July 17, 1962 J. J. ACKELL ET AL 3,044,395

PRINTING MACHINES

Filed Oct. 18, 1960 8 Sheets-Sheet 1

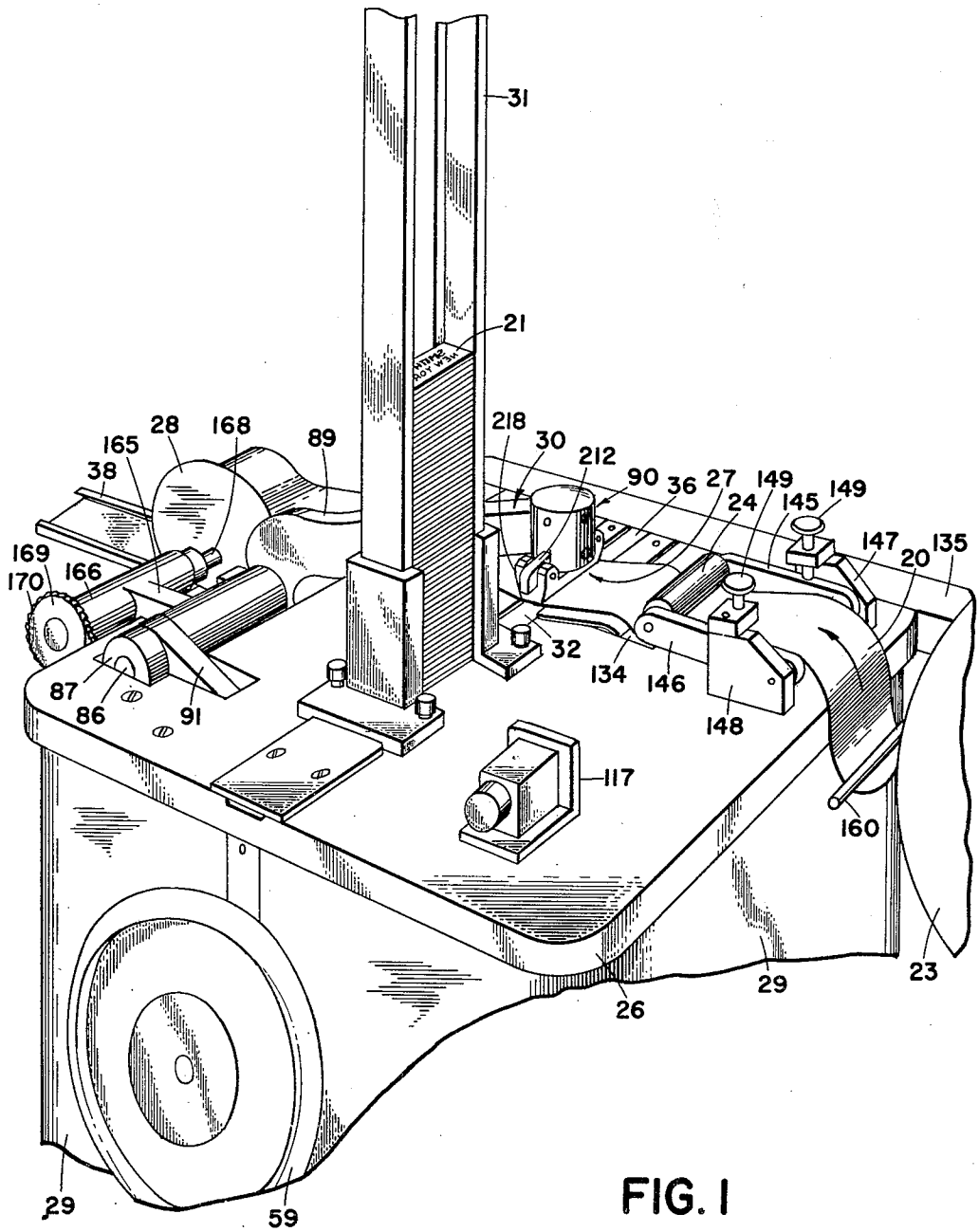


FIG. 1

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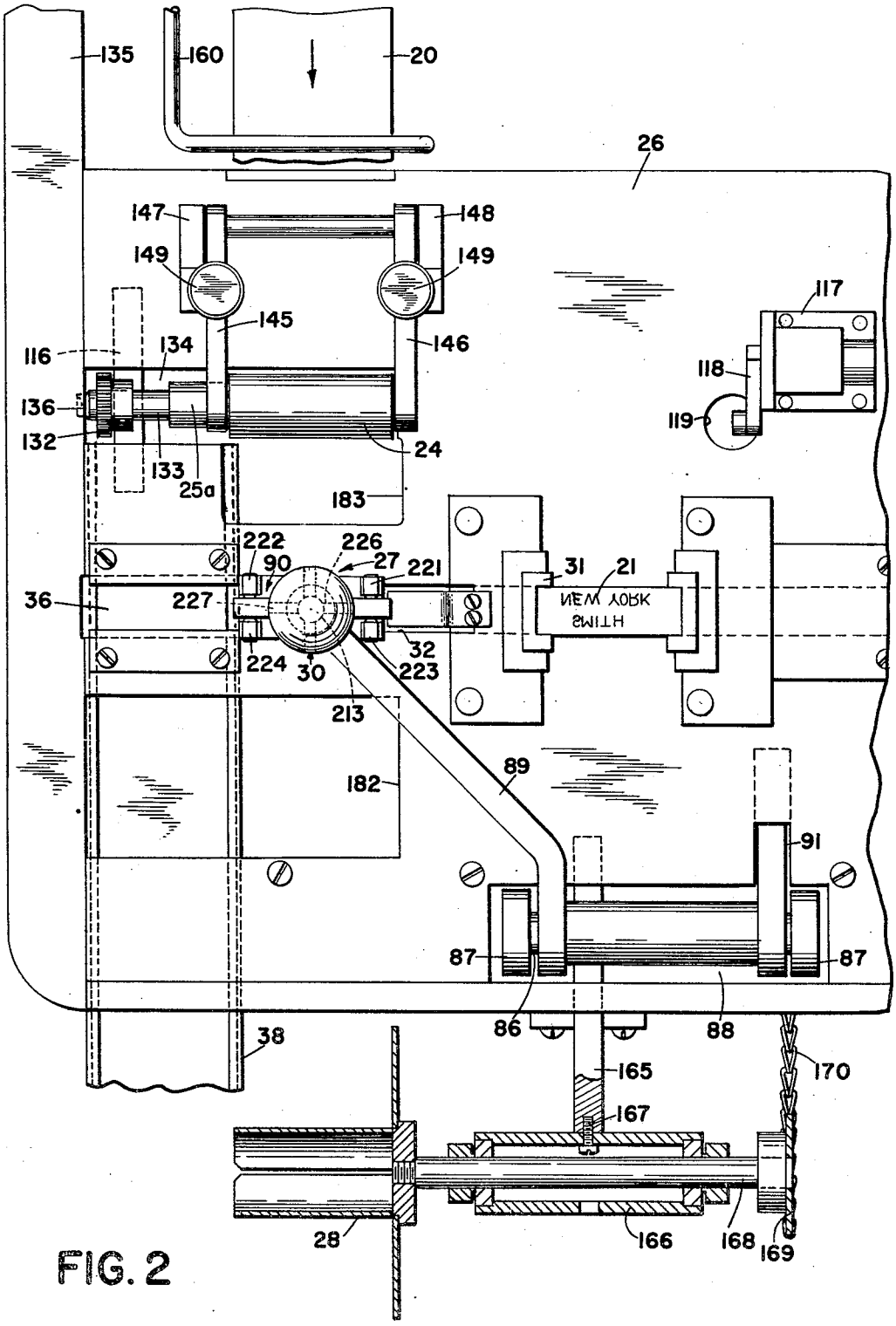


FIG. 2

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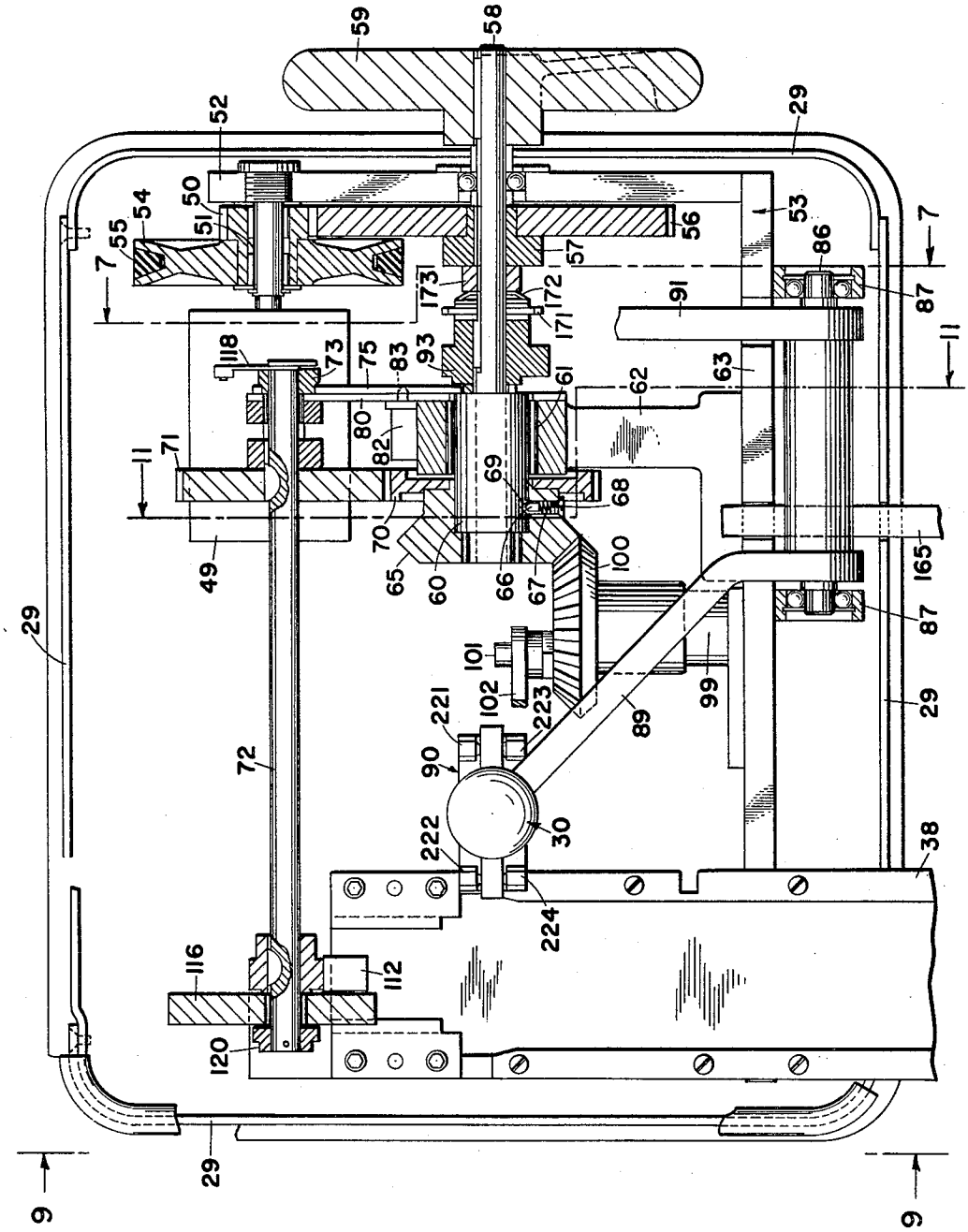


FIG. 3

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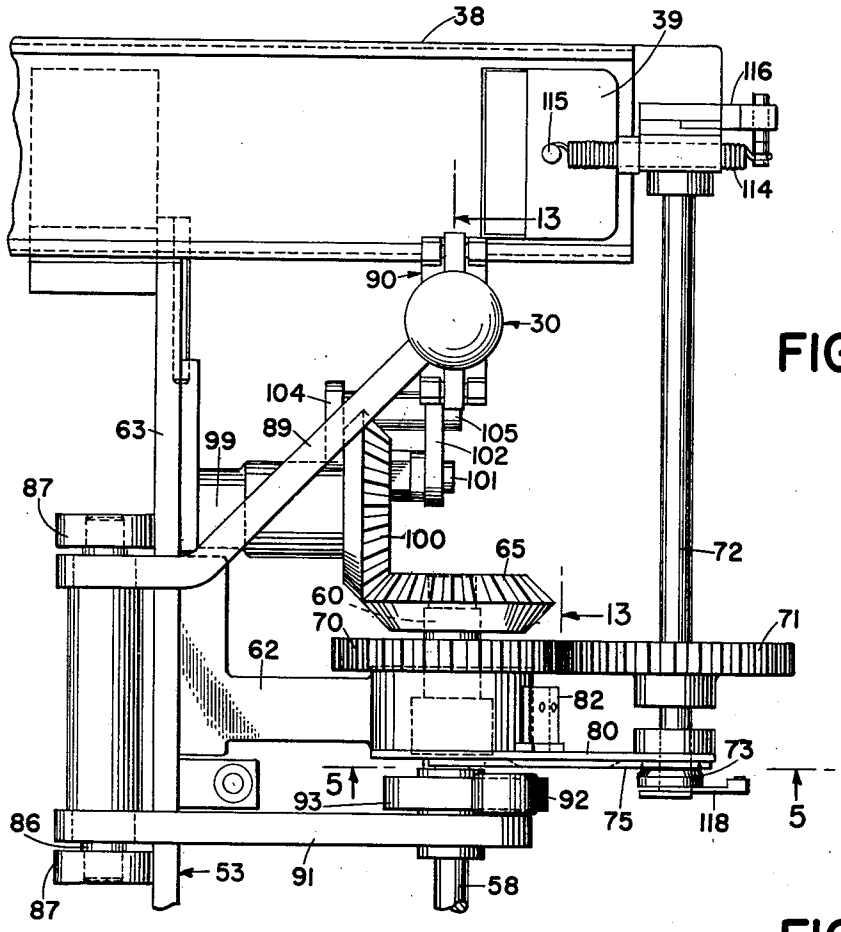


FIG. 4

FIG. 6

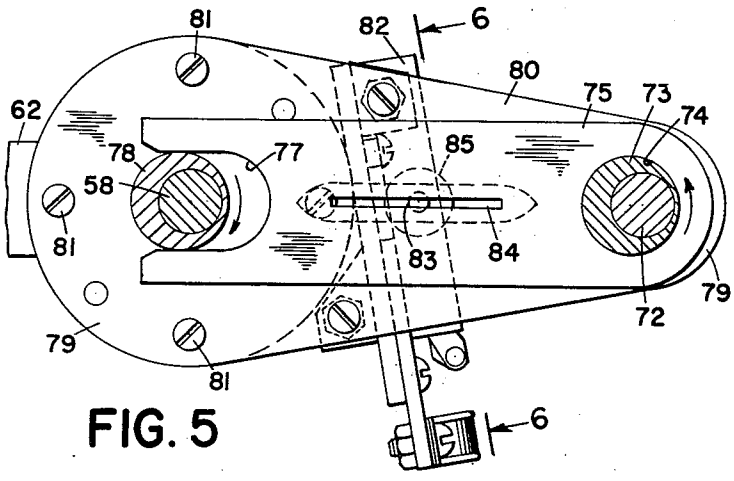
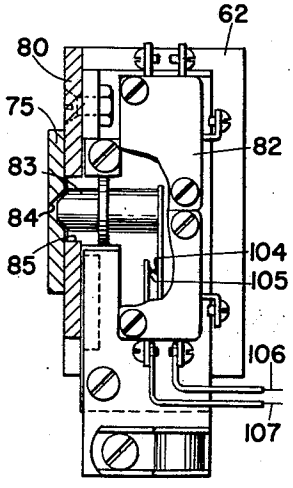


FIG. 5



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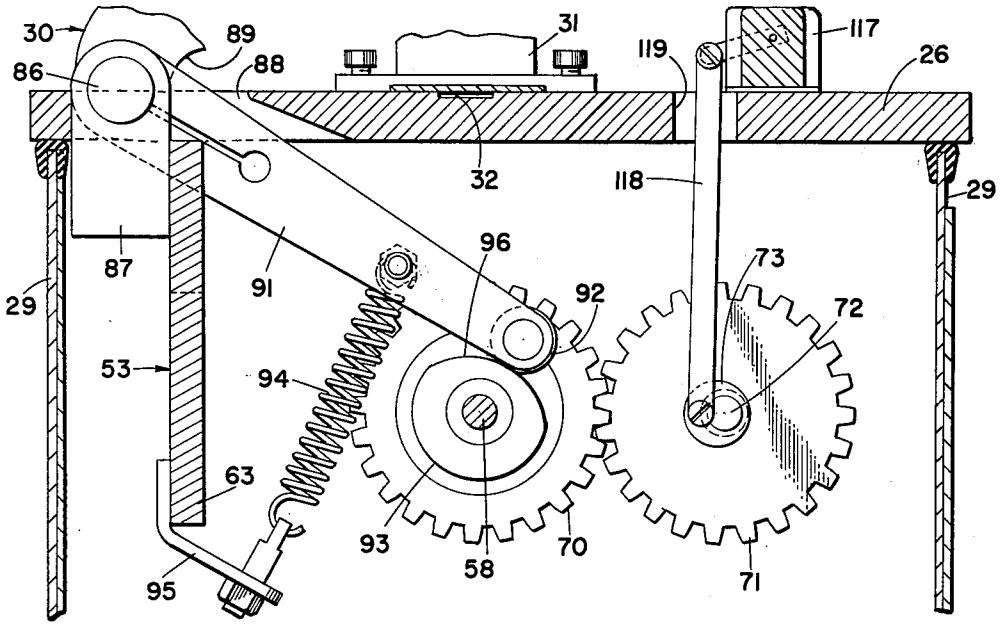
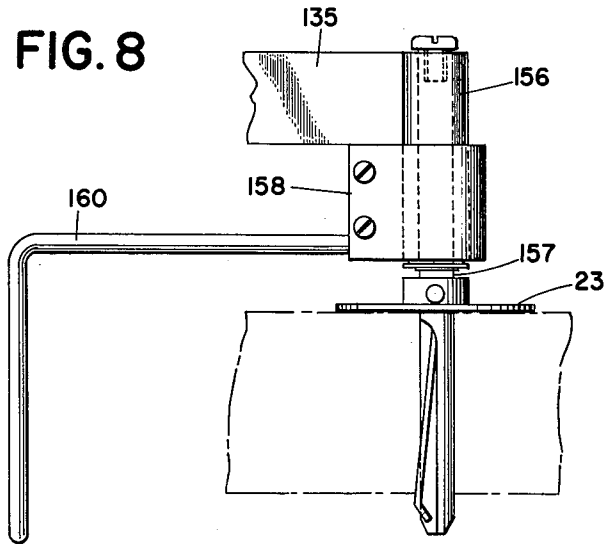


FIG. 7

FIG. 8



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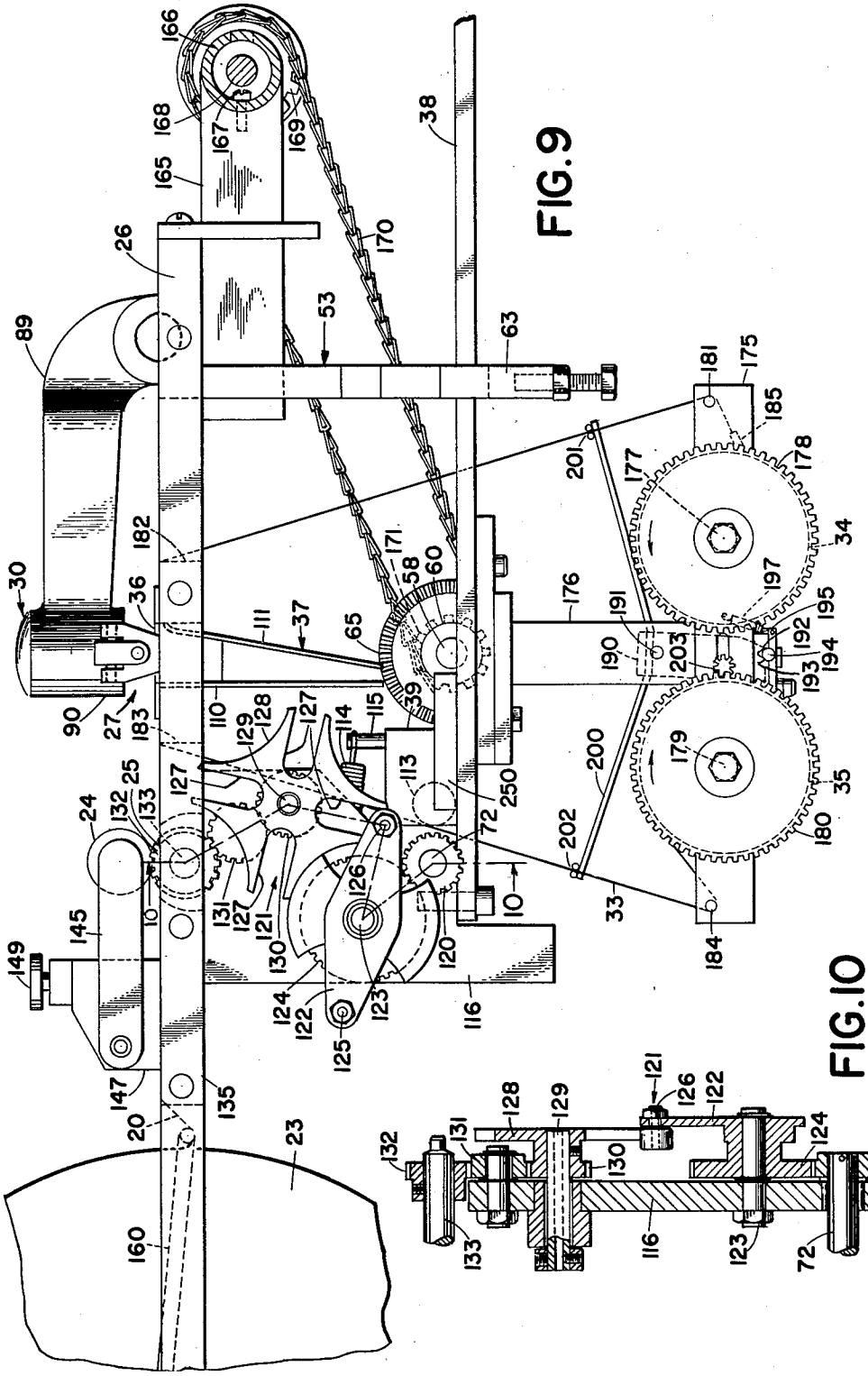


FIG. 9

FIG. 10

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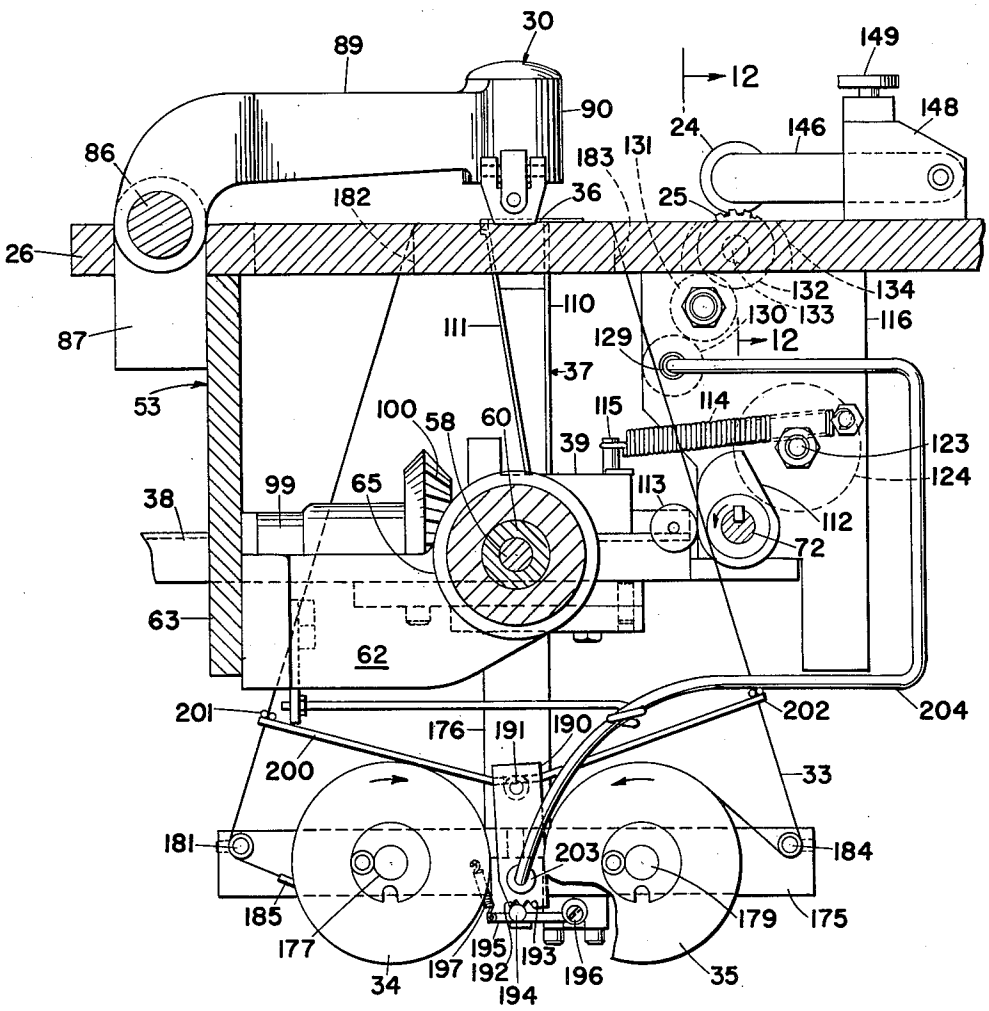


FIG. 11

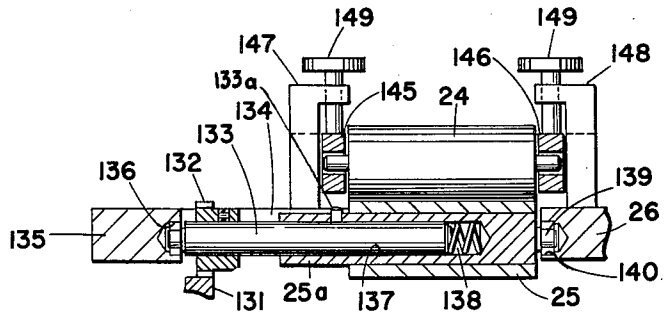


FIG. 12

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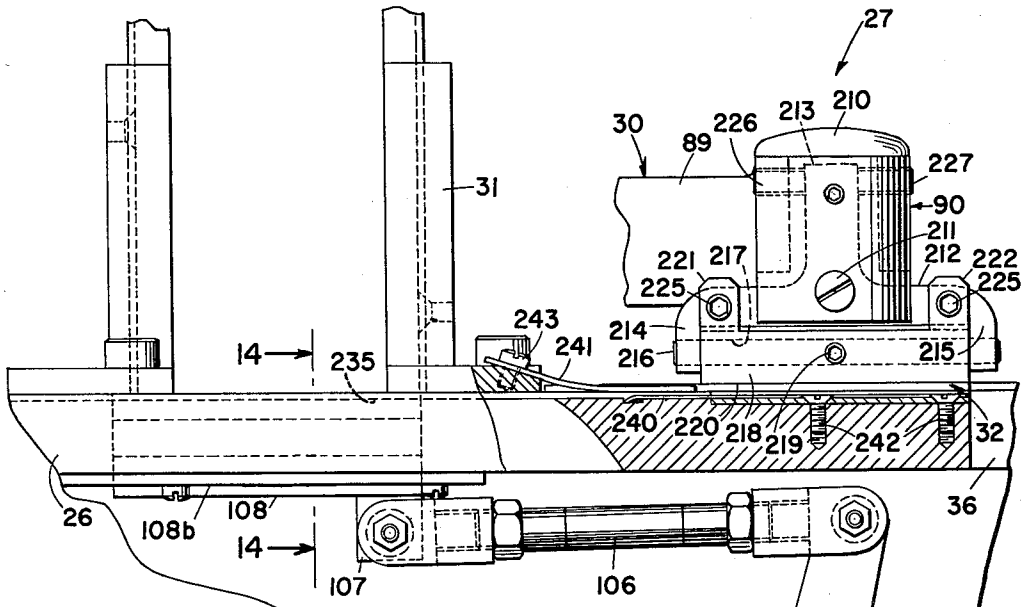
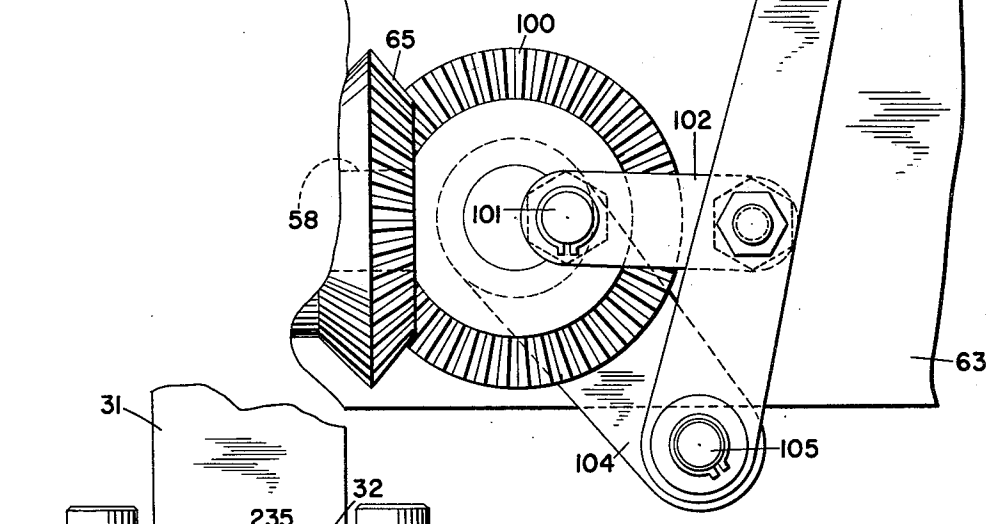


FIG. 13



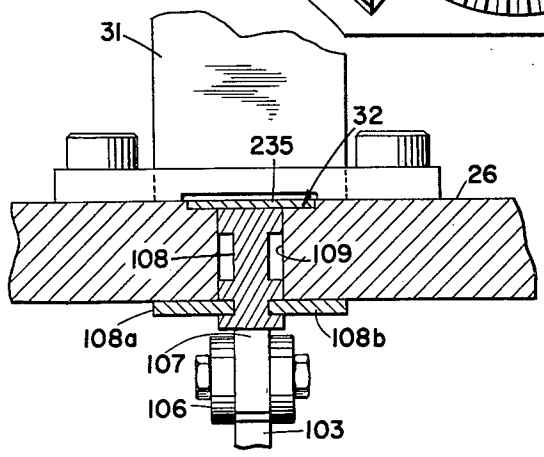


FIG. 14

United States Patent Office 3,044,395 Patented July 17, 1962

3,044,395

PRINTING MACHINES

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Filed Oct. 18, 1960, Ser. No. 63,435
26 Claims. (Cl. 101—65)

This invention relates to printing machines and more particularly to such machines of the type which are adapted to make printed impressions from a series of printing devices sequentially advanced through the machine.

Printing machines of the type to which the present invention is directed, while of general application, are particularly suited for printing information, such as a series of names and addresses, for example, on a continuous web of paper or other material. The various printing devices illustratively may comprise small rectangular plates which bear appropriate indicia representative of the information to be printed. These plates are stored in a suitable storage magazine and, together with the web of material, are led in step by step fashion to a printing location on the machine. An impression hammer or like device is disposed adjacent the printing location, and inking means, such as an inked ribbon, for example, is also provided at this location. Operation of the impression hammer is adapted to create an inked impression on the adjacent portion of the web corresponding to the information contained on the particular printing device which is at the printing location at the time the impression hammer is operated.

Heretofore, in the use of such machines, difficulties have been encountered in properly coordinating the various machine operations. Thus, for example, it is desirable that the printing devices, as well as the web of material and the inking means, remain at rest during operation of the impression hammer in order to avoid damaging the devices, smudging the printed impressions, etc., and many of the previous machines of this type have been found to be deficient in this respect. Also, primarily because of the construction and arrangement of the various parts, the machines heretofore employed frequently could not be operated at a sufficient speed for many applications.

One general object of this invention, therefore, is to provide a new and improved printing machine which is particularly adaptable for making printed impressions from a series of printing devices sequentially advanced through the machine.

More specifically, it is an object of this invention to provide such a machine in which the timed relationship between the various machine operations is accurately controlled.

Another object of this invention is to provide a printing machine of the character indicated which can be operated at a rapid rate.

Still another object of the invention is to provide a printing machine utilizing comparatively simple mechanical elements, which machine is economical to manufacture and thoroughly reliable in operation.

In one illustrative embodiment of the invention, there is provided a machine for making printed impressions from a series of printing devices on a continuous web of material. The web of material is drawn intermittently along a first path to a printing location, and the various printing devices are led to the printing location along a second path and are disposed adjacent one surface of the web. An impression hammer or other impression means is located at the printing location adjacent the opposite surface of the web and is adapted to urge successive portions of the web against the successive printing devices to thereby form a series of printed impressions on the web. The arrangement is such that the printing operation takes place only when the printing devices and the web are at rest. An inked ribbon also is disposed at the printing location and is movable with respect thereto, and means is provided for assembling and stacking the printing devices after use.

In accordance with one feature of this invention, changes in the timed relationship between various machine operations, such as between the feed of the printing devices and that of the web, for example, are effective to automatically shut down operation of the machine. In this manner, the deleterious effects of such changes, such as injury to the printing devices or to other parts of the machine, smudging or smearing of the printed impressions, etc., are avoided.

In accordance with another feature of the invention, in certain particularly advantageous embodiments, the inked ribbon is advanced simultaneously with the web of material, and means is provided for automatically reversing the direction of movement thereof as it approaches the end of its travel. As a result, a fresh supply of ink is maintained at the printing location, and unusually clear printed impressions on the web of material are insured.

In accordance with a further feature of the invention, in a preferred embodiment, the mechanisms employed to advance the web of material, the printing devices and the ribbon are of unique construction and insure the positive yet intermittent movement thereof.

The present invention, as well as further objects and features thereof, will be understood more clearly and fully from the following detailed description of a preferred embodiment thereof, when read in conjunction with the accompanying drawings, in which:

FIGURE 1 is a perspective view, partially broken away for convenience, of a printing machine constructed in accordance with a preferred embodiment of the invention;

FIGURE 2 is a top plan view of the machine with certain parts shown in section and others broken away;

FIGURE 3 is also a top plan view of the machine but with certain parts removed and others shown in section to illustrate details of the internal construction;

FIGURE 4 is a further top plan view of the machine with certain parts removed to illustrate additional details of the internal construction;

FIGURE 5 is an enlarged vertical sectional view taken along the line **5—5** in FIGURE 4;

FIGURE 6 is a sectional view taken along the line **6—6** in FIGURE 5;

FIGURE 7 is a vertical sectional view taken generally along the line **7—7** in FIGURE 3, with certain parts omitted for purposes of clarity;

FIGURE 8 is a top plan view of a portion of the construction adjacent the upper end of FIGURE 2;

FIGURE 9 is a side elevational view of the machine, as viewed along the line **9—9** in FIGURE 3, with certain parts omitted for purposes of clarity;

FIGURE 10 is a detail view in vertical section taken along the broken line **10—10** in FIGURE 9;

FIGURE 11 is a vertical sectional view taken generally along the line **11—11** in FIGURE 3;

FIGURE 12 is a fragmentary sectional view taken along the line **12—12** in FIGURE 11;

FIGURE 13 is a view, partially in section and partially in elevation, taken generally along the line **13—13** in FIGURE 4; and

FIGURE 14 is a fragmentary sectional view taken along the line **14—14** in FIGURE 13.

Referring to the drawings, there is shown a printing machine which is adapted to make printed impressions on an elongated tape **20** of paper or similar material from

a series of rectangular printing plates 21. In the illustrated embodiment of the invention, the plates 21 advantageously are fabricated from a relatively rigid material, such as metal, and each bears appropriate embossed indicia representative of the information to be printed. Thus, for example, the plates 21 may contain the names and addresses of newspaper subscribers, and upon the completion of the printing operation, the separate printed impressions on the tape 20 may be severed from the others to thereby form a series of labels to be applied to copies of the newspaper for mailing purposes.

General Operation

In order to facilitate the detailed description of the printing machine shown in the drawings, there will first be given a discussion of the general mode of operation of the machine. That is, before describing in detail the construction and arrangement of the various parts of the machine, a brief description will be given of its overall function in making inked impressions of the printing devices 21 on the paper tape 20.

The tape 20 (FIGURES 1 and 9) is stored on a supply reel or spool 23 adjacent one side of the machine and is intermittently advanced by a pair of feed rollers 24 and 25 along the upper surface of a table 26 to a printing location indicated generally at 27. From the printing location, the tape is led to a take-up reel or spool 28 adjacent the opposite side of the machine. Side panels 29 depend from the table 26 and serve to provide an enclosed cabinet for various machine components, as will become more fully apparent hereafter.

Simultaneously with the advance of the tape 20, an impression hammer 30 is raised, and the lowermost printing plate 21 in a vertically disposed storage magazine 31 is advanced toward the printing location 27 along a horizontal guideway 32. The guideway 32 defines a feed path for the printing plates and extends in a direction substantially transverse to that of the tape and beneath the latter. As each printing plate moves from magazine 31 along the guideway 32, a preceding plate in the guideway is urged into position at the printing location.

As best shown in FIGURES 9 and 11, an inked ribbon 33 is mounted on a pair of ribbon spools 34 and 35 positioned beneath the table 26. The ribbon extends from one of these spools to the upper surface of the table, where it is disposed immediately beneath the portion of the tape 20 at the printing location 27 and above the advancing plates 21 in the guideway 32. The ribbon is rewound around the other spool and is intermittently advanced each time the plates 21 and the tape 20 move forward.

As the tape 20, the printing plates 21 and the inked ribbon 33 come to rest, the impression hammer 30 is lowered and is pressed against the upper side of the tape which is in turn pressed against the inked ribbon, and the latter is pressed against the printing plate at the printing location 27, thus making an inked impression on the tape of the information contained on the printing plate. The hammer 30 is then raised, and as the web 20, the printing plates 21 and the ribbon 33 are again advanced, the printing plate previously beneath the hammer is urged along the guideway 32 to an opening 36 in the upper surface of the table 26, and a new printing plate 21 is introduced into guideway 32 from the magazine 31.

As each printing plate 21 drops through the opening 36, a discharge chute 37 translates the plate from a horizontal to a substantially vertical position. The downward motion of the plate is arrested by a horizontally disposed outfeed tray 38 in which is positioned a reciprocally movable pusher member 39. The member 39 engages each printing plate as it drops onto the tray 38 and urges it outwardly along the tray in stacked relationship with the preceding plates.

A detailed description of the machine will now be set forth:

Drive Mechanism

As best shown in FIGURE 3, a pinion 50 is rotatably mounted on a stub shaft 51 which extends in a direction parallel to the printing plate feed path and is affixed to one leg 52 of a horizontally disposed, L-shaped frame member 53 depending from the under surface of table 26. A pulley 54 is fixedly secured to the pinion 50 and cooperates with a V-belt 55 which is adapted to be driven at a constant speed by a second pulley (not shown) mounted on the drive shaft of a suitable power source, such as an electric motor 49.

The pinion 50 is in meshing engagement with a spur gear 56 rigidly positioned on a bushing 57 which is keyed or otherwise affixed to an elongated drive shaft 58 intermediate the ends thereof. One end of the shaft 58 extends outwardly through the frame member leg 52 and the adjacent side panel 29 and is provided with a hand wheel 59, while the opposite, inner end of this shaft is disposed beneath the central portion of the table 26 and carries a sleeve 60. This sleeve is adapted to rotate with the shaft 58 and is secured thereto by a pin (not shown) or by other suitable means. Roller bearings 61 are disposed around a portion of the sleeve 60 and ride in a journal surface provided in one end of an elongated bracket 62 which serves as a support for the inner end of the drive shaft. The bracket 62 extends in a direction parallel to that of the leg 52 of the L-shaped frame member 53 and is affixed at its opposite end to the other leg 63 of this frame member.

Rotatably positioned on the remaining, inwardly extending portion of the sleeve 60 is a bevel gear 65. During normal operation conditions, the gear 65 is adapted to rotate with the sleeve and is normally prevented from slipping with respect thereto by a wedge shaped member 66 disposed in a radial aperture 67 in the shank portion of the bevel gear. A coil spring 68 in aperture 67 urges the member 66 inwardly into a notch 69 in the sleeve. Upon excessive resistance to the turning of the gear 65, however, the member 66 will ride out of the notch 69 and permit the shaft 58 and sleeve 60 to rotate without rotating the gear 65, for purposes that will become more fully apparent hereafter.

A spur gear 70 is fixedly secure to the shank portion of the bevel gear 65 and is in meshing engagement with a second spur gear 71 of equal diameter which is keyed to an elongated shaft 72 adjacent one end thereof. The shaft 72 extends to the left, as viewed in FIGURE 3, in a direction parallel to the drive shaft 58 and the stub shaft 51, and under normal operating conditions is driven at a constant speed by the spur gears 70 and 71.

As best shown in FIGURES 4 and 5, an eccentric 73 is fixedly secured to the end of the shaft 72 adjacent the gear 71 and is adapted to rotate in an aperture 74 in one end of an elongated plate 75 positioned between and extending transversely of the shaft 72 and the drive shaft 58. The opposite end of the plate 75 is bifurcated to form a recess 77 which cooperates with an eccentric 78 affixed to the drive shaft. The throw of the eccentric 78 is the same as that of the eccentric 73, and the shafts 58 and 72 are oriented such that the geometric centers of the eccentrics 73 and 78 extend in the same direction from the axes of their respective shafts. An elongated fixed plate 80 is disposed parallel with and adjacent to the plate 75 and has end portions 79 surrounding the shafts 58 and 72. The plate 80 is rigidly secured at the end thereof adjacent the shaft 58 to the support bracket 62, as by machine screws 81.

Positioned between the shafts 58 and 72 adjacent the plates 75 and 80 and disposed transversely thereof is a microswitch 82. The switch 82 includes a pair of normally closed contacts 104 and 105 respectively connected to two conductors 106 and 107 which are in turn con-

nected (by means not shown) in series with the power supply circuit for the drive motor 49 (FIGURE 3). Switch 82 is mounted on the plate 80 intermediate its ends and includes a tapered pin 83 which controls the switch contacts and is positioned at a point equidistant from the axes of the shafts 58 and 72. This pin is reciprocally movable in a direction normal to the plates 75 and 80 and is spring biased toward a pair of apertures 84 and 85 respectively disposed in these plates. The apertures 84 in the plate 75 is in the form of a narrow slot of beveled, V-shaped cross-section (see FIGURE 6), while the aperture 85 in plate 80 is of circular configuration. The switch pin 83 extends through the aperture 85 and partially into the aperture 84, and in the position shown in FIGURE 6, the tapered end of the pin just clears the bevelled edges of this latter aperture.

During normal operation of the machine, the shafts 58 72 are continuously rotated in opposite directions at the same speed. Thus, the electric motor 49 (FIGURE 3), the V-belt 55, the pinion 50 and the spur gear 56 drive the main drive shaft 58 in a clockwise direction, as viewed in FIGURE 5, to similarly rotate the bevel gear 65 and its attached spur gear 70. The spur gear 70 rotates the meshing spur gear 71 to drive the shaft 72 in a counterclockwise direction, as viewed in this figure. The eccentrics 73 and 78 on the respective shafts 72 and 58 likewise normally rotate in opposite directions at the same speed, with the result that a pivoting motion is imparted to the plate 75 about the axis of pin 83 which is at a point equidistant from the axes of these shafts. The switch pin 83 at this point thereby remains stationary with its tapered end disposed to its maximum extent in the aperture 84, and the contacts 104 and 105 remain in their normally closed position.

As will become more fully apparent hereafter, the bevel gear 65 on the drive shaft 58 is adapted to control the intermittent advance of the printing plates 21 (FIGURE 1) along the guideway 32 from the magazine 31 to the discharge opening 36, while the shaft 72 controls the intermittent feed of the tape 20, the advance of the inked ribbon 33 and the operation of the pusher member 39 to stack the printing plates as they drop onto the tray 38. In the event of any change in the predetermined timed relationship between these various functions, the microswitch 82 is effective to shut down operation of the machine. Thus, for example, should one or more of the printing plates 21 become jammed as it is led from the magazine 31 to the discharge opening 36, the resulting increase in the resistance to the torque transmitted by the bevel gear 65 causes the wedge-shaped member 66 (FIGURE 3) to become disengaged from the notch 69 in the sleeve 60. The bevel gear 65 and the attached spur gear 70 begin to slip with respect to the sleeve 60 and the shaft 58, and the speed of the spur gear 71, the shaft 72 and the eccentric 73 decreases relative to that of the shaft 58 and the eccentric 78. As a result, the elongated plate 75 mounted on the eccentrics 73 and 78 oscillates about a point other than its normal pivot point midway between the axes of the shafts 58 and 72, and the microswitch pin 83 is forced by the bevelled edge of aperture 84 from its position in the plate and moves to the right, as viewed in FIGURE 6, to thereby open the microswitch contacts 104 and 105 and shut off the motor 49.

Similarly, in the event that one or more of the printing plates 21 on the outfeed tray 38 jam as they are stacked by the pusher member 39, the resistance to the torque transmitted by the shaft 72 increases and slippage occurs between the bevel gear 65 and the sleeve 60 on the shaft 58. As a result, the speed of the shaft 72 is reduced, and the plate 75 is effective to actuate the microswitch 82 and thereby shut down operation of the machine.

The arrangement is such that the microswitch pin 83 senses any change in the relative speed or angular position of the shafts 58 and 72 and is thereupon effective to arrest the operation of the machine. Upon the shutting off of the motor 49, the machine operator repositions the jammed printing plates or makes other appropriate corrections, and the hand wheel 59 is then rotated until the wedge-shaped member 66 again is disposed in the notch 69 and the shafts 58 and 72 are in proper angular relationship with each other. The rotation of the shafts 58 and 72 is then continued under the control of the motor 49 in the manner described heretofore.

Hammer Control Mechanism

As best shown in FIGURES 2 and 7, the impression hammer 30 is mounted on a rock shaft 86 which is pivotally supported at its ends by brackets 87. The brackets 87 each extend through an aperture 88 in the table 26 adjacent the outfeed side of the machine and are secured to the leg 63 of the L-shaped frame member 53. Rigidly affixed adjacent one end of the rock shaft 86 is an elongated hammer arm 89 which extends upwardly at an angle with respect to the table 26 and is also bent in a diagonal direction, as viewed in FIGURE 2, toward the printing location 27. An impression head 90 is formed at the outer end of the arm 89 and is disposed above the portion of the tape 20 at the printing location. The head 90 has a length parallel to the guideway 32 equal to the length of the matter to be printed from each of the plates 21.

One end of an elongated follower arm 91 (FIGURE 7) is fixedly secured to the rock shaft 86 at the end thereof opposite that affixed to the hammer arm 89. The arm 91 extends downwardly through the aperture 88 at an angle with respect to the table 26, and the lower end of this arm carries a pin or roller cam follower 92 which rides on an impression hammer operating cam 93 keyed to the shaft 58 on the side of bracket 62 (FIGURE 3) opposite that adjacent the bevel gear 65. The follower 92 is maintained in engagement with its cam 93 by a coil spring 94 having one end fixedly secured intermediate the ends of the follower arm 91 and the other end connected to a fixed bracket 95 depending from the leg 63 of the frame member 53.

The impression hammer operating cam 93 is circular over more than half its periphery but includes a portion 96 (FIGURE 7) of gradually decreasing and then increasing radius. As the drive shaft 58 rotates, the follower 92 rides on the portion 96 and thus causes the spring 94 to rock the shaft 86 in a clockwise direction, as viewed in FIGURE 7, and thereby to urge the impression head 90 (FIGURE 1) downwardly into engagement with the portion of the paper tape 20 therebeneath. As a result of the tension in the coil spring 94, the impression head presses the tape forcibly into engagement with the inked ribbon 32, and this ribbon is in turn pressed against the printing plate 21 thereadjacent, thus making an inked impression on the portion of the tape above the ribbon. As the drive shaft 58 continues its rotation, the cam follower 92 rides onto the circular portion of the cam 93, and the impression head 90 is urged upwardly against the tension in the spring 94 to its elevated position.

As best shown in FIGURE 13, the impression head 90 includes an inverted, cup-shaped member 210 which is welded or otherwise affixed to the outer end of the hammer arm 89. A stud 211 extends through the lower portion of the member 210 in a direction transverse to the guideway 32 and pivotally accommodates an impression yoke 212 having an upright shank portion 213 disposed within the member 210 and two end portions 214 and 215 extending downwardly on either side thereof. The end portions 214 and 215 are connected by a shaft 216 which is positioned in an elongated bore 217 in an impression pad 218 and is normally maintained in fixed relationship with respect to the impression pad by set screws 219. The pad 218 is supported between the end portions 214 and 215 and includes a rectangular impression surface 220 which is disposed directly above the

guideway 32 at the printing location 27 in a plane parallel to that of the printing plate thereat.

Four lugs 221, 222, 223 and 224 (FIGURES 2 and 13) extend upwardly from the corners of the impression pad 218 and are each provided with a set screw 225 which is disposed in a direction transverse to that of the guideway 32. These set screws contact the adjacent portions of the yoke 212 and serve to maintain the pad 218 in fixed relationship therewith during operation of the machine. In addition, the cup-shaped member 210 includes set screws 226 and 227 adjacent its upper end which extend inwardly in contact with the shank portion 213 of the yoke 212 and prevent the yoke from pivoting about the stud 211. These screws are in axial alignment with each other and are substantially parallel with the guideway 32.

In order to insure that the surface 220 of the impression pad 218 at all times extends in a plane parallel to that of the printing plate at the printing location 27, the various set screws in the impression head 90 provide a ready adjustment of the position of this surface. Thus, for example, should the impression surface become tipped slightly in a longitudinal direction, one of the set screws 226 and 227 is tightened while the other is loosened to thereby pivot the yoke 212 about the stud 211 and return the surface 220 to its position parallel to the plate at the printing location. In cases where the impression surface is tipped in a transverse direction, the set screws 219 are loosened, and the various set screws 225 are adjusted to rotate the impression pad 218 about its shaft 216 and restore the surface 220 to its initial position. With this arrangement, the particular location of the impression surface 220 is quickly and easily controlled by the various set screws to insure that the surface 220 is in its proper position.

The head 90 of the impression hammer 30 is adapted to form a printed impression on the paper tape 20 during each revolution of the constantly rotating drive shaft 58. If desired, the number of these printed impressions may be counted by determining the number of revolutions of the shaft 72, and hence the drive shaft 58, during each period of operation of the machine. Thus, as best shown in FIGURES 2 and 7, a counter 117 is mounted on the table 26 immediately above the end of the shaft 72 to which the spur gear 71 is secured. One end of an elongated link 118 is affixed to the eccentric 73 at this end of shaft 72, and the link extends upwardly through a suitable aperture 119 in the table and is affixed at its opposite end to the counter 117. As the shaft 72 rotates, the eccentric 73 moves the link 118 in a substantially vertical direction to thereby record the number of printed impressions made on the tape 20.

Printing Device Feed

Journalled on a stud 99 extending laterally from the leg 63 (FIGURES 3 and 4) of the L-shaped frame member 53 is a bevel gear 100 which is in meshing engagement with the bevel gear 65 on the sleeve 60 of drive shaft 58. As best shown in FIGURE 13, an eccentric pin 101 is affixed to the face of the gear 100, and pivotally connected with this pin is one end of connecting rod 102. The opposite end of the rod 102 is pivotally secured intermediate the ends of an elongated arm 103 which extends in a substantially vertical direction and is connected at its lower end to a fixed anchor plate 104 by means of a pin 105. The plate 104 is welded or otherwise affixed to the stud 99 (FIGURE 4).

A horizontally disposed turnbuckle 106 is secured at one end to the free end of the arm 103 and at the other end to a depending lug 107 of a shuttle 108. This shuttle is reciprocally movable in an elongated aperture 109 (FIGURE 14) which extends through the table 26 beneath the portion of the guideway 32 immediately below and on the outfeed side of the upstanding storage magazine 31. As best shown in FIGURES 1 and 2, the guideway comprises an elongated groove in the upper surface of the table 26 which extends from the side of the machine adjacent the hand wheel 59, beneath the storage magazine 31 and the head 90 of the impression hammer 30 to the discharge opening 36.

A pair of parallel plates 108*a* and 108*b* (FIGURE 14) are affixed to the under surface of the table 26 on either side of the aperture 109, and the inner edges of these plates are disposed in mating grooves in the shuttle 108 to guide the shuttle as it reciprocates in the aperture. The upper surface of the shuttle is provided with an elongated plate 235 which is slidably positioned in the guideway 32. In its retracted position, the plate 235 is disposed in the portion of the guideway between the storage magazine 31 and the hand wheel 59, while this plate in its advanced position (the position shown in FIGURE 13) is located directly beneath the magazine 31.

During the initial portion of each revolution of the drive shaft 58 and the bevel gear 65, the rotating bevel gear 100 is effective to move the connecting rod 102 to the position shown in FIGURE 13, thus causing the arm 103 to pivot in a clockwise direction about the pin 105 to thereby draw the turnbuckle 106 and the attached shuttle 108 toward the printing location 27. As the shuttle moves forward, the plate 235 affixed thereto is urged along the guideway 32 and engages the printing plate in the guideway immediately beneath the storage magazine 31. This printing plate is advanced along the guideway by the shuttle plate 235 and is urged between a pair of horizontally disposed leaf springs 240 and 241. The spring 240 is secured to the bottom of the guideway 32 by screws 242 and extends from beneath the printing location 27 toward the magazine 31, while the spring 241 is affixed at one end thereof to a portion of the magazine, as by screws 243, and its other end is spaced above the adjacent end of the spring 240. The printing plate between these springs pushes the preceding printing plates in the guideway to the right, as viewed in FIGURE 13, and the leading printing plate in guideway 32 is urged over the discharge opening 36 and drops down onto the outfeed tray 38 (FIGURE 9) while the immediately following printing plate is positioned at the printing location 27 beneath the impression hammer head 90. As the drive shaft 58 completes its revolution, the shuttle plate 235 is returned to its initial position and is withdrawn from beneath the lowermost printing plate in the magazine 31. This lowermost plate then drops into the guideway in position to be moved toward the printing location upon the next revolution of the drive shaft 58.

The printing plates 21 dropping through the opening 36 are received by the discharge chute 37 (FIGURE 9) which, as indicated heretofore, is adapted to translate the plates from a horizontal to a substantially vertical position. The chute 37 comprises two substantially flat members 110 and 111 which are affixed to the table 26 and extend downwardly therefrom. The member 110, which forms the left-hand wall of the chute, as viewed in FIGURE 9, is disposed in a vertical plane, while the member 111, which forms the right-hand wall of the chute, is canted slightly so that its lower end is spaced from the member 110 by a distance substantially less than the transverse dimension of a printing plate but greater than the thickness thereof, and its upper end is spaced from member 110 by a distance slightly greater than the transverse dimension of the plate. As each plate enters the chute 37, it strikes the member 111 and is oriented into a substantially vertical plane upon reaching the outfeed tray 38. The plate is maintained in this plane by the preceding plates stacked on the tray 38 and by a suitable gate 250 positioned adjacent the pusher member 39.

The pusher member 39 is reciprocally movable in the tray 38 and is adapted to pass through the gate 250 to urge each printing plate discharged from the chute 37 toward the outfeed end of the tray. The member 39 operates under the control of a cam 112 (FIGURE 11)

which is keyed or otherwise affixed to the shaft **72** at the end thereof opposite that carrying the spur gear **71**. A cam follower **113**, preferably in the form of a roller, is mounted adjacent the right-hand portion of the pusher member **39**, as viewed in FIGURE 11, and is maintained in abutting relationship with the cam **112** by a coil spring **114** affixed at one end to an upstanding pin **115** on the pusher member and at the other end to a bracket **116** depending from the under surface of the table **26**.

As indicated heretofore, the shaft **72** continuously rotates at a speed equal to that of the drive shaft **58**. The angular position of the cam **112** on shaft **72** is such that, at the time one of the printing plates **21** is discharged onto the tray **38**, the pusher member **39** is urged outwardly along the tray against the tension of the spring **114**. The outwardly moving pusher member engages this printing plate and moves all of the discharged plates along the tray **38** toward the outfeed side of the machine. The plates on the tray are thereby disposed in uniform, stacked relationship with each other. As the cam **112** continues its rotation, the pusher member **39** is returned to its initial position by the coil spring **114**.

Tape Feed

As best shown in FIGURES 9 and 10, a pinion **120** is affixed to the end of the shaft **72** adjacent the bracket **116** and is adapted to drive a Geneva mechanism **121** which intermittently drives the lowermost feed roller **25** to thereby advance the tape **20**. The mechanism **121** includes an elongated arm **122** which is rotatably mounted intermediate its ends on a stub shaft **123** supported by the bracket **116**. The arm **122** is adapted to be driven in a counterclockwise direction, as viewed in FIGURE 9, at half the angular speed of shaft **72** by a spur gear **124** which is integrally formed with said arm and is in meshing engagement with the pinion **120**. Studs **125** and **126** are respectively mounted at opposite ends of the arm **122** and carry rollers in position to alternately engage successive peripheral recesses **127** in a star wheel **128**. The wheel **128** is affixed to a stub shaft **129** journalled in the bracket **116** and is connected by means of an integrally formed spur gear **130** and an intermediate gear **131** to a spur gear **132** mounted adjacent one end of a shaft **133** which carries the lower feed roller **25**.

As best indicated in part in each of FIGURES 2 and 12, the feed roller **25** is positioned in a recess **134** in the table **26**, and this recess extends inwardly from the edge of the table to a point beyond the inner edge of the paper tape **20**. An elongated arm **135**, fixedly disposed along the specified edge of the table, is provided with an aperture **136** aligned with the recess **134** and is arranged to receive a bearing element for the reduced end of the feed roller shaft **133** to which is secured the spur gear **132**. The opposite end of the shaft **133** extends into an axial aperture **137** in one end of a cylindrical member **25***a* which forms a core for the roller **25** and is suitably affixed thereto. This end of shaft **133** abuts a coil spring **138** disposed in the aperture **137**. The shaft is secured to the member **25***a* by a set screw **133***a* adjacent the outer end thereof, while a pin or stud **139** is affixed to the opposite, inner end of the member **25***a* and is rotatably disposed in a mating bearing element **140** within a recess in the adjacent portion of the table **26**.

With this arrangement, the lower feed roller **25** can be quickly and easily removed for purposes of inspection, repair, etc., or in cases where it is desired to substitute a roller of different diameter therefor to vary the rate at which the tape is advanced and hence the spacing between successive printed impressions thereon. Thus, to remove the roller **25**, the screw **133***a* is loosened, and the roller **25** is moved to the left from the position shown in FIGURE 12, thereby compressing the spring **138** and disengaging the pin **139** of member **25***a* from its recess. The roller may then be lifted from its normal position and removed, after first removing the roller **24**, and an alternate feed roller substituted therefor.

The feed roller **24** is disposed immediately above the roller **25** and is supported between adjacent ends of two elongated arms **145** and **146** which extend horizontally in spaced, parallel relationship with respect to each other along the edges of the tape **20**. The ends of the arms **145** and **146** closest to the spool **23** and opposite to those supporting roller **24** are pivotally affixed to two support brackets **147** and **148**, respectively, which are mounted on the table **26**. Each of these support brackets is provided with an adjustment screw **149** which engages a compression spring (not shown) in contact with the corresponding arm **145** or **146** intermediate its ends. These springs urge the feed roller **24** downwardly and thereby firmly grip the tape **20** in the nip formed between this roller and the roller **25**.

Upon the rotation of the shaft **72** (FIGURE 9) in the manner described heretofore, the pinion **120** on this shaft rotates at a constant speed to similarly rotate the spur gear **124** and the arm **122** on the stub shaft **123**. The gear ratio between the pinion **120** and the spur gear **124** is such that the arm **122** is rotated one-half revolution for each revolution of the shaft **72**. During each of these half revolutions, one of the studs **125** or **126** engages the adjacent recess **127** in the star wheel **128** and rotates this wheel, along with its spur gear **130**, in a clockwise direction, as viewed in FIGURE 9, through a 90-degree arc. The lower feed roller **25** is also rotated in a clockwise direction by means of the gears **131** and **132**, and the paper tape **20** is thereby advanced from the infeed spool **23** to the printing location **27**. During the remaining portion of each revolution of the shaft **72**, the star wheel **128**, and hence the feed roller **25** and the tape **20**, remain at rest.

The elongated arm **135** serves as a support for the infeed spool **23** and extends along the edge of the table **26** on the side thereof adjacent the outfeed tray **38**. As best shown in FIGURE 8, a sleeve **156** is fixedly mounted on the projecting end of the arm **135**, and this sleeve extends transversely thereof and provides a journal for a shaft **157** to which is secured the spool **23**. Any suitable friction means may be provided to prevent turning of the spool **23** except in response to a predetermined pulling force applied to the tape by the feed rollers **24** and **25**. Disposed around the sleeve **156**, between the spool **23** and the arm **135**, is a leaf spring **158**. This spring is fastened at one end to the sleeve and at its other end to an L-shaped rod **160** (FIGURES 2 and 8). The portion of the rod **160** projecting from the spring **158** extends inwardly toward the table **26** in a direction parallel to the arm **135**, while the remaining portion of the rod is bent in a transverse direction and, as best shown in FIGURE 1, is disposed over the paper tape **20** between the spool **23** and the feed rollers **24** and **25**. The spring **158** exerts a slight downward pressure on the rod **160**, with the result that the transversely extending portion of the rod applies just enough tension to the portion of the tape between the spool **23** and the feed rollers to facilitate the movement of the roll of tape on the spool **23** and prevent the tape from becoming slack.

From the feed rollers **24** and **25**, the tape passes beneath the impression hammer **30** to the outfeed spool **28**. The spool **28** is supported by a bracket **165** (FIGURES 1 and 2) which extends outwardly from the end of the machine frame opposite that adjacent the infeed spool **23**. A transversely extending sleeve **166** is secured to the outer end of bracket **165**, as by a machine screw **167** (FIGURE 2), and this sleeve has journalled therein a shaft **168**. The spool **28** is secured to one end of the shaft **168**, while a chain sprocket **169** is mounted on the opposite end of this shaft. The sprocket **169** is connected by a driving chain **170** with the drive shaft **58** (FIGURES 3 and 9) through a sprocket **171** mounted on the drive shaft in abutting relationship with the impression hammer cam **93** (FIGURE 3). A spring member **172** is positioned on shaft **58** between the sprocket **171** and a spacer **173** keyed to the shaft, and urges the sprocket into frictional driving relation with respect to cam **93**. During the time the feed

rollers 24 and 25 are effective to advance the tape, the spring member 172 urges the sprocket 171 into frictional driving engagement with the cam 93 and thus causes the sprocket to rotate with the shaft 58, thereby driving the chain 170, the sprocket 169 and the shaft 168 to wind the tape 20 on the outfeed spool 28. When the feed rollers are at rest, however, the frictional force created by the spring member 172 on the sprocket 171 is insufficient to overcome the resistance by the tape to rotation of the outfeed spool, and slippage occurs between the sprocket 171 and the drive shaft 58. This slippage may also occur at other times, as when the tape building upon the spool 28 tends to create a greater take-up action on the tape than is permitted by the feed rollers.

Ribbon Control Mechanism

As best shown in FIGURES 9 and 11, the ribbon spools 34 and 35 are rotatably mounted on a horizontally extending arm 175 which is disposed beneath and slightly to one side of the outfeed tray 38 and is supported intermediate its ends by an upstanding bracket 176. A stub shaft 177 extends through the arm 175 on one side of the bracket 176 and carries the spool 34 with which is connected an axially aligned spur gear 178. Similarly, a stub shaft 179 is positioned in arm 175 on the opposite side of the bracket 176 and carries the spool 35 and a connected spur gear 180.

The inked ribbon 33 extends from the spool 34, around a pin 181 at the adjacent end of the arm 175 and then upwardly through an aperture 182 in the table 26 adjacent the printing location 27 and to one side of the guideway 32 (FIGURE 2). The ribbon then follows a path over the printing plate 21 at the printing location 27 but beneath the tape 20 at this point, and is then led through an aperture 183 in table 26 on the opposite side of the guideway, downwardly around a pin 184 at the end of arm 175 adjacent the spool 35 and then around this latter spool. A short flexible wire 185 or a clip is sewn or otherwise secured adjacent each end of the ribbon 33 (only the wire 185 adjacent the ribbon end affixed to the spool 34 being visible in FIGURES 9 and 11) and is so disposed with respect thereto as to project from one or both surfaces thereof.

Mounted on the upstanding bracket 176 is a vertically disposed plate 190. The upper end of this plate, as viewed in FIGURE 11, is pivotally affixed to the bracket 176 by a pin 191, and the plate extends downwardly between the spools 34 and 35 and is provided with two notches 192 and 193 along its lower edge. A detent 194 is disposed in the notch 192, when the ribbon is being fed in the direction indicated in FIGURES 9 and 11, and is supported intermediate the ends of a detent arm 195 which is pivotally secured at one end to the arm 175, as at 196, and has connected to it at the other end one end of a coil spring 197. The opposite end of spring 197 is affixed to the arm 175.

An elongated member 200, in the form of a spring wire or flat spring element, is secured to the pin 191 and is rigidly attached by the latter, intermediate its ends, to the plate 190. The left end of the member 200, as viewed in FIGURE 11, is provided with a transverse slot or channel 201 in substantially vertical alignment with the pin 181 around which the adjacent portion of the ribbon 33 passes. Although this slot or channel is of a width sufficient to permit the ribbon to pass therethrough, it is smaller than the diameter of the wire 185 adjacent the end of the ribbon. In a similar manner, the right end of the wire member 200 is disposed over the pin 184 and includes a transverse slot or channel 202 of a width sufficient to receive the ribbon but insufficient to permit the adjacent wire 185 to pass therethrough.

Rotatably mounted on the plate 190, adjacent the lower end thereof, is a pinion 203. In the position shown in FIGURES 9 and 11, this pinion is in meshing engagement with the spur gear 180 for the spool 35 and is driven under the control of the star wheel shaft 129 by a flexible shaft 204 (FIGURE 11) connected therebetween. As indicated heretofore, the star wheel shaft intermittently drives the lower feed roller 25 through the gears 130, 131 and 132 to thereby advance the tape 20. Each time the tape moves forward, the flexible shaft 204 rotates the pinion 203 to thereby drive the spur gear 180, the shaft 179 and the spool 35 in a clockwise direction, as viewed in FIGURE 9, or in a counterclockwise direction, as viewed in FIGURE 11. The ribbon 33 intermittently unwinds from the spool 34 and is taken up by the spool 35, thus positioning a fresh portion of the ribbon over the guideway 32 at the printing station 27 prior to the making of each printed impression. Excessive turning of the spool 34, as the ribbon is withdrawn from it, may be prevented by appropriate frictional resistance.

As the ribbon 33 approaches the end of its travel, the wire 185 adjacent the end thereof connected with the spool 34 is drawn around the pin 181 and into engagement with the end of the spring member 200 having the slot 201. Upon continued movement of the wire 185, the spring member 200 flexes until such time as the force exerted thereon by the wire overbalances the holding force of the spring 197 on the detent arm 195. The spring member and the attached plate 190 then snap or pivot in a lockwise direction, as viewed in FIGURE 11, about the pin 191, and the pinion 203 disengages from the spur gear 180 for the spool 35 and moves toward the spur gear 178 for the spool 34. The detent 194 is forced out of the notch 192, and the left end of the detent arm 195 moves downwardly against the tension in the coil spring 197 until such time as the notch 193 is disposed above the detent. As the pinion 203 engages the spur gear 178, the spring 197 and the arm 195 urge the detent 194 into the notch 193 to thereby hold the pinion in its new position. Upon the intermittent rotation of the pinion 203 in this position, the direction of rotation of the spools 34 and 35, and hence the direction of movement of the ribbon 33, is reversed. That is, the pinion now drives the spool 34 in a clockwise direction, as viewed in FIGURE 9, or in a counterclockwise direction, as viewed in FIGURE 11, and the ribbon is taken up by this spool and is unwound from the spool 35.

In a similar manner, as the wire 185 in the end of the ribbon 33 adjacent the spool 35 contacts the end of member 200 having the slot 202, the member 200, the plate 190 and the pinion 203 return to the positions shown in the drawings, and the ribbon again is wound around the spool 35. With this arrangement, each time the ribbon approaches the end of its travel, its direction is automatically reversed, and it is intermittently fed over the guideway 32 in the opposite direction to thereby insure that a fresh supply of ink is maintained at the printing location 27 at all times.

It will of course be understood that the various gear ratios, the angular positions of the shafts 58 and 72, etc., are all synchronized in proper timed relationship. As indicated heretofore, any change in this relationship, which may be brought about by the jamming of a plate in the guideway 32, for example, is effective to actuate the microswitch 82 to thereby shut down operation of the machine.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions, of excluding any equivalents of the features shown and described, or portions thereof, it being recognized that various modifications are possible within the scope of the claims.

What is claimed is:

1. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means for advancing successive printing

devices from a supply thereof along a second path, said paths crossing at a printing location, impression means disposed adjacent said printing location, means including a power source for operating said first and second feeding means, to advance said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for operating said impression means, to thereby form a printed impression of matter appearing on the printing device at said location on the adjacent portion of said web, and means operatively associated with said first and second feeding means for shutting off said power source in response to a change in said timed relationship.

2. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means for advancing successive printing devices from a supply thereof along a second path, said paths crossing at a printing location, impression means disposed adjacent said printing location and movable between two extreme positions with said impression means in one of its said positions being spaced from the web of material and in the other of said positions being in engagement with the portion of said web at said location, means including a power source for operating said first and second feeding means, to advance said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and means operatively associated with said first and second feeding means for shutting off said power source in response to a change in said timed relationship.

3. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting at a printing location, impression means mounted for displacement between two extreme positions with said impression means in one of said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, means including a power source for operating said first and second feeding means, to advance said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and sensing means connected to said means for operating said first and said second feeding means, said sensing means being adapted to disconnect said power source in response to a change in said timed relationship.

4. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path to a printing location, second feeding means for advancing successive printing devices from a supply thereof along a second path to said location, each of said feeding means including an elongated shaft for controlling the same, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said printing location, means including a power source for rotating the shafts for said first and second feeding means, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and means operatively associated with said shafts for disabling said power source in response to a change in said timed relationship.

5. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path to a printing location, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path to said location, each of said feeding means including an elongated shaft for controlling the same, impression means mounted for displacement between two extreme positions, said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said printing location, means including a power source for rotating the shafts for said first and second feeding means, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and means positioned between said shafts for disabling said power source in response to a change in said timed relationship.

6. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means for advancing successive printing devices from a supply thereof along a second path, said paths intersecting to form a printing location, said first and said second feeding means respectively including a first and a second control shaft in spaced, parallel relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said printing location, means including a power source for rotating said first and second control shafts in opposite directions at a uniform speed, to control the advance of said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urgng said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and means operatively associated with said first and said second control shafts for disabling said power source in response to a change in the relative speed of said shafts.

7. In a machine of the character set forth in claim 6, outfeed means positioned along said second path on the

side of said printing location opposite that including said supply, said outfeed means being responsive to the rotation of said first control shaft for stacking the printing devices as they are led from said location.

8. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting at a printing location, the successive printing devices at said printing location being positioned adjacent one surface of said web, said first and second feeding means respectively including a first and a second control shaft in spaced, parallel relationship with each other, impression means mounted for displacement between two extreme positions, said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the opposite surface of said web at said location, means including a power source for normally continuously rotating said first and second control shafts in opposite directions at the same speed, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging the portion of said web thereadjacent toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said one web surface, and means connected between said first and said second control shafts for disabling said power source in response to a change in the relative speed of said shafts.

9. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting at a printing location, said first and said second feeding means respectively including a first and a second control shaft in spaced, parallel relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said printing location, means including a power source for rotating said first and second control shafts, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location in timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression of matter appearing on said device on said web portion, and means including normally closed contact means cooperating with said power source and with said first and said second shafts, said contact means being adapted to open to prevent delivery of power from said power source in response to a change in the relative speed of said shafts.

10. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting to form a printing location, said first and said second feeding means respectively including a first and a second control shaft normally rotated in predetermined angular relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said printing location, operating means including a power source for continuously rotating said first and second control shafts in predetermined angular relationship with each other, to thereby control the advance of said web and said successive printing devices along their respective paths toward said printing location, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward the printing device at said location to thereby form a printed impression from said device on said web portion, means connected with said shafts and given a predetermined normal movement upon rotation of said shafts, said last mentioned means being responsive to an increase in the resistance to movement of either said web or said printing devices which brings about a variation in the predetermined angular relationship between said shafts to partake of an abnormal movement, and means operated by said means connected with said shafts for disabling said power source in response to said abnormal movement of said last specified means.

11. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting at a printing location, the successive printing devices at said printing location being positioned adjacent one surface of said web, said first and second feeding means respectively including a first and a second control shaft rotatable in predetermined angular relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the opposite surface of said web at said location, means including a power source for normally continuously rotating said first and second control shafts in opposite directions in accordance with said predetermined angular relationship, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location and for thereafter operating said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging the portion of said web thereadjacent into engagement with the printing device at said location to thereby form a printed impression from said device on said one web surface, means mounted on said second shaft and responsive to an increase in the resistance to rotation of either of said shafts for enabling a variation in the predetermined angular relationship therebetween, and means including normally closed contact means cooperating with said power source and with each of said shafts, said contact means being adapted to open to prevent delivery of power from said power source in response to said variation in said predetermined angular relationship.

12. In a machine for making printed impressions from a series of printing devices on a continuous web of material, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said paths intersecting to form a

printing location, the successive printing devices at said printing location being positioned adjacent one surface of said web, said first and said second feeding means respectively including a first and a second control shaft rotatable in predetermined angular relationship with each other, each of said shafts extending in a direction parallel to said second path, impression means mounted for displacement between two extreme positions under the control of said second shaft, said impression means in one of said positions being spaced from said printing location and in the other of said positions being in engagement with the opposite surface of said web at said location, means including a power source for continuously rotating said first and second control shafts in opposite directions normally in accordance with said angular relationship, to thereby control the advance of said web and said successive printing devices along their respective paths to said printing location and to thereafter move said impression means from its said one position to said other position, said impression means in its movement from said one position to said other position urging the portion of said web thereadjacent toward the printing device at said location, to thereby form a printed impression from said device on said one web surface, means mounted on said second shaft and responsive to an increase in the resistance to rotation of either of said shafts for enabling a variation in the predetermined angular relationship therebetween, and means including a normally closed switch connected to said power source, eccentric means mounted on each of said shafts and a member operated by said eccentric means and cooperating with said switch, said member being adapted to open said switch in response to said variation in said predetermined angular relationship, to thereby disconnect said power source.

13. A machine of the character set forth in claim 12, in which said eccentric means includes a first eccentric affixed to one of said shafts and a second eccentric affixed to the other shaft, said member being mounted on said eccentrics and extending between said shafts, said eccentrics imparting a rocking motion to said member about a point intermediate said shafts.

14. A machine of the character set forth in claim 13, in which said switch includes actuating means disposed at said point about which said member rocks, a change in the location of said point due to a change in said predetermined angular relationship of the shafts serving to open said switch to thereby disconnect said power source.

15. A printing machine for making impressions from a series of printing devices on a continuous web of material, comprising, in combination, first feeding means for moving said web of material along a first path, second feeding means for advancing successive printing devices from a supply thereof along a second path, said first and second paths intersecting at a printing location, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, inking means including an inked ribbon disposed at said printing location, means positioned along said second path on the side of said printing location opposite that on which said supply is located, said last mentioned means being arranged to receive the printing devices as they are advanced from said location, means for supplying power to said first and second feeding means, to advance said web and said printing devices along their respective paths in predetermined timed relationship with each other, and for supplying power to said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward said inked ribbon and the printing device at said printing location, to thereby form a printed impression on said web portion from said printing device, and means operatively connected with said first and said second feeding means for disconnecting the supply of power in response to a change in said predetermined timed relationship.

16. A printing machine for making impressions from a series of printnig devices on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means for advancing successive printing devices from a supply thereof along a second path, said first and second paths intersecting at a printing location, impression means mounted for movement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, inking means including an inked ribbon disposed at said printing location, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located for receiving and assembling the printing devices as they are discharged from said location, said outfeed means being operatively associated with said first feeding means, means for supplying power to said first and second feeding means, to move said web along said first path, to advance said printing devices along said second path, and to operate said outfeed means to assemble said printing devices as they are discharged from said location, all in predetermined timed relationship with each other, and for supplying power to said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward said inked ribbon and the printing device at said location to thereby form a printed impression on said web portion from said printing device, and means connected to said first and to said second feeding means for disconnecting the supply of power in response to a change in said predetermined timed relationship.

17. A printing machine for making impressions from a series of printing devices on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said first and second paths intersecting at a printing location, the successive printing devices at said printing location being positioned adjacent one surface of said web, impression means mounted for movement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the opposite surface of said web at said location, inking means including an inked ribbon disposed at said printing location between said one surface of said web and the printing device thereadjacent, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located for stacking the printing devices as they are discharged from said location, said outfeed means being operatively connected with said first feeding means, means including a power source for operating said first and second feeding means, to move said web along said first path, to advance said printing devices along said second path and to stack said printing devices as they are discharged from said location, all in predetermined timed relationship with each other, and for thereafter operating said impression means, to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging the adjacent portion of said web against said inked ribbon to thereby form a printed impression on said web portion from the printing device at said location, and means cooperating wtih said power source and with said

first and second feeding means for disconnecting the supply of power from said source in response to a change in said predetermined timed relationship.

18. A printing machine for making impressions from a series of printing devices on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, side first and second paths intersecting at a printing location, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, inking means operatively connected with said first feeding means and including an inked ribbon having a portion disposed at said printing location, said ribbon being adapted for intermittent movement to present successive portions at said location, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located for stacking the printing devices as they are discharged from said location, said outfeed means being operatively connected with said first feeding means, means including a power source for operating said first and second feeding means, to advance said web and said printing devices along their respective paths, to move successive portions of said ribbon past said location and to stack said printing devices as they are discharged from said location, all in predetermined timed relationship with each other, and for thereafter operating said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward said inked ribbon and the printing device at said operating location, to thereby form a printed impression on said web portion from said printing device, and sensing means operatively associated with said first and said second feeding means for disconnecting the supply of power in response to a change in said predetermined timed relationship.

19. A printing machine of the character set forth in claim 18, in which said inking means includes means for automatically reversing the direction of movement of successive portions of said ribbon past said printing location.

20. A printing machine for making impressions from a series of printing devices on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means for advancing successive printing devices from a supply thereof along a second path, said first and second paths intersecting at a printing location, said first and said second feeding means respectively including a first and a second control shaft in spaced, parallel relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, inking means controlled by said first feeding means and including an inked ribbon having a portion disposed at said printing location, said ribbon being adapted for intermittent movement to present successive portions at said location, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located for stacking the printing devices as they are discharged from said location, said outfeed means being operatively connected with said first feeding means, means including a power source for rotating the control shafts for said first and second feeding means, to advance said printing devices along their respective paths, to move successive portions of said ribbon past said location and to stack said printing devices as they are discharged from said location, and for thereafter operating said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward said inked ribbon and the printing device at said location, to thereby form a printed impression on said web portion from said printing device, and sensing means connected to said first and second feeding means for disconnecting the supply of power in response to a change in the relative speed of rotation of said shafts.

21. A printing machine for making impressions from a series of printing plates on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing plates from a supply thereof along a second path, said first and second paths intersecting at a printing location, said first and said second feeding means respectively including a first and a second control shaft rotatable in predetermined angular relationship with each other, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the portion of said web at said location, inking means controlled by said first feeding means and including an inked ribbon having a portion disposed at said printing location, said ribbon being adapted for intermittent movement to advance successive portions to said location, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located for stacking the printing plates as they are discharged from said location, said outfeed means being operatively connected with said first control shaft, means including a power source for continuously rotating said first and second control shafts in accordance with said predetermined angular relationship, to thereby control the advance of said web and said printing plates along their respective paths, the movement of successive portions of said ribbon past said location and the stacking of said printing plates as they are discharged from said location, and for thereafter operating said impression means to move the same from its said one position to said other position, said impression means in its movement from said one position to said other position urging said web portion toward said inked ribbon and the printing plate at said location, to thereby form a printed impression on said web portion from said printing plate, means mounted on one of said shafts and responsive to an increase in the resistance to rotation of either of said shafts for enabling a variation in the predetermined angular relationship therebetween, and means operatively connected with said first and second shafts for disconnecting said power source in response to said variation in said predetermined angular relationship.

22. A printing machine for making impressions from a series of printing plates on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing plates from a supply thereof along a second path, said first and second paths intersecting at a printing location, the successive printing plates at said printing location being positioned adjacent one surface of said web, said first and said second feeding means respectively including a first and a second control shaft rotatable in predetermined angular relationship with each other, said shafts each extending in a direction parallel to said second path, impression means mounted for displacement between two extreme positions with said impression means in one of its said positions being spaced from said printing location and in

the other of said positions being in engagement with the opposite surface of said web at said location, inking means controlled by said first feeding means and including an inked ribbon having a portion disposed at said printing location between said one surface of said web and the printing plate thereadjacent, said ribbon being adapted for intermittent movement to present successive portions at said location, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located and responsive to rotation of said first control shaft for stacking the printing plates as they are discharged from said location, means including a power source for normally continuously rotating said first and second control shafts in opposite directions in accordance with said predetermined angular relationship, to thereby advance said web and said printing plates along their respective paths, to present successive portions of said ribbon at said location and to stack said printing plates as they are discharged from said location, all in timed relationship with each other, and for thereafter operating said impression means to move the same from its said one position to its said other position, said impression means in its movement from said one position to said other position urging the adjacent portion of said web against said inked ribbon, to thereby form a printed impression on said web portion from the printing plate at said location, means mounted on said second shaft and responsive to an increase in the resistance to rotation of either of said shafts for enabling a variation in the predetermined angular relationship therebetween, and means cooperating with said power source and with said first and second feeding shafts for disconnecting said source in response to said variation in said predetermined angular relationship.

23. A printing machine of the character set forth in claim 22, in which said inking means includes spool means rotatably driven under the control of said first feeding means for advancing said ribbon, and means automatically responsive to the approach of said ribbon to the end of its travel for reversing the direction of rotation of said spool means, to thereby reverse the direction of movement of successive portions of said ribbon to said printing location.

24. A printing machine of the character set forth in claim 22, in which said last-mentioned means includes a first eccentric affixed to one of said shafts, a second eccentric affixed to the other shaft, and an elongated member cooperating with said eccentrics and extending between said shafts, said eccentrics imparting a rocking motion to said member about a point intermediate said shafts, a change in the location of said point resulting from a change in said predetermined angular relationship.

25. A printing machine of the character set forth in claim 24, in which said last-mentioned means includes normally closed contact means in the connection from said power source and arranged to be operated by said elongated member, said contact means being operated to an open position to thereby disconnect said power source in response to a change in the location of said pivot point.

26. A printing machine for making impressions from a series of printing devices on a continuous web of material, comprising, in combination, first feeding means for intermittently moving said web of material along a first path, second feeding means spaced from said web for advancing successive printing devices from a supply thereof along a second path, said first and second paths intersecting at a printing location, the successive printing devices at said printing location being positioned adjacent one surface of said web, said first and said second feeding means respectively including a first and second control shaft rotatable in predetermined angular relationship with each other, each of said shafts extending in a direction parallel to said second path, impression means mounted for displacement between two extreme positions under the control of said second shaft, said impression means in one of its said positions being spaced from said printing location and in the other of said positions being in engagement with the opposite surface of said web at said location, inking means controlled by said first feeding means and including an inked ribbon having a portion disposed at said printing location between said one surface of said web and the printing device thereadjacent, said ribbon being adapted for intermittent movement to present successive portions thereof adjacent said location during the time said first feeding means is effective to advance said web, outfeed means positioned along said second path on the side of said printing location opposite that on which said supply is located and including a reciprocally movable pusher member controlled by said first shaft for stacking the printing devices as they are discharged from said location, means including a power source for rotating said first and second control shafts in opposite directions at the same speed, to thereby advance said web and said printing devices along their respective paths, to present successive portions of said ribbon at said location, to stack said printing devices as they are discharged from said location and to move said impression means from its said one position to its said other position, all in timed relationship with each other, said impression means in its movement from said one position to said other position urging the adjacent portion of said web against said inked ribbon, to thereby form a printed impression on said one web surface from the printing device at said location, means mounted on said second shaft and responsive to an increase in the resistance to rotation of either of said shafts for enabling a variation in the predetermined angular relationship therebetween, and means including a normally closed switch connected to said power source and including eccentric means mounted on each of said shafts for controlling the operation of said switch, said eccentric means being adapted to open said switch in response to a variation in said predetermined angular relationship between said shafts, to thereby disconnect said power source.

No references cited.