Feb. 4, 1969 J. J. WETZLER 3,425,306

WEB CONDITIONING APPARATUS

Filed Oct. 28, 1965

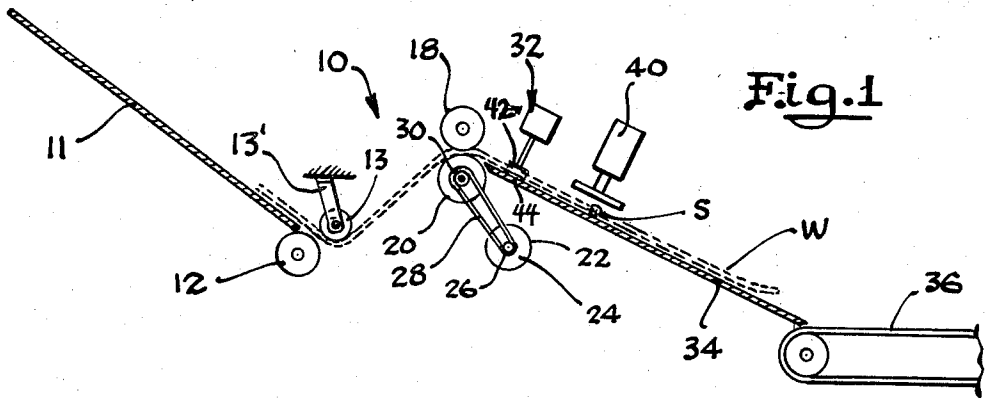


Fig.1

Fig.2

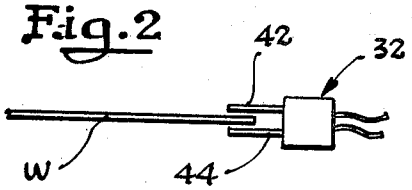


Fig.3

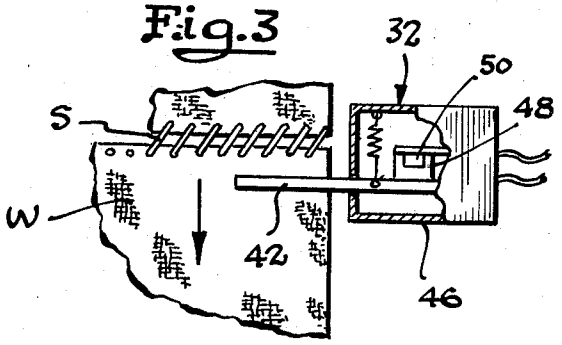
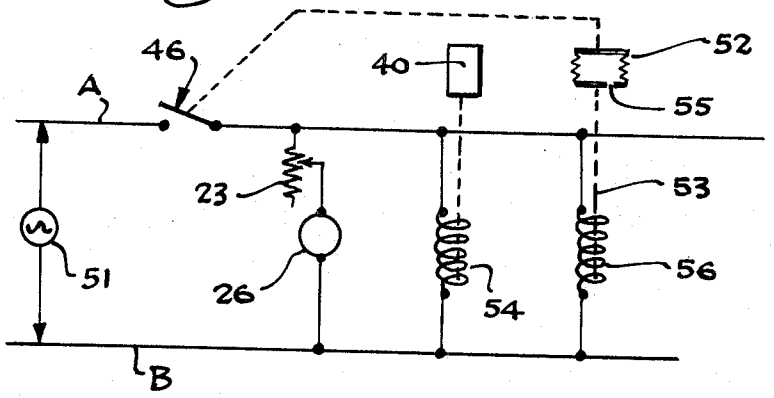


Fig.4



Inventor
Justin J. Wetzler
By Frost, Burmeister & Kulie
Attorneys

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WEB CONDITIONING APPARATUS

Justin J. Wetzler, Evanston, Ill., assignor to F. W. Means & Co., Chicago, Ill., a corporation of Illinois

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ABSTRACT OF THE DISCLOSURE

A web conditoning apparatus for severing a continuous web into predetermined lengths including a power source to withdraw webbing from the conditioning apparatus and means to sense the passage of a seam defined between successive predetermined lengths of webbing to control the power means and a device to sever the continuous web at the seams after sensing of passage of a seam past the sensing device.

The present invention relates to a web conditioning apparatus and more particularly it relates to an improved means for severing a continuous web length into predetermined lengths after conditioning of the web.

In applications where predetermined lengths of webbing are conditioned for re-use it is economical and convenient to process the web in a continuous web form during the conditioning process. To this extent separate web lengths must be joined into continuous web form. It is essential, of course, to re-separate the web into predetermined lengths after conditioning for re-use in the original length form. One use of web lengths of the type noted above is in continuous towel cabinets for washrooms, or the like, where a predetermined length of toweling is mounted between rollers and being discharged from one during use in drying the hands while simultaneously being taken up on the other roller. After use these towel lengths are taken to a laundry for cleaning and conditioning for re-use in the cabinets.

Preferably the individual lengths of webbing (or toweling) are joined into a continuous web prior to processing or conditioning so that the conditioning line may be run without interruption. After the web is cleaned or otherwise conditioned for re-use it must be separated at the seams for packaging and in this manner made ready for re-use. Separation of the continuous web is made at the seam to avoid laps or seams within a given length of webbing.

The present invention is directed to the provision of an improved apparatus for a web conditioning apparatus for automatically severing the continuous web into predetermined lengths at the seam.

It, accordingly, is a general object of the present invention to provide an improved web conditioning apparatus for processing a continuous web and for severing the continuous web into predetermined lengths after conditioning.

Another object of the present invention resides in the provision of an improved web severing means for a web conditioning machine wherein the web is automatically severed into predetermined lengths at the seams in the continuous web.

A further object of the present invention resides in the provision of web conditioning apparatus that includes improved severing means having means to temporarily interrupt the web drive means to sever a web length from the continuous web.

An additional object of the present invention resides in the provision of web conditioning apparatus having an improved severing means that is economical to manufacture and maintain, that is easy to use and that is durable in use.

The novel features which are believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a schematic representation of a portion of a web conditioning line including the web severing section of said line;

FIGURE 2 is a fragmentary enlarged view of a portion of the seam sensing means of the apparatus illustrating the seam engaging fingers;

FIGURE 3 is a fragmentary enlarged view, partly in section, of the switch means of the same sensing means for temporarily interrupting the power supply to the drive motor of the apparatus and to energize the severing element; and

FIGURE 4 is a schematic diagram of the circuit involved in the drive means and severing means of the apparatus of the present invention.

Referring more particularly now to FIGURE 1, a portion of a conditioning line for a continuous web is schematically represented at **10**. An inspection table **11** may be provided to receive the conditioned web from the last stage of processing and to provide an area for scanning of the web to determine whether it is satisfactorily conditioned and whether defects exist that would direct rejection or diversion of the web. The webbing W passes through a pair of pinch rollers **12–13**. The rollers **12–13** may be utilized to pull the webbing W through the last stage of processing which may be an ironing stage in the case of continuous toweling for washrooms.

The webbing W passes from the pinch rolls **12–13** to and between rolls **18** and **20** mounted in over-under relation. It should be observed, however, that a loop forming pit may be interposed between the pinch rolls **12–13** and the rolls **18–20** of the severing means. This would permit continuous discharge of webbing from the laundering apparatus while the severing means is stopped temporarily for separation of web lengths prior to packaging.

The roll **13** may be a tension roll providing means for maintaining a constant tension on the webbing W with a direct feed between the rolls **12–13** and the succeeding stage in the sequence in the absence of the loop L therebetween. The tension roll is mounted to rest upon the upper surface of the webbing in direct transfer from the rolls **12–13** to the succeeding stage. In web tensioning operation the roll **13** would rest on the upper web surface and would move an arm **13'** through an arc depending upon the tension required on the webbing W.

The rolls **18** and **20** are mounted on suitable support means and in abutting relation so that the webbing W may be pinched therebetween and pulled from rolls **12–13**.

A motor **22** is connected through a reducer **24** to a drive shaft and pulley **26**. A drive belt or chain **28** is connected to a pulley **30** secured to the axle of the drive roll **20** thereby completing the drive relation between the motor **22** and the drive roll **20**.

A support table **34** is mounted between the rolls **18** and **20** and the transport belt **36** of the conditioning apparatus. Belt **36** carries the severed lengths of webbing W along to the packaging stage of the processing line. The table **34** supports the webbing during transfer through the severing stage of the processing line. It should be noted that the table **34** may be a moving belt which may be commonly driven by the motor **22** through suitable drive means (not shown).

Sensing means **32** is mounted above the table **34** and downstream of the rolls **18** and **20**. The sensing means is adapted to detect the passage of a seam S and to control the operative condition of the drive motor **22**.

Severing means **40** is located downstream of the sensing means **32** and is adapted to sever the continuous webbing W at the seam S into predetermined lengths of the same character as initially introduced to the conditioning line.

After the webbing W is severed at the seam S into a predetermined length said length is carried along the belt **36** to the packaging stage and rolled or otherwise placing in condition for reuse. It is, of course, important in many uses to sever the continuous webbing at the seam and to avoid having seams interspersed along the length of the webbing sections. Such seams may cause difficulty in use if the webbing is to be dispensed in an automatic or manual dispensing machine.

As shown in FIGURE 2, the sensing means **32** is mounted so that the webbing W will pass between fingers **42** and **44** extending therefrom. The fingers **42** and **44** are arranged in spaced apart relation a distance sufficient to permit the normal web thickness to pass freely therethrough. This spaced apart relation of the fingers may be varied to accommodate varying web thicknesses with the space being just greater than the web thickness. The fingers are held in a predetermined spaced relation by spring tension, or the like. Web flexure or varying thicknesses within web tolerances may cause slight finger deflection. This slight deflection can be accommodated by the switch element so that circuit continuity will be maintained.

The webbing processed in the conditioning apparatus may initially be of predetermined lengths. For example, toweling for use in continuous cabinets may be in fifty foot lengths. Since one of the more economical conditioning techniques involves continuity of operation the predetermined web lengths are joined together to form a continuous web which then is passed through the laundering or other conditioning apparatus. After the webbing has been conditioned it must be re-cut into the predetermined web lengths at the seam for packaging and for reuse.

The webbing may be joined by overlapping terminal portions of web lengths and stitching the web lengths together. Joining in this manner results in a seam thickness that is at least twice the normal web thickness. Another method of joining may involve placing the terminal portions of web lengths in end-to-end relation and then stitching the web ends together. The stitching, of course, extends above and below the webbing and again results in a seam area that this thicker than the normal web thickness.

When a seam S passes between the fingers **42** and **44** the greater seam thickness will cause the fingers **42** and **44** to deflect in the direction of seam travel. The fingers **42** and **44** are parts of a switch element which when so deflected will interrupt the power supply to the motor **22** and cause the motor temporarily to stop (as described below). At the same time the severing means **40** is activated to cut the continuous web W at the seam juncture and to sever the conditioned portion of webbing from the continuous form. The conditioned, severed web segment then is passed along to the belt **36** for transport to the packing means (not shown).

The switch element **46** for the sensing means **32** is illustrated in FIGURE 3. The web W is illustrated as moving downwardly in the view of FIGURE 3 and into the fingers **42** and **44** (only the top finger **42** being shown). Fingers **42** and **44** are biased toward each other with a spring, or the like. When this bias force is exceeded the fingers **42** and **44** will be spread apart a distance which will be a function of the spreading force acting on said fingers in opposition to the bias force. Thus, when the seam S moves into the fingers, the fingers **42** and **44** first will be carried along with the seam. As the fingers are moved along the contact element **48** affixed to the finger elements will be moved out of electrical engagement with the mating contact element **50** to break the circuit defined by side A of the power supply (schematically represented in FIGURE 4). As the seam S continues to move along it will carry the fingers until the limit of movement of the fingers is reached. At this time the spreading force of the moving seam area will exceed the bias force holding the fingers in predetermined spaced relation and the fingers **42** and **44** will spread slightly to permit the seam S to pass therebetween.

The control apparatus for the device of the present invention is illustrated schematically in FIGURE 4. The motor **22** and solenoids **54** and **56** are connected to the power supply **51** across A and B. The motor **22** is connected between sides A and B of the supply through a variable resistor **23** to provide means for varying the speed of the motor **22** and thereby the take-up and drive characteristic of the apparatus to vary the rate of withdrawal of the webbing W from the loop forming area L.

The solenoid **54** controls the action of the severing means **40**. When circuit continuity is defined through the solenoid **54** the severing means is withdrawn and in spaced relation to the path of movement of the webbing over the table or other support means **34**. However, when the circuit is interrupted as by opening of the switch **46** in side A of the power supply the severing element of the severing means **40** is moved into the path of the webbing W to sever the webbing therebeneath.

A time delay bellows **52** is connected to the plunger **53** of the solenoid **56** and to the movable switch element of the switch **46**.

When the switch **46** is opened by passage of a seam S therebetween the circuit on one side of the power supply is broken and the power supply to the motor **22**, and solenoids **54** and **56** is interrupted. The severing means **40** is operatively connected to the switch **46** such that the seam S will be directly beneath the severing means when the webbing W is stopped by interruption of the power supply to the motor **22**. The circuit to solenoid **54** is terminated when switch **46** is opened, as defined above, and the severing element of the means **40** is brought into contact with the seam S to sever the conditioned portion of the webbing from the webbing still being processed in the apparatus. During this period of interruption the conditioning line is operated so that webbing is not stalled within the conditioning means at any stage. The webbing being discharged from the conditioning means during the interruption for severing of the conditioned section of webbing will move into a loop forming area at some stage of the processing line to accommodate the discharged webbing for the brief period of interruption thus allowing continuous operation. When the packaging apparatus is ready to receive another length of material the operating speed of the motor **22** is adjusted to take up the loop formed during the previous interruption for severing thereby preparing the system for the next severing operation. The motor speed may be adjusted, as noted above, by adjustment of the voltage drop across variable resistor **23**.

A time delay means must be available during the severing operation to permit sufficient time to fully release the conditioned length of webbing from the webbing still being conditioned. This time delay may be achieved with a bellows time delay, or similar functional apparatus. When the power supply to solenoid **56** is interrupted by opening of the switch **46** the plunger **53** is moved to collapse the bellows **52**. One end plate of the bellows **52** is connected to the moveable element of the switch **46** to control the position thereof during the severing operation. When the bellows is in a collapsed condition the moveable element **48** of the switch **46** is held out of engagement with the mating element **50** to maintain the circuit in an "open" condition. As the bellows **52** expands after a predetermined interval, which interval may be regulated by varying the size of the orifice **55**, the switch element **48** is again permitted to engage the element **50**

to re-establish the circuit connection to the motor **22** and the solenoids **54** and **56**.

When the circuit is re-established webbing is drawn between the rolls **18** and **20** and into the severing and packaging area of the system; the severing means **40** is withdrawn from the webbing path through the system by energization of solenoid winding **54** and the plunger **53** of solenoid **56** is withdrawn into the winding of said solenoid ready for the next severing cycle.

While a specific embodiment of the present invention is shown and described it will, of course, be understood that other modifications and alternative constructions may be used without departing from the true spirit and scope of the invention. It is intended by the appended claims to cover all such modifications and alternative constructions as fall within their true spirit and scope.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a web conditioning apparatus for processing predetermined lengths of webbing joined into a continuous web before conditioning and having means to package the webbing at the terminal point of conditioning after severing of the continuous web into said predetermined lengths, said severing means comprising:

a variable speed drive motor having a power supply to control withdrawal of webbing from the conditioning apparatus and web feed to the severing stage;

sensing means to sense the passage of the seam between successive lengths and to control the power supply to the drive motor said sensing means including a time delay switch means operatively associated therewith temporarily to terminate operation of the drive motor in response to passage of the joined area past the sensing means, said sensing means including a time delay switch means operatively associated therewith temporarily to terminate operation of the drive motor in response to passage of the joined area past the sensing means; and

severing means operative in response to passage of a seam past the sensing means to separate the conditioned predetermined length of webbing from the continuous web for packaging of said conditioned predetermined length said severing means being operatively associated with the sensing means such that the full termination of movement of the mass of the apparatus will bring the seam to the severing means after passage through the sensing means.

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ANDREW R. JUHASZ, *Primary Examiner.*

U.S. Cl. X.R.

83—367, 371, 372