US006878103B2

(12) **United States Patent**
Ackermann

(10) **Patent No.: US 6,878,103 B2**
(45) **Date of Patent: Apr. 12, 2005**

(54) **CONTROLLING CUTS IN AN INNER LINER FOR A GROUP OF CIGARETTES**

(75) Inventor: **Gunter Ackermann**, Bischofsgrun (DE)

(73) Assignee: **R. J. Reynolds Tobacco Company**, Winston-Salem, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 27 days.

(21) Appl. No.: **10/329,875**

(22) Filed: **Dec. 26, 2002**

(65) **Prior Publication Data**

US 2003/0123068 A1 Jul. 3, 2003

(30) **Foreign Application Priority Data**

Dec. 27, 2001 (DE) ..... 201 20 977 U

(51) **Int. Cl.**[7] **B31B 1/00**

(52) **U.S. Cl.** **493/13**; 493/14; 493/16; 493/18

(58) **Field of Search** 493/13, 14, 15, 493/16, 17, 18; 250/548, 202

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,137,528	A *	1/1979	Traise	340/675
4,682,038	A *	7/1987	Focke	250/548
4,813,288	A *	3/1989	Gamberini	73/865.8
4,899,765	A	2/1990	Davis et al.	
5,664,026	A *	9/1997	Neri et al.	382/143
5,674,347	A *	10/1997	Edwards et al.	156/351
5,800,325	A *	9/1998	Wilkes	493/22
5,807,222	A *	9/1998	Totani	493/22
5,970,682	A *	10/1999	Focke et al.	53/53
6,253,817	B1 *	7/2001	Edwards et al.	156/351
6,264,591	B1 *	7/2001	Keen et al.	493/4
6,726,612	B1 *	4/2004	Bodolay	493/213

FOREIGN PATENT DOCUMENTS

DE	3341539	A1	5/1985
DE	3700928	A1	7/1987
DE	196 07 215	A1	8/1997
DE	197 43 984	A1	4/1999
DE	198 59 949	A1	6/2000
EP	0 677 444	A1	4/1995

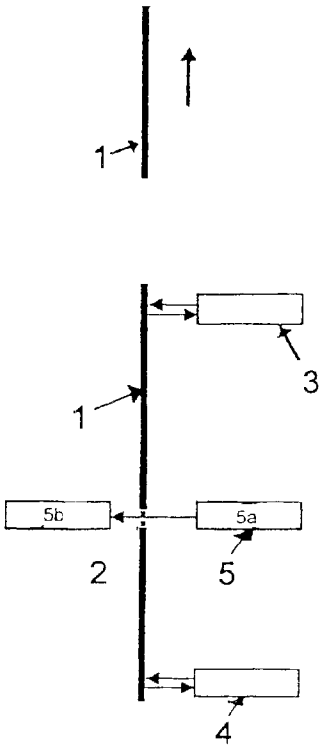
* cited by examiner

Primary Examiner—Sameh H. Tawfik
(74) *Attorney, Agent, or Firm*—John F. Salazar; Middleton Reutlinger

(57) **ABSTRACT**

A device for controlling at least one cut in an inner liner for a group of cigarettes in a cigarette packaging machine comprises at least one optical detector consisting of a light source and a sensor.

3 Claims, 3 Drawing Sheets



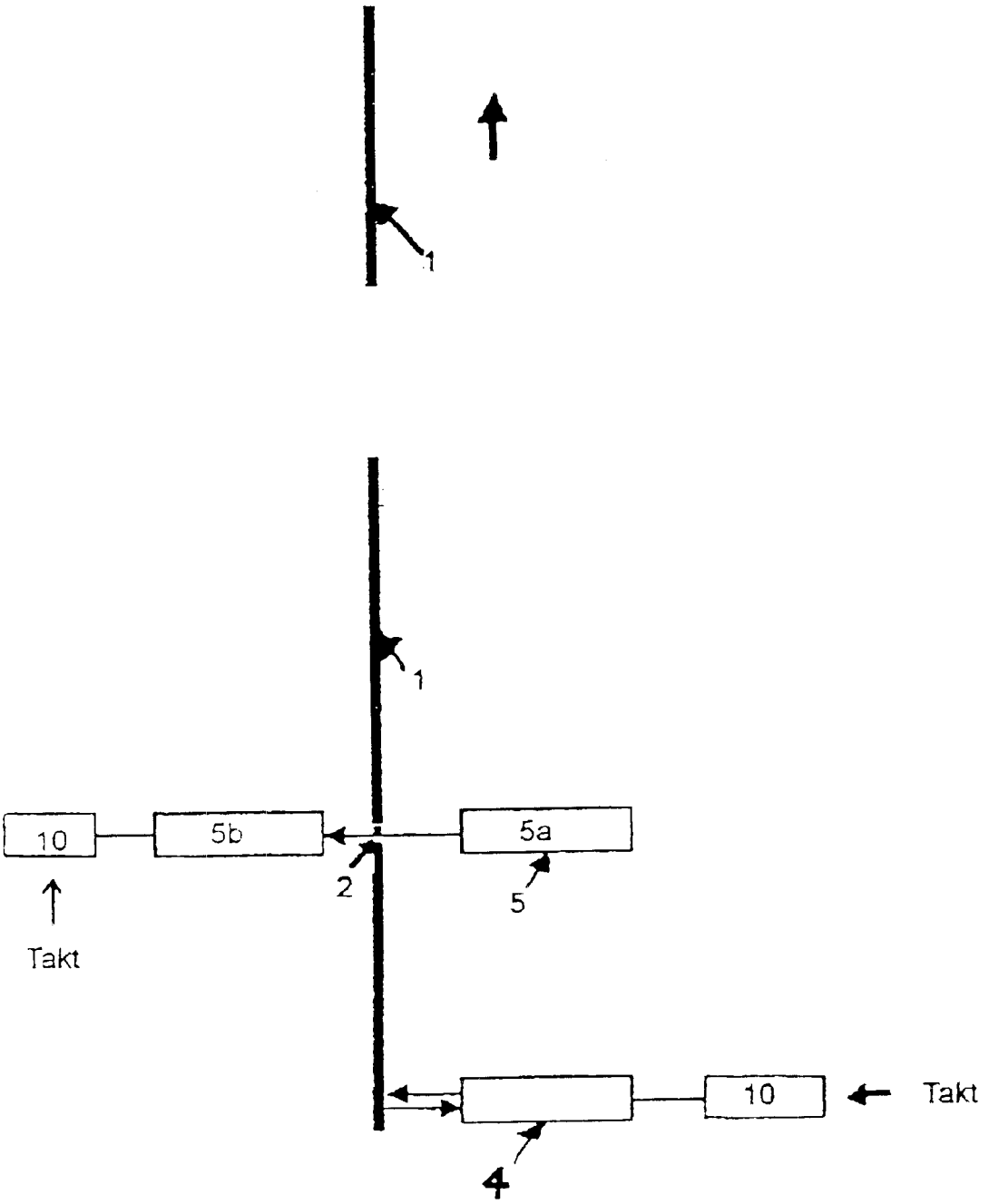


FIG. 1

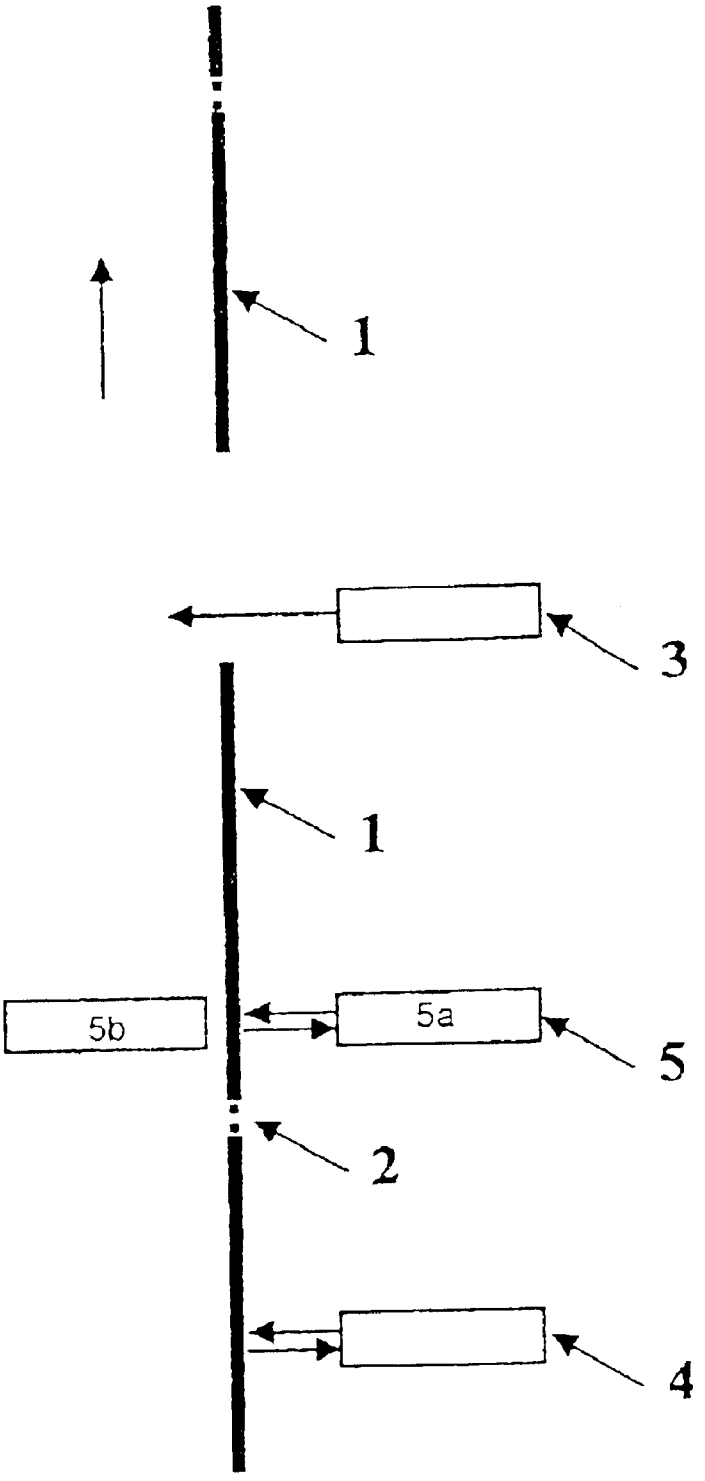


FIG. 2

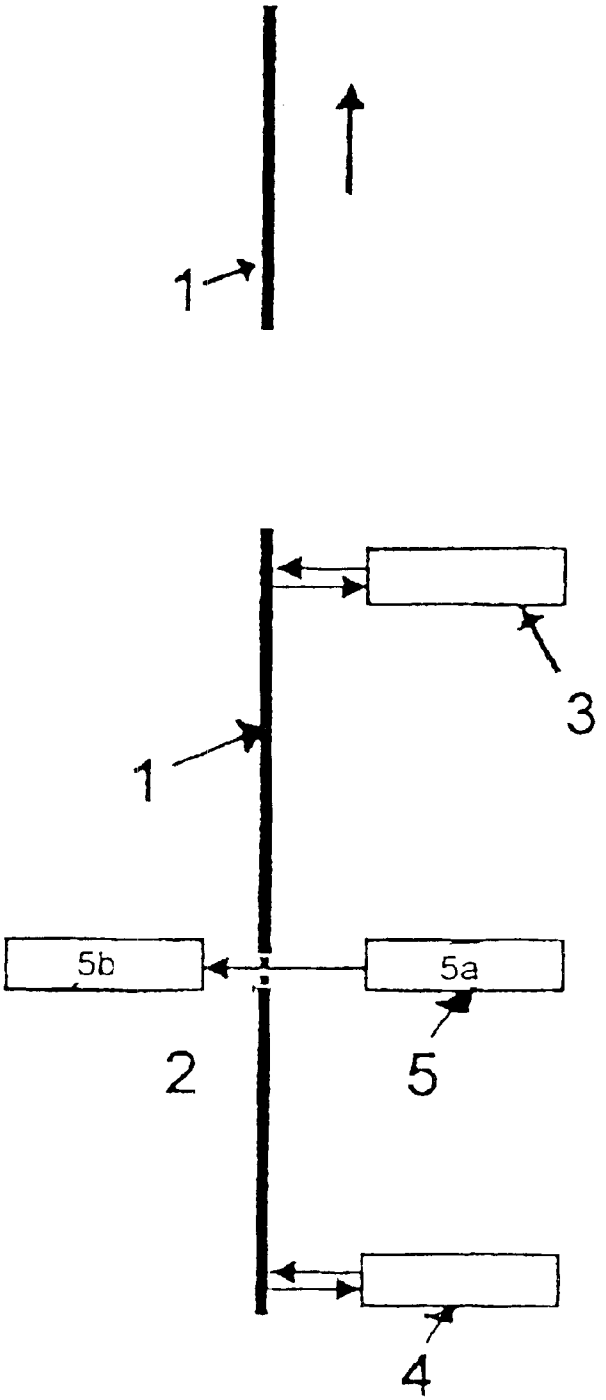


FIG. 3

CONTROLLING CUTS IN AN INNER LINER FOR A GROUP OF CIGARETTES

CROSS-REFERENCE TO PRIOR APPLICATIONS

This application claims priority to German Utility Model Application No. 201 20 977.2, filed on Dec. 27, 2001, which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present relates to a device for controlling at least one cut in an inner liner for a group of cigarettes on a cigarette packaging machine.

When packaging cigarettes in flip-lid packets, the cigarettes are wrapped in an inner wrapping, the so-called inner liner, and the flip-lid packet is wrapped around said wrapped group of cigarettes by the packaging machine.

The inner liner can consist of printed paper, metallized paper or other suitable, strip-shaped materials. These materials are drawn off at the packaging machine from a bobbin and cut to the appropriate length. Before the inner liner is wrapped around the cigarettes, the inner liner is often subjected to impressing, printing or other processing. One of these possible processing steps is to deliberately cut into the inner liner to create desired separation points which allow the smoker, when opening the packet for the first time, to tear out a section of the inner liner in the area of this opening and thus reach the cigarettes.

If these cuts in the inner liner are not carried out properly, then access to the cigarettes is made more difficult and it is no longer possible to easily remove the packaging from around the cigarettes.

Hitherto, these cuts in the inner liner have not been controlled, rather it has only been established from test samples of finished cigarette packets that the inner liner has not been correctly cut. The machine then has to be re-adjusted and the cigarette packets having an incorrectly cut inner liner are disposed of and not released into the market.

Since several thousand defective cigarette packets are often manufactured until, by random sampling, a defective cigarette packet has been detected, a technique has been sought to verify on-line, i.e. while the cigarettes are packaged, that the cuts in the inner liner are correct.

SUMMARY OF THE INVENTION

The Invention is therefore based on the object of providing a device for controlling cuts In an inner liner, which on the one hand responds fast enough to be used on-line, and on the other reliably establishes that the cuts are correct.

The advantages achieved by the invention are based on the use of an optical detector, integrated into the conveying section for an inner liner in the packaging machine, comprising a light source and a sensor which is arranged on the conveying section of the inner liner and can detect both cuts running along the transport direction of an inner liner, which are thus present in the detection area for a long time, and cuts running perpendicular to the transport direction, which thus result in only a brief response of the optical detector.

In principle, such an optical detector can operate using reflection or transmission, a transmission detector being preferred since, as mentioned above, the inner liner is often metal-coated and thus has a certain reflective effect. This makes detecting a clear detection signal more difficult when using a reflective optical detector.

Since the inner liners which are transported past the optical detector are separated by a gap which the optical detector could identify as a cut without further measures, the detector or the sensor in the embodiment using a single detector is coupled to the conveying speed for transporting the inner liner. Thus, the optical detector can only respond when it is established, on the basis of the conveying speed, that an inner liner is actually being transported past the optical detector. Therefore, a cut is present when an inner liner is being transported past the detector, and not a gap between two inner liners, when the amount of light falling on the sensor changes significantly.

It is not important here whether the cuts in the inner liner run parallel or perpendicular to the transport direction, since both cases can be detected and indicated by coupling the sensor to the conveying speed of the inner liner.

It has proven expedient if, when an inner liner with an incorrect cut is ascertained, an indication signal is generated and an error message is outputted to the packaging line, such that for example said inner liner which has been ascertained as defective is removed from the production line and ejected as waste.

As an alternative to the described embodiment comprising a single optical detector, two optical detectors can also be used, arranged sequentially in the conveying direction of the inner liner and at a distance from each other. This distance is smaller than the length of the individual inner liner in the transport direction.

In this case, coupling to the conveying speed of the inner liner is no longer required, since a correct cut in the inner liner can be established when both optical detectors simultaneously respond, i.e. one optical detector establishes the presence of the inner liner and the other optical detector establishes the presence of a cut.

The two optical detectors therefore have to be arranged at a distance from each other, the distance being smaller than the length of the inner liner in the transport direction.

Also for avoiding detection errors, it is expedient if the two optical detectors are based on different detection principles, i.e. one operates using transmission and the other operates using reflection.

Particularly good results have been achieved in experiments on a cigarette packaging machine comprising three optical detectors which are arranged sequentially in the transport direction of the inner liner at a distance from each other such that the largest distance between two optical detectors is smaller than the length of the inner liner in the transport direction.

The middle optical detector then expediently operates using transmission, while the two outer ones operate using reflection.

In this case, an inner liner is judged to be "cut" if all three optical detectors output a signal.

In principle, it is possible for the central optical detector to constantly be in operation, or to only be switched on when the two outer optical detectors respond to the presence of the inner liner.

In this case, the position of the optical detectors relative to each other and the dimensions of the inner liner being transported by the detectors are crucial. This also enables the device to be easily adapted to changing packet formats and therefore also inner liner dimensions and to a changing position of the cuts by correspondingly adjusting the optical detectors in the conveying direction of the inner liner.