Sept. 12, 1933. W. H. KNIEP 1,926,340

METHOD OF PRODUCING SLITTED WEB PAPER ROLLS

Filed March 21, 1932 2 Sheets-Sheet 1

Fig. 1.

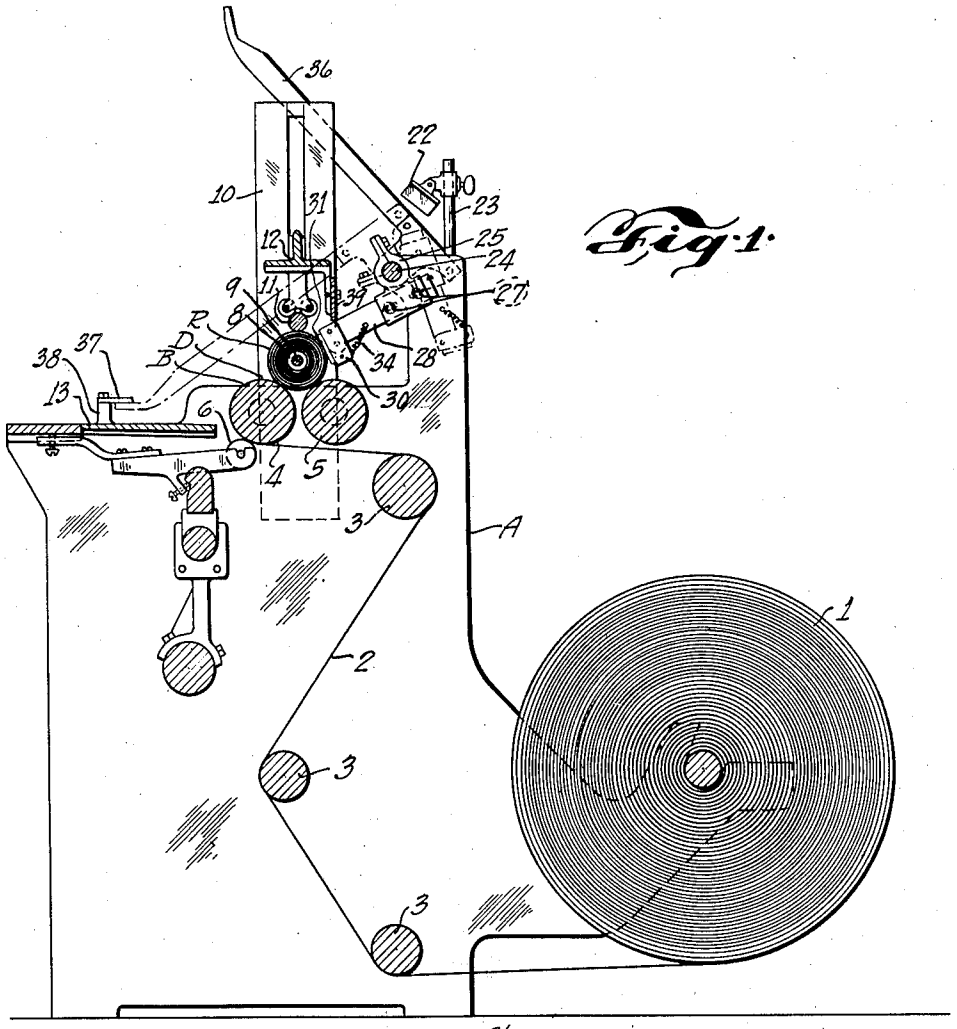


Fig. 2.

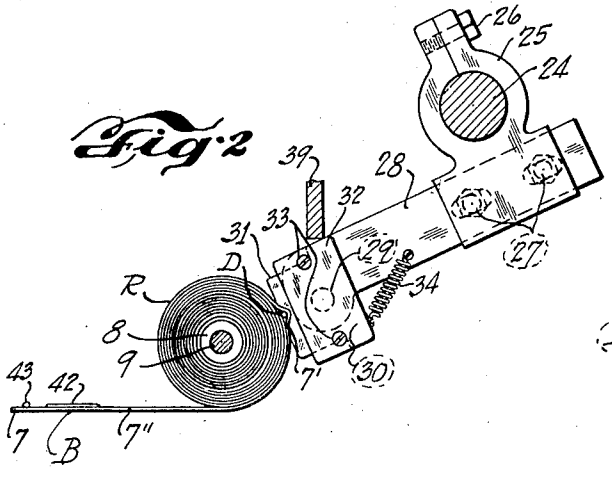
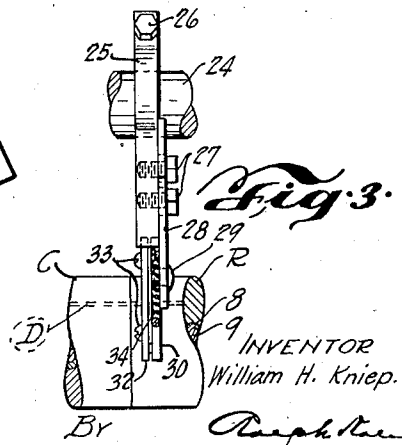


Fig. 3.



INVENTOR
William H. Kniep.

By Ralph Stein

ATTORNEY

Sept. 12, 1933. W. H. KNIEP 1,926,340

METHOD OF PRODUCING SLITTED WEB PAPER ROLLS

Filed March 21, 1932 2 Sheets-Sheet 2

Fig. 4.

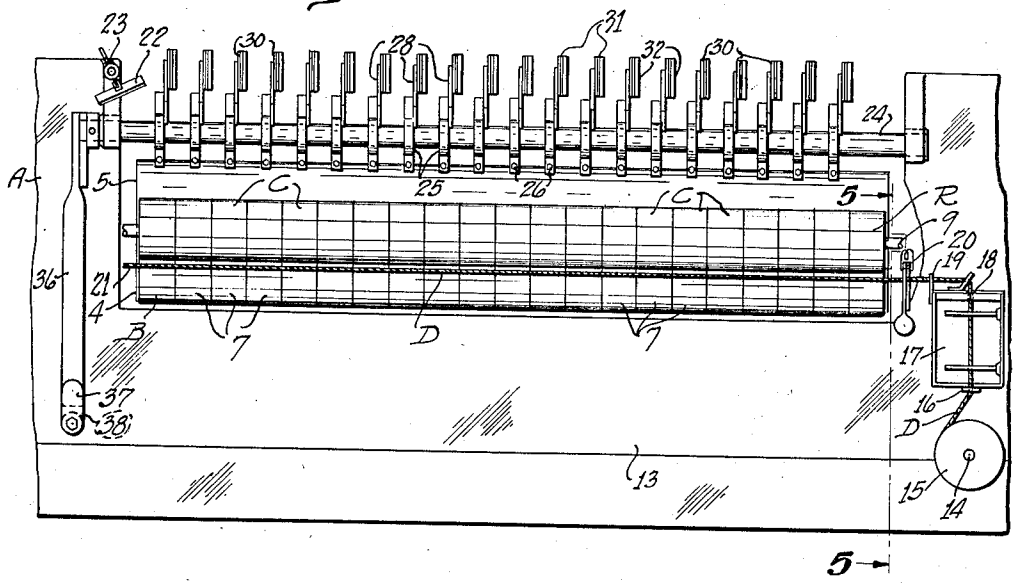
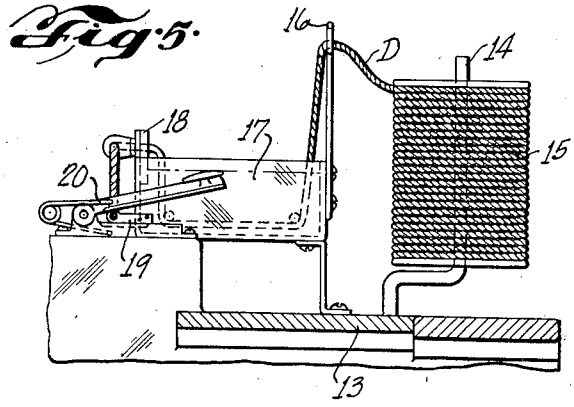


Fig. 5.



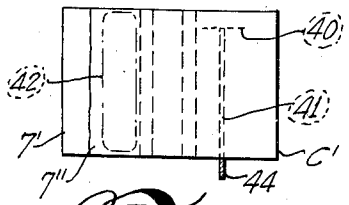


Fig. 6.

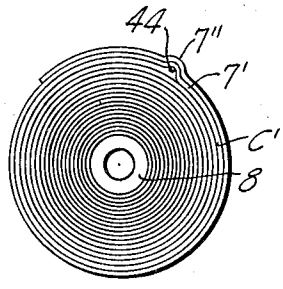


Fig. 7.

INVENTOR
William H. Kniep.
By Ralph Kenia
ATTORNEY

Patented Sept. 12, 1933 1,926,340

UNITED STATES PATENT OFFICE

1,926,340

METHOD OF PRODUCING SLITTED-WEB PAPER ROLLS

William H. Kniep, University City, Mo., assignor to The Graham Paper Company, St. Louis, Mo., a corporation of Missouri

Application March 21, 1932. Serial No. 600,223

5 Claims. (Cl. 164—65)

This invention relates generally to the manufacture of paper-rolls and the like and has more particular reference to a slitted-web paper-roll and to the method of, and apparatus for producing the same.

Briefly, it may be said that heretofore, so far as I am aware, strip-paper rolls comprise wound strips resulting from the slitting in situ of a web of paper stock, the individual rolls being constructed from the slitted-web-strips and during the roll-winding operation are substantially continuations of such strips and are suitably assembled in endwise or side-by-side contiguous relation on a mandrel or the like.

When the rolls are formed to the desired diameter, a film of suitable glue or adhesive is applied crosswise on the slitted-web, and the roll-winding operation then continued for adheringly lapping the so-glued-portions of the web-strips on to the respective rolls for retaining the same in wound condition. The rolls are then suitably severed from the web and removed from the machine, and, being suitably smoothed, trimmed, and marked, if desired, are in condition for consumer-use.

However, before such a paper-strip roll may be employed for its intended purpose in an adding machine or the like, it is, of course, necessary to cut and remove the glued, wrapped, lap-end from the body of the roll. If neatly and carefully done by a transverse cut merely through two thicknesses of the paper, only the glued together portion or minimum outer lap of the roll is discarded as waste. In actual practice, such perfect scoring is seldom, if ever, attainable, resulting either in loss of more paper than the minimum necessary, or the annoying expenditure of more time and effort than the paper saved is worth.

For the avoidance of such annoyance and loss of paper-material, and for conveniently, economically, and greatly expediting the unwinding of the paper-rolls for use, my invention has for its prime object the provisions of a paper-roll having a glued-outer lap, under which is embedded a rip-cord having a projecting end conveniently available for gripping with the fingers for pulling the cord through the glued-lap for severing the same from the body of the roll.

My invention has for another object the provision of a method of manufacture of paper-rolls from slitted or split-web stock for, with facility and economy, incorporating in the finished roll a rip-cord for severing the glued-end of the roll from the body thereof.

My invention has for still another object the provision of efficient apparatus for employment with a paper-web slitting and roll-winding machine for embedding into the roll-assembly a rip-cord and for dividing the cord into sections respectively corresponding in length to the individual roll-widths, but offset therefrom for, on separation of the roll-assembly into its individual rolls, providing cord-formed tips available for finger gripping purposes for ripping the cord from the roll and severing the superposed lap or laps of the roll.

And with the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts hereinafter described and pointed out in the claims.

In the accompanying drawings (two sheets),—

Figure 1 is a vertical transverse sectional view through a conventional form of paper-web slitting and roll-winding machine, illustrating apparatus of my invention employed in conjunction therewith for the production of a slitted-web paper-roll, also of my invention;

Figure 2 is an enlarged fragmentary view of a portion of the machine of Figure 1, illustrating a cord-slitting knife and its co-operating parts, the knife being shown in operative or advanced roll-penetrating position;

Figure 3 is a fragmentary rear view of the machine parts shown in Figure 2;

Figure 4 is a fragmentary plan view of the machine of Figure 1, showing the roll-winding drums, the slitted web, and the roll-assembly wound therefrom, and illustrating the application of the rip-cord to and across the slitted web for subsequently winding the cord into the roll-assembly, the cord-slitting knives being shown in retracted position;

Figure 5 is a fragmentary sectional view taken approximately along the line 5—5, Figure 4, illustrating the cord-supplying and gluing apparatus;

Figure 6 is a plan view of a strip-paper roll of my invention, showing the glued-end-lap and the embedded rip-cord; and

Figure 7 is an end view of the roll.

Referring now more in detail and by reference characters to the drawings, which illustrate a preferred embodiment of such apparatus, A designates a conventional form of web-slitting and roll-winding machine, merely a fragmentary or diagrammatic outline thereof being shown sufficiently for my present purposes.

Briefly, however, it may be said that the machine A comprises means for supporting a roll 1

of the web of paper to be slitted and rewound, the solid or non-slitted web 2 thereof being trained over suitable rollers 3 for the purpose of guiding and smoothing the web 2 for delivery thereof under uniform tension to the web-slitting and rewinding mechanism of the machine.

The latter mechanism includes a pair of front and rear winding-drums 4, 5, respectively, the web 2 being trained forwardly under and to, and for engaging the front lower portion of, the front drum 4. Just prior to the engagement of the web 2 with drum 4, a series of spaced cutting elements, preferably in the form of disc or circular knives 6, supported in suitable adjusted position in the machine A, have paper-slitting peripheral co-operation with the web 2, as shown in Figure 1, for the production of the slit-web B, the web-slitting operation being carried out in such manner that the resulting strips 7 of the slit-web B are undistorted and remain in an undisturbed side-by-side relation as they pass upwardly over the drum 4, as clearly shown in Figure 4.

The strips 7, passing then upwardly and rearwardly over the drum 4, are respectively, wound into the individual strip-rolls C. Preferably the winding of the rolls C is initiated by simply tucking the ends of the strips 7 around indivdual cores or centers 8, in width substantially equal to the width of the strips 7, and composed of wood, fiber, or the like.

The cores 8 are suitably mounted in an endwise abutting series on a rewinding shaft or mandrel 9 having its opposite ends mounted for vertical shiftable movement in guide-members 10 upstanding suitably, as will be understood, from the respective opposite ends of the frame of the machine A.

The rolls C, during their formation on the mandrel 9, are peripherally, for surface-driving rotatory strip-winding actuation, disposed on and supported by the drums 4, 5, which latter are, for such purpose, suitably power-driven by any suitable means, not shown, a so-called riding-drum 11 having bearing on the upper surface of the series of rolls C for retaining the same in contact with the drums 4, 5.

The riding-drum 11 is preferably also power-driven and is rotarily supported in a frame 12 slidably mounted also in the guides 10, whereby, as the winding operation proceeds, the riding-drum-frame 12 rises in the guides 10 for, in co-operation with a suitable scale or like device, not shown, indicating to the operator the moment the rolls C are of the desired diameter, the drums 4, 5, 11, being then disconnected from their source of power for manual manipulation of the drums during succeeding steps of roll production.

For purposes of description, the several so formed rolls C so disposed on the mandrel 9 in an endwise series will be collectively termed the roll-assembly, designated R in Figure 4. Preferably the machine A along its front side is provided with a knife-guard or work-table 13 disposed approximately at the level of the rolls 4, 5, and suitably at a corner of the table 13, is a stand 14 carrying a bobbin 15 of suitable rip-cord material D, the latter being preferably colored for a purpose soon appearing.

From the bobbin 15, a strand of the cord D is threaded through a guide 16 and then through a glue-pot 17, where the cord D is coated with a suitable film of the adhesive. The coated cord D is then passed through a wiper 18 and guide 19 to a suitable shears 20, as best seen in Figure 5, the shears 20 being preferably located on the front side and at one end of the roll-assembly R, as shown in Figure 4.

The rolls C having been wound to the desired diameter and the drums 4, 5, and 11, having been brought to rest as described, the operator threads the adhesive-coated cord D through the shears 20, and then, drawing the cord D across the front of the machine, as shown in Figure 4, disposes and lays the cord transversely upon the slitted-web B for adhering thereto, as nearly as practicable in the crotch between the strips 7 and the rolls C, as best seen in Figure 1, with the free end of the cord D projecting suitably as a marker 21 beyond the far end-roll of the assembly R, as best seen in Figure 4.

The operator then manually rotates the roll-assembly R for causing the cord D to pass under and around the several rolls C in adhering engagement between the then outer surface of the rolls and the lap 7' of the strips 7 applied to the rolls C by such turning actuation thereof, as best seen in Figure 2.

The cord D hence becomes concealed from view as the assembly R is rotated but as the cord D passes to the rear side of the assembly R, the marker 21 may be readily observed by the operator by means of a mirror 22 mounted suitably for universal adjustment on a stand 23 disposed at a rear corner of the machine A longitudinally opposite the shears 20 for reflecting a rear view of the marker-bearing end of the roll assembly R, as best seen in Figure 4.

The coloring of the cord D serves for rendering the marker 21 plainly visible through the mirror 22, whereby the operator is enabled with facility and precision to manipulate or rotate the assembly R until the position of the marker 21 indicates that the cord D is disposed at the upper rear side of the assembly R, for a purpose soon appearing.

Mounted for oscillation on the frame of the machine A in an elevated position to the rear of, and extending longitudinally parallel with, the roll-assembly R, is a shaft 24, on which is mounted in suitable spaced relation a series of knife-carrying hubs 25. Preferably, the hubs 25 are of split type and provided with clamp-screws 26, whereby the spacing and angular position of the hubs 25 may be readily adjusted on the shaft 24.

Mounted on each hub 25 as by a slot-and-screw connection for adjustment toward and from the roll R, is an arm 28, and pivoted, as at 29, on the projecting end of the arm 28, is a knife-block 30, endwise projecting from which is a knife or cutter 31. As best seen in Figure 2, the cutter 31 comprises preferably a straight blade clamped on the block 30 by means of a cap-plate 32 secured, in turn, to the block 30 by suitable fastening elements 33, each cutter 31 having its cutting-edge disposed for swingable actuation in an arcuate path transverse to the longitudinal axis of the roll-assembly R.

The block 30 depends from the arm 28, and a tensional member or spring 34 is engaged between the block 30 and arm 28, the spring 34 normally being in solid or non-stretched condition, that is to say, collapsed upon itself for both biasing the knife in slightly oblique position on the arm 28 and acting as a stop, as may be said, for the block 30 in its knife-biased position.

As presently appearing, however, the block 30 has oscillation on the arm 28 responsive to roll-engagement of the knife 31 for tensing the spring

34 for biasing the knife 31 on the roll R for roll slitting purposes, as best seen in Figure 2.

Mounted on an end of the shaft 24 adjacent the mirror 22, is a lever 36 having its free end normally engaged with a latch 37 pivotally supported on a boss 38 upstanding suitably from the table 13 for holding the lever 36 in normally depressed shaft-oscillated position for disposing the knife-arms 28 in rearwardly swung position away from the roll-assembly R, as shown by dot-dash lines in Figure 1.

During the roll-slitting-operation, the operator, observing the marker 21 through the mirror 22, manipulates the drums 4, 5, for disposing the lap-covered or embedded cord D into the path of the knives 31. The operator then releases the lever 36 from the latch 37 and, upwardly manipulating the lever 36, oscillates the shaft 24 for swinging the series of arms 28 forwardly toward the assembly R. The hubs 25 are suitably spaced on the shaft 23 for disposing an arm 28 opposite each of the rolls C on the assembly R, the arms 28 being adjusted in the hubs 25 as described for effecting, on such forward swinging actuation of the arms 28, arcuate movement of the knives 31 for initially impinging the advancing corner of each knife 31 upon the periphery of the particular roll C slightly above or in advance, as may be said, of the cord D embedded in the roll-assembly R.

The operator then, further manipulates the drums 4, 5, for rotating the assembly R thereby drawing the blades 31 upon the respective rolls C, the blocks 30 oscillating on the arms 28, as shown in full lines in Figure 2, for under tension of the springs 34 effecting paper-slitting penetration of the cutting-edges of the knives 31 into preferably merely the outer lap 7' of the respective rolls C, a slit being thus formed in each roll a short distance inwardly from an end thereof, as indicated by the dotted-line 40 in Figure 6, a suitable stop-bar 39 depending longitudinally from the rider-drum frame 12 for impingement by, and for limiting the forward oscillation of, the arms 28 toward the assembly R, as best seen in Figures 1 and 2.

During the rotation of the roll-assembly R, the cord D is carried under the cutting edges of the knives 31, whereby the latter, in penetrating the lap 7' of the rolls C, pass through and likewise sever the cord D for dividing the same into sections, as at 41 in Figure 6, in such manner that each section 41 of a roll C has one terminal or end portion extending also into the next adjacent roll of the assembly R.

As described, the knives 31 are mounted on the rear side of the machine and likewise the lever 36 is disposed at an end thereof, in order that, while the operator is severing the cord D into roll-sections, the operator's assistant may work at the front side of the machine for applying a strip or film 42 of suitable adhesive on the slitted-web B, and also behind the adhesive and transversely of the web B, a temporary rip-cord 43, as shown in Figure 2.

Following the cord-slitting operation, the assembly R is further rotated so as to wind another or outer slit-covering lap 7'' on and over the cord-covering lap 7' and for also disposing the glued-portion 42 of the lap 7'' in adhering connection to the lap 7' and in overlapping relation to the lap-embedded cord-sections 41, as best seen in Figure 6, whereby the finished roll C' is secured against unwinding and also the slit 40 is neatly covered and concealed from view, the cord-section 41 being then, as will be seen, disposed beneath the second lap 7' of the roll C'. Thus, in the finished roll C', the cord-section 41 may be ripped through the superimposed two thicknesses or laps 7', 7'', of the roll C' for severing the glued lap 7'' from the body of the roll, as will be understood from Figure 7.

Meanwhile, during said final lap-winding operation, the temporary rip-cord 43 is also wound into the rolls C behind the glued-portion 42, whereby, on completion of the final lap-winding operation, the cord 43 is ripped through the web B for severing the respective laps 7'' from the web-strips 7.

The roll-assembly R may now be removed from the machine A, and, the rewinding-shaft or mandrel 9 being withdrawn, the rolls C' are separated one from the other, the terminal portion of the respective cord-sections 41 in each roll being pulled out of the adjacent roll and appearing then as a tip 44 projecting from its roll C', as best seen in Figure 6.

In practice, the operation of embedding the cord D in the rolls C may also be accomplished in a simple and economical manner by eliminating the splitted lap 7'' and securing the cord-covering lap 7' to the roll-body. In either case, the cord-embedding operation may be carried out with minimum interruption of the operation of the machine A, since the cord embedment is accomplished upon the roll-assembly R before the same is removed from the machine, thus providing for a high rate of production of the rip-cord carrying rolls C'.

In the use of my new paper rolls, it will be seen that the rip-cord-section 41 is normally retained in position in the roll C' by reason of the adhesive initially applied to the cord. However, by gripping with the fingers the projecting tip 44, the cord-section 41 may be ripped through the superimposed laps 7', 7'', for severing the glued lap 7'' of the roll from the roll-body for thus, with convenience, facility, and minimum loss of time and paper, opening the roll for exposing a clean and neatly edged lap of the roll-paper in a manner highly suitable and economical for consumer use.

The particular form of roll C' shown is suitable especially, though not exclusively, for use in adding and calculating machines, stock-tickers, and the like. However, my invention is not to be limited to such types of rolls C', but may be employed also for production of rolls of wall-paper, wrapping-paper, tissue-paper, and kindred paper-articles, as well as, and more particularly, for the production of rolls composed of other windable and cord-severable materials as tin-foil, rubber tissue, or the like, and it will be understood the term "paper-roll" where appearing in the appended claims refers also to such analogous uses and purposes of my invention.

It will be further understood that changes and modifications in the method of manufacture of my new paper-roll and in the form, construction, arrangement, and combination of the several parts of the roll and apparatus may be made and substituted for those herein shown and described without departing from the nature and principles of my invention.

Having thus described my invention, what I claim and desire to secure by Letters-Patent is,—

1. Those steps in the process of forming a plurality of paper rolls, which comprise winding the several rolls in an endwise disposed series on a

mandrel, disposing a suitably elongated rip-cord transversely across the respective faces of the several rolls of the series, then by winding superposing a cord-embedding lap on the respective rolls, and then by cutting action on the mandrel-presented rolls slitting the respective superposed cord-embedding laps and simultaneously severing the embedded cord into sections each corresponding to a particular roll width.

2. Those steps in the process of forming a plurality of paper rolls, which comprise winding the several rolls in an endwise disposed series on a mandrel, disposing a suitably elongated rip-cord transversely across the respective faces of the several rolls of the series, then by winding superposing a cord-embedding lap on the respective rolls, and then by cutting action on the mandrel-presented rolls slitting the respective superposed cord-embedding laps at respective points spaced from the respective ends of the several rolls and simultaneously severing the embedded cord into sections each corresponding in length to a particular roll-width and each being offset at its particular roll for projecting an end-portion thereof into the adjacent roll.

3. Those steps in the process of forming a plurality of paper rolls, which comprise winding the several rolls in an endwise disposed series on a mandrel, disposing a suitably elongated adhesive-coated rip-cord transversely across the respective faces of the several rolls of the series, then by winding superposing a cord-embedding lap on the respective rolls, then by cutting action on the mandrel-presented rolls slitting the respective superposed cord-embedding laps at respective points spaced from the respective ends of the several rolls and simultaneously severing the embedded cord into sections each corresponding in length to a particular roll-width and each being offset at its particular roll for projecting an end-portion thereof into the adjacent roll, and then winding and securing respective terminal slit-covering laps on to the several rolls.

4. Those steps in the process of forming a plurality of paper rolls from a slitted web of paper-stock, which comprise winding the several rolls in an endwise disposed series on a mandrel, disposing a suitably elongated adhesive-coated cord transversely across the respective faces of the several rolls of the series, then by winding superposing a cord-covering lap on the respective rolls, then by cutting action on the mandrel-presented rolls, slitting the respective superposed cord-embedding laps at respective points spaced from the respective ends of the several rolls and simultaneously severing the embedded cord into sections each corresponding in length to a particular roll-width, then applying adhesive to and across the slitted web in advance of the several rolls, then winding the adhesive-bearing lap on to the several rolls for covering the slits in the cord-embedding lap, and then severing the respective glued laps from the slitted web.

5. Those steps in the process of forming a plurality of rolls from a slitted web of paper-stock, which comprise winding the several rolls in an endwise disposed series on a mandrel, disposing a suitably elongated adhesive-coated rip-cord transversely across the respective faces of the several rolls of the series and thereby connecting the several rolls together, then by winding superposing a cord-embedding lap on the respective rolls, then by cutting action on the mandrel-presented rolls slitting the respective superposed cord-embedding laps at respective points spaced from the respective ends of the several rolls and simultaneously severing the embedded cord into sections and thereby disconnecting the rolls one from the other, each cord-section corresponding in length to a particular roll-width and each being offset at its particular roll for projecting an end-portion thereof into the adjacent roll, then winding and securing respective terminal slit-covering laps on to the several rolls, and then removing the several disconnected cord-equipped rolls from the mandrel.

WILLIAM H. KNIEP.