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[54] **SMOKELESS CUT-OFF BLADE FOR PLASTIC WRAPPING FILM**

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[52] **U.S. Cl.** **83/16**, 83/171, 53/390

[51] **Int. Cl.** **B26f 3/12**

[58] **Field of Search** 53/390, 389; 83/171, 83/16

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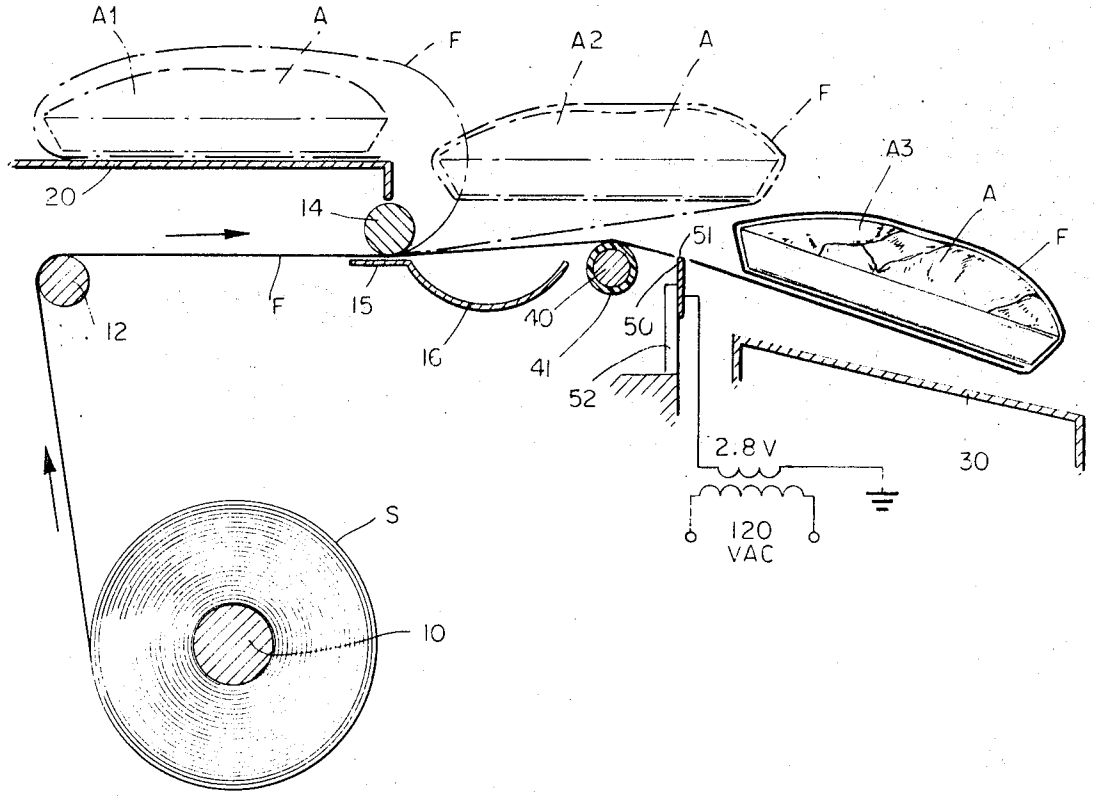
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[57] **ABSTRACT**

In wrapping machinery for wrapping articles in heat-sealable plastic film, such as polyvinylchloride (PVC), a web of film is drawn from a supply roll and is severed by pulling the film under tension downwardly onto the narrow edge of an electrically heated blade to melt the film material along a thin transverse line, and permit severance thereof by pulling, without generating toxic fumes. The blade has sufficient width and sufficient cross-sectional area to store a quantity of heat capable of replenishing instantly the heat lost at the narrow edge of the blade when the film is contacted and melted, thereby maintaining substantially constant the temperature at the blade edge. The temperature at the blade edge is sufficiently high to melt the film material but not high enough to decompose the film and generate toxic fumes.

2 Claims, 3 Drawing Figures



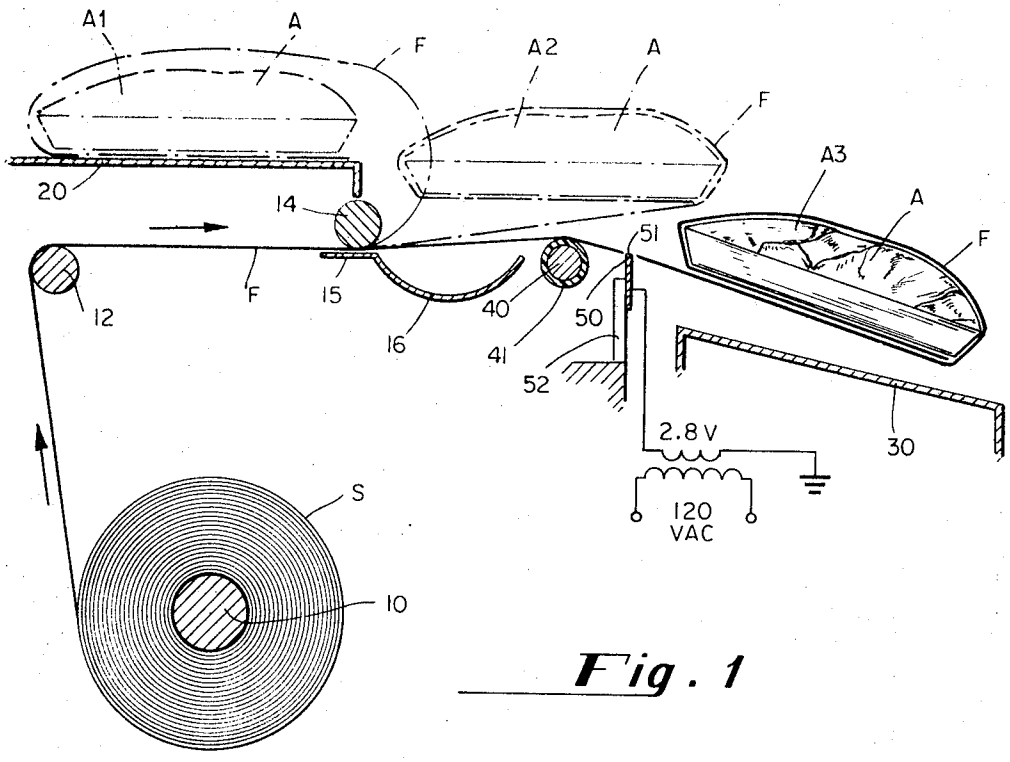


Fig. 1

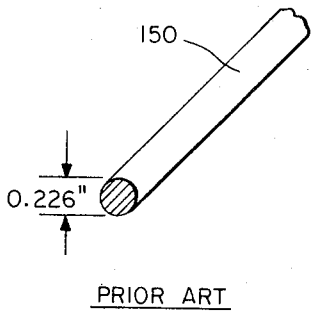


Fig. 3

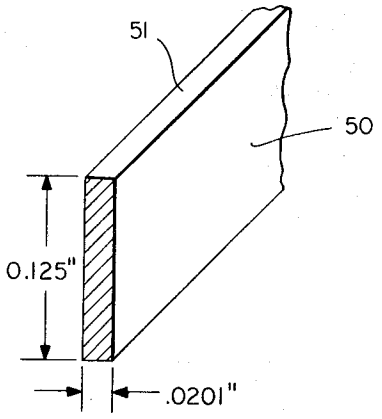


Fig. 2

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SMOKELESS CUT-OFF BLADE FOR PLASTIC WRAPPING FILM

BACKGROUND OF THE INVENTION

The present invention relates to wrapping machinery for wrapping, or for assisting an attendant to wrap, articles in heat-sealable plastic film. Such wrapping machinery is used primarily in supermarkets to wrap meats, vegetables, fruits, and the like prior to placing such items in the display counters. Wrapping machinery of the type herein involved is shown in a number of prior art patents, one of which is U.S. Pat. No. 3,043,071 issued to George W. Sadel, July 10, 1962 and assigned to the assignee of the present application.

In wrapping apparatus of the type being discussed, a web of plastic film is drawn from a supply roll by the attendant and is wrapped in tubular fashion around the article. The web of film is then severed from the supply roll by a hot wire, which in the prior art apparatus is a small-diameter wire of circular cross-section. In a typical prior art case, the hot wire may be No. 23 guage Nichrome wire having a diameter of 0.0226 inch. Because of the small cross-sectional area of the hot wire, the quantity of heat stored therein is small and the prior art has found it necessary to operate the wire at a high temperature of the order of 700° F in order to effect satisfactory severance of the film. This high temperature was found to be necessary because the temperature of the small diameter hot wire drops rapidly upon contact with the film, and unless the initial temperature is high, for example 700° F, insufficient heat is available to sever the film. It has been found, however, that the use of a temperature as high as 700° F has the effect of decomposing the material of the film and causing toxic fumes to be generated and emitted.

Because of the problem mentioned above, and to avoid the generation of toxic fumes, the prior art has turned to cold cutters having serrated or other knife edges for severing the web of plastic film. However, cold cutting of the web also introduces problems.

SUMMARY OF THE INVENTION

A principal object of the present invention is to provide, in wrapping machinery of the type described, means for severing the web of film from the supply roll without generating toxic or objectionable fumes, and without employing cold knives or cutters.

The foregoing object is achieved, in accordance with the present invention, by providing an electrically heated blade of sufficient cross-sectional area to store a quantity of heat so that it is able to function as a reservoir of heat to replace that lost at the edge of the blade during severance of the film. The narrow edge of the blade contacts the film to melt the plastic along a thin transverse line to allow severance thereof under tension. The blade is heated to the relatively low temperature of 325° – 350° F, which is too low to generate objectionable or toxic fumes. Due to the fact that the blade is functioning as a reservoir or supply of instant heat, the edge of the blade is maintained at a substantially constant temperature throughout the cutting period, and the quantity of of heat thus available at the blade edge is sufficient to quickly melt the film along a thin transverse line so as to permit severance by pulling under tension.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagramatic side elevational view, partly in section, illustrating the film-severance means provided by the present invention;

FIG. 2 is a fragmentary view in cross section of the cutter blade;

FIG. 3 is a fragmentary view of the prior art heater wire.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, a supply S of plastic film F is shown supported on a shaft **10** in a wrapping machine. The wrapping machine may be similar to the types of wrapping machine known and used in the prior art for the purposes described hereinbefore. The article A which is to be wrapped in shown in phantom in a first position identified **A1**, from which it is pulled by the operator to a second position identified **A2**, also shown in phantom, and then to a third position **A3**, shown in solid line.

The film F from the supply roll S is guided over a guide bar or roller **12**, and then under a guide bar or roller **14** supported just bove a shelf **15** having a finger well **16** in which the end of the supply film rests after severance.

The position occupied by the operator during the wrapping operation is at the front of the machine, which is to the right of the support pedestal **30**. An electrically heated cutter blade **50** is provided just behind the pedestal **30**. Blade **50** is supported against downward forces by support members **52** secured to the frame of the machine. Blade **50** may preferably be rectangular in cross section. Just behind blade **50** is a film restraining rod **40** which is covered with a material **41** having a high coefficient of friction to plastic wrapping film.

In operation, the operator, standing at the front of the machine, which is just to the right of the pedestal **30**, as viewed in FIG. **1**, places an article A on the prewrap support rest **20**. He then picks up the end of the film F in pickup well **16** and pulls the film F toward the front of the machine to withdraw film from the supply roll S. He then overwraps the article A as indicated in phantom at the position indicated A1 in FIG. **1**. He then pulls the overwrapped article A from position A1 toward position A2 and in so doing additional film is pulled from the supply roll S. In position A2, the film F is above the film restraining rod **40** but not in contact therewith. The operator continues to draw the overwrapped article forwardly to a position above the solid line position identified as A3,. He then moves it downwardly toward the pedestal **30**, to the solid line position A3. When the article is moved downwardly, the web of film leading from the underside of the package A back toward the supply roll S comes into contact with the frictional material **41** which covers the film restraining rod **40**, and the film is restrained at the rod **40** against further forward movement. The short length of film web between the rod **40** and the underside of the article A becomes taut, and as the package is lowered further the taut section of film comes into contact with the upper edge **51** of the blade **50** and the plastic material of the film along a narrow line corresponding to the edge **51** of the blade is quickly raised to its melting temperature and the film parts along this line due to the

tension on the film between the bottom of the package and the restraining rod **40.** The end of the web of film on the supply side of the parting then retracts under the tension into the pickup well **16,** where the film end is ready to be picked up for the next wrapping.

When the film contacts the blade **50,** heat is taken away from the edge **51** by the unheated plastic film F, but heat stored in the remainder of the blade **50** flows quickly into the edge **51,** to replenish instantly the heat taken away.

By the means, and in the manner just described, the plastic film F is severed, using a relatively low temperature at the blade **50.** This temperature, which may be of the order of 325° – 350° F, is sufficiently high to melt the plastic material but is not high enough to convert plastic to a gaseous state. Thus, the generation of objectionable or toxic fumes is avoided.

FIGS. **2** and **3** of the drawing represent a comparison of the cross-sectional areas of the prior art hot wire identified as **150** and the cutter blade **50** provided by the present application. A typical prior art heater wire **150** is No. 23 gauge Nichrome. This has a diameter of 0.0226 inch. In contrast thereto, the blade **50** may desirably have a thickness of 0.0201 inch and a width of 0.125 inch, or about six times the thickness. These dimensions are, of course, not limiting. The important thing is to provide a blade **50** having sufficient body area to store a sufficient quantity of heat to replenish instantly the heat taken away from the edge **51** during contact with the film F, without permitting the temperature of the edge **51** to drop to any significant extent.

In accordance with the present invention, a typical heater blade **50** may comprise a flat resistance wire comprised of 59.2 percent nickel, 16.0 percent chromium, 23.5 percent iron and 1.3 percent silicon. The cross section of the flat resistance wire or heater blade **50** may be as indicated in FIG. **2** of the drawing, namely, 0.0201 inches thick and one-eighth inch wide. The length of the blade **50** may be 21.750 inches. The blade **50** may be operated at an operating temperature of 325° – 350° F by causing a current of 6.8 amperes to flow therethrough from a 2.8-volt AC source.

Rod **40** may be a round steel rod having a diameter of three-eighths inch and covered with a synthetic material **41** which has a high coefficient of friction with regard to plastic wrapping films. A presently preferred covering **41** is hot-dipped polyvinylchloride.

It will be seen that, in contrast to the prior art technique of severing the film by decomposition, that is, converting the film from a solid plastic into a gaseous state, the technique employed in the present invention is that of raising the temperature of the plastic film to its melting point and then causing the web of film to part because the web is under tension. In a typical wrapping machine according to the present invention, the frictional restraining rod **40–41** is located about three-fourths inch behind the blade **50.**

Tests have shown that polyvinylchloride film begins to melt at about 300° F. As the temperature is raised to the vicinity of 375° F, the polymers of the film boil out, and obnoxious but non-toxic gases are generated. As the temperature is increased still further, to the vicinity of 400° F, the polyvinylchloride begins to decompose and toxic hydrochloric acid (HCL) fumes are emitted to the surrounding area. As the temperature is increased still further, greater and greater percentages of HCL fumes are generated and emitted.

We claim:

1. A method of severing an end section of heat-sealable plastic web film from a supply after overwrapping an article in an end section thereof, said method including the steps of:

a. holding the film under longitudinal tension between the overwrapped article and a restraining line located a short distance from the article toward the film supply; and

b. subjecting said tensioned web of film to a sufficient supply of heat to maintain substantially constant temperature along a thin line transverse of said web during the entire severing operation, said thin transverse line being located between said restraining line and said overwrapped article, said substantially constant temperature being sufficiently high to melt said film to allow parting thereof under said tension but not sufficiently high to create fumes.

2. In wrapping machinery for wrapping articles in heat-sealable film, the combination of:

a. a supply of plastic web film; and

b. means for severing an end section of film from the supply without generation of objectionable fumes by melting said film along a thin line transverse to the web while said web is under longitudinal tension to cause said web to part along the melt line, said means including:

b–1. a fixed heater blade of electrical resistance material, said blade being rectangular in cross section having a width at least five times its thickness, to provide a storage body for storing a quantity of heat to replenish instantly heat removed when the film is moved into contact with the edge of the blade to melt the film;

b–2. a film restraining rod located on the film supply side of said heater blade and spaced a short distance therefrom, said film restraining rod having a frictional surface adapted to offer substantial resistance to movement of the web of film thereacross, thereby to place in tension the film beyond the restraining rod in the direction of movement of the film; and

b–3. means for heating said heater blade to a temperature sufficiently high to melt said film but not sufficiently high to cause the film material to decompose and emit fumes, said temperature being not in excess of 350°.

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