B. C. WHITE.

WEB FEEDING MECHANISM.

APPLICATION FILED AUG. 9, 1912.

1,268,134.

Patented June 4, 1918.

5 SHEETS—SHEET 1.

Fig. 1.

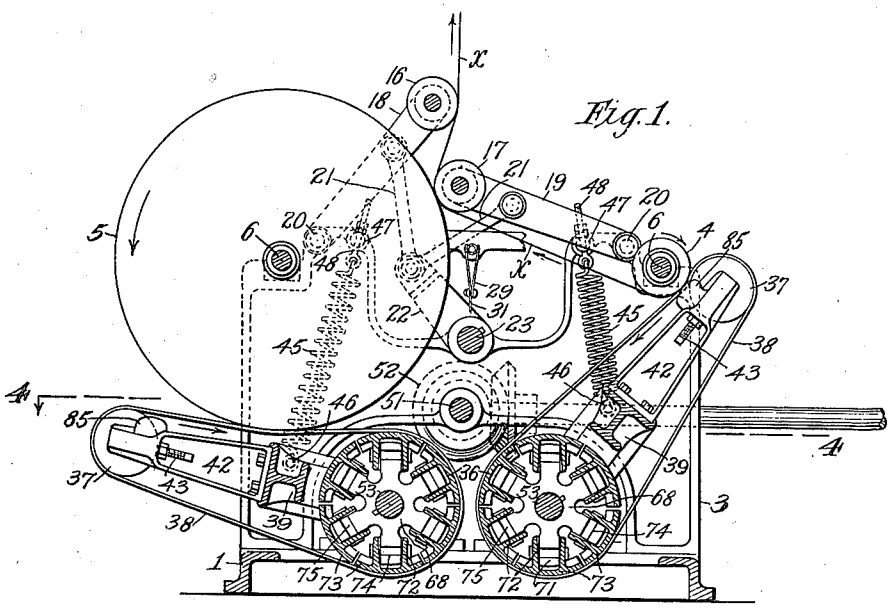
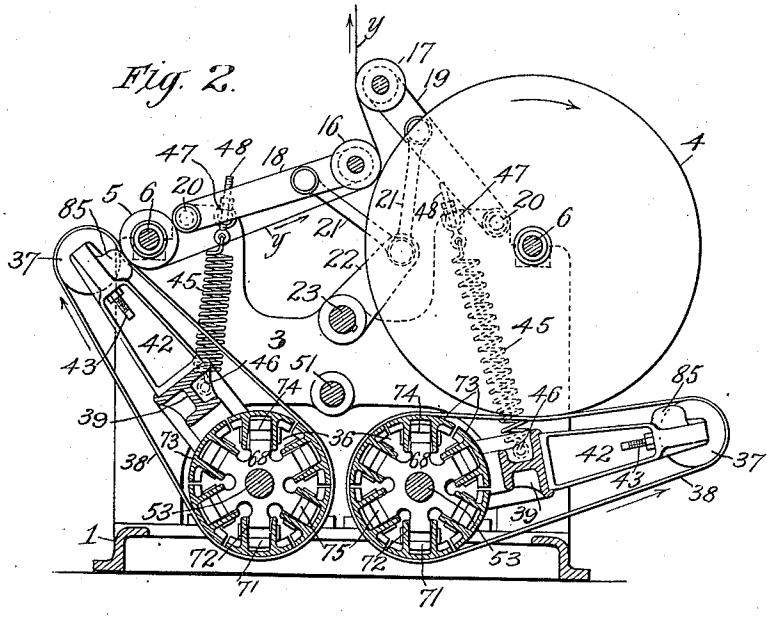


Fig. 2.



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5 SHEETS—SHEET 2.

Fig. 3.

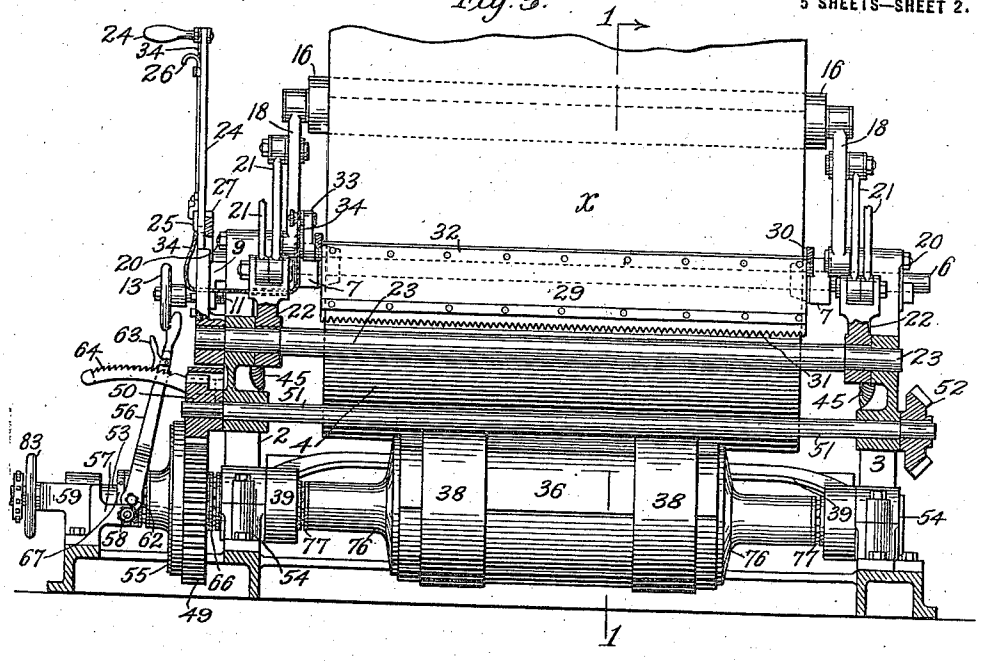
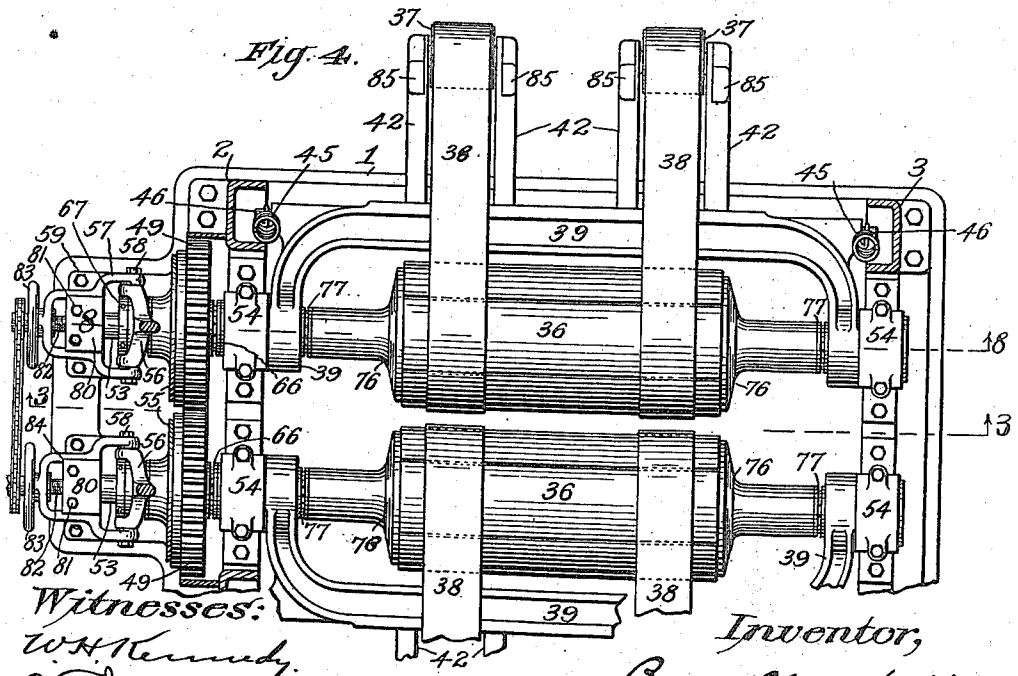


Fig. 4.



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5 SHEETS—SHEET 3.

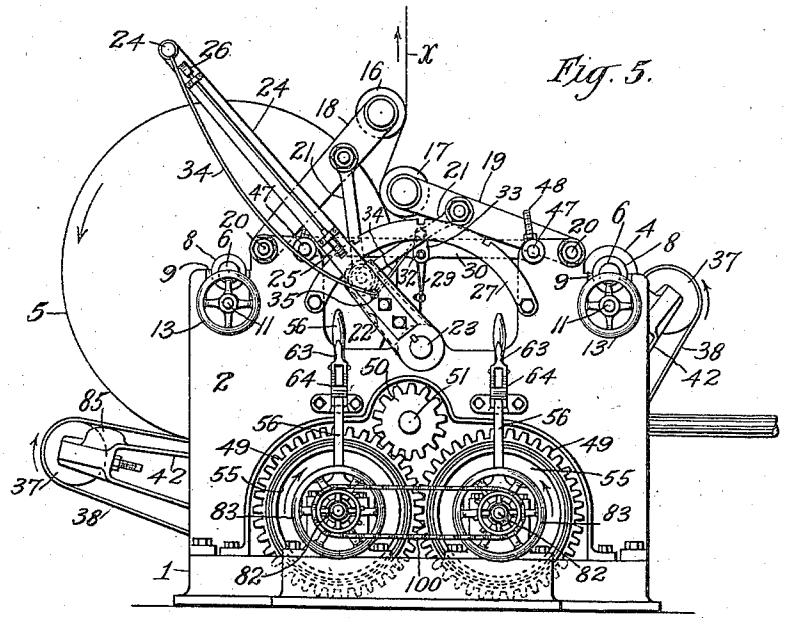


Fig. 5.

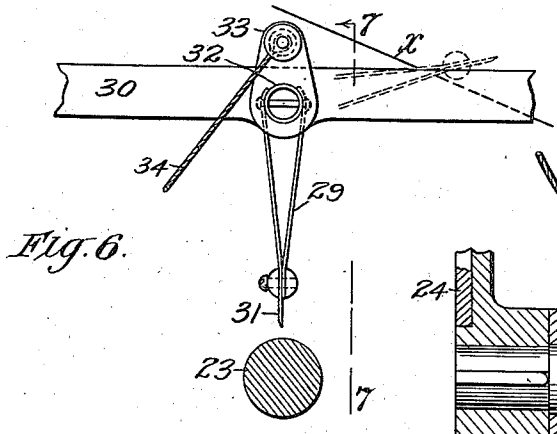


Fig. 6.

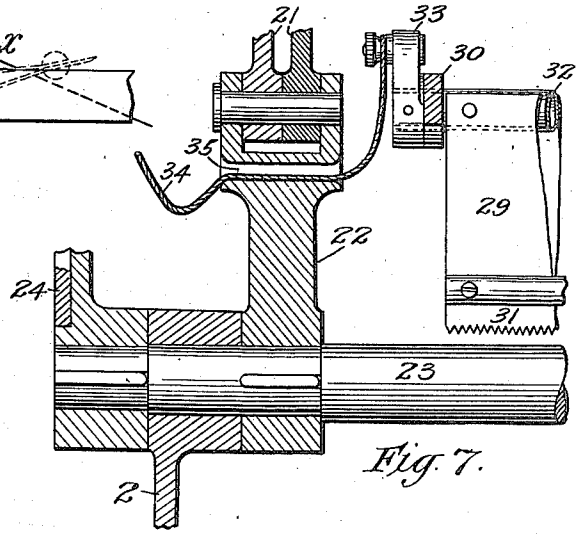


Fig. 7.

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5 SHEETS—SHEET 4.

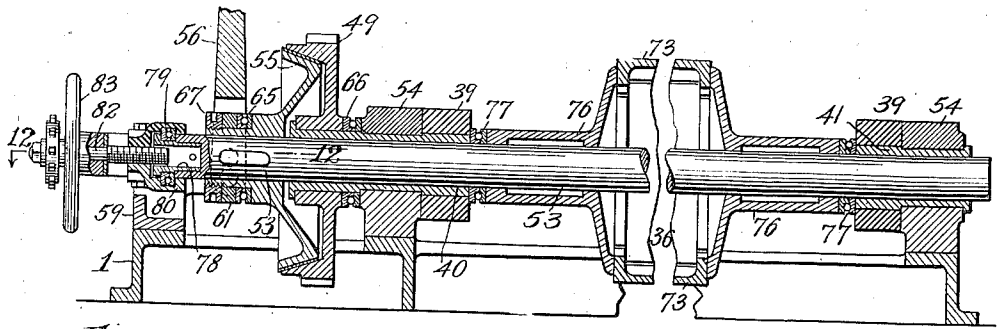


Fig. 8.

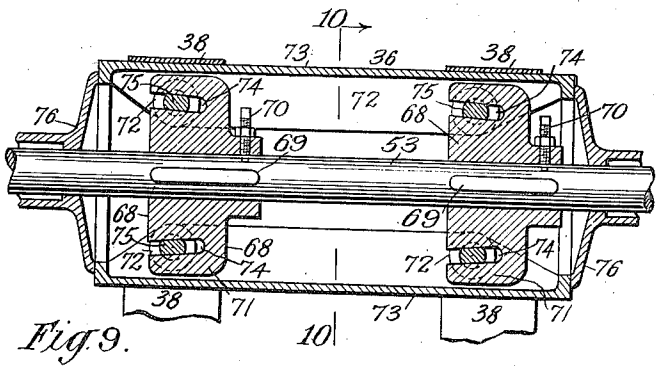


Fig. 9.

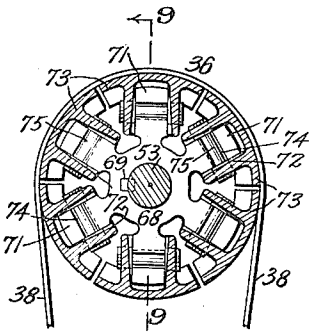


Fig. 10.

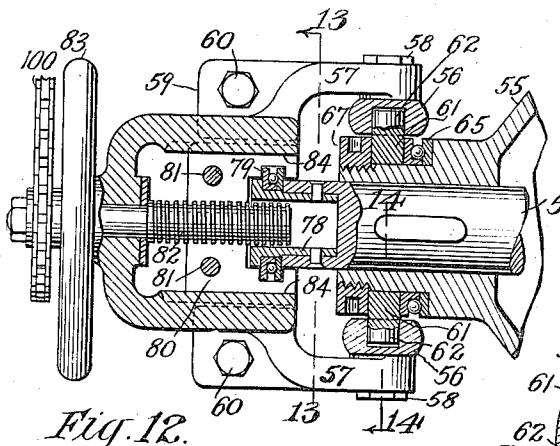


Fig. 12.



Fig. 11.

Fig. 13.

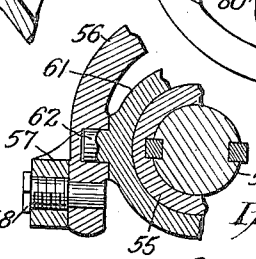


Fig. 14.

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APPLICATION FILED AUG. 9, 1912.

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5 SHEETS—SHEET 5.

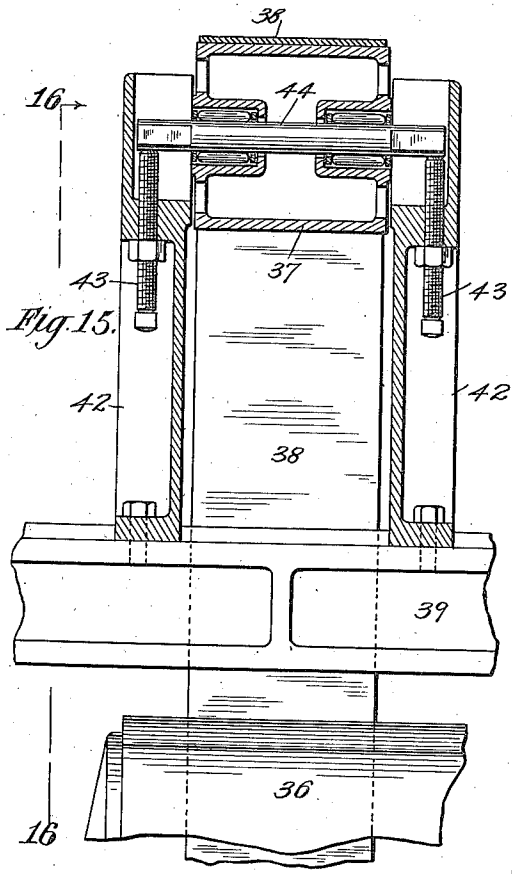


Fig. 15.

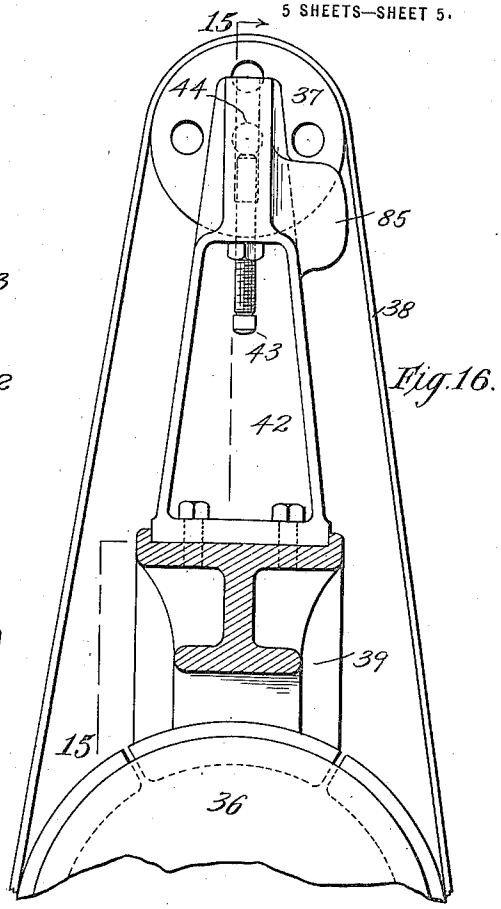


Fig. 16.

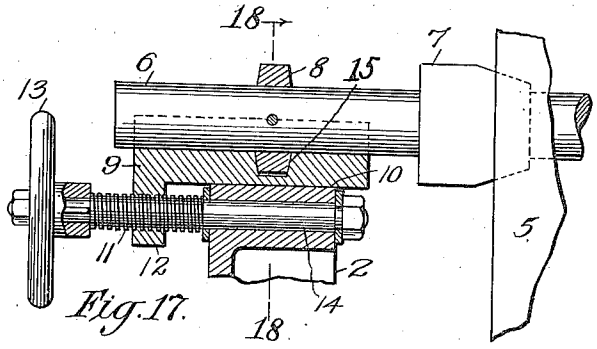


Fig. 17.

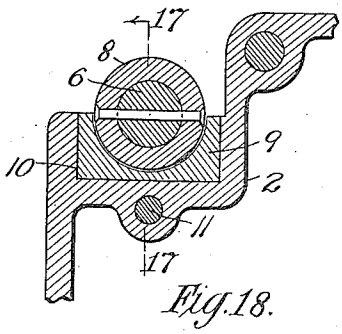


Fig. 18.

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UNITED STATES PATENT OFFICE.

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WEB-FEEDING MECHANISM.

1,268,134. Specification of Letters Patent. Patented June 4, 1918.

Application filed August 9, 1912. Serial No. 714,161.

To all whom it may concern:

Be it known that I, BRUCE CLARK WHITE, a citizen of the United States, residing at Woonsocket, county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Web-Feeding Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to web feeding mechanisms for machines which derive their web supply from rolls, the mechanism being particularly adapted for use in high speed web printing machines, but applicable also in machines of other classes.

The especial object of the invention is to provide an improved web roll renewer for connecting the web of an expiring roll of paper to the web of a fresh roll without stopping the press, whereby the web supply may be continuous and uninterrupted, and particularly to provide a simple and efficient mechanism for this purpose, in which the web roll remains in its original position during the web connection and until the roll is exhausted, the fresh roll being placed alternately in one or the other of two sets of roll bearings.

A further object of the invention is to provide mechanism for rotating paper rolls, whereby the peripheral speed of a fresh roll may be brought to correspond exactly with the lineal speed of the web from the roll in use and before the fresh roll is connected to the running web, and which shall continue to rotate the fresh roll during web connection and until its web has been connected in turn to another fresh roll, and this roll rotating mechanism is applicable also for feeding paper webs from rolls in web feeding mechanisms other than web roll renewers. Other objects of the invention are to provide an automatic adjustment of the web tension in feeding from rolls, variable with the momentum of the roll, to automatically check the tendency of the roll to run ahead and slacken the web in case the press is suddenly stopped, and to prevent excess tension on the web when the press is again started, and finally to combine the parts in a compact, simple and convenient form.

In the accompanying drawings illustrative of the preferred embodiment of my invention—

Figure 1 is a sectional view on line 1—1 of Fig. 3, showing the right-hand roll nearly expired and the fresh roll in the left-hand position with the pasting-rolls in position to connect the webs;

Fig. 2 is similar to Fig. 1 except that the rolls are in the opposite positions;

Fig. 3 is a transverse vertical section on line 3—3 of Fig. 4;

Fig. 4 is a horizontal section on line 4—4 of Fig. 1, showing the expansion drums and belts in plan view;

Fig. 5 is a side elevation;

Fig. 6 is an enlarged detail of the cut off knife and its connections;

Fig. 7 is a sectional view of same taken on line 7—7 of Fig. 6;

Fig. 8 is a longitudinal sectional view of one of the expansion drums along parts of the line 8—8 of Fig. 4, showing the bearings and driving connections for same;

Fig. 9 is a longitudinal section on line 9—9 of Fig. 10, showing the expansion drum;

Fig. 10 is a transverse section of the expansion drum on line 10—10 of Fig. 9;

Fig. 11 is a perspective detail view of one of the pins in the drum spiders;

Fig. 12 is an enlarged detail of the clutch handle and adjustment wheel on the expansion drum shaft, being a horizontal section on line 12—12 of Figs. 8 and 13;

Fig. 13 is another detail sectional view of the same on line 13—13 of Fig. 12;

Fig. 14 is a detail sectional view of the lower end of the clutch lever along a part of the line 14—14 of Fig. 12;

Fig. 15 is a horizontal section of the belt tension brackets on line 15—15 of Fig. 16;

Fig. 16 is a tranverse section of the same on line 16—16 of Fig. 15;

Fig. 17 is a detail of the cross-wise adjustment of the roll, showing the roll bearings, being taken on line 17—17 of Fig. 18; and

Fig. 18 is a transverse section of the same on line 18—18 of Fig. 17.

Referring to the drawings in detail in which like characters of reference designate corresponding parts, 1 is a bed-plate, 2 and 3 are upright frames for supporting the rolls and other mechanism, 4 is a roll of paper in the right-hand position, shown as expiring in Figs. 1 and 5 and as a fresh roll in Fig. 2, 5 is a roll of paper in the left-hand position, shown as a fresh roll in Figs. 1 and 5 and as an expiring roll in Fig. 2, 6, 6 are the roll shafts, centered and secured to the rolls by cones 7, 7 in the usual manner. Upon one end of each of the shafts 6, 6 is pinned a collar 8, see Figs. 17 and 18. Bearing blocks 9, 9 are fitted to slide in rectangular recesses 10, 10 and are movable therein by means of the screw 11, the threaded portion of which engages the bearing block 9 through the lug 12. A hand-wheel 13 operates the screw which is journaled at its other end in the frame 2 at 14. A suitable recess 15 is provided for the collar 8 in the bearing 9 whereby the movement of either of the bearing blocks 9 will be imparted to the roll of paper supported therein, thereby adjusting its position laterally as desired.

Between the two rolls of paper and above their centers are two guide rollers 16 and 17 extending across the machine parallel with the paper roll shafts 6, 6. These guide rolls are mounted upon swinging arms 18 and 19 which latter are pivoted at their lower ends to the frames 2 and 3 at 20. The arms 18 are so disposed that the roller 16 may swing obliquely through an arc approximately parallel to the periphery of the roll 5, see Fig. 1. The arms 19 are similarly disposed to move the roller 17 in an arc approximately parallel to the periphery of roll 4, see Fig. 2. Links 21, 21 connect the arms 18 and 19 to the levers 22, 22, which latter are rigidly secured to the rock-shaft 23. The rock-shaft is operated by a hand lever 24 secured thereto. A latch 25 upon said lever, having a hook 26, engages notches in a quadrant 27 whereby the lever and consequently the rollers 16 and 17 may be locked in any desired position.

The web x or y from the respective rolls 4, 5, whichever may be in use, passes between the guide rollers 16 and 17, as shown in Figs. 1 and 2. Assuming that roll 4 is expiring, the flap end of the fresh roll of paper 5 having been lightly pasted down to its body and having had a stronger adhesive applied to the outer surface of the flap end and the fresh roll having been rotated until its peripheral speed corresponds with that of the web x the connecting of the webs may now be accomplished. The operator grasps the handle 24, lifts the latch 25 by means of the hook 26, swings the handle to the left and brings the guide roller 17 downward, thereby making contact between the running web x and the pasted outer surface of the flap-end of the paper roll 5 to which the web attaches, as shown in Figs. 1 and 5. The adhesion between the web and the end of the fresh roll being greater than that of the end of the fresh roll to its body, the latter connection is severed and the web from the fresh roll accompanies the web from the expiring roll, which latter may now be severed. The guide roller 17 may now be withdrawn from contact with the roll 5 by moving the hand lever to the right. A notch in the quadrant permits the hand lever to be locked in this latter position while the fresh roll 5, which has now become the roll in use, is being exhausted. When the latter is near its expiration its web is connected to a fresh roll in the opposite position as before, as shown in Fig. 2, thus supplying the web to the printing press alternately from a right hand and a left hand roll with a continuous web which passes continuously between the guide rollers and is alternately deflected by the rollers to a fresh roll introduced in one or the other of the roll positions.

To effect the web connection it will be apparent that a short amount of extra web must be supplied from the expiring roll to accommodate the movement of guide roll 16 or 17 in pasting. The expiring roll, having but slight frictional contact with the source of power which rotates it, will slip ahead sufficiently to permit the guide roll 16 or 17 to reach the fresh roll 4 or 5, as will be shown later on.

As soon as the web of the expiring roll has been connected with the fresh roll it is necessary to sever the former. This may be done by hand with a stick or a bar, preferably by a swinging knife holder 29 mounted to hang freely in bearings in knife frames 30 and having a serrated edged knife 31 secured to the lower edge of the knife holder.

The shaft 32 of the knife holder 29 extends through and beyond the knife frame 30 and is provided with an upwardly extending arm 33 to which is attached a cord 34 extending through an eye 35 in arm 22, thence to the upper end of the hand lever 24 for convenient operation. The operator, having pulled the hand lever 24 to the left and having connected the webs, promptly pulls the cord 34 which swings the knife 29 upward and to the right and into the path of the web x, thus severing it. Should the expiring roll be at the left the hand lever 24 would be inclined to the right and the knife blade would be swung upward and to the left. The knife swings back each time to the position shown in full lines in Fig. 6 by the action of gravity.

The parts so far described are so arranged as not to interfere with the removal of a

spent roll or the introduction of a fresh roll into the place thus vacated.

Beneath each roll of paper and arranged parallel to the axis thereof is a drum 36. Trained about these drums and about tension idler pulleys 37, 37 are short belts 38, 38. A swinging frame 39 journaled upon the inwardly projecting bushings 40, 41 has mounted upon it brackets 42, 42, which carry the idler pulleys 37, 37. Each of these brackets is provided with an adjusting screw 43 whereby the shaft 44 of the idler pulley 37 may be moved to adjust the tension of the belt 38. The brackets may be secured to the swinging frame 39 in any lateral position desired. Tension springs 45 are connected at their lower ends to the swinging frame 39 by pins 46 and at their upper ends they are connected to the frames 2 and 3 by pins 47. Threaded rods 48 pass through the pins 47 and are provided with nuts whereby the tension of the springs may be adjusted as desired.

The belts 38 engage the underside of the fresh roll at points where no paste has been applied. The belts, swinging frame and points of spring connection are all so arranged that the springs will act to press the belts 38 against the underside of the roll of paper with their maximum tension and leverage when the diameter of the roll is greatest and consequently when its weight, inertia and momentum are greatest. At this time, as shown in Figs. 1 and 2, the springs are acting at their most advantageous angle and the contact point of the paper roll upon the belt is about midway of the distance between the drum 36 and the idler 37. As the roll of paper decreases in diameter and, therefore, decreases in weight and momentum proportionately to the square of its diameter, it is desirable to decrease the pressure of the belts 38 and consequently the retarding or controlling frictional resistance thereof in the same proportion. This is accomplished by the shortening and weakening of the springs as the frame 39 rises, due to the decreasing roll diameter. In addition to this the point of contact of the paper roll with the belt 38 is moving outward toward the idler pulley as the paper roll decreases in diameter. A further decrease in the pressure is effected by the change occurring in the angle of the spring action, which becomes more obtuse and less effective as the roll diminishes in diameter.

It has been demonstrated that a retarding pressure sufficient to control a full roll at full speed would be excessive when the roll is reduced to near its expiring point, while a suitable retarding pressure for the latter condition would be wholly ineffective for the former.

The drums 36 are driven by intermeshing gears 49, one of which intermeshes with a pinion 50, which latter is keyed to the driving shaft 51. The driving shaft 51 is arranged to be driven directly from the printing press by positive gearing 52 whereby the rotation of the gears 49 will correspond exactly with the rotation of the printing elements of the printing press.

The gears 49 are not secured directly to the drum shafts 53 but are mounted to rotate freely upon the bushings 40. The latter are clamped fixedly in the pedestals 54, see Fig. 8, and form journals for the swinging arms 39, the drum shafts 53 and the gears 49. The bushings 41 form journal bearings for the other end of the drum shafts 53 and for the opposite ends of the swinging arms 39.

Keyed to the drum shaft 53, although free to slide endwise thereon, is the sliding member 55 of a cone friction clutch, the other member being the gear 49. As these parts are in duplicate the description will be limited to one of them. A handle 56 is forked at its lower end and is fulcrumed in projecting ears 57 upon pins 58 of the thrust block 59. The latter is bolted to the bed-plate 1 by screws 60. Trunnions 62 formed upon a ring 61 fit into recesses in the forked lever 56. This lever is provided with a latch and pawl 63 (see Fig. 3) which engages teeth upon the quadrant 64 in such manner as to lock the lever in any desired position. These parts are so arranged that the operator may cause the gear 49 to frictionally engage the clutch 55 by shifting the lever 56, thereby transmitting rotation to the shaft 53, the drum 36, belts 38 and finally to the roll of paper upon the belts. This frictional engagement may be as gradual and gentle as desired. After the roll of paper has attained full speed, the lever 56 may be locked, thus maintaining the parts in full operative engagement, whereby the paper roll will be driven at the full speed of the printing press.

I preferably introduce an antifriction thrust collar 65 between the ring 61 and the sliding member 55, also one 66 between the gear 49 and the pedestal 54. A nut 67 retains the ring 61 in place.

The drum shaft 53 has mounted upon it spiders 68, 68; these are keyed to the shaft by keys 69 and are held from endwise movement thereon by setscrews 70. A description of one spider will suffice. It comprises radial arms 71 which are each fitted between lugs 72 formed upon the inside of the shell sections 73 of the drum, thus maintaining each shell section in proper alinement and angular position and out of contact with the adjacent sections, while leaving it free to move radially or endwise in relation to the spider. Angular slots 74 are formed in each arm of the spider. Pins 75 (see Fig. 11) are fitted snugly in transverse holes through

the lugs 72 of the several shell sections. These pins are flattened in their middle portion to slide endwise in the angular slots 74 of the spider arms whereby the endwise movement of the spiders will cause the various shell segments to move radially toward or away from the drum shaft 53, thus enlarging or contracting the drum uniformly throughout its length. The segments forming the drum shell are prevented from endwise movement by means of the flanged sleeves 76, between the flanges of which the drum segments are freely fitted. The flanged sleeves are fitted to permit the drum shaft to slide freely through them. I preferably introduce antifriction thrust collars 77 between the sleeves and the inside surfaces of the frame against which they bear.

The drum shaft 53 is recessed at its end and is fitted with a flanged bushing 78 securely pinned in place (see Fig. 12). A thrust collar 79 turns freely in the annular groove thus formed between the end of the drum shaft and the flange of the bushing, said collar projecting into an internal groove formed in the split nut 80. The two halves of this nut are clamped together by bolts 81, 81. These parts are so constructed that an endwise movement of the split nut 80 in either direction will move the drum shaft endwise, while the thrust between the rotating drum shaft and the non-rotating nut 80 will be received by the antifriction thrust collar 79.

The split nut 80 is internally threaded to engage an adjusting screw 82 actuated by a hand-wheel 83. The split nut engages guide surfaces 84 formed in the thrust block 59. The adjusting screw 82 is also journaled in this block. These parts are so fitted that by the rotation of the hand-wheel 83 the drum shaft is moved endwise and thereby expands or contracts the drum 36, thus increasing or decreasing the speed of the belts 38 in relation to the speed of the web of paper as it is consumed by the printing press, thereby maintaining the proper tension on the web between the paper roll and the printing roll as desired.

While the drawings illustrate independent adjusting means for each drum they preferably are cross-connected, as by sprocket wheels and a chain 100, as shown, and both may be operated by a single handwheel, which may be placed at the web feeding machine, as shown, or may be at the printing press, or both. Similarly, the margin adjustment of the paper rolls by hand wheels 13 may be controlled by suitable connections at any convenient point of the press.

When the expiring roll has become small and has but slight momentum, the friction clutch, which drives it, may be opened, in which case the expiring roll is no longer driven but becomes the driving means for the drum beneath it. Blocks 85 mounted upon the brackets 42 may be used as brakes for the expiring roll. They would come into contact with the roll only after it had diminished nearly to its expiring point and would prevent the web from unwinding after it had been severed.

The weight of the fresh roll is relied upon to depress the idler pulleys and swinging arms to the position shown at the left in Fig. 1, thereby stretching the springs 45. The fresh rolls vary somewhat in diameter. This variation changes their weight proportionately, thus the larger rolls would further depress the swinging arms with a resultant increase in spring tension and in belt pressure. The swinging arms may be instantly locked down, thus placing belts 38 out of engagement with the paper rolls should it become necessary, through accident or for any other reason, to resort to hand pasting. In the case of short rolls a single belt 38 would suffice. The spring adjustment would be changed or a single spring would be employed.

While the roll driving devices employed are not essential to the invention, broadly considered, certain important results are thus secured, of which may be mentioned the following:

On account of the exact conformity of speeds of the peripheries of the two rolls of paper, together with the facility afforded for effecting the web pasting, it is not necessary to stop the printing press to change rolls, but this may be done at relatively high speeds. The necessity for an auxiliary web tension device is obviated as the functions of such a device are performed by the above described mechanisms acting upon the paper roll. Brakes for the paper roll are not required with this device as the necessary control of the roll and of the web tension is provided by the belts and the variable diameter of the drums. Should the printing press be stopped or slowed down or be speeded up while the fresh roll is being speeded up or at the time the running web is being attached to the fresh roll, it will not affect the proper functioning of the mechanism as the rotation of the rolls is controlled directly from the printing press or from the source of power thereof.

Numerous modifications may be made in the mechanism employed without departing from the principles of my invention.

What I claim is:—

1. The combination with two sets of web roll bearings, of web guiding devices, and means for moving the web guiding devices in one direction toward and against a web roll in one set of bearings to carry a running web against said roll, and then in the opposite direction toward and against a wel

roll in the other set of bearings to carry a running web against said roll for web renewal.

2. The combination with two sets of web roll bearings, of a pair of web guide rollers, and means for moving the web guide rollers in one direction to bring one of them toward and against a web roll in one set of bearings to carry a running web against said roll, and then in the opposite direction to bring the other of the guide rollers toward and against a web roll in the other set of bearings to carry a running web against said roll for web renewal.

3. The combination with two sets of web roll bearings on opposite sides of the web path, of a pair of web guide rollers between which the web passes, and means for swinging the web guide rollers in one direction to bring one of them toward and against a web roll in one set of bearings to carry a running web against said roll, and then in the opposite direction to bring the other of the guide rollers toward and against a web roll in the other set of bearings to carry a running web against said roll for web renewal.

4. In a web feeding mechanism, the combination with a set of web roll bearings for supporting a partially exhausted web roll from which the web is being unwound, a pair of guide rollers between which the web passes, a set of bearings for supporting a fresh web roll, means for moving one of the pair of guide rollers to bring the unwinding web into contact with the fresh web roll for securing the unwinding web to the end of the fresh roll, means for unwinding the fresh roll until it is nearly exhausted, and means for moving the other of the pair of guide rollers to bring the unwinding web into contact with another fresh roll.

5. In a web feeding mechanism, the combination with a set of web roll bearings for supporting a partially exhausted web roll from which the web is being unwound, a pair of guide rollers between which the web passes, a second set of web roll bearings for supporting a fresh web roll, means for moving one of the pair of guide rollers to bring the web into contact with the fresh roll to attach the web to the end of the fresh roll, means for discontinuing the web from the partly exhausted roll, means for unwinding the fresh roll until it is nearly exhausted, and means for moving the other of the pair of guide rollers to bring the unwinding web into contact with another fresh roll.

6. In a web feeding mechanism having bearings for two rolls of paper arranged for web supply from either roll, the combination of separate means for rotating each of said rolls each of said means comprising a belt in contact with the periphery of the roll, a pulley for driving said belt, and an idle pulley for said belt, said idle pulley being movable to maintain contact between said belt and the periphery of said roll of paper as the latter diminishes in diameter.

7. In a web feeding mechanism, the combination of fixed bearings in which a fresh web roll is supported, means for rotating said fresh roll through contact with its periphery, a set of bearings in which a web roll is supported from which the web is being unwound, means for rotating said unwinding roll through contact with its periphery, and means for connecting the running web from the unwinding roll to the end of the web of the fresh roll as it rotates.

8. In a web feeding mechanism, the combination with fixed bearings for supporting a fresh web roll of paper and an unwinding roll, and means for rotating both rolls by peripheral contact through a train of gearing from the source of power which actuates the web consuming device whereby the peripheral speed of both rolls will correspond with the web speed required by the web consuming device.

9. In a web feeding mechanism, the combination of a driving pulley, an idle pulley, a belt trained about them and in contact with a web roll to be driven, an arm carrying said idler, said arm being mounted to swing upon a bearing concentric with said pulley, the relative positions of the roll, pulley and idler being such that the roll will make contact with the belt at a point near the pulley when the roll is of maximum diameter and will make contact with the belt at a point near the idler when the roll is reduced to a small diameter, and means for swinging the arm toward the roll with a pressure decreasing throughout the unwinding of the roll.

10. In a web feeding mechanism, in which is rotatably mounted a roll of paper, the combination of a driving pulley, an idler pulley, and a belt trained about them and in contact with said roll of paper, a pivoted arm carrying said idler, and a spring attached to said arm to force said belt against said roll and arranged to act with a decreasing pressure as the roll decreases in size.

11. In a web feeding mechanism, in which is rotatably mounted a roll of paper, the combination of a driving pulley, an idler pulley, and a belt trained about them and in contact with said roll of paper, a swinging arm carrying said idler, and a tension spring attached to said swinging arm and to a fixed support in such a position in relation to the swinging arm pivot that the said spring will act with its greatest force, tension and leverage when the roll of paper is of maximum diameter, and will act with less force and tension with a less advantageous leverage as the roll decreases in diameter.

12. In a web feeding mechanism, the com-

bination of bearings therein in which a fresh roll of paper is rotatably mounted, means for rotating the roll to give it the requisite peripheral speed before it is connected to a web running from another roll, means for connecting its end to the running web while it is being so rotated, said rotating means continuing to act to control its rotation throughout its unwinding.

13. In a web feeding mechanism, the combination of a support in which a roll of paper is rotatably mounted, a belt in peripheral contact with the roll, a pulley to drive said belt, an idler for said belt, an arm for moving said idler, means for forcing said idler toward said roll and a brake shoe upon the outer extremity of said arm so located as to come into contact with the periphery of said roll of paper when the latter has been reduced to a certain point.

14. In a web feeding mechanism for a printing press, bearings for two rolls of paper arranged in substantially the same horizontal plane, web guide rolls and a web running upwardly between the guide rolls to the press from one or the other of the rolls of paper alternately, and means between the rolls for causing the guide rolls to attach the web from a fresh roll to the web from an expiring roll.

15. The combination with two sets of web roll bearings, of means engaging a web running from a roll in either set of bearings and mounted to move in opposite directions for deflecting a web running from a roll in either set of bearings into contact with the surface of a roll in the other set of bearings for roll renewing.

16. The combination with two sets of web roll bearings, of web guiding devices mounted to swing on fixed pivots, and means for swinging the web guiding devices in opposite directions to bring a web running from an expiring roll in either set of bearings into pasting contact with a fresh roll in the other set of bearings for roll renewing.

17. The combination with two sets of web roll bearings, of guide rollers on opposite sides of the running web, said guide rollers being mounted in separate swinging arms, and means for moving the guide rollers in opposite directions to bring a web running from an expiring roll in either set of bearings into pasting contact with a fresh roll in the other set of bearings for roll renewing.

18. The combination with two sets of web roll bearings, of guide rollers on opposite sides of the running web, each of said guide rollers being mounted to swing in a path approximately concentric with one of the bearings, and means for moving the guide rollers in opposite directions to bring a web running from an expiring roll in either set of bearings into pasting contact with a fresh roll in the other set of bearings for roll renewing.

19. The combination with a support for a fresh web roll and a support for an expiring web roll and means for attaching the fresh web to the expiring web, of a single roll driving device acting to start the web roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web.

20. The combination with a support for a fresh web roll and a support for an expiring web roll and means for attaching the fresh web to the expiring web, of a single roll driving device acting to start the fresh roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web, and means for adjusting the roll driving device to vary the speed and tension of the web.

21. The combination with two sets of web roll bearings and means for attaching the web of a fresh roll in either set of bearings to the web running from an expiring roll in the other set of bearings, of two roll driving devices, one for each set of bearings, each device acting to start the fresh roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web.

22. The combination with two sets of web roll bearings and means for attaching the web of a fresh roll in either set of bearings to the web running from an expiring roll in the other set of bearings, of two roll driving devices, one for each set of bearings, each device acting to start the fresh web roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web, and means for adjusting the roll driving devices to vary the speed and tension of the web.

23. The combination with two sets of web roll bearings and means for attaching the web of a fresh roll in either set of bearings to the web running from an expiring roll in the other set of bearings, of two roll driving devices, one for each set of bearings, each device acting to start the fresh roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web, and means for adjusting the speed of the roll driving devices including connections between the devices for maintaining relative adjustment.

24. The combination with two sets of web roll bearings and means for attaching the web of a fresh roll in either set of bearings to the web running from an expiring roll in the other set of bearings, of roll driving devices, one for each set of bearings, each device acting to drive the rolls in both sets

of bearings continuously throughout the starting of a fresh roll before attachment of its web to the running web and to drive the roll during such attachment and the unwinding of the web.

25. The combination with fixed bearings for two web rolls, of guide rollers 16, 17 carried by arms 18, 19 pivoted at fixed points, and connections between said arms for moving them simultaneously to shift the web in opposite directions.

26. The combination with fixed bearings for two web rolls, of guide rollers 16, 17 carried by arms 18, 19 pivoted at fixed points, a pivoted actuating member, and links 21 connecting arms 18, 19 to the actutating member for moving the rollers simultaneously to shift the web in opposite directions.

27. The combination with two sets of fixed bearings for web rolls, of means for attaching the web running from an expiring roll in either of said bearings to a fresh roll in the other set of bearings, and a pivoted blade located between the rolls and pivoted to swing in either direction to sever a web running on either side of the blade.

28. In a web feeding mechanism, the combination of a support in which a roll of paper is rotatably mounted, a driver in contact with the roll, and a braking device carried by the driver and so located as to come in contact with the roll to stop the rotation thereof when the latter has been reduced to a certain point.

29. The combination with fixed bearings for two web rolls, of guide rollers carried by arms pivoted at fixed points, and connections between said arms for moving them simultaneously to shift the web in opposite directions.

30. The combination of means for supporting two rolls adjacent to each other for feeding the webs alternately therefrom, means for rotating either roll at substantially the same surface speed as that of the web fed from the other roll, and means for pressing the web running from either roll against the adjacent rotating roll for causing said running web to pick up the gummed end of the web of the other roll.

31. The combination of means for supporting two rolls adjacent to each other for feeding the webs alternately therefrom, means for rotating either roll at substantially the same surface speed as that of the web fed from the other roll, rollers movably mounted on opposite sides of the web running from one or the other of said rolls, and means for moving one roller toward one roll for pressing the running web against said roll or for moving the other roller toward the other roll for pressing the running web against said other roll, one of said rollers being movable relative to the other roller from one side thereof to the other side.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

BRUCE CLARK WHITE.

Witnesses:
RICHARD KELLY,
HAROLD M. TILLINGHAST.