

March 9, 1926.

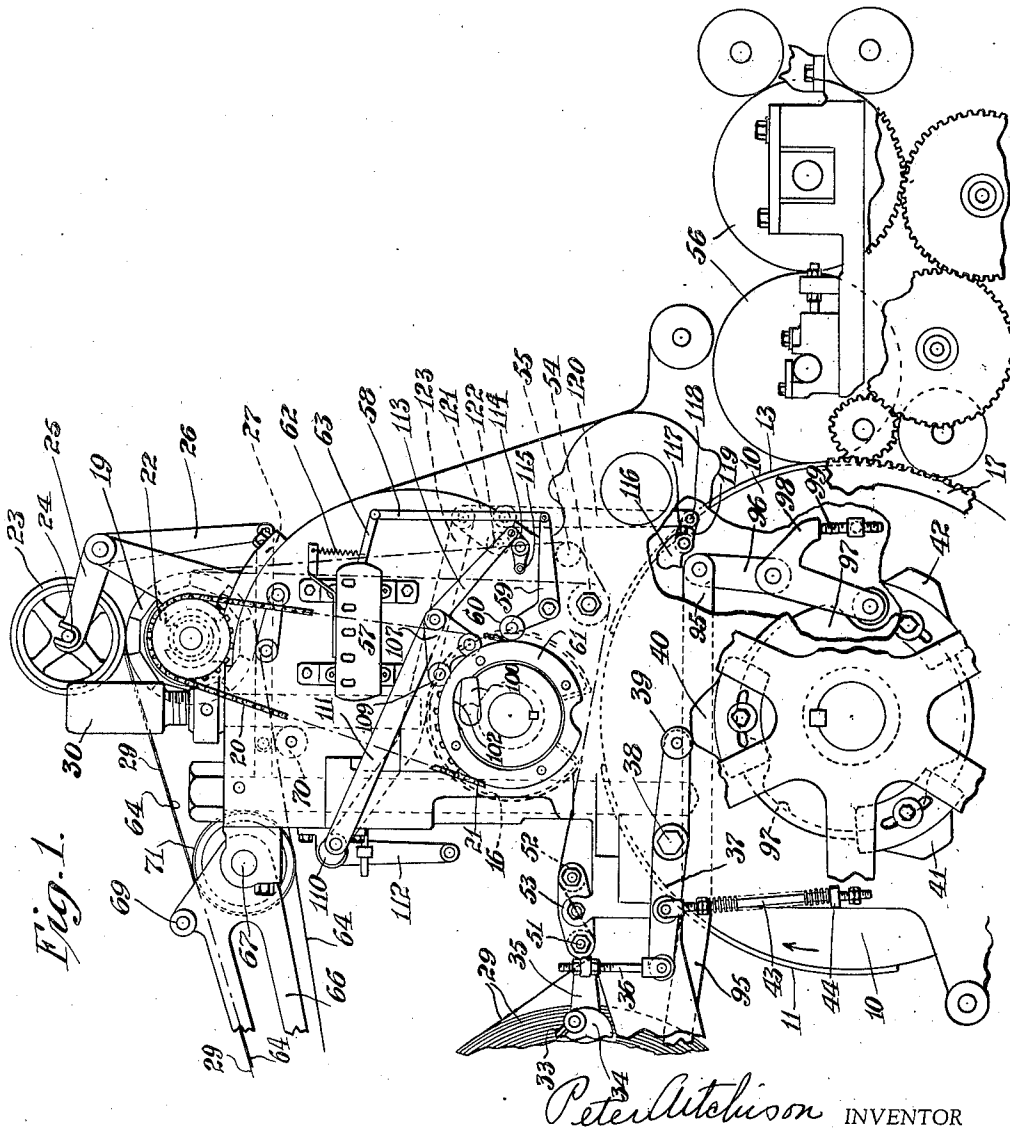
P. AITCHISON

1,576,293

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed April 18, 1924

5 Sheets-Sheet 1



March 9, 1926.

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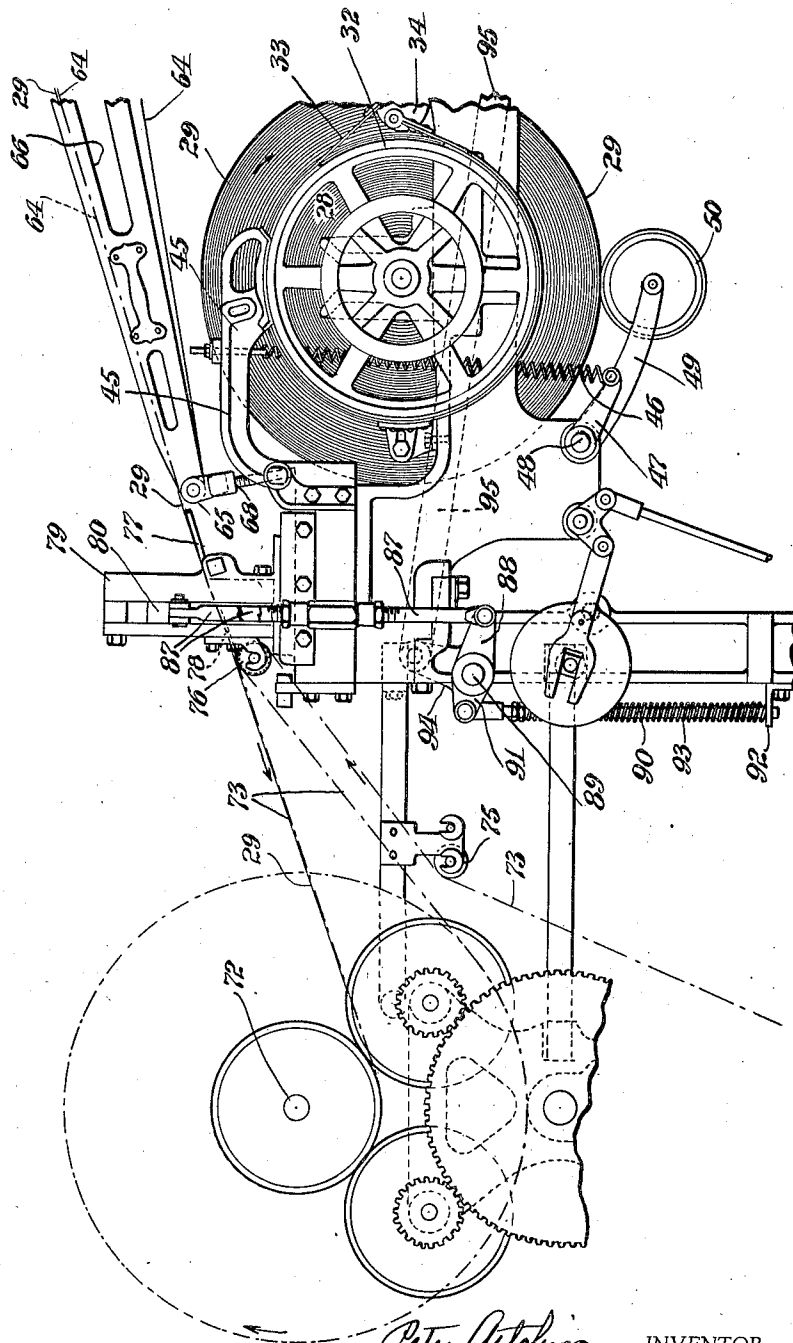
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ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed April 18, 1924

5 Sheets-Sheet 2

Fig. 2.



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ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed April 18, 1924

5 Sheets-Sheet 3

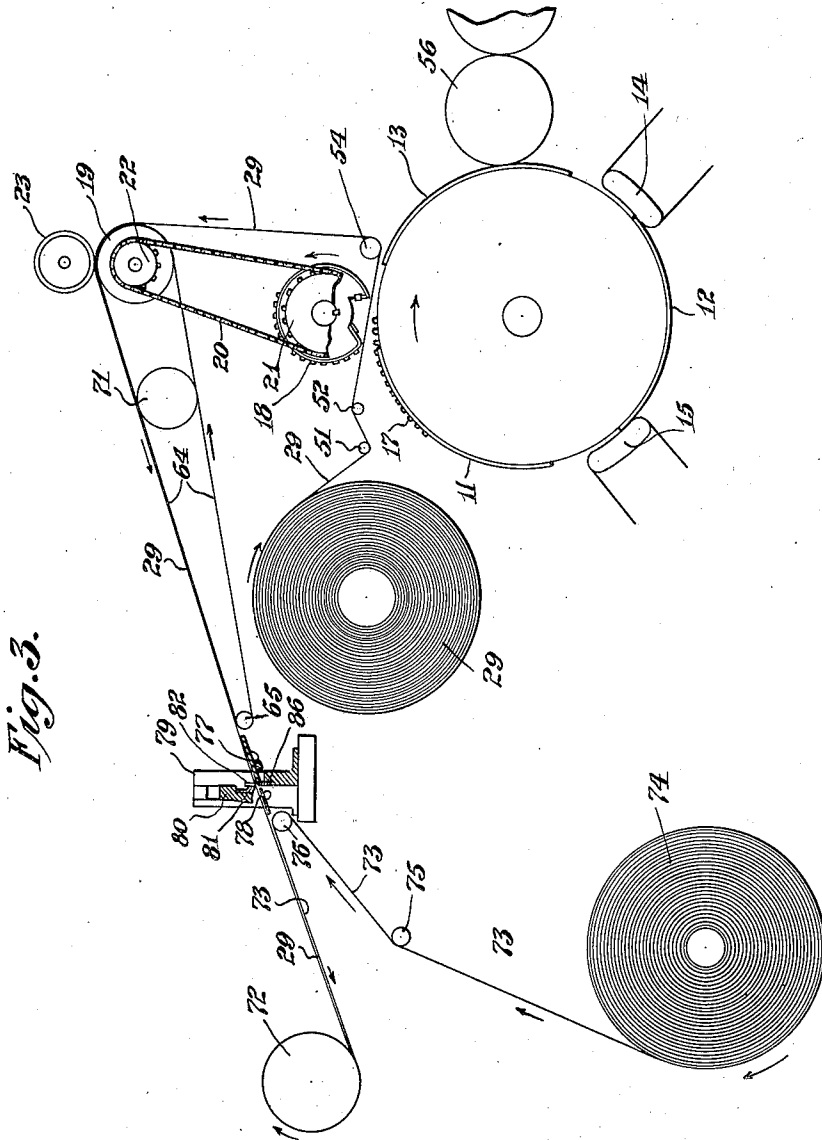


Fig. 3.

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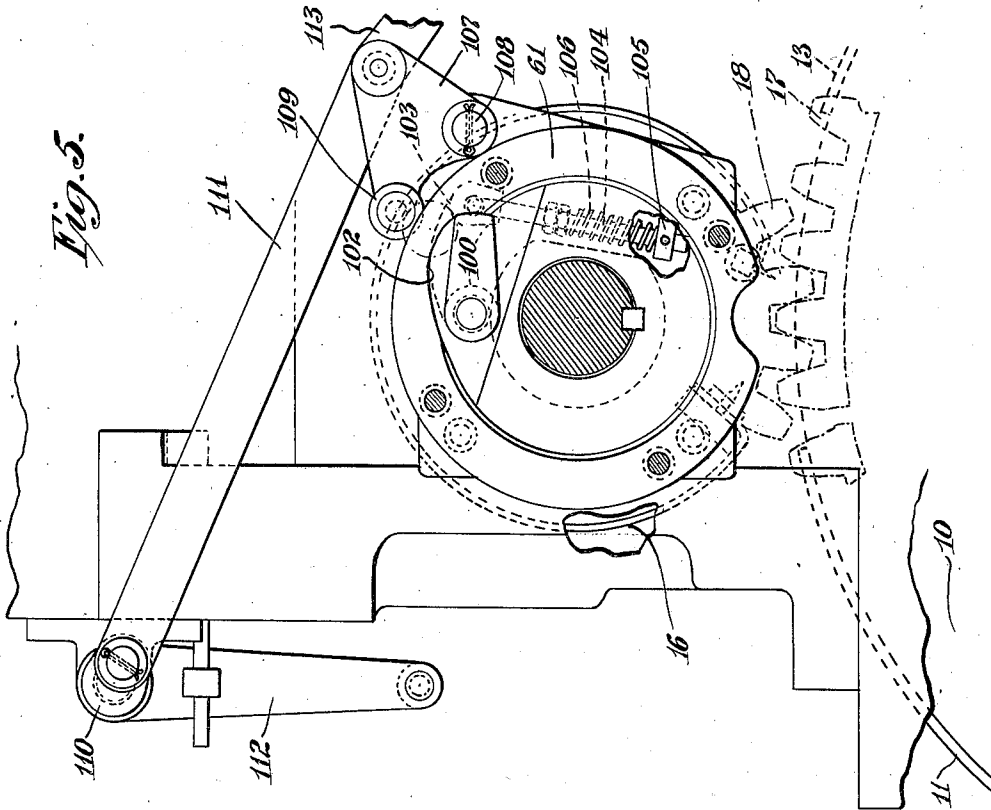
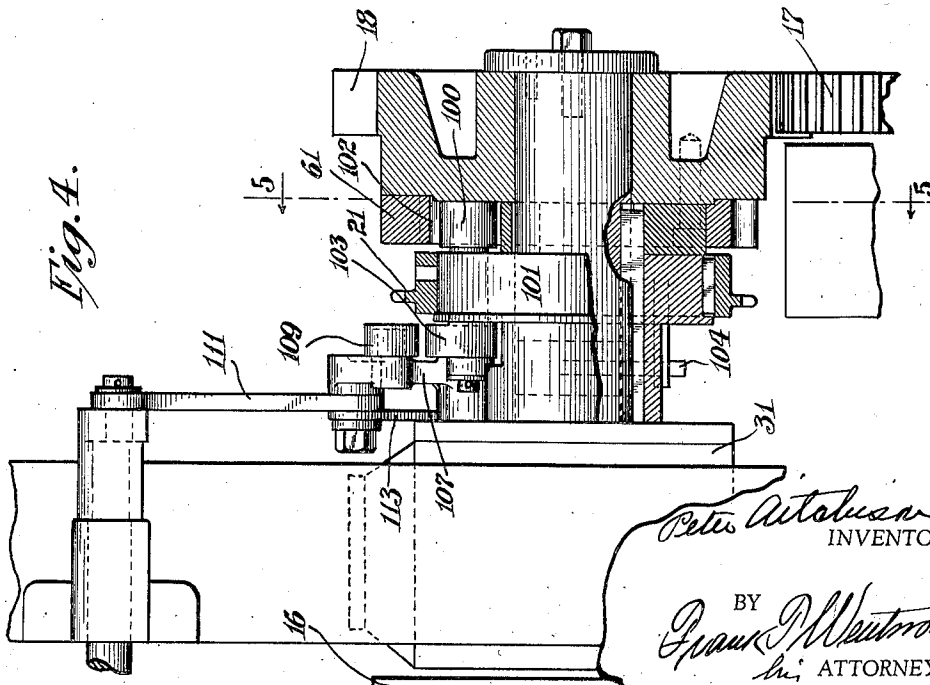
1,576,293

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ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed April 18, 1924

5 Sheets-Sheet 4



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1,576,293

ROTARY WEB UNDERSURFACE PRINTING MACHINE

Filed April 18, 1924

5 Sheets-Sheet 5

Fig. 6.

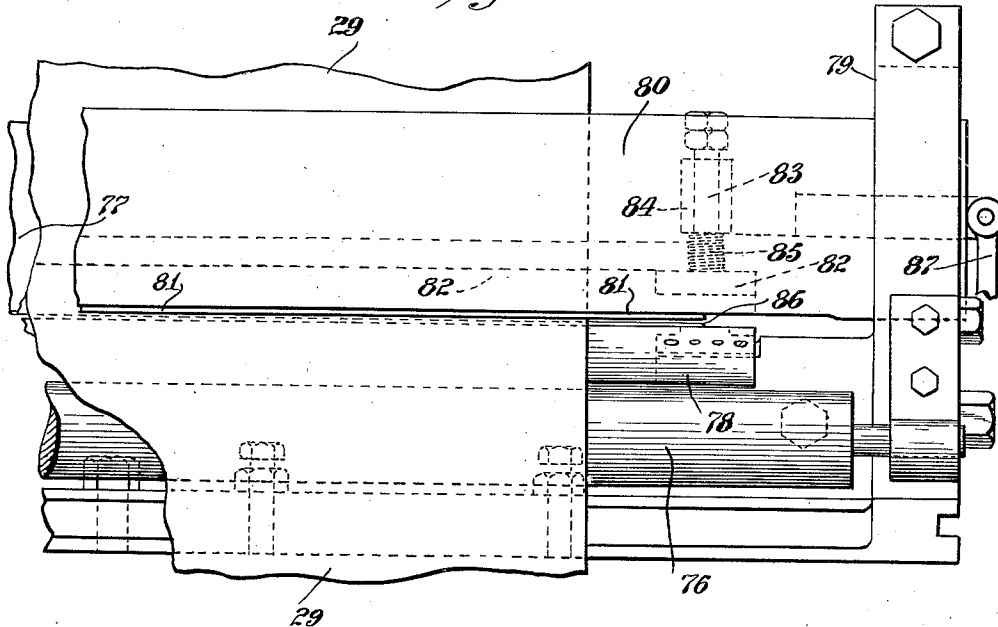
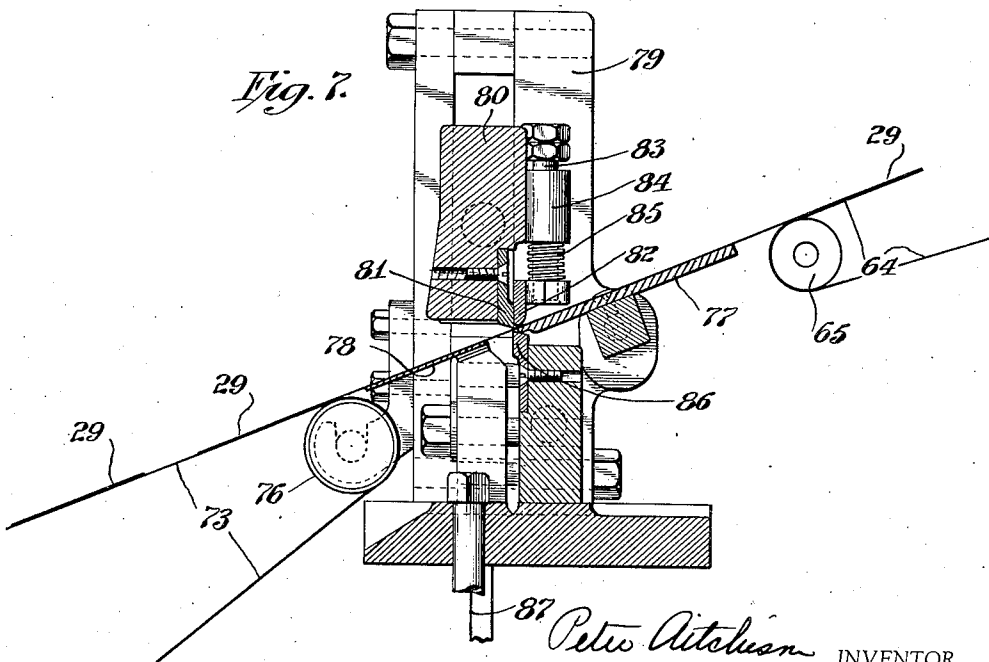


Fig. 7.



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Patented Mar. 9, 1926.

1,576,293

UNITED STATES PATENT OFFICE.

PETER AITCHISON, OF NEW ROCHELLE, NEW YORK, ASSIGNOR TO AMERICAN BANK NOTE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ROTARY WEB UNDERSURFACE PRINTING MACHINE.

Application filed April 18, 1924. Serial No. 707,432.

To all whom it may concern:

Be it known that I, PETER AITCHISON, a subject of the King of the United Kingdom of Great Britain and Ireland, residing at New Rochelle, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Rotary Web Undersurface Printing Machines, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to rotary web undersurface printing machines, and more particularly to a machine of this type, the plate cylinder of which is adapted to receive a plurality of engraved, intaglio, or undersurface plates.

In rotary printing machines or presses, for making impressions from engraved, intaglio or undersurface plates, the making of impressions upon continuous strips or webs of paper has heretofore been found to be extremely difficult and very unsatisfactory from a commercial standpoint. Ordinarily, in making of impressions by such machines, it has been found necessary to dampen or wet the paper. The problem of wetting or dampening the paper has been of a nature which could not be satisfactorily solved irrespective of the speed at which the machine was operated, since the moistening fluid, of necessity, had to be applied to the paper while it was running through the machine, and the result was lack of uniformity in the conditioning of the paper. Furthermore, in such machines it has always been the practice when attempting to print from a continuous strip or web to bring the plates with their edges closely adjacent or abutting one upon the other, so as to secure as nearly as possible a continuous surface about the cylinder, in order to bring the impressions upon the web in sufficiently close proximity to avoid excessive wastage of the paper of the web.

This bringing of the plates close together resulted in the introduction into such machines of a very difficult polishing and wiping problem. Although various wiping mechanisms have been devised for the purpose of packing the lines in the plates and removing ink from the nonprinting surface thereof, such mechanisms have not been found to be sufficiently effective where there

is a practically continuous printing surface owing to the difficulties of developing the requisite pressure of the cloths or rags upon the plates, and of the progressive feeding of the cloths or rags.

In fact, the conditioning of the paper by dampening or wetting it while it is passing through the machine, and the impossibility of securing a continued clean wiping and polishing action, have resulted in a substantially uniform practice of printing upon separate previously dampened sheets of paper, and the abandonment of all efforts to print upon a web.

In the type of rotary printing machines heretofore designed for printing upon a continuous web from engraved or intaglio plates, considerable difficulty was developed arising from the necessity of at least partially drying the web after it had received impressions from the printing couple, and before it was collected in roll form, in order to prevent offsetting upon the insert or anti-offset web.

The attempted use of such machines has been limited to the production of postage or similar stamps and the printing methods required by such machines, have interfered with the application of the adhesive to the unprinted surface of the web, since it was necessary to effectively dry both the paper and the ink before it was possible to run the web through the gumming machine.

With the above conditions in mind I have provided a rotary web undersurface printing machine in which the plates upon the plate cylinder, a plurality of such plates being used, are spaced apart a sufficient distance to permit the effective wiping and polishing of these plates by mechanisms in the machine, the strip or web being fed through the machine with an intermittent, or step by step, movement, so that the impressions may be made closely adjacent one another upon the web, notwithstanding the spacing of the plates apart upon the plate cylinder.

In a machine embodying my invention, the construction is such that the web or strip may be printed while dry, thus avoiding all necessity for the use of a dampening or wetting mechanism in the machine, or a drying mechanism, the elimination of which mechanisms not only ensuring the making of a more perfect impression and minimizing the likelihood of offsetting as the

strip or web is collected, but permitting the operation of the machine at its maximum speed as defined by the time required to properly ink and wipe the plates upon the plate cylinder, and for the paper to pick up ink from the lines of the plate.

While when printing upon a dry web, the ink will adhere more firmly to the paper than though the paper were wet, I provide a collecting mechanism by means of which the printed web may be collected as sheets separated from a continuous web or strip, in a roll of paper so coated or saturated with paraffin or some similar substance as to have little or no affinity for the ink.

To permit the printed web to be delivered in the form of separate sheets, I provide in the machine, a cutter which is automatically actuated in synchronism with the printing couple so that a sheet bearing an impression from each plate will be separated from the end of the web during the dwell of the web between impressions. The actuating mechanism for said cutter is so constructed that it will be made inoperative simultaneously with the actuation of the throw-off mechanism operative upon the D-roll or impression cylinder.

A machine embodying my invention is also so constructed that the moving inertia of the supply roll of the web will be automatically and instantly checked after the making of each impression, thus preventing feeding of the web except under the control of the printing couple, suitable tension devices being provided to ensure accuracy in the alinement of the web as it is passing to the printing couple of the machine and the desired firm frictional engagement of the web between each plate and the impression cylinder or D-roll, thus avoiding wrinkling of the sheet. The braking mechanism and its actuating mechanism are so constructed that while rotation of the paper roll is instantly checked upon the conclusion of each impression, the roll will be released substantially simultaneously with, or just prior to the making of the succeeding impression so as to permit the web to be drawn freely from the roll, supplemental braking means being provided for maintaining the desired light resistance to the movement of the roll and the web drawn therefrom during its feeding intervals.

In a printing machine embodying my invention, the strip or web is drawn from adjacent the printing couple, and fed in relation to the cut-off knife by means of a feeding roller and friction devices co-operating therewith, the angular speed of this roller being relatively greater than that of the impression cylinder or D-roll, so that there will be a tendency to advance the strip at all times, at a speed greater than that at which the impressions are made thereon, so as to

ensure the paper being held taut beyond the printing couple. This construction involves slippage between the paper and the feeding roller, this being possible when dry paper is used.

Since, in a machine embodying my invention, the paper web is fed solely as a result of its engagement between the blanket of the impression cylinder or D-roll and a plate upon the plate cylinder, both members of the printing couple may, and preferably are, rotated continuously, the diameter of the impression cylinder or D-roll being proportioned in relation to that of the plate cylinder as determined by the number of plates carried by said plate cylinder.

This construction permits the members of the printing couple to be geared together by constantly meshing gears which will ensure the desired accuracy in the timing of the impression cylinder or D-roll with relation to each plate upon the plate cylinder. Furthermore, the construction of the machine is such that the making of impressions may be stopped at any time entirely independently of the main actuating mechanism of the machine, through a clutch mechanism connecting the impression cylinder or D-roll proper with its driving gear or gears, so as to permit the blanket carrying portion of the said impression cylinder or D-roll to be disconnected from its driving gear or gears, the construction and arrangement being such that when this disengagement occurs, the recessed portion of the impression cylinder or D-roll will always be presented towards the plate cylinder.

The construction above referred to, permits the application of a counter to the machine, which is driven directly from the gearing of the impression cylinder or D-roll, means being provided, however, whereby in the event of the release of the clutch members immediately above referred to, the actuating means for said counter will be made inoperative.

The invention consists in the novel features of construction and combination of parts 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 at one end of a printing machine embodying my invention, showing the relation of the members of the printing couple, and the various parts appurtenant thereto;

Fig. 2 is a side view of the other end of the machine illustrating the cut-off and rewind mechanisms, and the supply roll of web, and the parts appurtenant thereto;

Fig. 3 is a diagrammatic view illustrating the operations of the machine;

Fig. 4 is a vertical section of the driving mechanism for the impression cylinder and

its D-roll, and the clutch and throw-off mechanisms co-operating therewith;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a rear view of a portion of the machine adjacent the cut-off mechanism; and

Fig. 7 is a vertical section through the cut-off mechanism.

Like numerals refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, I employ a plate cylinder 10 having thereon three engraved, intaglio or undersurface steel printing plates indicated respectively at 11, 12 and 13, these plates being arranged upon said cylinder with their centers spaced apart 120° in arc, and the adjacent edges of the plates spaced apart a distance varying according to the size of plate or plates used. The clearance between succeeding plates is provided to relieve the wiping and polishing cloths indicated respectively at 14 and 15 from pressure from the plates and permit a step by step advancement of these cloths after each wiping and polishing operation. The wiping and polishing mechanism indicated in Fig. 3 of the drawings, is not shown in detail since the use of such mechanisms is old in the art, and they may take a variety of different forms.

Co-operating with the plate cylinder 10 is an impression cylinder or D-roll 16 having the usual recessed portion and blanket tightening mechanism.

Carried by an arbor of the plate cylinder 10, is a gear 17 meshing with a gear 18, idly mounted upon an arbor of the impression cylinder or D-roll 16, and connected therewith by a releasable clutch mechanism which will be more fully described hereinafter.

While the machine is in operation, the cylinders 10 and 16 are continuously rotated by the gears 17 and 18, the proper timing of the engagement of the impression cylinder or D-roll with the plates 11, 12 and 13, respectively, being secured by making the cylinder 16 of a diameter which bears a ratio to that of the cylinder 10 of one to the number of plates carried by the cylinder 10. In the machine shown in the drawings, the diameter of the cylinder 16 will therefore, be one-third of that of the cylinder 10, so as to cause one complete revolution of the impression cylinder or D-roll during the making of each impression by each plate upon the plate cylinder.

Associated with, and positioned above the printing couple, is a delivery cylinder 19 rotated from the impression cylinder or D-roll 16 by a sprocket chain 20 passing over sprocket wheels 21 and 22, carried by said impression cylinder or D-roll 16, and by

said delivery roll respectively, the relative diameter of these sprocket wheels and of said impression cylinder or D-roll and the feeding cylinder, being such as to secure higher peripheral speed of the cylinder 19 than of the cylinder 16.

The delivery cylinder 19 is driven from the impression cylinder or D-roll 16 since stoppage of the machine results from the disengagement of the clutch mechanism connecting said cylinder 16 with its driving gear 18, and it is desirable to interrupt any possible feeding movement of the strip or web by the feed cylinder 19 in the event of the stoppage of the cylinder 16.

Positioned adjacent each end of the cylinder 19 is a friction wheel 23, the position of these friction wheels being such that they will not engage with the inked impression upon the web passing over said cylinder 19.

Bearings 24 for the wheels 23 are formed in an oscillatory frame 25 having an actuating arm 26 connected with a slidable bar 27, the adjustment of which bar will cause the engagement or disengagement of said friction wheels 23 with the cylinder 19, or the web passing thereover, for the purpose of facilitating the threading of the web through the machine at the starting of a run with a fresh web.

As heretofore stated, no paper dampening mechanism is required in a machine embodying my invention, the web being fed through the machine in a dry state, preferably having one surface thereof gummed before the making of the impression, and upon a separate machine, thus not only avoiding those difficulties inherent to proper dampening of the paper, but minimizing likelihood of wastage of printed sheets during the gumming operation. At the same time the application of the gum at a higher speed than is possible with singly printed sheets, is possible, and a material saving of time in the making of the completed printed and gummed sheets is effected. This saving of time results from the absence of any necessity for drying the paper before applying the gum thereto, and from the fact that gumming a continuous strip or web can be done more rapidly than is possible with single sheets.

At one side of the printing couple at each side of the machine, is a bearing 28 for the arbors of the core of a roll of continuous strip or web of paper 29, this bearing being capable of movement to permit the adjustment of the roll, in its entirety, for the purpose of ensuring a timely rectilinear traverse of the web, or straightening the web with relation to the printing couple.

In printing upon a dry strip or web, it is necessary to develop considerable pressure between the impression cylinder or D-roll 16, and a plate upon the cylinder 10, such

adjustment for pressure being secured in the form of the invention shown, by means of pressure screws as 30, acting against the bearing housings for the arbors of the impression cylinder or D-roll 16, one of said housings being shown at 31, Fig. 4 of the drawings.

The roll of paper strip or web 29 has considerable weight, which will vary according to the quality of the paper and its width. With papers commonly used, the average weight of such rolls would be, in the width of paper required for steel plate work, between three and four hundred pounds. Hence the moving inertia of this roll is sufficiently great to tend to materially interfere with the proper feeding of the paper with relation to the printing couple, so that means must be provided to normally resist the rotation of the roll when feeding paper therefrom, and to positively stop such rotation instantly with the release of frictional engagement of the paper by the members of the printing couple.

To meet this condition, I provide an arbor of the core of the paper roll 29 with a brake drum 32 co-operating with which is a band brake 33, the ends of the band of which are carried by a plate 34. The oscillations of this plate will either firmly set the brake band so as to instantly stop or release said brake band so as to permit the free rotation of said roll. An extension 35 upon this plate is connected by means of a link 36 with a rocking lever 37 pivoted at 38, one arm of this lever being provided with an antifriction roller 39 extending into operative engagement with a cam carried by the shaft of the plate cylinder 10. This cam has three risers, 40, 41 and 42, so located as to be operative upon the roller 39 substantially simultaneously with the disengagement of each plate upon the cylinder 10 and the blanket upon the impression cylinder or D-roll 16, with the paper.

Since the plates 11, 12 and 13 may be set with their rear edges positioned with relation to the location of the respective risers of this cam, no means permitting adjustment of said cam is necessary, and no advantage is secured by making this cam adjustable with relation to the plate cylinder.

Carried by the lever 37 is a spring rod 43 slidably mounted in a bracket 44 in a manner to cause the spring of said rod to have a normal tendency to rock the plate 34 to release the band brake 33, the oscillation of said lever 37 under the control of the various risers 40, 41 and 42 being against the tension of this spring rod.

By this arrangement of the stop brake and the manner of actuating same, and by controlling the feeding movement of the web at the supply roll, the feeding of the web by the printing couple itself is secured and the

feeding of the web by the feeding roller 19 except as slack is created therein, as a result of the action of the printing couple, is prevented. In other words, instantly with the disengagement of a plate from the web, all feeding movement of the web ceases, notwithstanding the continued rotation of the cylinders 10, 16 and 19.

The band brake mechanism above described is utilized merely as a stop mechanism for arresting all feeding movement of the web upon the completion of each impression, and preventing the creation of slack as a result of the moving inertia of the roll of web after the making of each impression. It is desirable, however, to provide a retard device which will develop and maintain sufficient resistance to the rotation of the roll of strip or web 29 while the strip is being fed during the making of each impression so as to hold the strip or web taut between the supply roll and the printing couple, and prevent overrunning of the roll during this feeding movement.

Since with the continued run of the press, there is a gradual decrease in diameter of the supply roll of web 29, and consequently a progressively decreasing leverage at which the strip or web acts in unwinding the paper from the roll, and an increasing quantity of rotation of the roll in unwinding a given length of web, it is desirable to so construct the retard device as to ensure a progressive decrease in the resistance to the rotation of the roll as its diameter decreases. This retard device in the form of the invention shown, comprises a pivoted brake member 45 acting upon the brake drum 32. This brake member is acted upon by a spring 46, one end of which is connected to said brake member, and the other end of which is connected to a crank 47 carried by the shaft 48, which shaft also has an arm 49 carrying a roller 50 bearing upon the perimeter of the paper roll. By this construction the tension of the spring 46 will be determined by the diameter of the roll of web 29 and this tension will be gradually decreased as the roller 50 advances toward the core of the paper roll with the decrease in the diameter of said roll. As a consequence, the braking action of the member 45 will be governed by the tension of the spring 46 and will therefore become gradually less as the diameter of the roll decreases, or as the quantity of rotary movement of the brake drum 33 increases, during the withdrawal of a given length of paper from the roll. Hence the resistance to, or retardation in, the movement of the roll as paper is drawn therefrom, will remain fairly constant, the great pressure between the plates upon the cylinder 10 and the impression cylinder or D-roll 16 permitting considerable latitude in this respect.

As shown more particularly in Fig. 3 of

the drawings, the paper web is led from the top of the roll, since in gumming such webs, it is the practice to have the gummed surface presented outwardly.

tion of the impression cylinder or D-roll 16.

Passing about the feeding roller 19 is an endless blanket 64, said blanket also passing about a roller 65 adjacent the end of the frame 66. This frame is pivoted at 67, and its free end is supported adjacent the cutoff mechanism, to be hereinafter described, by means of the rest pin 68. Carried by said frame is a takeup roller 69 for controlling slack created in the blanket 64 between the pivotal point 67 and the feeding roller 19 when the frame 66 is turned upwardly about said pivot 67 to facilitate the mounting of a roll of strip or web 29 in the bearings 28. The lower reach of the blanket 64 passes about a guide roller 70 positioned between the pivot 67 and the feeding roller 19, the shaft of the pivot 67 also having mounted therein a guide roller 71 for the opposite reaches of said blanket.

The friction wheels 23 and the blanket 64 may aptly be termed a feeding mechanism, since their function is to receive the paper strip or web from the printing couple and advance it in relation to a cutoff mechanism, so as to permit the collection of printed sheets by means of a collecting mechanism which may take any desired form, but which in the embodiment of the invention shown, consists in a mechanism by which the sheets severed from the strip or web are delivered and wound within a roll of a continuous strip or web of anti-offset material, such as tissue or waxed paper. This form of collecting mechanism is used because a continuous strip of anti-offset material affords a simple mechanism by which each severed sheet will be received from the cutoff mechanism and accumulated in a form which will prevent offsetting of ink from one sheet to another, while permitting the rapid collection of these sheets after the ink is dried, by an independent mechanism. Furthermore, this web or strip of anti-offset material will serve to support the sheet before it is cut from the end of the web and at all times thereafter until it is wound within the roll of this material.

The collecting mechanism comprises a rewind reel 72 driven in any desired manner and from any desired source of power. Leading to this reel is a continuous strip or web of paraffined paper 73, or any other desired type of anti-offset material, said strip or web passing from a supply reel indicated at 74, Fig. 3, about guide rollers 75 and 76, one of which as 76, is located closely adjacent the shearing knife of the cutoff mechanism.

As indicated in dotted lines, Fig. 2, the pitch of the reach of this strip 73 will vary with the diameter of the roll of said anti-offset material upon the reel 72, without in any way modifying the operative effect of the collecting mechanism, so far as the col-

To ensure the proper travel of the web 29 irrespective of the diameter of the roll of web, and also ensure the proper running of the web, I provide a tension device intermediate the supply roll of paper web and the printing couple, consisting of a pair of rollers 51 and 52 mounted in adjustable frames 53 through which the paper strip or web is threaded. This tension device will automatically take up slight variations in the length of strip between the printing couple and the supply roll of strip or web, or between said supply roll and the feeding roll 19 when said impression cylinder or D-roll 16 is inoperative when the web is relieved from the tensioning stress.

Between the printing couple 10—16 and the feeding roll 19 are guide rollers 54 and 55, one of which as 54 is used when one length of plate is upon the cylinder 10, and the other of which is used when a different length of plate is upon said cylinder. This guide roller arrangement, however, is old and well known in other types of rotary web printing machines.

Associated with the plate cylinder 10 is an inking mechanism 56 which may take any desired form so long as it is located so as to apply ink to each plate after an impression has been made therefrom, and before said plate comes into the operative relation to the wiping and polishing cloths.

I preferably embody in the machine an automatic counter which will register the number of impressions made upon a strip or web. The detailed construction of this counter is immaterial to the invention, but the particular manner of actuating the counter from the impression cylinder or D-roll, or the driving mechanism therefor, and the mechanism by which actuation of the counter is prevented substantially simultaneously with the stoppage of the making of impressions, I believe to be novel. This counter is shown, Fig. 1 of the drawings, at 57, and the actuating means therefor consists of a link 58, one end of which is operative upon said counter and the other end of which is connected with a rocking lever 59, one arm of which carries an antifriction roller 60 co-operating with a recessed plate 61 carried by the gear 18 operative upon the impression cylinder or D-roll 16. The roller 60 is normally forced toward the plate 61 by a spring 62 operative upon the actuating member 63 of the counter 57.

As will appear more fully hereinafter, said rocking lever 59 will be moved and maintained out of the operative relation to the plate 61 through the medium of the throwoff mechanism for controlling the rota-

lection of the severed sheets in a roll of anti-offset material is concerned.

Between the roller 76 and the roller 65, a gap is afforded in which the cutoff mechanism is positioned, the printed paper web or strip spanning this gap and resting upon the anti-offset strip 73 before the end of the strip is severed to form the printed sheets. This location of the cutoff mechanism is such as to avoid the cutting of the web 73.

It is apparent that with an intermittently fed strip or web, it is essential that this cutoff mechanism be actuated during that interval when the web has no feeding movement, or while the band brake 33 is set upon the drum 32. Hence the actuation of this cutting mechanism is synchronized with the actuation of the stop mechanism and preferably is controlled from the shaft of the plate cylinder 10, or the same member from which the actuation of the band brake 33 is controlled.

Referring more particularly to Figs. 2, 6 and 7 of the drawings, this cutoff mechanism comprises a plate 77, the top face of which is on substantially the same plane as the upper reach of the blanket 64, and a second plate 78, the top face of which is on the same plane as said first named plate, and which terminates adjacent the guide roller 76. Said plates 77 and 78 are spaced apart a sufficient distance to afford clearance for the actuation of the shearing blade and a clamp mechanism co-operating therewith. Said plates 77 and 78 are carried by a bracket 79 in which is mounted a vertically reciprocatory head 80 carrying a shearing blade 81 and a clamp bar 82. This clamp bar is carried by suitable slidable stems 83 mounted in housings 84 upon the head 80. Said stems are acted upon by springs 85 having a normal tendency to thrust the clamp bar downwardly but permitting the bar to yield as it engages and presses the paper strip or web against the plate 77. Below the plate 77 is a second shearing blade 86 with which the shearing blade 81 co-operates. Suitable clearance is provided below said blades to permit the escape of fluff resulting from the cutting operation.

The cutter head 80 receives reciprocatory movement through the medium of links 87 pivotally connected therewith and with crank arms 88 carried by a rock shaft 89. Said rock shaft is acted upon by a spring rod 90 acting upon a crank 91 carried by the shaft 89 and extending therefrom substantially diametrically opposite the cranks 88. The lower end of this spring rod is mounted in a bracket 92 against which the spring 93 of said rod acts when rocking the shaft 88 in a manner to draw the cutter head downwardly.

Said shaft 88 is provided with another crank arm 94, which crank arm is connected

by the link 95 with a rocking lever 96 acted upon by a cam 97 upon the shaft of the cylinder 10. This cam is provided with three long risers as shown, the risers of said cam being of a length to hold the cutter head in its uppermost position, and the spring 93 in tension during that interval when an impression is being made, but instantly releasing said lever 96 and permitting said spring to function upon the completion of the making of an impression, and simultaneously with the actuation of the rocking lever 37 for setting the band brake 33.

The lever 96 is provided with an extension 98 adapted to engage an adjustable stop 99 for the purpose of limiting the movement of the cutter head 80 under the control of the spring 93, and thus defining the length of stroke of said cutter head and its blade 81.

The cam 97 has three risers thereon, the falls of said cam being so set with relation to the risers 40, 41 and 42 as to ensure accuracy in the timing of the setting of the stop mechanism and the actuation of the cutter.

In the machine of my invention herein shown and described, the impression cylinder or D-roll 16 is connected with the driving gear by a clutch mechanism which is under the control of a throwoff mechanism. This throwoff mechanism in addition to releasing said clutch so as to check the rotation of the impression cylinder or D-roll, acts simultaneously to prevent the actuation of the cutter head by the spring 93, and prevent actuation of the counter 57. Hence when the clutch mechanism is released, and the arrangement of parts is such that this can occur only when the recess in the impression cylinder or D-roll 16 is presented toward the plate cylinder, the band brake 33 is set, and the cutter blade 81 is in its raised position, all of the mechanisms in the machine by which impressions are made, by which the strip or web is fed with relation to the cutter, and by which the cutting blade is actuated, are made instantly inoperative, notwithstanding that power is still being applied to the machine.

The clutch mechanism by which power is transmitted to the impression cylinder or D-roll 16 from its driving gear 18, includes therein a dog 100 pivotally mounted in a collar 101 keyed to the arbor of said cylinder 16. This dog is adapted to engage a tooth 102, formed in the plate 61, which plate is carried by, and rotates with the gear 18. Carried by the shaft of the dog 100 is an arm 103 acted upon by a spring rod 104, one end of which is slidably mounted in a bracket 105, the spring 106 of this rod having a normal tendency to act upon the arm 103, in a manner to engage the dog 100 with the tooth 102. By this arrangement,

the said dog 100 is normally engaged with the tooth 102 so that rotation of the gear 18 imparts similar movement to the impression cylinder or D-roll 16.

5 Mounted adjacent the impression cylinder or D-roll is a fitting 107 pivoted at 108 and carrying a striker roller 109, adapted when it is desired to stop making impressions, to be positioned in the path of movement of the roller carried by the arm 103, so that when said arm or the roller thereon is engaged by said striker roller, the shaft carrying the dog 100 will be oscillated in a manner to disengage it from the tooth 102. 10
15 The fitting 107 is so located that the roller 109 will engage the arm 103, only at a time when the recessed portion of the impression cylinder or D-roll is positioned toward the plate cylinder 10, or when the paper strip or web 29 is stationary, as a result of the disengagement of the blanket upon said impression cylinder or D-roll, with a plate upon the cylinder 10, and other mechanisms in the machine have been made operative to prevent movement of the strip or web. 20
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The sprocket wheel 21 is carried by the sleeve 101, being keyed thereto as shown more particularly in Fig. 4, so that the disengagement of the dog 100 with the tooth 30 102 will also cause the stoppage of the feeding roller 19, and the blanket 64. The fitting 107 is connected with a manually operative crank shaft 110, by a link 111, said shaft 110 having a crank handle 112 by means of which it may be actuated. Said link 111 has an extension 113 connected with a rocking lever 114, one arm, 115, of which is positioned adjacent the lever 59 so that with the oscillation of said fitting 107 for the purpose of disengaging the dog 100 from the tooth 102, the lever 114 will be so actuated as to project the arm 115 in the path of movement of the lever 59, as a result of the movement of the plate 61, and thus prevent the actuation of the counter 57 at all times when the impression cylinder or D-roll is inoperative to make an impression. 40
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Mounted adjacent the link 95 is a pivotally mounted stop 116 adapted to be interposed in the path of movement of said link, said stop having a normal tendency to descend by gravity to a position where it will prevent the return movement of said link and lever 96, under the control of a spring 93. This normal tendency of the stop to descend by gravity, however, is restrained by a stop 117 upon a crank 118 said stop having a heel 119 adapted to engage the stop on said crank 118. Said crank is connected by a link 120 with an oscillatory plate 121 pivoted at 122, and connected by the link 123 with the crank shaft 110. Hence by throwing the shaft 110, by means of its crank handle 112, the clutch through 50
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which the impression cylinder or D-roll is actuated; the counter, and the cut-off mechanism will simultaneously be made inoperative, but only after the completion of the making of an impression, the registering of this impression and the separation of a sheet from the end of the strip or web 29 by the knife or cutter blade 81. Since the feeding cylinder 19 is driven directly from the impression cylinder or D-roll 16, and indirectly from the gear 18, the feeding of the strip or web 29 to the cutter mechanism will be stopped simultaneously with the stoppage of the impression cylinder or D-roll. 70
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The operation of the herein described is substantially as follows:— 80

In starting a run of the machine, the end of the strip or web 29 is drawn from the supply roll, threaded below the roller 51, and above the roller 52 of the tensioning device, and brought between the impression cylinder 16 and the plate cylinder 10, the throwoff mechanism having been previously actuated to disconnect the cylinder 16 from its driving gear 18 in order to ensure the recessed portion of the impression cylinder or D-roll 16 being presented toward the plate cylinder. 85
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As heretofore stated, the strip or web 29 has one surface thereof coated with a dry adhesive or gum, which surface will be presented toward the impression cylinder or D-roll. In threading the strip or web through the tensioning device, this device may be used as a gauge to determine whether or not the position of the supply roll is such as to ensure the desired straight run of the strip or web while the machine is in operation. The supply roll is turned by hand to create slack sufficient to facilitate this threading of the strip or web. 100
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The tensioning device not only serves as a support for the strip or web intermediate the supply roll and the printing couple, but by reason of the diversion of the path of travel of the strip of web from a straight line, will place a tensioning pressure upon the strip or web, and ensure its passing to the printing couple always at the same angle, and will compensate for any slight slack which may develop between the tensioning device and the supply roll. In order to ensure the straight running of the strip or web, the arbors for the core of the supply roll may be adjusted in the usual manner. 110
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So long as the free end of the strip or web is brought beyond the printing point, power may be applied to a machine for making impressions, and as the web is fed by its frictional engagement between the impression cylinder 16 and a plate 11, 12 or 13 upon the cylinder 10, the pressman passes the end of the strip about the guide roller 54, or the guide roller 55, and up- 125
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wardly about the feeding roller 19 or rather about the blanket 64 thereon, the end of the strip or web being inserted between the friction wheels 23 and said blanket 64.

5 Thereafter all of the functionings of the machine will be automatic.

While the recessed portion of the impression cylinder or D-roll 16 is presented toward the plate cylinder 10 at a point of said cylinder corresponding with the space between two of the plates upon said cylinder, one of the risers 40, 41 or 42 will be in engagement with the roller 39 so as to hold the rock shaft 37 in a position which will set the brake 15 band 33 upon the drum 32 and prevent movement of the supply roll. With the engagement of the blanket of the impression cylinder or D-roll 16 with the forward edge of the succeeding plate, or rather as said 20 cylinder 16 and the forward edge of the succeeding plate approach the printing position so as to frictionally engage the strip or web 29 between them, the riser 40, 41 or 42 will pass from its engagement with the roller 39, and thus permit the spring 25 rod 43 to actuate the lever 37, and through the link 36, extension 35 and plate 34, release the brake band 33 and permit the supply roll to turn as a pull is exerted upon the strip or web by the impression cylinder 30 and the plate. The brake 45 will act merely as a retard to ensure the strip or web 29 being held perfectly smooth from the point of its engagement by the printing couple to 35 the point where it leaves the supply roll.

The feeding of the strip or web 29 will thus be solely due to its frictional engagement between the impression cylinder or D-roll 16 and a plate 11, 12 or 13 upon the 40 impression cylinder, the feeding roller 19 and its blanket 64, and the friction wheel 23 co-operating therewith serving merely to advance the strip or web in relation to the cutoff mechanism as it is fed by the 45 printing couple.

The feeding of the strip or web 29 will cease instantly when the rear edge of any plate passes the printing position, irrespective of the length of the plate, and substantially simultaneously with the cessation 50 of such feeding movement, the succeeding riser 40, 41 or 42 by engagement with the roller 39, and the mechanisms connecting same with the band brake 33, will set said 55 brake so as to overcome the moving inertia of the supply roll. With a short plate the release of the braking action by the band 33 may be slightly in advance of any feeding movement of the strip or web by the 60 printing couple, but this will not in any way affect the making of the succeeding impression. There is little likelihood of any overrunning of the supply roll, since the use of the band brake mechanism will pre-

vent the development of momentum of the 65 supply roll and will ensure the making of succeeding impressions in a machine under exactly the same conditions.

The band brake 33 will be set upon the drum 32 for an interval substantially corresponding with the non-printing interval, and the plates 11, 12 and 13 may be so set upon the cylinder 10 as to ensure the setting of the band 33 upon the drum 32 substantially simultaneously with the release 75 of the strip or web by the printing couple after each impression is completed.

As the diameter of the supply roll of strip or web gradually decreases, so as to require a greater quantity of rotary movement of the roll in withdrawing the desired length of paper therefrom, the movement of the roller 50 toward the core of said supply roll, will reduce the tension upon the spring 47 so as to progressively reduce 85 the friction developed by the brake member 45, and thus substantially compensate for the increased retardation effect which ordinarily would result from the greater and faster rotary movement of the drum 32. 90

The plate cylinder 10, and the impression cylinder or D-roll 16 rotate continuously while impressions are being made, and the feeding roller 19 and its blanket 64 will therefore having continuous movement while 95 the machine is in operation, since the feeding cylinder 19 is driven from the impression cylinder or D-roll, but at a slightly greater angular speed. This condition will result in slippage between the blanket 64 100 and the printed strip or web 29 since, while an impression is being made, the strip or web can have movement only at the speed defined by the printing couple, and upon completion of the impression, the brake band 105 33 will prevent any feeding movement of said strip or web. In fact, the frictional engagement of the strip or web 29 between the blanket 64 with its backing, the roller 19, and the friction wheels 23 is not sufficiently 110 strong to do more than take up the slack in the strip or web 29 as it is created by the printing couple.

As a result of the conditions above referred to, while there is a continuous rotation of the members of the printing couple, and a continuous actuation of the feeding mechanism for advancing the strip or web toward and in the operative relation to the cutoff mechanism, said strip or web will 120 pass through the machine by an intermittent or step by step movement which will permit the impressions thereon to be brought fairly close together, notwithstanding that the plates 11, 12 and 13 upon the cylinder 125 10 are spaced apart a considerable distance in order to afford that space required to permit the feeding movement of the wiping

and polishing rags following each wiping and polishing operation.

I have made no attempt to provide a machine so nicely adjusted as to permit a continuous impression to be made upon the strip or web, since a small white margin about each impression is not objectionable, and in fact is generally desirable, particularly in the making of sheets of stamps. The intermittent movement of the strip or web and the feeding thereof by means of the printing couple itself, will limit the white space between impressions to the marginal non-printing portions of the plates, and thus effect a material saving of paper.

The blanket 64 will carry the strip or web 29 toward the roller 65, the end of the strip or web spanning the short gap between said roller and the plate 77 passing along said plate 77 to the plate 78 across and above the cutting blade 86. After leaving the plate 78, the end of the strip or web 29 passes upon the continuous strip 73 of anti-offset material which may receive either continuous or intermittent movement as desired, from the supply roll 74 about the guide rollers 75 and 76 to the rewind reel 72.

Substantially simultaneously with the actuation of the band brake 33 by any riser 40, 41 or 42, the roller upon the rocking lever 96 will pass into one of the falls of the cam 97, and thus permit the spring 93 of the spring rod 90 to rock the shaft 89 in a manner to draw the rods 87 downwardly, and thus bring the cutter head 80 with its blade 81 and clamp bar 82 toward the plate 77, and the blade 86, respectively.

The springs 85 will have a normal tendency to position the clamp bar 82 in advance of the blade 81, so that this clamp bar will engage a portion of the strip or web upon the plate 77 and hold it firmly in position in relation to the cutting blade 86, before the shearing blade 81 comes into the operative relation to said blade 86.

By reason of the timing of the actuation of the levers 96 and 37, the actuation of the cutter mechanism through the connecting rod 95 can occur only at a time when there is no feeding movement of the strip or web.

Since the cutter head 80 is actuated solely by the spring rod 90, it is desirable to provide means for limiting the quantity of movement of said cutter head, which may be so adjusted as to ensure a clean cut of the strip or web, and yet prevent excessive movement of the cutter head. This result is secured by the arm 98 of the lever 96, and the adjustable stop 99 arranged in the path of movement of the arm 98.

Since the strip or web 29 is dry and coated with a dry adhesive or gum, a clean cut thereof is possible. Smutting of an impression will not occur since the clamp bar 82 will engage a narrow strip of the strip or web

between imprints thereon, but the travel of the web from adjacent the printing couple to the location of the cutter mechanism will afford a sufficient dwell to permit, at least, a partial oxidation of the oil vehicle of the ink before the end of the strip or web reaches the cutter mechanism. The strip 73 is used, however, to prevent offsetting, since there is always a possibility of portions of the impression not being properly dried.

The manner of actuating the rewind reel 72 is immaterial to the present invention, and this mechanism may be either such as to permit a slow continuous movement of the anti-offset strip 73, or a more rapid intermittent movement thereof.

Since the separation of the end of the strip or web from the remainder thereof occurs while said strip or web is held against movement by the band brake 33, and since when the press is operated this interval is short, it is preferable to have the cutter head 80 actuated by a spring rather than by a cam, since this will ensure the desired rapid movement of the blade 81 and a slower return movement thereof by the cam, against the tension of the spring 93, will have no effect whatever so far as cutting by the blade 81 is concerned. The cams carrying the risers 40, 41 and 42 and 97, being carried by and rotatable with the shaft of the plate cylinder 10, will ensure accuracy in the relative operation of the band brake 33, and of the cutter mechanism.

The operation above described will occur immediately following the making of each impression, and while the dwell between impressions is for but a short time interval, it is sufficient to permit the separation of the strip or web into separate sheets without reducing the capacity of the machine.

The feeding mechanism for the wiping and polishing rags or cloths 14 and 15 is that ordinarily found in rotary printing machines of the undersurface type, and the timing of the actuation of said feeding mechanism for said rags or cloths, bears no relation to the actuation of other mechanisms in the machine, excepting so far as the position of the plates upon the cylinder 10 is concerned. In fact, when an impression is being made from one plate in a three plate machine, another of the plates will be acted upon by the wiping mechanism, and the third plate will be acted upon by the polishing mechanism.

With each rotation of the impression cylinder or D-roll 16, the plate 61 carried by and movable with said cylinder will receive one rotation so that the recess in said plate 61 will, during each rotation, permit the actuation of the lever 59 by the spring 62 to register the impression upon the counter 57.

As heretofore stated, since the sprocket wheel 21 is carried by and rotatable with

the cylinder 16 as distinguished from the gear 18, the sprocket chain 21 and the sprocket wheel 22 will continuously rotate the feed cylinder 19 while the machine is in operation.

The stoppage of the impression cylinder or D-roll will, in a manner which will now be described, also stop the feeding movement of the roller 19 and the actuation of the counter 57 upon the actuation of the throwoff mechanism for making the impression cylinder 16 inoperative, notwithstanding the continued rotation of the gears 17 and 18.

When it is desired to interrupt the making of impressions, the shaft 110 is thrown by means of its handle 112, an approximately 180° movement of said shaft having the threefold effect of releasing the clutch mechanism, connecting the impression cylinder or D-roll with its driving gear 18, preventing actuation of the counter 57 and preventing the actuation of the cutting mechanism.

The first of these results is secured by the movement of the plate 107 through the link 111, so as to interpose the roller 109 carried by said plate in the path of movement of the lever 103, and cause the dog 100 to be disengaged from the tooth 102 formed in the plate 61, when the recessed portion of the impression cylinder or D-roll is presented toward the plate cylinder 10, or upon the completion of the making of an impression only. This movement of the lever 103 and the dog 100 will be against the tension of the spring 106 of the spring rod 104, so that after the dog 100 is disengaged from the tooth 102, the spring rod 104 will have a normal tendency to re-engage said dog with said tooth, although this cannot occur so long as the position of the plate 107 is such as to maintain the roller 109 in the path of movement of the lever 103.

The extension 113 of the link 111 will oscillate the crank 114 so as to bring the crank 115 in the path of movement of the actuating lever 59 for the counter 57, and thus prevent the actuation of said counter during rotary movement of the plate 61 with the gear 18, so long as the dog 100 is disengaged from the tooth 102. The location of the recess in the plate 61 permitting movement of the lever 59, is such with relation to the position of the tooth 102 upon said plate 61, that irrespective of the time during a revolution of the cylinder 16 that the throwoff mechanism is actuated, the impression made will be registered upon the counter 57 since after the lever 103 has once passed the point where the roller 109 can engage same, the said recess will have permitted the actuation of the lever 59 before the throwoff mechanism can be actuated.

With the movement of the shaft 110, the link 123 will be moved simultaneously with the link 111, so as to rock the plate 121 about

its pivotal point 122, and draw the link 120 upwardly and with it, the heel 117 controlling the movement of the stop member 116 through the heel 119 upon said stop member. Hence, said stop member will thus be permitted to fall in the path of movement of the end of the rod 95 when said rod has been moved by the lever 96 to a position which will elevate the cutter head 80. This dropping of the stop member 116 will prevent a return movement of the rod 95 under the control of the spring rod 90 irrespective of any movement of the cam 97, thus making the cutter mechanism inoperative, but only immediately after it has severed a sheet from the end of the strip or web 29, or when it will immediately become operative upon the reversal of the throwoff mechanism to couple the impression cylinder or D-roll with its driving gear 18.

Furthermore, the stoppage of the operation of the cutter mechanism can occur only immediately prior to, or during, the making of an impression so that a portion of the end of the strip will be severed before the stop member 116 becomes operative, or immediately that said member is disengaged from said rod.

When the throwoff mechanism is reversed to making the impression cylinder operative, the construction and arrangement of the co-operating members of the clutch mechanism and the different portions of the throwoff mechanism are such, that the resumption of the making of impressions can occur only when the various mechanisms in the machine are in a position so that thereafter all of these parts will act in synchronism. In fact, irrespective of the time of the stoppage and of the restarting of the machine, the recess of the plate 61 and the various risers 40, 41 or 42, and of the cam 97, must always be in a position where one of the risers 40, 41 or 42 will be operative to set the band brake 33, and the falls of the cam 97 will be so positioned as to permit the immediate operation of the lever 96, or its operation only after one-third of a revolution of the cylinder 10.

In a machine constructed and operating as above described, it is possible to make impressions upon a dry strip or web of paper by means of a printing couple, the plate cylinder of which has a plurality of plates thereon spaced apart, and the impression cylinder or D-roll of which has one revolution for each plate upon the plate cylinder.

While a machine is in operation, the members of the printing couple rotate continuously, but the strip or web is fed intermittently as a result of its being frictionally engaged between the blankets of the impression cylinder or D-roll and the plates upon the plate cylinder. The dwell afforded by the absence of such frictional pressure is

due to the space between succeeding plates upon the plate cylinder permitting the stoppage of the feeding movement of the strip or web and causing the impressions to be positioned thereon in fairly close proximity one to the other so as to avoid the wastage of paper.

Under all circumstances the feeding movement of the strip or web is retarded by a friction device, and feeding of the said strip or web is prevented except by the printing couple after the making of each impression so as to afford ample time for the actuation of the cutting mechanism for separating the web into sheets each having an impression from a single plate thereon. After being advanced by the printing couple, the strip or web is fed in relation to the cutting mechanism by a continuously operated feeding mechanism, the speed of which is relatively greater than the feeding speed of the paper by the printing couple, or the printing speed, this mechanism being so constructed as to permit slippage with relation to the strip or web will be kept taut at all times owing to the tendency of the feeding mechanism to advance the strip or web more rapidly than it is delivered by the printing couple. This slippage between the strip or web and the members of the feeding mechanism also permits the continuous operation of this mechanism, notwithstanding that any movement of the web from the supply roll is prevented by an automatically operated brake mechanism synchronized with the operative effect of the printing couple in feeding the strip or web, and of the cutter mechanisms separating it into sheets.

The feeding movement of the strip or web by the printing couple results from the fact that with engraved, intaglio or undersurface printing plates, the development of great pressure between the impression cylinder or D-roll and the plate is not only possible, but necessary in order to secure a clear, sharp impression. Hence, it is possible to maintain a proper alinement of the strip or web by a friction retard device, and to feed the printed strip or web by a feeding mechanism operating as described, both of which conditions would be impossible were it not for the firm grip which the impression cylinder or D-roll and the printing plates have upon the paper.

The dwell between impressions in addition to causing the intermittent feeding movement of the strip or web resulting in the bringing of succeeding impressions in close proximity to each other, will result in each impression being made under conditions which will permit the correction of any error in the feeding of the strip upon one impression, during the next or succeeding impression, so as to prevent the accumulation of

error as a result of the continued run of the machine.

The use of the continuous web of anti-offset material as a collecting means avoids all likelihood of offsetting from one sheet to another and permits the operation of the machine at a maximum speed at which undersurface printing machines may be operated.

The use of a counter with various forms of rotary printing machines is old, and well known in the printing art, and the particular manner of causing and preventing the operation of the counter as described, or the manner of associating the actuating mechanism therefor with relation to other mechanisms in the machine, I believe to be novel.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying 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 a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

2. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, a brake mechanism operative thereon, means whereby said brake mechanism is released while said impression cylinder or D-roll and a plate are in engagement with said web, and is set substantially simultaneously with

the disengagement of said impression cylinder or D-roll with such a plate, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

3. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means whereby said cylinders may be continuously rotated, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and continuously moving means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

4. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, and means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll.

5. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip

or web between same and a plate upon said plate cylinder, means whereby said cylinders may be continuously rotated, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, and means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll.

6. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means whereby said cylinders may be continuously rotated, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, and a driving mechanism connecting said impression cylinder or D-roll and one of said parallel rollers whereby said blanket receives continuous movement at a lineal speed greater than the angular speed of said impression cylinder or D-roll.

7. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such

plate from the web, a collecting mechanism, means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism, a cutoff mechanism intermediate said collecting mechanism and said means receiving the strip or web, and means whereby said cutoff mechanism is actuated to sever a sheet from the end of said web substantially simultaneously with the actuation of said automatically acting means to prevent rotation of the roll of web.

8. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, and means whereby said cutoff mechanism is actuated to sever a sheet from the end of said web substantially simultaneously with the actuation of said automatically acting means to prevent rotation of the roll of web.

9. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, means receiving a strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate

cylinder, and moving it away from said cylinders, a supply reel for a strip of anti-offset material, a rewind reel, and guide rollers whereby said last named strip is brought to a position to receive the printed strip of web from said last named means.

10. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, means whereby said cutoff mechanism is actuated to sever a sheet from the end of said web substantially simultaneously with the actuation of said automatically acting means to prevent rotation of the roll of web, a supply roll for a continuous strip of anti-offset material, a rewind reel therefor, and guide rollers directing said strip adjacent said blanket and said cut-off mechanism, whereby separate sheets of paper severed from the printed strip or web will be received and mounted in said strip of anti-offset material.

11. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a fric-

tion device co-operating with said blanket adjacent one of said rollers, means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, comprising a fixed cutting blade, a reciprocatory cutter head, a cutting blade carried thereby, a presser bar also carried thereby, a plate adjacent said cutting blades and in the path of movement of said presser bar, and means whereby said cutter head will be actuated substantially simultaneously with the stoppage of the web supply reel.

12. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, comprising a fixed cutting blade, a reciprocatory cutter head, a cutting blade carried thereby, a presser bar also carried thereby, a plate adjacent said cutting blades and in the path of movement of said presser bar, a crank shaft, links connecting the cranks upon said shaft with said cutter head, a spring acting upon another crank upon said shaft having a normal tendency to actuate said cutter head, a cam carried by and rotatable with said plate cylinder, a rocking lever acted upon by said cam, a rod connecting said lever with a crank upon said crank shaft, said cam being so set that said spring will be permitted to actuate said cutter head immediately following the disengagement of said impression cylinder or D-roll with a plate upon said plate cylinder, and an adjustable stop member co-operating with said lever, whereby the operative effect of said spring upon said cutter head may be controlled.

13. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and

polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll, and such plate from the web, a collecting mechanism, parallel rollers, and endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, means imparting continuous movement to said blanket at a lineal speed greater than the angular speed of the impression cylinder or D-roll, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, comprising a fixed cutting blade, a reciprocatory cutter head, a cutting blade carried thereby, a presser bar also carried thereby, a plate adjacent said cutting blades and in the path of movement of said presser bar, a crank shaft, links connecting the cranks upon said shaft with said cutter head, a spring acting upon another crank upon said shaft having a normal tendency to actuate said cutter head, a cam carried by and rotatable with said plate cylinder, a rocking lever acted upon by said cam, a rod connecting said lever with a crank upon said crank shaft, said cam being so set that said spring will be permitted to actuate said cutter head immediately following the disengagement of said impression cylinder or D-roll with a plate upon said plate cylinder, and an adjustable stop member co-operating with said lever, whereby the operative effect of said spring upon said cutter head may be controlled.

14. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a clutch mechanism connecting said impression cylinder or D-roll with its gear, means whereby said clutch mechanism may be made inoperative in order to arrest rotation of said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while

said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and continuously moving means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

15. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a plate having a tooth thereon carried by and rotatable with the gear cooperating with said impression cylinder or D-roll, a dog carried by said impression cylinder or D-roll, a spring tending to normally engage said dog with said tooth, an arm by means of which movement will be imparted to said dog against the tension of said spring, a movable fitting, a striker roller adapt to be moved into and out of the engaging relation with said arm, a throwoff shaft, operative connections between said shaft and said fitting, said fitting being so positioned as to permit the engagement of said arm and said striker roller only at a time when said impression cylinder or D-roll is out of engaging relation with a plate upon said plate cylinder, whereby said clutch mechanism may be made inoperative in order to arrest rotation of said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the engagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and continuously moving means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

16. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to

apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, a brake drum carried by and rotatable with the roll of web, a band brake co-operating with said drum, means carried by and rotatable with said plate cylinder, whereby as each plate passes from engaging relation with said impression cylinder or D-roll, said brake band will be set to prevent rotation of said roll, and while a plate is in engaging relation with the impression cylinder or D-roll, said band brake will be released to permit rotation of said roll, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

17. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, a brake drum carried by and rotatable with the roll of web, a band brake co-operating with said drum, a rocking lever, operative connections between same and said band brake, a spring acting upon said lever to normally release said band brake, a cam carried by and rotatable with said plate cylinder, having a plurality of rises thereon corresponding with the number of plates upon said cylinder and respectively so set as to operatively engage said rocking lever when said impression cylinder or D-roll is out of engaging relation with a plate upon said plate cylinder, whereby as each plate passes from engaging relation with said impression cylinder or D-roll, said brake band will be set to prevent rotation of said roll, and while a plate is in engaging relation with the impression cylinder or D-roll, said band brake will be released to permit rotation of said roll, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

18. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cyl-

inder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a clutch mechanism connecting said impression cylinder or D-roll with its gear, means whereby said clutch mechanism may be made inoperative in order to arrest rotation of said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, continuously moving means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism, a cutoff mechanism positioned intermediate said continuously moving means and said collecting mechanism, means whereby said cutoff mechanism is actuated to sever a sheet from the end of said web substantially simultaneously with the actuation of said automatically acting means to prevent rotation of the roll of web, means whereby said last named means may be made inoperative, and operative connections between said last named means and the means operative upon said clutch mechanism, whereby said cutoff mechanism will be made inoperative simultaneously with the making of said clutch mechanism inoperative.

19. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a clutch mechanism connecting said impression cylinder or D-roll with its gear, means whereby said clutch mechanism may be made inoperative in order to arrest rotation of said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, continuously moving means receiving the

strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism, a cutoff mechanism intermediate said endless blanket and said collecting mechanism, comprising a fixed cutting blade, a reciprocatory cutter head, a cutting blade carried thereby, a presser bar also carried thereby, a plate adjacent said cutting blades and in the path of movement of said presser bar, a crank shaft, links connecting the cranks upon said shaft with said cutter head, a spring acting upon another crank upon said shaft having a normal tendency to actuate said cutter head, a cam carried by and rotatable with said plate cylinder, a rocking lever acted upon by said cam, a rod connecting said lever with a crank upon said crank shaft, said cam being so set that said spring will be permitted to actuate said cutter head immediately following the disengagement of said impression cylinder or D-roll with a plate upon said plate cylinder, a movable stop adapted to operatively engage said rod, and connections between said stop and said means operative upon said clutch mechanism, whereby said stop will be moved out of engaging relation with said rod when said clutch mechanism is set, and will be permitted to engage said rod following the release of said clutch.

20. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, a retard device operative upon the support for said roll, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

21. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a

roll of continuous web, a retard device operative upon the support for said roll, means operative upon said retard device whereby the frictional resistance developed thereby will be progressively decreased proportionately to the decrease in the diameter of said roll, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

22. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, a retard device operative upon the support for said roll, a rocking shaft, a roller carried thereby and in engaging relation with said roll, a spring connection between said shaft and said retard device, whereby the frictional resistance exerted by said retard device will be progressively decreased with a decrease in the diameter of said roll, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

23. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a clutch mechanism connecting said impression cylinder or D-roll with its gear, means whereby said clutch mechanism may be made inoperative in order to arrest rotation of

said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, parallel rollers, an endless blanket passing about said rollers, a friction device co-operating with said blanket adjacent one of said rollers, and a driving mechanism connecting said impression cylinder or D-roll and one of said parallel rollers, whereby said blanket receives continuous movement at a lineal speed greater than the angular speed of said impression cylinder or D-roll while said impression cylinder or D-roll is in motion, but will be stopped substantially simultaneously with, and as a result of, the disengagement of the clutch mechanism connecting said impression cylinder or D-roll with its gear.

24. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, continuous gears carried by said impression cylinder and operative upon said impression cylinder or D-roll respectively, a clutch mechanism connecting said impression cylinder or D-roll with its gear, means whereby said clutch mechanism may be made inoperative in order to arrest rotation of said impression cylinder or D-roll and prevent feeding of the strip or web thereby, means adapted to rotatably support a roll of continuous web, automatically acting means permitting rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, a collecting mechanism, continuously moving means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism, a counter, a member carried by and rotatable with the gear for said impression cylinder or D-roll, having a recess therein, a rocking lever co-operating with said member, connections between said lever and the actuating means for said counter, a spring acting upon said actuating means and said lever, means actuated by the means opera-

tive upon said clutch mechanism, whereby said counter will be made inoperative substantially simultaneously with the actuation of said clutch mechanism to arrest rotation of said impression cylinder or D-roll.

5 of said impression cylinder or D-roll.
25. A rotary web undersurface printing machine embodying therein a plate cylinder adapted to receive a plurality of engraved, intaglio or undersurface plates, spaced apart in relation to each other, inking, wiping and polishing mechanisms associated therewith, an impression cylinder or D-roll adapted to apply great pressure upon a strip or web between same and a plate upon said plate cylinder, means adapted to rotatably support a roll of continuous web, automatically acting means permitting

rotation of said roll while said impression cylinder or D-roll and a plate are in engagement with said web, and preventing rotation thereof substantially simultaneously with the disengagement of the impression cylinder or D-roll and such plate from the web, tensioning guides for the web intermediate the support for the roll of web and the printing couple, a collecting mechanism, and means receiving the strip or web as it is fed by said impression cylinder or D-roll and a plate upon said plate cylinder, and delivering it toward said collecting mechanism.

In witness whereof I have hereunto affixed my signature, this 28th day of April 1924.

PETER AITCHISON.