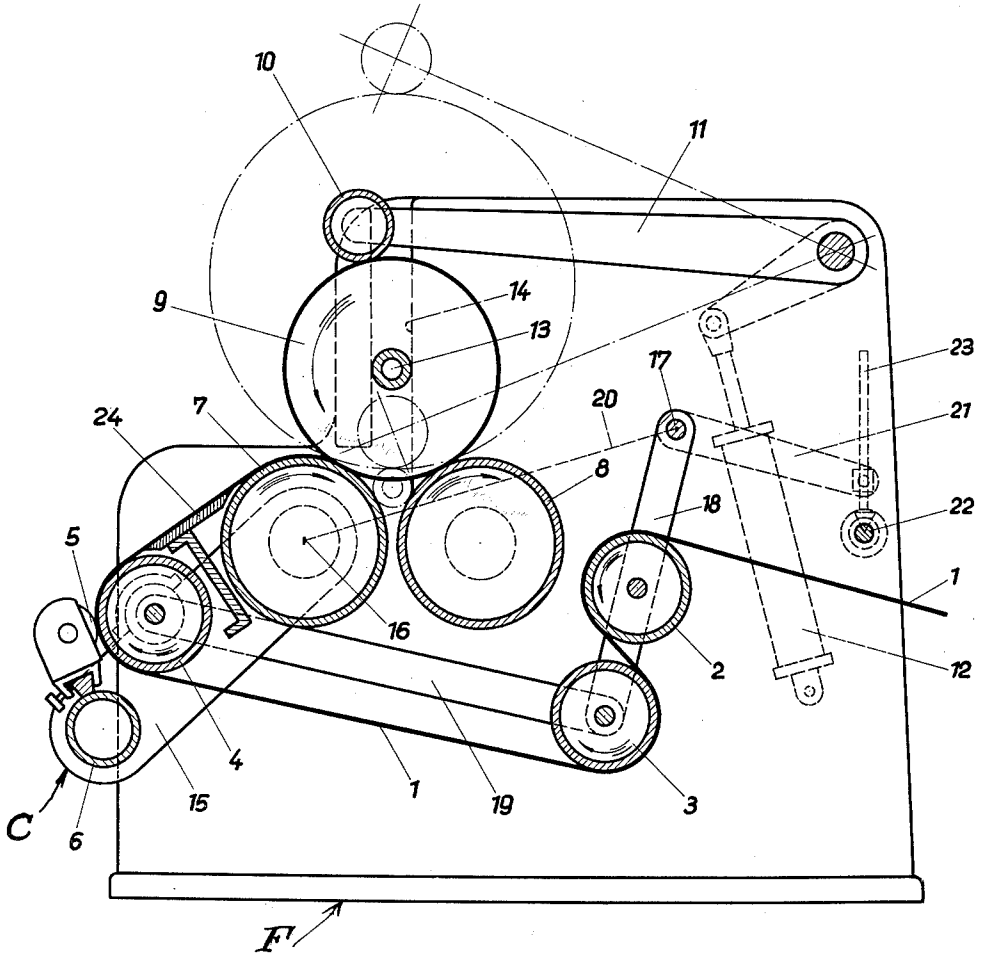
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MACHINE FOR REWINDING PAPER WEBS OR SIMILAR MATERIALS

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Fig. 1



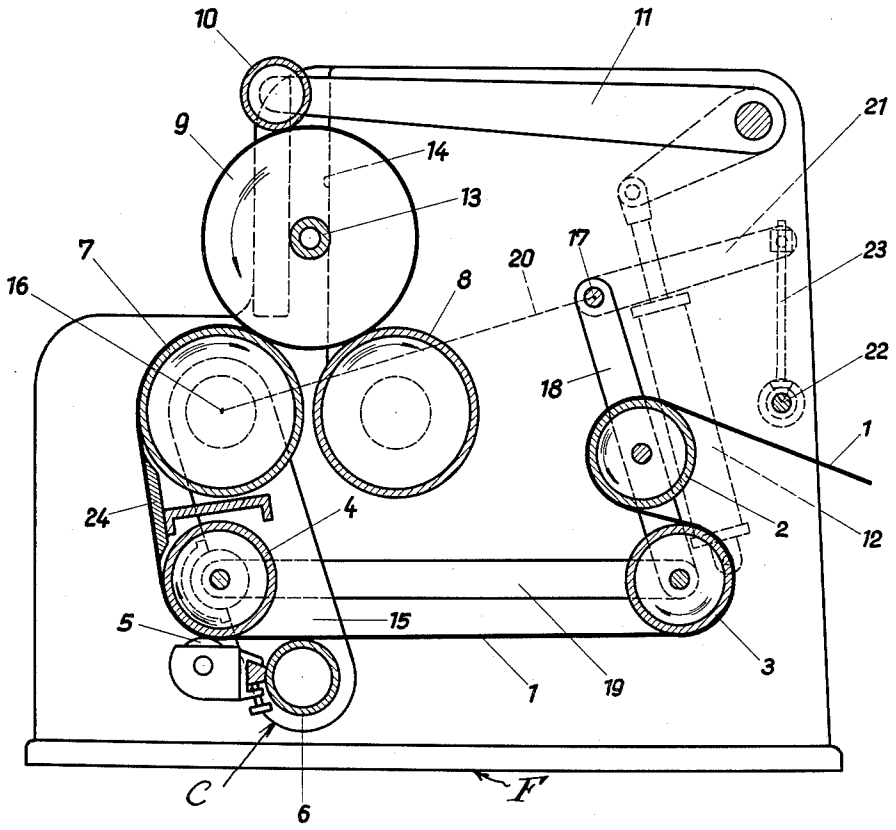
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Fig. 2



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MACHINE FOR REWINDING PAPER WEBS OR SIMILAR MATERIALS

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5 Claims. (Cl. 242—66)

The present invention relates to a method of and apparatus for regulating the tightness of a web of paper or the like wound on a roll.

More particularly, the invention relates to a method of and apparatus for the rewinding of a web in roll cutting and rewinding machines in which the web is fed directly to a rewinding roll by way of a pressure or support roller in such a fashion that the angle of the web passing about the pressure or support roller can be varied to regulate the tightness of the web wound on the rewinding roll.

With respect to the method of the looping angle influencing the tightness of the winding, it is pointed out that with a basically constant web tension, this tension becomes less effective and produces a loose winding at a large angle and correspondingly frictional adhesion between the support roller and the paper web. At a small looping angle, the paper web tension becomes more effective and thus results in a correspondingly tight winding.

Generally, the regulation of the tightness of wound rolls in roll cutting and rewinding machines requires extensive constructional and control characteristics and presents special difficulties in the case of machines in which the paper web is fed by a pressure or support roller in direct peripheral contact with the rewinding roller. Particularly, in the case of double support rollers in which the paper web is fed to the rewinding roller by being partially wound around one of the support rollers, the impairment of braking sensitivity of the web by virtue of this partial winding of the web around the support roller adversely effects the regulation of the tightness of the web being wound. Since braking of the paper web is a preferred means for regulating the tightness of the winding and as the same is no longer effective for tightness control of the web being wound if there is a considerable angle of the web around the support roller, additional means must be provided to regulate the winding tightness of the web to the desired degree in the case of double support roller rewinding machines, and in other machines in which the web is fed to the rewinding roller by passing around a roller in contact with the rewinding roller.

To overcome the problems existing in the art is a salient object of the invention, and the same is broadly accomplished by varying the angle of the web passing about the pressure or support roller whereby the change of the angle results in a change of the braking sensitivity of the web moving to the rewinding roller and thus in the tightness of the web being wound.

A further object of the invention includes a swingably arranged guide means for the web, preferably roller means arranged ahead or forward of pressure or support roller means serving to feed the web to a rewind roller means whereby the movement of the guide means relative to the pressure or support roller means varies the angle of the web passing around the pressure or support roller means as regards the rewinding roller means.

Yet another object of the invention is to provide a machine of the type described including further guide roller means for the paper web defined by a counter roller means about which the web passes and cutting means cooperable therewith with such further guide means being so associated with the first guide means that swinging movement

of the further guide means is such that the length of the web from the unwinding point to the rewinding point is not affected by the swinging movement of the counter roller means of the further guide means.

To accomplish the preceding object the pressure or support roller, the counter roller of the cutting means and the guide rollers constitute components of a four link system, the center of the shaft of the pressure or support roller providing one fixed point of the link system and also serving as a pivot point for the lever means carrying the cutting means, with the guide rollers being in series with the cutting means and carried by lever means pivotally mounted about the other fixed point of the system and guide rod means interconnecting the lever means carrying the cutter means, and the lever means carrying the guide rollers whereby swinging movement of one of the lever means is transmitted to the other lever means.

Yet another object of the invention is to provide the lever means carrying the cutting means with a guide plate, the contact face of which lies essentially in the plane of the tangent common to the counter roller and the pressure or support roller, and said guide plate serving as a surface to facilitate the gluing or securing of any tears occurring in the web.

A further object of the invention is that the provision of the guide plate and the cutting and the feeding of the web around the support roller on the servicing side of the machine allows accessibility to such components for securing the adjacent edges of web tears, as well as for adjusting the cutting means and permitting the web to be fed to the rewind roller under tension, following a gluing or other securing operation.

Further objects and advantages of the invention will become apparent from a study of the following description and annexed drawings, and in which drawings:

FIGURE 1 is a diagrammatic view of a double support roller rewinding machine in which the parts are shown in the position for winding tightly the web on the rewinding roller, and,

FIGURE 2 is a view similar to FIGURE 1, showing the relationship of parts for effecting a looser winding on the rewind roll.

As shown in FIGURE 1, the invention comprises a suitable frame F and a paper web 1 moving from a supply roll (not shown) which is initially passed over guide rollers 2 and 3 to a cutting means denoted generally C. The cutting means C includes a counter roller 4, and a series of circular knives 5 cooperable therewith. The knives 5 are axially shiftable on a support 6, and can be adjusted and fixed at any desired cutting width.

After the web leaves the counter roller 4, it passes about a part of the periphery of support roller 7, and fed directly from said roller to a rewinding roller 9 supported by support roller 7, and a similar support roller 8. To secure the position of the rewinding roller 9 a pressure roller 10 contacts the apex of the rewinding roller, and the roller 10 is carried by a pivoted lever 11. The position of the lever 11 is determined by operation of a piston cylinder assembly 12 operably connected to the lever 11, as shown by the dash lines in FIGURE 1.

The rewinding roller 9 is carried by a shaft 13, and the ends of the shaft are guided in vertical slots 14, provided in the framework F. Means, not shown, function to balance the weight of the roller 9 as it increases during the rewinding cycle.

The counter roller 4 is mounted ahead or forwardly of the support roller 7, and serves as a guide roll. The counter roller 4 and the knives 5 are mounted in lever means 15, which lever means is swingably disposed about shaft 16 of the support roller 7. Guide rollers 2 and 3 are also mounted in lever means 18 swingable about a fixed shaft 17 mounted in the framework. The shaft

of guide roller 3 and the shaft of counter roller 4 are connected by guide rod means 19, which transmits the swinging movement of the lever 15 to the lever 18.

Hence, it will be seen that the lever means arrangement above described constitutes in effect a four-link system, whose fixed component is defined by an imaginary line 20 extending between the center of shaft 16 and the fixed shaft 17. The swinging movement of such four-link system, and thus a change in the angle between the paper web 1 and the support roller 7 is accomplished by a rocking lever 21 attached to the shaft 17, and forming a constant angle with the lever means 18, with said lever being actuated by shaft 22 of a drive motor (not shown) drivingly connected to a spindle 23 operably associated with the lever 21.

In FIGURE 1, the components of the invention are shown in the position having a smaller "looping" angle for providing a tighter winding on the rewinding roller 9, and FIGURE 2 illustrates the components in the relationship to effect a looser winding. In other words, the looping angle in FIGURE 2 is greater. The size and the motion ratios of the entire system are so calculated that the tension of the paper web remains uneffected within the swinging area. To facilitate the gluing or securing or any tears in the web, a guide plate 24 suitably attached to the lever meains 15 is positioined between the counter roller 4 and the support roller 7. It will be noted that the contact face of the plate 24 lies essentially in the plane of a tangent common to the counter roller 4 and the support roller 7.

The invention is not to be restricted to a double support roller rewinding machine, as illustrated, but may be used with a single support roller rewinding machine, as well as roll cutting and rewinding machines, in which the paper web is fed to the rewinding roller by a pressure roller located at any selected point on the periphery of the rewinding roller.

We claim:

1. A rewinding machine for a paper web and the like comprising a support roller, a rewinding roller supported by said support roller with the web being fed about the support roller and then directly about the rewinding roller, means operably coupled with said support roller to vary the angle of looping of the web passing about the support roller to regulate the tightness of the web wound on the rewinding roller, said operably coupled means including a swingably mounted counter roller arranged forwardly of said support roller about which the web passes effective on swinging movement thereof to change the looping angle of the web passing about the support roller and cutting means cooperable with the counter roller, swingably mounted guide rollers about which the web passes located forwardly of said counter roller and cutting means and means interconnecting said guide rollers and said counter roller and cutting means whereby swinging movement of the guide rollers imparts swinging movement to the counter roller and cutting means so that the tension of the web remains constant within the zone of swinging movement.

2. A rewinding machine as claimed in claim 1, in which said support roller, counter roller and guide rollers constitute components of a four-link arrangement.

3. A rewinding machine as claimed in claim 2, in which said means operably coupled with said support roller include lever means carrying said counter roller and cutting means with said lever means swingable about the axis of rotation of the support roller.

4. A rewinding machine as claimed in claim 3, in which said means operably coupled with said support roller includes further lever carrying said guide rollers with said further lever means swingable about a fixed axis, an imaginary line passing through the center of the fixed axis of the further lever means, and the center of the axis of said support roller with such imaginary line defining the fixed component of the four-link arrangement.

5. A rewinding machine as claimed in claim 4, in which the lever means carrying the counter roller and cutting means is provided with a guide plate located between the counter roller and the support roller having a contact face lying essentially in the plane of the tangent common to the counter roller and the support roller.

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