R. M. DAVIDSON.

PAPER PERFORATING, CUTTING, AND DELIVERY APPARATUS.

APPLICATION FILED JAN. 29, 1908.

901,892. Patented Oct. 20, 1908

SHEETS—SHEET 1.

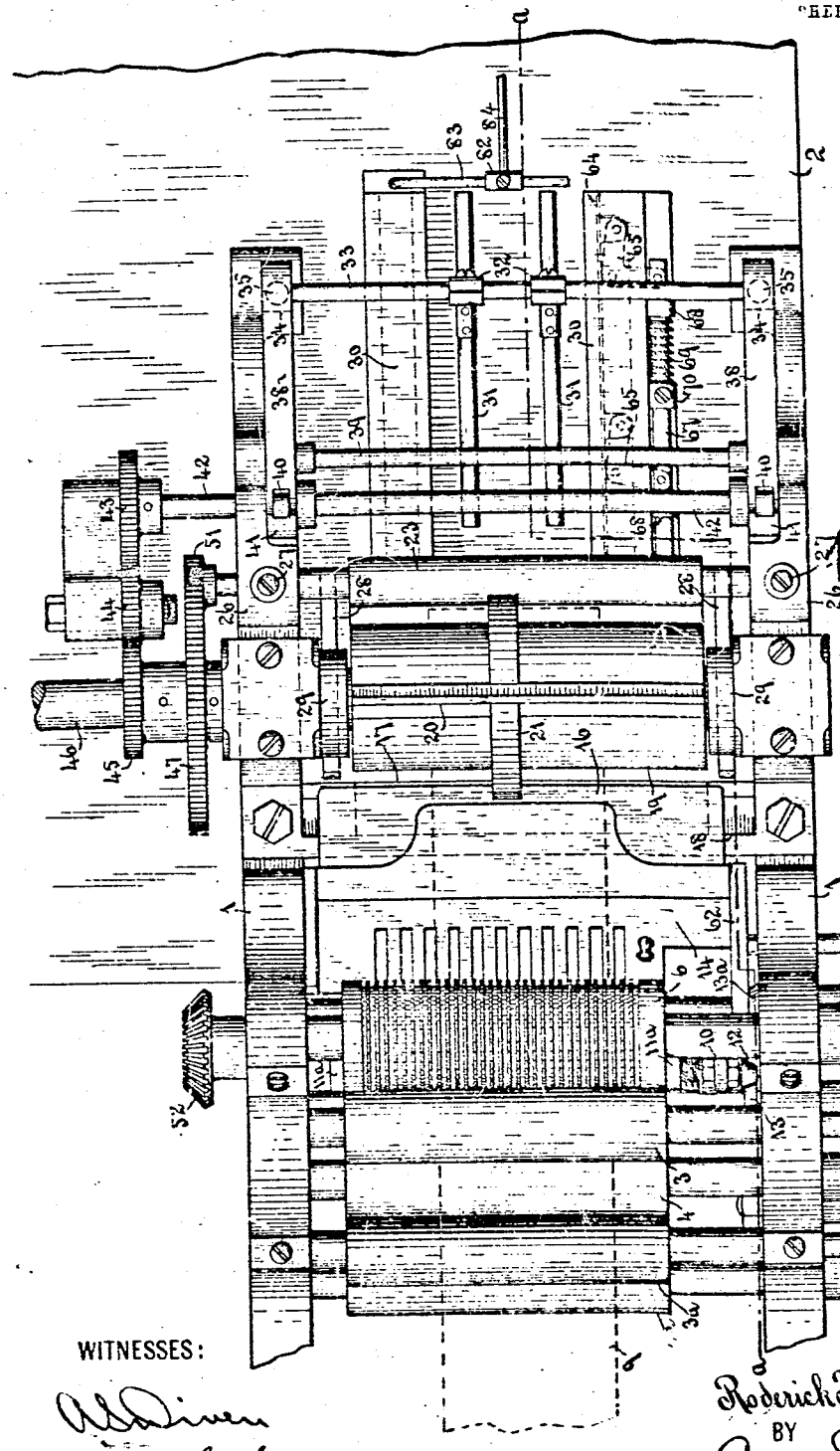


Fig. 1.

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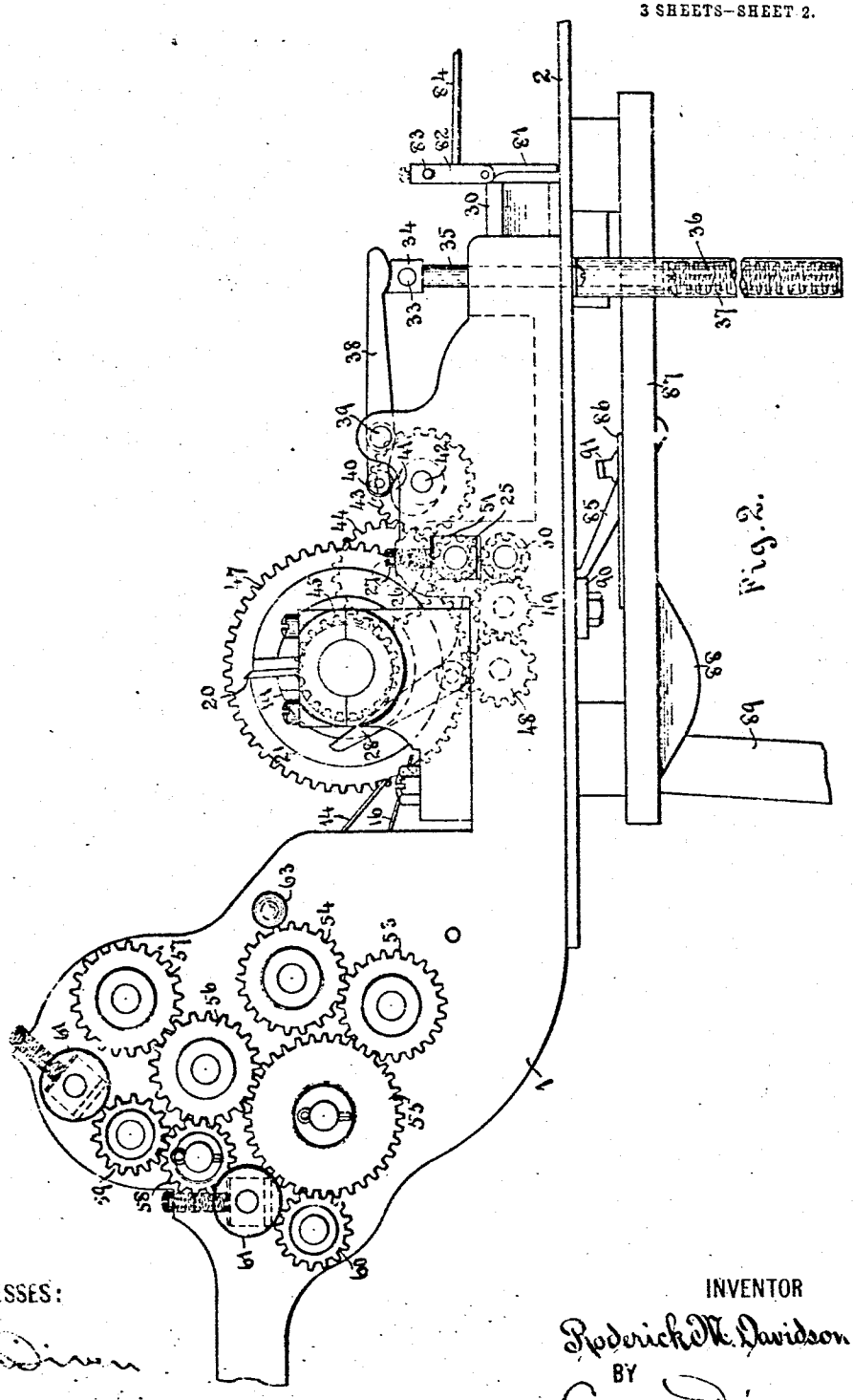


Fig. 2.

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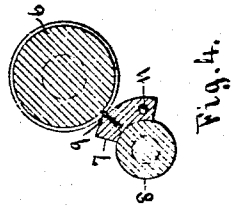


Fig. 4.

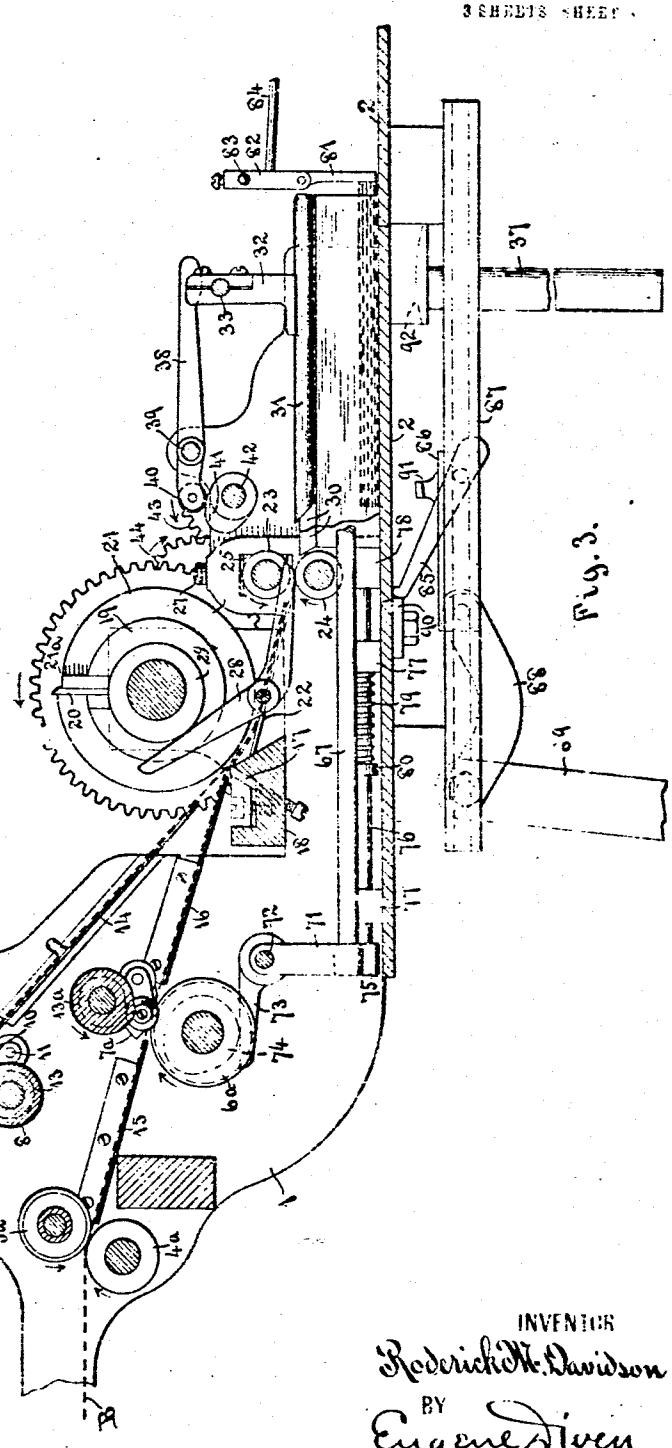


Fig. 3.

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UNITED STATES PATENT OFFICE.

RODERICK M. DAVIDSON, OF ELMIRA, NEW YORK.

PAPER PERFORATING, CUTTING, AND DELIVERY APPARATUS.

No. 901,892. Specification of Letters Patent. Patented Oct. 20, 1908.

Application filed January 29, 1908. Serial No. 413,289.

To all whom it may concern:

Be it known that I, RODERICK M. DAVIDSON, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Paper Perforating, Cutting, and Delivery Apparatus, of which the following is a specification.

This invention relates more particularly to improvements in the perforating, cutting and delivery apparatus for web printing machines, and has to do especially with apparatus of this character applicable to machines for printing the leaves for memorandum or counter check books, wherein the original and duplicate leaves are printed upon differently colored paper, and therefore, from different webs running through the machine. While I have shown my improved apparatus as adapted for such a machine, I do not, however, confine it to such application, since the features of novelty may be applied as well to single web machines, and to machines for other purposes.

One object of my improvements is to provide an apparatus of this character, wherein the perforating of the web will be performed after the web has passed the printing cylinders, and just before it is cut into sheets and discharged upon the delivery table.

A further object is to provide means whereby the web will be entirely relieved from tearing strains during the perforating and cutting operations. And a final object is to provide an improvement in the delivery mechanism whereby the sheets may be delivered from the cutting mechanism at a high speed, stacked in packets of the desired number of leaves, and delivered from the stacking and jogging mechanism in proper sequence as fast as the packets are completed.

I attain my objects by constructing and arranging the parts of the apparatus in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of the apparatus, as applied to a two web printing machine; Fig. 2, a side elevation thereof; Fig. 3, a vertical section on the line *a*—*a* in Fig. 1; and Fig. 4, a detail showing a section through the perforating mechanism.

Like numerals designate like parts in the several views.

The apparatus is mounted between two frame-plates, 1, 1, adapted to be fastened to the main frame of the printing machine, in any desirable position, and carrying upon their under sides a delivery table 2, (part only of which is shown in the drawings). From the printing cylinders of the machine the web, or webs, of paper will be delivered to feed rolls 3, 4, and 3^a, 4^a, from suitable guide rolls, not shown. Where two webs of paper are to be run through the machine, said webs, (see A, B, Figs. 3.), will be brought into exact vertical alinement by properly adjusted guide rolls, before entering the feed rolls. From these feed rolls the webs of paper pass over aprons 5, and 15, to the perforating cylinders, 6, 7, and 6^a, 7^a. These perforating cylinders may be of any desired type, although I have shown in the apparatus a perforating mechanism which I have devised particularly for this work, said mechanism being fully shown and described in a separate application filed of even date herewith and bearing Serial No. 413,288.

Without going into specific details, this perforating mechanism consists of a circumferentially grooved cylinder 6, a cylinder segment 7, adjustably mounted upon a cylinder 8, and carrying a radially reciprocating perforating blade 9, the teeth on which enter the grooves on cylinder 6; said blade being projected from the segment, when in radial alinement with the cylinder 6, by means of an arm 10 attached to one end of an operating shaft 11, mounted in the segment, said arm being operated at the proper moment by means of a roller 12, mounted upon a pin at the free end of the arm and engaging a cam surface 13, projecting from the inward side of one of the frame-plates 1. Motion is imparted to the perforating blade from shaft 11 by means of arms 11^a, (see Fig. 1), fastened to the shaft at each end of the segment and engaging projections from the ends of the blade. The perforating teeth are, by this means, immediately disengaged from the web after perforating it, leaving it free to continue in its line of travel to the cutting mechanism.

From the perforators the webs pass along aprons 14, and 16, over the stationary cutting blade 17, to the apron 22. The blade 17 is adjustably mounted on a cross bar 18, attached to the journal blocks which carry the cutting cylinder 19. Carried by the cylinder 19 is a cutting blade 20. A central ring 21 fastened on the cylinder acts as a guide to prevent the paper from rising,

or buckling, as it passes from the stationary cutter blade to apron 22. This ring is cut away or flattened, at 21^a, back of the blade, to permit the ends of the webs to pass freely over the blade 17 before they pass to the apron 22. While I prefer to use the ring for economy in construction, I may make the cylinder 19 of the full diameter and dispense with the ring.

From the apron 22 the paper passes between rolls 23 and 24, the upper of said rolls being mounted in vertically movable journal boxes 25, in order that the rolls may be separated during certain periods, as will hereinafter be set forth. The journal boxes 25 are mounted in guides 26, and are pressed downwardly by springs, the tension of which is regulated by set screws 27. The roll 23 is raised at the proper periods by means of the bent levers 28, pivoted on the frame-plates at each side and actuated by cams 29 on the shaft of the cutting cylinder.

From the rolls 23 and 24, the severed sheets are delivered upon the inwardly projecting ledges 30, at the top of the sides of the packing and jogging box; said ledges 30 being set slightly closer together than the width of the sheets, so that said sheets will rest momentarily upon the ledges before they are deposited in the jogging box. For delivering the sheets to the jogger, I provide a pair of horizontal vertically reciprocating presser arms 31, said arms being fastened to brackets 32, clamped to a cross bar 33. This cross bar, at each end, is mounted in blocks 34 attached to the upper ends of vertical rods 35; said rods being mounted to slide in the ends of the frame-plates 1, and having their lower ends engaged and pressed upward by coiled springs 36, mounted in cylindrical casings 37, (see Fig. 3.). Rock arms 38, mounted upon the oscillating shaft 39, bear upon the box 34 at one end, and at the other end are provided with rollers 40, which bear upon the cams 41, carried by a rotating shaft 42: whereby the cross bar 33 will be depressed at each revolution of said shaft; that is to say, at each delivery of a sheet, or pair of sheets, to the jogger; the return stroke being accomplished by means of the springs 36, which also act to hold the rollers 40 on the rock arms in contact with the cams 41.

Motion is imparted to the shaft 42, through gear wheels 43, 44 and 45, at one side of the apparatus, (see Fig. 1.). The gear 45 is attached to a shaft 46, which receives motion in suitable manner from the main gear train of the printing machine. The shaft 46 also carries the cutting cylinder 19; shaft 42 being geared to shaft 46, so as to rotate in unison with said cylinder.

The shaft 46 is also provided with a larger gear 47, which meshes with a gear train 48, 49 and 50, (see Fig. 2), to communicate an accelerated motion in the same direction to the shaft of roll 23 by means of the gear 51, which meshes with gear 50, the lift of the roll 23 being so little as not to throw these gears 50 and 51 out of mesh.

Motion is imparted to the perforators and feed rolls through the bevel gear 52, which is driven from the main gear train of the printing machine; said bevel gear being attached to the shaft of the under perforating roll 6^a, and having attached to its outer end, which projects beyond the opposite frame-plate, the gear 53, which meshes with gear 54 attached to the shaft which carries the perforator segment 7^a. An idle wheel 55 transmits motion from gear 53 to the gears 56 and 57, which transmit motion to the upper perforator. From gear 56 motion is imparted to the feed roll through the idler 58 and the gear 59, the upper roll 3 being held in frictional contact with the roll 4, in the usual manner, by spring actuated journal blocks slidably mounted in the frame-plates. From the idler 55 motion is transmitted to the lower rolls through the gear 60.

For the purpose of raising the upper rolls 3 and 3^a, to permit the adjustment of the webs, in alining their printed matter, I extend the roller shafts, and provide them with the knobs 61. In order to get at the under perforator for adjustment, etc., I make the apron 14 removable, said apron being held in place by a clamping bar 62, mounted upon the end of the rod 63, which passes out through one of the frame-plates.

The jogging mechanism consists of a transversely movable plate 64, carried by rock arms 65, at one side of the jogging box, said rock arms 65 being actuated by the reciprocating bar 67, mounted in bearings 68 on the delivery table, and actuated in one direction by the spring 69, the tension of which is adjusted by the sleeve 70, adjustably mounted on the rod 67. The outward motion of the rod 67 is imparted thereto by means of an arm 71, mounted upon an oscillating shaft 72, actuated by the arm 73, which contacts with a cam on the shaft of cylinder 6^a. An end jogger 78, (see Fig. 3.), is carried by a rod 76, mounted in bearings 77 on the delivery table and actuated by spring 79, which presses upon the adjustable collar 80, in one direction; in the opposite direction being actuated by means of an arm 75, attached to the shaft 72. This jogging mechanism is not essentially new, and is described simply for the purpose of illustrating the complete operation of the apparatus.

At their outward ends the sheets are held in alinement during the jogging operation by means of a plate 81 hinged to the bottom of the stop 82, against which the sheets are brought to rest as they are delivered from

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rolls 23, 24, upon the ledges 30. The stop is held in position by a bent arm 83, rising from one side of the jogging box. The rod 82 prevents the leaves of a stack from flying upward when discharged from the jogging box. The packets of sheets when they reach the required number, are thrown out of the jogging box by a reciprocating discharge device, comprising an arm 85, adapted to pass up through a longitudinal slot in the delivery table, and pivotally mounted in a slide 86, carried by guides 87 positioned below the delivery table. Motion is imparted to the slide by means of the link 88, and a rock arm 89, the latter being actuated at the proper periods to throw the slide backward and forward in the guides. Upon its backward throw the arm 85 strikes a cross bar 90, and is thereby thrown upward into the slot in the delivery table, being fastened in its upright position by a detent 91, so that on the outward throw of the slide it will push the packet of sheets outward from the jogging box, the plate 81 being swung outwardly as the sheets pass beneath it. When the slide has reached its extreme outward throw, the detent 91 is actuated by a cam surface 92 to release the arm 85, which is then depressed for the return throw. This discharging device is not essentially new, and I lay no claim to it herein. After being discharged from the jogger, the packets may be at once removed by the operator, or carried by suitable mechanism to a still further point of delivery.

The operation of the apparatus is as follows:—Where two webs A and B are to be run through the printing machine, they will first be properly adjusted into vertical and longitudinal alinement, so that the printed or other matter on one sheet will fall directly above that on the sheet below, when the webs arrive at the cutting mechanism. When so adjusted, the webs, when the machine is in motion, will pass from the feed rollers 3, 4, and 3^a, 4^a, to the perforators, where they will receive the perforations in the proper localities, the ends of the sheet, after passing the perforators; and, in fact, while passing through the perforators, being entirely free from any pulling strains, as the rollers 23 and 24 are held apart while the webs are being fed to the cutter, as will be seen from an inspection of Fig. 3. Immediately after the rotating blade 20 has passed the stationary blade 17, however, the roll 23 will be dropped upon roll 24, and thereafter the severed sheets will be delivered with a greatly accelerated motion upon the ledges 30 of the jogging box; thereby carrying said severed sheets to the jogging box sufficiently in advance of the following sheets to permit the presser arms 31 to have ample time to be depressed and returned to their upper positions, before the delivery to the jogger of the next succeeding sheets. In Fig. 3, the presser arms 31 are shown as having commenced their downward stroke, roller 40 being shown in the act of riding out on the cam 41. An inspection of the cam 41 will show that this depression and return of the presser arms will be accomplished during one-half of a revolution of the shaft 42, and, therefore, during half the period in which the sheets are being delivered to the cutter blades. By means of these horizontal vertically reciprocating presser arms, the sheets are acted upon throughout their entire length to an equal degree and at the same time, and an accurate and effective delivery into the jogging box is accomplished. This delivery mechanism will be found particularly adapted for machines running at high speed. While I have spoken of these presser arms as being horizontal and vertically reciprocating, it will be understood that I have done so because the delivery table, at the jogging box, is horizontal in the apparatus as illustrated. Should the delivery box be set at an incline, then the presser arms and their direction of travel will be correspondingly tilted. In other words, the presser arms must be set parallel to the surface of the sheets as delivered to the box and reciprocate in that position.

By reason of providing the perforating cylinder with means for withdrawing the perforating blades from engagement with the webs as they pass between the cylinders, I am enabled to let the webs run free to the cutting mechanism, thereby avoiding putting a strain upon the webs after they have been weakened by the perforations, as where rolls are employed to draw the webs from the perforators. The apparatus may be provided with but one of these perforators where one web is to be operated upon, or where the perforations on two or more webs permit them to be run through the one perforator, and more than two perforators may be employed where a larger number of webs having differently alined perforations are to be brought together at the cutting and delivery mechanisms, as in making triplicate copy books, and the like. Various other details in the structural features may be changed without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent is—

1. A perforating, cutting and delivery apparatus comprising a perforating mechanism, feed rolls to deliver a web of paper thereto, a cutting mechanism to which the web passes from the perforating mechanism, separable delivery rolls between which the end of the web enters prior to the action of the cutting mechanism, means for closing said rolls upon the paper after the cutting mechanism has severed a sheet therefrom

and for separating the rolls upon the passage of the sheet through the rolls, and a delivery mechanism to receive the sheets from said rolls.

2. A perforating, cutting and delivery apparatus adapted to operate upon one or more webs of paper, said apparatus comprising one or more perforating mechanisms through which the webs are fed, feed rolls whereby the webs are delivered to the perforator or perforators in vertical alinement, a cutting mechanism to which the webs pass from the perforators in superposed position, separable delivery rolls between which the ends of the webs enter prior to the action of the cutting mechanism, means for closing said rolls upon the superposed sheets after the cutting mechanism has severed them from the webs and for separating the rolls upon the passage of the sheets through the rolls, and a delivery mechanism to receive the sheets from said rolls.

3. A perforating, cutting and delivery apparatus comprising a rotary perforating mechanism set transversely to the line of travel, means for feeding a web of paper thereto, means embodied in said mechanism for disengaging the perforating teeth from the paper whereby the web may run free immediately after perforation, a cutting mechanism to and through which the web freely passes from the perforating mechanism, and means for delivering the severed sheets from the cutting mechanism.

4. The combination, with a cutting mechanism, of means for feeding a web of paper thereto, means for delivering the severed sheets therefrom, a delivery receptacle above which the sheets are deposited, and one or more reciprocating presser arms adapted to engage the surface of the sheets to enter the sheets into the receptacle.

5. The combination, with a rotary cutting mechanism, of means for feeding a web of paper thereto, means for delivering the severed sheets therefrom at an accelerated speed, a delivery receptacle above which the sheets are deposited, said receptacle having an opening at its top narrower than the sheets, one or more reciprocating presser arms adapted to enter the sheets into the receptacle, and means for imparting a complete reciprocation to said arm or arms during each revolution of the cutting mechanism.

6. The combination, with a rotary cutting mechanism, of means for feeding a web of paper thereto, means for delivering the severed sheets therefrom at an accelerated speed, a delivery receptacle above which the sheets are deposited, said receptacle having an opening at its top narrower than the sheets, one or more presser arms set parallel to the top of said receptacle and positioned to enter the sheets into the receptacle, a transverse bar to which said arms are fastened, posts set at right angles to the top of the receptacle in which the ends of said bars are mounted, and mechanisms whereby said posts will be reciprocated in unison during each revolution of the cutting mechanism.

7. The combination, with a rotary cutting mechanism and means for feeding a web of paper thereto, of a pair of rolls to receive the several sheets from said mechanism, one of said rolls being mounted in movable boxes, pivotally mounted levers engaging the ends of said roll, cams on the cutter shaft to actuate said levers to move the roll to and from the fixed roll, and a train of gears whereby accelerated motion will be imparted from the cutter shaft to the rolls.

8. A delivery mechanism comprising a receptacle, means for feeding sheets of paper to and positioning them over an opening into the receptacle, one or more presser arms set parallel to the surface of the sheets when so positioned, and means for reciprocating the arm or arms to enter the sheets into the receptacle.

In testimony whereof I have affixed my signature, in presence of two witnesses.

RODERICK M. DAVIDSON.

Witnesses:
A. S. Diven,
M. E. Verbeck.