E. A. COX.

APPARATUS FOR SEPARATING, FEEDING, AND DELIVERING SHEETS.

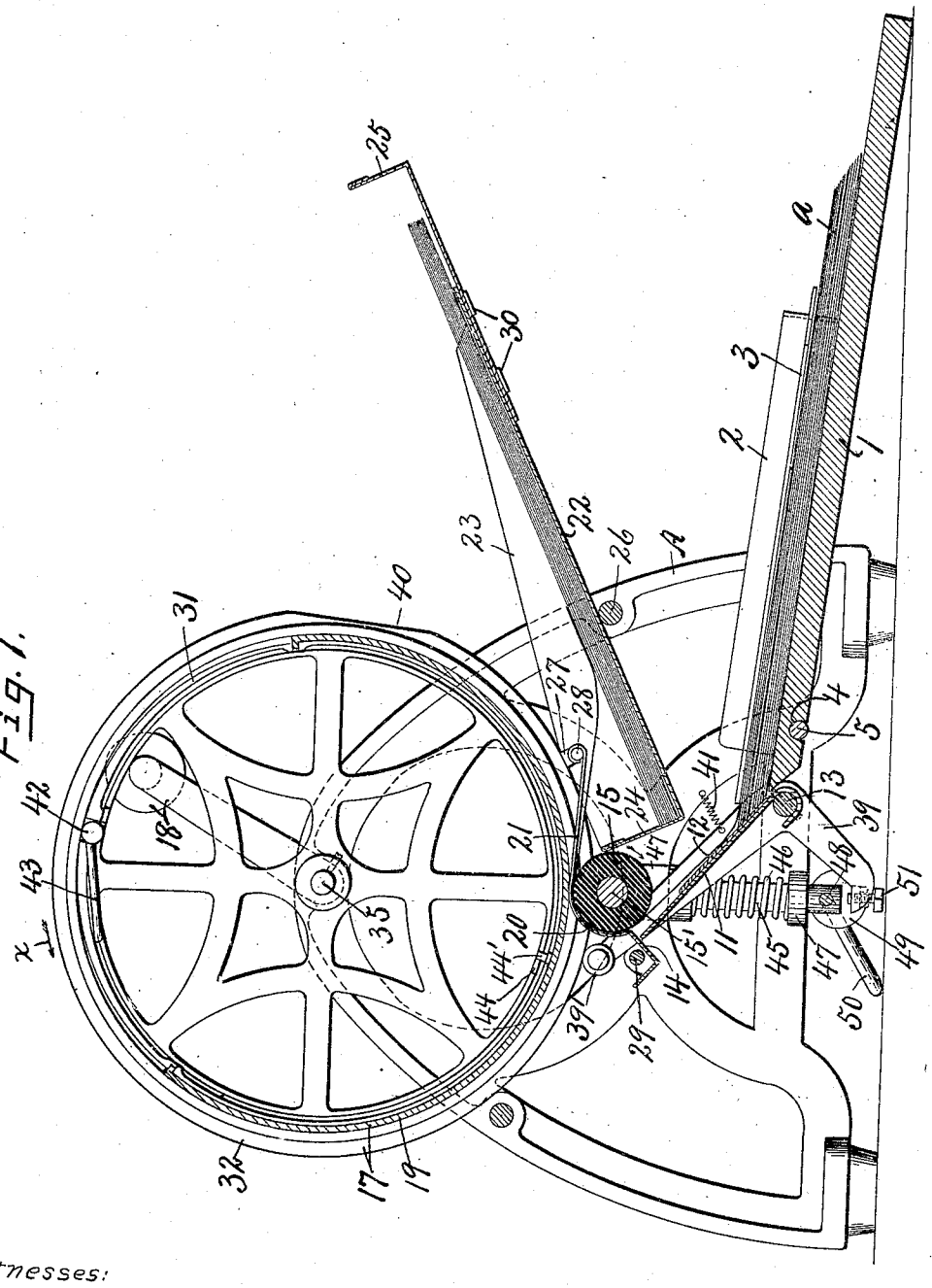
APPLICATION FILED JAN. 25, 1911.

1,075,697.

Patented Oct. 14, 1913.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

Ray. V. Bailey.

H. E. Chase

Inventor:

E. A. Cox

By Howard P. Denison

Attorney.

E. A. COX.

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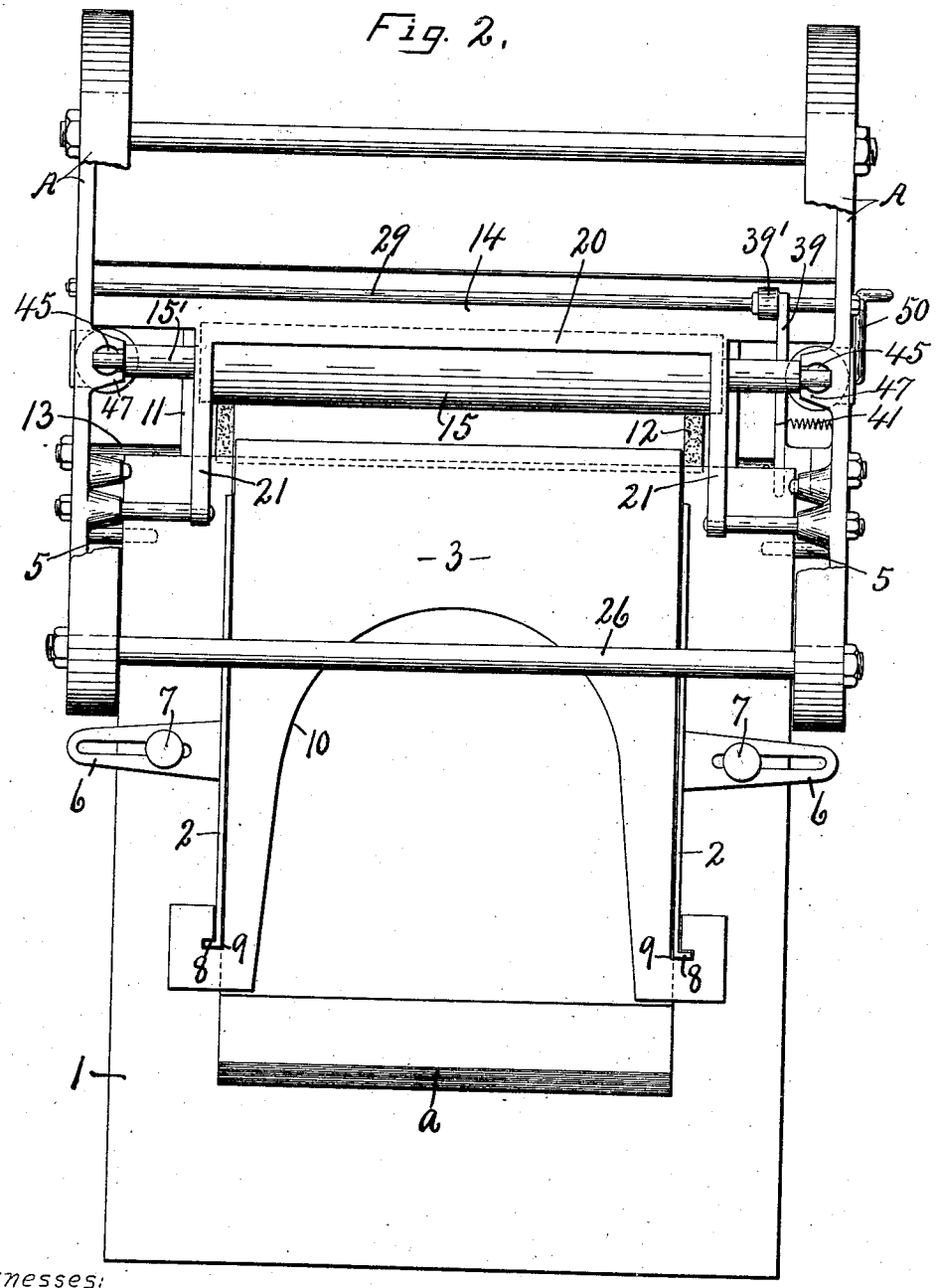
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5 SHEETS—SHEET 2.

Fig. 2.



Witnesses:
R. W. Bailey.
H. E. Chase

Inventor:
E. A. Cox

By
Howard P. Denison
Attorney.

E. A. COX.

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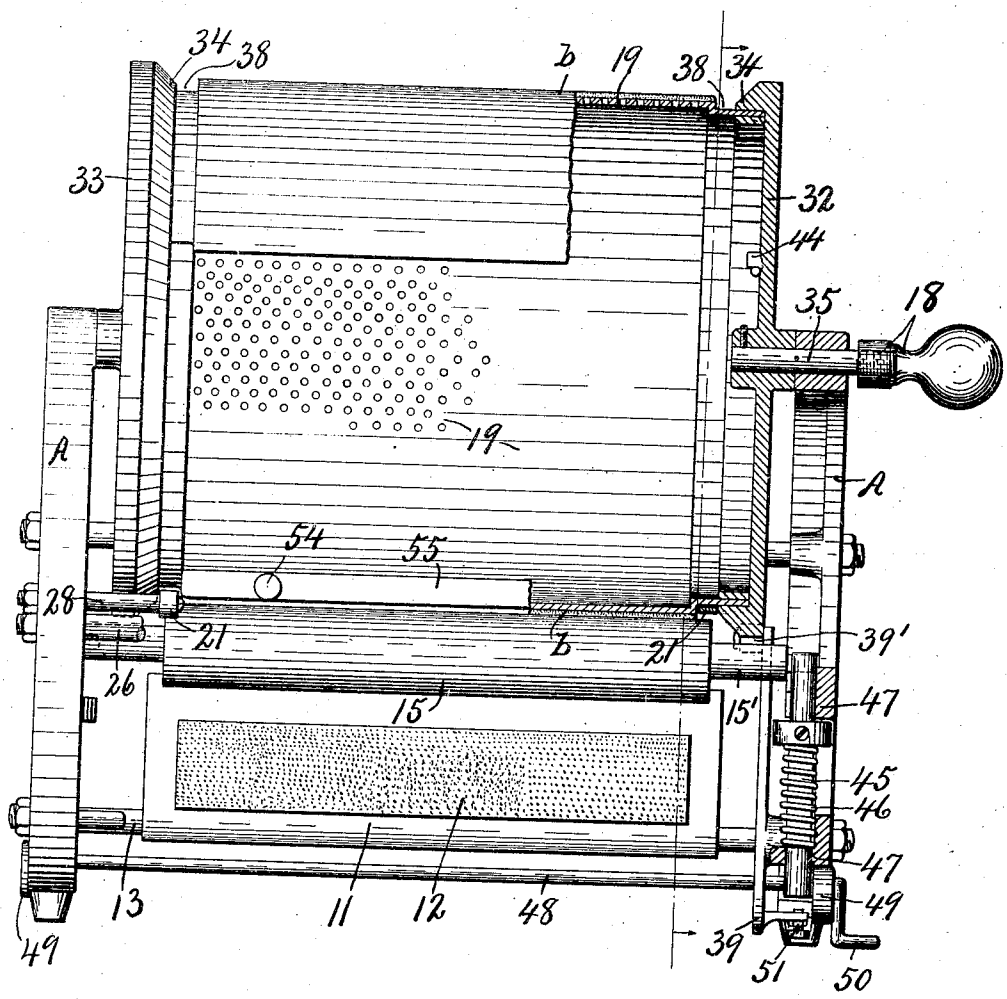
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5 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
R. W. Bailey.
H. E. Chace

Inventor:
E. A. Cox

By Howard P. Denison
Attorney.

E. A. COX.

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5 SHEETS—SHEET 4.

Fig. 4.

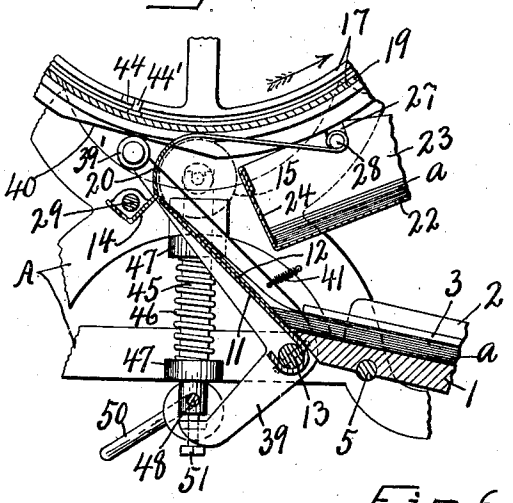


Fig. 5.

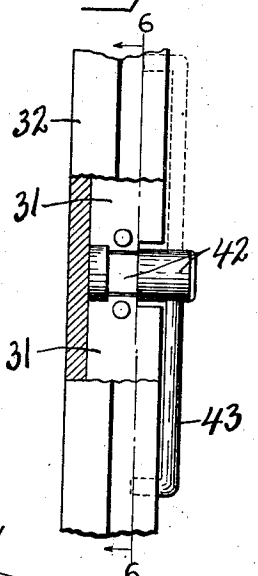


Fig. 6.

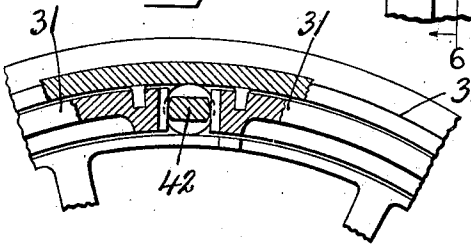


Fig. 7.

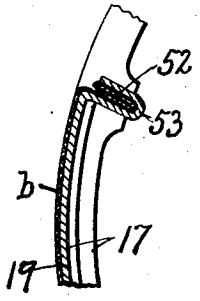


Fig. 8.

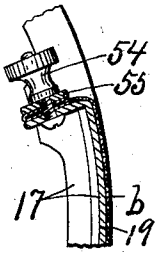


Fig. 9.

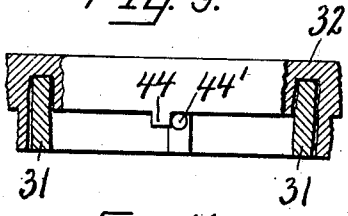


Fig. 10.

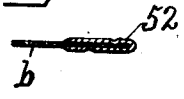


Fig. 11.

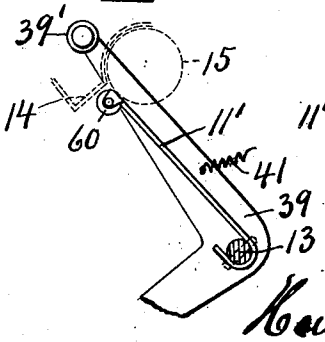
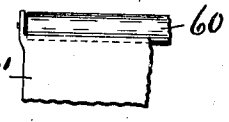


Fig. 12.



Witnesses:
P. W. Bailey.
H. E. Chase

Inventor.
E. A. Cox
By
Howard P. Denison
Attorney.

E. A. COX.

APPARATUS FOR SEPARATING, FEEDING, AND DELIVERING SHEETS.

APPLICATION FILED JAN. 25, 1911.

1,075,697. Patented Oct. 14, 1913.

5 SHEETS—SHEET 5.

Fig. 13.

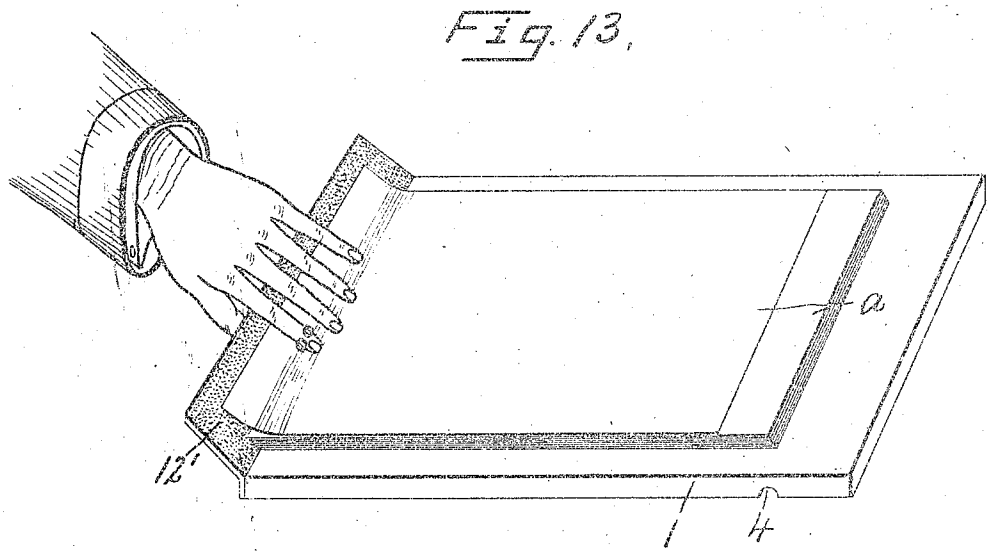


Fig. 14.

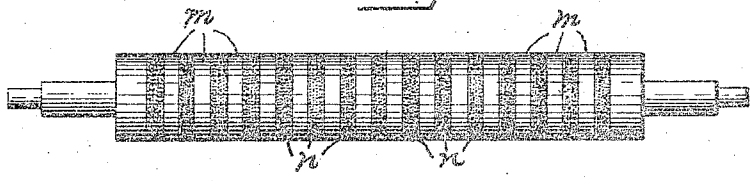
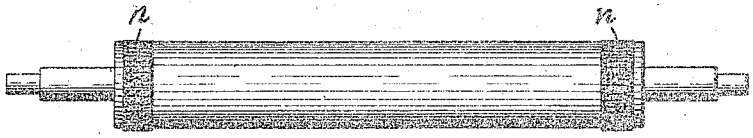


Fig. 15



Witnesses:
R. W. Bailey.
H. E. Chase.

Inventor:
E. A. Cox
By Howard P. Denison
Attorney

UNITED STATES PATENT OFFICE.

EDWIN A. COX, OF NEWARK, NEW JERSEY.

APPARATUS FOR SEPARATING, FEEDING, AND DELIVERING SHEETS.

1,075,697. Specification of Letters Patent. Patented Oct. 14, 1913.

Application filed January 25, 1911. Serial No. 604,604.

To all whom it may concern:

Be it known that I, EDWIN A. COX, of Newark, in the county of Essex, in the State of New Jersey, have invented new and useful Improvements in Apparatus for Separating, Feeding, and Delivering Sheets, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in apparatus for separating, feeding and delivering sheets of paper and similar articles from a collated pile and although it is specifically adapted for use in connection with duplicating or stencil printing machines it is equally useful in connection with addressing, folding, copying, ruling, printing and other machines to which such sheets may be successively fed for further operation thereon.

The main object is to provide means whereby the sheets may be separated by hand and successively fed one by one to a printing or similar machine and the printed sheets delivered at or near the point of entrance and recollated right side up in readable position by the operator during the separating and feeding operation so that the work upon each sheet may be readily inspected upon its delivery without in any way interfering with or retarding the progress of the work of separating and feeding the sheets to the apparatus.

Other objects and uses relating to specific parts of the apparatus will be brought out in the following description:

In the drawings Figure —1— is a longitudinal vertical sectional view of a duplicating or stencil printing machine and my improved separating, feeding and delivering apparatus associated therewith, the parts being shown in the position assumed while feeding and printing one of the sheets while in transit from the feeding table to the delivery shelf. Fig. 2 is a top plan of the separating, and feeding mechanism omitting the printing cylinder and delivery shelf and showing portions of the supporting frame in section. Fig. 3 is a front elevation partly in section of the machine shown in Fig. —1— except that the feeding table and delivery shelf are omitted. Fig. 4 is an enlarged longitudinal vertical sectional view of the same feeding and delivering mechanism and adjacent portions of the printing cylinder and sheet supporting shelves except that the feed or presser roller is shown by dotted lines and the presser plate in position for pressing the advance end of the sheet against the roller. Fig. 5 is an enlarged rear view, partly in section, of part of a cylinder head showing a clamping ring for the stencil supporting plate and means for operating said ring. Fig. 6 is a sectional view taken on line 6—6, Fig. —5—. Figs. 7 and 8 are enlarged transverse sectional views of opposite ends of the segmental stencil support showing particularly the manner of fastening the inking pad and stencil sheet in place. Fig. 9 is an inner face view of one of the cylinder heads and adjacent clamping ring showing the stops for limiting the relative circumferential movement of those parts. Fig. 10 is an enlarged detail sectional view of one end of an inking pad showing a metallic fastener by which it is attached to the cylindrical segment. Fig. 11 is a rear view of a modified form of presser plate employing a roller by which the advance edge of the papers is forced into contact with the main feed roller, a portion of the actuating element being also shown in connection therewith. Fig. 12 is a face view of a portion of the presser plate and roller thereon shown in Fig. 11. Fig. 13 is a perspective view of a supporting plate and collated sheets mounted thereon showing the manner of separating the sheets by hand. Figs. 14 and 15 are face views of modified forms of feed and press rolls adapted to be used in connection with type printing machines.

Arranged in close proximity to and inclining upward and rearwardly at an obtuse angle with the table —1— is a deflector plate —11— forming a temporary limiting stop against which the advanced ends of the blank sheets normally rest one in advance of the other from the bottom upward so as to facilitate the separation of the uppermost sheets as they are fed forwardly by hand, said deflector plate being preferably provided with a retarding face —12— of rubber or roughened material to prevent the remaining sheets from being drawn forwardly with the one which is being advanced by hand to the mechanical feeding device.

The plate —11— is preferably secured at its lower edge to a rock shaft —13— and its upper edge is movable transversely of and in close proximity to an abutment —14— parallel with the axis of the rock

shaft —13— and extending transversely at substantially right angles to the plate —11— and is adapted to be engaged by the advance end of the sheets as they are successively fed one by one by hand across the front face of the deflector —12— for the purpose of properly alining the sheets upon their entry to the feeding mechanism.

In Fig. 13 I have shown the detached sheet-supporting device adapted to be used independently or in connection with any machine or apparatus for receiving the separated sheets and consisting of the support —1— upon which the collated sheets —*a*— are placed and an inclined retarding surface —12'— disposed in a plane at an obtuse angle to that of the support —1— for permitting the uppermost sheet to be separated from the remaining sheets which abut against the retarding surface.

Feeding mechanism.—After each sheet has been fed by hand across the inclined plate —11— and into engagement with the abutment —14—, the rock shaft —13— and plate —11— are rocked at the proper time to press the advanced end of the sheet into contact with the periphery of a feed roller —15— having a suitable gripping surface of rubber or equivalent material capable of picking up the advanced end of the sheet and feeding it forwardly in the direction of rotation of the feed roller, the deflector plate being instantly released from its holding position to free the sheet from unnecessary resistance and allow it to be advanced freely by the feeding roller. The upper edge of the plate —11— therefore becomes a presser bar or guide for pressing the advance end of the sheet against the feed roll but only after it has been lined up by the abutment —14—, the movements of the feed roll and presser plate being synchronized so as to bring the advance end of the sheet into contact with the feed roller only after it has been fed by hand into engagement with the abutment —14—.

Any suitable mechanism may be employed for rotating the feed roll and oscillating the presser plate or deflector —11— and in the present instance this feeding means consists of a rotary cylinder —17— journaled in suitable bearings upon the upper portion of the frame —A— and provided with a suitable crank arm —18— by which it may be rotated, said cylinder having a perforated stencil supporting segment —19— coacting with the periphery of the feed roll 15 to facilitate the continued feeding of the sheet and at the same time transmitting printed matter thereon in which case the roller —15— serves the double purpose of a feed roll and press roll.

For type printing machines the feed roll may be made up of hard and soft rubber disks —*m*— and —*n*— alternating with each other and spaced to correspond with the line spacing of the type or I may employ hard rubber roller with rubber disks or bands at the ends for engaging the head and foot spaces of the sheet.

Delivery device.—As the sheets are brought into contact with and fed by the roller —15— they are returned forwardly by a curved deflecting plate —20— preferably forming a continuation of the abutment —14— and having its opposite ends formed with stripper fingers or arms —21— forming a continuation of the deflector plate —20— and extending some distance in front of the feed roll —15— for returning or delivering the sheets with the printed side uppermost upon an underlying receiving tray —22—. This tray is preferably disposed in a forwardly inclined plane a sufficient distance above the table —1— to permit the operator to readily manipulate the blank sheets in feeding them by hand to the feeding roller —15—, said tray being located wholly in front of the feed roller and in this instance below the printing cylinder —17— directly in the path of movement of the returning sheets. This tray is supported upon the frame —A— and is provided with upwardly projecting side flanges —23— and rear and front end flanges —24— and —25— for guiding, alining and confining the sheets one upon the other as they are delivered from the feeding roller.

The apparatus forming the subject matter of my present invention comprises in this instance three coacting mechanisms, namely sheet separating means, mechanism for feeding the separated sheets successively to a printing or other device adapted to operate thereon and an additional mechanism for delivering and recollating the sheets right side up at or near the point of entrance to the machine.

Separating mechanism.—The collated blank or other sheets to be separated are supported upon a rearwardly inclined table or shelf —1— between adjustable guides —2— and are lightly held flatwise by a comparatively light presser plate —3— of card-board or similar comparatively stiff material resting upon the uppermost sheet and preferably interlocked with the front ends of the guides —2— substantially as shown in Fig. —2— to prevent accidental endwise displacement thereof relatively to the guides and at the same time allowing it to gravitate freely onto the uppermost sheet. The rearward inclination of the table —1— is just sufficient to hold the collated sheets back against undue forward movement, the under side of the rear end of the table being formed with an open sided slot or bearing —4— resting upon lengthwise pins —5— on the main supporting frame —A— while the front end may be adjusted vertically to vary the in-

clination and may rest upon the same support upon which the frame —A— is mounted or may be blocked up when necessary to vary the inclination. The purpose of the open sided bearing —4— is to permit the table to be readily attached to or detached from the machine when desired. The guides —2— are adjustable transversely of the table to engage and guide the edges of the sheets and for this purpose are provided with laterally projecting slotted arms —6— for receiving clamping screws —7— engaging the table —1— to hold the guides in their adjusted position.

As shown in the drawings, particularly Fig. —2— the rear ends of the guides are provided with lateral offsets —8— and the corresponding end of the sheet retarding plate is provided with similarly formed slots —9— for receiving the offset portions —8— and thereby locking the retarding plate against endwise movement relatively to the table. The central portion of the rear end of the retarding plate —3— is cut away forming a recess —10— extending forwardly a considerable distance from the rear end to permit the free action of the fingers of the operator in feeding the uppermost sheets one by one to the mechanical feeding device hereinafter described. The necessary separation of the sheets is therefore accomplished by hand preferably through the medium of anti-slipping rubber tips of any well known construction worn upon the fingers to enable the operator to more effectively feed the uppermost sheets forwardly one by one under light contact while the slight pressure of the weighted member —3— serves to hold the remaining sheets flat and to prevent in a measure such sheets from being drawn forward by suction or friction as the outermost sheet is advanced, and also holds them from sliding back. Another purpose of the weighted plate —3— which is substantially coextensive with the width of the sheets is to smooth out any creases, wrinkles or overturned corners in the sheet which is being fed forwardly to assure its proper entry to and passage through the feeding device and printing or other machine with which such feeding device is associated.

The intermediate portion of the tray rests upon a transverse rod —26— on the front portion of the frame —A— and the side flanges —23— are formed with open sided bearings —27— for engaging the studs —28— also projecting inwardly from opposite sides of the frame some distance to the rear of the bars —26— leaving the greater weight of the tray in front of said bar so as to hold the tray in interlocking engagement with the studs —28— and at the same time to permit the tray to be readily removed by simply tilting its forward end upwardly sufficiently to disengage the flanges —23— from the studs and then to withdraw the tray forwardly.

The object in disposing the tray at an inclined position is to offer a limited resistance to the rapid delivery of the sheets sufficient to prevent them from passing beyond the limits of the tray and also causing the collated sheets to gravitate endwise against the rear end flange —24— which serves to aline the sheets in compact stacks for removal when necessary.

The deflector plate —20— extends upwardly from the abutment —14— partially around and in close proximity to the rear side of the feed roll —15— but terminates a sufficient distance at the rear of the meeting faces of said roller and cylinder to allow the sheets to be impinged between said meeting faces and thereby continue to feed them forwardly onto the receiving tray —22—, the stripper arms —21— serving the double purpose of stripping the sheets from the cylinder and additionally deflecting them onto the tray.

The deflector plate —20—, arms —21— and abutment —14— are preferably made of a single piece of sheet metal and are supported in operative position by securing the front ends of the arms to the studs —28— while the portion of the plate having the abutment —24— is similarly attached to a transverse rod or bar —29— just at the rear of the feed roller —15—. The front portion of the receiving tray bearing the flange —25— is preferably adjustable lengthwise relatively to the main body to conform to different lengths of sheets and for this purpose the main body is provided with suitable ways —30— in which the movable section is guided. In this particular instance the duplicating or stencil printing cylinder —17— constitutes a part of the separating, feeding and delivering mechanism in so far as it forms the means for actuating or controlling the operation of such mechanisms and in order that the invention may be clearly understood, it will be necessary to further describe the construction of this particular driving and controlling mechanism.

The perforated stencil supporting segment —19— is secured at its ends to opposite split rings —31— which are mounted upon and adjustable circumferentially of adjacent cylinder heads —32— and —33— within inwardly projecting annular flanges —34—, the adjacent ends of the stencil supporting segment —19— being depressed inwardly beyond the printing face and frictionally held between the split clamping rings —31— and flanges —34— as best seen in Figs. —3— and —6—. The cylinder heads —32— and —33— are mounted upon central spindle sections or studs —35— and —36— journaled in the upper portion of the

frame —A—, one of said studs as —35— being provided with the hand crank —18— whereby the cylinder may be rotated in the direction indicated by arrow —X— Fig. —1—. By depressing the ends of the stencil supporting segment inwardly in the manner described, annular grooves —38— are formed between the flanges —34— and the perforated portion of the segment for receiving the stripper fingers —21— which lie wholly above or within the printing face of the stencil as —*b*— while the ends of the feed roller —15— extend some distance beyond the ends of the stencil and under the fingers —21— so as to guide the edges of the sheets beneath said fingers and allow the latter to strip the printed sheets from the stencil and simultaneously deflect or deliver them onto the receiving tray —22—. The perimeter of one of the cylinder heads as —32— constitutes a cam coöperating with a roller bearing —39'— on a lever —39— for controlling the operation of the presser plate —11—, said perimeter being circular throughout the greater portion of its circumference but having a small portion thereof cut away at —40— to form a slight depression or comparatively short flat bearing face.

The lever —39— is secured to one end of the rock shaft —13— and its upper end is spring pressed upwardly and forwardly to hold the roller bearing —39'— in contact with the perimeter of the cylinder head —32—. Both the lever —39— and presser plate —11— are secured to the same rock shaft —13— and therefore any movement of the lever is imparted to the presser plate. The radius of the circular portion of the perimeter of the cylinder head —32— is such as to hold the upper end of the presser plate —11— a sufficient distance away from the feed roller —15— to permit the free entrance of the advance end of the sheet between said plate and roller and against the abutment —14— while the radius of the low point of the depression —40— is such that when in contact with the roller —39'— a spring —41— acting upon the lever —39— draws the upper end of said lever and presser plate forwardly sufficiently to cause the upper end of the plate to firmly press the advance end of the interposed sheet forwardly against the periphery of the feed roller —15— and at the same time or before this action takes place the advance edge of the stencil comes in contact with and rotates the roller —15— to feed the paper forward, the deflector plate —20— and stripper fingers —21— serving to return or deliver the sheet right side up upon the receiving tray —22— as the cylinder continues to rotate.

As previously stated the cylinder heads and supporting rings for the segment are adjustable circumferentially relatively to each other to vary the head space on the printed sheet but are adapted to be locked in their adjusted position by means of a cam —42— interposed between the meeting edges of the split rings and operated through the medium of a lever —43— as best seen in Figs. —5— and —6—.

In order to prevent adjustment of the depressed portion —40— of the head —32— in advance of the corresponding end of the stencil supporting segment —19—, the rings and heads are provided with limiting stops —44— and —44'— arranged so that the depressed portion —40— can only be adjusted within the circumferential length of the stencil supporting segment and not across the opening between its circumferential ends. Otherwise the feed roller —15— would not be rotated at the time when the advanced end of the sheet was pressed into engagement therewith by the presser plate —11—.

The feed roller —15— is mounted upon a suitable shaft —15'— having its ends journaled in vertically movable supporting spindles —45— which together with the feed roller are spring pressed upwardly by coiled springs —46— to normally hold the feed roller in contact with the periphery of the stencil. These spindles are guided in apertures lugs or ears —47— on the main supporting frame. The lower ends of the spindles —45— extend some distance below the lower apertured lugs —47— and are provided with suitable apertures in which is journaled a rock shaft or spindle —48— having its ends provided with similar eccentrics —49— engaging portions of the frame, said shaft being operated by a suitable hand lever —50— to rotate the cams and thereby lower the spindles —45— and roller —15— sufficiently to clear the periphery of the printing cylinder and thus preventing injury to the stencil when the machine is not in use. During this latter operation of withdrawing the feeding roll —15— from its pressing position, the lower end of one of the spindles —45— engages an underlying shoulder —51— on the lever —39— and simultaneously forces the roller bearing —39'— and presser bar —11— clear from the periphery of the cylinder head and from the feed roller, thus permitting the cylinder to be revolved independently of any of the other mechanisms without liability of injuring the stencil sheet.

The manner of fastening the inking pad and stencil sheet in place is shown in Figs. 7, 8 and 10, Fig. 10 showing a pad or stencil sheet as provided with a metallic clasp or bar —52— around which the adjacent portions of the pad or stencil sheet may be folded and then tucked or inserted into a loop —53— in the corresponding end of the

perforated segment —19—, the opposite ends of the ink pad or stencil sheet being held in place by a clamping screw —54— and bar —55—.

In Fig. —11— I have shown a slightly modified form of presser bar —11'— having its upper end provided with a presser roll —60— to force the advanced end of the sheet against the feeding roll —15—.

In operation the blank sheets are placed upon the supporting table —1— and the sheets are successively fed by hand against and upwardly across the presser plate —11— and then against the abutment —14— by which the sheet is properly alined. During this operation the printing cylinder —17— is rotated and as soon as the depression —40— is registered with the roller bearing —39'—, the presser bar —11— is instantly drawn forwardly to force the advanced end of the sheet into engagement with the periphery of the feed roll —15— which is by that time rotated by contact with the stencil sheet so as to feed the sheet upwardly and forwardly between the printing couple thereby printing the sheet and delivering it right side up upon the receiving tray —22— where it may be inspected at any time without necessitating change of position of the operator and while the blank sheets are being fed forwardly into the machine.

What I claim is:

1. In apparatus for separating, feeding and delivering sheets, two coacting rotary printing elements, separate supports one above the other at one and the same side of said elements toward which their meeting faces travel, an abutment against which the sheets are fed by hand from one of said supports, and oscillating means for pressing said sheets from the abutment against the opposite side of one of the rotary elements whereby they are successively fed upon the other support.

2. In combination with a rotary printing element and an underlying presser roll coacting therewith, supports one above the other at the front side of the rotary elements toward which their meeting faces travel, an abutment against which the sheets are fed by hand from the lower support, and oscillating means for pressing the sheets from said abutment against the rear side of the presser roll, whereby sheets are carried between and printed by the printing couple and returned printed side up upon the upper support.

3. In combination with coacting rotary elements disposed one above the other, separate sheet supports one above the other at the front side of said elements toward which their meeting faces travel, an inclined guide extending from the lower support toward the rear side of the lower rotary element across which the sheets are adapted to be initially advanced one by one by hand, and means controlled by one of the rotary elements for operating said guide to press the advance end of the sheet against the lower element, whereby said sheet is carried between said elements and returned upon the upper support.

4. In combination with a rotary printing couple, separate sheet supports one above the other at one and the same side of said elements toward which their meeting faces move, a movable guide extending from the lower support to a point in proximity to one of the elements of the printing couple and across which the sheets on the lower support are adapted to be advanced one by one by hand from the lower support between the guide and said coacting element, and means controlled by one of the elements of the printing couple for operating said guide to press the sheet against the adjacent rotary element whereby said sheet is carried between the elements of the printing couple and thereby delivered printed side up upon the upper support.

5. Apparatus for separating, feeding and delivering sheets comprising a printing drum and a feed roll, and actuating means therefor, a receiving tray at one side of the feed roll, an alining abutment at the opposite side of the feed roll against which the sheets are fed by hand one by one, a press plate separate from the drum for pressing the advance end of the sheet from said abutment and against the feed roll and means for oscillating said press plate.

6. An apparatus for separating, feeding and delivering sheets comprising a rotary drum and a feed roll, means permitting the feeding of sheets one by one by hand in one direction toward the feed roll, intermittently movable means separate from the drum for pressing the advance end of the sheet against a portion of the feed roll moving in the same general direction, actuating means for said feed roll, and means for reversing the direction of movement of the sheet while engaged by the feed roll.

7. In an apparatus for separating, feeding and delivering sheets, a support for the collated sheets to be separated, said sheets being separated and advanced one by one by hand, and a flat follower resting on the uppermost sheet and having the central portion of its rear end cut away to form an entering space for the hand in feeding the upper sheet forwardly.

8. In combination with a rotary printing cylinder and press roll actuated thereby, a receiving tray at one side of the press roll toward which the meeting faces of the printing couple travel, an abutment at the opposite side of the press roll and parallel there-

with, a supporting tray for the collated sheets, a vibratory guide extending from the rear end of the supporting tray to a point in proximity to the abutment and movable toward and from the press roll, said sheets being fed one by one by hand from the supporting tray across said guide plate and against said abutment, and means movable with one of the revolving elements of the printing couple for controlling the operation of the guide plate.

9. In an apparatus for separating, feeding and delivering sheets, a feed roll and actuating means therefor, sheet supports arranged one above the other at one and the same side of the feed roll toward which the upper side of the feed roll moves, an abutment at the opposite side of the feed roll and parallel therewith, a guide extending from the rear end of the lower support to a point in proximity to the abutment, and means controlled by the feed roll operating means for operating said guide to press the advance end of the sheet from the abutment against the feed roll whereby the sheet is advanced by the feed roll, and additional means for reversing the direction of movement of the sheet and delivering it upon the upper support.

In witness whereof I have hereunto set my hand on this twenty-first day of January 1911.

EDWIN A. COX.

Witnesses:
F. B. HELLER,
WALTER BAKER.