The present invention relates to web-renewing mechanism and more particularly to mechanism for joining the lead end of a reserve web roll to the running web as the web is fed to a printing press or other web-consuming machine.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and descried.

The accompanying drawings, referred to hereinafter and comprising a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

9 Claims. (Cl. 242-58)

The present invention has for its object the provision of an automatic web-renewing mechanism for use in connection with printing presses or other web-consuming machines. Another object of the invention is the provision of a web-renewing mechanism, for making flying pasters, in which the movement of the reserve web roll from reserve to running position sets the reserve web roll in rotation and brings it to the speed of the running web. A further object of the invention is the provision of a web-renewing mechanism in which the reserve web roll is brought to the speed of the running web by the gravitational movement of the reserve web roll as it is moved to active or running position.

In accordance with the illustrative embodiment of the invention, a pair of rotatable arms are provided for rotatably and revolutely supporting an active web roll, the reserve web roll being positioned at a higher level than the active roll from which the web is fed to the press. Means are provided for holding the web roll supporting 10 arms against movement as the web is fed to the press, and for releasing the arms as soon as the active web roll has worn down to a predetermined size. As soon as the arms are released, the greater weight of the reserve web roll rotates the 15 arms, bringing the reserve web roll to the position of the active roll. During this movement the energy released by this movement of the reserve roll is applied to rotate the reserve roll and bring it to the speed of the running web. Measured 20 are also provided for checking the rotational movement of the web roll supporting arms, without impeding the free rotation of the reserve roll, and for finally bringing the web roll supporting arms to rest with the surface of the web roll 25 contacting with the running web. After the reserve roll reaches active position, the lead end 30 of the reserve web is joined to the running web so that continued operation of the printing press may take place. Suitable braking means are provided for the web rolls, and these are preferably released from the reserve web roll while it is being brought to the speed of the running web.

It will be understood that the foregoing general description and the following detailed description as well, are exemplary and explanatory of the invention, but are not restrictive thereof.

Referring now in detail to the accompanying drawings, showing the illustrative embodiment of the invention, the web roll supporting means 35 comprise a pair of arms 10, 11, rotatably mounted by means of a shaft 12 journaled in the side frames 13, 14 of the press. Near their ends, arms 10 and 11 are provided with freely-rotatable 40 15, 16, rotatably supporting a reserve web 45 roll 17 and an active web roll 18 by engagement with the axial orifices thereof. At least one of 50 each pair of 15 and 16 is preferably axially movably to permit new web rolls to be substituted for the exhausted rolls.
Arms 10 and 11 are axially movable on their shaft 12, and set screws 19 cooperate with splines 20 to hold the arms against relative rotation and at the desired distance from each other. By variably positioning the arms with respect to each other, web rolls of different widths may be rotatably supported and fed to the printing press.

Suitable web guiding means are provided for guiding the web from the active web roll to the press and for this purpose a guide roller 21 and a presser roller 22 are rotatably mounted in the frame.

Means are provided for holding the web roll supporting arms against rotation as the running web is fed to the press, and the ends of the arms 10 and 11 are formed with notches 24, cooperating with a detent 25. Detents 25 are pivoted in brackets 27 mounted on side frames 13 or 14 by means of shafts 26, and normally held in engagement with their respective notches 24 by means of springs 28. Means are provided for automatically releasing detents 25, and thereby permitting rotational movement of the web roll supporting arms 10 and 11. As embodied, arms 30, provided at their outer ends with freely rotatable rollers 31 are mounted on a shaft 32 extending between the side frames 13 and 14, and held with their rollers 31 in engagement with the surface of the active web roll 18. Arms 30 are resiliently pressed upwardly by means of springs 33, coiled around shaft 32; having their ends fastened to the side frames 13, 14 and collars 34 which are fixed to the shaft 32.

Arms 35 are fixed to the ends of shaft 32, and cooperate with levers 36 extending downwardly and fixed to shafts 25. Stops 37 are mounted on the side frames 13 and 14 for limiting movement of the arm 36 and detent 25, between arm-holding and releasing positions. Arms 30 are preferably extendable in length and may be extended or retracted to vary the position of rollers 31 with respect to the active web roll, thereby to determine the time of operation of the pasting.

As the running web is fed from the active web roll 18, the size of the web roll gradually diminishes, with the roller 31 in contact with the surface of the web roll, as shown in Fig. 5. As soon as the active web roll has been sufficiently exhausted, rollers 31 and their supporting arms 30 are free to move past the web roll and to the position shown in Figure 6, thereby withdrawing detents 25 from the notches 24 and permitting the web tension to start rotation of the web roll supporting arms.

In accordance with the present invention, means are provided for setting the reserve web roll in rotation and gradually bringing it to the speed of the running web, and for accomplishing this by transforming the energy generated by the reserve web roll in moving to a lower level. For this purpose, the outer ends of the web roll chuck spindles 15 are provided with pinions 40, adapted to mesh with the teeth of a relatively large and substantially semi-circular rack 41 mounted on the side frame 13, concentric with the support shaft 12. The upper end of rack 41 is preferably closely adjacent to the normal reserve position of the reserve web roll, while the lower end of the rack terminates somewhat short of the normal position of an active web roll. By virtue of this construction, the pinions 40 are in mesh with the rack 41 during the major portion of their travel as the reserve web roll is moved from its upper or reserve position to its lower or active position.

Means are also provided for tensioning the web as it is fed from the active web roll, and as embodied, brake drums 45 are mounted on the chuck spindles 15 and cooperate with pairs of brake shoes 46 mounted in brake arms 47 which are pivotally supported arm 48 by means of the pivot pin 49. The outer ends of the brake arms 47 are connected together by means of a threaded member 49, threaded into the end of one brake arm 47, and loose within an aperture in the other, spring 50 being compressed between one loose arm and hand wheel 51.

Means are also provided for releasing the web tensioning means during rotation of the web roll supporting arms, thereby preventing the brakes 15 from interfering with the acceleration of the reserve web roll. For this purpose, the inner ends of brake arms 47 are extended inwardly and are connected together by means of toggle links 59', each pair of which is connected to a bar 51, slidably mounted on arm 10 by means of a sleeve 52. Bars 51, are each provided at their inner ends with a roller 53 which cooperates with a cam 54 mounted on side frame 13 and surrounding shaft 12. Cam 54 is freely rotatable with a pair of depressions 55 at a position corresponding to the reserve and active positions of rollers 53, and when rollers 53 are opposite these depressions, rollers 53 are held out of engagement with the cam and the brakes are applied with full normal tension. As the web roll supporting arms are rotated to bring the reserve roll into active position, rollers 53 and the slidable rods 51 are moved outwardly to release the brakes and thereby permit unimpeded rotation of the web rolls.

Means are also provided for checking the speed of rotation of the web roll supporting arms as the reserve web rolls approaches running position, these means preferably operating without interference with the rotational movement of the reserve web roll. As embodied, the rack 41 terminates slightly above the bottom of travel of pinions 40, and in the space between the lower end of rack 41 and the active position of the web roll supporting arms is provided a braking member 45 adapted to cooperate with the supporting arms.

The outer ends of the web roll supporting arm 10 are rounded and provided with friction strips 60 firmly secured to the arms 30. These friction strips are adapted to contact with a resiliently pressed friction member during the last portion of the half revolutions of arm 10.

The resiliently pressed friction member comprises a recessed plate 63, into which is fitted a 55 block of wood 64, or other friction material, the plate being pivoted along one edge by means of shaft 65, supported in the sides of a frame 66 mounted on the side frame 13. Plate 63 and the friction block 64 are resiliently pressed upwardly towards the web roll supporting arm 10 by means of a spring 67, positioned between the free end of plate 63 and a seat 10' on the upper end of adjusting screw 68. Screw 69 extends downwardly through an aperture in the lower part of frame 66, and is threaded on the inner end, engaging a supporting surface 71 formed in the lower part of frame 66. Worm 72 is rotatably journaled in the frame by means of shaft 73, and may be rotated by movement of hand wheel 74 to raise or lower screw 68 and thereby vary the force of spring 67.

The upper surface of friction block 64 is preferably concave, and in one position is substan-
tially concentric with shaft 12, insuring a uniform, even contact with friction strips 50 as arms 10 and 11 rotate.

Means are also provided for pressing the running web against the reserve web roll, and for resiliently stopping rotation of the web roll supporting arms at the end of their movement. For this purpose, a small resilient roller is rotatably and adjustably mounted in the side frames and is positioned in the path of movement of the reserve roll to contact therewith as it is moved to running position. Roller 22, which may serve for this purpose, is preferably formed with a relatively thick coating of soft rubber, and is rotatably mounted in end blocks 18 which are horizontally slideable in a slide way 78. The roller is resiliently pressed towards the active web roll by means of springs 80. At the end of the rotation of arms 10 and 11, roller 22 is pressed slightly away from its normal position by contact with the active web roll while pressing the running web against the adhesively coated lead end of the reserve web roll. At the end of the movement of the reserve web roll to running position, roller 22 is moved to the right (Fig. 1) by the momentum of the reserve roll, and the roller is held in this position, slightly compressing springs 80, by means of detent 25.

The operation of the illustrative embodiment of the invention is diagrammatically shown in Figures 7, 8, 9, and 10 of the drawings.

In Figure 7 of the drawings the reserve web roll 17 is supported above the active web roll 16, and the rolls are held in this position by detents 25 (Fig. 5) until the active web roll 16 is practically exhausted. At that time, arms 38 are swung to the left (Fig. 6) releasing detents 25 and the tension then pulls on the active web roll 16 to start rotation of the web roll supporting arms 10 in a clockwise direction. As they rotate, pinion 40 corresponding to the reserve web roll 17,meshes with rack 41 and gradually accelerates the rotation of web roll 16 as it is moved to active position. After pinion 40, leaves the lower end of rack 41, the end of arm 10, provided with the friction strip 60, engages the upper face of friction block 62, and rotation of the web roll supporting arms 10 is gradually checked, thereby reducing the force with which the reserve web roll is moved against roller 22. As the reserve web roll 17 is moved to running position, the active web roll is raised to the upper or reserve position, and the running web continues to be fed from the roll 18, as shown in Figure 8.

The reserve web roll 17 is finally brought to rest in active roll position, and roller 22 presses the running web against it, arms 10 and 11 being held against movement by means of detents 25, this position of the parts being shown in Figure 9.

The web drawn from the exhausted web roll 18 may then be severed, as shown in Figure 10, and the adhesive coated lead end of the reserve roll is pressed against the running web by means of roller 22, thereby joining the reserve web to the running web and permitting continued and uninterrupted operation of the printing machine.

The proportion and size of the various parts of the present embodiment may be varied within wide limits and are determined to a greater or less extent by the particular operating conditions. The speed attained by the reserve web roll as it is moved to running position depends largely upon the length of the web roll supporting arms 10, the length of rack 41, and the diameter of the web roll, but these factors may be varied in accordance with each other and the speed of rotation to be produced.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:

1. Web renewing mechanism including in combination a pair of rotatable frames adapted to revolveably support a plurality of web rolls, means for revolving a web roll as the frame rotates, means for locking the frame after each movement thereof and means for automatically releasing said locking means on depletion of a web roll.

2. Web renewing mechanism including in combination means for supporting a running web roll and a reserve web roll, means for securing the leading end of the reserve web to the running web, means for controlling the pasting by the size of the running web roll, means for brak ing the running web roll and means for releasing the braking means while the reserve roll is being brought to the speed of the running web.

3. Web renewing mechanism including in combination a pair of rotatable web roll supporting arms, a running web roll and a reserve web roll revolvably mounted at the ends of the arms, means for joining the leading end of the reserve web roll to the running web, means for braking the web rolls and normally applied to said running and reserve rolls and means for releasing the braking means while the arms are rotating.

4. Web renewing mechanism including in combination a support for a reserve web roll and an active web roll, pinions fast with respect to each web roll, driving means engageable with said pinions to set the reserve web roll in rotation, brake means for tensioning the web drawn from the active web roll and means for releasing said brakes while said reserve web roll is being driven.

5. Web renewing mechanism including in combination rotatable means for supporting a reserve web roll and an active web roll, braking means cooperating with said rotatable means to check rotation thereof as a reserve web roll is brought to active position by rotation of said first means and a stop for holding said rotatable means in a fixed position.

6. Web renewing mechanism including in combination rotatable means for supporting a reserve web roll and an active web roll and a guide roller mounted at one side of the active web roll said roller being positioned to cause a substantial turning moment to be exerted on the rotatable means in the direction of movement of said rotatable means as the active web roll approaches exhaustion.

7. Web renewing mechanism including in combination rotatable means for supporting a reserve web roll and an active web roll and a guide roller positioned a substantial distance from the edge of the active web roll in running position and in the direction of movement of the active web roll as it is moved from running position whereby a substantial turning moment is set up as the active web roll becomes exhausted.

8. Web renewing mechanism including in combination a rotatable support for a plurality of web rolls including an active web roll and a reserve web roll, a roller positioned in the path of movement of said rolls as the support is ro-
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tated to engage the surface of a full roll but clear an exhausted web roll, said roller serving to limit rotation of the support and to press the running web against the reserve web roll.

9. Web renewing mechanism including in combination rotatable means for supporting a reserve web roll and an active web roll, means for rotating the reserve roll, and a guide roller mounted at one side of the active web roll said roller being positioned to cause a substantial turning moment to be exerted on the rotatable means in the direction of movement of said rotatable means as the active web roll approaches exhaustion.

HOBART N. DURHAM.