

May 31, 1949.

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2,471,447

WEB FEEDING AND CUTTING MACHINE

Filed Sept. 2, 1944

3 Sheets-Sheet 1

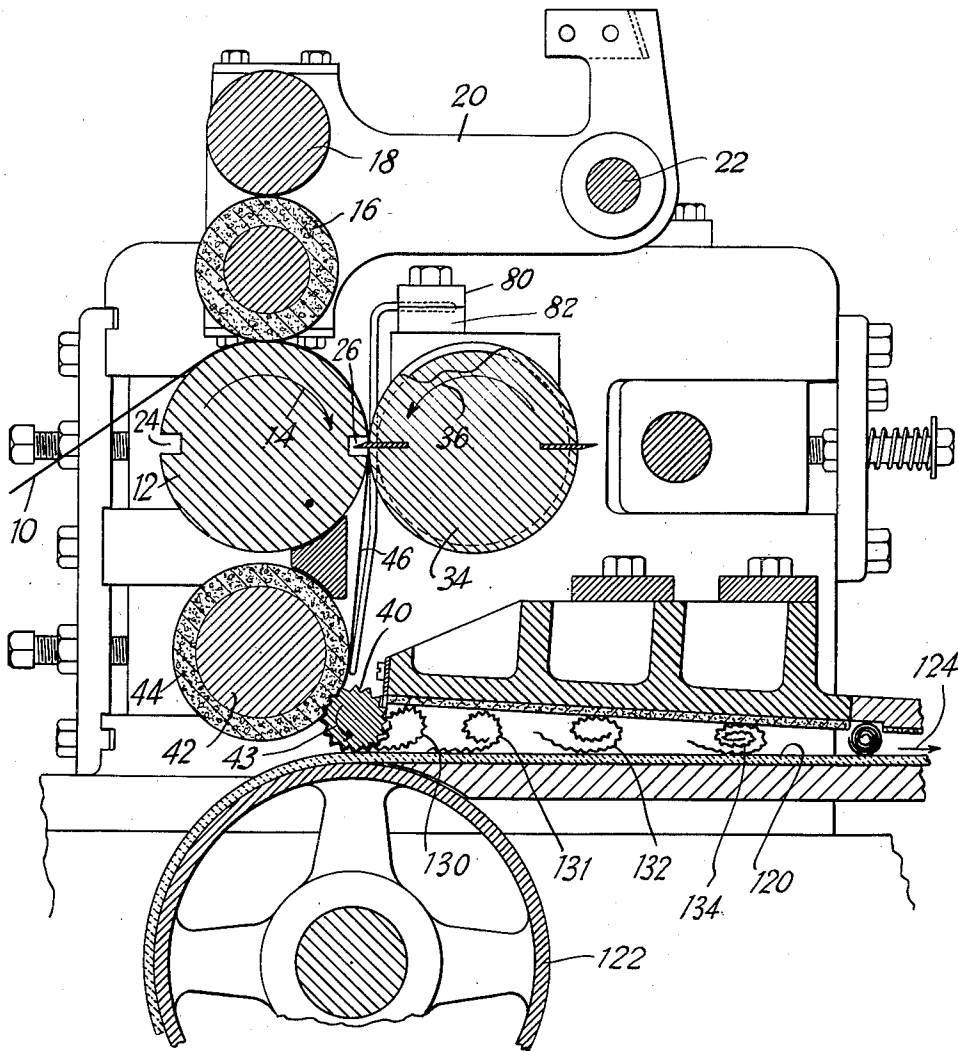


Fig. 1

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3 Sheets-Sheet 2

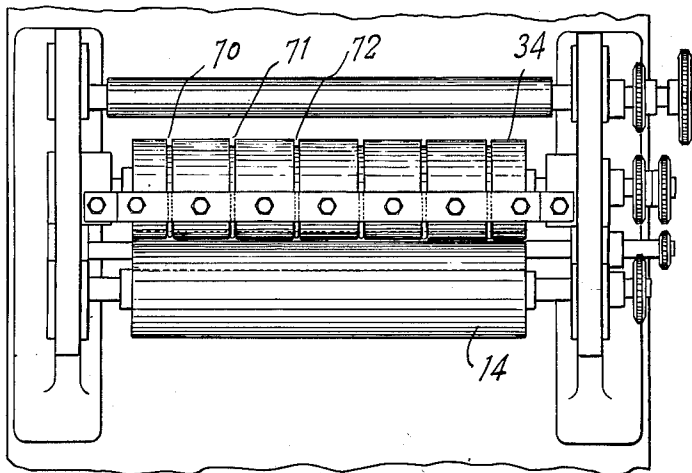


Fig. 2

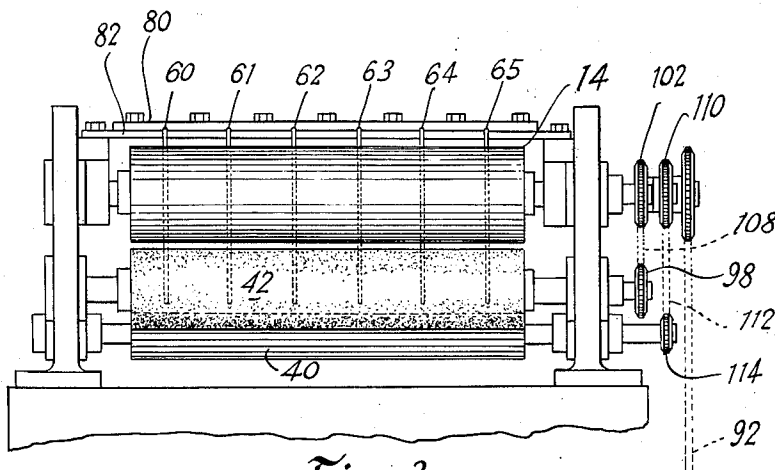


Fig. 3

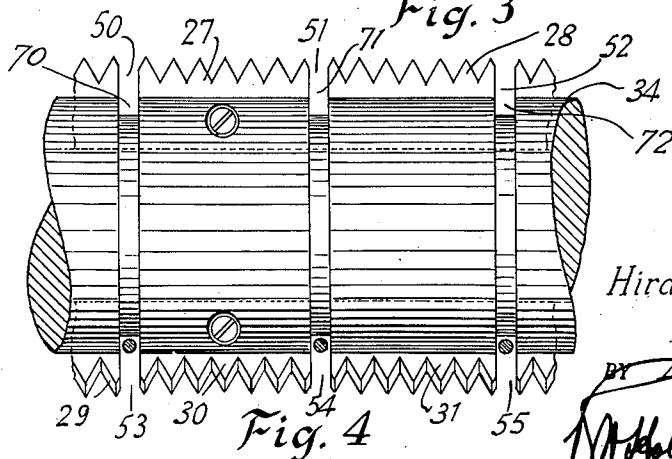


Fig. 4

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3 Sheets-Sheet 3

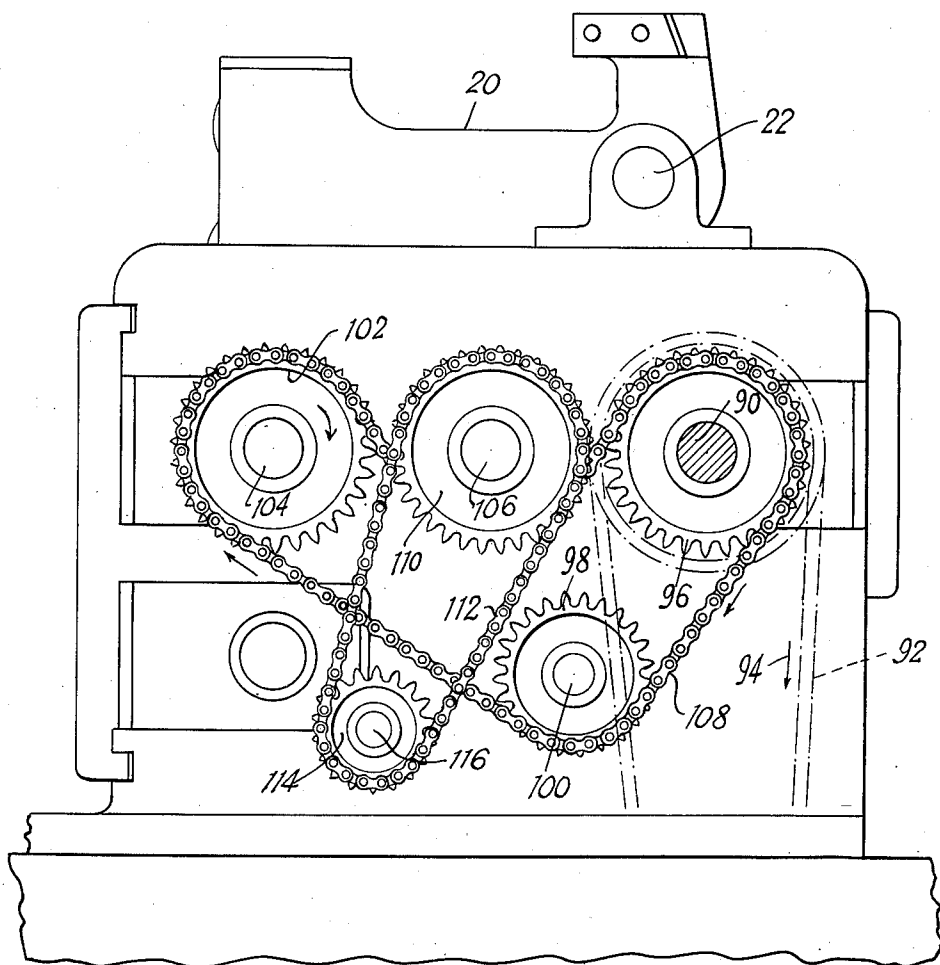


Fig. 5

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UNITED STATES PATENT OFFICE

2,471,447

WEB FEEDING AND CUTTING MACHINE

Hiram A. Perkins, deceased, late of Rochester, N. Y., by Stuart L. Perkins, Rochester, N. Y., and Madeleine P. Hathaway, Essex County, N. J., executors, assignors to Setter Bros. Inc., Cattaraugus, N. Y., a corporation of New York

Application September 2, 1944, Serial No. 552,424

3 Claims. (Cl. 164—84.5)

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This invention relates to web feeding, cutting, tearing, and crimping devices.

An object of the invention is to provide improved means for reliably feeding, cutting, and tearing, a continuously advancing strip or web into sections of uniform dimensions, and a further object is to accomplish these results in apparatus which will not be subjected to frequent outages because of the failure of the advancing web, or its sections, to proceed through the apparatus in the intended manner.

The invention will be illustrated by reference to web handling and treating mechanism utilized in a machine for manufacturing convoluted paper rods, this machine being shown in detail in the parent patent application Ser. No. 354,945 filed August 31, 1940, and issued as Patent No. 2,357,846 on September 12, 1944. This application is a continuation-in-part of said parent application.

The illustrative mechanism is shown in accompanying drawings, in which:

Fig. 1 is a vertical sectional view of the machine;

Fig. 2 is a plan, showing particularly the first set of web feeding rolls which also perform a web cutting operation;

Fig. 3 is a partial elevation showing one of the upper feeding rolls and one of the lower rolls;

Fig. 4 is a detail view showing a section of the web cutting roll with its spaced cutters and their relationship to the web guide rods; and

Fig. 5 is a side elevation showing a part of the driving mechanism for the various web feeding rolls.

In the operation of the machine shown in the drawings, the web 10 passes over an indented cutter roll 12, which is positively driven so as to rotate in the direction indicated by the arrow 14. The web is held against the surface of the roll 14 by a superposed roll 16 weighted by contact with the floating roll 18, both the latter rolls being carried by the floating frame 20 pivoted on the frame of the machine at 22.

The roll 14 is formed with diametrically opposite recesses 24 and 26 which coact with the spaced cutter sections, such as 27—31, fixed at diametrically opposite positions in the cutter roll 34, to sever uniform web sections. This roll 34 is rotated in the direction of the arrow 36 so as to cause the cutter sections to pierce the web as they enter the recesses in the roll 14. This action is indicated clearly in Fig. 1 of the drawings.

Beneath the web severing rolls 14 and 34 there are disposed the web feeding and crimping rolls 40 and 42. The former of these is preferably a steel roll, which is positively driven in the direction indicated by the arrow 43. In operation, the serrated teeth of the roll 40 are pressed into

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the resilient covering 44 of the roller 42 to grip the leading end of a web section 46 just before a series of the cutter sections of the roll 34 begin to enter one of the recesses 24 or 26.

5 The roll 40 is driven at such speed that the rolls 40 and 42 exert a strong pull upon the web section 46, tending to advance the web faster than the speed of the advance caused by the rolls 14 and 34. The first effect of this pull upon the web sections 46 is to tension or tighten a portion of the web tightly over one of the recesses 24 and 26 just prior to, and during the cutting of the web by the cutters (i. e., 27—31). This enhances the piercing and cutting effect of the teeth of 15 the cutter sections and promotes a clean and quick web cutting action. The second effect of the pull of the rolls 40 and 42 upon the web is the tearing of the small sections of the web at the positions of the spaces, such as 50—55, between successive cutter sections. These spaces are necessitated by the disposition of the fixed guide rods or wires 60—65 in the circumferential grooves 70—72, etc. in the roll 34, this arrangement being shown in detail in Fig. 3.

25 The guide rods or wires 60—65 are disposed at spaced intervals across the width of the web so as to guide the severed web while it is advanced and pulled downwardly by the action of the rolls 40 and 42. These rods or wires also act 30 to prevent the web from adhering to the surface of the roll 34 so that the leading edge of the web immediately after a cutting and tearing operation will not depart from its proper path of advance toward the infeed zone of the rolls 40 35 and 42.

As shown, the rods or wires 60—65 have their upper ends fixed between stationary bars 80 and 82 secured to the frame of the machine.

A driving mechanism for the rolls is illustrated 40 in Fig. 5 where there is shown a countershaft 90 driven by sprocket chain 92 advancing in the direction of the arrow 94.

The countershaft 90 has fixed thereon a sprocket 96 which lies in the same plane of rotation as a sprocket 98 on the countershaft 100. It also lies in the same plane of rotation as sprocket 102 on the shaft 104 of the roll 14 and another sprocket fixed to the shaft 106 which is rigid with the roll 34. Around these aligned sprockets 50 there extends a sprocket chain 108 to cause the cutter rolls 14 and 34 to rotate in the desired directions.

Upon the shaft 106 is a larger sprocket 110 connected by a sprocket chain 112 to a smaller sprocket 114 upon the shaft 116, which is rigid with the crimper roll 40. The resiliently covered roll 42 is driven by reason of its frictional engaging relation to the roll 40, the positive drive to the roll 40 resulting in much longer life of the 60 resilient covering.

The action of the crimper roll 40 causes the web section to be given a convoluting tendency, and the convolutions of the severed web sections is caused by the action of the carrier belt 120 which advances over the pulley 122 in the direction of the arrow 124. The succeeding convoluting stages of the severed web sections are indicated at 130—134 inclusive, in Fig. 1. Beyond the position of the stage 134 there is further compacting and convolution of the web sections until substantially solid and small diameter rods are produced, as more fully described and disclosed in the parent application.

What is claimed is:

1. In a machine for forming rod-like articles by tightly convoluting web sections, means including web tensioning and tearing crimping rolls normally initiating the convolution of severed web sections, the crimping rolls feeding successively severed web sections to the convoluting zone, normally continuously rotating web severing rolls continuously feeding the uncut and unsevered web toward the crimping rolls, one of the severing rolls having several cutter sections closely spaced from each other along the length of the roll and distributed across the entire width of the web, said sections projecting outwardly of the circumference of their supporting roll and being axially aligned along the roll, the other severing roll being recessed inwardly from its circumference to receive said cutter sections when the web is cut, the roll carrying the cutter sections having circumferential grooves arranged at positions in registry with the spaces between the successive cutter sections, small diameter spring rods acting as web guides with each rod extending substantially tangentially from the infeed side of the web severing rolls through the part of a groove in the web severing zone and thence to a position of close proximity to the infeed position of the crimping rolls, said rods being fixed at positions near their upstream ends and having their opposite ends biased toward one of the crimping rolls, there being one of said rods for each of said circumferential grooves which are of a radial depth greater than the rod diameter, and means rotating the crimping rolls at a surface speed sufficiently greater than that of the severing rolls to tension the web across the recessed section of said severing roll just prior to and during the web cutting action and to create enough pull on the web to tear the web at its uncut parts of the positions of said guide rods.

2. In a web treating machine, a first pair of feeding rolls, spaced and aligned cutter sections fixed to one of said rolls and projecting outwardly from the surface thereof, the other of said rolls being longitudinally grooved or recessed along a line parallel with its axis to receive said cutter sections during the operation of the machine, a pair of web feeding and crimping rolls advancing the web beyond the first rolls, the first pair of rolls constantly feeding the uncut web toward the feeding and crimping rolls, the cutter section carrying roll being formed with circumferential grooves at positions in register with the spaces between successive cutter sections, web guide members fixed at a position on the infeed side of the first pair of rolls and extending to a position closely adjacent the web gripping zone of the feeding and crimping rolls and having intermediate portions disposed in said grooves at the

web cutting zone, said grooves and the parts of the web guide members therein being disposed in registry with the spaces between the cutter sections and distributed across the width of the web, and roll driving means rotating the web crimping and feeding rolls at a surface speed higher than the surface speed of the rolls of the first pair and thereby exerting a pull on each web section as it is being severed by said cutters, said pull tightening the web across said cutter recess just prior to the web cutting action and tearing those portions of the web not severed by the cutter sections due to the spaces between the latter.

3. In a web treating machine, a first pair of oppositely rotating web feeding rolls normally gripping the web between them, spaced and longitudinally aligned cutter section fixed to one of said rolls and projecting outwardly from the surface thereof, the other of said rolls being longitudinally grooved or recessed along a line parallel with its longitudinal axis to receive said cutter sections during the operation of the machine, a pair of web feeding and crimping rolls advancing the web beyond the first rolls, the first pair of rolls constantly feeding the uncut web toward the feeding and crimping rolls, the cutter section carrying roll being formed with circumferential grooves at positions in register with the spaces between successive cutter sections, web guide members fixed at a position on the infeed side of the first pair of rolls and extending to a position closely adjacent the web gripping zone of the feeding and crimping rolls and having intermediate portions disposed in said grooves at the web cutting zone, said grooves and the parts of the web guide members therein being disposed in registry with the spaces between the cutter sections and distributed across the width of the web, roll driving means rotating the web crimping and feeding rolls at a surface speed higher than the surface speed of the rolls of the first pair and thereby exerting a pull on each web section as it is being severed by said cutters, said pull tensioning the web across said cutter recess just prior to the web cutting action and tearing those portions of the web not severed by the cutter sections due to the spaces between the latter, and web contacting means effective forwardly of the infeed position of said first mentioned feeding rolls to insure sufficient opposition to the pull of the crimping rolls to create said tensioning and tearing of the web.

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