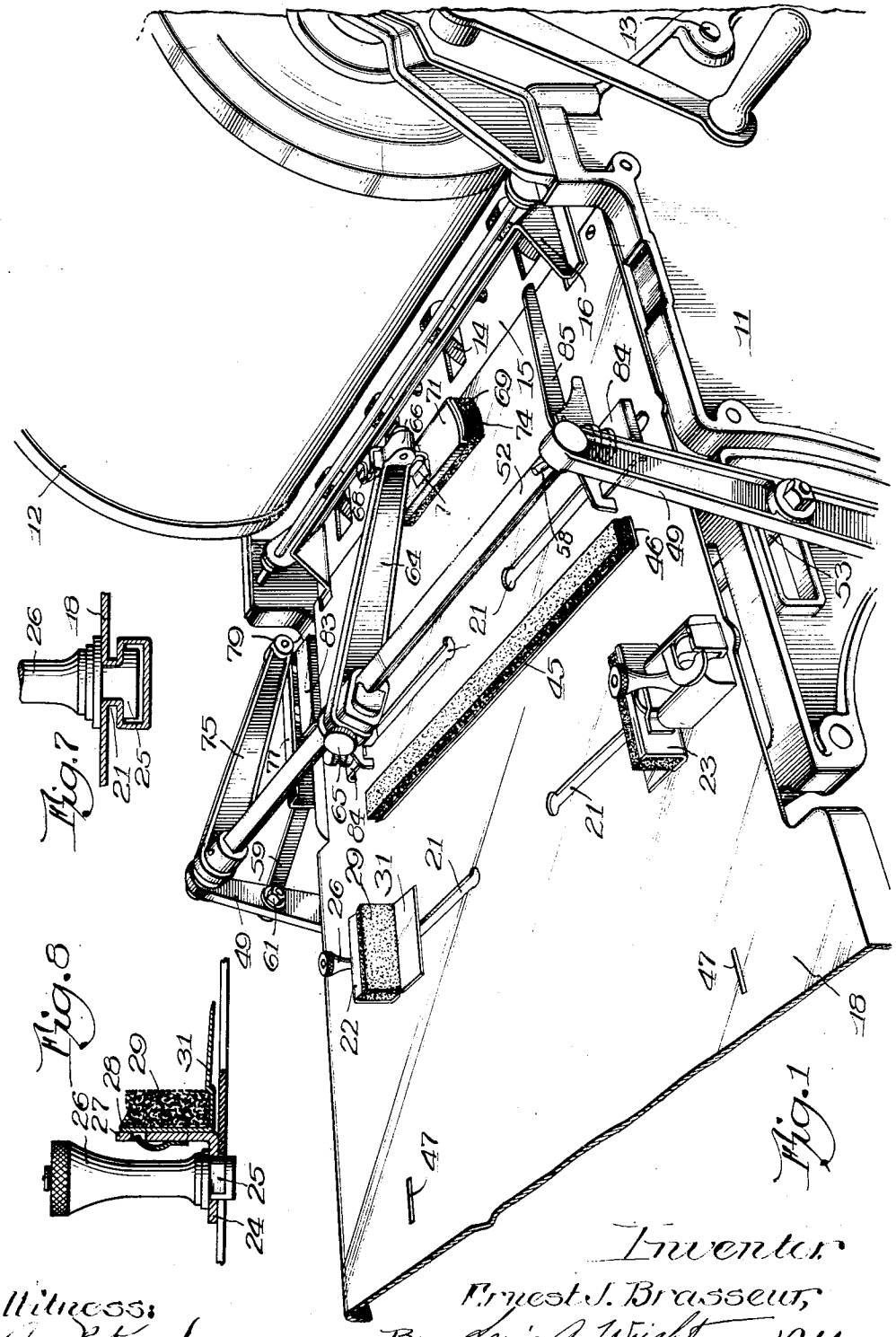

Fig. 7

Fig. 8

Fig. 1

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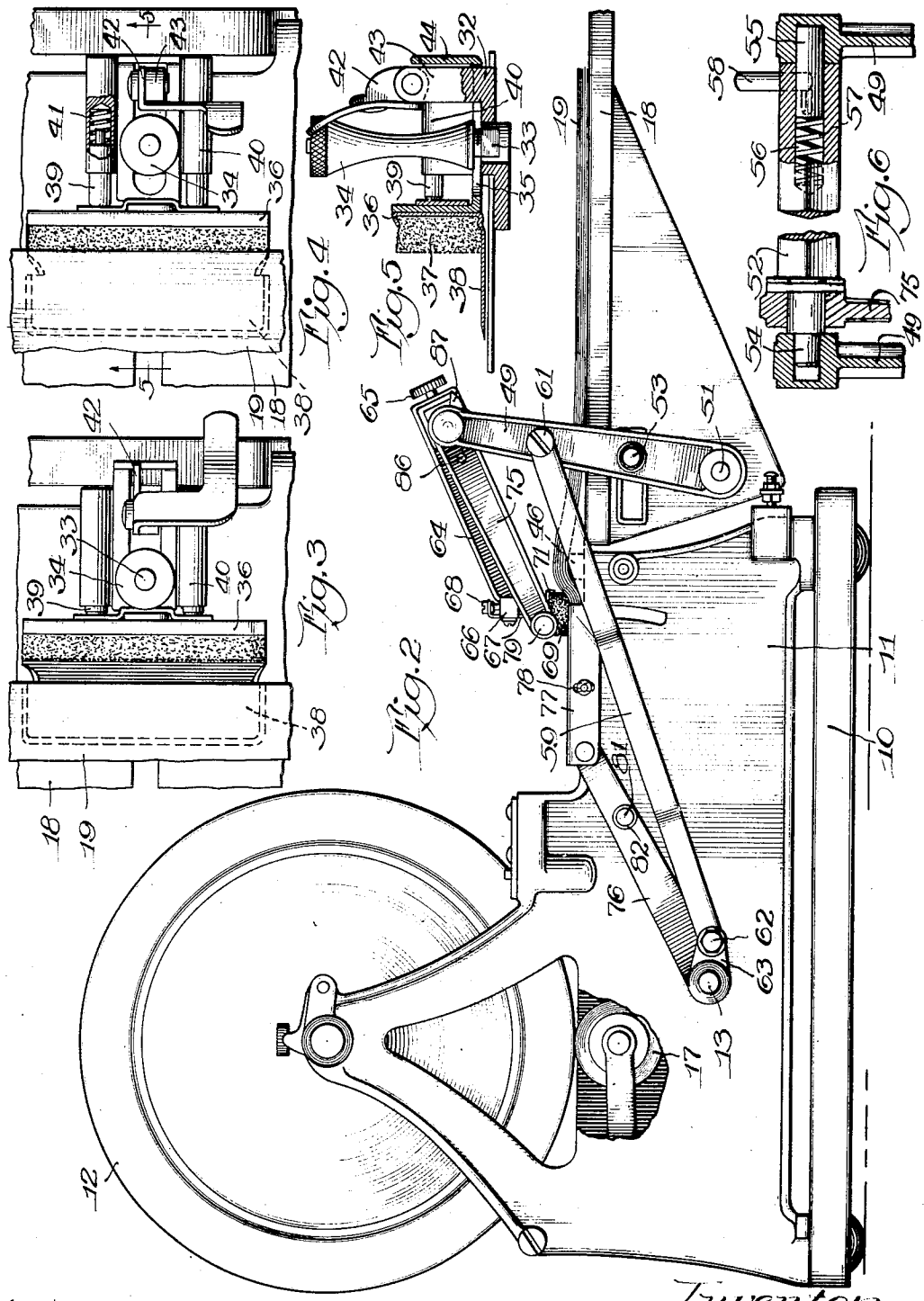

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UNITED STATES PATENT OFFICE

1,964,498

SHEET FEEDING DEVICE

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This invention relates to sheet feeding devices and more particularly to such devices adapted for use in connection with duplicating machines and the like, and it has for its principal object to provide apparatus of the character designated which shall effect certain improvements and economies in the feeding of sheets singly and in succession from a pile or stack.

The invention may be used in connection with any machine to which sheets of material are to be fed, but it is particularly adapted for use in connection with rotary stencil duplicating machines, such as that disclosed in United States Patent No. 1,024,186 to Albert B. Dick, and by way of example has been shown and described in connection with such a machine. In machines of this nature as now commonly employed, the impression sheets are fed from a pile on a suitable support or feed table to a position in which the forward edge lies between the members of a printing couple, comprising a stencil drum and an underlying pressure roller.

One of the objects of the invention is to provide a simple, reliable and inexpensive feeding device for such a machine in which single sheets shall be periodically removed from the pile and accurately guided to the printing couple, the remainder of the pile being retained in position on the feed table.

Another object of the invention is to provide means to relieve back-drag of the feeding device on the pile of sheets during the return movement and to elminate stresses on the impression paper and on the relatively frail stencil.

Another object of the invention is to provide side guides or gauges for the pile of sheets which shall insure the accurate feeding of one sheet to the printing couple while frictionally restraining the remainder of the pile with a constant and predetermined pressure, and which shall facilitate replenishment of the pile.

Another object of the invention is to provide means to transversely stiffen the pile of sheets against buckling or crumpling due to the restraining pressure of the side gauges.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of this specification, and in which:

Fig. 1 is a perspective plan view, partially broken away, of the feed end of a duplicating machine of the type described, showing the invention applied thereto;

Fig. 2 is a side elevation, partially broken away, of the opposite side of the machine shown in Fig. 1 showing the feeding device and the drive mechanism therefor;

Figs. 3 and 4 are fragmentary plan views of a retractible side gauge assembly, showing the retracted and applied positions thereof respectively;

Fig. 5 is a detail section taken on line 5—5 of Fig. 4;

Fig. 6 is a detail section through the feed shaft, or bar, showing the mounting thereof;

Fig. 7 is a detail section showing one form of gauge clamping post and slot, and

Fig. 8 is a detail sectional view, similar to Fig. 5, showing the construction of a non-retractable side gauge.

Referring to the drawings, the duplicating machine to which this invention is applied comprises a base 10 upon which side frames 11 are erected. The stencil carrying drum 12, mounted by suitable trunnions in the side frames, is connected through the usual train of gearing (not shown) to a shaft 13, extending between and journaled in the side frames, one of the gears being actuated in the customary manner by an operating crank. The shaft 13 is adapted to operate suitable sheet forwarding devices 14, which receive the impression sheets as they are fed over a feed board 15 and into a feed chute 16, as is well understood. A pressure roller 17 (Fig. 2) mounted below and cooperating with the drum 12 to form the printing couple, is adapted to receive the impression sheets from the sheet forwarding devices 14 in the usual manner. As the operation of duplicating machines of this character is well understood in the art to which this invention relates, further description thereof is unnecessary.

The sheet feeding device of this invention, as shown in connection with a duplicating machine of the character described, comprises a feed table 18 secured to and forming a continuation of the feed board 15, and mounted on the side frames 11. The feed table 18 is adapted to support a pile of impression sheets 19 to be fed, and is provided with pairs of transverse alined slots or channels 21, for the reception and support of suitable positioning and guiding members, by which the pile 19 is placed and retained in proper position, and the sheets guided to the sheet forwarding devices. These include the friction side gauges 22 and 23.

The gauge 22, best shown in Figs. 2 and 8, is the stationary or non-retractable guide. It comprises a member 24 adapted to rest on the upper surface of the feed table and to be secured there-

to by a clamping member 25, engaging the slot 21 and having a thumb nut 26. The member 24 has an upright bracket 27 on which is mounted a carrier 28 for a removable guide shoe 29, preferably of sponge rubber, adapted to engage the side edge of the pile 19. The carrier 28 is somewhat loosely secured to the bracket 27 to permit slight movements of adjustment and is provided with a horizontal apron portion 31 disposed in proximity to the feed table and beneath the pile of sheets 19.

The opposite side edge of the pile 19 is adapted to be engaged by a retractable side gauge 23, shown in Figs. 2 to 5. This includes a member 32 adapted to be clamped to the table 18 by a member 33 and thumb nut 34, similar to the member 25 and nut 26. The member 32 carries a bracket 35 which is slidable thereon transversely of the table, and which has an upright portion to which a carrier 36, similar to the carrier 28, is secured. A guide shoe 37 is removably secured to the carrier 36 and a horizontal apron portion 38, similar to the apron 31, is provided.

The carrier 36 is urged transversely of the table, so that its shoe 37 is pressed into clamping engagement with the edge of the sheet pile 19, by a pair of spring pressed plungers 39, mounted in housings 40, integral with the member 32. The clamping pressure of the shoe 37 is determined by the strength of the springs 41, so that the clamping effect, and accordingly the frictional engagement of the shoe with the pile 19, is a predetermined constant.

Retraction of the carrier 36 against the pressure of the plungers 39 is provided by a cam member 42, pivoted to a post 43 on the member 32 and engaging an abutment 44 on the slidable bracket 35, the cam being provided with a suitable thumb-piece or handle for convenient actuation. When moved into the extreme position, the cam member 42 acts as a latch to retain the shoe 37 out of engagement with the pile 19, and permit ready replenishment thereof.

The feed table 18 is also provided with a buckle bar 45, preferably formed of sponge rubber, the upwardly disposed surface of which extends transversely beneath the pile of sheets 19, and forms a transverse curvature or buckle in the pile of sheets 19, thus stiffening the pile against the clamping pressure of the gauge 22 and 23 and preventing crumpling or distortion of the pile as the thickness thereof decreases.

The friction surface of the bar 45 also assists in preventing forward creeping of the pile 19. The rubber is preferably supported on a suitable backing, which may be a channel shaped metal strip 46, and this backing member is provided, adjacent its ends with downwardly disposed ears (not shown) adapted to engage in spaced slots 47 in the table 18. A number of pairs of the slots 47 are preferably provided in the table to permit convenient adjustment of the position of the bar 45 lengthwise of the table. The bar 45 may also be used to assist the hand feeding of sheets from the pile, should this be desirable.

The invention also includes suitable means for feeding sheets from the pile 19 to the sheet forwarding devices 14. This comprises an oscillatory yoke member having side arms 49 pivoted as at 51 to the side frames 11 below the level of the feed table 18, and a yoke bar or shaft 52 supported at its ends by the upper ends of the arms 49 so that it extends transversely across the table and is parallel thereto. This shaft is preferably square, or of other suitable, non-circular section. The arms 49 are rigidly connected to oscillate in unison about their respective pivots 51 by a member 53 extending beneath the table. Their upper ends are provided with bearings for the shaft 52 which is pivotally mounted to turn therein between limits as by means of trunnions 54 and 55. The trunnion 55 is slidably mounted in a bore 56 in the end of shaft 52 and is urged outwardly by a spring 57 in the bore. It is also provided with a handle 58, projecting through a slot in the shaft, whereby it may be retracted against the pressure of the spring 57 to disengage the yoke arm, thus permitting ready removal of the yoke shaft.

The yoke is adapted to be oscillated about the pivots 51 in timed relation to the duplicating machine by suitable actuating means including a connecting rod 59, pivotally connected as at 61 to one of the side arms 49. At its other end, rod 59 is connected to a crank pin 62 on a crank 63, this crank being secured to the projecting end of the shaft 13 to rotate therewith.

Projecting forwardly and downwardly from the yoke shaft 52 is a feed arm 64, which is secured against turning on the shaft but which may be adjusted lengthwise thereof in any convenient manner, as by the clamp screw 65. The arm 64 is provided at its forward end with a boss 66 to which a carrier member 67 is adjustably secured. This member may be vertically adjusted with respect to the arm 64 by a screw 68 engaging its upper end. The lower end of the carrier member 67 supports a feed shoe assembly comprising a sponge rubber feed shoe 69 and a holder 71 therefor. The holder 71 is formed with an ear 72 which is attached to the member 67 by suitable connection such as a loose rivet (not shown), thus permitting a limited transverse rocking of the shoe with respect to the feed arm. The feed shoe 69 has a slightly convex contact surface 74, which is presented to the plane of the sheet pile 19 at an angle such that the sliding friction increases rapidly with resistance to horizontal movement of the top sheet.

The yoke shaft 52 is also provided near its end with an arm 75, which is integral with or rigidly secured thereto and which provides means for controlling rotation of the shaft 52 to disengage the feed shoe 69 from the sheet pile 19 during rearward or return movement of the feeding mechanism. To effect this, a cam lever 76 is pivotally mounted at one of its ends on the side frame 11 in any convenient manner, as on the shaft 13 adjacent crank 63. The other end of the lever 76 carries a cam plate 77, adjustably secured thereto as by screws 78, which cam plate is adapted to engage a cam roller 79 carried at the end of the arm 75. The cam lever 76 is provided, intermediate its ends, with a stud 81, on which is disposed a roller 82. This projects into the path of the connecting rod 59, which engages it once in each revolution of the machine to swing the cam lever 76 about its pivotal support and elevate the plate 77. Elevation of the plate causes rotation of the shaft 52, through roller 79 and arm 75, which in turn oscillates the feed arm 64 to raise the shoe 69 from the surface of pile 19. The position of the roller 82 is such that it engages the connecting rod 59 just at the beginning of the rearward travel of the feeding device, and releases it just at the completion of such rearward movement, so that during the return movement the feed shoe is out of contact with the pile of sheets 19.

Adjustment of the cam plate 77 is effected by loosening the screws 78 and rotating the machine until the plate rests on a surface 83, formed on the side frame 11 and parallel to the table 18. The screws 78 are then tightened to clamp the plate rigidly to the cam lever 76.

The feed shoe assembly may also be adjusted to feed down to the last sheet of the pile 19, if desired, without permitting the shoe to become glazed by rubbing on the steel table. This is effected by placing on the table 18 the number of sheets which it is desired to leave and turning the machine until the cam roller 79 is in contact with the cam plate 77 and the latter is in its lowermost position. The carrier member 67 is then lowered by means of screw 68 until the feed shoe 69 is just out of contact with the uppermost sheet.

If desired, the feed table may be also provided with marginal guides 84 of any suitable construction, adjustably clamped in one of the pairs of slots 21 and preferably between the gauges 22 and 23 and the feed chute 16. Such guides assist in initial positioning of the pile 19 on the table, and in guiding the sheet being fed and preventing cocking or twisting thereof. They may also be provided with paper leaders or weight arms such as shown at 85, to prevent upward curling of the leading edge of the sheet being fed. The leaders 85 are conveniently pivoted to the guides 84 and are preferably removable therefrom.

In order that the feeding means may be placed in inoperative position when desired without stopping the machine, as when the pile 19 is to be replenished or when the feeding of sheets is to be temporarily interrupted for any reason, the arm 75 is provided with a stop pin 86 adapted to contact a lug 87 on one of the side arms 49. When the shaft 52 is turned until the pin 86 contacts this lug 87, the arms 64 and 75 project rearwardly and upwards, and are retained by their weight in this position in which the feed shoe is out of contact with the pile of sheets. The feed assembly may be thus swung back into inoperative position at any time, the yoke continuing to oscillate.

The operation of the invention will be readily understood from the foregoing description. With the side gauge 23 in its retracted position a pile of sheets is placed on the feed table beneath the feed shoe 69, with one edge in contact with the gauge 22, the gauge 23 is adjusted laterally in its slot to proper position with respect to the other edge of the pile, and the cam 42 released, so that the pile is clamped between the guide shoes 29 and 37 with the predetermined pressure of the spring plungers 39. Upon operation of the machine in the usual way, the yoke is oscillated through crank 63 and rod 59 to move the feed shoe forwardly, and on such movement the frictional engagement of the shoe with the uppermost sheet of the pile advances that sheet into engagement with the sheet forwarding devices, the edges of the sheet sliding in contact with the gauge shoes. The second and other sheets of the pile are meanwhile restrained by the frictional engagement of shoes 29 and 37 with their edges, which friction is greater than the inter-sheet friction but less than the feed shoe friction, this action being assisted by the friction of the buckle bar 45. In this manner forward creeping of the pile 19 is effectually prevented.

While the sheet thus fed is being advanced by the sheet forwarding device 14 to the printing couple, the feed shoe is returning to its initial position. During such return movement it is raised by the cam lever 76 and the associated mechanism, so that it does not drag over the surface of the sheet, thus obviating all danger of damage to the sheet and more particularly to the relatively fragile stencil on the drum 12, with which that sheet is in contact. At completion of the return movement, the feed shoe is again lowered into contact with the pile 19, and the cycle of operations is repeated.

It will be evident that the invention provides a simple, compact and reliable sheet feeding device whereby the feeding of single sheets in succession may be accomplished with great accuracy at relatively high speeds, without material resistance to or stress on the receiving device, and without excessive wear of the parts.

It will also be evident that the device is well adapted for application as an attachment to duplicating and other machines already constructed, as well as for incorporation in new machines as a structural part thereof.

While a specific embodiment of the invention has been herein described, which is deemed to be new and advantageous and may be specifically claimed, it is not to be understood that the invention is limited to the exact details of the construction, as it will be apparent that changes may be made therein without departing form the spirit or scope of the invention.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. In a sheet feeding device for rotary printing machines, a feed table, a feed yoke having parallel arms pivotally mounted on said machine at the sides of the table, a yoke shaft pivotally mounted in the ends of said arms and extending across and above the table, a cam arm, a lever arm secured to the yoke shaft and adapted to be actuated by the cam arm, a connecting rod to oscillate the feed yoke and to actuate the cam arm from and in timed relation to the machine, and a feed shoe connected to said yoke shaft.

2. In a sheet feeding device for rotary printing machines, a feed table, an oscillatory feed yoke having a shaft member arranged above and parallel to said table, a feed member comprising a feed arm secured to said shaft member and a feed shoe carried by said feed arm, link means adapted to oscillate said feed yoke, and a cam lever operated by said link means to turn said shaft member whereby the feed shoe is raised and lowered in timed relation to said machine.

3. In a sheet feeding device for rotary printing machines having a power shaft, a feed yoke comprising a pair of parallel yoke arms pivoted to oscillate in unison and a shaft rotatably mounted between the ends of the yoke arms, a feed arm secured to the shaft, a lever arm secured to the shaft, a connecting rod actuated from the power shaft to oscillate said yoke arms, and a cam lever pivoted to the machine and actuated by the connecting rod to rotate the lever arm and raise the feed cam upon rearward movement of the feed yoke.

4. In a sheet feeding device for rotary printing machines having a drive crank and a feed table, a shaft mounted across and above the table and bodily movable in parallel relation thereto, driving means including a connecting rod associated with said drive crank to move the shaft longitudinally of the table in timed relation to the ma-

chine, a feed shoe supported from said shaft, and means operated by said connecting rod to rotate said shaft and thereby raise the feed shoe in timed relation to the machine.

5. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets being fed and having laterally disposed aligned slots therein, guide carriers adapted to be clamped in said slots, guide shoes of resilient material removably mounted on said carriers, and means associated with one of said carriers to resiliently urge the guide shoe laterally into contact with said pile.

6. In a sheet feeding device for rotary printing machines, a feed table having laterally disposed slots therein, guide carriers mounted in said slots and laterally adjustable therein, and sponge rubber guide shoes removably secured to said guide carriers.

7. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets being fed, side guides for said pile of sheets including sponge rubber guide shoes, and means to resiliently urge said guide shoes into contact with said pile of sheets with a predetermined pressure.

8. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets, resilient side guide shoes for said pile, spring means associated with one of said shoes to urge it into contact with the side edge of the pile, and latch means to hold said shoe out of contact with the pile.

9. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets, sponge rubber guide shoes for said pile laterally adjustable on said table, means including spring plungers to resiliently urge said shoes into clamping engagement with the side edges of the pile, and retracting means to withdraw said shoes from engagement.

10. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets, sponge rubber guide shoes for said pile laterally adjustable on said table, means including spring plungers to resiliently urge said shoes into frictional engagement with the side edges of the pile, and retracting means operable on said plungers to hold the shoes out of engagement.

11. In a sheet feeding device for rotary printing machines, a feed table adapted to support a pile of sheets, guide members for the sides of said pile, each comprising a guide shoe and a carrier therefor, said carriers being adjustably secured to said table, spring actuated plungers associated with one of said carriers to urge the shoe into resilient engagement with said pile, and a cam device operable to retract said shoe and retain it out of engagement with the pile.

12. In a sheet feeding device having a feed table adapted to support a pile of sheets, side guides adapted to resiliently engage the side edges of the pile, and a buckle bar disposed on said table transversely of and beneath the pile and adjacent said guides to stiffen said pile.

13. In a sheet feeding device having a feed table adapted to support a pile of sheets, guiding means frictionally engaging the side edges of said pile, and means adjacent said guiding means to transversely stiffen said pile.

14. In a sheet feeding device having a feed table adapted to support a pile of sheets, guiding means frictionally engaging the side edges of said pile, and buckling means disposed on the table adjacent the guiding means and having a friction surface, adapted to transversely stiffen and frictionally retard movement of said pile.

15. In a sheet feeding device having a feed table adapted to support a pile of sheets, side guiding means adapted to frictionally engage the sides of the pile to resist movement of the sheets therein, and a buckle bar on the table having an upwardly disposed friction surface contacting the bottom of said pile to transversely buckle the pile adjacent the guiding means and to frictionally resist movement of said pile.

16. In a sheet feeding device for rotary printing machines, having sheet forwarding devices, a feed table to support a pile of sheets to be fed to said devices, friction means engaging the side edges of the pile to restrain movement thereof, and friction means periodically operable on the pile to advance the uppermost sheet thereof to said sheet forwarding devices against the frictional resistance of the restraining friction means and the intersheet friction.

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