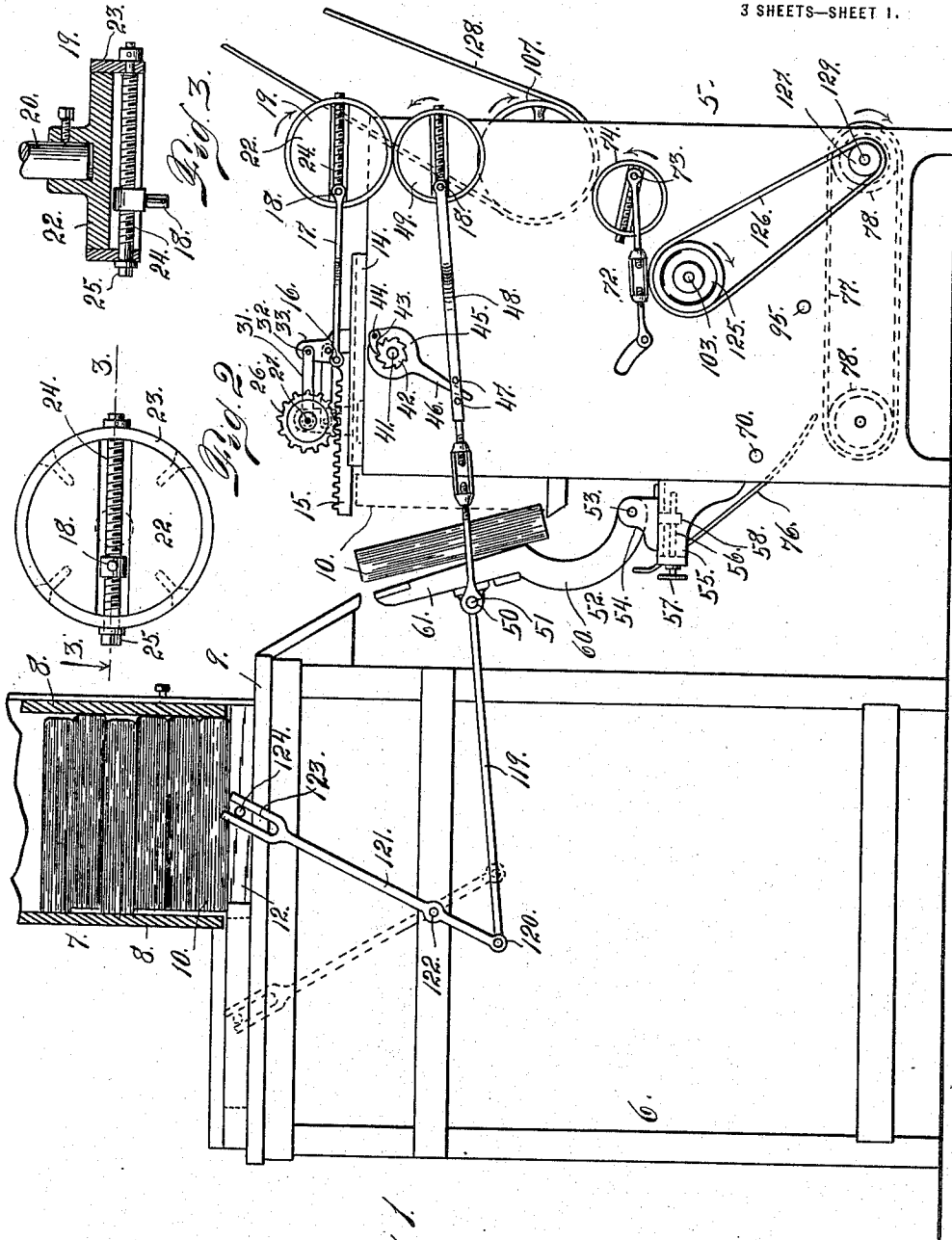


L. R. SMITH.  
BOOK EDGE PRINTING MACHINE.  
APPLICATION FILED JULY 6, 1912.

1,189,747.

Patented July 4, 1916.

3 SHEETS—SHEET 1.



Witnesses  
Otto E. Heddick.  
C. H. Rosemer.

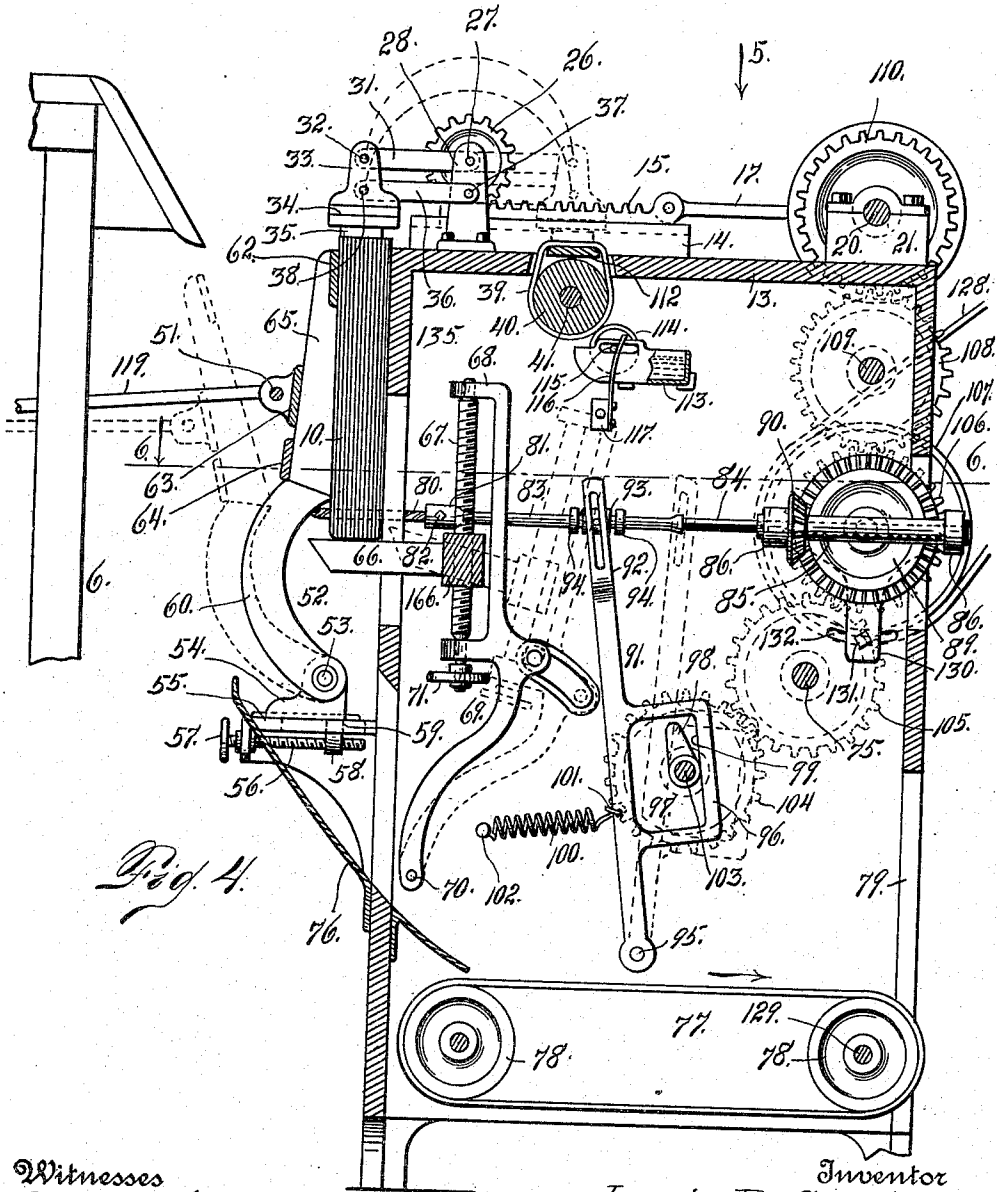
Inventor  
Louis R. Smith.  
By *A. J. G. Zinner*  
Attorney

L. R. SMITH.  
BOOK EDGE PRINTING MACHINE.  
APPLICATION FILED JULY 6, 1912.

1,189,747.

Patented July 4, 1916.

3 SHEETS—SHEET 2.



Witnesses  
Otto E. Haddock.  
C. H. Rossner.

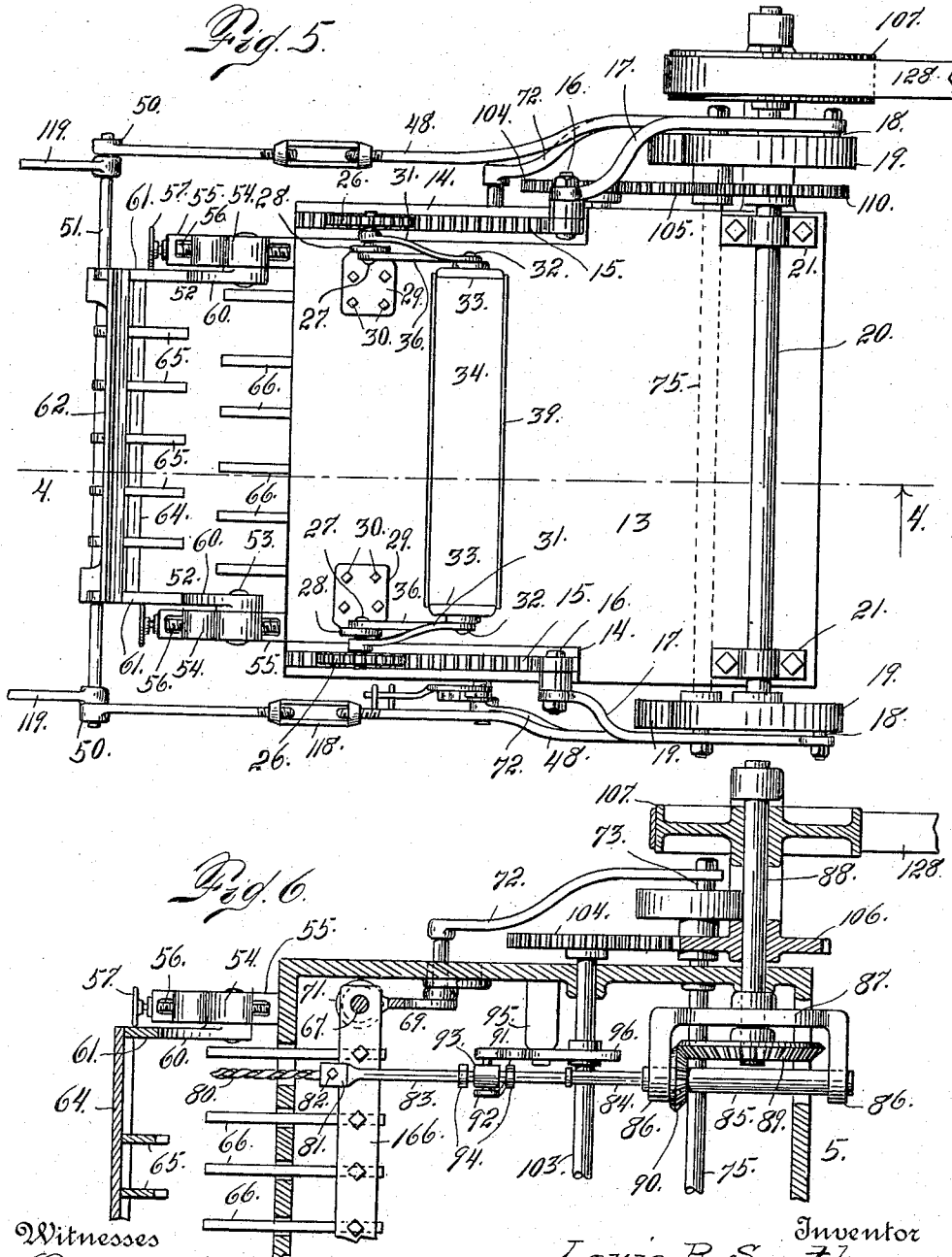
Inventor  
Louis R. Smith.  
By A. J. C. Zinn  
Attorney

L. R. SMITH.  
BOOK EDGE PRINTING MACHINE.  
APPLICATION FILED JULY 6, 1912.

1,189,747.

Patented July 4, 1916.

3 SHEETS—SHEET 3.



Witnesses

Otto E. Haddock  
C. H. Rosener

Inventor

Louis R. Smith

By A. J. G. M.  
Attorney

# UNITED STATES PATENT OFFICE.

LOUIS R. SMITH, OF COLORADO SPRINGS, COLORADO, ASSIGNOR TO THE UNIVERSAL INDEXING COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

## BOOK-EDGE-PRINTING MACHINE.

1,189,747.

Specification of Letters Patent.

Patented July 4, 1916.

Application filed July 6, 1912. Serial No. 708,074,

*To all whom it may concern:*

Be it known that I, LOUIS R. SMITH, citizen of the United States, residing at Colorado Springs, county of El Paso and State of Colorado, have invented certain new and useful Improvements in Book-Edge-Printing Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in machines for printing on the edges of books, as city directories and various other books which for different reasons require that the printing or index marks shall be visible on their exposed edges. It is well known that the printing of advertisements on the exposed edges of directories is a very popular way of advertising, but so far as I am aware this operation heretofore has been accomplished only by hand.

The object of my present invention is to do this work automatically, that is to say, to provide a machine which, when set in operation, will place the books in position for printing and remove them from said position successively, the machine operating continuously and printing the required matter on the edge of each book as it is brought into position therefor. Provision is also made for perforating the books at one corner, as is usually required in the case of city directories, for the purpose of passing a string therethrough, by the aid of which the directory may be suspended or hung by a suitable hook. My improved machine automatically accomplishes all of the various functions required in work of this class. The element for perforating the book may be employed or not, as may be desired. It is evident that it may be desirable to print or place index marks upon the edges of some books other than directories, and where it will not be required to perforate the book since it is not necessary to apply a supporting cord or other device to the book. In printing on the edges of books which do not require a perforation, the perforating tool or instrument may be removed from the chuck of the operating device.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a side elevation of my improved machine. Fig. 2 is a face view of a crank wheel, several of which are employed in the construction of the machine. Fig. 3 is a section taken on the line 3—3, Fig. 2. Fig. 4 is a fragmentary section taken through the machine on the line 4—4, Fig. 5. Fig. 5 is a top plan view of the machine. Fig. 6 is a fragmentary section of the machine taken on the line 6—6, Fig. 4, looking downward, or in the direction of the arrow adjacent said line.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the frame work of my improved machine, the same consisting of a casing in which many of the operating parts of the apparatus are concealed and protected. In front of this frame work is mounted a sort of table, containing an adjustable receptacle 7 for holding the books upon whose edges the printing is to be done. The side walls 8 of this receptacle are raised above the top 9 of the table, a distance equal to the thickness of one of the books 10 to be handled. Mounted on top of the table is a movable block 12 which is adapted to be reciprocated for the purpose of successively removing the books from the receptacle as they drop upon the table. As soon as a book has been removed, the ejecting block is moved rearwardly from the receptacle, allowing another book to drop into place upon the table, then by the forward movement of the block the said book is ejected and caused to move into position for printing, the mechanism of the body of the machine serving to handle the said book during and after the printing operation as hereinafter fully set forth.

The body of the machine contains a top plate 13, the opposite sides of which are provided with tracks 14, upon which are slidably mounted cogged racks 15 with which are pivotally connected as shown at 16, pitmen 17 whose opposite extremities are pivotally connected with wrist pins 18 of crank wheels 19, which are mounted and

made fast upon a shaft 20 mounted in journal boxes 21 supported on top of the machine. These crank wheels 19 are preferably of the construction illustrated in Figs. 2 and 3 of the drawing, each consisting of a disk 22 to which is applied a ring 23 which extends beyond the disk, this extension carrying a screw 24 which is journaled in the ring. Upon this screw is mounted a nut 10 carrying the wrist pin 18. By virtue of this construction and arrangement, the wrist pin may be adjusted upon the screw for the purpose of regulating the stroke of the pitmen 17. One end 25 of the screw is adapted to receive a wrench or socket key whereby the screw may be rotated for the purpose of adjusting the wrist pin thereon for the purpose stated.

Gear wheels 26 are mounted and made fast upon spindles 27 journaled in supporting arms 28 having base flanges 29 secured to the top 13 of the machine by fastening devices 30. Pivotally connected to each of the spindles 27 is a link 31 whose opposite extremity is pivotally connected as shown at 32 with the upright members 33 of a type carrier 34 which performs the printing function, the face 35 of the type carrier being equipped with the necessary plates or type for performing the printing function. A second link 36 is also pivotally connected with each arm 28 as shown at 37 while its opposite extremity is pivotally connected with the arm 33 of the type carrier as shown at 38.

When the machine is in operation, the crank wheels 19 are rotated whereby the rack bars 15 are reciprocated. During this reciprocating operation the type carrier is alternately moved from its forward position shown in full lines in Fig. 4 and to its rearward position shown in dotted lines in the same figure. When in its forward position the type carrier performs the printing function upon the edge of one of the books 10. The rearward movement of the type carrier is accomplished for the purpose of supplying its printing face 35 with the necessary ink for printing purposes after each printing act. When in its rearward position, the type carrier is brought into contact with an ink belt or band 39 which is actuated by a roll 40 mounted on a shaft 41, a step by step movement being imparted to the said shaft by means of a ratchet disk 42 fast on the shaft, and a pawl 43, pivotally connected as shown at 44 with a disk 45 loosely mounted on the spindle 41, the said disk, or pawl holder, being provided with an arm, 46, which projects downwardly between two pins 47 carried by a pitman 48 actuated by a crank wheel 49, the pitman being pivotally connected with the wrist pin 18. By virtue of this connection as the wheel 49 is rotated the pitman is reciprocated. During this

movement in one direction the pawl 44 slides over the teeth of the ratchet, while during its movement in the opposite direction, the pawl engages the teeth of the ratchet to rotate the shaft 41 whereby the ink belt or band 39 is actuated.

While there is only one ratchet and pulley construction, there is a pitman 48 located on each side of the machine, the forward extremities of these pitmen being pivotally connected as shown at 50 with a rod 51 extending transversely of the machine. This rod is connected at the opposite sides of the machine with two levers 52 fulcrumed as shown at 53 on blocks 54 slidable on brackets 55, the said blocks together with the levers being adjustable by means of a screw 56 journaled in a depending lug 57 of the bracket and threaded in a nut 58 formed integral with the block, the nut being connected with the body of the block by a neck movable in a slot in the bracket. By adjusting the screw 56 the rod 53 together with the levers may be moved back and forth in order to regulate their position with reference to the thickness of the book 10 to be acted on. Each lever 52 consists of a curved lower portion 60 and an upper member 61. The two members 61 of the levers 52 are connected by cross pieces 62 set into the front face thereof and other cross pieces 63 and 64 applied to their opposite sides. The two levers 52 are connected by the cross pieces 62, 63 and 64 which also connect a number of fingers 65 of substantially the same construction as the upper parts 61 of the levers 52. During the rotation of the crank wheels 49 and the consequent reciprocation of the pitmen 48, the levers 52 and the fingers 65 are oscillated. During the movement of the said pitmen in the forward direction, the clamp composed of the levers 52 and the fingers 65 is opened or moved forwardly to allow a book 10 to move downwardly from the case or receptacle 7 to a position resting on a series of horizontally disposed fingers 66 rigidly connected with a transverse bar 166 vertically adjustable on a screw 67 journaled in lug 68 formed integral with the upper part of a lever 69 fulcrumed at 70. The screw 67 is provided with a hand wheel 71 whereby it may be rotated for the purpose of adjusting the bar 166 vertically in order to regulate the position of the fingers 66 with reference to the dimensions of the book 10 which is handled by the machine.

The levers 69 are arranged to oscillate on their fulcrums 70 and this movement is accomplished through the instrumentality of pitmen 72 whose rear extremities are pivotally connected as shown at 73 with crank wheels 74 fast on opposite ends of a shaft 75. The object of the oscillatory movement of the levers 59 is to move the fingers 66 back and forth according as it is necessary

to support or release a book 10. While supporting the book 10 for printing purposes, the levers 69 are in their forward position and the fingers 66 in their horizontal position, while during the backward movement of the levers (see the dotted line position in Fig. 4) the fingers are removed from the book supporting position allowing the latter to drop downwardly where it strikes a metal apron 76 and is guided thereby to a belt conveyor 77 mounted on end wheels or drums 78, the upper run of the said conveyor traveling in the rearward direction, or that indicated by the arrow adjacent the conveyor (see Fig. 4) whereby the books are discharged from the machine, the rear wall of the casing being open as shown at 79 for the purpose.

Where books, such as telephone directories, are to be perforated for the purpose of passing a supporting cord or loop there-through, I employ a boring tool or a bit 80 inserted in a chuck 81 in which it is made fast by a set screw 82. This chuck is mounted on the forward extremity of a shank 83 whose rear portion 84 is polygonal, preferably square in cross section. This squared section 84 of the shank telescopes in a hollow shaft 85, whose opposite extremities are journaled as shown at 86 on a U-shaped holder 87 pivotally mounted on a shaft 88 extending at right angles to the shaft 85. Fast on the extremity of the shaft 88 adjacent the shaft 85 is a beveled gear 89 which meshes with a beveled pinion 90 fast on the shaft 85 for rotating the latter and imparting a corresponding movement to the shank 83 and the boring tool 80. The tool 80 is moved forwardly during its rotary action for perforating the corner of a book 10, by a lever 91 whose upper extremity is forked as shown at 92 to straddle a collar 93 loose on the shank 83 to permit the latter to rotate freely therein, but prevented from moving longitudinally on the shank by stop collars 94 fast on opposite sides of the collar 93, the stop collars being fast on the shank and therefore rotating therewith.

In order to actuate the lever 91 whereby it is caused to impart the forward and back movement to the perforating device, the said lever which is fulcrumed at its lower extremity as shown at 95 is provided with a frame 96 having an opening 97 in which is located a cam 98 arranged to act upon the rear face 99 of the frame for the purpose of imparting the rearward movement to the lever, its forward movement being imparted by a coiled spring 100 which is connected with the lever at one extremity as shown at 101 and the stationary part of the machine at its opposite extremity as shown at 102. Hence it will be understood that the cam 98 acts only on the face 99 of this frame on account of opening 97 being large enough

to permit the rotation of the cam without touching the other surfaces of the frame. This cam 98 is fast on a shaft 103 upon whose outer extremity is made fast a gear 104 meshing with a gear 105 on the shaft 75, the gear 105 in turn meshing with a gear 106 fast on the shaft 88 carrying the beveled gear 89 as heretofore explained, the shaft 88 being rotated by means of a pulley 107 fast on the said shaft and connected by means of a belt 128 with a line shaft or suitable motor not shown. Also meshing with the gear 106 is a gear 108 fast on a shaft 109 journaled on the frame work. This shaft is that upon which the crank wheels 49 are mounted. Also meshing with the gear 108 is a top gear 110, the latter being fast on the shaft 20, this shaft serving to operate the crank wheels 19 employed in actuating the rack bars 15 through the medium of the pitmen 17 as heretofore explained.

In order to apply the necessary ink to the belt 39 which passes over a flat plate 112 located above the roll 40, I employ an ink receptacle 113 in which is mounted a roll 114 journaled in slots 115. The journals of this roll are acted on by springs 116 connected with a stationary member 117, the springs being normally under sufficient tension to hold the inking roll 114 against the belt 39, the inking roll receiving a supply of ink from the receptacle 113, as the said roll is actuated. The roll by virtue of its engagement with the ink belt 39, is rotated as the latter is actuated through the ratchet and pawl construction heretofore explained.

The blocks 54 are moved back and forth for the purpose of adjusting the clamping device to cause the latter to conform to the dimensions of the books handled. It is also necessary to adjust the pitmen 48 and for this purpose each of the last named pitmen is composed of two parts connected by a turnbuckle 118.

For the purpose of feeding the books 10 to the machine from the rack or receptacle 7, two rods 119 are pivotally connected at their rear extremities with the rod 51 while their forward extremities are connected as shown at 120 with the lower ends of levers 121, one only of the latter being illustrated. These levers are fulcrumed as shown at 122 on the table 6 below the top 9 thereof, the upper extremities of the levers being forked as shown at 123 to engage projections 124 with which the opposite extremities of the feed block or follower 12 are provided.

During the forward movement of the pitmen 48 whereby the clamp is opened (see Fig. 1), the levers 121 are actuated to move the same from the dotted line position in Fig. 1 to the full line position, during which time the follower 12 is moved from

a position in the rear of the book-rack or receptacle 7 to a position directly below the pile of books in the rack, and while assuming this position it acts upon the lowermost book to eject the same and cause it to move rearwardly into position upon the fingers 66 of the levers 69. Then as the rearward movement is imparted to the pitmen 48, the book is tightly clamped in place, its outer surface being engaged by the front portion 135 of the casing while its rear surface is acted on by the clamping levers 53 and their cooperating fingers 65. Every time a book is clamped in position, as just explained, the pitmen 17 are moved rearwardly, imparting a corresponding movement to the rack members 15 whereby the gears 26 are actuated to move the type carrier 33 from the inking position shown in dotted lines in Fig. 4 to the printing position shown in full lines in the same figure, the type carrier serving to print the desired matter upon the edge of the book 10, which is uppermost. During this printing operation the perforating device is moved forwardly, causing the tool 80 to form the perforation in the proper corner of the book. Then as the clamp is released by throwing it into the dotted line position in Fig. 4, and the supporting fingers 66 are moved rearwardly to the dotted line position in the same figure by virtue of the mechanism heretofore explained, the boring tool 80 is also moved rearwardly to disengage it from the book, allowing the latter to drop first to the apron 76 and then to the endless conveyer 77 which discharges it from the machine, as heretofore explained. The conveyer belt 77 is operated by a belt 126 leading from a pulley 125 fast on the shaft 103, to a pulley 127 fast on a shaft 129 of the drum 78. The U-shaped holder 87 has a depending projection 130 connected with one wall of the casing by a set bolt 131 passing through a curved slot 132 of the casing. By moving this projection 130 in either direction from the vertical position shown in the drawing, the U-shaped frame may be tilted to impart a corresponding movement to the boring tool whereby the latter may be given an upward or downward inclination from the horizontal position shown in the drawing, (see Fig. 4).

Having thus described my invention, what I claim is:

1. In apparatus of the class described, the combination with a suitable frame, means for supporting a book in the edgewise position for printing purposes, said means being adjustable to fit books of varying width between the edge engaging the support and the edge upon which the printing is done, an inking device, a type carrier, stationary members located between the book and the inking device, two pairs of

links connecting the type carrier with said members, a rock spindle journaled in each of the stationary members and with which one link of each pair is connected, and means for rotating the spindles to throw the type carrier alternately into position for printing and inking purposes.

2. In a book edge printing machine, the combination of a type carrier, means for inking the type carrier, automatically operated means for holding a book in position for printing on the edge thereof, said means comprising a flatwise clamping device, and a device for supporting the book in the edgewise position for printing purposes, the said devices being independently adjustable to cause them to fit books of varying dimensions, a support interposed between the book holding means and the inking means, two pairs of links connecting the type carrier with said support, a rock spindle journaled in each support and with which one end of one link of each pair of links is made fast, and means for automatically imparting rotary movement to the spindles in reverse directions, whereby the type carrier is alternately brought into contact with the inking means and the book edge for printing purposes.

3. In a book edge printing machine, the combination of a type carrier, a support for the book, said support being adjustable, a clamp for holding the book in position for printing on said support, the clamp being adjustable, means for automatically feeding the books to the support and into position to be acted on by the clamp, means for automatically actuating the supporting means to cause it to alternately support and release the book, means for automatically actuating the clamping means to cause the latter to alternately clamp and release the book, the adjustment of the clamping and book-supporting means being timed to work in synchronism.

4. In a book edge printing machine, the combination of means for automatically feeding the book into position for printing, means automatically operated for alternately supporting the book in position for printing, and releasing same, means automatically operated for alternately clamping the book on said support and releasing the same, means automatically operated for printing the book edge, means for perforating the book, and means for removing the books from the machine, the various operations being synchronously timed, substantially as described.

5. In apparatus of the class described, the combination with a suitable frame, automatic means for alternately supporting a book in edgewise position for printing purposes and discharging the same, an inking device, a type carrier, stationary members

located between the book in its supported position and the inking device, two pairs of links connecting the platen with said members, rock spindles journaled in the stationary members and with which one link of each pair is connected, gears fast on said spindles, and means for automatically rotating the gears to throw the type carrier alternately into positions for printing and inking purposes, the latter means being so timed with relation to the book-supporting and discharging means as to cause the type carrier to engage the edge of the book while supported and to move to and from the inking position while that book is being discharged and another book is being supported.

6. In a machine of the class described, the combination of means for automatically feeding the book into position for printing, automatically operated means for clamping the book flatwise in such position, said clamping means being automatically releasable, means for supporting the book, said means being engaged by one edge thereof and automatically actuated for bringing it into the supporting and releasing positions, a type carrier, and means for automatically actuating the said carrier for

printing upon the edge of the book opposite that engaging the support, substantially as described.

7. In a machine of the class described, the combination of a type carrier, means for automatically carrying a book into position for printing, means for automatically clamping the book flatwise in such position, means for supporting the book at right angles to the action of the clamping devices, the clamping devices and the said supporting devices being adjustable to fit books of varying width and thickness, means for automatically actuating the type carrier to print upon the edge of the book opposite that engaging the support, the printing device acting at right angles to the clamping device, means for automatically releasing the clamping device, and means for simultaneously releasing the supporting device to allow the book to leave its printing position after the performance of the printing function.

In testimony whereof I affix my signature in presence of two witnesses.

LOUIS R. SMITH.

Witnesses:

A. J. O'BRIEN,  
MAY CLEMENTS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."