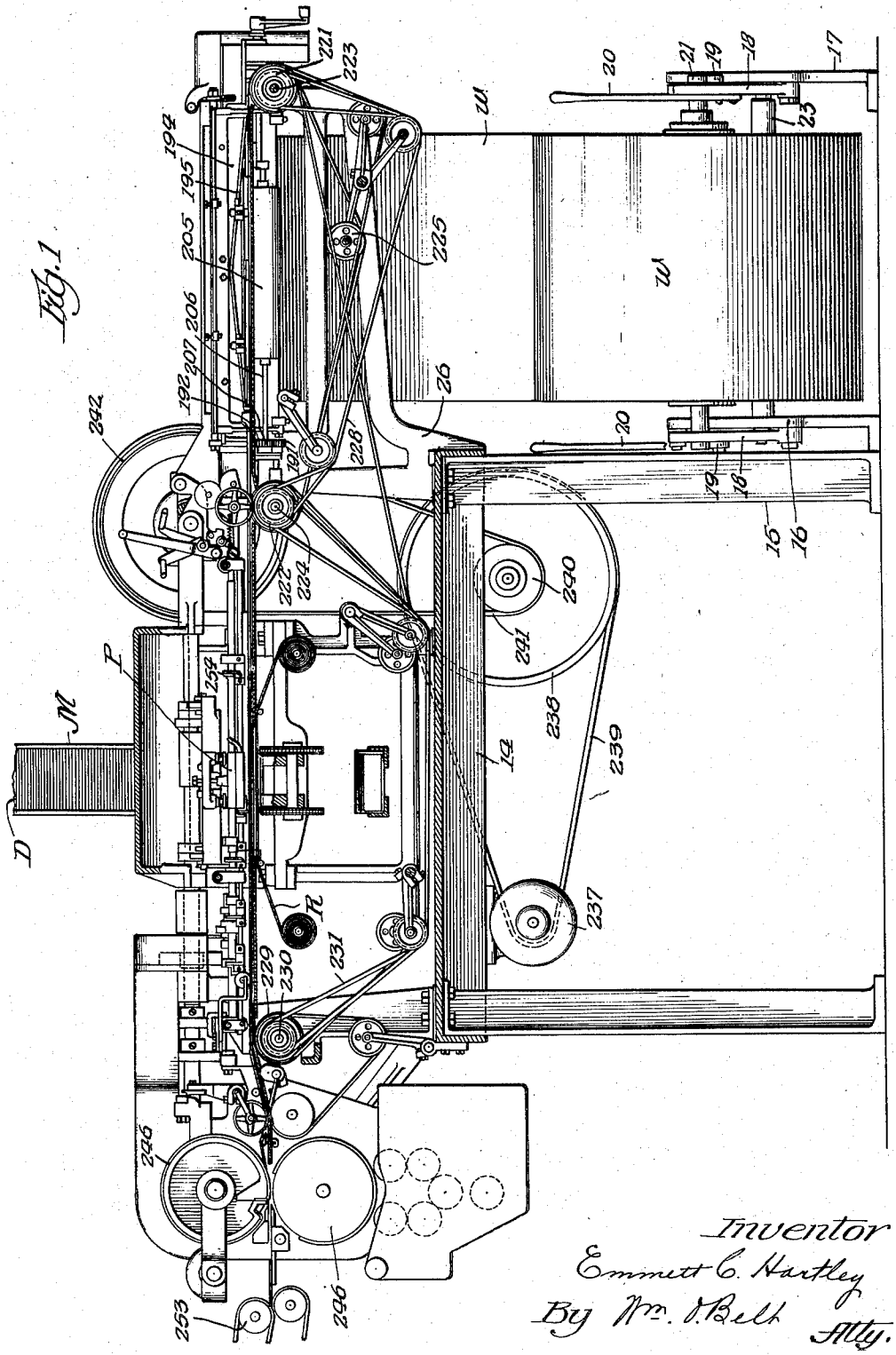
May 19, 1936. E. C. HARTLEY 2,041,183

PRINTING MACHINE

Filed June 6, 1930 6 Sheets-Sheet 1

Fig. 1



Inventor
Emmett C. Hartley
By Wm. J. Belt Atty.

May 19, 1936. E. C. HARTLEY 2,041,183

PRINTING MACHINE

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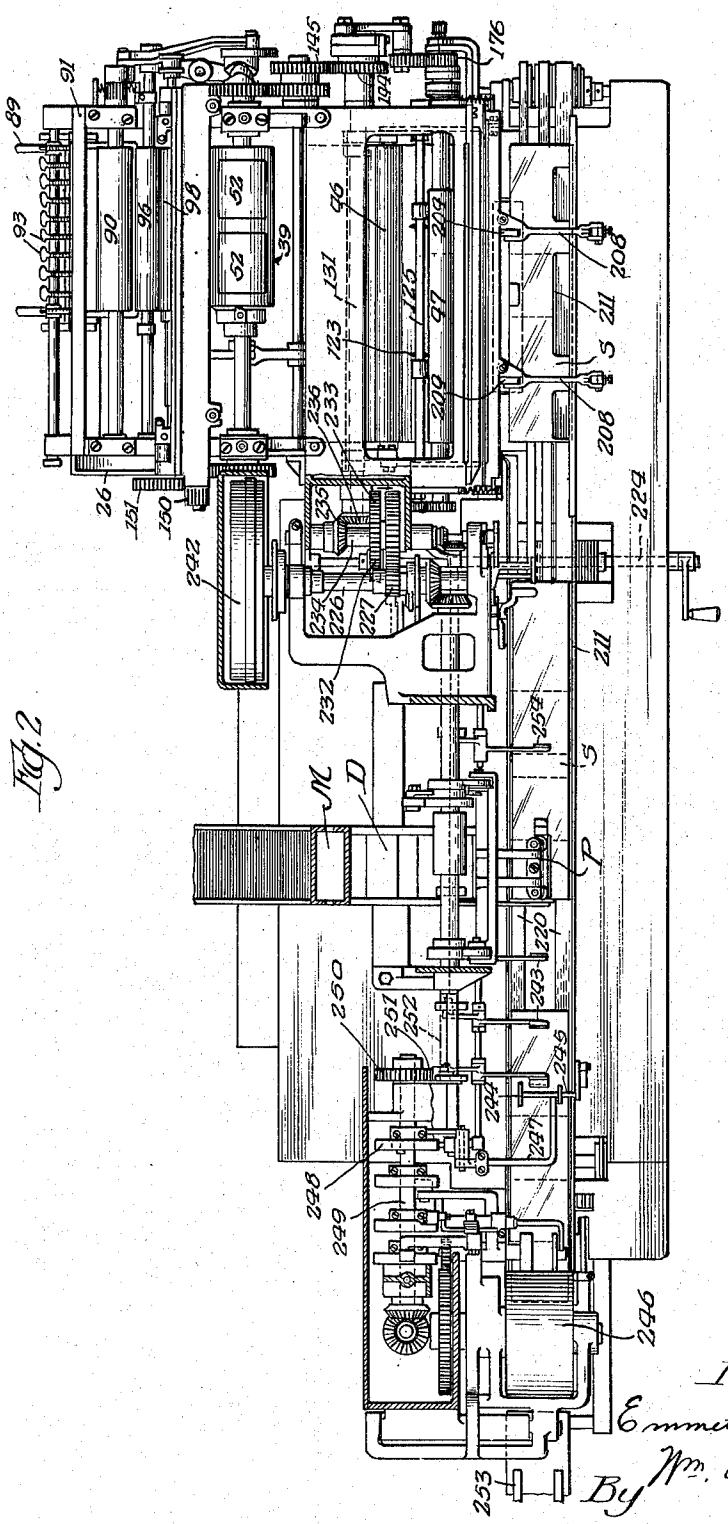


Fig. 2

Inventor
Emmett C. Hartley
By Wm. O. Bell
Atty.

May 19, 1936. E. C. HARTLEY 2,041,183

PRINTING MACHINE

Filed June 6, 1930 6 Sheets-Sheet 3

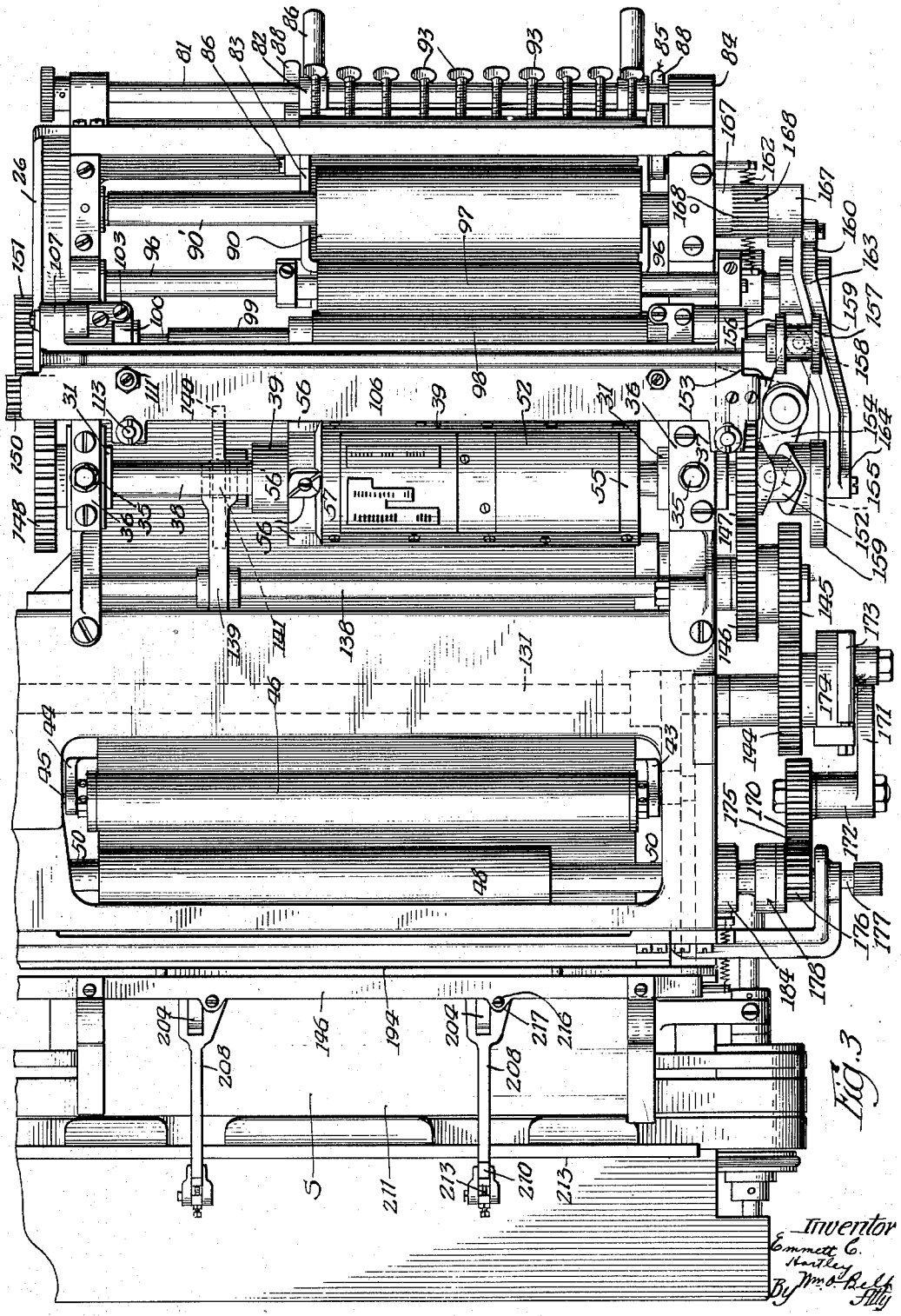


FIG. 3

Inventor
Emmett C. Hartley
By Mm. O. Reed & Filly

May 19, 1936. E. C. HARTLEY 2,041,183

PRINTING MACHINE

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Fig. 4

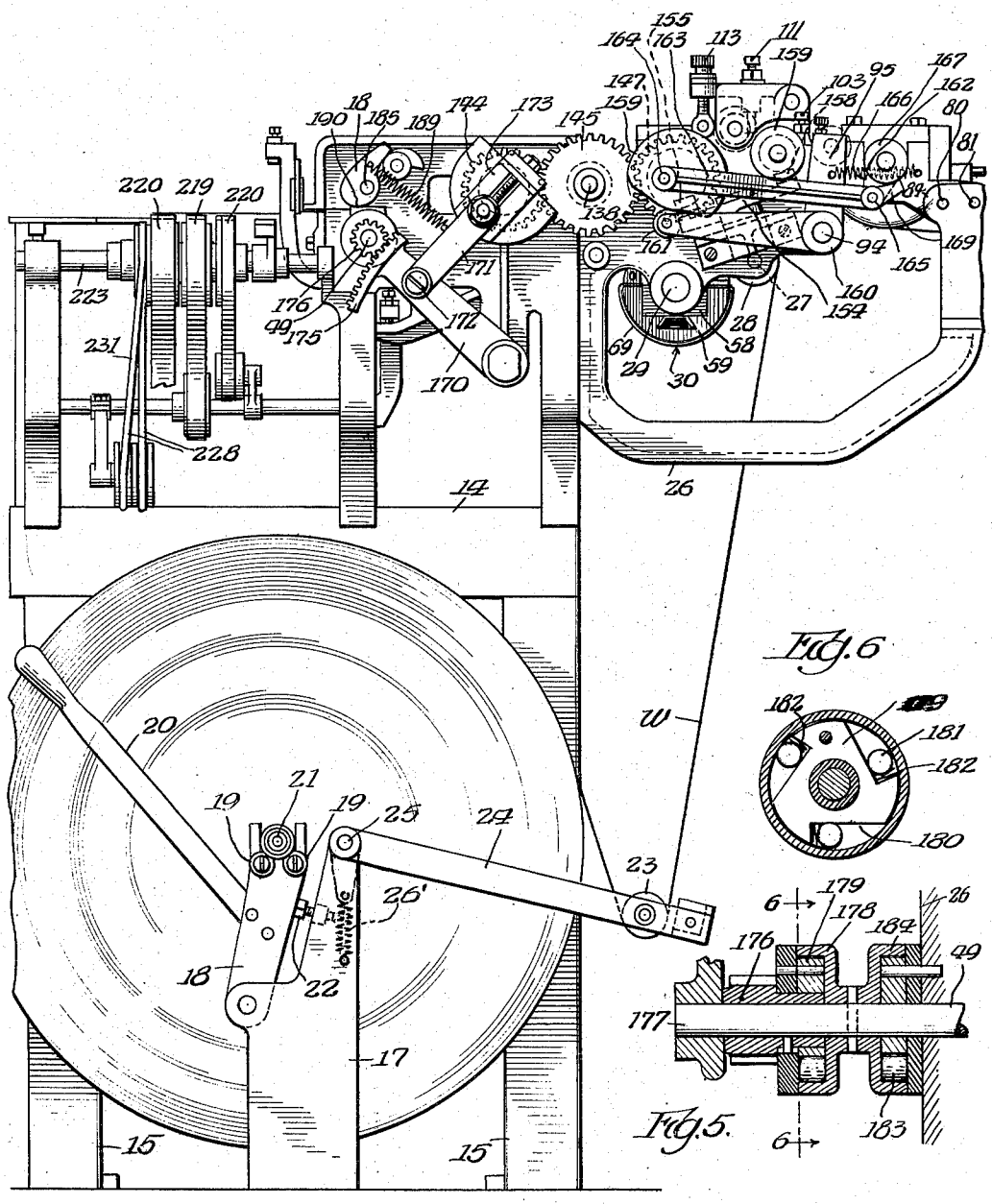


Fig. 6

Fig. 5.

Inventor:
Emmett C. Hartley
By Wm. O. Belt
Atty.

May 19, 1936. E. C. HARTLEY 2,041,183

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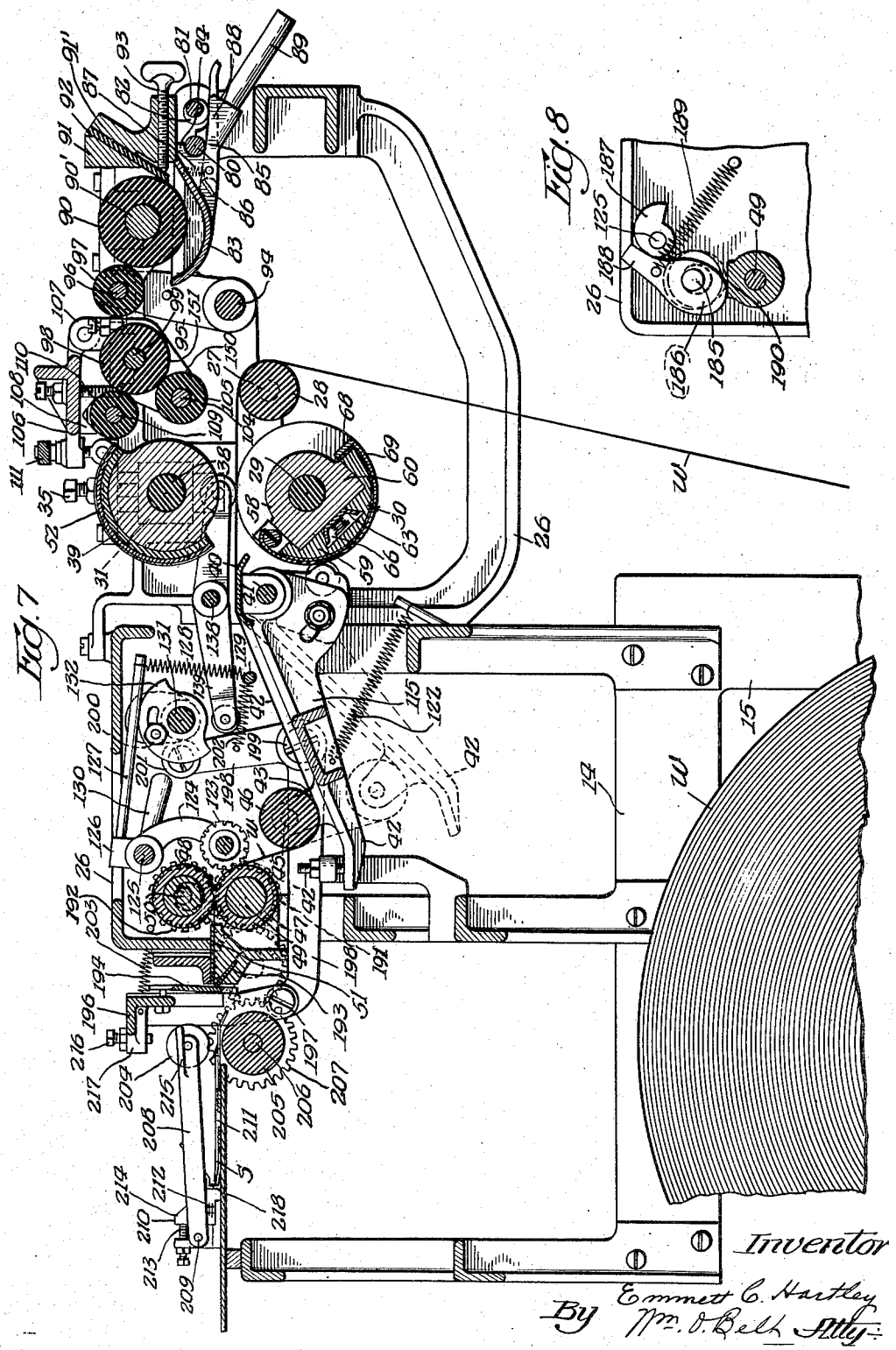


Fig. 7

Fig. 8

Inventor
Emmett C. Hartley
By Wm. O. Belk Atty.

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PRINTING MACHINE

Filed June 6, 1930 6 Sheets-Sheet 6

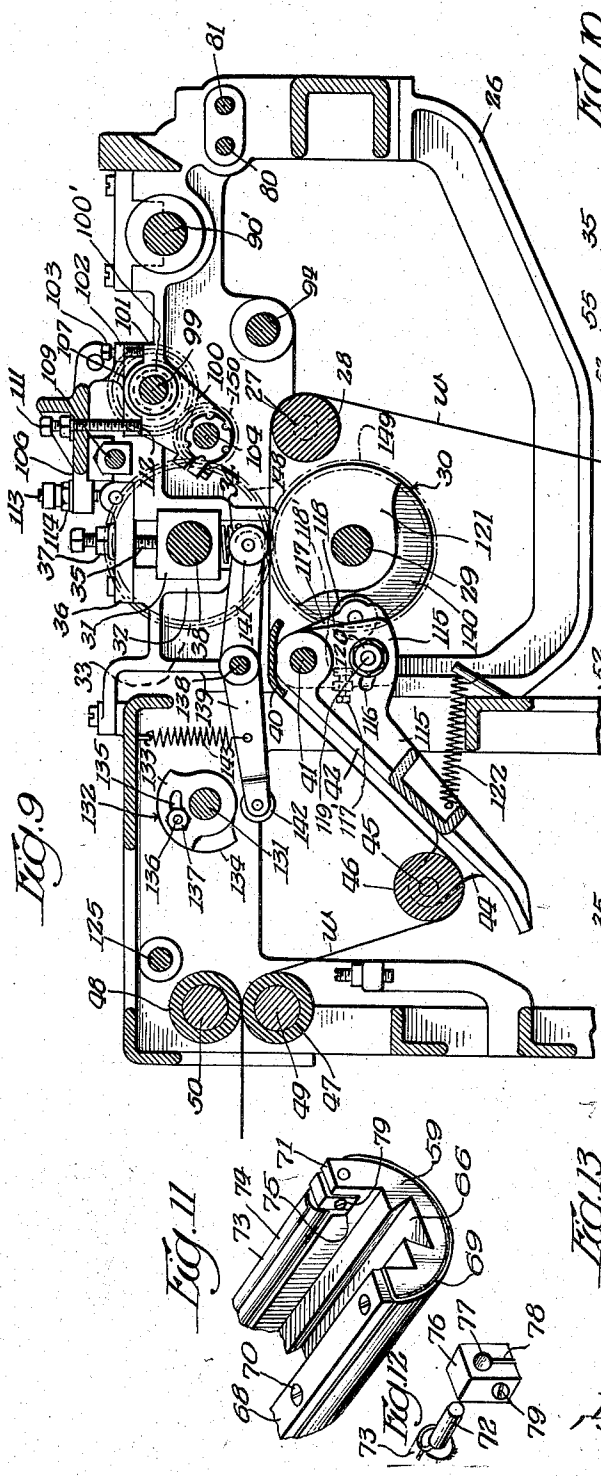


Fig. 9

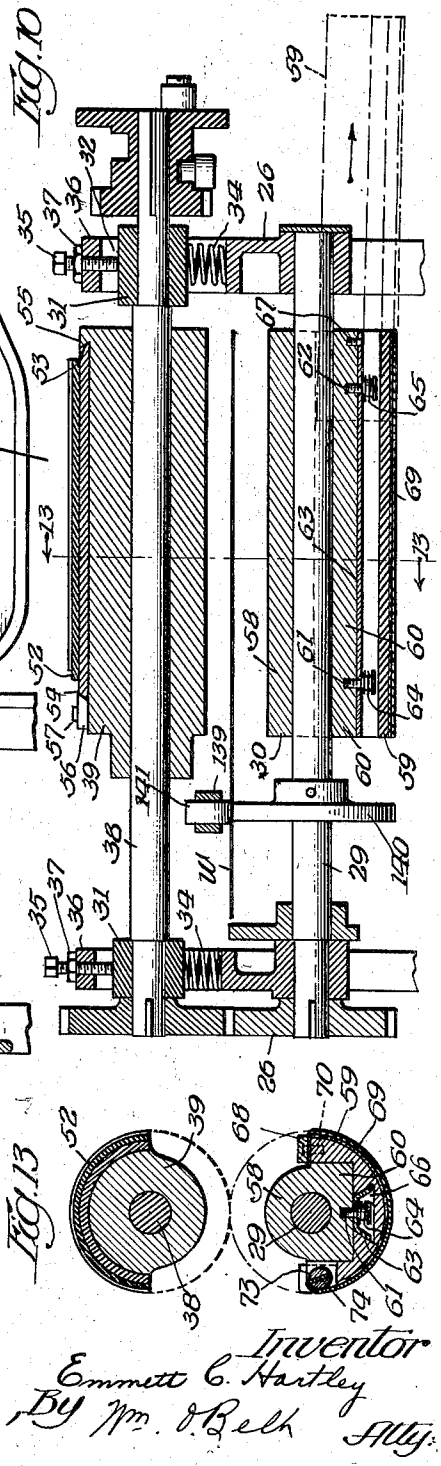


Fig. 10

Fig. 11

Fig. 12

Fig. 13

Inventor
Emmett C. Hartley
By Wm. O. Belk Atty.

Patented May 19, 1936

2,041,183

UNITED STATES PATENT OFFICE

2,041,183

PRINTING MACHINE

Emmett C. Hartley, Oak Park, Ill., assignor to Addressograph Company, Wilmington, Del., a corporation of Delaware

Application June 6, 1930, Serial No. 459,599

59 Claims. (Cl. 101--216)

The invention relates to machines for printing and addressing the sheets forming bills, statements, notices and the like, of the kind used by public service, insurance and similar companies. These sheets are usually long and narrow and comprise body portions and one or more stubs separated from each other and from the body portions on scored lines.

One of the objects of the invention is to provide a novel machine in which such sheets are cut from a continuous web and then are successively passed through the machine to have certain printing operations performed thereon. These sheets usually have certain constant information printed on the back thereof, while on the face thereof certain constant information and other variable information is printed, the variable information usually being in the form of names and addresses of customers or clients. It is, therefore, another object of the invention to provide a machine in which the various printing operations will be performed at predetermined places on the sheet.

A further object of the invention is to divide the sheet by scoring into the required sections or stubs, and an ancillary object is to perform this scoring operation in a novel manner before the sheet is cut from the web. Other objects are to score the sheet parallel with the edges of the web, and to provide a machine in which this scoring operation may be performed in different transverse positions to permit variation of the width of the sections or stubs.

Still further objects of the invention are to provide a machine in which the printing operation on one side of the bill may be performed before it is cut from the web; to provide a machine, in which this printing operation on the bill is performed in a certain position to provide proper margins around the impression; and to provide a machine in which the printing operations are performed without smutting and in a uniform manner.

A selected embodiment of the invention is illustrated in the accompanying drawings and, therein,

Fig. 1 is a front view, partly in elevation and partly in section, showing a printing machine of the character to which my invention appertains;

Fig. 2 is a plan view of the machine disclosed in Fig. 1;

Fig. 3 is a plan view drawn to an enlarged scale showing the mechanisms for performing a printing operation on the back of the bill;

Fig. 4 is an end elevation of the machine;

Fig. 5 is a sectional detail view of a ratchet arrangement employed in the device;

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

Fig. 7 is a longitudinal sectional view of the mechanisms shown in Fig. 3;

Fig. 8 is a sectional detail view of one of the adjustments employed in the device;

Fig. 9 is a sectional view showing a portion of the mechanism for performing the printing operation on the back of the bill;

Fig. 10 is a transverse sectional view illustrating the printing form roller and the cooperating impression roller;

Fig. 11 is a fragmental perspective view of the impression member removed from the supporting arrangement therefor;

Fig. 12 is a perspective detail view of a connection employed for retaining the blanket on the impression member; and

Fig. 13 is a vertical sectional view taken substantially on the line 13—13 of Fig. 10.

Referring to the drawings, 14 indicates the frame of the machine that is supported by legs 15 which are rested on a suitable support. Rested on the same support are standards 16 and 17 on which standard yokes 18 are pivotally mounted. Rotatably mounted in the yokes 18 are rollers 19, said rollers being disposed adjacent the bottoms of the bifurcations in the ends of the yokes 18. Handles 20 are provided on the yokes 18 in order that these yokes may be pivoted from the position illustrated in Fig. 4 into a substantially horizontal position whereby opposite ends of the shaft 21 may be arranged in the bifurcations in the yokes 18. The web, indicated by W, is withdrawn from a roll that is mounted in any suitable manner on the shaft 21 and when the shaft 21 is arranged in the yokes 18, as set forth, by gripping the handles 20, the roll may be moved into the position illustrated in Fig. 4, the yokes 18 being extended past center into abutment with the stops 22 to support the roll in position. A diabolo 23 is provided that is mounted in the yoke frame 24 pivoted on the standards 16 and 17, as indicated at 25. Center springs 26' act on the yoke frame 24 to urge the diabolo 23 into a position slightly below horizontal. The web W is directed from the roll under the diabolo 23 up to the machine.

Mounted at one end of the bed 14 is a frame generally indicated by 26. This frame 26 supports the mechanisms which perform the printing operation on the back of the bill or sheet.

Journaled in the side members of the frame 26 is a shaft 27 on which a guide roller 28 is arranged. The web W is first directed around this guide roller 28. Arranged forwardly of the shaft 27 and disposed slightly below the horizontal plane thereof is a shaft 29 on which the impression or blanket roller, generally indicated by 30, is mounted. Disposed above and vertically alined with the shaft 29, in the side members of the frame 26, are bearing blocks such as 31. These bearing blocks 31 are slidably mounted in guides, such as 32, and between the bottom of the guides 32 and the bearing blocks 31 springs 34 are arranged. These springs 34 urge the bearing blocks 31 upwardly, this upward movement being limited by the adjusting screws 35 mounted in the plates 36 secured at the upper ends of the guides 32, the screws 35 being held against displacement by the lock nuts 37. These screws regulate the pressure exerted by the roller 39 on the roller 30. Journaled in the bearing blocks 31 is a shaft 38 which extends across the machine parallel with the shaft 29 and mounted on the shaft 38 is the printing form roller 39. The web W is passed between the rollers 30 and 39 and over a ledge 40 arranged forwardly of these rollers and extended between the side members of the frame 26. Below the ledge 40 is a shaft 41 on which a rocker 42 is pivotally mounted. Bearings 43 and 44 are mounted in spaced relation on the upper side of the rocker 42, and a shaft 45 is journaled therein and carries a roller 46. From the ledge 40 the web W is extended across the rocker 42 and below the roller 46 and up to and between the feed rollers 47 and 48, respectively, which are enlarged portions on the shafts 49 and 50 journaled in the sides of the frame 26. From the rollers 47 and 48 the web W is passed over the ledge 51.

The printing form roller 39 carries the printing member, in the form of an electroplate, preferably of semi-cylindrical formation. This electroplate is indicated by 52, and opposite ends thereof are tapered as indicated at 53 and 54, Fig. 10. At one end of the roller 39 is a unitary peripheral ring 55 the inner edge of which is beveled to cooperate with the taper 53 when the electroplate 52 is mounted on the roller. At the opposite end of the roller 39 spaced retaining nuts 56 are mounted that are held in position by screws 57. As best illustrated in Fig. 10, these retaining nuts include tapered edges which cooperate with the tapered edge 54. Thus, the electroplate 52 is retained in position between these nuts and the ring 55. When it is desired to change the electroplate the screws 57 are loosened to permit the nuts 56 to disengage the edge of the electroplate, and after this has been done the electroplate is moved along the periphery of the roller 39 to disengage the taper 53 from the ring 55, after which the electroplate may be lifted from the roller. As best illustrated in Fig. 7, the portion of the periphery of the roller 39 not covered by the electroplate is undercut for a purpose to be made apparent hereinafter.

It has been pointed out that the impression roller 30 cooperates with the printing form roller 39. An impression blanket is arranged on this roller 30 and, if desired, a make-ready is associated with this blanket. The roller 30 embodies two sections 58 and 59 and the section 59 is arranged to be removable from the machine to expedite arrangement of the make-ready with the blanket. The section 58 is secured to the shaft 29 and includes a substantially rectangular portion 60. On the face of this rectangular portion 60, opposite the bearing portion of section 58, screws 61 and 62 are arranged. A substantially V-shaped bar 63 is provided which includes a flattened portion that rests against the face of the rectangular portion 60 into which the screws 61 and 62 extend, said screws also being extended through this portion of the bar 63. Disposed between the heads of the screws 61 and 62 and the flattened portion of the bar 63 are springs 64 and 65 which hold the bar against the face of the flattened portion 60. The portion of the section 58, opposite the portion 60, is undercut to reduce the peripheral diameter of the roller 30. The section 59 cooperates with the portion 60 to provide a peripheral portion for the roller 30. The section 59 includes a cut-out portion into which the portion 60 of the section 58 is fitted when the section 59 is arranged on the section 58. In the face of the cut-out portion in the section 59 that cooperates with the face of the portion 60 to which the strip 63 is secured, I provide a dovetail groove 66. As best illustrated in Fig. 10 wherein the section 59 is illustrated in full and dotted line positions, the section 59 is attached to the section 58 by being slid axially thereonto and these sections are interconnected in this manner. It is apparent that the bar 63 may be fitted into the groove 66 and, by reason of the springs acting on the bar 63, it is manifest that the section 59 will be attached to the section 58. In order to prevent axial displacement of the section 59 from the section 58 a pin 67, Fig. 10, is provided adjacent the end of the section 58 first engaged by the section 59 in the mounting of said section 59, and when the section 59 is disposed in proper axial position on the section 58 this pin 67 enters an opening in the section 59. To remove the section 59, it is pulled radially of the portion 60 against the action of the springs 64 and 65 until the pin 67 is disengaged, after which it may be axially slid from position.

On one face of the section 59 is a strip 68 and, arranged between this strip 68 and this face of the section 59, is one end of the blanket 69, it being understood that the strip 68 is suitably secured to the section 59 as, for example, by the screws 70. The blanket 69 is directed around the periphery of the section 59 to the face thereof opposite the face to which the strip 68 is secured. At opposite ends of this last named face lugs, such as 71, are provided into which the bearing portions 72 of the rod 73 are extended. A slot 74 is provided in the rod 73 and the adjacent end of the blanket 69 is extended into this slot, as illustrated in Fig. 13. As best illustrated in Fig. 11, a recess 75 is provided in the face of the section 59 having the lugs 71 thereon. A clamp block 76 is provided which has an opening 77 therein through which one of the portions 72 on the rod 73 is extended. The block 76 is split, as indicated at 78, and a screw 79 is provided for drawing the split portions of the block together and, in so doing, the block may be securely clamped to the bearing portion 72.

In use, the blanket 69 is detached from the rod 73 and the usual make-ready is arranged on the periphery of the section 59. The blanket 69 is then arranged over this make-ready and is connected to the rod 73 which is rotated until the blanket is stretched taut over the make-ready and, after the blanket has been stretched taut, the screw 79 is tightened to clamp the block 76 onto the bearing portion 72 of the rod 73. The

block 76 is disposed in the recess 75 and engages therewith. Therefore when the block is clamped onto the bearing portion 72 retroactive movement of the rod 73 is prevented.

To supply ink to the electroplate 52 in order that a printing operation will be performed thereby the following arrangement is provided: As best shown in Fig. 7, two shafts 80 and 81 extend across between the side members of the frame 26 at the rear end thereof. On the rearwardmost of the shafts, that is, the shaft 81, an eccentric 82 is arranged. The trough-like ink fountain 83 has lugs such as 84 thereon and co-operating with these lugs are arms 85 pivotally mounted on the fountain 83 as indicated at 86. Springs 87 urge the arms 85 toward the lugs 84 which lugs and co-operating lugs on the arms embrace the shaft 80 to thus connect the ink fountain in position. Lugs 88 on lugs 84 rest against the eccentric 82. Therefore, when this eccentric is rotated the lugs 88 are raised or lowered in accordance with the eccentricity of the eccentric 82 to vertically move the ink fountain 83 about the shaft 80. A handle 89 is provided which may be manually manipulated to similarly move the ink fountain 83. Mounted on a shaft 90', journaled in the side members of the frame 26, is a fountain roller 90 which extends into the ink fountain 83 and when the ink fountain 83 is moved, as above described, it is moved relative to this roller. Thus, as the ink supply diminishes in the fountain 83, said fountain may be moved toward the roller 90 and, in this manner, a substantially uniform section of the roller 90 may be maintained in contact with the ink in the fountain. This arrangement permits the ink fountain to be removed for cleaning, when desired, and also insures uniform contact of the fountain roller in the fountain. Further, the device for removing excess ink from the roller, which device will be described presently, is permanently associated with the roller and need not, therefore, be adjusted each time the fountain is removed.

At the rear of the machine is an upstanding bracket 91 and a plate 91' is fastened thereto by screws. A blade 92 is arranged between this plate and bracket. The blade 92 bears against the periphery of the roller 90 and has scraping engagement therewith as the roller 90 is rotated in a counter-clockwise direction as viewed in Fig. 7, in a manner to be described presently. Extended horizontally through the plate 91' are a plurality of thumb screws 93, the inner ends of said screws engaging the end of the blade 92 adjacent the edge thereof in contact with the roller 90. As best illustrated in Fig. 3, a multiplicity of screws 93 is provided for these screws are employed to regulate the engagement of the blade 92 with the periphery of the roller 90 and nice adjustment of this blade is best attained by providing a multiplicity of screws. The ink is picked up from the fountain 83 by the roller 90 and is carried thereby toward the blade 92 which scrapes excess ink from the roller so that only a thin film of ink remains thereon.

A shaft 94 is journaled in the side members of the frame 26 and has arms 95 thereon. These arms 95 support a shaft 96 on which the ductor roller 97 is fixed. This ductor roller moves between the fountain roller 90 and the oscillating vibrator roller 98, this movement being brought about in a manner to be described presently. A shaft 99 is rotatably and slidably journaled in the side members of the frame 26 and the vibrator roller 98 is mounted thereon. Bearing structures, such as 100, are mounted in the bushing 100' in the side members of the frame 26. On these bearing members 100 are lugs 101 and on the side members of the frame 26 are lugs 102 in which screws 103 are mounted, the screws 103 bearing against the lugs 101. In the bearings 100 a shaft 104 is journaled which extends across the machine and mounted on this shaft 104 is the form roller 105. The form roller 105 engages the vibrator roller and the face of the electroplate 52 and transfers ink from the vibrator roller (that receives ink from the ductor roller, which, in turn, picks up ink from the fountain roller) to the electroplate. A frame 106 includes bearing portions, such as 107, at opposite ends thereof and these bearing portions are pivotally mounted on the side members of the frame 26. This frame 106 is pivotally mounted on the frame 26 and may be pivoted from the position shown to afford access to the form 53. Lugs, such as 108, depend from the frame 106 and a shaft 109 is journaled therein. On the shaft 109 is a form roller 110 which also bears against the electroplate 52 and the vibrator roller 98. In order to adjust the form roller 110 relative to the electroplate 52 I provide adjusting screws 111 which extend through the frame 106 into engagement with shoulders 112 on the bearing members 100. Pivot bolts 113 are mounted on the side members of the frame 26 and fit into bifurcations in the frame 106 so that when the nuts 114 thereon engage the frame 106 said frame is held against movement. It is manifest that adjustment of the bearing members 100 to vary the position of the form roller 105 will also vary the position of form roller 110 but the form roller 110 may be adjusted independently by the use of the screws 111, after the pivot bolts 113 have been loosened.

It has been pointed out that the rocker 42 is mounted for pivotal movement about the shaft 41. The rocker 42 includes a web 115 having a slot 116 therein. Also mounted on the shaft 41 is a support member 117 on which a follower roller 118 is arranged. A bolt 119 is connected to the carrier member 117 and is extended through the slot 116 and a nut 120 on the bolt 119 serves to interlock these members. On the shaft 23 is a peripheral cam 121 and the roller 118 bears thereagainst, said roller being urged into such engagement by the spring 122 that is extended between the rocker 42 and the frame 26. The cam 121 is so arranged that the roller 118 will move in and out and therefore the rocker 42 will be oscillated between the full line and the dotted line positions thereof shown in Fig. 7. By adjusting the position of the support member 117 relative to the web 115, the upper position of the rocker 42 may be determined, this position also being determined by engagement of the rocker with the stop screws 42' on the frame 26. The lower position is determined by engagement of the screw 117', Fig. 9, on member 117 with the lug 118' on the frame 26.

It has been pointed out that the web is to be scored so that the sheets cut therefrom will be divided into sections or stubs. This scoring is brought about by notched wheels, such as 123, Fig. 7. The notched wheels 123 are rotatably supported by arms 124 mounted on the shaft 125 journaled in the side members of the frame 26. A lug 126 on the shaft 125 has one end of a rod 127 connected thereto. A spring 128 extends between the other end of the rod 127 and a spring anchor 129 fixed in the frame 26. The spring 128

acts to urge the wheels 123 toward the roller 47 and therefore the web, which is passed about the roller 47 from the roller 46, is scored by these wheels. The wheels 123 are in the form of disks which have a plurality of spaced axially extending slots therein, which slots extend from the periphery. As the edges of these slots contact with the web, spaced perforation are formed therein which bring about the scoring. The arms 124 are ajustable along the shaft 125 and therefore the notched wheels 123 may be disposed at proper places across the web W. A handle 130 is connected to the shaft 125 and this handle may be manipulated to move the shaft 125 to remove the wheels 123 from engagement with the web W.

Journaled in the side members of the frame 26 is a shaft 131 (Fig. 9). Mounted on this shaft 131 is a cam generally indicated by 132. As best illustrated in Fig. 9, the cam 132 includes two sections 133 and 134. In the section 133 a slot 135 is formed through which a bolt 136 is extended that is engaged by a nut 137. The sections 133 and 134 include cooperating peripheral sections and, by adjusting these sections relative to each other, the length of the peripheral portion of the cam 132 may be varied. After this peripheral length has been determined, the nut 137 is tightened to secure the sections against relative movement. A shaft 138 extends between the side members of the frame 26 and, mounted thereon, is a lever 139. Mounted on the shaft 29 is a disk 140 and mounted at one end of the lever 139 is a roller 141 which rests on the periphery of the disk 140. At the opposite end of the lever 139 is a roller 142 adapted to engage the cam 132. A spring 143 extends between the last named end of the lever 139 and the frame 26 and acts on this lever to force the roller 141 toward the disk 140. The web W is disposed between the disk 140 and the roller 141. As long as the spring 143 urges the roller 141 to clamp the web between this roller and the disk 140 and when the shaft is rotated, it is manifest that movement will be imparted to the web W. However, when it is desired to interrupt this movement, the cam 132 is caused to engage the roller 142 and this pivots the lever 139 so that the roller 141 is moved away from the web, against the action of the spring 143, and since the web is not forced into engagement with the disk 140 under these conditions, it is manifest that no movement is imparted thereto by the rotation of the disk 140. If desired, a plurality of such levers and disks may be arranged at intervals across the web W in order that said web may be moved through the device.

In a manner to be described, the shaft 131 is continually rotated during operation of the described printing arrangement. On the end of this shaft, opposite that adjacent the other portions of the printing machine, a spur gear 144 is fixed. This spur gear 144 meshes with a spur gear 145 on the shaft 138. A spur gear 146 on the shaft 138 and joined to gear 145 meshes with a spur gear 147 on the shaft 38. At the opposite end of the shaft 38 is a spur gear 148 which meshes with a spur gear 149 (Fig. 9) fixed on the shaft 29, these gears having a one to one ratio. A stud shaft is fixed on the outer face of the adjacent side member of the frame 26 and a pinion 150 is mounted thereon. This pinion meshes with the spur gear 148. The pinion 150 has a relatively wide face for the purpose set forth hereinafter. On the shaft 99 is a spur gear 151 meshing with the pinion 150. On the shaft 38 outwardly of the spur gear 147 is a groove cam 152. On a boss 153, carried by the frame 26, is a lever 154 having a roller 155 at one end thereof which travels in the groove of cam 152. On the end of shaft 99, opposite the gear 151, are two spaced disks 156 and 157 between which a roller 158 on the lever 154 is disposed. On the shaft 38, outwardly of the groove cam 152, is a peripheral cam 159. A bell crank 160 (Fig. 4) is pivotally mounted on the shaft 94 and at the end of one arm thereof is a roller 161 which is forced into engagement with the peripheral cam 159 by the spring 162 extended between spring anchors on the frame 26 and one of the arms 95. The end of the other of the arms of the bell crank 160 is connected to the shaft 96 (Fig. 7). Thus, when the bell crank 160 is actuated by the cam 159, the arms 95 will be rocked. An arm 163 is pivotally and eccentrically connected to the face of the peripheral cam 159, as indicated at 164 (Fig. 4), and the opposite end thereof is pivotally connected, as indicated at 165, to the arm 166 depending from the shaft 90'. A collar 167 is fixed to the shaft 90' and has a plurality of notches 168 (Fig. 3) in the periphery thereof. A pawl 169 is mounted on the arm 166 and engages the notches 168.

Pivotally mounted on one of the side members of the frame 26 is a rocker 170 (Fig. 4). A link 171 is pivotally connected at 172 to the rocker 170 and is also pivotally connected to the adjustable crank 173 operable from a disk mounted on the shaft 131 outwardly of the spur gear 134. On the free end of the rocker 170 is a gear segment 175 that meshes with a pinion 176 rotatably mounted on the reduced bearing portion 177 of the shaft 49. Fixed to the shaft is the housing 178 of a double roller clutch and the pinion 176 is connected to the inner member 179 of one of the clutches. A plurality of peripheral notches 180 are provided in the inner member 179 and arranged in these notches are rollers 181, which rollers are urged away from the shoulders of the notches by springs 182. When the pinion 176 is rotated, the inner member 179 is also rotated in a direction which causes the rollers 181 to move into a wedging position to interconnect the inner member 179 and the portion of the housing 178 disposed thereabout and, in this manner, the shaft 49 is rotated when the pinion 176 is rotated in the direction to cause this wedging. However, when the pinion is rotated in the other direction, the rollers 181 move from wedging position and the rollers 183 associated with the inner member 184 of the other portion of the clutch move into wedging position and, since this inner member is permanently connected to the frame 26, the shaft 49 is held against rotation in this direction. This double clutch therefore provides a ratchet which functions so that the shaft 49 is rotated when the rocker 170 is moved in one direction, but it is not rotated when the rocker 170 moves in the other direction. By adjusting the adjustable crank 173 the amount of movement imparted to the rocker 170 may be regulated and therefore the amount of movement imparted to the shaft 49 may be regulated. As best illustrated in Fig. 8, the bearing portions 185 on opposite ends of the shaft 50 are journaled in eccentrics 186 mounted in the side members of the frame 26. Mounted on the ends of the shaft 125, extended through the side members of the frame 26, are cams 187 which bear against tail portions 188 on the eccentrics 186. Springs 189 extend between spring anchors on the tails 188 and spring anchors on the sides of the frame 26, and these springs act on the tail

portions to so position the tail portions that the eccentricity of the eccentrics 186 causes the roller 48 on the shaft 50 to be urged into engagement with the roller 47 on the shaft 49. When the shaft 125 is rotated the cams 187 are also rotated and move the tail portions 188 against the action of the springs 189 to vary the position of the eccentrics by reason of the engagement of these eccentrics with the bearing portions 190 in order that the shaft 50 and, therefore, the roller 48 will be moved away from the roller 47 in order that the web W may be easily passed between these rollers. On the end of shaft 49 opposite the pinion 176, as best illustrated in Figs. 1 and 2, is a gear 191 which meshes with a gear 192 on the corresponding end of the shaft 50 and, therefore, when the shaft 49 is rotated in the manner above described, the shaft 50 is also rotated and thus a feeding movement is imparted to the rollers 47 and 48.

It has been pointed out that the web W is directed over a ledge 51 after passing through the rollers 47 and 48. This ledge 51 supports a stationary knife 193. A vertically reciprocal knife 194, slightly inclined from the vertical, cooperates with the lower or stationary knife 193 to shear the web transversely of its line of movement. The cutting edge 195, Fig. 1, of the knife 194, is tapered upwardly from both ends to a central point so that a shearing action progresses from the edges of the web to the center thereof in a cutting operation. This knife is mounted in a supporting frame 196, the lower ends of which are pivotally connected at 197 to the arms 198 of bell crank levers pivotally mounted as at 199 on each side of the frame 26. These bell crank levers are rocked about their pivots 199 by means of cams 200 on the shaft 131, the arms 198' of the bell cranks having rollers 201 thereon which ride on the cams 200. The rollers are maintained in contact with the cams 200 by springs 202 anchored to the frame and to the arms 198'. The springs also serve to return the knife to its upper position after each cutting operation. The knives are maintained in cutting relation by springs 203 connected to the frame of the machine and the knife frame 196. These springs yieldingly urge the upper knife against the lower one.

As a proper length of the web is advanced by the feed rollers it is positioned between the normally separated upper and lower discharge rollers 204 and 205 positioned on opposite sides of the web. The lower discharge roller is mounted on a shaft 206 journaled in bearings in the frame and this roller is positively driven by a gear 207, Fig. 1, which is driven by the idler gear 191. The upper rollers 204, Figs. 2 and 7, are mounted at the ends of arms 208 which pivot at 209 on suitable mountings 210 arranged on the opposite side of the guideway 211 from the rollers 204 and 205. Springs 212 normally urge the arms 208 upwardly to separate the rollers, and adjusting screws 213 engage lugs 214 on the arms to provide limit stops therefor. The ends of the arms 208, adjacent the roller 204, have lugs 215 thereon that are engaged by adjusting screws 216 on the overhanging lugs 217 on the knife frame 196. Hence, as this frame moves downwardly and completes a cutting operation, the lower ends of the screws 216 engage the lugs 215 and pivot the arms 208 to move the rollers 204 downwardly. The sheet S, which will have been cut from the web W by the knives 193 and 194, will be positioned between the rollers 204 and 205 and, therefore, when the rollers 204 move downwardly the sheet S will be engaged with the constantly rotating roller 205, which will be rotating in a counter-clockwise direction as viewed in Fig. 7, and therefore the sheet S will be quickly moved from the cutting mechanism into the guideway 211, a stop arrangement 218 being provided to properly position the sheet.

As shown in my copending application for bill printing machines, Serial No. 404,123, filed November 1, 1929, now Patent No. 1,955,806, patented April 24, 1934, an arrangement is provided in the guideway 211 for conveying the sheet to other printing mechanisms arranged along the side of the guideway 211. The guideway 211 extends at right angles to the line of movement of the web W. In this guideway are belts 219 and 220 which serve as a conveyor to carry the sheets S along the guideway. The belt 219 (Fig. 4) is directed around pulleys 221 and 222 respectively mounted on shafts 223 and 224 journaled below the guideway. This belt is endless and is directed around a tightener 225 carried by an arm pivotally mounted on the frame 26. The shaft 224 is driven from the main drive shaft 226 (Fig. 2) by a suitable gear train, generally indicated by 227, and if desired, a suitable clutch or other control member may be interposed. An endless belt 228 interconnects pulleys on the shafts 224 and 223 to simultaneously operate the shafts and, therefore, the pulleys and belts connected thereto. The belts 220 extend the entire length of the guideway and are directed around pulleys 229 on the shaft 230 at the opposite end of the machine, this shaft 230 being driven by a belt 231 directed about pulleys on the shafts 224 and 230. Thus a conveyor is provided by which the sheets S may be carried entirely across the machine.

On the shaft 224 is a pinion 232 (Fig. 2) which meshes with a gear 233 on the counter-shaft 234. A bevel gear 235 on the countershaft 234 meshes with a bevel gear 236 fixed on the adjacent end of the shaft 131. It is, therefore, apparent that this shaft 131 will be operated with the shaft 226. A motor 237 is carried by the bed 14 and a flywheel 238 is mounted on a shaft carried by the bed 14. A belt 239 interconnects the drive pulley of the motor 237 and the pulley 238. A pulley 240 is mounted on the same shaft as the pulley 238 and a belt 241 interconnects this pulley and a flywheel pulley 242 on the shaft 226, and it is through these mechanisms that power is supplied to the shaft 226.

At a suitable point along the guideway 211, rearwardly thereof, is a magazine M in which a plurality of printing devices D are stored and these printing devices are withdrawn from the magazine M and are successively fed into a printing position below the guideway 211. A ribbon R, operated by a suitable mechanism, is extended between two spools and over the printing devices D in printing position and below the sheet S in the guideway 211, said guideway having an opening therein at this point, so that when the platen P is operated an impression will be made on the portion of the sheet S disposed above the printing device D and ribbon R. It has been pointed out that the web W is scored prior to the time it is severed into the sheets S and thus scorings divide the sheet S into a main body and a number of attached stubs. This main body and each of the stubs are intended to receive a printing impression from the printing device D and, to accomplish this, a plurality of stop fingers 243 are provided which are operated to interrupt movement of the sheet S along the guideway 211, said

sheet being carried by the belts 220. All of these mechanisms, that is, the conveyor belts, the stop fingers, the platen, and the printing device feeding means, are described in detail in my referred to copending application.

Gripping rollers 244 are carried by an arm 245 pivotally mounted in the main frame, Fig. 2, and these rollers are arranged in advance of the last stop finger 243 to engage the sheet when it is released from the last stop finger, after the platen P has operated, in order that the sheet S will be pressed against the belts 220 to insure a quick feed to the printing cylinders 246. Just before the sheet S meshes with the printing cylinders the gripping rollers are raised by a crank 247 intermittently operated by the cam 248 on the shaft 249 having a gear 250 thereon meshing with the gear 251 on the shaft 252, which shaft 252 controls operation of the stop fingers 243. The printing cylinders 246 operate to print fixed data, such as the forms for a bill and stubs, and this printing operation is performed on the sheet on the face opposite the face from which the printing operation was performed from the form 52. The data printed by the cylinders 246 is printed in proper and unchanging relation to the impressions made on the sheets from the printing devices D by the platen P, these latter impressions normally being names and addresses or the like. The printing mechanism, including the cylinders 246, forms the subject matter of the application of Curtis George Kranz, Serial No. 404,092, filed November 1, 1929, now Patent No. 1,955,814, patented April 24, 1934, and reference may be made thereto for the details of the construction. The completely printed sheet is carried away from the machine by the conveyor 253. The sheets S are timed before entering the portion of the machine printing the addresses, namely, the platen P and the printing devices D, by a stop finger 254 which delays movement thereof until the preceding sheet has been addressed and moved from final printing position.

The operation of the device is as follows: A roll from which the web W is withdrawn is mounted on the standards 16 and 17 and the web is directed through the machine in the manner set forth. Ink is stored in the fountain 83 and the machine is then set in operation. The rollers 38 and 39 are synchronized so that the printing form 52 on the roller 39 cooperates with the blanket 69 on the roller 30, the leading edges of these two members engaging the web simultaneously and the following edges disengaging the web simultaneously so that the undercut portions of the rollers are free from the web during a portion of the operations, as illustrated in Fig. 10. It has been pointed out that the roller 39 is forced toward the roller 30 and that pressure is exerted thereby on the blanket. It is, therefore, manifest that when the web is disposed between these members it is fed therethrough because the blanket and form cooperatingly roll on opposite sides of the web. The blanket is preferably made of a material embodying innate resiliency, as, for example, rubber, and it therefore tends to conform to the surface characteristics of the form, but any unevenness not taken care of by the blanket is removed by a make-ready, as set forth. As soon as the machine starts to operate the fountain roller picks up ink from the fountain 83, and when the ductor roller 97 engages this fountain roller some of the ink is picked up from the periphery thereof. When the cam 159 moves the ductor roller into engagement with the vibrator roller 98 ink is transferred from the ductor roller onto this vibrator roller. The lever 154 imparts an axial movement to the vibrator roller 98 and the pinion 151 meshes with and moves across the gear 150 which causes rotation of this vibrator roller. Therefore, the vibrator roller both rotates and moves axially with respect to the form rollers 105 and 110, and therefore ink is supplied thereto in an even manner. These form rollers engage the electroplate 52 and the ink thereon is uniformly distributed on the electroplate. Thus, when the form roller and blanket cooperatingly roll together, an impression is made on the web. At the time the impression is being made on the web W the rollers 47 and 48 are stationary by reason of the ratchet drive therefor. It is therefore necessary to loop the web intermediate the printing rollers and the feeding rollers, and this is done by moving the rocker 42 from the full line position of Fig. 7, in which position it is disposed at the start of the printing operation, into the dotted line position of Fig. 7, in which position it is disposed at the completion of the printing operation. The printing operation and this loop forming operation are performed synchronically and therefore smutting of the web is prevented. I have described the web as being fed past the printing devices by the frictional engagement of these devices with the web and I have found that satisfactory operation results from so doing but, if desired, a separate drive for the web at this time may be provided by employing the disk 140 and the roller 141. As soon as the printing operation is completed the web is disengaged by the roller 141. The seating of cam 132 as shown in the drawings is, however, such as to cause the disk 140 and the roller 141 to cooperate during the period the printing couple including the rollers 30 and 39 is operative, but it is apparent that by altering the seating of the cam 132 the operation of the disk 140 and roller 141 can be timed to occur in any desired relationship to the cooperation of the printing couple. When the printing operation is completed the feed rollers 47 and 48 are set in operation. These feed rollers advance the web over the ledge 51 past the knives 193 and 194. The springs 26' act on the yoke frame 24 to urge the diabolo 23 downwardly and thus the web W is maintained taut, this, of course, being aided by the action of the rocker 42. As the feed rollers 47 and 48 operate this rocker 42 moves upwardly and thus the loop is removed from the web. If the feed rollers 47 and 48 operated to move the web in the same amount as it is moved during the printing operation the various printing operations would be performed on the web in close juxtaposition, but it is desired that margins be provided on each side of the printing impression. Therefore the feed rollers operate to move the web not only in an amount equal to the width of the impression, but in an amount equal to the total width of the impression and the two borders or margins on each side of the impressions. As soon as the web has been advanced over the ledge 51 in an amount equal to the desired width of one sheet the knives 193 and 194 are operated to sever the sheet from the web, these knives engaging the web intermediate the spaced impressions to thus create the top margin on one sheet and the lower margin on the succeeding sheet. As soon as the knives have severed the sheets the rollers 204 force the sheet into engagement with the roller 205, and it is therefore moved onto the guideway 211 to be moved therethrough

to have the various printing operations performed thereon. At the time the web is being moved by the feed rollers 47 and 48 the notched disks 123 act to score the web parallel with the side edges thereof. It is apparent that the sheet is severed from the web transversely thereof and therefore the web is made of a width equal to the desired length of the sheet S. By varying the width of the form 52 and also the amount of movement imparted to the feed rollers 47 and 48, different widths of sheets may be severed from the web. Manifestly, by varying the width of the web, the length of the sheet may be varied. The feed rollers so operate that the width of sheet is moved past the severing device and hence when the severing device operates, the sheet is cut from the web. Ordinarily the sheet so cut from the web is wider than the impression made in the printing couple for margins are provided along the sides of the impression. From this it is apparent that the feed rollers move the web in an amount greater than it is moved by the action of the printing couple thereon for the printing couple only acts on the web when an impression is being made. Hence it is essential that the web be so fed that the impressions are spaced one from the other to provide margins along the edges of adjacent impressions, the margin at what may be termed the lower edge of one sheet and the margin at the top edge of the succeeding sheet being provided intermediate the impressions. To attain this spacing the rocker 42 is operated to create a loop containing slightly more of the web than that fed by the action of the printing couple. However, intermediate the impressions the web is maintained taut and this insures uniform spacing and if the size of the loop is slightly greater than necessary the web will slip rearwardly at the time the undercut portions of the rollers of the printing couple are juxtaposed to each other, this rearward movement being induced by the diabolo.

By interchanging the positions of the blankets and the forms on the mechanisms for printing on opposite faces of the bill these devices may be made to operate on faces opposite to those described, that is, the printing form 52 may print on the face of the bill rather than on the back of the bill, and such a change is intended to be within the purview of my invention.

While I have illustrated a selected embodiment of my invention, it is to be understood that this is capable of variation and alteration, and such changes are intended to be within the spirit and scope of the following claims.

I claim:

1. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest, and means operable with said printing means for operating the looping means.

2. In a printing machine, printing means for intermittently making impressions on a web, intermittently operable feeding means for the web, means for operating the feeding means intermediate the intermittent impression operations of the printing means, means for looping the web during the impression operations of the printing means and while the feeding means is at rest, and means operable with said printing means for operating the looping means.

3. In a printing machine, a constantly operating printing means for intermittently making impressions on a web, intermittently operable feeding means, means for operating the feeding means intermediate the intermittent impression operations of the printing means, means for looping the web during the impression operations of the printing means and while the feeding means is at rest, means operable with the printing means for operating the looping means, and means for maintaining the web taut.

4. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest, means operable with said printing means for operating the looping means, and means for limiting movement of the looping means.

5. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest, means operable with said printing means for operating the looping means, and means for varying the amount of movement of said looping means.

6. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means, means for looping the web while said feeding means is at rest, means operable with said printing means for operating said looping means, and means for limiting movement of said looping means.

7. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means, means for looping the web while said feeding means is at rest, means operable with said printing means for operating said looping means, and means for varying the amount of movement of said looping means.

8. In a printing machine, printing means for intermittently making impressions on a web, intermittently operable feeding means for the web, means for operating the feeding means intermediate the impression operations of the printing means, means for looping the web during the intermittent operations of the printing means and while the feeding means is at rest, means operable with said printing means for operating the looping means, and means for limiting the movement of the looping means.

9. In a printing machine, printing means for intermittently making impressions on a web, intermittently operable feeding means for the web, means for operating the feeding means intermediate the impression operations of the printing means, means for looping the web during the intermittent operations of the printing means and while the feeding means is at rest, means operable with said printing means for operating the looping means, and means for varying the amount of movement of said looping means.

10. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impres-

sion operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest, and cam means operable with said printing means for operating the looping means.

11. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest, cam means operable with said printing means, and means on said looping means and engageable with said cam means to receive movement therefrom to thereby operate said looping means.

12. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest and including an adjustable part, and means operable with said printing means for operating the looping means.

13. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest and including an adjustable part, means operable with said printing means for operating the looping means, and means on said adjustable part cooperating with said means operable with said printing means.

14. In a printing machine, printing means adapted to make impressions on a web, intermittently operable feeding means, means for operating said feeding means intermediate impression operations of said printing means, means for looping the web during operation of the printing means and while said feeding means is at rest and including an adjustable part, cam means operable with said printing means, and a cam follower on said adjustable part and engageable with said cam means to receive movement therefrom to operate the looping means.

15. In a printing machine, printing means for intermittently making impressions on a web, intermittently operable feeding means for the web, means for operating the feeding means intermediate the impression operations of the printing means, means for looping the web during the intermittent operations of the printing means and while the feeding means is at rest and including an adjustable part adapted to be adjusted to vary the movement of said looping means, and means operable with said printing means for operating the looping means.

16. In a printing machine, a constantly operating printing means for intermittently making impressions on a web, intermittently operable feeding means, means for operating the feeding means intermediate the intermittent impression operations of the printing means, means for looping the web during the impression operations of the printing means and while the feeding means is at rest, and a diabolo acting on the web prior to passage thereof to the printing means and holding said web in taut condition.

17. In a printing machine, constantly operating printing means for making intermittent impressions on a web withdrawn from a roll, means for guiding said web to said printing means, feeding means operable intermediate the intermittent impression operations of said printing means, a diabolo for maintaining said web taut, and means intermediate said printing and feeding means for looping said web during the intermittent impression operations of said printing means.

18. In a constantly operating printing machine, printing means for intermittently making impressions on a moving web, means for looping said web, intermittently operable feeding means for said web and operable intermediate the intermittent impression operations of said printing means, and means for operating said looping means to increase the loop in said web during intermittent impressions of said printing means and while said feeding means is at rest and to decrease said loop during the operation of said feeding means.

19. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, and means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations.

20. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, and means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations and including an adjustable part for regulating the operation thereof.

21. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, and means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations and including an adjustable cam for regulating the operation thereof.

22. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, said printing means including a pair of shafts carrying the operative parts thereof, means cooperating with said printing means to feed said web during said intermittent impression operations and including clamping means engageable with the web and having a part mounted on one of said shafts at one side only of the operative part thereon, and means for regulating operation of the clamping means.

23. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, said printing means including a pair of shafts carrying the operative parts thereof, means cooperating with said printing means to feed said web during said intermittent impression operations and including clamping

means engageable with the web and having a part mounted on one of said shafts at one side only of the operative part thereon, and an adjustable cam for regulating the operation of the clamping means.

24. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations, and other means for feeding said web intermediate said intermittent impression operations and engageable with the web throughout the width thereof.

25. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations and including an adjustable part for regulating the operation thereof, and other means for feeding said web intermediate said intermittent impression operations and engageable with the web throughout the width thereof.

26. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations and including clamping means engageable with the web and means for regulating operation of the clamping means, and other means for feeding said web intermediate said intermittent impression operations and engageable with the web throughout the width thereof.

27. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, means positioned at one side only of said printing means and cooperating with said printing means to feed said web during said intermittent impression operations and including clamping means engageable with the web and an adjustable cam for regulating the operation of the clamping means, and other means for feeding said web intermediate said intermittent impression operations and engageable with the web throughout the width thereof.

28. In a printing machine, a constantly operating printing means for making intermittent impression operations on a web and for feeding the web during the intermittent impression operations, means cooperating with said printing means for feeding said web during said intermittent impression operations, other means for feeding said web intermediate said intermittent impression operations, means intermediate said printing means and said other feeding means for looping said web, and means operating the printing means, the feeding means cooperating with the printing means, the other feeding means, and the looping means from a common source of power.

29. In a printing machine, a printing means for making intermittent impression operations on a web and for intermittently withdrawing the web from a roll and for feeding the web during the intermittent impression operations, means positioned at one side only of said printing means and cooperating with said printing means to feed the web during said intermittent impression operations, intermittently operated feeding means and engageable with the web throughout the width thereof, and means for operating said feeding means to advance the web after an impression operation of said printing means.

30. In a printing machine, printing means intermittently engaging a web to make spaced impressions thereon and operating to withdraw the web from a roll during the intermittent impression operations, means cooperating with said printing means for feeding the web during said intermittent impression operations, other feeding means for said web and operable intermediate the intermittent impression operations on said web, and means for operating said other feeding means to move the web in an amount greater than the movement imparted thereto by said printing means and the first feeding means during said intermittent impression operations of the printing means to thereby additionally withdraw said web from the roll whereby a greater length of web is fed by said other feeding means than by said printing means and said first named feeding means.

31. In a printing machine for making impressions on bill sections comprising a main body and one or more stubs, the combination of printing means including a form for making an impression in each printing operation thereof on one face of the main body and stubs of each bill section, other printing means operating intermittently to print variable information on one face of the main body and stubs of each bill section separately, still other printing means including a form for making an impression on the faces of the bill sections opposite to those receiving an impression from the first named form, operating means for each of said printing means, and means for operating the operating means for each of said printing means in timed relation with each other.

32. In a printing machine to which a web is fed that is divisible into bill sections comprising a main body and one or more stubs, the combination of printing means including a form for making an impression in each printing operation thereof on one face of the main body and stubs of each bill section, other printing means operating intermittently to print variable information on one face of the main body and stubs of each bill section separately, still other printing means including a form for making an impression on the faces of the bill sections opposite to those receiving an impression from the first named form, means for severing the bill sections from the web, operating means for each of said printing means and severing means, and means for operating the operating means for each of said printing means and severing means in timed relation with each other.

33. In a printing machine for making impressions on bill sections comprising a main body and one or more stubs, the combination of printing means operating intermittently to print variable information on one face of the main body and stubs of each bill section separately, other print-

ing means including a form for making an impression in each printing operation thereof on one face of the main body and stubs of each bill section and in unchanging relation with the variable information printed thereon by the first printing means, still other printing means including a form for making an impression on the faces of the bill sections opposite to those receiving an impression from the first named form, operating means for each of said printing means, means for operating the operating means for each of said printing means in timed relation with each other, and means for dividing the bill sections into a main body and one or more stubs.

34. In a printing machine to which a web is fed that is divisible into bill sections comprising a main body and one or more stubs, the combination of printing means including a form for making an impression in each printing operation thereof on one face of the main body and stubs of each bill section, other printing means operating intermittently to print variable information on one face of the main body and stubs of each bill section separately, still other printing means including a form for making an impression on the faces of the bill sections opposite to those receiving an impression from the first named form, means dividing the bill sections into a main body and one or more stubs, means for severing the bill sections from the web, operating means for each of said printing means and said severing means, and means for operating the operating means for each of said printing means and said severing means in timed relation with each other.

35. In a printing machine the combination of printing means for making impressions at spaced intervals on one face of a web, means for severing the web intermediate the impressions to form a sheet having one of said impressions on one face thereof, printing means for making impressions on the opposite face of the sheet, printing means for repetitiously printing variable information at spaced intervals on one face of the sheet, and means for moving the sheet relative to the printing means acting thereon.

36. In a printing machine the combination of a printing means for making impressions on a web, means for severing the web intermediate said impressions to form a sheet, means for moving the sheet away from the web, means for interrupting the movement of the sheet, printing means for making impressions on said sheet during interruption of said movement, and other printing means for making impressions on the sheet.

37. In a printing machine, printing means for making impressions on one face of a web, means for severing the web intermediate said impressions to form a sheet having one of said impressions on one face thereof, other printing means for making an impression on the opposite face of the sheet, means for moving the sheet away from the web, means for interrupting the movement of the sheet, and printing means for making an impression on the sheet during interruption of the movement.

38. In a printing machine, printing means for making impressions on one face of a web, means for severing the web intermediate said impressions to form a sheet having one of said impressions on one face thereof, other printing means for making an impression on the opposite face of the sheet, means for moving the sheet away from the web, means for interrupting the movement of the sheet, and means for printing variable information on the sheet during interruption of the movement.

39. In a printing machine, printing means for making impressions on one face of a web, means for severing the web intermediate said impressions to form a sheet having one of said impressions on one face thereof, other printing means for making an impression on the opposite face of the sheet, means for moving the sheet away from the web, means for interrupting the movement of the sheet, and means for printing variable information on said opposite face of said sheet.

40. In a printing machine which has means for making repetitious impressions on sheets successively passed therethrough, a printing couple for printing constant information in unchanging relation with the repetitious impressions made on the sheets, and means for operating the impression means and the printing couple, the combination therewith of a frame having a printing couple therein adapted to make spaced impressions on a web, intermittently operable feeding means for moving the web, means for severing sheets from the web intermediate the impressions made thereon in the printing couple carried by said frame, means in the frame intermediate the printing couple and the feeding means for looping the web during the operation of said printing couple, and means for operating the printing couple in said frame, the feeding means, the severing means, and the looping means from the means operating said impression means and the first printing couple.

41. In a printing machine which has means for making repetitious impressions on sheets successively passed therethrough, a printing couple for printing constant information in unchanging relation with the repetitious impressions made on the sheets, and means for operating the impression means and the printing couple, the combination therewith of a frame having a printing couple therein adapted to make spaced impressions on a web, feeding means, means for operating the feeding means intermediate the impression operations of the printing couple, means for holding the feeding means against movement during impression operations of the printing couple, means for severing sheets from the web intermediate the impressions made thereon in the printing couple, and means for operating the printing couple in said frame, the operating means for the feeding means, and the means for severing the sheets from the means operating said impression means and the first printing couple.

42. In a printing machine which has means for making repetitious impressions on sheets successively passed therethrough, a printing couple for printing constant information in unchanging relation with the repetitious impressions made on the sheets, and means for operating the impression means and the printing couple, the combination therewith of a frame having a printing couple therein adapted to make spaced impressions on a web, feeding means, means for operating the feeding means intermediate the impression operations of the printing couple, means for holding the feeding means against movement during impression operations of the printing couple, means for looping the web at the time said feeding means is held against movement, means for severing sheets from the web intermediate the impressions made thereon in the printing couple, and means for operating the printing couple in said frame, the operating means for the feeding

means, the looping means, and the severing means from the means operating said impression means and the first printing couple.

43. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, means arranged intermediate the printing couple and the feeding means for looping the web, operating means, means for actuating the feeding means from the operating means intermediate the intermittent impression operations of the printing couple, means holding the feeding means against movement during the intermittent impression operations of the printing couple, and means actuated by the operating means for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and to reduce the web during the operation of the feeding means.

44. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, means arranged intermediate the printing couple and the feeding means for looping the web, operating means, means for actuating the feeding means from the operating means intermediate the intermittent impression operations of the printing couple, means holding the feeding means against movement during the intermittent impression operations of the printing couple, means actuated by the operating means for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and to reduce the web during the operation of the feeding means, and means for varying the operation of the looping means in accordance with the web moving operation of the printing couple and the feeding means.

45. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, means arranged intermediate the printing couple and the feeding means for looping the web, operating means, means including an adjustable crank for actuating the feeding means from the operating means intermediate the imression operations of the printing couple, said adjustable crank being adjusted to vary the amount of feed imparted to the web by the feeding means, means holding the feeding means against movement during the intermittent impression operations of the printing couple, and means actuated by the operating means for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and to reduce the web during the operation of the feeding means.

46. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, means arranged intermediate the printing couple and the feeding means for looping the web, operating means, means including an adjustable crank for actuating the feeding means from the operating means intermediate the impression operations of the printing couple, said adjustable crank being adjusted to vary the amount of feed imparted to the web by the feeding means, means holding the feeding means against movement during the intermittent impression operations of the printing couple, means actuated by the operating means for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and to reduce the web during the operation of the feeding means, and means for varying the operation of the looping means in accordance with the web moving operation of the printing couple and the feeding means.

47. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, operating means for said feeding means and including a clutch device providing a clutch engageable to move said feeding means in one direction and a brake engageable to hold said feeding means against movement in the other direction, means arranged intermediate the printing couple and the feeding means for looping the web, operating means for the printing mechanism, a rockable arm having a gear segment thereon, a gear connected to said clutch device and meshed with said gear segment, means operable from the operating means for said printing mechanism for rocking said arm whereby said gear is alternately rotated in opposite directions to alternately operate said clutch and brake, and means actuated by the operating means for the printing mechanism for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and when the brake is engaged and to reduce the web during the operation of the feeding means when the clutch is engaged.

48. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, operating means for said feeding means and including a clutch device providing a clutch engageable to move said feeding means in one direction and a brake engageable to hold said feeding means against movement in the other direction, means arranged intermediate the printing couple and the feeding means for looping the web, operating means for the printing mechanism, a rockable arm having a gear segment thereon, a gear connected to said clutch device and meshed with said gear segment, means operable from the operating means for said printing mechanism for rocking said arm whereby said gear is alternately rotated in opposite directions to alternately operate said clutch and brake and including an adjustable part whereby the magnitude of the rocking movement imparted to said arm may be varied to vary the operation of said clutch and brake, and means actuated by the operating means for the printing mechanism for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and when the brake is engaged and to reduce the web during the operation of the feeding means when the clutch is engaged.

49. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, operating means for said feeding means and including a clutch device providing a clutch engageable to move said feeding means in one direction and a brake engageable to hold said feeding means against movement in the other direction, means arranged intermediate the printing couple and the feeding means for looping the web, operating means for the printing mech-

anism, a rockable arm having a gear segment thereon, a gear connected to said clutch device and meshed with said gear segment, driving means on the operating means for said printing mechanism, means including an adjustable member for connecting said driving means to said rockable arm whereby a rocking movement is imparted to said rockable arm to thereby rotate the gear meshed with said gear segment in opposite directions to alternately operate said clutch, adjustment of said adjustable member varying the rocking movement imparted to said arm to vary the operation of said clutch and brake, and means actuated by the operating means for the printing mechanism for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and when the brake is engaged and to reduce the web during the operation of the feeding means when the clutch is engaged.

50. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, operating means for said feeding means and including a clutch device providing a clutch engageable to move said feeding means in one direction and a brake engageable to hold said feeding means against movement in the other direction, means arranged intermediate the printing couple and the feeding means for looping the web, operating means for the printing mechanism, a rockable arm having a gear segment thereon, a gear connected to said clutch device and meshed with said gear segment, driving means on the operating means for said printing mechanism, a link connecting said driving means to said rockable arm whereby a rocking movement is imparted to said rockable arm to alternately rotate the gear meshed with the gear segment on said arm in opposite directions to alternately operate said clutch and brake, means for varying the length of said link to vary the rocking movement imparted to said arm to vary the operation of said clutch and brake, and means actuated by the operating means for the printing mechanism for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and when the brake is engaged and to reduce the web during the operation of the feeding means when the clutch is engaged.

51. In a printing mechanism having a frame, a printing couple mounted in the frame and adapted to make intermittent impression operations on a web, web feeding means mounted in the frame, operating means for said feeding means and including a clutch device providing a clutch engageable to move said feeding means in one direction and a brake engageable to hold said feeding means against movement in the other direction, means arranged intermediate the printing couple and the feeding means for looping the web, operating means for the printing mechanism, a rockable arm having a gear segment thereon, a gear connected to said clutch device and meshed with said gear segment, driving means on the operating means for said printing mechanism, means including an adjustable member for connecting said driving means to said rockable arm whereby a rocking movement is imparted to said rockable arm to thereby rotate the gear meshed with said gear segment in opposite directions to alternately operate said clutch, adjustment of said adjustable member varying the rocking movement imparted to said arm to vary the operation of said clutch and brake, means actuated by the operating means for the printing mechanism for operating the looping means to form a loop in the web during the intermittent impression operations of the printing couple and when the brake is engaged and to reduce the web during the operation of the feeding means when the clutch is engaged, and means engaging the web ahead of the printing couple and operable on the web to tension the same whereby the web is maintained taut throughout movement thereof through the printing mechanism.

52. In a printing machine, printing means intermittently engaging a web to make spaced impressions thereon and operating to withdraw the web from a roll during the intermittent impression operations, means cooperating with said printing means for feeding the web during said intermittent impression operations, other feeding means for said web and operable intermediate the intermittent impression operations on said web, and means for operating said other feeding means to move the web in an amount greater than the movement imparted thereto by said printing means and the first feeding means during said intermittent impression operations of the printing means to thereby additionally withdraw said web from the roll whereby a greater length of web is fed by said other feeding means than by said printing means and said first named feeding means, the operating means for said other feeding means including a drive shaft, an adjustable crank on said drive shaft, a rockable arm, and a link connecting said adjustable crank and said rockable arm.

53. In a printing machine, printing means intermittently engaging a web to make spaced impressions thereon and operating to withdraw the web from a roll during the impression operations, feeding means for said web operable intermediate the intermittent impressions on said web, means for operating said feeding means to move said web in an amount greater than the amount of movement imparted thereto by said feeding means during said intermittent impression operations of the printing means to thereby additionally withdraw said web from said roll whereby a greater length of web is fed by said feeding means than by said printing means, and means including an adjustable crank adapted to be adjusted to vary the withdrawal of said web from the roll.

54. In a printing machine, a rotary printing couple for intermittently making impressions on a web and for feeding the web during the intermittent impression operations, intermittently operable feeding means for the web, means for operating said feeding means intermediate impression and web feeding operations of said printing couple, means for severing the web into bill sheets, and means for operating the severing means in timed relation with the operation of the feeding means.

55. In a printing machine, a rotary printing couple for intermittently making impressions on a web and for feeding the web during the impression operations, intermittently operable feeding means for the web, means for operating the feeding means intermediate impression operations of said printing couple, means for looping the web, and means for operating the looping means in timed relation with the operation of the feeding means.

56. In a printing machine, a rotary printing couple for intermittently making impressions on

a web and for feeding the web during the impression operations, intermittently operable feeding means for the web, means for operating the feeding means intermediate impression operations of said printing couple, means for looping the web, means for operating the looping means in timed relation with the operation of the feeding means, means for severing the web into bill sheets, and means for intermittently operating the severing means in timed relation with the operation of the feeding means.

57. In a printing machine to which a web is fed that is divisible into bill sections comprising a main body and one or more stubs, a rotary printing couple for intermittently making impressions on the web and for feeding the web during the impression operations, intermittently operable feeding means for the web, means for operating said feeding means intermediate impression operations of said printing couple, means for looping the web, means for operating the looping means in timed relation with the feeding means, and means for scoring the web to divide the bill sections into a main body and one or more stubs.

58. In a printing machine to which a web is fed that is divisible into bill sections comprising a main body and one or more stubs, a rotary printing couple for intermittently making impressions on the web and for feeding the web during the impression operations, intermittently operable feeding means for the web, means for operating said feeding means intermediate impression operations of said printing couple, means for looping the web, means for operating the looping means in timed relation with the feeding means, means for scoring the web to divide the bill sections into a main body and one or more stubs, means for dividing the web into the bill sections subsequent to the scoring of the web, and means for intermittently operating said severing means in timed relation with the operation of the feeding means.

59. In a printing machine to which a web is fed that is divisible into bill sections comprising a main body and one or more stubs, a rotary printing couple for intermittently making impressions on the web and for feeding the web during the impression operations, intermittently operable feeding means for the web, means for operating said feeding means intermediate impression operations of said printing couple, means for scoring the web to divide the bill sections into a main body and one or more stubs, means for dividing the web into the bill sections subsequent to the scoring of the web, and means for intermittently operating said severing means in timed relation with the operation of the feeding means.

EMMETT C. HARTLEY.