

[54] **WEB SEVERING APPARATUS**

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83/701

[51] Int. Cl. .... **B26d 7/14**

[58] Field of Search ..... 83/105, 106, 175, 307,  
83/308, 367, 649, 650, 925 R, 857, 401;  
225/93, 106

[56] **References Cited**

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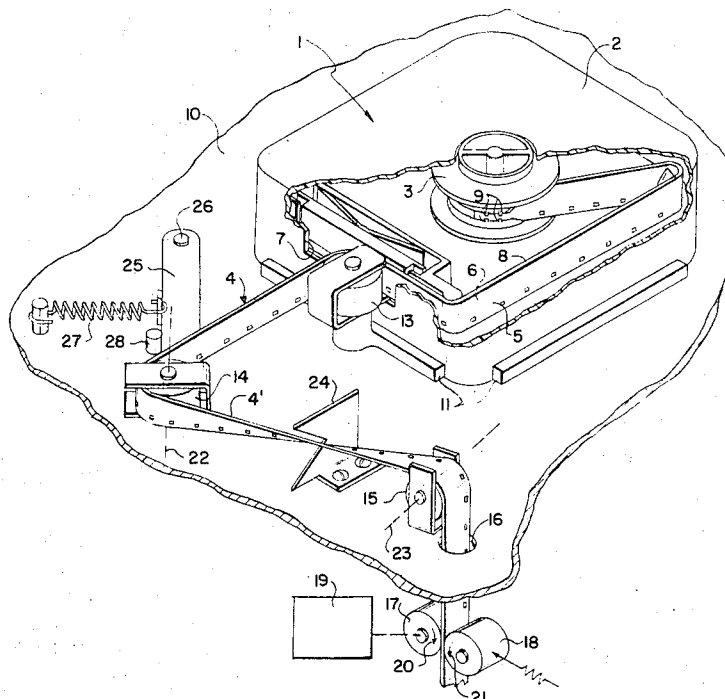
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[57] **ABSTRACT**

A web severing apparatus is adapted for use with flexi-

ble web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to the web holder and a free leading end portion. The apparatus includes a web pulling mechanism for pulling such web material, in either of first and second different orientations, longitudinally along a web path from the web holder. When substantially all but the trailing end portion of such web material is withdrawn from the web holder, the web pulling mechanism serves to shift a particular web portion which closely precedes the trailing web end portion laterally out of the web path. A web cutter blade in the apparatus is disposed to sever the free leading web end portion from a remainder of such web material at the web holder, in the event the web material is initially pulled in the second orientation along the web path. Also, the web cutter blade is disposed to sever such web material at the particular web portion which closely precedes the trailing web end portion, when substantially all of the web material has been withdrawn in the first orientation from the web holder and the particular web portion is shifted out of the web path.

**14 Claims, 3 Drawing Figures**



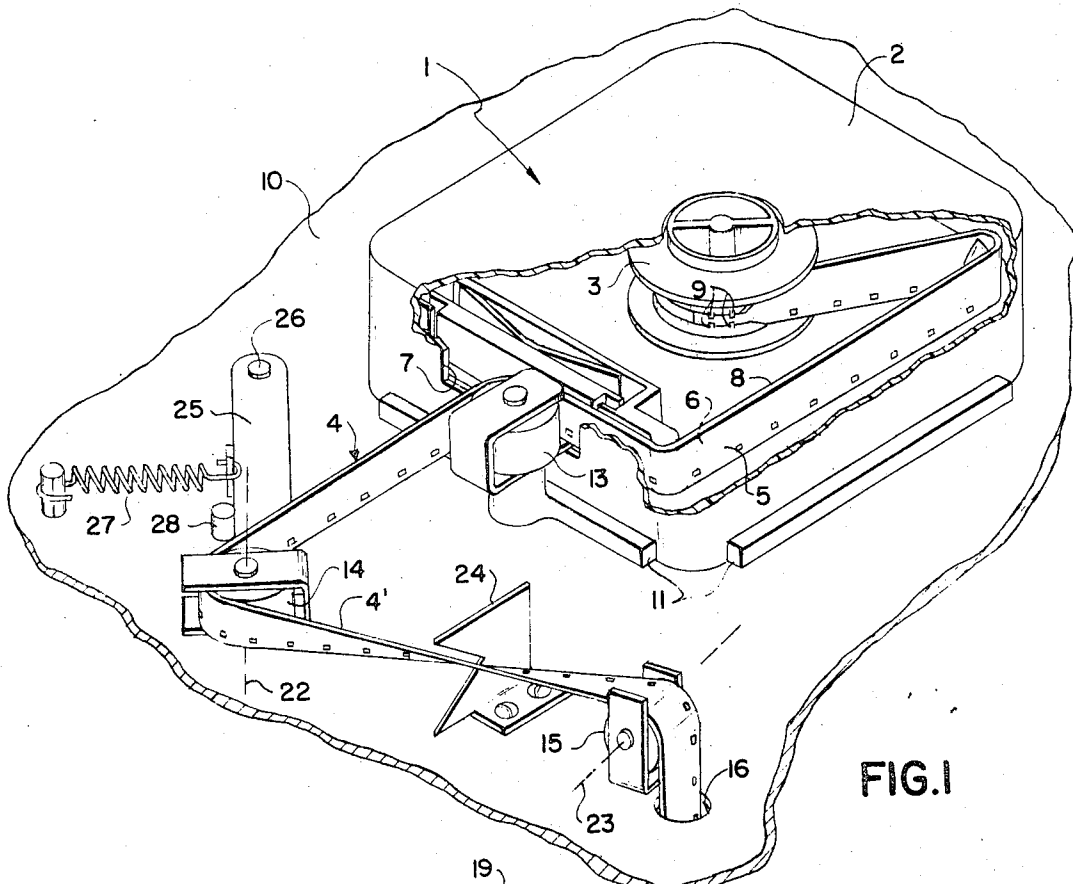


FIG. 1

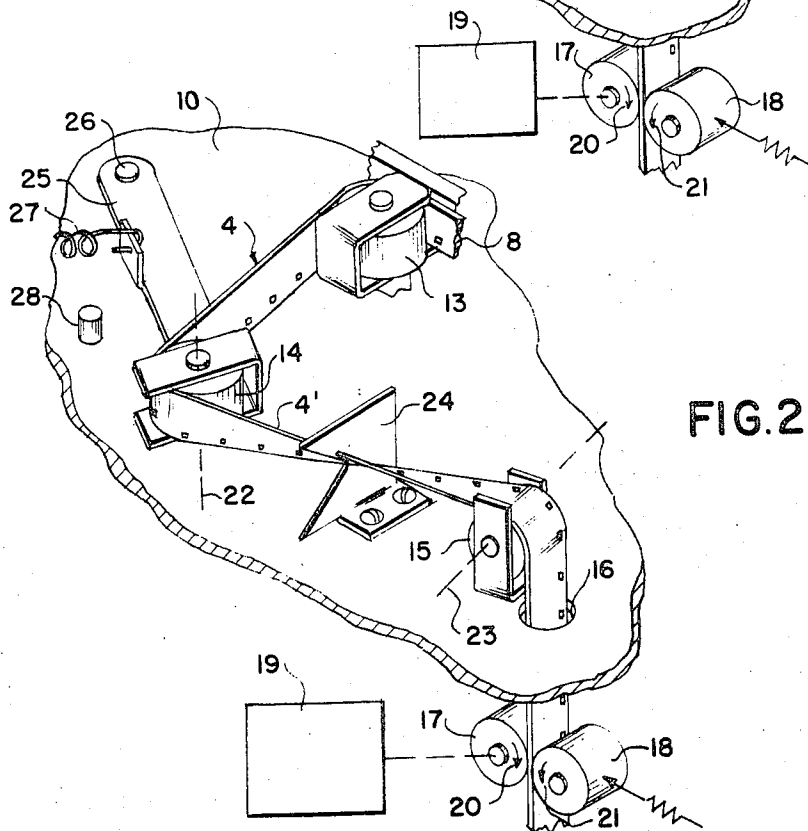
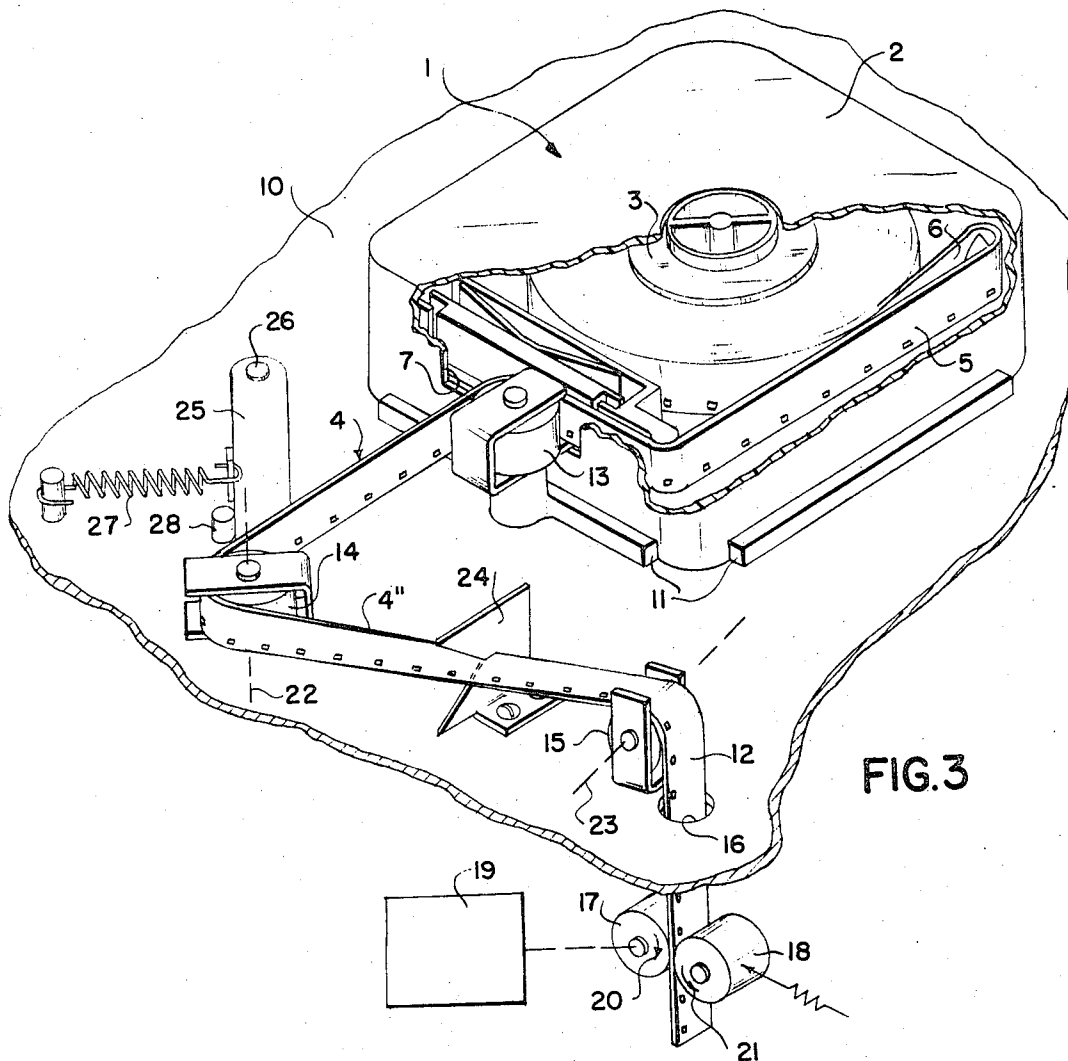


FIG. 2



## WEB SEVERING APPARATUS

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to apparatus for severing web material and, in particular, to web severing apparatus which is adapted to sever web material generally in response to the state of withdrawal of such material from a web reel, web cartridge, or other web holder.

## 2. Description of the Prior Art

Concurrent with the introduction of web holders of the kind wherein one end portion of the web material is anchored to a core member of the web holder, a need arose for simple and efficient means for detecting when substantially all but the anchored end portion of the web material has been withdrawn from the web holder and, in response thereto, for severing the withdrawn web from the anchored web end portion. Generally speaking, apparatus has heretofore been devised in which a web pulling mechanism is actuated to withdraw successive portions of the web material from the web holder and in which a control mechanism serves to detect the presence of a hole in the web material at a particular web portion which closely precedes the anchored web end portion and, upon this detection, deactuates the web pulling mechanism. In operation, the control mechanism detects the presence of the web hole upon withdrawal of the particular web portion from the web holder. Thus, the web pulling mechanism will be deactivated in response to substantially completed withdrawal of the web material from the web holder. After such deactuation of the web pulling mechanism, the web material is manually severed at the particular web portion so as to separate the withdrawn web from the anchored web end portion. Accordingly, while the apparatus is adapted to stop pulling of the web material away from the web holder on the occurrence of substantially completed web withdrawal, no means is included in the apparatus for thereafter automatically separating the withdrawn web from the anchored web end portion.

Situations arise wherein the web material to be withdrawn from the web holder is provided with two opposite surfaces which must be oriented in a given relative manner during such web withdrawal. For example, if an exposed photographic film strip is withdrawn from the web holder and immediately ushered into a film processor, the film strip preferably should be oriented so that the base surface which is inert, rather than the emulsion surface which is sensitive, will abut against at least the majority of web guiding shoes and rollers in the processor. This is to reduce the possibility of scratching or marring the emulsion surface of the film strip, in the processor. It will be appreciated that the previously described apparatus for stopping web movement in the event of substantially completed withdrawal of the web material from the web holder cannot satisfactorily be used in the present example, because the film strip should be advanced without interruption from the web holder to the film processor. Moreover, such apparatus does not include means for distinguishing between withdrawal of the film strip, in desired and undesired orientations, from the web holder. Thus the film strip may be withdrawn from the web holder and ushered into the film processor in a manner causing the film

emulsion surface to abut against most of the web guiding shoes and rollers in the processor.

Contrary to the foregoing apparatus, apparatus has been devised in accordance with the present invention (1) which is adapted to automatically sever a leading end portion of the web material from a remaining web length upon initial withdrawal of such leading web end portion, in an undesired orientation, from the web holder and (2) which is adapted to automatically sever the web material from a trailing web end portion, anchored to the web holder, upon substantially completed withdrawal of the web material, in a desired orientation, from the web holder.

## SUMMARY OF THE INVENTION

Accordingly, a general object of the invention is to provide apparatus for severing web material in response to the condition of withdrawal of such material from a web holder.

Another object of the present invention is to provide web severing apparatus which is adapted to sever a leading end portion of the web material from a remaining web length upon initial withdrawal of such leading web end portion, in an undesired orientation, from a web holder.

Yet another object of the present invention is to provide web severing apparatus which is adapted to sever the web material from a trailing web end portion, anchored to the web holder, upon substantially completed withdrawal of the web material, in a desired orientation, from the web holder.

A further object of the present invention is to provide web severing apparatus which is adapted both to (1) sever a leading end portion of the web material from a remaining web length upon initial withdrawal of such leading web end portion, in an undesired orientation, from a web holder and (2) sever the web material from a trailing web end portion, anchored to the web holder, upon substantially completed withdrawal of the web material, in a desired orientation, from the web holder.

In accordance with a preferred embodiment of the present invention there is disclosed, in detail hereinafter, a web severing apparatus adapted for use with flexible web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to the web holder and a free leading end portion. The apparatus includes a web pulling mechanism for pulling such web material, in either of first and second oppositely twisted orientations, longitudinally along a web path from the web holder. When substantially all but the trailing end portion of such web material is withdrawn from the web holder, the web pulling mechanism serves to shift a particular web portion which closely precedes the trailing web end portion laterally out of the web path. A web cutter blade in the apparatus is disposed to sever the free leading web end portion from a remainder of such web material at the web holder, in the event the web material is initially pulled in the second twisted sense along the web path. Also the web cutter blade is disposed to sever such web material at the particular web portion which closely precedes the trailing web end portion, when substantially all of the web material has been withdrawn in the first twisted sense from the web holder and the particular web portion is shifted out of the web path.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and objects of the present invention and the manner of obtaining them will become more apparent by reference to the following detailed description of a preferred embodiment of such invention taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a perspective view of a web bearing cartridge, a web material being withdrawn from such cartridge, and a web severing apparatus in accordance with a preferred embodiment of the present invention;

FIG. 2 is a fragmentary view of the web severing apparatus depicted in FIG. 1 (the web bearing cartridge being omitted), showing the manner in which the web material is severed in response to substantially completed withdrawal of such material from the cartridge; and

FIG. 3 is a perspective view similar to FIG. 1, showing the manner in which the web material is severed in response to initial withdrawal of such material, from the web bearing cartridge, in a web orientation different from that depicted in FIG. 1.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

It may be well before proceeding with a description of the preferred invention embodiment to first consider a web roll cartridge with which such invention embodiment can be used. Since the web roll cartridge is fully disclosed in U.S. Pat. No. 3,208,686, there will be described hereinafter only those features of the cartridge which are necessary for a complete understanding of the purposes and operation of the present invention. Referring to FIG. 1, the cartridge which is generally indicated by the reference number 1 includes a casing body 2 and, within the body, a rotatably mounted core member 3. The core 3, in the present illustration, is adapted to support a convoluted roll of photographic film strip material 4. As can be realized from FIG. 3, the film strip 4 is wound about the core 3 in a manner such that an emulsion surface 5 of the film strip is located on the interior side of a strip convolution and a base surface 6 of the film strip is located on the exterior side of the same convolution. As shown in FIG. 1, the film strip 4 may be withdrawn from the cartridge 1 through a strip egress opening 7 in the cartridge body 2 (by means known in the art). However, a trailing or rearmost end portion 8 of the film strip 4 is anchored to the core 3 by four strip engaging lugs 9, so that a substantial force would be required to separate the trailing film strip portion from the core.

Coming now to the preferred invention embodiment, there is shown in FIG. 3 a support plate 10 on which is received the web roll cartridge 1. Several cartridge positioning bars 11, fixed to the support plate 10, serve to firmly seat the cartridge 1 for withdrawal of the film strip 4 through the cartridge opening 7. As shown in FIG. 3, a free leading end portion 12 of the film strip 4 is first threaded about three idler rollers 13, 14 and 15 which are mounted on the support plate 10 in spaced relation. Once threaded about the idler rollers 13-15, the film strip 4 is passed through an opening 16 in the support plate 10 and, thence, between drive and pressure rollers 17 and 18. Upon actuation of a motor 19, operably connected to the drive roller 17, such roller

will be rotated in a clockwise direction generally indicated by the arrow 20 in FIG. 3. This rotation of the drive roller 17 will, in turn, cause the pressure roller 18 to rotate in a counterclockwise direction generally indicated by the arrow 21 in FIG. 3. Thus, successive portions of the film strip 4 will be pulled longitudinally from the cartridge 1 and, in order, about the idler rollers 13, 14 and 15.

As shown in FIG. 3, the idler rollers 14 and 15 are mounted on the support plate 10 in a manner such that the respective roller axes of rotation 22 and 23 are disposed in nonparallel, nonintersecting relation. Accordingly, as can be realized from a comparison of FIGS. 1 and 3, the emulsion and base surfaces 5 and 6 of the film strip 4 can be supported by the idler rollers 14 and 15, for movement therebetween, in either of two different relative orientations. That is to say, successive portions of the film strip 4 will be supported for movement from the idler roller 14 to the idler roller 15 in a first longitudinally twisted sense, as shown in FIG. 1, or in a second longitudinally twisted sense, as shown in FIG. 3.

A web cutter blade 24 is mounted on the support plate 10 at a location generally intermediate the idler rollers 14 and 15. This blade 24 is disposed so as to be spaced from a film strip portion 4' which extends in the first longitudinally twisted sense between the idler rollers 14 and 15, as in FIG. 1, and so as to sever a film strip portion 4'' which extends between such rollers in the second longitudinally twisted sense, as in FIG. 3. Accordingly, as shown in FIG. 3, the free leading end portion 12 of the film strip 4 will be severed from a remaining length of the film strip when the drive and pressure rollers 17 and 18 pull the film strip, in the second longitudinally twisted sense, from the idler roller 14 to the idler roller 15. However, such severance of the film strip 4 will not occur when the film strip is similarly pulled in the first longitudinally twisted sense.

Referring again to FIG. 1, the idler roller 14 is located on a lever arm 25 which, in turn, is pivotably mounted on the support plate 10 by means of a pivot pin 26. A helical tension spring 27, interconnecting the support plate 10 and the lever arm 25, serves to urge such arm (with the idler roller 14) in a clockwise direction, as viewed in FIG. 1, about the pivot pin 26. However, a stop pin 28, fixed to the support plate 10, is disposed to limit such clockwise urging of the lever arm 25.

As can be seen in FIG. 1, the idler rollers 13, 14 and 15 are equally spaced apart along the path of film movement between such rollers. Moreover, this path of film movement includes an abrupt change of direction or bend at the idler roller 14. Thus, a comparison of FIGS. 1 and 2 will show that when substantially all but the trailing end portion 8 of the film strip 4 has been withdrawn from the web roll cartridge 1, the continued pulling of the film strip by the drive and pressure rollers 17 and 18 will cause the film strip portion 4' to laterally shift out of the path of film movement between the idler rollers 14 and 15 and, thence, into abutment against the web cutter blade 24. In this way, severance of the film strip 4 at the film strip portion 4' will be effected as shown in FIG. 2. Such shift of the film strip portion 4' out of the film movement path serves to pivot the lever arm 25 through the intermediary of the idler roller 14, in a counterclockwise direction as viewed in FIGS. 1 and 2, since the pulling force which

is exerted by the drive and pressure rollers 17 and 18 on the film strip 4 is sufficient to overcome the bias of the spring 27. After the film strip 4 is severed at the film strip portion 4', the spring 27 returns the lever arm 25 to the position shown in FIG. 1, and the drive and pressure rollers 17 and 18 continue to rotate so that substantially all but the trailing end portion 8 of the film strip is advanced (without any interruption) between the drive and pressure rollers.

It will be appreciated that although the preferred invention embodiment has been described for use with the film strip 4 and the web roll cartridge 1, such invention embodiment can similarly be used with other kinds of web material and web holders. Moreover, although the preferred invention embodiment includes a single web cutter blade 24, such invention embodiment can be modified to include two separate web cutter blades which are adapted to respectively perform the different web cutting operations shown in FIGS. 2 and 3 and previously described.

The present invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

I claim:

1. In a web handling apparatus adapted for use with web material of a kind (a) which is to be removed from a web holder and (b) which has a trailing end portion anchored to such web holder, the combination comprising:

means for defining a web path;

means for moving successive portions of such web material along said web path from such web holder and, when substantially all but such trailing end portion of the web material is removed from the web holder, for inducing movement of a particular web portion which closely precedes the trailing web end portion out of said web path; and

means, responsive to movement of such particular web portion out of said web path, for severing such web material at the particular web portion.

2. The combination as recited in claim 1, wherein said web severing means includes:

a web cutter blade; and

means disposing said web cutter blade so as to be spaced from such web material which is moved along said web path and so as to interrupt movement of such particular web portion out of said web path.

3. In a web handling apparatus adapted for use with web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to such web holder, the combination comprising:

means for defining a web path;

web severing means;

means disposing said web path and said web severing means in spaced relation; and

means for pulling successive portions of such web material longitudinally along said web path from such web holder and, when substantially all but such trailing end portion of the web material is withdrawn from the web holder, for inducing movement of a particular web portion which closely precedes the trailing web end portion laterally out of said web path and into abutment against

said web severing means to effect severance of the web material at the particular web portion.

4. In a web handling apparatus adapted for use with web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to such web holder, the combination comprising:

means for defining a web path, in which is formed a bend, and for supporting such web material for movement longitudinally along said web path;

means for pulling successive portions of such web material longitudinally along said web path from such web holder and, when substantially all but such trailing end portion of the web material is withdrawn from the web holder, for inducing movement of a particular web portion which closely precedes the trailing web end portion laterally out of said web path at least at said bend;

a web cutter blade; and

means disposing said web cutter blade so as to be spaced from such web material which is pulled longitudinally along said web path and so as to interrupt movement of such particular web portion laterally out of said web path.

5. The combination as recited in claim 4, wherein said web supporting means includes:

an idler roller for supporting such web material;

means mounting said idler roller for synchronous movement with such particular web portion away from said web path; and

means urging said idler roller to a location adjoining said bend in said web path.

6. In a web handling apparatus adapted for use with flexible web material having a longitudinal axis, the combination comprising:

means for defining a web path and for supporting such web material, in either of first and second oppositely twisted senses about its longitudinal axis, for movement along said web path;

means for moving such web material, in either of said first and second twisted senses, longitudinally along said web path;

web severing means; and

means disposing said web severing means so as to be spaced from such web material moving in said first twisted sense along said web path and so as to sever such web material moving in said second twisted sense along said web path.

7. The combination as recited in claim 6, wherein said web severing means includes:

a web cutter blade; and

means mounting said web cutter blade so as to be stationary with respect to such web material moving in either of said first and second twisted senses along said web path.

8. The combination as recited in claim 6, wherein said web supporting means includes:

two rollers for supporting such web material for movement along said web path and individually having separate roller axes of rotation; and

means mounting said rollers respectively at different spaced locations adjoining said web path and in a manner disposing said roller axes of rotation in nonintersecting, nonparallel relation.

9. The combination as recited in claim 8, wherein said web severing means includes:

a web cutter blade; and

means mounting said web cutter blade at a location generally between said two rollers.

10. In a web handling apparatus adapted for use with flexible web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to such web holder and a free leading end portion, the combination comprising:

means for withdrawing such web material, in either of first and second different orientations, from such web holder; and

means for severing such leading web end portion from a remainder of such web material at such web holder, when the web material is initially withdrawn in said second orientation from the web holder, and for severing such web material from such trailing web end portion, when the web material is substantially completely withdrawn in said first orientation from such web holder.

11. In a web handling apparatus adapted for use with flexible web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to such web holder and a free leading end portion, the combination comprising:

means for defining a web path and for guiding such web material, in either of first and second different orientations, for movement along said web path;

means for pulling such web material, in either of said first and second orientations, along said web path from such web holder and, when substantially all but such trailing end portion of the web material is withdrawn from the web holder, for inducing movement of a particular web portion which closely precedes the trailing web end portion out of said web path; and

means for severing such leading web end portion from a remainder of such web material at such web holder, when the web material is initially pulled in said second orientation along said web path, and for severing such web material at such particular web portion, when the web material is pulled in said first orientation along said web path and the particular web portion is moved out of said web path.

12. In a web handling apparatus adapted for use with flexible web material of a kind (a) which is to be withdrawn from a web holder and (b) which has a trailing end portion anchored to such web holder, a free leading end portion and a longitudinal axis, the combination

comprising:

means for defining a web path and for supporting such web material, in either of first and second oppositely twisted senses about such longitudinal web axis, for movement longitudinally along said web path;

means for pulling such web material, in either of said first and second twisted senses, longitudinally along said web path from such web holder and, when substantially all but such trailing end portion of the web material is withdrawn from the web holder, for inducing movement of a particular web portion which closely precedes the trailing web end portion laterally out of said web path; and

means for severing such leading web end portion from a remainder of such web material at such web holder, when the web material is initially pulled in said second twisted sense longitudinally along said web path, and for severing such web material at the particular web portion, when the web material is pulled in said first twisted sense longitudinally along said web path and the particular web portion is moved laterally out of said web path.

13. The combination as recited in claim 12, wherein said web severing means includes:

a web cutter blade; and

means disposing said web cutter blade so as to be spaced from such web material which is pulled in said first twisted sense longitudinally along said web path, so as to sever such web material which is pulled in said second twisted sense longitudinally along said web path, and so as to interrupt movement of said particular web portion laterally out of said web path.

14. The combination as recited in claim 13, wherein said web supporting means includes:

two rollers for supporting such web material for movement longitudinally along said web path and individually having separate roller axes of rotation; and

means mounting said rollers respectively at different spaced locations adjoining said web path and in a manner disposing said roller axes of rotation in nonintersecting, nonparallel relation, and wherein said web severing means further includes:

means mounting said web cutter blade at a location generally intermediate said two rollers.

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