Jan. 9, 1940. R. S. HARM 2,186,485

SLIP SHEET FEEDER

Filed May 23, 1938 2 Sheets-Sheet 1

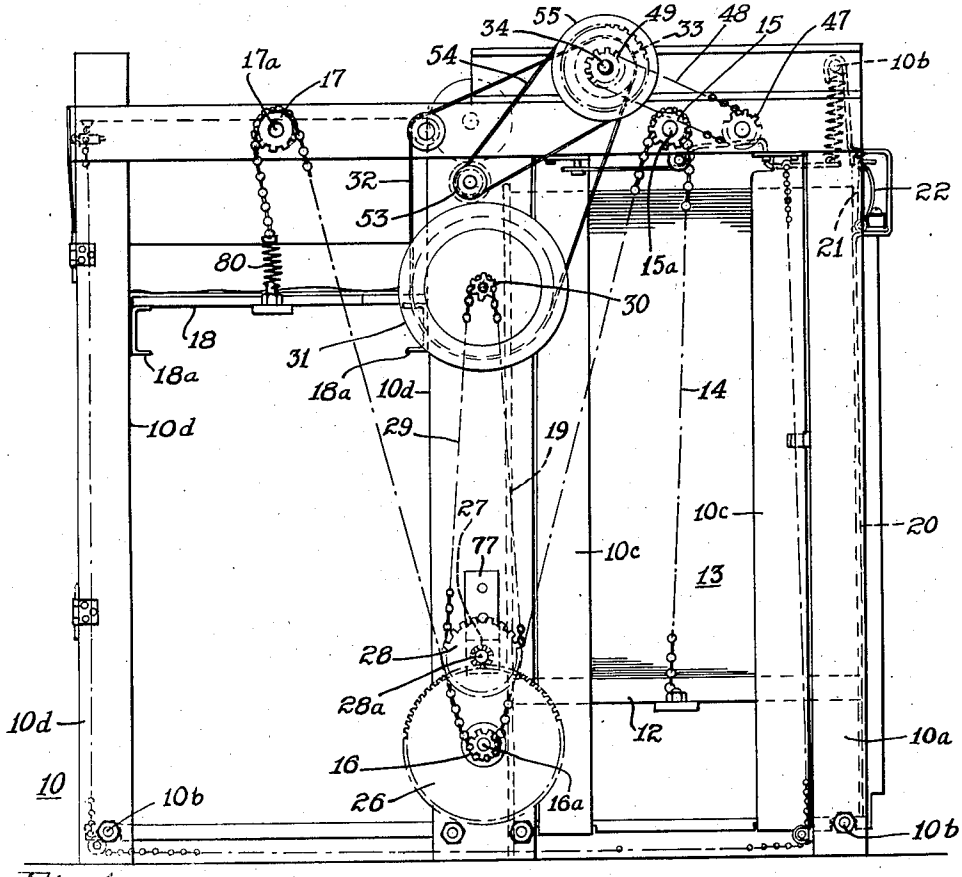


Fig. 1.

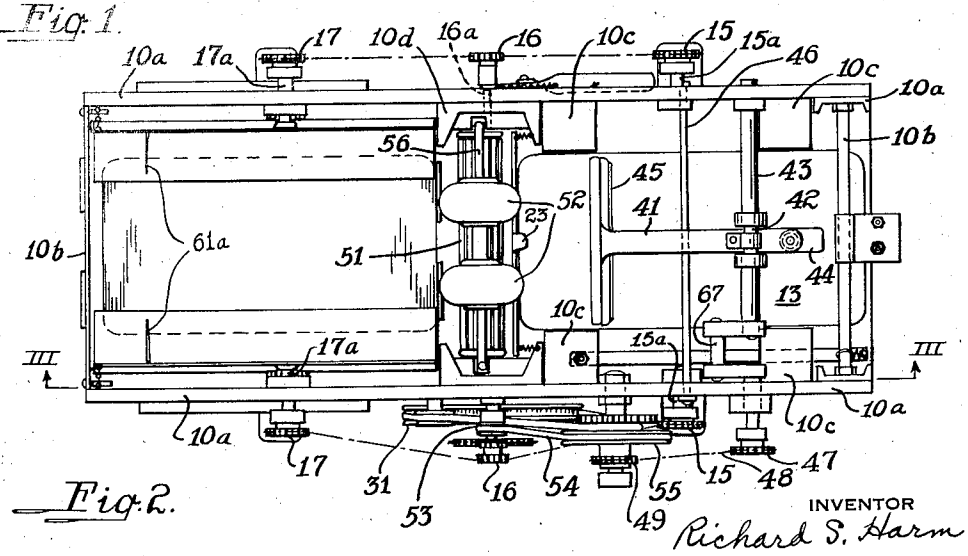


Fig. 2.

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SLIP SHEET FEEDER

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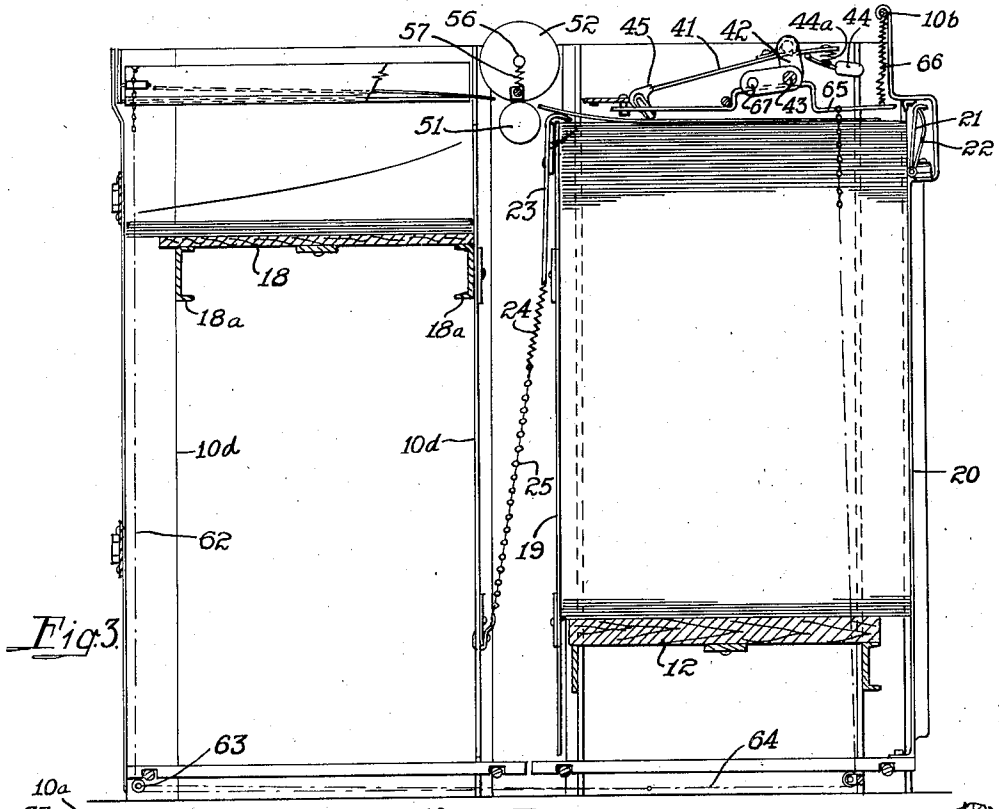


Fig. 3.

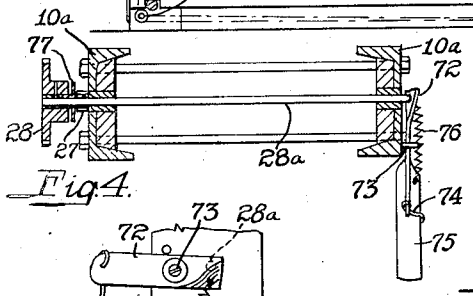


Fig. 4.

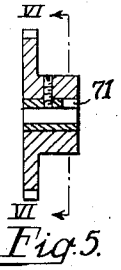


Fig. 5.

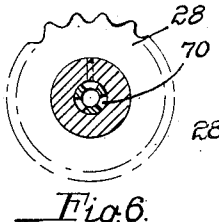


Fig. 6.

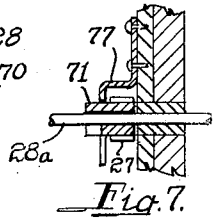


Fig. 7.

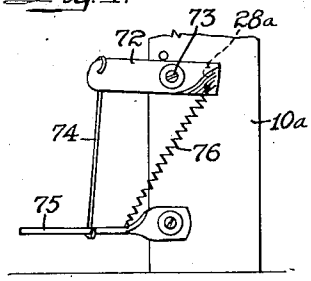


Fig. 8.

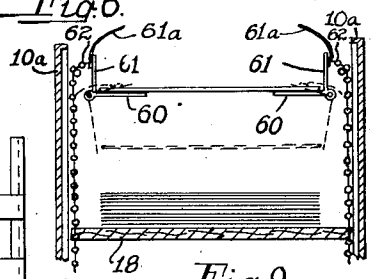


Fig. 9.

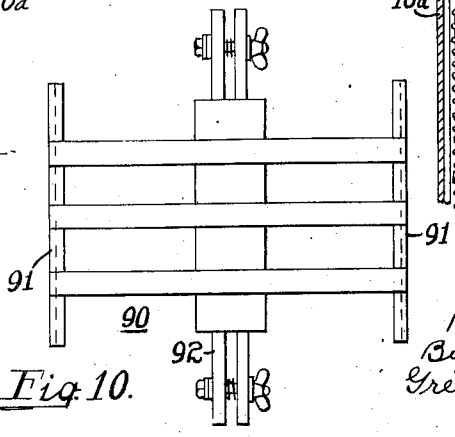


Fig. 10.

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Patented Jan. 9, 1940 2,186,485

UNITED STATES PATENT OFFICE

2,186,485

SLIP SHEET FEEDER

Richard S. Harm, Dormont, Pa., assignor of one-half to Guy W. Battles, Springdale, Pa.

Application May 23, 1938, Serial No. 209,455

6 Claims. (Cl. 34—1)

This invention relates to sheet feeding mechanisms for printing or duplicating machines, and more particularly to an improved mechanism for feeding slip sheets between the printed sheets as they are delivered from the press or duplicator to prevent smearing of the ink on the preceding printed sheet and to protect the backs of succeeding printed sheets.

One object of this invention is to provide an improved slip sheet feeder for duplicating or printing machines which will deliver slip sheets between the printed sheets and is so synchronized with the duplicating or printing machine that the slip sheet is delivered in position to receive and support the printed sheet delivered from the press or duplicator.

Another object is to provide a slip sheet feeder for duplicating or printing machines which has a materially greater capacity than the feeders now in general use on such machines and which is extremely simple to manufacture, positive in operation and relatively economical in cost.

A further object is to provide a slip sheet feeder in which the slip sheets are successively delivered to a receiving station in position to receive a printed sheet and in which the slip sheet and the printed sheet carried thereby are discharged and travel in a substantially vertical path onto a collecting platform where the printed sheets and the slip sheets are stacked.

A still further object is to provide a slip sheet feeder in which a stack of slip sheets is located beneath the press or duplicator and the mechanism supporting the stack is capable of being elevated so that each succeeding slip sheet in the stack is brought into position to be acted upon by feeding means which convey the sheets, one at a time, to a station where the printed sheet is deposited thereon and in which the slip sheet with the printed sheet thereon is discharged from the receiving station and stacked on a collecting table in such a way that smearing of the ink on the preceding printed sheet is eliminated.

These and other objects which will hereinafter be made apparent to those skilled in this particular art are accomplished by means of this invention, one embodiment of which is described in the following specification and illustrated in the accompanying drawings, wherein:

Figure 1 is a view in side elevation of a feeding mechanism made in accordance with my invention;

Fig. 2 is a top plan view of the feeder shown in Fig. 1;

Fig. 3 is a section taken on line III—III of Fig. 2;

Fig. 4 is a sectional view showing the clutch arrangement in the drive for the feed table and receiving table;

Fig. 5 is an enlarged sectional view of the sprocket wheel forming a part of the clutch mechanism;

Fig. 6 is a sectional view taken on line VI—VI of Fig. 5;

Fig. 7 is an enlarged view of the pinion forming a part of the clutch and illustrating the means for holding the pinion against movement when the clutch is to be disengaged;

Fig. 8 is an enlarged detail view in elevation showing the means for actuating the clutch;

Fig. 9 is a sectional view illustrating the sheet receiving means and the collecting table; and

Fig. 10 is a view in elevation of a device adapted to be secured to the receiving table to permit printed sheets of several odd or small lots to be stacked thereon.

Referring to the drawings, a slip sheet feeding mechanism, made in accordance with my invention, is illustrated, which is carried by a frame 10 that may also be used to support a press or a duplicator (none shown). The frame 10 consists of vertically extending openwork side walls 10*a* which are spaced apart and connected together at the top and bottom by end members 10*b*.

Mounted for vertical movement within the frame 10 at the rear end thereof, is a feed table 12 on which the slip sheets, indicated at 13, are stacked for feeding between the printed sheets and in order that the machine will handle a relatively large number of slip sheets, I prefer to have the side walls 10*a* of the frame of a height sufficient to permit the table 12 to be moved through a vertical distance approximately equal to the thickness of at least one thousand slip sheets, whereby such number of slip sheets may be stacked on the table at one time. The feed table 12 is suspended from sprocket chains 14, one attached to each side thereof, which pass upwardly over sprockets 15 mounted on stub shafts 15*a* secured to the top of the frame and downwardly around sprockets 16 on the ends of stub shafts 16*a* which are mounted in the side walls 10*a* of the frame and then upwardly and pass over sprockets 17 mounted on stub shafts 17*a* secured to the top of the frame 10 and have their ends attached to the opposite sides of a receiving table 18. The sprockets 15, 16 and 17 are so arranged that as the feed table 12 is raised the table 18 is lowered through substantially the same distance.

The front edges of the slip sheets on the table 12 bear against a vertically extending plate 19 and are urged against such plate by means of a back bar 20 which is removably attached to the frame 10 and is provided at its upper end with a pivoted section 21 which is continually urged toward the plate 19 by a spring 22. The plate 19 and bar 20 also hold the table 12 against endwise movement and side swinging of the table is prevented by vertically extending guides 10c, two on each side of the table, which are attached top and bottom to the side walls 10a. The guides 10c also hold the stack of slip sheets 13 in position on the table and not only prevent the stack from falling over but also hold the sheets in proper position to be acted upon by the feeding means, as will more fully appear.

Table 18 is also held against swinging movement by means of transverse guides 18a which are secured to the bottom of the table 18 and engage and slide along vertically extending channel members 10d forming a part of the frame 10. The sheets on the table 12 are also held in compact position by a clip 23 which is slidably secured to the plate 19 and engages the top slip sheet of the stack 13. Clip 23 is continually urged into engagement with the top sheet of the stack by spring 24, one end of which is connected to the clip 23 and the other end of which is secured to a chain 25 fastened to the frame 10.

Slip sheets are fed successively from the stack 13 by suitable feeding means, hereinafter described, and as each sheet is fed from the stack the table 12 is raised a distance approximately equal to the thickness of one slip sheet to deliver the next succeeding sheet in the stack into position to be engaged by the feeding means and the table 18 is simultaneously lowered a like distance. To elevate the table 12 and lower the table 18, a gear 26 is secured to the sprocket 16 which meshes with a pinion 27 slidably mounted on a shaft 28a which is journaled in the side walls 10a of the frame and has a sprocket 28 secured thereto which is connected by a sprocket chain 29 to a sprocket 30 carried by a driven pulley 31. Pulley 31 is connected by belt 32 with a pulley 33 mounted on a shaft 34 which is driven from any suitable source, such as a suitable motor (not shown) or the shaft 34 may be connected or geared to the drive of the printing or duplicating machine which is adapted to be carried by the frame 10.

When the machine is in operation, slip sheets are successively released and fed from the stack 13 by a feeder comprising a bar 41 which is pivotally mounted on a crank 42 of a crank shaft 43 and has a releaser 44 pivotally connected to the rear end thereof and a pusher 45 connnected to the front end thereof. Bar 41 is eccentrically mounted on the crank 42 and in order to lift the pusher 45 from the stack and lower the releaser 44 into engagement with the top slip sheet of the stack as the crank shaft 43 is rotated, a transversely extending rod 46 is secured to the side walls 10a in front of the crank shaft 43, which is adapted to engage the bar 41 and lift the pusher 45 as the crank 42 moves toward the rear of the machine frame. Crank shaft 43 is provided at one end with a sprocket 47 having a sprocket chain 48 extending therearound which connnects the sprocket 47 with a sprocket 49 secured to the driven shaft 34.

From this construction, it is apparent that during a portion of each revolution of the crank shaft 43, the bar 41 is moved toward the back of the machine and as it moves rearwardly the pusher 45 is raised from engagement with the top slip sheet of the stack 13 by the bar 46 and this turning movement of the bar 41 lowers the releaser 44, which is urged toward the stack by a spring 44a interposed between the bar 41 and the top of the releaser so that it frictionally engages the top sheet of the stack and moves it back against the member 21 which, being pivoted, permits the end of the sheet to be moved beyond the bar 20, thus freeing it from the clip 23. As the crank shaft 43 continues its cycle of revolution, the crank 42 is moved forward and on such forward movement the bar 41 is raised from engagement with the rod 46, thus lowering the pusher 45 into engagement with the released slip sheet and the continued forward movement of the crank 42 moves the released sheet between a continuously driven, transversely extending feed roll 51 and a pair of rollers 52, which frictionally engage the roll 51.

Feed roll 51 is journaled in the side walls 10a and is provided on one end with a pulley 53 connected by a belt 54 with a pulley 55 secured to the driven shaft 34, while rollers 52 are mounted on a shaft 56 having its ends journaled in the side walls of the frame 10 and the rollers 52 are held in frictional engagement with the driven rollers 51 by means of tension springs 57 attached to the shaft 56 and which tend to pull the shaft toward the roll 51.

The slip sheets passing between the rolls 51—52 are delivered onto the legs 60 of turnable angle brackets 61 on which the printed sheets are deposited (Fig. 9), and I prefer to have the feeding mechanism so synchronized with the printing or duplicating machine that the slip sheet is deposited on the legs 60 of the angle members 61 slightly before the printed sheet is delivered from the press or the duplicator.

One angle bracket 61 is pivoted to each of the side walls 10a of the frame adjacent the top thereof and in position to receive the slip sheets from the feed rolls 51—52 and the slip sheet receiving leg 60 of each bracket is of such a length, relative to the other leg, that the bracket has a tendency to turn by gravity about its pivot so that the legs 60 will extend downwardly. Legs 60 of the brackets 61 are held in a position to receive the slip sheets by means of chains 62 attached to the opposite legs of the brackets 61 and which extend downwardly adjacent the front end of the frame 10 and pass around suitable rollers 63 and are attached near the center of the machine to a chain 64 which has its opposite end attached to a bar 65 which is urged upwardly to hold the chains taut and, consequently, hold the legs 60 in a horizontal position by a spring 66 which is attached to the bar 65 and to one of the members 10b of the machine.

In order that the slip sheets deposited on the legs 60 of the brackets 61 will be delivered to the table 18 in timed relation with the operation of the releaser 44 and the pusher 45, the crank shaft 43 is provided with a crank 67 which is adapted to periodically engage and depress the bar 65 against the tension of the spring 66 which slackens the chains 64—62 and permits the brackets 61 to turn by gravity and drop the slip sheets and the printed sheets carried thereby in a substantially vertical path onto the table 18. In order that the delivery of the slip sheets and the printed sheets to the table 18 will be positive, a clip 61a is secured to each of the brackets 61 which extend over the legs 60 and knock such

sheets onto the table when the brackets are turned to discharging position.

After all of the slip sheets on the table 12 have been fed between the rolls 51 and 52 and deposited on the table 18, the table 12 is then in its uppermost position and the table 18 is in its lowermost position, and in order that the tables 12 and 18 may be readily returned to their initial position with the table 12 in position to receive another stack of slip sheets, the hub of the sprocket 28 on the shaft 28a is provided with a series of spaced openings 70 to receive the outwardly projecting spaced teeth 71 on the pinion 27 which meshes with the gear 26 (Figs. 4–8). In order that the teeth 71 on the pinion 27 may be readily withdrawn from the opening 70 on the sprocket 28 to permit the gear 26 and sprocket 16 to be freely turned, the shaft 28a extends a substantial distance beyond the side wall 10a on the opposite side of the machine from the gear 28 and bears against a cam plate 72 pivoted at 73 to the side wall 10a and connected at its outer end by link 74 to a foot lever 75 which is normally held in its raised position by a spring 76 having one end attached to the front end of the cam plate 72 and which also holds the cam surface thereof away from the shaft 28a. When the foot lever 75 is depressed the cam lever 72 is turned about its pivot 73 and moves the shaft 28a to the left, as shown in Fig. 4, and disengages the teeth 71 from the openings 70 in the hub of the sprocket 28. In order to prevent the pinions 27 from traveling with the shaft 28a, a bracket 77 attached to the side wall 10a and having an opening for receiving the shaft 28a is positioned between the sprocket 28 and the pinion 27.

When the sprocket 28 is disengaged from the pinion 27, the table 12 may be readily lowered in position to receive another stack of slip sheets, after which the shaft 28a is pushed back to reengage the teeth 71 with the openings 70 in the sprocket 28.

In order that the table 18 will accommodate the thickness of the printed sheets between which the slip sheets are interposed, springs 80 are provided between the ends of the chains 14 and the table 18 which preferably have a tension such that the weight of the printed sheets will cause the springs to lengthen sufficiently to keep the top of the slip sheets and printed sheets at a point somewhat below the bottom of the angle brackets 61.

When odd lot printing or duplication is being done and a fewer number of printed sheets are desired than the number of slip sheets stacked on the table 12, I provide a member 90 which is adapted to be clamped to the chains 14 above the table 18 to separate one job lot from another. The member 90 is of openwork construction and has guides 91 along opposite sides which are adapted to engage the table guides 10d of the table 18 and clamps 92 on the sides between said guides which permit the member 90 to be readily clamped to the table supporting chains 14.

From the foregoing description of my invention, it is apparent that I have provided a slip sheet feeder having an extremely large capacity and in which the slip sheets are successively released and fed singly into a position to receive a printed sheet thereon after which the slip sheet and the printed sheet carried thereby are dropped in a substantially vertical path onto the table 18, thus smearing of the ink on the printed sheet is eliminated.

It is further apparent that my feeder is extremely flexible since it permits job lot printing or duplicating without removing the prior lot from the receiving table and, since the feed table may be readily lowered in position to receive another stack of slip sheets, little time is lost between the time the last sheet is fed between the printed sheets and the placing of a new stack of slip sheets on the said table.

While I have described one embodiment of my invention, it is to be understood that certain changes, modifications, additions, omissions and subtractions may be made therein without departing from the spirit of my invention or the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Apparatus of the character described comprising a feed table adapted to support a stack of slip sheets thereon, a receiving table, driven feed rolls adjacent the top of the stack of sheets on said feed table, means for periodically engaging and feeding between said feed rolls the top sheet of said stack, means for supporting each sheet delivered from said feed rolls, means operating in timed relation to said feeding means for periodically releasing said sheet supporting means to deposit each said sheet on said receiving table, and means for elevating said feed table and lowering said receiving table.

2. Apparatus of the character described comprising a feed table adapted to support a stack of slip sheets thereon, a slip sheet receiving table, means for pushing sheets in succession from the stack of sheets on said feed table, driven feed rolls for engaging and delivering the sheets pushed from said stack, means for supporting each sheet delivered from said feed rolls, means operating in timed relation to said sheet pushing means for releasing said supporting means to deposit each said sheet onto said receiving table, and means for elevating said feed table and lowering said receiving table, said last-mentioned means being synchronized with the sheet pushing means and with said releasing means.

3. A slip sheet feeder comprising a feed table adapted to support a stack of slip sheets thereon, means for feeding slip sheets in succession from the stack of sheets on said feed table, a pair of spaced pivoted members adapted to receive the sheets fed from said stack, a receiving table beneath said members, means for holding said members in position to support the received sheets, and means for periodically releasing said holding means to permit said members to turn about their pivots and discharge the sheets positioned thereon onto said receiving table.

4. A slip sheet feeder comprising a frame, a feed table mounted for reciprocal movement within said frame and being adapted to support a stack of slip sheets thereon, a pair of continuously driven feed rolls in said frame, means for periodically engaging the top slip sheet of the stack of sheets on said feed table and delivering the same between said feed rolls, a pair of spaced angle brackets pivoted on said frame for receiving the sheets from said feed rolls, means for releasably holding said brackets in position to receive such slip sheets, means for periodically releasing said bracket holding means to discharge the sheet thereon, a table mounted for reciprocal movement within said frame beneath said angle brackets on which the discharge sheets are stacked, and means for simul-

taneously elevating said feed table and lowering said stacking table.

5. Apparatus of the character described comprising a feed table for supporting a stack of slip sheets, a receiving table, driven feed rolls adjacent the top of the stack of sheets on said feed table, means for periodically engaging and feeding between said feed rolls the top sheet of the stack, means for receiving and supporting each sheet delivered by said feed rolls, means operating in timed relation to said feeding means for periodically releasing said sheets whereby the same are deposited on said receiving table, and means for elevating said feed table and lowering said receiving table.

6. Apparatus of the character described comprising a feed table for supporting a stack of slip sheets, a slip sheet receiving table, means for pushing sheets in succession from the stack of sheets on said feed table, driven feed rolls for engaging and delivering the sheets pushed from said stack, means for supporting each sheet delivered from said feed rolls, means operating in timed relation to said sheet pushing means for releasing sheets from said supporting means whereby the same are deposited on said receiving table, and means for elevating said feed table and lowering said receiving table, said last-mentioned means being synchronized with the sheet pushing means and with said releasing means.

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