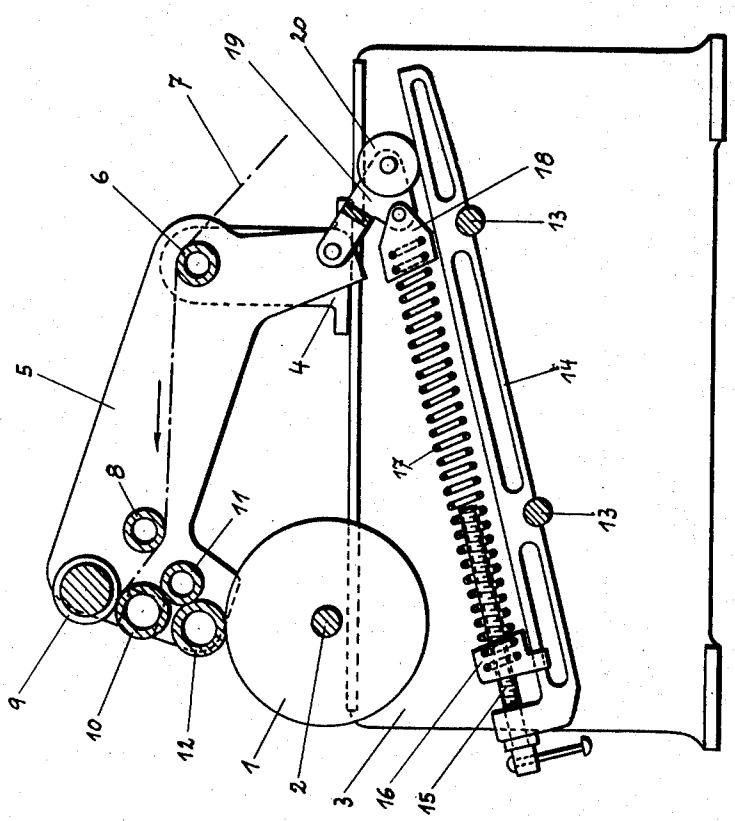
April 21, 1953 M. SCHNEIDER 2,635,824

REEL SLITTING AND REWINDING MACHINE

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Fig. 1



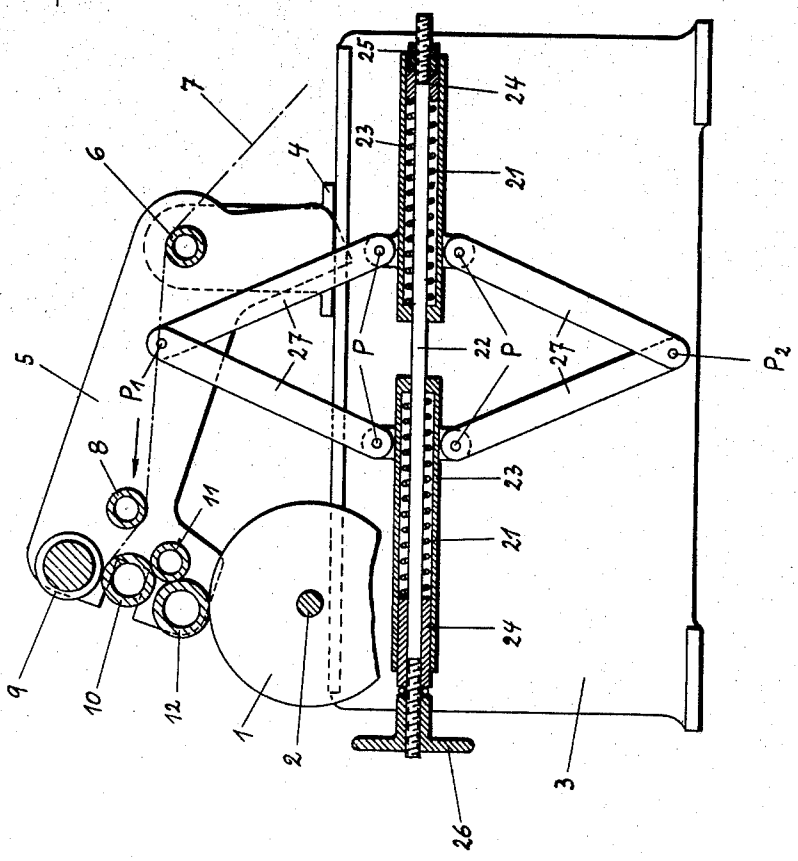
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Fig. 2



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REEL-SLITTING AND REWINDING MACHINE

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Application September 30, 1949, Serial No. 118,859
In Germany October 1, 1948

7 Claims. (Cl. 242—75)

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This invention relates to a reel-slitting and rewinding machine for slitting and rewinding webs of paper, or the like, with a pressure roller carried by a hinged cutter head above the winding spindle against the reel to be wound, on which the oscillating cutter head is relieved through spring power.

There are reel-slitting and rewinding machines known with a pivotally mounted cutter head, which is provided with a total or partial counterbalancing of the weight of cutter head by adding or removing a number of counterpoises or by displacing counterpoises and supporting levers. The adjustment over the width of web is obtained by providing counterpoises of different sizes or numbers on both sides, or by setting slide weights on levers distributed over the width of machine.

These devices are troublesome to the attendants and unwieldy in operation owing to the space required and the very bulky arrangement, for counterbalancing or adjusting the bearing pressure, the interchange or regulation of the weights has to be done during the winding process, thus diverting the operator from his real task with the result of increasing the threat of danger. The adjustment of the pressure is left to the feeling of the attendant who makes the changes of weight at more or less regular intervals, thus considerably affecting the uniformity of tension of the winding in an unfavourable manner.

Having in mind the defects of the prior art apparatus, it is the principal object of the invention to provide a web slitting and rewinding machine that is compact and wherein counterbalancing is effected without the use of counterweights.

It is another object of the invention to provide such a machine wherein continuous counter-balancing is affected resiliently.

It is still another object of the invention to provide a machine of this type wherein adjustment of the counter-balance may be readily effected during operation.

It is a further object of the invention to provide a machine of the present type wherein the counter-balancing is variable during each stroke and provides a substantially uniform tension.

It is a still further object of the invention to provide a machine of the present type, simplicity of design, economy of construction and efficiency in operation.

The foregoing objects and others ancillary thereto are preferably accomplished by mounting the pressure head eccentrically on the reel spindle support for vertical movement of a pressure

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roller carried by said head relative to a reel on said spindle, and counter-balancing said head by means of link means connected to said head and biased by rectilinear spring means on said support to continuously counter-balance said head regardless of its relative angular position to maintain a uniform tension on the web being wound on the reel.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention, itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings in which:

Fig. 1 represents a longitudinal section through a reel-slitting and rewinding machine with discharge by tension springs, and

Fig. 2 shows a longitudinal section through a reel-slitting and rewinding machine with discharge by compression springs.

The winding spindle 2, destined to receive the reel 1 on which the treated or slit web forming a roll is to be rewound, is carried on the two side frames 3 of the slitting and rewinding machine. On these side frames two pedestals 4 are fixed, in which the cutter head with its two side cheeks 5 are slewably or oscillatably mounted. At the same time, a guide roller 6 is placed around the center of rotation of the cutter head for conducting a paper web 7 coming from a parent reel not represented in the drawing. In the front part of the cutter head, between the two side cheeks 5 thereof, the cutting cylinder 9, the coacting pressure receiving or counter-cutting cylinder 10, the reversing roller 11 and the pressure roller 12 are provided besides a further guide roller 8.

In the form of embodiment represented by Fig. 1, a guide rail 14 is fixed, on both sides of the cross rods 13 connecting the two side frames 3. The front end of the guide rail 14 is formed as a bearing for the regulating spindle 15, on the threaded part of which the spring guide 16, secured against twisting by the guide rail 14, is provided, the tension spring 17 being fixed to the spring guide 16. The other end of the tension spring is fixed or pivotally connected to the trailing lever 19 by means of a spring eye 18, one arm of this lever carrying the guide roll 20 which rolls off on the guide rail 14, while the other arm attacks the transmission arm of the cutter head. As shown, the transmission arm of the cutter or

pressure head is a short depending arm to which the upper arm of the trailing lever 19 opposite the guide roll 20 is pivotally connected to rise with the connection as the cutter head and pressure roller 12 move down while the roll 20 moves rearwardly on the guide rail 14. As the cutter head and pressure roller 12 move upwardly with the increasing size or diameter of the reel or roll on the winding spindle 2 as the winding progresses the upper end of the trailing lever 19 swings downwardly and forwardly with the corresponding swing of the transmission arm and pressure or cutter head while the guide roll 20 travels rearwardly on the rail 14 to compensate for the progressive change in the relative positions of the parts and maintain a constant pressure of the pressure roller 12 on the web and wound roll after the first few turns or windings on the spindle or reel to insure uniformity of the winding.

The mode of action of the reel-slitting and rewinding machine is as follows:

The paper web 7, to be cut and rewound, is guided in known manner from the supply reel (not shown) over the guide roller 6 and under the guide roller 8, between the cutting cylinders 9 and 10, where the counter-cutting cylinder or pressure receiving roller 10 backs up or takes the pressure of the treating or cutting cylinder 9 against the web, and over the reversing and pressure rollers 11 and 12, to the rewinding reel 1. With the beginning of the rewinding operation, the oscillating cutter head will be raised with the growing diameter of the reel by means of the pressure roller 12 lying on top of the rewinding reel 1. The pressure between the pressure roller 12 and the winding reel 1, determined by the weight of the cutter head and the tension of the paper web 7, is opposed by the tension spring 17 in transferring its power on the trailing lever 19. The continuous change of bearing pressure, dependent upon the radius of center of gravity of the cutter head, the weight of the head, the springs and tension of the web, together with the fact that the swing or pivot axis of the cutter head within guide roller 6, is above the spindle 2 and reel or roll 1 and the cutter head swings below or above said axis and inclines forwardly in its initial and early stages, will be compensated by the position of the trailing lever 19 and the change of position of the cutter head, connected therewith and occurring in a like ratio, as well as position of the transmitting arm. Consequently there is a state of equilibrium, or, by adjusting the regulating spindle 15, a pressure wanted and remaining constant within the range of work, between the pressure roller 12 and the rewinding reel 1.

The distribution of pressure over the width of paper web can be adjusted, if unevenness of paper makes it necessary, by changing the spring tension by means of regulating spindles 15 separately on either side and independently one of another.

With the example of embodiment represented by Fig. 2, balancing the cutter head is obtained in such a way that two compression springs 21, provided in pairs on both sides and opposing one another, counterbalance the weight of the cutter head. The compression springs 21, mounted on a spindle 22, are enclosed in spring cases 23 which slide on the spindles 22 and the annular bottom areas or inner ends of which around the spindles, opposed to one another, receive the spring compression. The bushes 24

applied to the outer ends of the spindles 22 on both sides of the machine within side frames 3 serve as a means for guiding the spring cases 23 and as abutments for the outer ends of the compression springs 21. At the rear end of the spindles 22, they are secured against displacement by the nut 25, and at the threaded front ends of the spindles 22, they are made adjustable through the hand wheels 26. The spring cases 23 carry the fulcrums P of the knee levers 27, the common upper working point P_1 of which is situated in the side pieces or cheeks 5 of the oscillating cutter head, whilst their lower bearing point P_2 lies in the side frames 3.

The operation of the relieving device represented in Fig. 2 is as follows:

The compression springs placed in the spring cases rest with their exterior ends against the bushings 24, whereas their force of pressure, directed against each other, transmits itself to the fulcrums or hinge points P by applying towards the annular bottom areas or inner ends of the spring cases 23.

During the rewinding process, the spring cases 23 are displaced relatively toward each other on the spindle 22 and lessen their interspace according to the growing diameter of the reel, whereby the mechanically operated stretching of the springs or collapsing movement of the knee levers 27 toward each other causes the transmission of spring power upon the common point of application P_1 at the side cheeks of the oscillatable cutter head, opposing thereby the weight of the cutter head. By adjusting the hand wheels 26 on the spindles 22, the state of equilibrium thus obtained can be transformed into a bearing pressure of the cutter or pressure head and of the pressure roller 12 against the web 7 on the rewinding reel or roll 1 remaining constant within the working sphere. Otherwise the method of operation of this reel-slitting and rewinding machine is equal to or the same as that described in the example of embodiment according to Fig. 1.

I claim:

1. A winding and reeling device comprising a support, a spindle journalled on said support for winding a web thereon, a pressure head pivotally mounted eccentrically on said support to swing vertically relative to and gravitate toward said spindle, a pressure roller carried by said head and engageable with a web wound on said spindle to maintain a tension on the web, and resilient means on said support and operatively connected with and continuously counterbalancing said head regardless of its relative angular position to maintain a uniform pressure by said roller on the wound web as the diameter of the wound web varies.

2. A winding and reeling device comprising a support, a spindle journalled on said support for winding a web thereon, a pressure head pivotally mounted eccentrically on said support to swing vertically relative to and gravitate toward said spindle, a pressure roller carried by said head and engageable with a web wound on said spindle to maintain a tension on the web, link means connected to said head, and rectilinear spring means anchored to said support and biasing said link means to continuously counterbalance said head regardless of its relative angular position to maintain a uniform pressure by said roller on the wound web as the diameter of the wound web increases.

3. A device as defined in claim 2 wherein said

link means comprises a lever pivotally connected at one end to said head, a roller journalled on the other end of said lever, a guide on said support for said roller, and a spring engaging member pivotally connected to said lever intermediate its ends.

4. A device as defined in claim 3 wherein said spring means comprises a threaded spindle pivotally mounted parallel with said guide, an adjustable spring engaging member threaded on said threaded spindle and engaging said guide to be retained against rotation on said threaded spindle, and a coiled spring surrounding said threaded spindle and connected at its ends with said respective spring engaging members.

5. A device as defined in claim 4 wherein said head is in the form of a bell-crank pivotally mounted at its elbow on said support and carrying said pressure roller adjacent the end of one arm and connected to said link adjacent the end of its other arm.

6. A device as defined in claim 2 wherein said spring means comprises a spindle, a spring engaging member fixed on said spindle adjacent each end thereof, a pair of springs coiled about said spindle and respectively abutting said engaging members at their oppositely disposed ends,

and a pair of spring engaging members slidable on said spindle between and respectively engaging the adjacent ends of said springs, and said link means comprises a pair of links each pivotally connected at one end by a common pivot to said head and at their other ends to said slidable spring engaging members respectively, and a pair of links each pivotally connected at one end by a common pivot to said support and at their other ends to said slidable spring engaging members.

7. A device as defined in claim 6 wherein said spindle is threaded at least at one end and the engaging member at that end is threaded thereon.

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