Dec. 6, 1938. F. NIGRA 2,139,132

SLIP SHEETING DEVICE

Original Filed Oct. 22, 1934 2 Sheets-Sheet 1

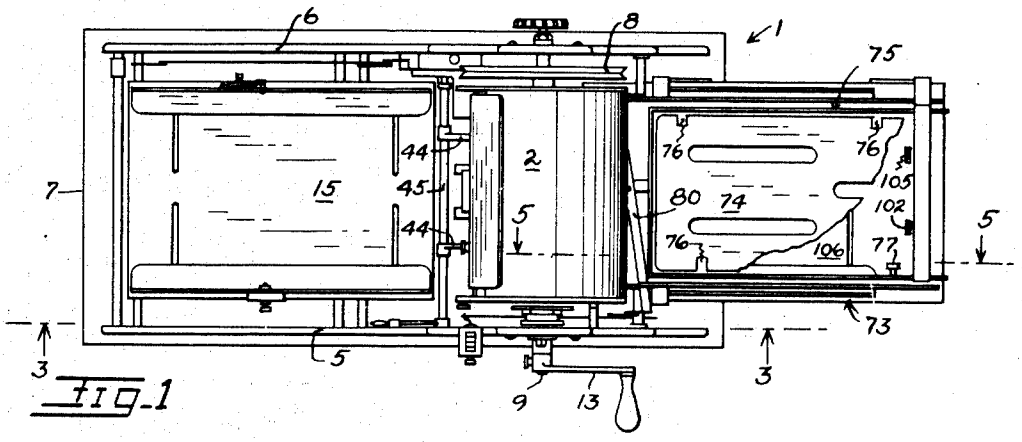


FIG. 1

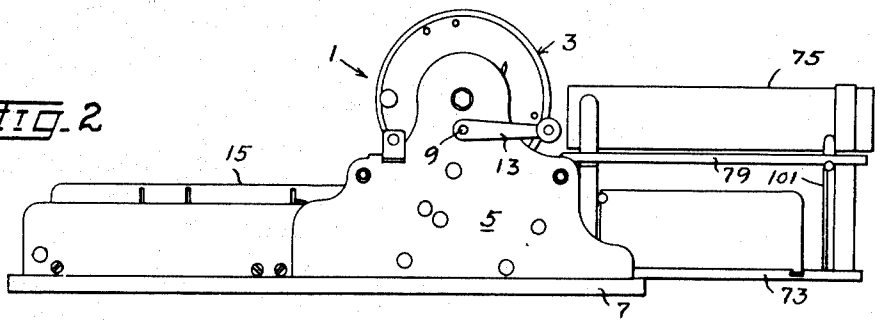


FIG. 2

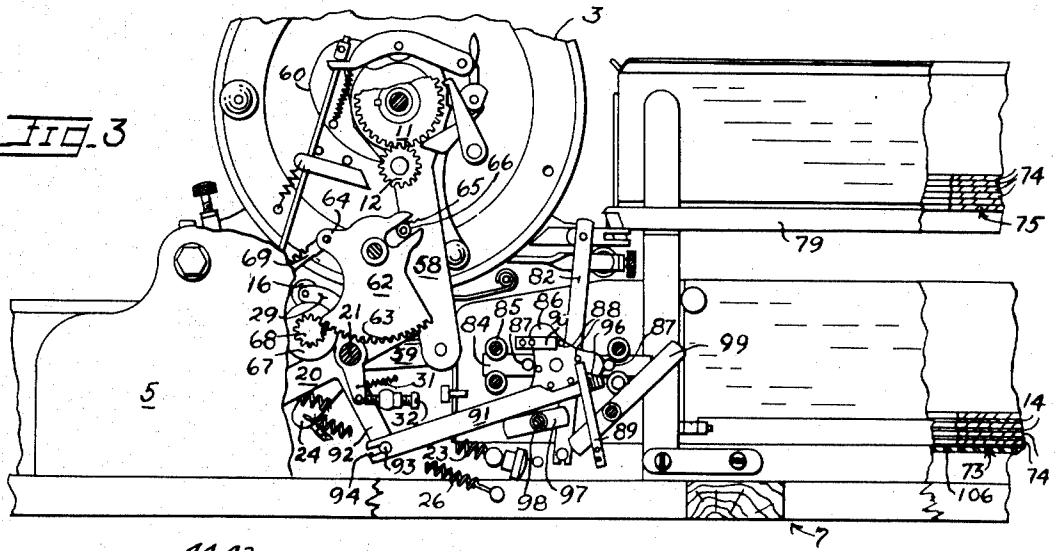


FIG. 3

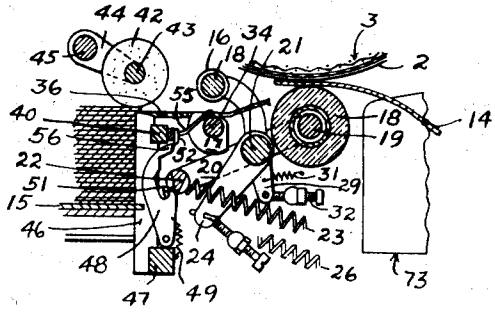


FIG. 4

INVENTOR.
FERDINAND NIGRA
BY Henry N. Young
ATTORNEY

Dec. 6, 1938. F. NIGRA 2,139,132

SLIP SHEETING DEVICE

Original Filed Oct. 22, 1934 2 Sheets-Sheet 2

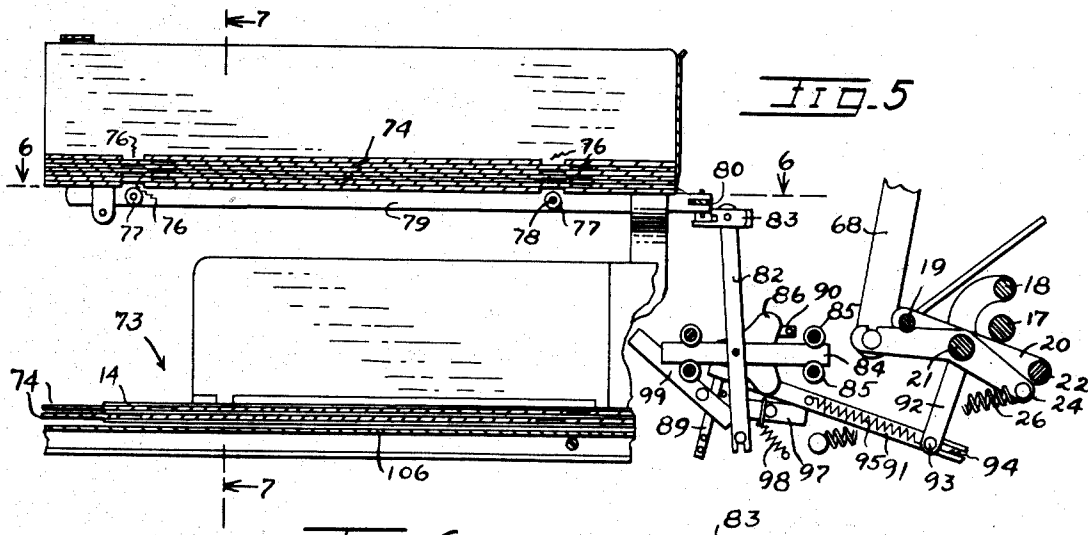
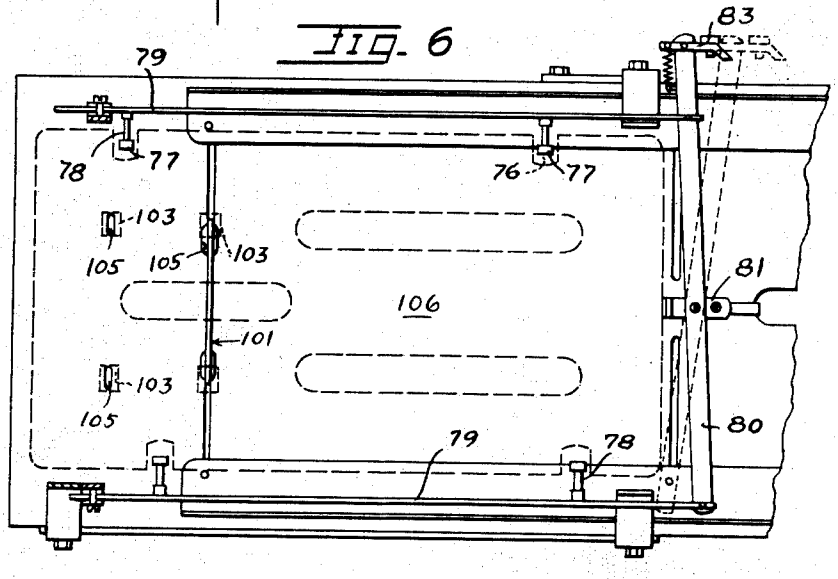


FIG. 5

FIG. 6



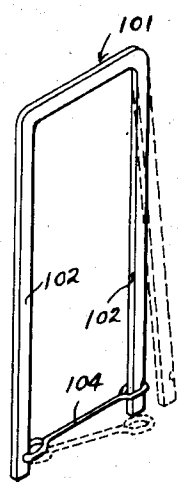
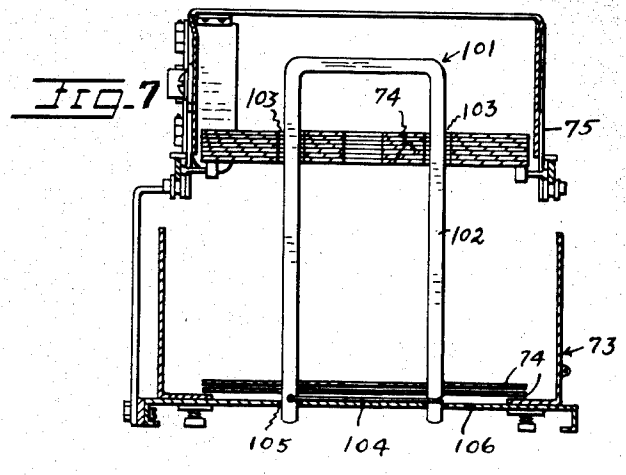


FIG. 8

FIG. 7



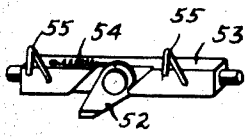


FIG. 9

INVENTOR.
FERDINAND NIGRA
BY Henry N. Young
ATTORNEY

Patented Dec. 6, 1938

2,139,132

UNITED STATES PATENT OFFICE

2,139,132

SLIP SHEETING DEVICE

Ferdinand Nigra, San Francisco, Calif., assignor to Niagara Duplicator Company, San Francisco, Calif., a corporation of California

Original application October 22, 1934, Serial No. 749,328. Divided and this application March 9, 1936, Serial No. 67,927

7 Claims. (Cl. 34—1)

The invention relates to a slip-sheeting device for use at the receiving tray of a sheet printing apparatus, and the present application comprises a division of my copending patent application Ser. No. 749,328, filed Oct. 22, 1934, for a Duplicating machine.

An object of the invention is to provide an improved interleaving or slip-sheeting device in association with a receiving tray for freshly printed sheets wherein interleaving cards are arranged to be delivered upon the printed sheets as they are deposited in the tray.

Another object is to provide a slip-sheeter which is particularly adapted for operative association with a duplicating mechanism of the mimeograph type wherein sheets of paper to be printed on are successively fed between a stencil on a rotary cylinder and an impression roller.

A further object is to provide for operating the slip-sheeter from and in synchronism with the operating mechanism of the duplicating machine whereby the slip sheets are automatically delivered to the tray alternately with the printed sheets and perpendicularly upon the latter sheets.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment of the invention, and in the accompanying drawings, in which,

Figure 1 is a plan view of a duplicator having the slip sheeter operatively associated therewith.

Figure 2 is a side elevation of the assembly of Figure 1.

Figure 3 is an enlarged fragmentary view taken generally at 3—3 in Figure 1, and particularly shows actuating mechanisms for the slip-sheeter in operative association with the duplicator mechanism.

Figure 4 is a fragmentary and somewhat diagrammatic view of the sheet-feeding and printing mechanism of the duplicator.

Figure 5 is a sectional elevation of the receiving tray and the associated slip-sheeter, the view being taken generally at 5—5 in Figure 1 and showing the operating mechanism for the slip-sheeter.

Figure 6 is a plan view taken generally at 6—6 in Figure 5.

Figure 7 is a transverse section taken at 7—7 in Figure 5.

Figure 8 is a perspective view of a packaging and stop element which is associated with a stack of the slip sheets.

Figure 9 is a perspective view of a detent assembly of Figure 4.

By way of illustration, the present slip-sheeter is shown as operatively associated with a duplicating machine 1 in which a stencil 2 is carried on a rotary cylinder 3 for printing engagement with a sheet of paper or other material for receiving printing. The printing cylinder 3 is supported for rotation on and between side frame members 5 and 6 which extend upwardly and in mutual opposition from a rectangular base frame 7 and receive the duplicator mechanism between them. Externally thereof, and at its end nearest the frame member 6, a belt pulley 8 is provided on the cylinder 3 for optional use in effecting a power rotation of the cylinder. A shaft 9 is journalled in the frame member 5 in parallel relation to the rotative axis of the cylinder, and is connected with the cylinder through constantly engaged gears 11 and 12 which are respectively provided on it and on the cylinder. At its outer end, the shaft 9 carries a hand crank 13 for use to manually rotate the cylinder through the coaction of the gears 11 and 12.

Referring to the generally diagrammatic showing of Figure 4, a sheet 14 of print-receiving material which has been moved from a feed table 15 to dispose its front end portion between pairs of upper and lower rollers 16 and 17 may be thereafter engaged by and between said rollers and is thereby advanced forwardly for the disposal of its front end portion between the stencil on the rotary cylinder 3 and an impression roller 18, and is finally gripped between the cylinder and the impression roller to continue the feeding movement of the sheet while the latter is being printed.

The impression roller 18 is mounted for its free rotation on a shaft 19 which is carried by and between corresponding and rearward ends of lever-like members 20 which are intermediately pivoted on a fixedly disposed rock-shaft 21, said shaft being journalled in and between the frame members 5 and 6 and being disposed toward the rear or feeding end of the machine with respect to the roller 18.

The forward ends of the lever members 20 are connected by a bar 22, and a tension spring 23 extends generally forwardly from the bar 22 to an anchorage in the frame base 7 to constantly urge a resilient engagement of the impression roller 18 against the cylinder 3. The extremities of the shaft 19 and the bar 22 pivotally engage the ends of the levers 20 whereby the generally planar assembly of these members may be dis-

torted transversely thereof if such is required to insure an even bearing of the impression roller with and along the cylinder.

Arms 24 extend rigidly and radially from the shaft 21 for simultaneous engagement with the bar 22 as a means to rock the levers 20 to dispose the roller 18 out of engagement with the cylinder. A tension spring 26 connects the free end of an arm 24 with an anchorage on the base 7 whereby the arm is resiliently urged to maintain an engagement thereof with an adjustable stop 27 mounted on a suitable bracket extending from the frame member 6; it will be understood that the stop 27 determines one limit of oscillation of the shaft 21.

The rollers 16 are mounted on a shaft 28 which is loosely journalled in and between the upper ends or lever-like members 29 which are disposed in generally upright position and are intermediately pivoted on the shaft 21 for rocking independently of the latter shaft. Preferably, and as shown, the upper lever portions are curved rearwardly whereby the shaft 28 may be disposed directly above the line of lower feed rollers 17 for cooperation of the pairs of feed rollers to grip a sheet 14 between them. The lower arms of the levers 29 are connected to the side frame members 5 and 6 by means of tension springs 31 operative in the planes of movement of the levers whereby the shaft 28 is yieldingly urged to maintain its engagement with adjustable stops 32 which are provided on the frame members 5 and 6 respectively and while the rollers 16 are in a limiting lowered position with respect to the axis of the rollers 17.

A fixedly disposed shaft 34 carries the rollers 17, and said rollers are segmental whereby their cylindrical face portions extend through an arc which is somewhat less than a full circle. The rollers 17 have like perimeters and are similarly positioned on the shaft 34 whereby they may simultaneously coact in like manner with the rollers 16 above them.

As the rollers 17 are rotated, their cylindrical faces are arranged to engage and grip a sheet 14 between them and the rollers 16 at a line at or adjacent the common plane of the shafts 28 and 34, it being noted that the rollers 17 coact with the rollers 16 only while their cylindrical faces are in opposition to the latter rollers. Preferably, and as shown, the circles of the cylindrical faces of the rollers 17 are arranged to intersect the circles of the depressed rollers 16 whereby the latter rollers may be pressed upwardly against the resistance of the springs 31 and an equalized and resilient gripping of the sheet 14 between the sets of rollers 16 and 17 may be assured while the rollers are coactive in the described manner. It will thus be understood that the rollers 17 are operative as a sheet-feeding means for only a part of each rotative cycle thereof.

An elongated plate member 36 is mounted in generally horizontal disposition and in a plane slightly below the rollers 16, and rectangular openings are provided in the plate 36 opposite the segmental rollers 17 to permit the described periodic coaction of the rollers 16 and 17 therethrough. The portion of the plate 36 forwardly of the feed rollers 16 and 17 slopes upwardly in generally tangential relation to the cylinder face. A frame cross-bar 40 disposed rearwardly of the shafts 28 and 34 mounts the plate 36.

Rollers 42 are provided for periodically engaging the top sheet 14 of a stack of sheets on the feed table 15 and for subsequent rotation to advance the engaged sheet to and against the stops 39, said rollers 42 being shown as fixed on a common shaft 43 which is carried by and between arms 44 extending rigidly from a rock-shaft 45 journalled in and between the frame members 5 and 6 and is parallel to both the feed table top and the cylinder axis. To insure a delivery to the machine of but one sheet 14 at a time for printing from the stencil, the advance end of the stack of sheets on the table 15 is engaged with an upright stop post 46 in such manner that only the top sheet lies above the top of the post 46 when the rollers 42 are actuated to advance a sheet.

When the top sheet has been completely removed from above the stack, the table 15 is arranged to be automatically raised to dispose solely the next sheet for removal by the rollers 42; this automatic control of the table 15 is fully described in the beforementioned application of which this application is a division. The post 46 is preferably positioned in the longitudinal central line of the sheets of the stack and is fixed to and between the frame cross-bar 40 and a lower cross-bar 47 which generally underlies the bar 40.

By particular reference to Figure 4, it will be noted that a roller 42 is there shown in pressure engagement with the top sheet 14 of the stack of sheets on the table 15, the roller 17 is in an inoperative position, and the impression roller 18 engages a previously fed sheet 14 against the cylinder 3. The foregoing positions and relations of the operative parts of the described sheet-feeding means of the present machine may be conveniently considered as representing the conditions at the beginning of a cycle of operations of the present duplicator machine with respect to the printing of a given sheet; said cycle of operations is fully described in the beforementioned application, and its last two steps comprise the discharge of the printed sheet and the lowering of the impression roller 18 out of engagement with the cylinder as the only steps of specific interest in relation to the present slip-sheeting device.

Means are preferably provided for preventing an operative disposition of the impression roller 18 unless a sheet 14 is actually on its way for printing engagement between the stencil on the cylinder 3 and the roller 18. As particularly illustrated in Figure 4, a swinging stop member 48 is provided for such coaction with the bar 22 of the described rockable mounting for the roller 18 as to prevent the operative positioning of the roller unless a sheet 14 is then engaged between the rollers 16 and 17. As shown, the stop member 48 is pivoted to the frame cross-bar 47 and is resiliently urged to maintain contact with the bar 22 through the action of a tension spring 49 which is coactive between it and the cross-bar 47.

Intermediately in its bar-engaging face, the member 48 is provided with a notch 51 for receiving a complementarily formed portion of the bar 22 in such a manner as to prevent a further lowering of the bar while permitting a lifting of the bar from the notch. While the bar 22 is disposed in the notch 51, the impression roller 18 is held spaced from the cylinder 3. It will be understood that the positioning of the roller 18 is controlled by the position of the bar 22 which is in turn arranged for movement in an arcuate path through its periodic engagement with the arms 24 of the shaft 21 which are oscillated between limiting positions thereof; the bar is lifted positively as the arms 24 move upwardly and is lowered through the action of the spring 23 as the arms move downwardly until its further lowering

is prevented either by its engagement in the notch 51 or by the engagement of the impression roller 18 against the under side of a sheet 14 at the cylinder.

A detent 52 is provided for operating to prevent the engagement of the bar 22 in the notch 51 of the stop member 48 as the bar moves downwardly along the working face of the member and while a sheet 14 is disposed in the machine for the printing thereof, said detent being directly coactive with said member. As shown in Figures 4 and 9 the detent 52 depends from a shaft 53 which is journalled in and between bearing blocks provided on the frame cross-bar 40 and for oscillation about an axis parallel to the axis of the cylinder. The detent 52 is pivoted to the shaft 53 for rocking in a plane parallel to the shaft axis and from a normal position thereof in which it is displaceably held by a tension spring 54 which is appropriately operative between the detent and the shaft 53 which carries it.

One or more fingers 55 extend generally radially from the shaft 53 to have their free ends overlie the shaft 34 at a plate opening for swinging upwardly through said opening to engage any sheet 14 thereabove. The detent 52 is arranged to be normally disposed in the arcuate path of movement of a top extension 56 of the member 48 whereby said extension may engage the detent to rock the shaft 53 and thereby lift the fingers 55.

If a finger 55 encounters a sheet 14 as it is lifted, the sheet operates to prevent a further rocking of the shaft and a displacement of the detent, whereby the detent is then and thereafter operative to hold the member 48 out of engagement with the rod 22 while the latter is swung downwardly past the notch 51 of the member. If the fingers 55 encounter no sheet above them, the engagement of the member 48 with the rod 22 continues and the rod is permitted to seat in the notch 51; the latter is understood to be the condition of the sheet-feeding mechanism before the first sheet of a stack on the feed table is advanced for printing or following an actuation of the mechanism without a feeding of a sheet therethrough.

Referring to the showing of Figure 4, it is noted that while a sheet 14 is being primarily advanced, the shaft 21 would be so rotated that its arm 24 has lifted the bar 22 above the notch 51 and, by reason of the engagement of the bar with the upper portion of the working face of the member 48, has rocked the member to dispose the upper end 56 of the member behind the plane of the detent 52. While the roller 42 is being raised from the sheet, the arm 24 is gradually lowered to permit a lowering of the bar 22 and a movement of the free extremity of the stop member 48 toward and against the detent 52 whereby, just before the bar 22 is positioned opposite the notch 51, the engagement of the detent with the member 48 has rocked the fingers 55 against the sheet 14 at the rollers 16.

The sheet 14, thereafter acting as a stop, holds the detent 52 fixed in front of the member 48 to prevent the further forward movement of the member as the arm 24 is lowered to its starting position to dispose the bar 22 below the notch 51. When the sheet 14 is advanced beyond the contact end of the finger 55, the fingers lift to release the member 48 for contacting the bar 22 at a point of the member below the notch 51 and the detent may be disposed on top of the member 48 which then underlies it; whenever the detent engages the top of the member 48, it is arranged to be displaced in its plane and against the resistance of the spring 54. A subsequent upward movement of the bar 22 as the next sheet 14 is advanced restores the previous conditions and the described cycle of operations of the feed mechanism is thereafter repeated.

The various shafts 21 and 34 and 43 are arranged to be appropriately actuated in the desired manner and sequence by a suitable actuating mechanism which is shown generally in Figure 3. The required operations are primarily derived from the controlled reciprocative movement of a bar 58 which pivotally engages an arm 59 extending rigidly from the shaft 21 and is forked at its upper end to span a hub extending from the cylinder. The bar 58 is disposed in generally upright position in parallel relation to the frame side 5, and a plate cam 60 is mounted on the cylinder adjacent and inwardly of the forked portion of the bar 58. At its inner side, and in the plane of the cam 60, the bar 58 carries a roller for periodic engagement by the cam to lower the bar and so oscillate the shaft 21 as is required for controlling the disposal of the impression roller 18, said roller being arranged to be operative only where a sheet 14 is disposed between it and the cylinder. It is noted that the spring 26 for the shaft 21 is operative to urge the upward disposal of the arm 59 and the bar 58.

An actuator element 62 is pivoted to the frame side 5 adjacent the plane of operation of the bar 58. The element 62 comprises a flat plate providing a segmental gear 63, an arm 64, and a radial slot 65. A roller 66 is mounted at the outer face of the bar 58 and constantly engages in the slot 65 whereby the element 62 is arranged for oscillation about its pivotal axis as the bar 58 is reciprocated, said axis being fixed.

The segmental gear 63 is utilized to effect the periodic rotation of the shaft 34 which carries the segmental feed rollers 17 through the operation of a pinion 68 which it constantly engages and which is connected with the shaft 34 through a suitable one-way clutch 67 in such a manner that the shaft 34 is rotated only by and during a return movement of the element 62 to its normal position which is shown in Figure 3. It will be understood that it is this rotation of the shaft 34 which periodically effects the described operative rotation of the segmental rollers 17 at the appropriate time in each rotative cycle of the printing cylinder 3.

A rack bar 69 is pivoted at one end thereof to the arm 64 of the actuator elect 62 and is operative, through connections not shown, to rotate the shaft 43 and the feed rollers 42 thereon at each movement of the actuator 62. A suitable means is provided to oscillate the rock-shaft 45 whereby the rollers 42 engage the top sheet of a stack on the feed table 15 only while rotating in a sheet-advancing direction, and for advancing the engaged sheet to contact a line of temporarily operative stops beyond the plane of the shafts 16 and 17, after which the rollers are raised out of contact with the engaged sheet until the same has been advanced from beneath it. Appropriate devices for controlling the positioning and operation of the feed rollers 42 are disclosed and described in detail in the beforementioned patent application of which this application is a division.

Printed sheets 14 delivered from between the stencil 2 and the impression roller 18 are ar-

ranged to fall into a collecting tray 73, and means are preferably provided for interposing insert sheets 74 between the printed sheets 14 as the latter are delivered to the tray. As particularly illustrated in Figures 3 and 5 and 7, a stack of the sheets 74 is arranged for support in a tray 75 mounted on and above the tray 73 and having an open bottom, and means are provided for releasing the sheets 74 one at a time for falling upon a delivered sheet 14 in the lower tray before the next sheet is delivered, the device being known as slip-sheeting.

The sheets 74 are alike and are each provided with two spaced notches 76 in each edge thereof. The notches of the two sheet edges are equally spaced apart but are differently spaced with respect to the same sheet end. In a stack of sheets 74 for use in the present machine, alternate sheets are reversed as to the disposal of the notches 75 in the stack whereby the correspondingly disposed notches of the sheets define four lines thereof at each edge of the stack, the latter being indicated in Figure 5.

The stack of sheets in the tray 75 is suported on four rollers 77 which engage below the stack and may pass through the notches 76 when they register therewith. In plan arrangement, the rollers 77 are spaced exactly as the notches 76 of a sheet 74 and are arranged for their simultaneous disposal beneath the bottom sheet of the stack at its notches 76 whereby they may engage the next higher sheet through the notches of the bottom sheet to thereby release the latter. The rollers 77 are supported on the ends of stub shafts 78 which extend beneath the stack from bar 79 disposed and supported at opposite sides of the tray 75 as the primary support means for the stack; in this manner, a released sheet 74 may fall freely into the underlying tray 73. In Figure 5, the rollers 77 are shown as disposed to release the lower sheet from the tray 75, said sheet not yet having fallen.

The roller-supporting bars 79 are mounted for longitudinal reciprocation in their places and are pivotally connected by a cross-bar 80 which is pivoted centrally of its connections with the bars 79 to a rearward projection 81 of the tray 75, it being noted that a rocking of the cross-bar 80 about its pivot point is arranged to oppositely shift the bars 79 and their rollers 77 to like degrees. Following a release of the bottom sheet of a stack of sheets 74 by reason of the registration of the rollers 77 with the notches 76 thereof, a shifting of the bar 80 to dispose the rollers beneath the notches of the second sheet will release this sheet, it thus being understood that the sheets 74 may be released from the bottom of the stack and one at a time by oscillating the bar 80 between limiting positions thereof which dispose the rollers 77 in sheet-releasing positions.

Means are provided for oscillating the bar 80 for effecting successive sheet-releasing disposals of the rollers 77 in synchronism with the delivery of printed sheets 14 into the tray 73, a preferred mechanism for this purpose being shown in detail in Figures 3 and 5. As particularly shown, an arm 82 is pivoted at its lower end at a pivot pin extending from the frame side 5. and is pivotally connected at its upper end with the bar 80 through a suitable link member 83. Intermediately thereof, the arm 82 is pivoted to a bar 84 which is engaged between four fixedly mounted rollers 85 for a solely longitudinal reciprocation thereof.

A three-point star-wheel 86 is mounted adjacent the bar 84, and rollers 87 are mounted on the bar for engagement with diametrically opposite points of the star-wheel periphery, the arrangement being such that a one hundred twenty degree rotation of the star-wheel will shift the bar 84 from one limiting position to the other and at the same time prevent an over-travel thereof. It is noted that the pivotal axis of the star-wheel lies in the plane of the axis of the rollers 87 whereby a close regulation of the reciprocation of the bar 84 and the oscillation of the arm 83 may be assured.

Pins 88 extend from the star-wheel 86 at the side thereof opposite the bar 84, six of said pins being shown and the pins being arranged in a circle having its center in the star-wheel axis. Leaf springs 89 and 90 extend from the inner face of the frame member 5 and have their free extremities normally disposed in the path of movement of the pins 88 whereby the springs are normally coactive with the pins to prevent a rotation of the star-wheel in either direction from a set position thereof when the bar 84 is in a limiting position thereof, it being noted that the springs function oppositely with respect to a rotative displacement of the star-wheel.

A pull bar 91 is normally operative between the pins 88 and an arm 92 extending rigidly from a lever 20 which carries the corresponding ends of the impression roller 18 and the bar 22 in the previously disclosed manner. The bar 91 is pivotally connected to the arm 92 through a pivot pin 93 which is slidably guided in a longitudinal slot 94 of the bar end thereat and is normally held inwardly in the slot through the action of a tension spring 95 which is coactive between the pin and bar. In this manner, the bar is arranged for reciprocation at each rocking of the levers 20.

At the edge of the bar 91 toward the pins 88, the bar is formed to provide a hook 96 for engaging behind a pin 88 for rotating the star-wheel 86 while a subsequent return movement of the bar is being effected. At the side thereof which is designed to be disposed toward the spring 89, the point of the bar 91 is bevelled whereby the sliding engagement of the bar between the star-wheel and spring is arranged to then render the spring 89 inoperative and permit a rotation of the star-wheel when the return stroke of the bar is made. The spring 90 remains operative at all times.

For holding the bar 91 in operative relation to the plane of the star-wheel, the back edge of the bar slidably engages a member 97 which is pivoted on the frame member 5 and has one end thereof resiliently pressed against the bar through the action of a spring 98 which is operative against the member 97. If the described actuation of the star-wheel is not desired, the member 97 may be swung into generally parallel relation with the bar through a manual rocking of a lever 99 which appropriately engages the member and is arranged to be frictionally held in a set position; when the member 98 is so disposed, the hook 96 does not engage the star-wheel pins 88 as the bar 91 is reciprocated in synchronism with the cylinder action.

It will now be particularly noted that the hook 96 of the bar 91 is arranged to operatively engage a pin 88 of the star-wheel only as a sheet 14 is delivered from between the stencil and the impression roller 18. This control is afforded in accordance with the disposal of the bar 22 in a downward direction whereby, if the bar 22 is

engaged in the notch 51 of the swinging stop member 48 because of no sheet being advanced, the arm 92 does not project the bar 91 far enough to engage its hook 96 with a pin 88 for thereafter rocking the star-wheel to release a slip-sheet 74 in the described manner. Since the bar 22 is stopped at the notch 51 unless a sheet 14 is being advanced through the described feeding mechanism, it will be understood that a slip sheet 74 is only released following the discharge of a printed sheet 14 from the printing mechanism into the collecting tray 73.

Since the slip sheets 74 are used repeatedly and are disposed in alternate arrangement in a stack thereof, means are provided for retaining the slip sheets in the required arrangement, said means also providing a stop to limit the movement of the printed sheets in the tray 73. As particularly illustrated in Figures 6 and 7 and 8, a U-shaped member 101 is provided for the insertion of its legs 102 through spaced openings 103 provided in the sheets 74. Two pairs of openings 103 are shown in the sheets 74, each pair of openings defining a line transverse to the longitudinal axis of the sheets and corresponding openings being aligned in the stack whereby the legs 102 may be disposed therethrough.

In its present embodiment, the member 101 is formed of resilient material in such a manner that the legs 102 tend to spread out of a mutual parallelism thereof, and a detachable link 104 connects the leg extremities below the stack whereby the slip sheets of the stack are releasably held between the head of the member and the link 104, and the legs 102 are held parallel. Below the link 104, the extremities of the legs 102 are arranged to engage in slots 105 of the bottom plate 106 of the tray 73 whereby the member 101 may be disposed and held in a plane perpendicular to that of the tray bottom to extend upwardly through the slip sheet stack through which it engages. It will be noted that the legs of the member 101 operate to limit the discharge movement of printed sheets 14 in the tray for insuring their orderly disposal between adjacent slip sheets 74 as the printed sheets are delivered. For shorter sheets 14, the member 101 would be engaged in a pair of slip sheet openings 103 and corresponding tray base openings 105 which are nearer to the cylinder than the openings for use with longer sheets.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and method of operation will be readily understood by those skilled in the art to which the invention appertains. While I have described the features and the principle of operation of a structure which I now consider to be a preferred embodiment of my invention, I desire to have it understood that the showing is primarily illustrative, and that such changes may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In combination with a continuously operable duplicator, a tray for receiving printed sheets from the duplicator in horizontal disposition, a stack of slip sheets in horizontal disposition and for the release of the bottom sheet of the stack for gravity delivery upon a printed sheet in the tray and before the succeeding printed sheet is deposited in the tray, means for releasing successive slip sheets from the bottom of the stack upon different printed sheets delivered to the tray, and a U-shaped member engaged transversely and freely through said stack of slip sheets said member being inverted and having its legs removably extending into the tray bottom whereby the legs of the member are operative as a stop for the printed sheets and a guide means for the falling slip sheets.

2. In combination with a sheet printing apparatus, a tray for receiving printed sheets from the apparatus in horizontal disposition, an elevated stack of slip sheets removably supported in horizontal disposition above the tray and for the release of the bottom sheet of the stack for its gravity delivery upon a printed sheet in the tray and before the succeeding printed sheet is deposited in the tray, means for releasing successive slip sheets from the bottom of the stack upon different printed sheets delivered to the tray, a U-shaped member engaged transversely and freely through said stack of slip sheets, said member being inverted and having the free ends of its legs removably extending into the tray bottom whereby the legs of the member are operative as a stop for the printed sheets and a guide means for the falling slip sheets, and a link member connecting the legs of the first member above and adjacent the tray bottom and below the lowermost slip sheet whereby the members provide a loop which retains the slip sheets in their order in the stack and is removable with the stack.

3. In combination with a continuously operable duplicator or the like, a tray for receiving printed sheets from the duplicator and in horizontal disposition, a stack of like-shaped slip sheets overlying said tray, each of said slip sheets having its opposite side edges provided with mutually spaced notches which have the same mutual spacing at both sheet edges and are differently spaced from the same sheet end and successive slip sheets in the stack being so related that the notches of alternate sheets define different lines of notches in the two sets thereof in the stack, a set of support members engaged beneath the stack and arranged for simultaneous registration with the notches of the bottom sheet of the stack whereby said sheet may be released and the new bottom sheet is supportedly engaged by the support members, and means to simultaneously and oppositely shift the support members at the different stack sides to simultaneously dispose the members in registration with the notches of the last sheet for the release thereof.

4. A structure in accordance with claim 3 wherein different slide bars carry the support members at the different stack sides, and means are provided to simultaneously and oppositely displace said bars to thereby shift the members to release the bottom slip sheet of the stack.

5. A structure in accordance with claim 3 having mutually parallel and independent slide bars mounting the support members at the different stack sides, slideways carrying said bars for their reciprocation between limiting positions in which the support members thereon register with the slip sheet notches of the different sets thereof, and a lever engaging said slide bars and intermediately pivoted whereby a rocking of the lever is arranged to simultaneously shift all of the support members from beneath one said set of notches to the other.

6. In combination with a continuously operable sheet printing apparatus having a member which is rocked during each printing cycle of the apparatus, a tray for receiving printed sheets from the apparatus, and a device for slip sheeting the

printed sheets as they are deposited in the tray; means for operating said slip sheeting device from said rockable member, comprising a rotary member arranged for a solely one way rotation thereof, a bar connected to the rockable member for its longitudinal reciprocation when the latter member is rocked from its normal position, means whereby said bar is arranged to actuate said rotary member to effect a rotative displacement thereof solely upon a return stroke of the bar, an actuator for said slip sheeting device comprising a lever arranged for swinging between limiting positions thereof whereby each movement thereof from one position to the other is arranged to actuate the device to release a slip sheet, a guideway transverse to said lever and in the general plane of movement thereof, a slide bar engaged in said guideway and pivotally secured to said lever, and means coactive between the rotary member and slide bar whereby the rotary member is operative against the slide bar to displace the actuating lever from one limiting position thereof to the other when the rotary member is rotatively displaced by an actuation of the first bar.

7. In combination with a continuously operable duplicator, a tray for receiving printed sheets from the duplicator in horizontal disposition, a stack of slip sheets in horizontal disposition and for the release of the bottom sheet of the stack for gravity delivery upon a printed sheet in the tray and before the succeeding printed sheet is deposited in the tray, means for releasing the bottom sheet of the stack upon each printed sheet delivered to the tray, and a U-shaped member engaged transversely and freely through said stack of slip sheets said member being inverted and having its legs removably extending into the tray bottom whereby the legs of the member are operative as a stop for the printed sheets and a guide means for the falling slip sheets.

FERDINAND NIGRA.