Sept. 16, 1969 N. W. WILSON 3,467,333

WEB SLITTER

Filed Sept. 22, 1967

FIG. 1

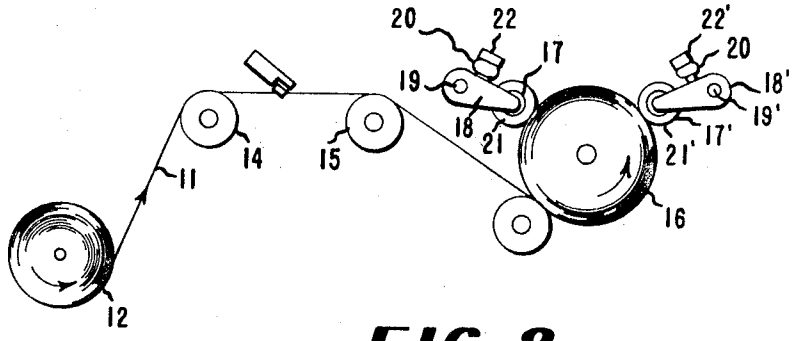
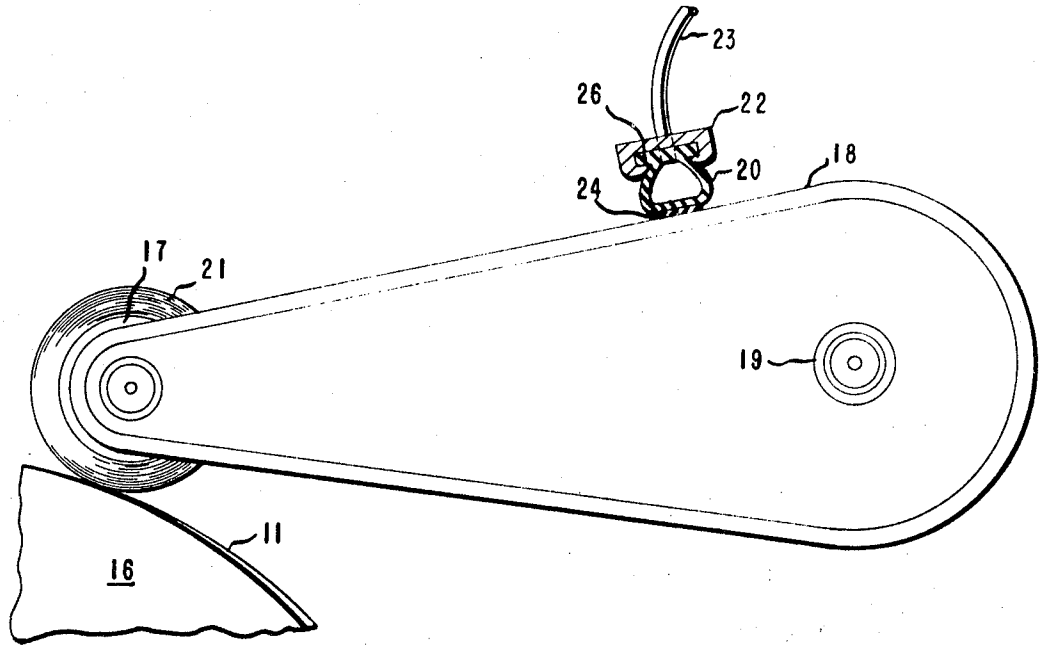


FIG. 2



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3,467,333

WEB SLITTER

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U.S. Cl. 242—56.2 3 Claims

ABSTRACT OF THE DISCLOSURE

Web slitting apparatus having a pivoted arm to position wind-up cores, and including a gas filled resilient container bearing on the pivoted arm, for high speed operation and efficient start-up.

Related art

This invention is an improvement of the web slitting and winding apparatus of the type described in Nicholson, United States Patent No. 2,777,644 issued Jan. 15, 1957.

Background

The formation of good rolls when a multiplicity of narrow strips of thin web, such as film, paper or fabric, are wound on individual rolls is dependent on the character of the material and on the nature of the winding arrangement. The slitting and winding of a film on a pivoted arm slitter of the Nicholson invention can be operated at speeds of to 200 to 400 or more feet per minute. At the higher speeds the pivoted arms winding in contact with the pull roll tend to bounce on the roll, leading to poor windup pattern of the slit roll.

There have been attempts to improve the winding performance of the slitter apparatus. In U.S. 3,122,335 it is proposed to use a fluid charged piston on each wind roll. The piston system is subject to oscillation at critical speeds dependent upon arm and piston construction. Other systems are shown in U.S. 3,198,453 and in U.S. 2,872,126.

Summary of invention

In the present invention, web slitting machine of the Nicholson type is improved by including therewith a gas filled resilient container cooperating with the positioning pivoted arms. In a specific embodiment the invention comprises a web slitting machine having a web supply, means for slitting continuous web into a plurality of strips, a positively driven web driving roll over which the strips pass, and cores in peripheral rotating contact with the web driving rolls and upon which the strips are wound, and pivoted arms positioning the cores in substantially parallel relationship in peripheral contact with the driving roll and a gas filled resilient container cooperating with the pivoted arm and urging the cores in contact with the web driving roll.

The gas filled device of the invention achieves an improvement in roll formation by minimizing arm bounce by damping the oscillations which occur, resulting in slit rolls with a smooth windup pattern and without unwanted beading. Furthermore and of considerable importance, the device can be readily deflated and re-inflated to permit rapid set-ups.

The invention will be more clearly understood by reference to the accompanying drawing wherein:

FIGURE 1 is a simplified schematic drawing of a slitting apparatus employing a device of the present invention; and

FIGURE 2 is a view of a gas filled hold-down device of the present invention as it bears on a pivot arm of the apparatus.

Referring to FIGURE 1, a continuous web **11**, e.g., a thermoplastic film such as polyethylene terephthalate, is unwound from a supply roll **12** and thereafter is slit by knife **13**, positioned between supporting rolls **14** and **15**, and then passes over the surface of main web driving drum or roll **16**. At web driving roll **16** the web, having been slit into a plurality of narrow strips, is wound as shown upon core **17** which is mounted at the free end of the pivot arm **18**. Pivot arm **18**, suspended to rotate freely about axis **19**, has gas-filled hold-down device **20** to urge the windup roll **21** into uniform surface contact with driving roll **16**. A back-up plate **22** is provided to mount and support the hold-down device **20**. The next adjacent strip of web is wound upon core **17'** mounted at the free end of pivot arm **18'**, and so on substantially identical to the apparatus already described. That is, each strip is individually wound on a separate core disposed on the periphery, alternatively in two or more rows parallel to the axis of driving roll **16**.

It should be understood that the rolls are driven, directly or through another driven roll, at speeds adapted to maintain the film or web under tension. Hence as rolls of wound material increase in diameter, speed of rotation is adjusted in the usual fashion to maintain the desired surface speed and, therefore, the designed film tension for good roll formation.

FIGURE 1 illustrates a general type of slitting apparatus wherein the present invention is highly useful but it is understood that the present invention can be employed in any type of slitting apparatus wherein the slit ends of the web or film are ultimately conducted onto a roll or rolls of the type illustrated in FIGURE 1.

Still with reference to FIGURE 1, the free end of pivot arm **18** is provided with a short shaft or a mandrel upon which is mounted a rotatable chuck for rigidly mounting thereon core **17**. The core **17** can be of cardboard, wood, metal, plastic, etc., and is in rotating contact with the surface of driving roll **16**. Core **17** may, if desired, be positively driven in a direction so as to maintain tension of a desired degree upon the roll which forms on this core. It should be understood that the present web winding apparatus is not restricted with respect to the number of individual winding positions which are located in peripheral contact with driving roll **16** of FIGURE 1. Usually, as indicated hereinbefore, additional rolls parallel to roll **21** on core **17** are positioned alternately on an arc about driving roll **16** so as to provide proper clearance for free motion of pivot arm **18** and winding of roll **31** on core **17**.

FIGURE 2 illustrates in somewhat greater detail the gas filled resilient hold-down device of the present invention and its cooperation with the pivoted arm of the rewinder in contact with driving roll **16**. This figure illustrates the device in a preferred embodiment, but modification therefrom can be made to conform to individual requirements.

Shown in FIGURE 2 is rigid support plate **22** to which the device **20** is fixedly clamped, as by suitably shaped flanges on the plate **22** and a rigid top portion **26** on the gas bag or device **20**. Plate **22** can be attached to the machine frame (not shown) or other location adapted to cause the device **20** to exert force against pivot arm **18**.

The gas filled resilient container **20** can suitably be made of a thin wall reinforced elastomer tube which, of course, is sealed to be gas impervious. For example, the container or bag can be made from a 1-ply, fabric-reinforced, cured, natural rubber about 60 mils thick. In use, such a bag is inflated to 2 to 10 p.s.i. gauge. A rigid tread top **26** and bottom **24** (FIG. 2) integral to the container **20** make it easy to attach to the support plate **22** and to avoid contact wear of the container **20** as it bears

on the pivot arm. An elastomer with a Shore A durometer hardness of 45–50 is suitable for the treads. A tread of ¼ to ½ inch thickness and ¾ to 2 inches wide will function well with a pivot arm. The hold-down device is preferably of a size to extend the full length of the wind roll. Consequently, when the pivot arms must be reset to different widths, the adjustments can be made rapidly and easily as follows: the pressure is released from the device **20** through a gas conduit **23**. The arm is moved and set. Then the container is repressured through conduit **23** from a gas source, e.g. a compressor.

The give or yield required of the resilient container **20** will depend upon the location on the arm. A yield of 1 to 3 inches has been found satisfactory for rolls up to 12 inches in diameter and 6 inches wide. The gas or inflatant employed can be any permanent gas such as air, nitrogen, or carbon dioxide.

In operation, the hold-down device **20** presses against the pivot arm **18**. As the windup roll **21** increases in diameter after taking up web or film from driving roll **16**, the pivot arm **18** compresses the container **20** which thereby maintains pressure on the pivot arm, damping oscillations caused by arm bounce.

When the improved slitting machine of this invention is used, the slitter may be operated at 600 or more feet per minute. The increase of a factor of 2 or more in speed is achieved without loss in yield because of uneven windup edge.

From the foregoing discussion and description, it is evident that the present discovery is an important improvement in web slitting and winding machines. The improvement effectively overcomes arm bounce with its attendant effects on rolls produced, and has the further advantage of simplicity in allowing speedy adjustments and set-ups of the equipment. While it has been described with certain details, it should be evident that changes can be made without departing from its scope.

What is claimed is:

1. In a web slitting machine having a web supply from which a continuous web is fed, means for slitting the continuous web into a plurality of continuous strips, a positively driven web driving roll over which the strips pass, and cores in peripheral rotating contact with the web driving roll and upon which the strips are wound, and pivoted arms positioning said cores in substantially parallel relationship and in peripheral contact with the web driving roll, the improvement comprising gas filled resilient container including a tread attached to its surface cooperating with the pivoted arm and urging the cores in contact with the web driving roll.

2. A web slitting machine according to claim **1** including means to fill and exhaust gas from said container to facilitate ready start-up of the slitting machine.

3. A web slitting machine according to claim **1** in which the gas container is formed of gas impervious fabric-reinforced rubber.

References Cited

UNITED STATES PATENTS

3,222,004	12/1965	Crowe	242—56.2 X
3,237,877	3/1966	Printz et al.	242—66

WILLIAM S. BURDEN, Primary Examiner

U.S. Cl. X.R.

242—65