This invention relates to paper winding apparatus and more particularly to apparatus arranged for unwinding thin or fragile paper from a roll and rewinding it on a cylinder roll.

In the production of paper, a suspension of wood pulp is flowed onto an endless wire in a Fourdrinier machine or the like, and the unwound paper is then passed continuously through a series of driers and calendering rolls, after which it is wound onto a spool by means of a reel, such as a Pope reel of the type shown in the patent to Pope No. 1,348,642 of September 4, 1917. In that system, the paper must be wound without stopping as fast as it is produced by the paper making machine, and the resultant roll may have many imperfections and breaks in the paper. Hence, it is customary to mount the spool of paper on a freely rotatable support and to rewind the paper as a full width roll, or to pass the strip over slitter and form separate narrow rolls. The paper making machine requires an initial winding of the paper as it comes from the calender as at a high rate of perhaps 1500 feet per minute. But, in the rewinding of this paper, it is necessary to run the rewinder at perhaps twice that speed in order to give the operator ample time within which he may stop the machine and make suitable splices where the paper has been broken.

The standard rewinding operation serves for many types of paper, particularly those which are strong and capable of withstanding the comparatively high tensions involved in unwinding the first roll by drawing the paper therewith from sufficient tension to rotate the spool, but it is found that this standard procedure is not suitable for crepe and tissue or other light weight and fragile papers. The supply spool of paper that is to be rewound may weigh several thousand pounds; hence there is a high tensional pull involved in drawing the paper from this roll, and that tension will change as the roll decreases in size. Also, if it becomes necessary to stop the rewinding mechanism in order to make an invisible splice in the paper where there has been a break, then the momentum of the rapidly moving supply spool will unroll a long strip of the paper onto the floor. It has been customary to provide a brake for the unwinding supply roll which gives a required tension on the roll at all times and stops it when the unwinding roll is stopped. But the changing size and mass of the unwinding roll creates problems in acceleration and deceleration and the standard brake mechanisms will not provide a uniform tension and a constant speed of unwinding. The mechanical brake as commonly used comprises a brake band on a small drum connected with the shaft of the unwinding spool, and its frictional strip is provided by a manually adjusted screw applying force through a fixed leverage. However, as the unwinding roll becomes smaller in size, the frictional force automatically increases to the decreasing leverage of the pull of the paper which serves to rotate the unwinding roll. An electrical brake mechanism may comprise an electric generator adapted to be driven by the unwinding roll which sends power back into the line. The amount of braking effort required may vary from a positive to negative value and pass through the zero point; hence electrical regulation has been found to be inadequate. Also, the windage of the armature and other forces cause a variation in the braking effect. For such reasons, the standard methods will not serve for unwinding and rewinding a crepe or thin tissue paper.

It is the primary object of this invention to overcome these various problems and to provide an unwinding-winding apparatus in which a roll of paper may be unwound at a given rate and rewound on another roll at a desired peripheral rate and wherein the paper is held under a controlled positive or negative tension between the unwinding and winding zones.

A further object of the invention is to provide an apparatus of this type wherein a massive roll of paper to be unwound is initially brought up to a correct speed of rotation and the paper is thereafter led forward to the winding part of the apparatus and rewound at that required speed, so that no undesirable tension is imposed on the paper when a new supply roll is mounted for rotation.

A further object of the invention is to provide a construction whereby spools of paper may be unwound and rewound continuously without stopping the apparatus, and the leading edge of a new strip of paper from another supply roll may be carried forward from the unwinding half to the winding portion of the machine while the end of the paper of the first supply roll is passing through the machine, so that the apparatus need not be stopped for changing supply rolls or for removing a finished rewound roll.

Another object of the invention is to provide a mechanism of this general type wherein an empty spool which is to receive the paper is brought up to full speed before it is permitted to contact the paper that is being wound on a nearly completed roll, and which thereby permits the strip of paper to be cut and automatically brought into
winding engagement with the second empty spool and to start on its path of winding without interrupting the operation of the machine or endangering the paper or the rest of the load. Various other objects will be pointed out or made apparent in the following disclosure.

In accordance with this invention, I propose to use two machines of the general type shown in said Pope patent, or equivalent constructions, wherein one is used for unwinding and supplying paper to a second machine which receives and winds the same in a finish roll. These machines are arranged back to back, as it were, and are so inter-connected so that the paper rolls are driven at the same or a desired peripheral rate. Mechanism is provided for starting a supply spool into full speed rotation before it engages the driving drum of the unwinding machine, and the winding machine comprises mechanism for rotating an empty spool at full peripheral speed rotation prior to its receiving the paper to be wound thereon. The parts are so constructed and arranged that the unwinding-winding operation may be carried on continuously and without interruption.

Referring to the drawings illustrating a preferred embodiment of this invention:

Fig. 1 is a side elevation of the complete unwinding and unwinding apparatus in which the unwinder has a new supply roll being initially brought up to speed while the old supply roll is nearing the end of its run, and in which the winder has the paper starting on an empty spool while a full size roll is positioned for removal;

Fig. 2 is a top plan view of the machine;

Fig. 3 is a fragmentary detail showing the mechanism for starting the empty spool in rotation;

Fig. 4 is a diagrammatic view showing the operation of the machine and the positions of the parts of the two machines, in which a new supply roll of the unwinding machine has been started in rotation and swung into contact with the main driving drum just before the paper has run off a previous supply roll, and in which an empty spool is positioned on the winding machine for starting rotation while an almost completed spool continues to wind the paper; and

Fig. 5 is a similar diagrammatic view in which the new empty first supply spool has been removed from the unwinding machine, and the new unwinding spool is about to be swung to a second unwinding position; while the winding machine has the roll transfer arms arranged to transfer a partly filled spool to a secondary final position so that a new spool may be put into place.

In Fig. 1 I have shown an unwinding machine at the left and a winding machine at the right which may be constructed as shown in said patent, or, as desired, except as herein described. Referring first to the unwinding machine, a roll of paper 10 may be unwound and fed forward to the winding zone by means of a power rotated drum 12 having a cylindrical surface arranged to engage the periphery of the paper roll and unwind the same by frictional contact therewith. This drum 12 has its axle 14 suitably mounted in bearings 15 carried by side standards of the machine. Although the drum may be driven by electrical drive mechanism, such as a constant speed direct current motor provided with a suitable variable speed and other desired controls, I have shown it, for the sake of simplicity of illustration, as driven by means of a gear 17 (Fig. 2) at the end of shaft 18 which in turn meshes with a further gear 19 mounted on a short shaft 18 suitably supported in its bearings and this shaft 19 is in turn driven by means of expansion sheaves 20 driven by V belts 21 from a further sheave 22 carried on the axle 23 mounted in suitable bearings on the framework of the winding machine at the right hand side of the assembly. The shaft 23 is driven by a pulley 24 and driving belt 25, which receives its power from a suitable mechanism as shown in Fig. 1. The shaft 23 carries a further drum 26 which is the driving power for winding the paper on the spool 28 of the winding machine. If desired, one or more suitably shaped cutters 30 (Fig. 1) may be arranged to slit the paper 31 as it travels from the unwinding to the winding side of the machine, and in that case the paper may be wound on several cores suitably assembled on the same spool. The slitters 30 may be a set of cutting discs or knives of circular form suitably driven by a power drive so as to rotate at high speed and slit the paper 31 held thereto against by a guide 32.

In order that the unwinding operation may be continuous, I first mount the shaft 33 of the supply spool 36 on a pair of side arms 35 of the unwinding machine and then transfer the same to a pair of running arms 38 which hold the supply roll against the drum 12. The arms 35 are fixed on a suitable pivot shaft 37 carried in bearings on the framework. The arms 35 are so arranged that a new supply roll 36 in its full size may be held initially out of contact with the driving drum 12 but can be moved downward into peripheral engagement therewith. Similarly, the other arms 36 are pivoted on short shafts 39 on the side frames arranged above the axis of the shaft 14. Each of these arms 35 and 36 is provided with a slotted or yoke portion so constructed and located that the arms may be moved to positions, as indicated at the left hand of Fig. 5, where the spool axle 33 carrying the paper roll 34 may be transferred from arms 35 to arms 36. To effect this transfer of the paper roll, each end of the shaft 33 of each spool is mounted in suitable bearings carried by a slide block 40. These slide blocks 40 are so constructed that each will fit between the two parallel spaced ends 41 of the yoke arm 35 and slide freely therein. The yokes 41 are flanged and the slide blocks are suitably shaped to slide between without permitting endwise movement of the spool shaft and the paper roll carried thereby. The supporting shaft 37 passes through the machine, and each of the arms 35 is keyed to the shaft so that the shaft will rock the arm 35 as required. The shaft 37 is rocked by suitable mechanism, such as the hand wheel 44 having a small gear 45 fixed to its shaft and in turn meshing with another gear 46 on a small shaft which carries a further gear 47 meshing with a large gear 48 fixed to the shaft 37, so that turning the hand wheel will swing the arms simultaneously as required.

The quadrant shaped yoke arms 36 are likewise swung about their supporting shafts 39 by means of the hand wheel 50 whose shaft has a gear 51 keyed thereto and which meshes with a further gear 54 on a cross shaft 56 carrying gears 55 at its opposite ends which meshes with an arcuate shaped rack bar 52 carried on the edge of each arm 36. The arms 36 are bifurcated by slots 53 forming the yoke, and the arms are so spaced as to engage the outer projecting ends of the shaft 33 and to slide against the outer sides of the slide blocks 40 and thus guide and position the same.
When each swinging arm 35 is vertical, as shown in Fig. 1, the flanges of the yoke arms 41 hold the bearing blocks 40 in position, and this support operates for all positions of the arms 35 as shown in Figs. 4 and 5. When, however, the quadrant arms 35 are swung to the position of Fig. 5, the yoke slot 53 of each of these arms is located substantially beneath the projecting end of the spool shaft 33, and the arms 35 may then be swung down further so as to deposit the bands 85 on the framework 2. While the arms 35 are in their lowestmost position, the quadrant arms 35 may be swung upwardly and toward the right and thus remove the bearing blocks 40 from the first pair of arms 35. This frees the latter so that they may return toward the left for receiving a new supply spool.

The construction of the winding up machine at the right hand side of Fig. 1 is substantially the same as that of the unwinding machine above described. This winder likewise comprises a pair of swinging arms 65 having yoked ends 61 adapted to carry the slide block 40 at each end of the spool shaft. These arms 60 are made and mounted the same as arms 35. That is, they are keyed to the cross shaft 62 suitably mounted in bearings on the framework of the machine. These shafts 62 are connected by bevel gearings operated by the hand wheel 65, which transmits power through the small gear 66 fixed on its shaft. The gear 66 meshes with a gear 67 on a short shaft carrying the small gear 68 which in turn meshes with the gear 69 keyed to the shaft 62. The arms support the paper roll in its final winding position.

The roll is initially supported by a pair of quadrant arms 70 pivotally mounted on pivots 71 suitably carried by the framework of the machine. The quadrant arms are provided with yoke slots 72 adapted to receive the outer ends of the spool shaft 33 on which the paper is to be wound. These arms 70 are moved by rack bar quadrants each of which has the gear teeth 74 meshing with the teeth of a small gear 75 keyed on each end of the through shaft 75 which has a hand wheel 76 on it with the small gear 76 on the shaft of the hand wheel 76. The two pairs of yoke arms operate the same as those of the unwinding machine to transfer the paper spool from one position to another.

Referring to Fig. 1, a paper roll 10 is being unwound by peripheral contact with the driving drum 12. The paper strip passes from the roll 10 towards the left and around and down under the driving drum 12 and thence up over an adjustably mounted roll 58 having its shaft carried by bearings which are suitably carried by a slide block 82 movable up and down by an adjusting screw 83, as will be understood. From this roll the paper 31 passes over the top of the winding drum 28 and then to the spool 29 arranged to receive the same.

Subsequently the fragile paper passes downwardly around the left hand side of the first drum 12, it is imperative that the massive roll 34 of the new supply be brought up to speed before that roll 34 is allowed to contact with the driving drum if the paper web is still coming off the initial supply roll 10, and that condition is required for continuous operation of the machine. To this end, I bring the roll 34 up to full speed while it is out of contact with the driving drum 12. The driving mechanism preferably comprises a set of endless bands 85 of canvas or other suitable material arranged to engage the periphery of the new supply roll and bring it up to speed while it may be freely rotated on its bearing blocks 40. These bands 85 are mounted on two driving rolls 66 and 67 suitably carried by brackets 54 mounted on the framework 55 thereof. The bands 85 preferably ride in shallow grooves in the driving rolls 66 and 67 so that they will be properly guided and lie in alignment with the roll surface. The lower driving roll 67 is driven by a belt connection with a sheave 88 on a shaft 88 which is further connected by a pulley 84, with a pulley 84 keyed on the shaft 14 of the driven drum. These various pulleys are of such size and arrangement that the endless bands 85 will be driven at the same peripheral speed as that at which the driving drum 12 is rotated.

If a new paper roll 34 is put into position on the yoke arms 35 and then moved towards the left into contact with the driving bands 65, as shown in Fig. 1, the massive roll will be brought up to full speed by frictional engagement with the bands, and this speed will persist because of inertia when the arms 35 are swung over to engage the roll with the periphery of the drum 12. Then the paper from the new roll 34 is caught by the paper on the drum 12 which is coming off the roll 10 and the two strips pass together in contact around the driving drum 12, the winding drum 28 for reception by the old or a new spool on the winding machine. It will be understood that various procedures well known in the art may be employed for causing the paper strips to adhere and thus make the unwinding operation continuous. Standard practice in the paper industry involves applying adhesive manually to the top of the leading end of the strip on the new roll, so that when the roll is moved forward to contact with the drum the adhesive will stick to the paper of the expiring roll and be drawn forward therefore to the winding machine. Thus, the roll 34 is brought up to full speed and when it contacts with the paper from the old roll 10 the tissue paper passing from the old supply will not be broken or injured, since the two strips are travelling at the same speed.

By the time the old supply is exhausted, the new supply is winding properly on the unwinder and there is no interruption or slowing down in the unwinding operation.

A further problem is presented at the wind up end of the machine when a new and empty spool 29 is to be brought into place for receiving the paper after the old roll has been wound to full size. The spool has considerable weight and if it were dropped into contact with the fragile paper 31 passing over the top face of the drum on its way to the right hand roll 32 (Fig. 4) that is still receiving the paper, it would tend to break or injure the fragile paper. It is therefore desirable that this new and empty spool 29 be rotating at full speed before it is allowed to drop down into engagement with the driving drum 28. Then the paper that is still going to the old spool 32 may be suitably kept from being fed forward by the drum and empty spool rolling thereon to fly upwardly over and around the spool and get caught in the nip and so be forced to wind on the spool, as is explained in said patent to Pope No. 1,248,542.
The preferred mechanism for starting the empty spool 23 into rotation comprises, as shown in Figs. 2 and 3, two rings 96 mounted on the opposite ends of the main driving drum 20 which are so resiliently supported that they may be moved upwardly to positions where they may engage the lateral shaft of the driving spool and hold it just out of contact with the driving drum while at the same time starting that spool shaft into rotation. Each ring 96 is a steel band having a cylindrical outer periphery. It is mounted on a supporting flange 95 on the outer side of the steel ring 94 and to the outer side of the supporting flange 95. The ring 96 rests on a pair of rollers 97 which are pivotally mounted on suitable bearings carried by the ends of the first class rock levers 98. The lower end of the right hand lever 98 (not shown) is pivotally connected through a link 101 with the rod 102 that carries the piston 103 located within a pressure cylinder 104. The left hand lever 98 is pivotally connected at its bottom to the casing 105 of the fluid pressure mechanism. A pipe 109 and valve 108 serve to introduce fluid under pressure, such as air or oil, to the piston chamber formed at the left hand side of the piston 103 and thus force the lower lever arms outwardly and the rollers 97 inwardly. The parts are so constructed and arranged that the roller 97 may be brought into engagement with the outer periphery of the steel ring 96 and thus lift it enough to prevent the spool 23 from touching the paper traveling over the periphery of the drum 28. The thickness and the resiliency of the rubber ring 96 is such as to permit this slight lifting motion of a fraction of an inch. If desired, various other constructions, such as springs, may be substituted for the rubber ring.

By means of this mechanism, the ring 96 may be moved upwardly to a position where it occludes about an axis that is slightly above that of the driving drum 28. Then a new supply spool 29 is dropped into place in the slotted yoke arms of the quadrants 70. The spool 29 is made longer than the driving drum 28 so that the central portion of its central portion will engage the ring 96, while the bearing block 40 is located outside of that ring driving portion. When the spool 29 has been brought up to full speed rotation, then by suitable manipulation of the valve 109 the rollers 97 are dropped back and the ring 96 then becomes concentric with the driving drum 28 and the spool 29 is lowered into contact with the periphery of the drum and is thereafter rotated directly by the drum with the rings 96 still in engagement therewith.

The operation of the above described apparatus will readily be apparent. During the normal running of the machine while paper is unwinding from the roll 10 in peripheral contact with the drum 12, a new supply spool 34 has its bearings 40 inserted in the yoke 41 of the vertically positioned pair of arms 35, and then it is moved toward the left into engagement with the driving bands 85 which frictionally engage the periphery of the paper roll and bring it up to full unwinding speed. In the meantime, the roll 10 is nearing the end of its supply, but before the paper strip has become exhausted the new supply roll 24 is moved down from the position of Fig. 1 to that of Fig. 4 while it is rotating at substantially its full speed. The paper of the new roll is caused to cling to the paper passing from roll 10 around the drum 12 and the two strips pass together to the winding drum 20. Then, when the roll 10 has become completely exhausted the empty spool is removed from its yoke arms 36, and these arms are then moved over to the position of Fig. 5 where the open slots thereof are located below the ends of the supply spool shaft 23 and as that paper strip grows smaller in diameter the spool shaft will ultimately engage the sides of the slot in the arms 38, and the arms may then be swung toward the right and so lift the spool bearings 40 from the yokes of the arms 38. Thus the arms 38 are returned to the position of Fig. 1 and the yoke arms 35 may be moved upwardly, as shown in the same figure, for reception of a new supply roll.

At the winding end of the machine, the paper roll 22 may be held by the yoke arms 30 in the position of Fig. 4 in driving contact with the drum. At the same time, the yoke arms 70 are held at their left hand end position for receiving an empty spool. Prior to the empty spool being put into place, the hydraulic mechanism, is suitable valve 108 is swung upwardly to the positions of Figs. 3 and 4 so that the periphery of the spool 23 cannot engage the drum 28. The ring 94, however, is traveling at the peripheral speed of the drum 28 and by frictional contact with the spool it starts it into full speed rotation. Then the spool may be dropped down onto the drum by suitable manipulation of the valve 109. By methods well known to paper makers the paper sheet that has been winding on the spool 92 is severed and the advancing free end is caused to wrap around the empty spool and thus be wound thereon. Then the fully wound spool 92 is swung to the right away from the driving drum 28 and the paper roll may be removed by means of the eyelets 108 secured to the bearing blocks which may be engaged in position where a new spool may be inserted.

When the new winding roll has attained a sufficient size so that preparation must be made for putting an empty spool into place, then the two pairs of supporting arms 50 and 70 are moved into the positions of Fig. 5 and the paper spool is transferred to the arms 50 while the bearing blocks 40 are held in position by the yokes. Then as the spool 92 grows in size the ends of the spool shaft 33 are gradually withdrawn from the yoke slots of the arms 70 and ultimately the arms 70 may be swung back to the receiving position of Figs. 1 and 4 where a new supply spool may now be put into position. When the spools are held in the arms 36 and 70, the eyelets 108 tend to swing to a lowestmost position and by their weight hold the bearing blocks 40 from revolving. The eyelets are shown upon the ends of the paper rolls 22 and 92 for the sake of clarity of illustration.

Thus the operation of unwinding and rewinding web material is carried on continuously and at a uniform speed for both the unwinding and winding spools.

It will now be appreciated that various modifications may be made in both the unwinding and winding halves of the machine, and that the apparatus is adapted for winding various other types of fragile webs such as delicate fabrics. At the unwinding end of the apparatus the new supply roll may be brought up to full speed by other mechanical devices such as an electric...
motor connected temporarily to the roll that is driven at the required rate to obtain peripheral synchronization of the supply spool with the drum. Also, the reeling device illustrated particularly fixes the edges of the machine to that winder and it will not be injured by contact of the stationary empty spool with the rapidly moving paper. This supplemental spool rotating mechanism may therefore be employed in association with a winding reel of the type shown in said Pope patent or other suitable winder apparatus where it is required to wind web material continuously and to bring an empty spool up to full speed before it is permitted to contact with the winding drum. Also, other types of drum reel may be used in place of the Pope reel above described. For example, fed swinging blades to the supply spool thereon which hold the paper spool in position against the driven drum. Also, it will be understood that the winding drum and associated spool may be driven at a different peripheral rate from that of the unwinding drum and spool, such as where a crepe paper is stretched out to a desired extent during winding. That is, I drive the two drums at a related or regulated peripheral rate so that the process of winding is continuous. This is accomplished by using a Reeves variable speed driving or by means of interrelated electrical regulating mechanism or by manual control, as is well understood.

It is therefore to be understood that the above disclosure is to be interpreted as describing the preferred embodiment and a preferred embodiment and not as imposing limitations on the claims appended hereto.

I claim:

1. Apparatus for unwinding and winding web material comprising unwinding and winding drums, a set of roll arms associated with each drum and arranged to removably hold two spools of web material in two peripheral rolling contacting positions on the associated drum, means whereby a spool may be driven or by means of interrelated electrical regulating mechanism or by manual control, as is well understood.

2. Winding apparatus comprising a power driven rotatable cylindrical drum, a support for holding an empty supply spool in or out of peripheral contact with the drum, a rotatable ring engageable with the periphery of the supply spool and means for moving the ring into engagement with said supply and rotatably holding it out of contact with the drum and initially starting the spool into rotation before it engages the drum.

3. Winding apparatus comprising a rotatable cylindrical drum, mechanism for rotating the same at a fixed rate, a spool for winding web material having a peripheral surface portion extending beyond the drum, a support arrangement to hold the winding spool in peripheral engagement with the drum, a driving ring engageable with said peripheral surface portion of the spool for rotating the same, and means for moving the driving ring into and out of peripheral engagement with the spool so that it may cause rotation of the spool prior to its contacting with the drum, said driving ring moving automatically out of contact with the spool when released.

4. A web winding apparatus comprising a power driven rotatable cylindrical drum, means for holding a spool in peripheral driving engagement with the drum but with a peripheral surface portion extending beyond the drum, a driving ring of substantially the same diameter as the drum which is releasably engageable with said peripheral portion of the spool, means for resiliently securing the ring to the drum and causing rotation thereof at the peripheral rate of the drum, and controllable means for releasably moving the ring directly into peripheral engagement with the spool in opposition to its resilient support and which starts rotation of the spool prior to its contacting the drum, said driving ring moving automatically out of contact with the spool when released.

5. Apparatus for unwinding and winding web material comprising unwinding and winding machines having each a power driven cylindrical drum arranged for peripherally engaging and moving a web from a supply roll to a rewinding roll, means for rotating the drums at substantially the same peripheral rate and moving the web under a controlled equalized tension, supports for holding two web rolls simultaneously in peripheral rotating contact with each drum which provide for a radially free movement of the axis of each roll, said supports being arranged for transferring a roll from one to another of two positions of rolling contact with each drum, means for moving the roll supports of the winding drum so that an empty spool may be brought into rolling engagement with the drum prior to removal thereof from a full roll, said roll being wound successively on spools while a controlled web tension is maintained.

6. Apparatus for unwinding and winding web material comprising unwinding and winding machines having each a power driven drum, means for rotating the drums at the same peripheral rate and controlling the tension on a web moved therebetween, supports for holding two web rolls simultaneously in a radially free peripheral rotating contact with the associated rotating drum, and which are arranged for transferring a roll from one to another of two circumferential positions in relation to each drum while it is maintained in a freely rotating peripheral contact with the associated rotating drum, and means for rotating a new supply roll of the unwinding machine at substantially full speed prior to its contact with the old web on its associated drum, so that a web may be unwound from a succession of supply rolls and rewound.

7. Apparatus for unwinding and winding web material comprising unwinding and winding machines having each a power driven drum, means for rotating the drums at the same peripheral rate and controlling the tension on a web moved therebetween, supports for holding two web rolls
simultaneously in a radially free peripheral rotating contact with the drum of each machine and which are arranged for transferring a roll from one to another of two circumferential positions in relation to each drum while it is maintained in a freely rotating peripheral contact with the associated rotating drum, and means for rotating an empty spool at substantially said rate prior to its contacting the web and drum of the winding machine so that web material from several supply rolls may be rewound continuously as a succession of rolls.

8. Winding and unwinding apparatus comprising a cylindrical unwinding drum and a cylindrical winding drum arranged with parallel axes to move web material from one to the other, mechanism for moving the drums at substantially the same peripheral rate, two pairs of pivoted yoke arms associated with the unwinding drum and arranged to move a spool into and away from peripheral engagement with the drum and to effect transfer of a spool from one pair to another, a power driven band moving at said rate which is arranged to rotate a full supply spool, one pair of yoke arms being arranged to hold the full supply spool in peripheral rotatable engagement with said driven band while out of contact with the drum and thereafter transfer the rotating spool into engagement with the drum, two pairs of yoke arms arranged to hold a spool in peripheral contact with the winding drum and to effect transfer thereof from one pair to the other, a rotatable ring driven by the winding drum and engageable with the periphery of an empty winding spool, means for moving the ring so as to rotate the empty spool while holding it out of contact with the drum and means for thereafter swinging the associated yoke arms and moving the rotating spool into peripheral engagement with the drum while it is supported thereby, said parts being so constructed and arranged that web material may be unwound and rewound continuously at a substantially uniform rate.

EVERETT W. CLEM.

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