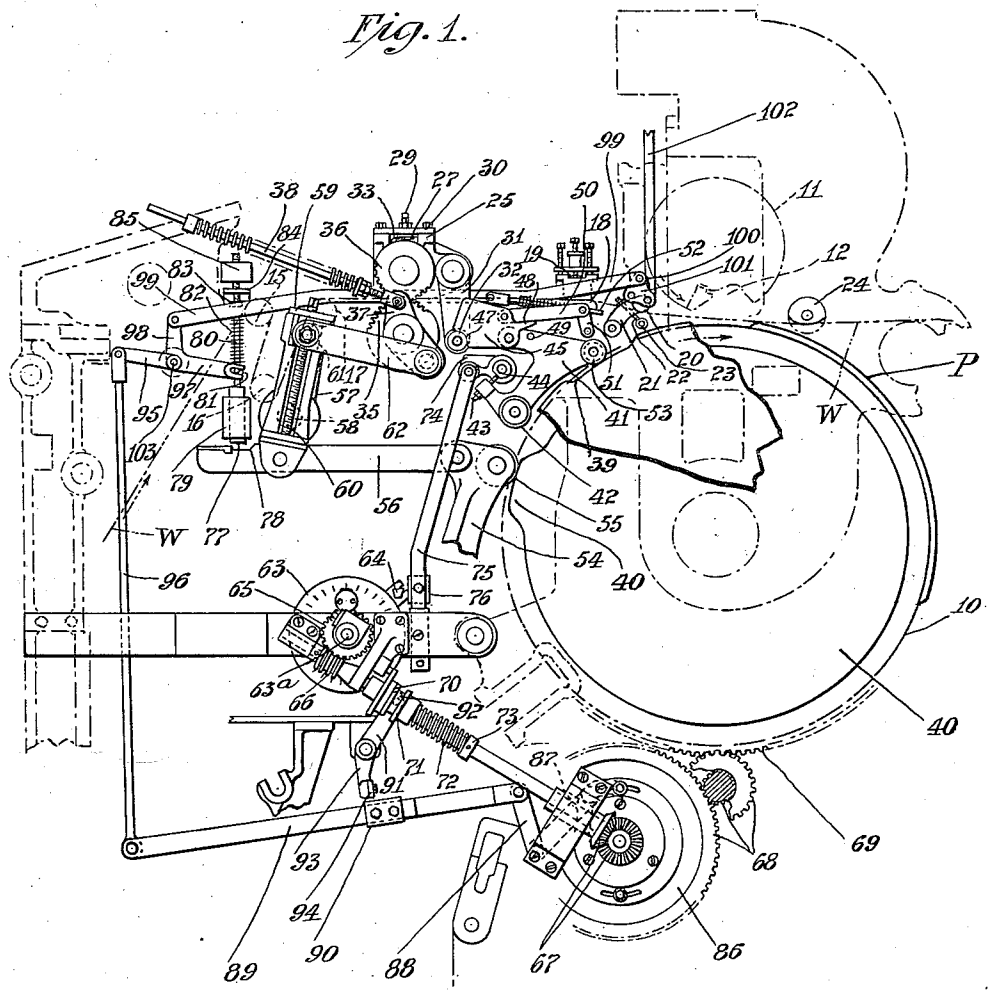
Sept. 1, 1936. F. C. MARQUARDT 2,052,638

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed Aug. 20, 1935 4 Sheets-Sheet 1

Fig. 1.



Frank C. Marquardt

INVENTOR

Frank T. Wentworth

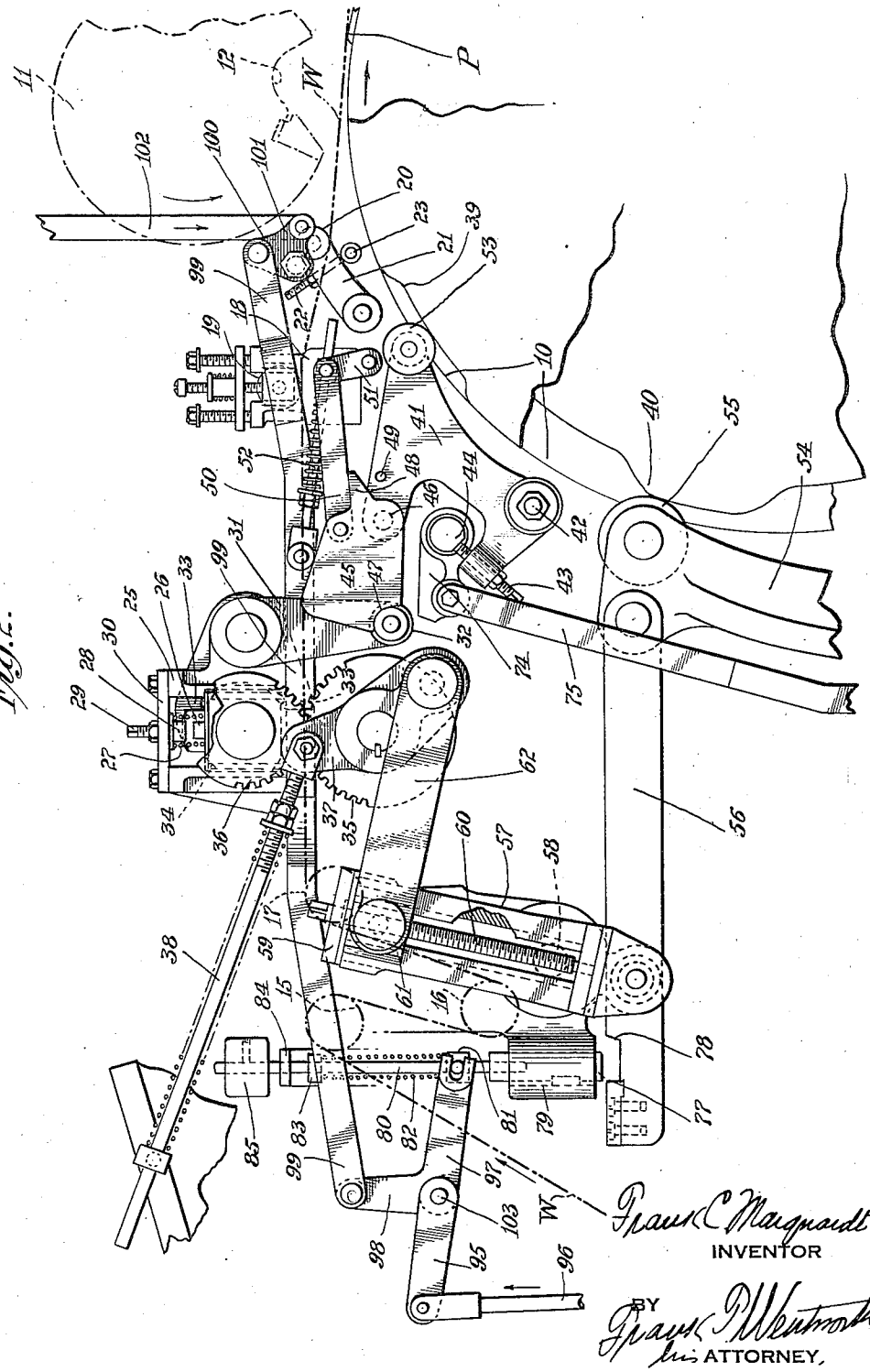
his ATTORNEY.

Sept. 1, 1936. F. C. MARQUARDT 2,052,638

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed Aug. 20, 1935 4 Sheets-Sheet 2

Fig. 2.



Frank C. Marquardt
INVENTOR

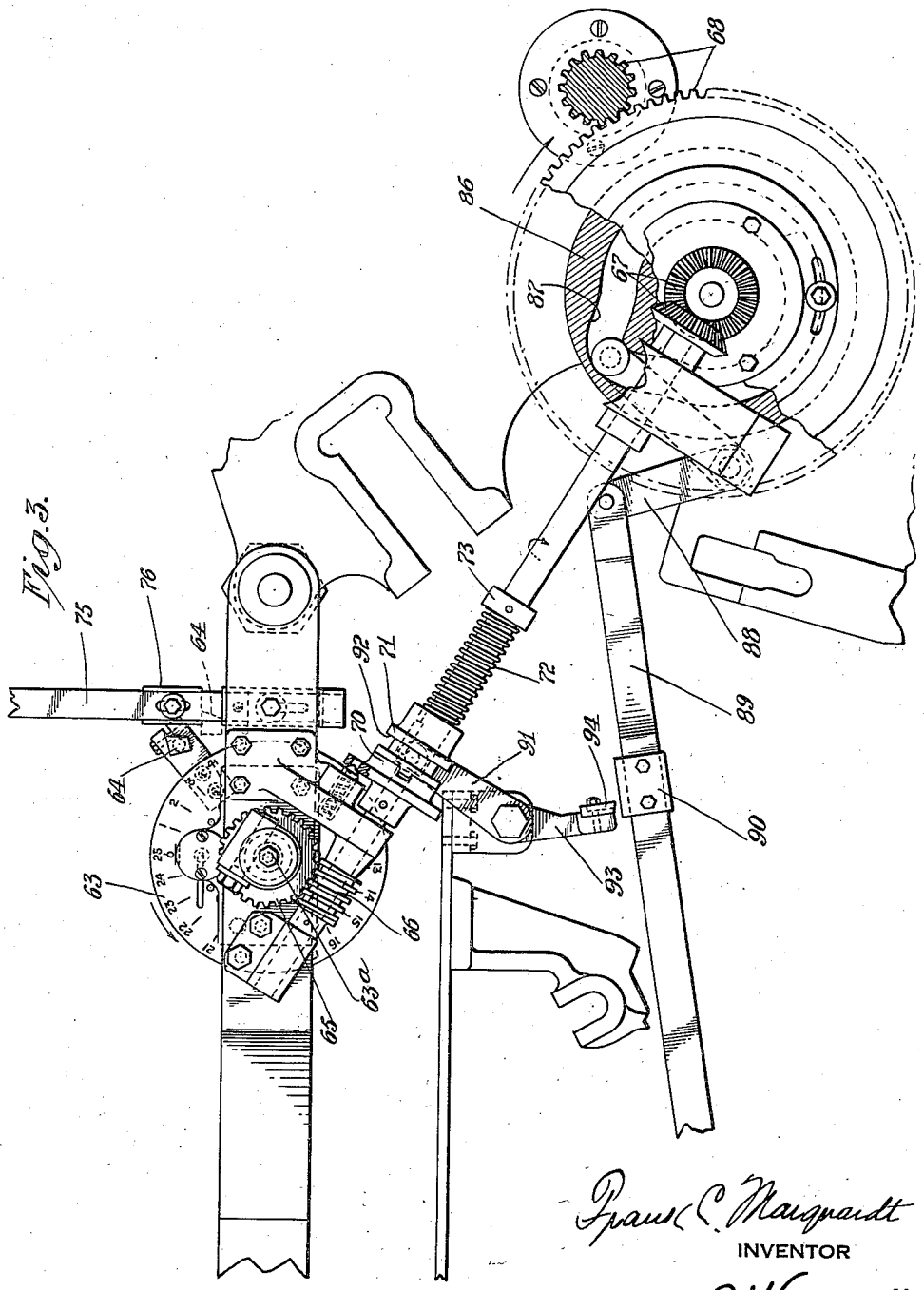
BY Frank P. Wentworth
his ATTORNEY.

Sept. 1, 1936. F. C. MARQUARDT 2,052,638

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed Aug. 20, 1935 4 Sheets-Sheet 3

Fig. 3.



Frank C. Marquardt
INVENTOR

BY Frank P. Wentworth
his ATTORNEY.

Sept. 1, 1936. F. C. MARQUARDT 2,052,638

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed Aug. 20, 1935 4 Sheets-Sheet 4

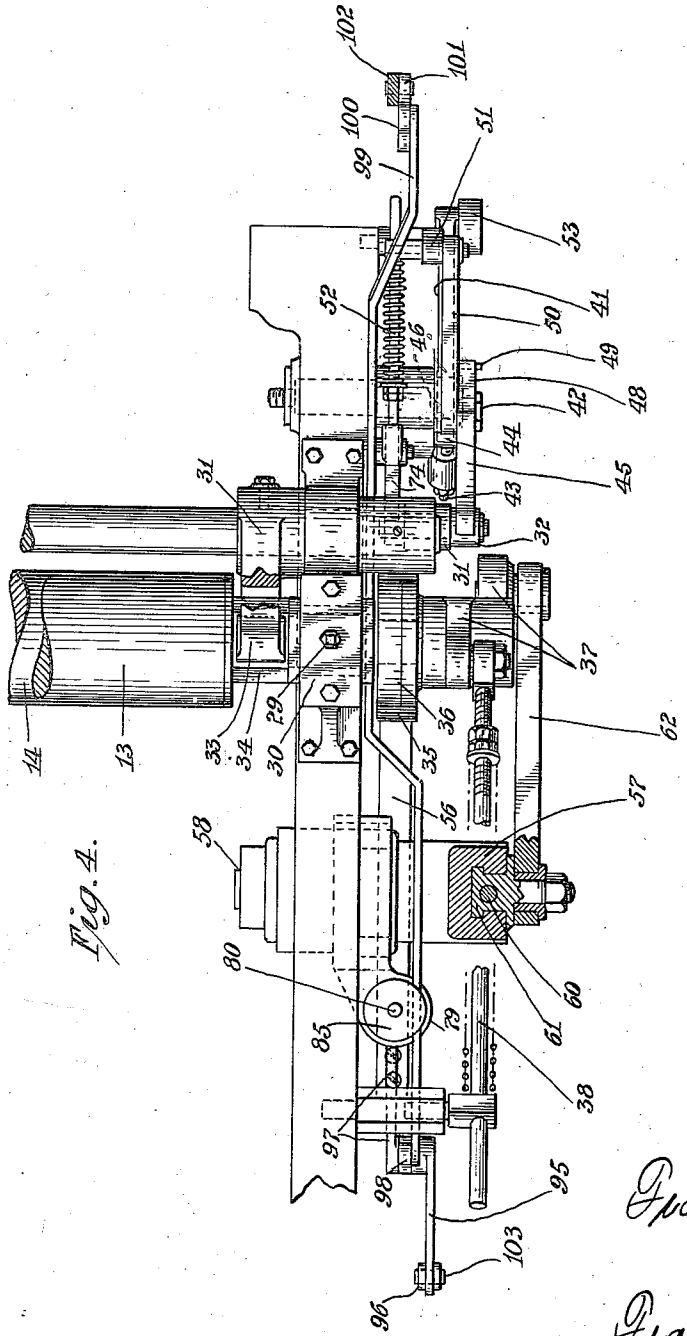


Fig. 4.

Frank C. Marquardt
INVENTOR

BY Frank P. Wentworth
his ATTORNEY.

Patented Sept. 1, 1936

2,052,638

UNITED STATES PATENT OFFICE

2,052,638

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Frank Charles Marquardt, New York, N. Y., assignor to American Bank Note Company, New York, N. Y., a corporation of New York

Application August 20, 1935, Serial No. 37,083

17 Claims. (Cl. 101—228)

The invention relates to rotary web undersurface printing machines, and more particularly to a printing machine of this type embodying therein mechanisms for controlling the movement of the web in a manner to secure accuracy in the spacing of succeeding impressions upon an intermittently movable web.

A rotary steel plate printing machine has a printing couple consisting of a plate cylinder and an impression cylinder or D-roll, the blanketed surface of which has a gap therein in which is located the mechanism used in attaching and tightening the blanket of the makeready of the cylinder. The plate cylinder is adapted to receive, about its periphery, one or more engraved steel plates, space being provided in advance of, and following, each of these plates, to afford a time interval during which the wiping and polishing webs may be moved preparatory to the succeeding wiping and polishing of each plate or plates.

The paper web receives movement only during the engagement of the impression cylinder or D-roll blanket with the paper positioned between it and a plate upon the plate cylinder, feeding of the paper being solely by the frictional engagement between same and the two members of the printing couple during the making of an impression. Hence, the web is advanced by a step by step movement, coming to rest following the making of each impression.

Engraved, intaglio or undersurface steel plates are of a greater length than the design upon the plate, and the feeding movement of the web by the plate and the impression cylinder is therefore greater in length than the design impressed upon the paper. Because of this condition, there would be a considerable blank space between succeeding impressions upon the web if means were not provided in the machine to impart a reverse movement to the web following the making of each impression.

The construction of the members of the printing couple above referred to, and the arrangement of the plate or plates affords a time interval during which this reverse movement may be imparted to the web, and by accurately controlling the quantity or extent of this movement, succeeding impressions may be accurately spaced in relation to each other. Therefore, particularly when printing postage stamps, the spacing of succeeding impressions, lengthwise of the web, may be brought to coincide with the spacing of the designs of the stamps upon a plate. This secures in effect, continuous lines of stamps equally spaced, one from the other, notwithstanding that portions of each line are made by succeeding printing operations, each of which involves an overfeed of the web to an extent in excess of the space between the designs of the stamps upon the plate.

Postage stamps are ordinarily printed 400 on, or in right angular rows of 20 stamps, and the space between the rows of stamps, both the longitudinal and the cross spaces, is ordinarily from $\frac{1}{16}$ to $\frac{3}{32}$ of an inch. This space is provided for the perforations facilitating separation of the individual stamps.

At the present time, coin control machines are extensively used in distributing stamps, and rolls of stamps are provided for use in these machines, each roll containing a single line of 500 stamps having cross perforations between the stamps.

It is obvious that when perforating a web having impressions thereon of postage stamps, any irregularity in the width of the space between succeeding impressions from a plate having 400 on will result in a gradual accumulation of error in the locating of the cross perforations, so that in view of the small leeway afforded between stamps, the accumulated error will result in the presence of perforations in the body of the stamp designs. If a web be cut into short lengths, irregularity in the cross spaces will also lead to improper location of the cross perforations in some of the printed sheets.

In a web printing machine in which the web has a step by step movement, interruption of the printing operation results from a separation of the members of the printing couple without interrupting the application of power to the machine, and the throwoff mechanism is ordinarily so constructed that the separation of said members occurs only upon the completion of the impression being made at the time of the actuation of the throwoff mechanism. Other mechanisms of the machine, however, continue to operate without imparting any feeding movement to the web, since with the separation of the members of the printing couple, the necessary pressure exerted upon the web between the blanket of the impression cylinder or D-roll and the plate is absent.

With the above conditions in mind, I have provided a rotary web undersurface printing machine, embodying therein a mechanism having no movement with, or control of, the web during its advancement by the members of the print-

ing couple, but which, immediately that the impression cylinder or D-roll passes out of its engagement with the web, will frictionally engage an unprinted portion of the web and impart a reverse or return movement thereto to an extent measured by the necessary overfeed of the web in the operation of the machine and the desired cross space between succeeding impressions upon the web.

In securing the desired control of the web in the manner described, it is essential that this mechanism, which for convenience may be termed a "drawback" mechanism, be so constructed that its effect upon the web may be accurately regulated for the purpose not only of securing extreme accuracy in its operative moment, but of also permitting adjustment of the machine to accommodate it to plates in which the designs are differently spaced.

In a machine embodying the invention, the operation of the drawback mechanism is accurately timed in relation to the impression interval by the movement of the members of the printing couple, preferably the plate cylinder, the source of power for the actuating means, however, having a constant operative effect and having no control upon the quantity of reverse movement of the web, this being controlled by adjustments of the mechanism between the source of power and the members operative upon the web to impart this reverse movement thereto. This intermediate mechanism may be so finely adjusted as to ensure absolute accuracy in the quantity of reverse movement of the web and thus ensure exact cross spacing between succeeding impressions, or cross spaces which exactly coincide in length with the cross spaces between succeeding designs upon the plate.

In conjunction with the drawback mechanism, I provide a mechanism which may be termed a "counter" operative thereon by which, after the making of a definite number of impressions, the drawback mechanism, during one cycle of operations of the machine, will be made inoperative to impart a reverse movement to the web so as to adapt the machine to the production of stamps to be used in rolls of 500 or any predetermined number.

By the use of such a mechanism, after 500 similarly spaced stamps have been impressed upon the web, a wide space is left upon the web, this space, in length, equalling one or two stamps plus the space ordinarily provided between stamps. This wide space facilitates the separation of the web into lengths, each length containing a series of vertical tiers of 500 stamps, and avoids lost time and labor in separating the web into lengths containing 500 stamps as stated.

The machine also includes therein mechanisms actuated from the throwoff mechanism of the machine which, simultaneously with the operation of said throwoff mechanism, will interrupt the operation of the drawback mechanism and also of the "counter" mechanism, so that during that interval when the printing couple is inoperative to impart feeding movement to the web, there will be no reverse movement of the web and no actuation of the counter mechanism. Consequently, when a printing operation ceases, the position of the web will remain unchanged until the throwoff mechanism has been actuated to restore the members of the printing couple to their operative position in relation to each other and the web.

As will more fully appear hereinafter, the friction members of the drawback mechanism are engaged with the web by springs, the action of these springs being controlled by the actuating mechanism operative from, or in synchronism with, the printing couple. The operation of the friction members of the drawback mechanism in reversing the movement of the web or drawing it backwardly is against a spring, the operation of this spring being controlled by the actuating mechanism or by parts actuated by the throwoff mechanism, which condition permits repeated operations of the actuating mechanism for the control mechanism without having any operative effect upon this mechanism so far as its action upon the web is concerned.

By using springs in the manner described for actuating the drawback mechanism, the source of power is utilized to so actuate the parts of the drawback mechanism as to make it inoperative upon the web, and to control the operative effect of the springs upon the drawback mechanism in a manner to secure a desired timing in the action thereof upon the web. The quantity of the reverse movement of the web is determined by the mechanisms intermediate the source of power and the springs and other parts of the drawback mechanism, thus not only permitting extreme accuracy in the control of the web movements, but permitting a constant quantity of movement of the parts of the actuating mechanism.

The friction members of the drawback mechanism operative upon the web are in the form of rollers movable toward and from each other and oscillated by the mechanism intermediate the source of power and said rollers, these rollers having the two-fold function of stopping the run of the web and imparting a reverse movement thereto.

By the term "oscillating", a turning of the rollers alternately in opposite directions is meant, the bearings of said rollers having no movement toward or from the printing couple.

The invention consists primarily in a rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, and an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a side view of a printing machine embodying the invention, the members of the printing couple and the frame of the machine being shown in dotted lines;

Fig. 2 is a view upon a larger scale showing the

clamping mechanism, the roller feed mechanism, the main actuating mechanism for each of these mechanisms, the intermediate mechanisms between said main actuating mechanisms and said other mechanisms and a part of the stop mechanism;

Fig. 3 is a view upon a larger scale of the counter mechanism and a part of the stop mechanism; and

Fig. 4 is a plan view of the mechanisms shown in Fig. 2.

Like numerals refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawings, the machine includes a plate cylinder 10 of the usual construction having associated therewith the usual inking, wiping and polishing mechanisms which are not shown in the drawings since such are well known and form no part of the present invention.

Associated with the cylinder 10 is an impression cylinder or D-roll 11 of the usual construction, having a recessed portion 12 interrupting the continuity of the impression surface.

It is customary, in machines of this type, to impart continuous rotary movement to both cylinders 10 and 11, the recess 12 of the impression cylinder affording an interval during which there can be no engaging relation with the portion of the web between the impression cylinder or D-roll and a plate upon the plate cylinder.

The machine, as shown in the drawings, is for use in printing from a single plate upon the plate cylinder, although the diameter of this cylinder is sufficiently great to permit the use of a plurality of plates mounted upon the cylinder and in spaced relation to each other circumferentially of the cylinder.

Feeding of a web in relation to the printing couple results from the pressing of the web by the impression cylinder or D-roll against a plate upon the plate cylinder. In forming intaglio, engraved or undersurface lines upon a plate, it is necessary to leave a plain, marginal portion circumferentially of the cylinder at each end of the plate, upon which no design appears, which portions, being of the maximum thickness of the plate, will, notwithstanding the absence of a design thereon, cause feeding movement of the web to an extent in excess of the amount of feeding movement required for the design impressed thereon. The presence of the recess 12, and the elevation of the plate above the surface of the plate cylinder, limits the feeding movement of the web to that interval during which the blanket upon the cylinder 11 is operative in relation to the plate.

Immediately that the plate passes the vertical center of the plate cylinder, all feeding movement of the web ceases, so that the web is advanced by a step by step movement, the amount of this advance being determined by the length of the plate as distinguished from the length of the impression or group of impressions thereon. Consequently, with each revolution of the impression cylinder or D-roll, the quantity of web fed will be sufficiently great to ordinarily leave an unengraved margin in advance of, and following each impression equalling the length of the plate in excess of the length of the group of designs thereupon. This spacing of succeeding impressions in relation to each other is undesirable, and in order to limit the space between succeeding impressions, or provide cross spaces between impression, of a width of cross spaces between parallel lines of designs engraved upon the plate, a drawback mechanism is used which becomes operative, immediately upon the disengagement of the impression cylinder or D-roll from a plate, to impart a reverse movement to the web equal to the overfeed thereof, because of the conditions above referred to This overfeed may be several inches in length.

The drawback mechanism shown in the drawings consists of a pair of drawback rollers 13 and 14 mounted in the frame of the machine intermediate the bearing for the roll of paper web and the printing couple, the web, in its run, passing about suitable guide rollers 15, 16, and 17 between the drawback rollers and the roll of web.

Between the drawback rollers and the members of the printing couple, the web passes between a platen 18 and a presser roller 19 which serves as a resistance or tensioning device to keep the web taut as it passes to the members of the printing couple.

Between this tensioning device and the printing couple is a guide roller 20 carried by suitable rocker arms 21, and guiding the web as it is being fed by the members of the printing couple. The arms 21 carry stop screws 22 engageable with studs 23 for controlling the position of the guide roller 20. Beyond the printing line of the members of the printing couple is a guide bar 24 for directing the run of a web following the printing operation. The rod 24, which may be termed an offtake guide is positioned below the plane of engagement of the impression cylinder or D-roll with a plate upon the plate cylinder, so that with the disengagement of the impression cylinder or D-roll and the plate with the web, the web will be drawn downward slightly, and rotation of the impression cylinder may be continued without any engagement of the blanket thereon with the web. The manner of controlling the run of the web is immaterial to the present invention, except insofar as the reverse movement or back feed of the web is concerned.

The drawback roller 14 is mounted in fixed bearings below a forked bracket 25 mounted upon the frame of the machine. This bracket 25 has vertically slidable therein, bearing blocks 26 for the arbors of the upper drawback roller 13. Acting upon the blocks 26 are heavy coiled springs 27, the upper ends of which have a spring seat block 28 engageable by an adjusting screw 29 carried by a cap plate 30 for the forked bracket 25.

The springs 27 form a part of what may be termed a clamping mechanism, the normal function of these springs being to force the drawback roller 13 toward the other drawback roller 14 so as to clamp the web between these rollers. Said clamping mechanism also includes a bell crank lever 31 mounted adjacent the bracket 25, one arm of which bracket carries an anti-friction roller 32, and the other arm of which is forked, as shown at 33, and engages a collar 34 loosely mounted upon the arbor of the roller 13. The function of the springs 27 is to engage the drawback rollers with the web, and the function of the lever 31 is to disengage said rollers from the web.

To impart a reverse movement to the web, it is essential that the rollers 13 and 14 receive a partial rotation while they are engaged with the web and that these rollers, after the completion of the drawback operation, be returned to their normal position preparatory to the next reverse feeding movement, and while said rollers are dis-

engaged from the web. This feeding mechanism comprises gears 35 and 36 keyed to the shafts of the rollers 13 and 14 respectively, it not being required that the teeth upon these gears extend entirely about same because said gears have only an oscillatory movement.

The roller feed mechanism comprises a lever 37 keyed to the shaft carrying the roller 14. One arm of this lever is acted upon by a spring rod 38, the turning of the roller to impart a reverse feed to the web being against the tension of the spring of this rod. A return oscillatory movement to the roller 14 while the drawback rollers are disengaged from the web is effected by the spring rod 38.

The clamping mechanism and the roller feed mechanism are actuated with a proper timing in relation to the making of the impression by a main actuating mechanism acting in synchronism with the movement of the plate cylinder, power from this main actuating mechanism being applied to the clamping mechanism and to the roller feed mechanism by intermediate mechanisms.

As shown in the drawings, the main actuating mechanism comprises two cams 39 and 40 carried by and rotatable with the plate cylinder. The number of rises and falls upon each cam is determined by the number of plates upon the plate cylinder, and the length of each cam will substantially coincide with the length of each plate upon the cylinder with which the cam is associated. In the drawings, only one plate is used upon the plate cylinder, and consequently, there is only one rise and fall upon each cam 39 or 40, the length of the fall or low point of the cam 39, and the length of the rise or high point of the cam 40 being substantially conicident with the length of the recess 12 of the impression cylinder or D-roll.

The cam 39 acts upon a rocking member 41 pivoted at 42, the extent of the oscillatory movement of this member being controlled by an adjustment screw 43 carried thereby and engageable with a stud 44, this adjustment screw and stud controlling the quantity of movement of the roller 13 by the spring 27.

The member 41 of the main actuating mechanism is operative upon the clamping mechanism through an intermediate mechanism consisting of a stirrup plate 45 pivoted at 46 to the member 41 and having a bearing surface or stirrup 47 engaging the anti-friction roller 32. The plate 45 carries a stop arm 48 engageable with a stop pin 49. A link 50 has one end pivotally connected with the stirrup plate 45, and the other end thereof pivotally connected with a crank 51 acted upon by a spring rod 52 resisting movement of the stirrup plate by the main actuating mechanism operative thereon, and permitting slight oscillatory movement of the stirrup plate while preventing its disengagement from the anti-friction roller 32. Said spring also assists in maintaining an anti-friction roller 53, carried by the member 41 in operative relation to the cam 39 acting upon said member 41.

The cam 40 acts upon a rocking lever 54 forming a part of the main actuating mechanism operative upon the roller feed mechanism, this rocking lever having an anti-friction roller 55 engageable by said cam, and having pivoted thereto one end of a link 56 through which power is transmitted to said roller feed mechanism through an intermediate mechanism which will now be described.

This intermediate mechanism comprises a rocking lever 57 pivoted at 58. The short arm of this lever is pivotally connected with the link 56. The long arm of this lever is slotted and undercut, as shown, the slot being closed by a cap plate 59 carrying a lead screw 60 extending longitudinally of the lever arm. This lead screw co-operates with the screw threads in a block 61 slidably mounted in the slot of the long arm of the lever 57.

A link 62 is pivotally connected with the block 61 and with one arm of the lever 37.

By adjusting the block 61 radially of the arm of the lever 57, the quantity of feeding movement imparted to the roller 14 may be controlled with absolute accuracy, the length of said feed screw and the length of the slot in the lever arm being sufficient to bring the axis of the pivotal connection between the link 62 and the block 61 into alignment with the pivot 58 of the lever 57 so as to impart no movement whatever to said rollers, if desired.

Ordinarily, an engraved, intaglio or undersurface printing plate for use upon the machine, has reproduced thereon 400 stamp designs, spaced longitudinally and laterally of the plate to provide lengthwise and cross spaces forming the plain margins about each stamp, the perforations being positioned in these marginal spaces. As heretofore stated, the designs are in twenty rows of twenty stamps each, and when it is desired to deliver stamps in rolls of 500, it is desirable to have a wide blank space at each end of the roll of stamps, this wide space being of a length not to intefere with the operation of the perforating machine upon a strip of the printed web.

To permit the production of stamps for delivery in rolls as referred to, it is necessary that the web receive a reverse feed by the drawback mechanism following the making of twenty-four succeeding impressions; that the drawback mechanism be made inoperative to impart a reverse feed to the web following the making of the twenty-fifth impression, and that during the making of the next twenty-four impressions, it be allowed to impart a reverse feed to the web. In this manner, twenty rows of 500 stamps, having equal cross spaces between the stamps, are printed upon the web, there being a wide cross space following the last of the 500 stamps. Subsequently, there is impressed upon the web, successive series of parallel rows of 500 stamps, so that during a run of the machine there will be a sequence of groups of printed stamps, each group containing a plurality of rows of 500 stamps, the stamps of each row being evenly spaced from each other, with a wide space at each end of the row.

To ensure the interruption of the operation of the drawback mechanism when a plurality of rows of 500 stamps have been impressed, I provide what may be termed a "counter" mechanism, although this mechanism does not have the ordinary function of such a mechanism but is merely an automatic stop mechanism operative upon the drawback mechanism following a predetermined number of revolutions of the plate cylinder.

This mechanism consists of a shaft 63a carrying an indicator dial 63 having removably secured thereto a tappet 64. The shaft 63a is mounted in a fixed part of the machine and carries a worm gear 65 enmeshed with a worm shaft 66 driven by bevel gearing 67 through a gear

train 68 enmeshed with a gear 69 on the plate cylinder 10. The worm shaft 66 is connected with the shaft of one of the bevel gears 67 by clutch members 70 and 71.

The clutch members 70 and 71 are engaged with each other by a spring 72 acting between the member 71 and a collar 73 carried by the bevel gear shaft. The purpose of this clutch mechanism will be more fully described hereinafter in connection with the operation of the stop mechanisms of the machine.

The tappet 64 is detachably connected with the dial 63 so as to permit the counter mechanism to be made inoperative when it is not desired to separate the impressions made upon the web into rows of 500 stamps.

Pivotally mounted upon the stud 44 is a stop lever 74 adapted to be interposed in the path of movement of one arm of the lever 31 while said lever is so positioned as to disengage the drawback rollers 13 and 14 from the web, thus preventing movement of the roller 13 by the spring 27 to clamp the web between said rollers 13 and 14. This lever 74 has pivotally connected therewith, an actuating link 75 having adjustably mounted thereon a block 76 positioned in the path of movement of the tappet 64, so that following a given number of impulses of the shaft 63*a*, said tappet 64 will engage the block 76, lift the link 75 and so position the lever 74 as to prevent the actuation of the drawback mechanism, notwithstanding that all other parts of said drawback mechanism and said clamp mechanism operate in the usual manner. Upon the completion of the cycle of operations necessary to the making of one impression, said tappet will pass from engagement with said block and permit movement of the lever 74 out of the path of movement of the lever 31, and the normal functioning of the drawback mechanism.

The gear train 68, the bevel gears 67, the worm shaft 66 and the worm gear 65 are so designed, in the form of the invention shown, as to turn the shaft 63*a* in a ratio of one to twenty-five as compared with the plate cylinder. By this construction, the shaft 63*a* receives one twenty-fifth of a revolution during the making of each impression.

In printing machines of the type to which the invention relates, a throwoff mechanism is provided which is used to interrupt the making of impressions, by separating the cylinders 10 and 11. This mechanism, which is old and well known, is so constructed that it becomes operative upon the cylinders only upon the completion of the making of an impression from a plate. Following the separation of the cylinders, they both continue to rotate in the usual manner and all other mechanisms in the machine also continue to operate. The sole effect of this old throwoff mechanism is to interrupt the making of impressions, and the feeding of the web, by the members of the printing couple. It is obvious that if the drawback mechanism were allowed to act to effect a reverse feed to the web, while the members of the printing couple are inoperative, when work was resumed there would be an overlapping of impressions upon the web. It is also obvious that under this condition, if the counter mechanism were to continue to operate in its usual manner, the drawback mechanism would be made inoperative by the counter mechanism before the full number of impressions desired in a group were made upon the web.

To prevent the development of the above condition, I provide means acting upon the main actuating mechanism operative upon the clamping mechanism, and means for simultaneously releasing the clutch mechanism connecting the worm shaft 66 with the bevel gearing 67 to make said main actuating mechanism inoperative upon the intermediate mechanisms acting upon the clamping mechanism, and the counter mechanism inoperative so long as the cylinders 10 and 11 remain separated, or the main throwoff mechanism of the machine remains operative to prevent the making of impressions.

The first of these mechanisms for convenience of expression will be termed a "drawback stop mechanism" and the second of these mechanisms will be termed a "counter stop mechanism".

The drawback stop mechanism consists of a bolt 77 engageable in a socket 78 in the link 56. Said bolt is mounted in a bearing 79 and has a stem 80 having slidably mounted thereon a stud block 81 acted upon by a spring 82 normally biasing the bolt toward the link 56. Said spring acts against a spring seat 83 carried by a bearing block 84 on the stem 80. Said stem also carries a weight 85.

The counter stop mechanism consists of a cam 86 carried by the last gear of the train 68, which cam has a single rise 87 acting upon a forked lever 88 pivotally connected with a link 89 carrying a block 90. Mounted adjacent the clutch member 71 is a lever, one arm 91 of which is forked and straddles a groove 92 in said clutch member 71, and the other arm 93 of which carries an impact member 94 adapted to be engaged by a block 90 with the actuation of the "counter stop mechanism". Since the "drawback stop mechanism" and the "counter stop mechanism" must be actuated simultaneously with the separation of the cylinders 10 and 11, I employ the same actuating mechanism for each of said stop mechanisms and connect this actuating mechanism with the throwoff mechanism so as to secure accuracy in the timing of the operative moment of all three mechanisms.

This actuating mechanism consists of a three armed lever 95, one arm of which is connected by a link 96 with the link 89, another arm 97 of which is forked and engages studs upon the stud block 81 and the third arm 98 of which is connected by a link 99 with one arm 100 of an oscillatory plate, the other arm 101 of which is connected by a link 102 with the throwoff mechanism of the machine. The three arm lever is pivoted at 103; the link 96 is pivoted to the arm 95 and to the link 89, and the link 99 is pivoted to the arms 98 and 100.

The drawback rollers 13 and 14 have rubber blankets or other friction surfaces about same.

The run of the web through the machine is indicated in dot and dash lines, as shown at W. The single plate upon the plate cylinder is indicated at P.

All of the mechanisms herein described are for controlling the run of the web for the purposes set forth in connection with each.

The operation of the herein described machine is substantially as follows:

During the makeready of a printing machine embodying the invention, the web W is drawn from its roll and the end thereof passed about the guide rollers 15, 16 and 17, between the tensioning roller 19 and the platen 18; below the guide roller 20; between the cylinders 10 and 11, and about the offtake guide rod 24 to a rewind mechanism not shown in the drawings, or to any

other mechanism for collecting the web or sheets into which it may be cut.

When threading the web through the machine, the recess 12 is positioned as shown in Fig. 1, the drawback rollers 13 and 14 being separated manually or, if desired, power may be applied to the machine so that it is merely necessary to insert the forward edge of the web between these rollers while they are separated by the main actuating mechanism operative upon the clamping mechanism.

The web having been properly threaded through the machine, power is applied in the usual manner to the members of the printing couple so as to bring the engraved, intaglio or undersurface plate P to a position where it will be engaged by the blanket upon the impression cylinder or D-roll 11. Substantially simultaneously with, or prior to, the gripping of the web between the plate P and the impression cylinder, the rise of the cam 39 engages the antifriction roller 53 rocking the member 41 about its pivot 42 and thrusts the plate 45 of the intermediate mechanism acting upon the clamping mechanism, toward the lever 31 in a manner to rock said lever so as to raise the bearing blocks 26 against the tension of the springs 27 and separate the rollers 13 and 14. This permits a free run of the paper web W as it is drawn forward by the plate P and the blanket of the impression cylinder or D-roll 11. The only restraint upon the run of the web while the impression is being made is the tensioning resistance to its movement by the action of the presser roller 19 and the platen 18 as it passes between these parts.

The movement of the lever 31 is merely sufficient to relieve any clamping action upon the web by the drawback rollers 13 and 14.

With movement of the plate 45 to rock the lever 31, the springs 27 are placed under tension as is the spring of the spring rod 50, tensioning power being applied to this spring through the link 52, one end of which is supported by the crank 51. Movement of the member 41 about the pivot 46 limits pivotal movement of the plate 45, due to resistance to its movement toward the lever 31. Limitation of pivotal movement of the plate 45 also results from the engagement of the stop pin 49 with the stop arm 48.

With the position of parts shown in the drawings, the drawback rollers 13 and 14 are in the position reached following the completion of the reverse feed back or drawback of the web.

Substantially simultaneously with the separation of the drawback rollers 13 and 14, the roller 55 carried by the lever 54 passes from the rise 40 of the cam, thus permitting the spring rod 38, the spring of which has been tensioned during the preceding feeding movement of the rollers by the lever 57, to impart a return movement to the lever 37 and through the link 62 lever 57 and link 56 to the lever 54, causing the roller 55 to follow the cam 40, and at the same time, positioning each of the rollers 13 and 14 preparatory to the next drawback operation.

Substantially simultaneously with the disengagement of the impression cylinder or D-roll from the web following the making of an impression from the plate, the roller 53 upon the member 41 passes from the rise of the cam 39, thus permitting the rocking of the lever 31 by the springs 27 to an extent to ensure the clamping of the web between the drawback rollers 13 and 14. Upon this initial clamping action by said rollers, said rollers have no turning movement, but substantially immediately thereafter, the lever 54 is oscillated by a rise of the cam 40, thus rocking the lever 57 through the link 56 and the lever 37 through the link 62 against the tension of the spring rod 38 to impart a contra-clockwise movement to the roller 14 and, through the segmental gears 35 and 36, a clockwise movement to the roller 13. Since the web W is clamped between these rollers, this turning or oscillation thereof will impart a reverse feed to the web W while the impression cylinder or D-roll 11 is disengaged therefrom and the rollers 13 and 14 are clamped thereupon.

As heretofore stated, this reverse movement, back feed or drawback of the web must not only be accurately timed in relation to the printing interval, but must be so controlled as to impart an exact quantity of reverse movement to the web, since variation or error of a few thousandths of an inch will, by accumulation during a day's run of a press, result in variations in cross spaces between succeeding impressions on the web to an extent to not only interfere with the subsequent proper functioning of a perforating machine, but to cause overlapping of stamp designs upon the web or otherwise imperfect work by the machine. The extent of oscillatory movement of the lever 37 is determined by the position of the block 61 radially of the rocking lever 57. By adjusting this block along said lever 57 by the lead screw 60, the extent of turning movement of the drawback rollers 13 and 14 may be accurately determined. Furthermore, this lead screw may be used to adjust the block 61 to adapt the machine for use in printing from different plates in which the overfeed by the unengraved end portions of the plate varies in relation to other plates which may be used upon the machine. The adjustment afforded by the lead screw 60 is for the purpose of determining the amount of reverse feed of the feed back or drawback of the web with each printing cycle.

The turning of the rollers 13 and 14 by the lever 37 to impart a reverse movement of the web, is against the tension of the spring rod 38.

With the operation of the clamping and drawback mechanisms as heretofore described, the following is the sequence of operations during each printing cycle, or each revolution of the impression cylinder or D-roll 11 while making an impression.

The main actuating mechanism acting upon the clamping mechanism through the intermediate mechanism, is actuated immediately prior to, or substantially simultaneously with, the engagement of the web between the impression cylinder or D-roll 11 and the plate P upon the plate cylinder 10, to separate the rollers 13 and 14 and to permit a free run of the web as it is drawn forward with the rotation of the impression cylinder or D-roll and the plate cylinder. This condition continues so long as the impression cylinder or D-roll is engaging the web, or the web is engaging a plate. Immediately that the impression cylinder or D-roll, or the web, passes out of such engagement, said main actuating mechanism becomes operative to impart movement of the drawback rollers 13 and 14 so as to clamp the web between these rollers while the rollers are stationary, thus effectively arresting movement of the web.

Immediately following the clamping of the web between the rollers 13 and 14, the main drawback actuating mechanism including the lever 54, actuates the roller feed mechanism including the

lever 37 through the intermediate mechanism including the lever 57, turning the roller 14 in a direction opposite to the movement of the plate cylinder 10, and the drawback roller 13 in a direction opposite to that of the impression cylinder or D-roll, thus imparting a reverse movement to the web to an extent determined by the radius at which the lever 57 acts upon the link 62. The extent of the reverse movement or drawback of the web is determined solely by the quantity of movement of the lever 37 by the lever 57 and as stated, this quantity of movement may be varied by adjustment of the block 61 radially of said lever 57.

The main actuating mechanism for the clamping mechanism and the main actuating mechanism for the drawback mechanism always have the same quantity of movement, but the operative effect of the latter may be varied by adjustment in the mechanism intermediate same and the roller feed mechanism.

The above described operation concludes the function of the rollers 13 and 14 with each printing cycle. In the form of the invention shown in the drawings, this cycle includes the making of an impression from one plate only upon the plate cylinder. When more than one plate is used upon this cylinder, the mode of operation will be the same as to each plate, the only change required being modification of the cam structure 39 and 40 so as to oscillate the lever 57 once for each plate upon the plate cylinder 10.

If it be desired to make an indefinite number of succeeding impressions with the same space between all impressions, the tappet 64 is removed from the dial 63 of the counter mechanism, thus making this counter mechanism inoperative.

When it is desired, however, to produce rolls of 500 stamps, the tappet 64 is mounted upon the dial 63 and this dial is so set as to position the tappet immediately beyond the block 76 carried by the actuating link 75 for the stop lever 74. The speed ratio between the dial 63 and the plate cylinder 10 being one to twenty-five, it is obvious that said dial will receive one-twenty-fifth of a revolution with each full revolution of said plate cylinder. Consequently, the tappet 64 will be slowly and progressively advanced so that upon the initiation of the twenty-fifth consecutive impression, the tappet 64 will engage the underface of the block 76 and, by the completion of the twenty-fifth impression, raise the actuating link 75 and stop lever 74 so as to position the latter in the path of movement of a part of the lever 31, so that with the succeeding actuation of the member 41 by the spring 52 alone, movement of the lever 31 by the springs 27 is prevented. When the stop lever 74 is thus engaged with the lever 31 of the clamping mechanism, the rollers 13 and 14 are held out of engagement with the web during that interval when, with a normal functioning of the machine, they would be closed upon the web and the web would be given a short reverse movement thereby. While with the movement of the member 41 under the conditions described, there will be no clamping movement of the rollers 13 and 14, these rollers will nevertheless be reciprocated by the roller feed mechanism actuated by the lever 57, but without any effect upon the movements of the web.

As a result, there is no reverse movement of the web following the twenty-fifth impression, although upon the succeeding impression, the tappet 64 passes out of engagement with the block 76 upon the actuating link 75, and the stop lever 74 moves out of the path of movement of the clamp lever 31. At this instant, said lever may be engaged by the stirrup plate 45.

The stop lever 74 is actuated following the making of the twenty-fourth impression and during the making of the twenty-fifth impression, becoming fully operative upon the completion of the making of this impression. Said stop lever 74 is operative only upon every twenty-fifth revolution of the plate cylinder, when, as in the machine shown in the drawings, a 400-on plate is used and it is desired to furnish rolls of 500 stamps.

The actuation of the printing couple throwoff mechanism is well known in rotary steel plate undersurface printing machines of all kinds. The mechanisms heretofore described in connection with the counter stop mechanism and drawback stop mechanism have no operative effect upon the throwoff mechanism in its action upon the members of the printing couple. These mechanisms are merely actuated in synchronism with the action of said throwoff mechanism, being connected therewith by the link 102 and the lever 100—101 for the purpose of a proper timing of the actuation of the throwoff and the other stop mechanisms.

When the throwoff mechanism is actuated, the link 102 imparts a downward thrust to the lever arm 101, thus exerting a pull to the right, Fig. 2, by the lever arm 100 upon the link 99. Through this link, the three armed lever 95 is rocked upon its axis 103, permitting movement of the stud block 81 by the spring 82 downwardly while the bolt 77 is engaged with the end of the link 56 beyond the socket 78. The weight 85 ensures the completion of the movement of the bolt 77 when the socket 78 is positioned below the bolt. Lifting of the bolt to disengage it from the socket 78 is against the tension of the spring 82.

With the rocking of said lever 95 as described, the link 96 will be raised to lift the link 89 of the counter stop mechanism, this occurring while the forked lever 88 is engaged with a low point of the cam 87. This raising of the link 89 brings the block 90 into a position where, with the rocking of the lever 88, it may engage the impact member 94 upon the arm 93 of the rocking lever, the forked arm 91 of which engages the slot 92 of the clutch member 71. With movement of the link 89, the clutch member 71 is disengaged from the clutch member 70, thus permitting the continued operation of the gear train 68 and the bevel gears 67 without imparting any rotary movement to the shaft 63a.

The drawback stop mechanism, upon the completion of any printing cycle following the actuation of the throwoff mechanism, is made inoperative by holding the roller 55 out of engagement with the cam 40 because of the engagement of the bolt 77 with the socket 78. Likewise, upon the completion of any printing cycle following the actuation of the throwoff mechanism, the actuating means for the dial 63 and tappet 64 is made inoperative upon the completion of the printing cycle.

After the actuation of the throwoff mechanism, the printing couple may continue to operate indefinitely and the drawback rollers 13 and 14 may be repeatedly moved into and out of engagement with the web, but during this interval, there will be no feeding of the web by the printing couple or by the drawback rollers, and no actuation of the counter mechanism. Consequently, when the throwoff mechanism is actuated to cause a resumption of the printing operation, the printing couple will proceed without any interruption in

the consecutive operations of the press, as defined by the counter mechanism, and without any variation in that position of the web necessary to a proper spacing of succeeding impressions.

It will be noted that while the throwoff mechanism of a rotary steel plate press may be manually actuated at any time, this manual actuation results merely in the setting of parts, which parts become operative to separate the members of the printing couple only upon the completion of a printing operation or cycle.

The drawback roller gears **35** and **36** and the clamp lever **31** are duplicated upon opposite sides of the machine, it being unnecessary to duplicate the main actuating mechanisms and the intermediate mechanisms. The duplicated clamp levers **31** are carried by a shaft extending from side to side of the machine, so that these levers will move in unison and ensure a right line movement of the roller **13**.

The construction of the various parts herein described is subject to various refinements, but such are not essential to the invention and are therefore not described in detail.

It is not my intention to limit the invention to the precise details of construction shown in the drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, and an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

2. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a counter mechanism including therein means operative upon said clamping mechanism to make said drawback mechanism inoperative at predetermined intervals, and speed reducing gearing between said counter mechanism and said plate cylinder.

3. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a counter mechanism including therein means operative upon said clamping mechanism to make said drawback mechanism inoperative at predetermined intervals, means whereby said counter mechanism may be made inoperative in relation to said clamping mechanism, and speed reducing gearing between said counter mechanism and said plate cylinder.

4. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a drawback stop mechanism including therein means adapted to make said main actuating means inoperative upon said roller feed mechanism, and means connecting same with the throwoff mechanism of the machine, whereby said drawback mechanism is made inoperative simultaneously with the actuation of the throwoff mechanism.

5. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web

runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a drawback stop mechanism including therein means adapted to make the main actuating means inoperative upon said roller feed mechanism, a counter mechanism including therein means operative upon said clamping mechanism to make said drawback mechanism inoperative at predetermined intervals, speed reducing gearing between said counter mechanism and said plate cylinder, a counter stop mechanism adapted to make said counter mechanism inoperative, means simultaneously operative upon said drawback stop, and said counter stop mechanisms, and means connecting same with the throwoff mechanism of the machine, whereby both stop mechanisms are actuated simultaneously with the actuation of the throwoff mechanism.

6. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, a bell crank lever, one arm of which is operative adjacent an end of said movable roller to disengage it from the web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said bell crank lever to cause disengagement of said rollers from a web against the tension of said springs during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, and an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

7. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, a bell crank lever, one arm of which is operative adjacent an end of said movable roller to disengage it from the web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, a stirrup plate engaging one arm of said bell crank lever acted upon by said main actuating means to cause disengagement of said rollers from a web against the tension of said springs during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, and an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

8. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, a bell crank lever, one arm of which is operative adjacent an end of said movable roller to disengage it from the web, a roller feed mechanism operative to oscillate said rollers, a stirrup plate engaging one arm of said bell crank lever, a rocking member pivotally connected with said stirrup plate, a crank, a spring acting theeron, a link connecting said crank and said plate, main actuating means including a cam upon said plate cylinder co-operating with said rocking member, whereby said rocking member, said stirrup plate and said bell crank lever are actuated to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, a mechanism acting in synchronism with the movement of the plate cylinder for operating said roller feed mechanism, and an intermediate mechanism acted upon by said last named mechanism and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

9. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, gears connecting said rollers, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a lever carried by one of said rollers, a spring acting on one arm of said lever, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, and an intermediate mechanism acted upon by said main actuating means and operative upon the other arm of said lever to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

10. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair

of drawback rollers between which the paper web runs, gears connecting said rollers, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a lever carried by one of said rollers, a spring acting on one arm of said lever, means operative in synchronism with the movement of the plate cylinder and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, a rocking lever, a cam upon the plate cylinder acting thereon, a second rocking lever, a link pivotally connected with said rocking levers, and a link pivotally connected with said second rocking lever and the other arm of the lever carried by a drawback roller, whereby said rollers are turned while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

11. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, gears connecting said rollers, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a lever carried by one of said rollers, a spring acting on one arm of said lever, means operative in synchronism with the movement of the plate cylinder and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, a rocking lever, a cam upon the plate cylinder acting thereon, a second rocking lever, a link pivotally connected with said rocking levers, a link pivotally connected with said second rocking lever and the other arm of the lever carried by a drawback roller, whereby said rollers are turned while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, and means whereby said last named link may be adjusted lengthwise of the rocking lever with which it is pivotally connected to regulate the turning movement of said rollers.

12. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, gears connecting said rollers, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a lever carried by one of said rollers, a spring acting on one arm of said lever, means operative in synchronism with the movement of the plate cylinder and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, a rocking lever, a cam upon the plate cylinder acting thereon, a second rocking lever, a screw threaded block slidably mounted thereon, a lead screw carried by said lever and co-operating with said block, a link pivotally connected with said rocking levers, and a link pivotally connected with said block and the other arm of the lever carried by a drawback roller, whereby said rollers are turned while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web.

13. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, bell crank levers, one arm of which is operative to disengage said movable roller from the web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said bell crank levers to cause disengagement of said rollers from a web against the tension of said springs during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a counter mechanism including therein means operative upon said clamping mechanism to make said drawback mechanism inoperative at predetermined intervals, and speed reducing gearing between said counter mechanism and said plate cylinder.

14. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, gears connecting said rollers, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a lever carried by one of said rollers, a spring acting on one arm of said lever, means operative in synchronism with the movement of the plate cylinder and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, a rocking lever, a cam upon the plate cylinder acting thereon, a second rocking lever, a link pivotally connected with said rocking levers, a link pivotally connected with said second rocking lever and the other arm of the lever carried by a drawback roller, whereby said rollers are turned while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a drawback stop mechanism including therein a bolt, said link connecting said rocking levers having a socket adapted to receive same, means biasing said bolt towards said link, a lever operative upon said bolt, and connections between said lever and the throwoff mechanism of the machine, whereby said rocking levers are held against movement simultaneously with the actuation of the throwoff mechanism.

15. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web

runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, bell crank levers, one arm of which is operative to disengage said movable roller from the web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said bell crank levers to cause disengagement of said rollers from a web against the tension of said springs during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a stop lever mounted adjacent said bell crank levers, an actuating link therefor, a block carried by said link, a rotatable shaft, a tappet carried thereby engageable with said block, and a speed reducing gearing between said shaft and the plate cylinder, whereby movement of said bell crank levers is prevented at predetermined intervals.

16. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, one of said rollers being mounted for movement toward and from the other, springs acting thereon to clamp the web between said rollers, bell crank levers, one arm of which is operative to disengage said movable roller from the web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said bell crank levers to cause disengagement of said rollers from a web against the tension of said springs during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a stop lever mounted adjacent said bell crank levers, an actuating link therefor, a block carried by said link, a rotatable shaft, a tappet removably mounted upon said shaft and engageable with said block, and a speed reducing gearing between said shaft and the plate cylinder, whereby movement of said bell crank levers is prevented at predetermined intervals.

17. A rotary web undersurface printing machine embodying therein, in combination with an impression cylinder and a plate cylinder adapted to receive an engraved steel plate, of a pair of drawback rollers between which the paper web runs, a clamping mechanism operative to cause said rollers to be alternately engaged with, and disengaged from, a web, a roller feed mechanism operative to oscillate said rollers, main actuating means acting in synchronism with the movement of the plate cylinder, an intermediate mechanism acted upon by said main actuating means and operative upon said clamping mechanism to cause disengagement of said rollers from a web during the making of an impression, and to cause the engagement of said rollers with a web following the making of an impression, an intermediate mechanism acted upon by said main actuating means and operative upon said roller feed mechanism to turn said rollers while engaged with a web in one direction to impart a reverse movement to a web, and in the opposite direction while said rollers are disengaged from a web, a drawback stop mechanism including therein means adapted to make the main actuating means inoperative upon said roller feed mechanism, a counter mechanism including therein means operative upon said clamping mechanism to make said drawback mechanism inoperative at predetermined intervals, speed reducing gearing between said counter mechanism and said plate cylinder, clutch members whereby said gearing may be made operative or inoperative, a cam actuated by said gearing, a lever co-operating therewith, a link pivotally connected with said lever, a second lever operative upon said clutch members, an impact member carried thereby, a block carried by said link, means simultaneously operative upon said drawback stop mechanism and upon said link to cause said block to engage said impact member, and means connecting said last named means with the throwoff mechanism of the machine, whereby said drawback and said counter mechanisms will be made inoperative simultaneously with the actuation of the throwoff mechanism.

FRANK CHARLES MARQUARDT.