July 12, 1960 C. O. JENNINGS 2,944,754

SLIT MACHINE WINDUP MECHANISM

Filed May 1, 1956

Fig. 1

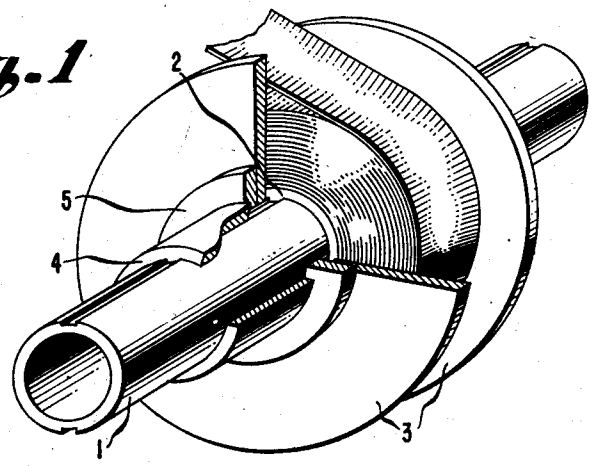


Fig. 2

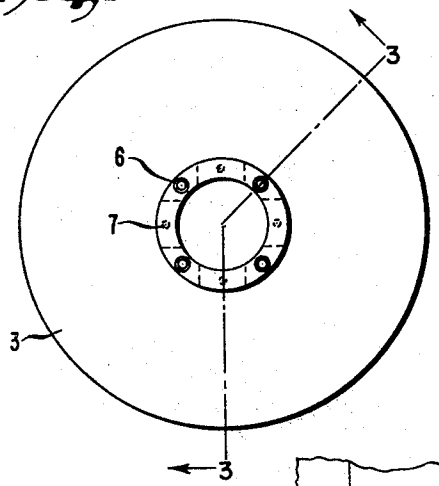


Fig. 3

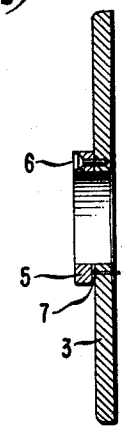
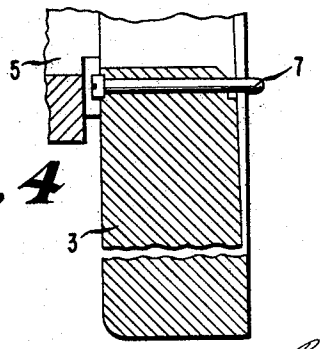


Fig. 4



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United States Patent Office 2,944,754 Patented July 12, 1960

2,944,754

SLIT MACHINE WINDUP MECHANISM

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Filed May 1, 1956, Ser. No. 581,976

2 Claims. (Cl. 242—68.3)

This invention relates to the winding of continuous web and, more particularly, to improvements in apparatus for winding slit film (e.g., cellophane), paper, and the like as it comes from the slitting machine.

One of the major defects in slit roll formation from continuous webs of film, paper, and like pellicular structures is irregular windup produced when there is a variation of positions between adjacent web edges in the roll or a variation between the web edge position in different sections of the roll. Slit roll formation may be improved to some extent by reducing, as much as possible, a web weave during windup, as described in Johnstone U.S. Patent 2,082,634, and Amos U.S. Patent 2,491,636, and the use of a flat circular disc at each end of the core upon which the slit film is being wound, as shown in Amos and Jeffrey U.S. Patent 2,533,307. However, these aids in slit roll formation have not entirely eliminated irregular windup.

During the slit roll windup operation, the edges of the weaving web have a tendency to force (deflect or warp) the disc faces outward from the core upon which the slit web is being wound. This spreading of the faces causes the distance between the faces to be slightly greater than the width of the slit film. Consequently, the film edges are not in contact with both faces at any one instant, thus increasing the possibility of irregular windup. A gap between the roll ends and the face surface of an adjacent disc is thus formed. As a result, the film can be observed to shift across this gap during windup. The shifting of the film causes variations in the roll ends which produce an irregularly wound slit roll.

An object of this invention, therefore, is to provide improved means for inhibiting irregular roll formation in the windup of continuous webs of slit film, paper, and like pellicular structures. A further object is to provide improvements in apparatus for winding relatively narrow continuous webs of slit film, e.g., cellophane, as it comes from the slitting machine. The foregoing and other objects will more clearly appear hereinafter.

These objects are realized by the present invention which, briefly stated, comprises, in a slit roll windup mechanism comprising a driven windup mandrel, a pair of spaced rigid, annular edging discs having opposed web contacting faces and mounted on said mandrel in driving engagement therewith, and a core upon which the slit web is wound mounted on said mandrel between and in contact with said edging discs, said core being in driving engagement with said edging discs, the improvement which comprises annular edging discs the web-contacting face of at least one of said discs being recessed, the recess tapering inwardly from the outer to the inner edge of the annulus.

The invention in a preferred embodiment will now be described with reference to the accompanying drawing wherein:

Fig. 1 is a perspective view of a roll windup mechanism (with a partially-wound roll thereon) embodying the improved annular edging disc of this invention, parts

being broken away to show salient features of construction;

Fig. 2 is a front elevation of the improved annular edging disc;

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2; and,

Fig. 4 is a fragmentary view taken from Fig. 3, and increased in scale to more clearly show the taper-recess in the edging disc.

Referring to Fig. 1, the slit roll windup mechanism customarily employed in the windup of slit film, paper, and like pellicular structures comprises a positively driven windup mandrel 1 of a length adapted to provide for the simultaneous windup of a plurality of slit rolls (only one of which is shown); a hollow core 2, upon which the slit web is wound, and annular edging discs 3 at each end of core 2 which serve to align the slit web as it is being wound on the core. Motion of the driven mandrel is transmitted to the core freely mounted thereon by means of a spacing sleeve 4 keyed to the mandrel which frictionally engages and thereby drives friction ring 5 bolted to the edging disc by bolts (Fig. 2). Outwardly projecting prongs or pins 7 (Fig. 2) in the edging discs penetrate the wall of the hollow core and complete the driving connection between the mandrel and core.

In accordance with the present invention, the inner or web-contacting face of one or both of the edging discs is recessed, as shown in Figs. 3 and 4, to a uniformly increasing depth from the outer to the inner edge of the annulus so that the distance between the two web-contacting faces is greater at the center (i.e., inner edge of the annulus) than between the outer edges. The maximum distance between the edging discs (and, hence, the length of the core) corresponds substantially to the width of the split web being wound on the core.

In operation, the slit web from the slitters contacts the outer-most edge of the tapered disc faces, and since the distance between these edges is less than the width of the web and since the discs are rigid there results a slight cupping (concaving) of the web as it is guided onto the core (cf. Fig. 1), causing the web to track more uniformly on the disc faces, thus greatly reducing shifting of the web and improving the roll formation with respect to irregular windup or weave. The tapered face of the disc effectively eliminates the gap between the roll edges and the disc faces. The effect of deflected or warped edging faces is similarly reduced. Irregularities of core ends may be compensated for by the additional recess (bevel) at the core contact point.

The degree to which the face of the edging disc is tapered to form the recess may vary in accordance with the width and diameter of the slit roll being wound and will also depend to some extent upon the physical characteristics of the web. In the winding of film, such as cellophane, a taper of 0 to 1/32" has proven satisfactory. The use of a combination of a flat-faced disc and a recessed disc may be used on small rolls, i.e., rolls 20" or less in width. However, on larger slit rolls, it is preferred that both edging discs be recessed in order to effect the best roll formation.

The edging disc having a tapered recess showed a highly significant improvement over the standard or flat-faced disc in all cases. An evaluation test was conducted during which time varying widths of slit rolls were obtained. The tapered discs and standard discs were alternated within each mill roll. The results of this test showed that there was a significant reduction in the number of irregularly wound slit rolls when the tapered discs were used. During the testing period for slit rolls under 20" in width, an 18.8% increase or a 174% improvement (10.8% to 29.6%) in the number of "excellent"

rolls and a 2.6% decrease or a 21% reduction (12.1% to 9.5%) in the number of "poor" rolls was realized (see Table A); for slit rolls over 20" in width, an 8.9% increase or a 468% improvement (1.9% to 10.8%) in the number of "excellent" rolls and a 34.2% decrease or a 70% reduction (49.0% to 14.8%) in the number of "poor" rolls was realized (see Table B).

Table A

TWO STANDARD DISCS vs. ONE TAPERED AND ONE STANDARD DISC SLIT ROLLS UNDER 20" IN WIDTH

Two Standard Discs			One Tapered & One Standard Disc		
Grade	No. of Rolls	Percent	Grade	No. of Rolls	Percent
Excellent	41	10.8	Excellent	103	29.6
Very Good	225	59.2	Very Good	170	48.8
Good	68	17.2	Good	42	12.1
Poor	46	12.1	Poor	33	9.5
Total	380	100	Total	348	100

Table B

TWO STANDARD DISCS vs. TWO TAPERED DISCS SLIT ROLLS 20" WIDE AND OVER

Two Standard Discs			Two Tapered Discs		
Grade	No. of Rolls	Percent	Grade	No. of Rolls	Percent
Excellent	1	1.9	Excellent	8	10.8
Very Good	17	32.0	Very Good	37	50.0
Good	9	17.1	Good	18	24.4
Poor	26	49.0	Poor	11	14.8
Total	53	100	Total	74	100

GRADING SYSTEM

(*a*) Excellent formation: The roll ends extremely smooth; no irregularities.

(*b*) Very good formation: Smooth ends with very slight variation between sheets.

(*c*) Good formation: Smooth ends but with some variation between film layers and the presence of slight "shiners".[1]

(*d*) Poor formation: Variations in film layers, pronounced "shiners"[1] and weave.

I claim:

1. In a windup mechanism for a slitting machine comprising a driven mandrel, a pair of spaced, annular, rigid, edging discs mounted on said mandrel in driving engagement therewith, and a core upon which a slit web is wound mounted on said mandrel between and in driving contact with said discs, the improvement which comprises the web-contacting face of at least one of said discs being recessed, the recess tapering inwardly from the outer to the inner edge of the disc whereby the distance between the discs is greater at the inner edges thereof than at the outer edges thereof, the distance between the discs being fixed and the maximum distance between the discs being not greater than the width of the slit web being wound on the core.

2. A windup mechanism as in claim 1 in which both discs are recessed, each recess tapering inwardly from the outer to the inner edge of the disc.

References Cited in the file of this patent

UNITED STATES PATENTS

1,469,017	Kingsbury	Sept. 25, 1923
2,001,780	Fry	May 21, 1935
2,015,860	May	Oct. 1, 1935

[1] Shiner: A single layer of film distinctly protruding beyond the adjacent layers within the roll, so that light striking it is brightly reflected.