

Jan. 21, 1947.

P. R. HEYGEL

2,414,739

COMBINATION RIBBING AND SLITTING MACHINE

Filed Nov. 11, 1942

2 Sheets-Sheet 1

Fig. 1.

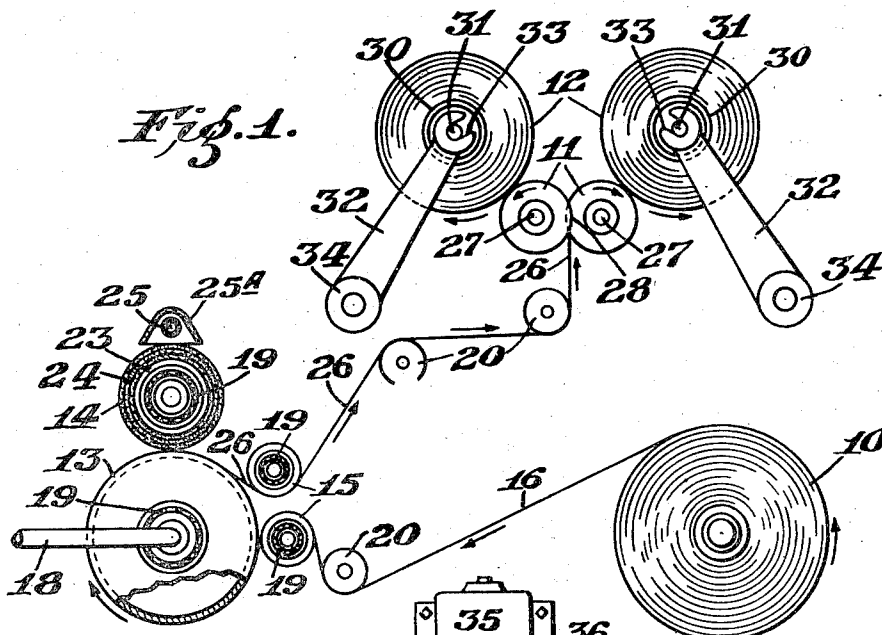
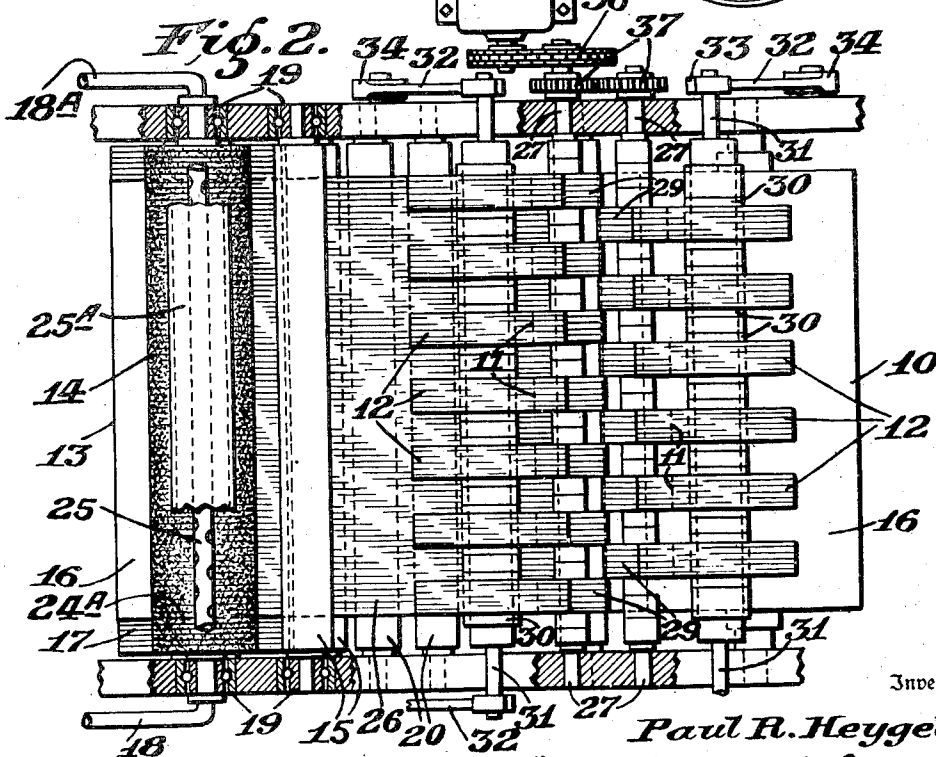


Fig. 2.



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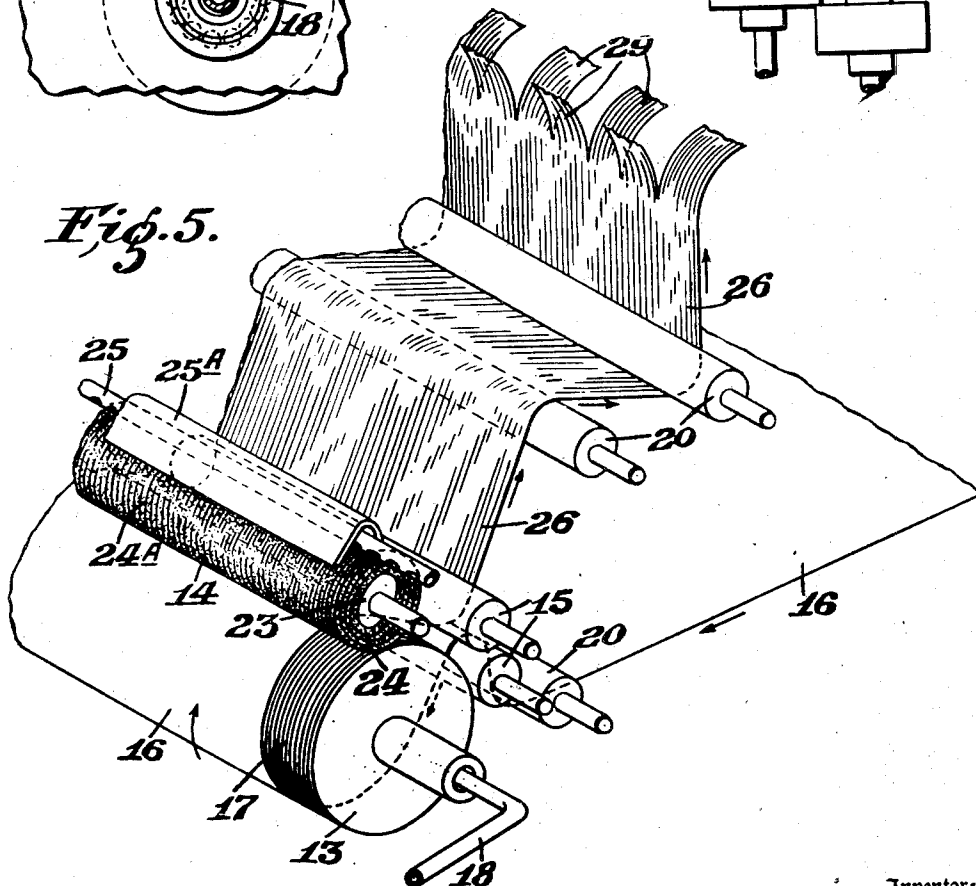
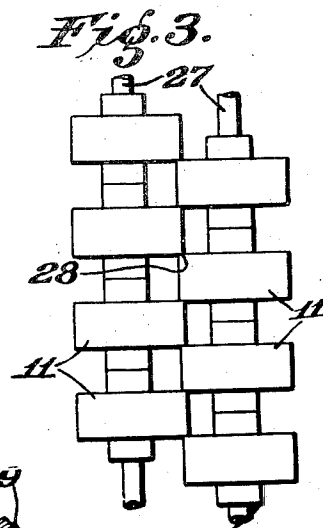
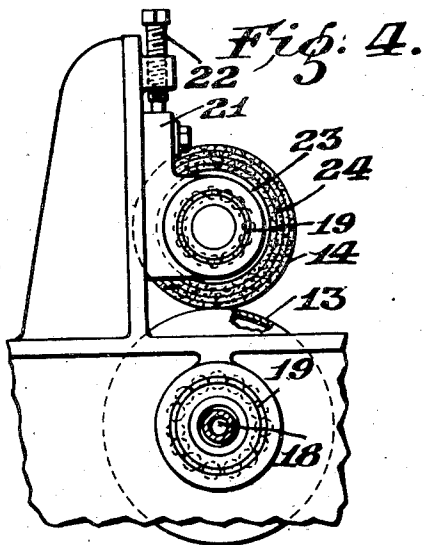
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UNITED STATES PATENT OFFICE

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COMBINATION RIBBING AND SLITTING MACHINE

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3 Claims. (Cl. 92-69)

1

2

My invention relates to the manufacture of tissue papers, such as cigarette paper, and more particularly to a combination ribbing and slitting machine for continuously forming on a moving paper web the fine parallel lines characteristic of cigarette paper and for slitting and winding this ribbed paper into rolls of suitable width for use on a cigarette making machine.

Heretofore, it has been the common practice to rib certain cigarette paper by passing the paper web between large, heavy, embossing rolls and rewind the paper before slitting into narrower rolls. Separate machines have thus been required for the ribbing and slitting operations. To use one machine would necessitate synchronizing the rotation of the ribbing rolls and the slitting knives, with expensive and intricate synchronizing machinery, especially because of the large heavy construction of the ribbing rolls. Otherwise, uneven feed and consequent tearing of the paper between the ribbing and slitting mechanisms, would result. Also, these heavy, ribbing rolls require considerable preliminary running to condition them prior to the ribbing operation.

In accordance with my invention I have overcome the above disadvantages and have produced a simplified, combination ribbing and slitting machine that is self synchronized and carries out the two operations in quick succession without any adverse effects on the paper.

One of the important features of the machine of my invention is the use of wind up reels, in rotating contact with powered slitting knives, as the sole means for drawing the paper web through the ribbing and slitting portions of the machine and thereby assuring synchronism between these two operations.

Another important feature is the accurate, easy rotation of a light weight ribbing roll and associated rolls solely by the traction or pull of the web of tissue paper.

Details of construction and mode of operation of my invention will be clearly understood from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a diagrammatic view that illustrates the flow of the paper web through the ribbing and slitting operations;

Fig. 2 is a plan view of the ribbing and slitting machine;

Fig. 3 is an elevational, fragmentary, view of the slitting knives;

Fig. 4 is an end view of the ribbing and presser rolls and adjustments therefor; and,

Fig. 5 is an isometric view of the paper web and ribbing and guiding rolls.

Referring now to the several figures in the drawings, the paper is supplied from a roll 10 and is drawn through the entire machine by means of the reels 12 in rotative contact with the power-driven slitting knife rolls 11. The strips of paper slit by the rolls 11 are wound up to form the reels or bobbins 12 that rest upon and are rotated by the knife rolls 11. Between the supply roll 10 and finished rolls 12, are located the ribbing roll 13, a presser roll 14, and two, loop forming, guide rolls 15. Each of these four rolls is mounted on frictionless bearings 19, and is rotated by the traction or pull of the paper web 16.

The two rolls 15 are arranged adjacent the ribbing roll 13 so that the paper web 16 is looped into almost a complete circle and is brought into contact with substantially the entire surface of the ribbing roll 13, as illustrated in Figs. 1 and 5. This arrangement produces the maximum traction for rotating the ribbing roll 13 as well as the presser roll 14 and the rolls 15, and for ribbing of the paper by the ribbed surface 17 of the roll 13.

The roll 13 is of relatively large diameter but of relatively very light weight. It is hollow and is heated with steam introduced through pipe 18 and exhausted through pipe 18A. In operation, the roll rotates in frictionless bearings, indicated at 19. This is important in view of the fact that this roll is rotated entirely by the pull of the tissue or cigarette paper, which would break if substantial friction were encountered. Idler or guide rolls 20 are provided at suitable locations to guide the paper web to the ribbing roll 13 and also to the knife rolls 11, as later described.

Superimposed upon the ribbed roll 13 is a fabric covered roll 14. This roll is also mounted in frictionless bearings 19 so that it rotates very easily. The proper contact or pressure of the fabric roll upon the ribbed roll is controlled by the adjustable bracket 21 and screw 22. This fabric roll 14 comprises a rigid core 23 upon which is wound several layers of fabric 24. The number of fabric layers will depend upon the type of tissue paper being used and the character of the ribbing design. The softness and resiliency of the fabric roll may be varied by use of different types of fabric and by different thicknesses or layers. The softness increases generally with the number of layers of fabric used.

The fabric surface 24 rotating in pressure contact with the ribbed surface 17 of the roll 13 will become impressed with the rib construction and form the counterpart of the surface 17. In other

words, there will be formed a series of ribs and grooves 24A in the fabric surface roll that will be complementary to the series of ribs and grooves in the metal, ribbing roll 13. When the grooves thus formed in the fabric become too deep or too wide because of wear, the fabric roll may be resurfaced. The old layers of fabric may be substituted by the new fabric or the latter may be wound directly over the worn fabric layers.

The fabric roll 16 performs the function of pressing the paper 16 down upon the ribbed surface of the roll 13 and the inherent impressionable nature of the fabric permits the ribs in the roll 13 to embed themselves in the soft surface. The ribs, in effect, form as above-mentioned complementary grooves in the roll 13, and the thin cigarette paper being pressed between the ribs in the roll 13 and the grooves in the fabric roll 16 is embossed with parallel ribs and grooves to give the desired parallel line appearance.

Located at the side or above the fabric roll is a perforated pipe 25 for applying steam onto the surface of the fabric 24. This keeps the fabric slightly moist and thereby facilitates ribbing of the cigarette paper that passes under and in contact with the fabric roll. A hood 25A is provided to direct the steam downward. The combination of the moisture and the fabric surface roll pressed against the ribbing roll provides efficient ribbing of the paper.

The ribbed paper 26, after leaving the ribbing rolls, passes around the upper guide rolls 20 as shown in Figs. 1 and 5 and then enters vertically between the two sets of slitting knife rolls 11, shown in Fig. 1. These rolls 11, which are shown in more detail in Figs. 1 and 3, comprise a series of parallel steel rolls arranged in staggered side by side relationship and mounted on shafts 27 that are positioned to cause slight overlapping of adjacent rolls. The overlapped edges, indicated at 28, cause a shearing or scissors action on the ribbed paper web 26 and slit it into a plurality of separate strips 29 that are wound up to form the reels 12.

The reels 12 are supported on paper cores 30, which are in turn carried on mandrels 31. The mandrels 31 extend the full width of the slitting machine as shown in Fig. 2 and carry a plurality of cores on each of which is wound a reel of slit paper 12. The mandrels 31 are supported at each end by arms 32 that are slotted on one end as shown at 33 to receive the mandrels, and are pivotally mounted at the other end 34. These arms are of sufficient weight to press the reels 12 down upon the knife rolls 11 and thereby cause the reels 12 to rotate smoothly and uniformly. As the diameter of the paper reels 12 progressively increases, the arms 32 move arcuately away from the knife rolls 11.

The sole driving mechanism for the entire machine is illustrated in Fig. 2, and comprises a motor 35 having a sprocket and chain drive 36, which is in turn connected to a pair of pinion gears 37, mounted on knife shafts 27. This arrangement effects rotation of the slitting knife rolls 11 and indirectly rotation of the mandrels 31, and paper reels 12 which rest upon the rolls 11, as described above.

The paper reels 12 when wound so as to provide the proper length of cigarette paper in each roll are ready for packaging and shipping to the cigarette manufacturers without unwinding or other processing.

While the invention has been described with particular reference to cigarette paper it will be

apparent to those skilled in the art that it may be applied to various other types of thin or tissue paper or to any other suitable sheet material capable of being embossed, slit and wound in the manner described herein or according to any desired modified procedure which is intended to come within the scope of this invention. Likewise other types or designs of embossing or ribbing rolls, than the one described, may be employed to produce different designs on the paper.

Various other modifications and changes may be made within the purview of this invention, some of the novel features of which are defined in the appended claims.

I claim:

1. A machine for embossing and slitting thin tissue-like paper, the same comprising a roll supporting a supply of paper from which a continuous web is drawn, a roll of substantial diameter, mounted freely rotatable and having a fine annular rib formation on its circumference, means guiding the paper web and causing it to loop about and substantially completely encircle said roll as the paper web is drawn from the supply, cutter and winder means remote from said ribbed roll cooperating to draw the paper web from the supply to and around and forwardly from said circumferentially ribbed roll so that the exerted pull of the paper web alone rotates the roll and the paper web in its travel on the roll is impressed with longitudinal, parallel, fine-line ribbing in substantial counterpart of the rib formation on the roll, motive power means connected to said cutter means for driving the same, said winder means being arranged to be driven indirectly by said power means through cooperation with said cutter means, the cutter and winder means effecting the slitting of the paper web coming from the ribbed roll longitudinally into separate narrow strips and winding of the strips into individual rolls while cooperating to effect the pull of the paper web on said ribbed roll.

2. A machine for embossing and slitting thin tissue-like paper, the same comprising a roll supporting a supply of paper from which a continuous web is drawn, a roll of substantial diameter, mounted freely rotatable and having a fine annular rib formation on its circumference, means guiding the paper web and causing it to loop about and substantially completely encircle said roll as the paper web is drawn from the supply, an opposed, freely rotatable, soft-surfaced presser roll having means for exerting pressure upon it sufficiently to press the interposed paper upon said annularly ribbed roll whereby to conform the paper in substantial counterpart of the roll surface configuration, means for heating said annularly ribbed roll, means for moistening said soft-surfaced presser roll, and cutter and winder means remote from said ribbed roll cooperating to draw the paper web from the supply to and around and forwardly from said circumferentially ribbed roll so that the exerted pull of the paper web alone rotates the annularly ribbed roll and the presser roll and the paper web in its travel on the annularly ribbed roll is impressed with longitudinal, parallel, fine-line ribbing in substantial counterpart of the rib formation on the roll, motive power means connected to said cutter means for driving the same, said winder means being arranged to be driven indirectly by said power means through cooperation with said cutter means, the cutter and winder means effecting the slitting of the paper web coming from the ribbed roll longitudinally into separate narrow

5

strips and winding of the strips into individual rolls while cooperating to effect the pull of the paper web on said ribbed roll.

3. A combination machine for ribbing and slitting thin tissue-like paper comprising a roll supporting a supply of such paper in continuous web form, a rotary ribbing device, cooperating 5 slitter and winder means for drawing said paper from the supply to and over said device so that the paper pull alone rotates said device and the 10 paper in its travel over said device is impressed

6

with the surface design of the same, motive power means connected to said slitter means for driving the same, said winder means being arranged to be driven indirectly by said power means through cooperation with said slitter means, the said cooperating means effecting slitting of said paper longitudinally into narrow widths and winding the same onto individual bobbins during effective pull of the paper in rotation of said ribbing device.

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