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(54) CIGARETTE PAPER TESTING APPARATUS AND ASSOCIATED METHOD

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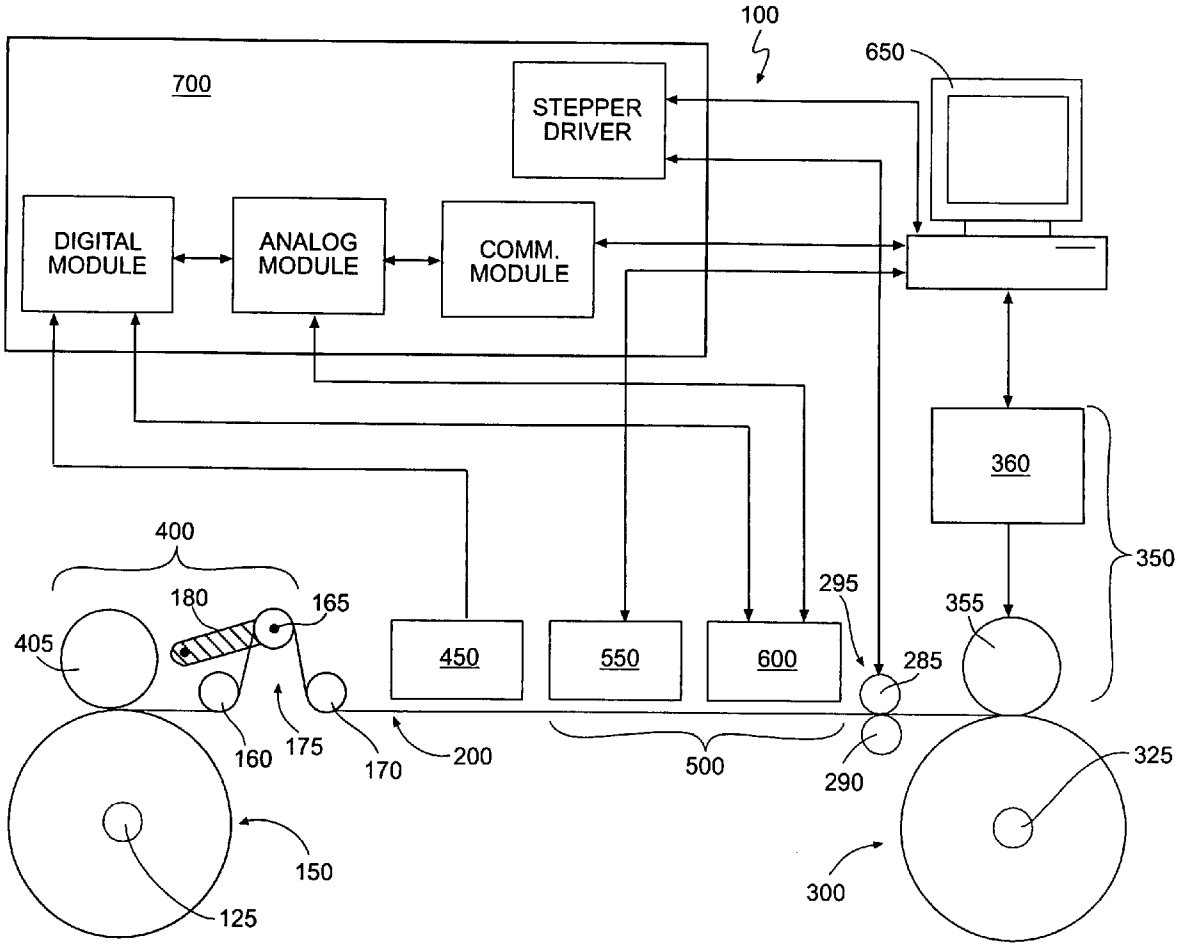
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(57) **ABSTRACT**

An apparatus adapted to examine a length of a cigarette paper is provided. The paper includes a pattern having a first and a second band, the pattern repeating along the length thereof. A second bobbin is configured to have the paper advanced thereto and wound thereon after the paper is unwound from a first bobbin. A pattern detection device is disposed between the first and second bobbins, and is configured to detect at least one of the bands and produce a signal in response thereto. A testing device is in communication with the pattern detection device and is disposed between the first and second bobbins. The testing device is configured to nondestructively determine a property of at least one of the bands in response to the signal. An associated apparatus, system, and method are also provided.



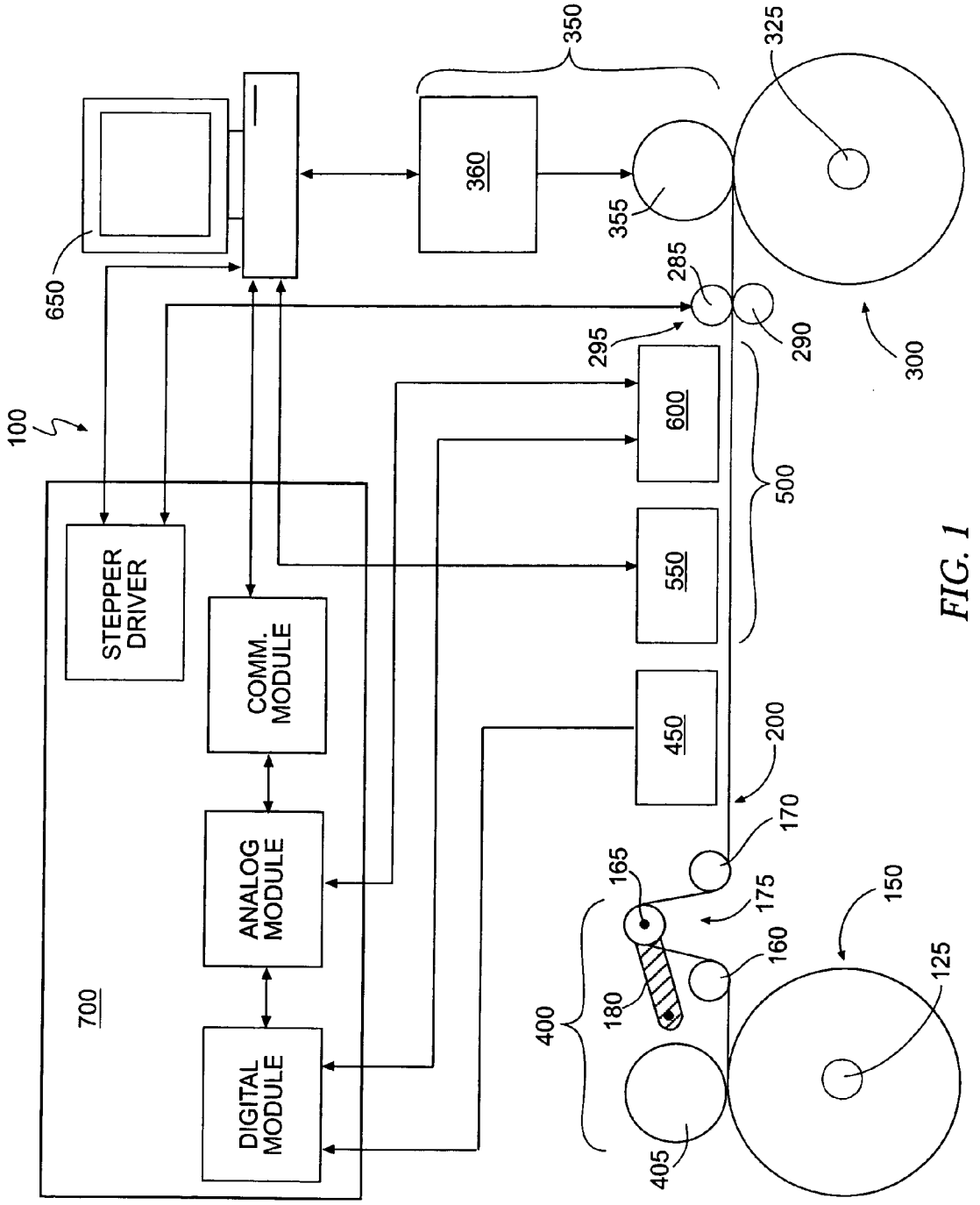

350
325
360
355
650
285
295
290
300
100
600
500
STEPPER DRIVER
COMM. MODULE
550
450
200
170
165
175
150
160
125
ANALOG MODULE
180
400
700
DIGITAL MODULE
405

FIG. 1

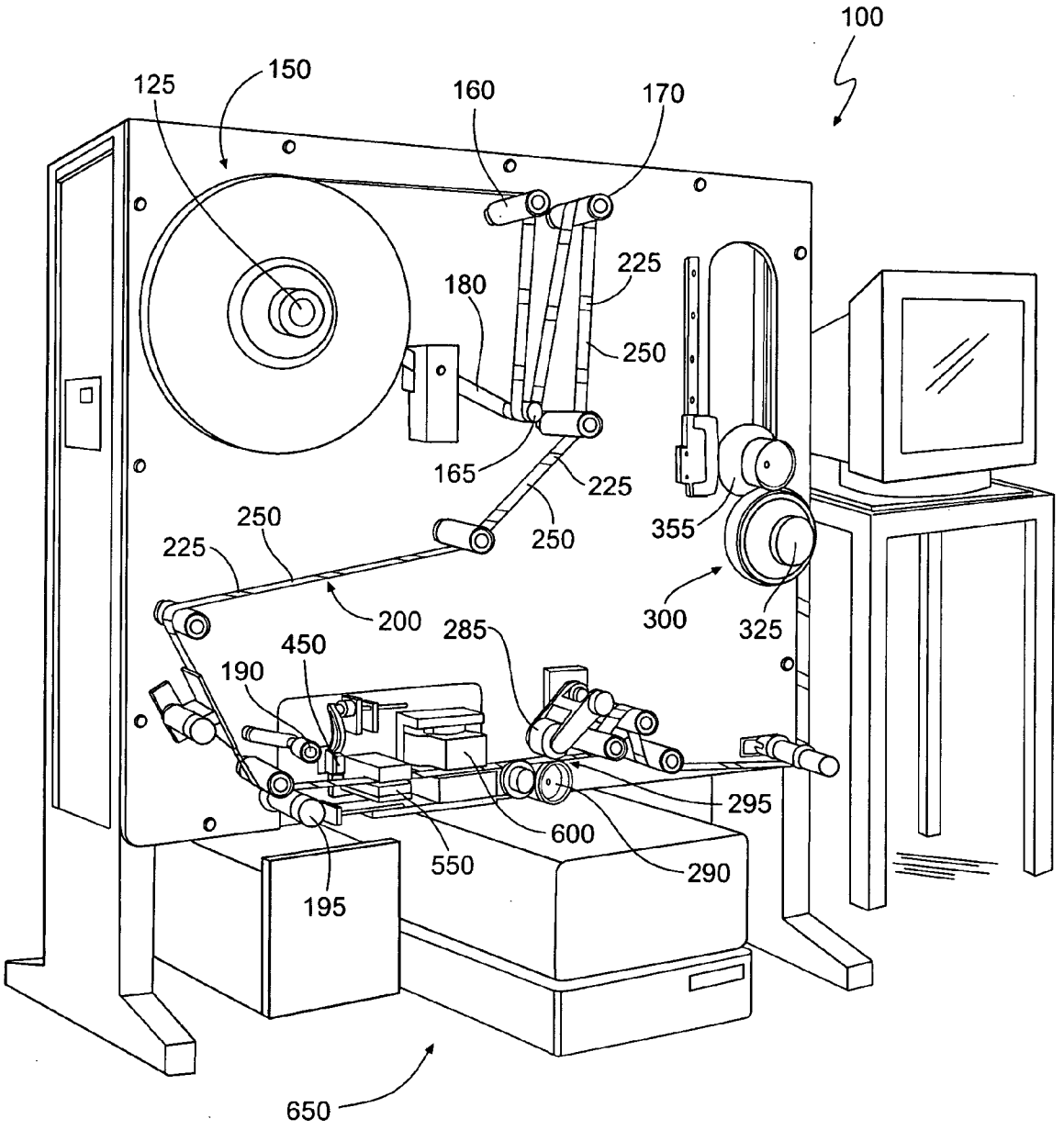

100
125
150
160
170
180
225
250
165
225
250
225
250
355
200
300
325
285
450
190
295
600
550
290
195
650

FIG. 2

CIGARETTE PAPER TESTING APPARATUS AND ASSOCIATED METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to smoking articles and, more particularly, to an apparatus for examining a length of a paper material suitable for use as a component of such a smoking article, preferably in a nondestructive manner, whereafter the paper material can be used to manufacture the smoking article.

[0003] 2. Description of Related Art

[0004] Popular smoking articles, such as cigarettes, have a substantially cylindrical rod shaped structure and include a charge, roll or column of smokable material such as shredded tobacco (e.g., in cut filler form) surrounded by a paper wrapper thereby forming a so-called "tobacco rod." Normally, a cigarette has a cylindrical filter element aligned in an end-to-end relationship with the tobacco rod. Typically, a filter element comprises plasticized cellulose acetate tow circumscribed by a paper material known as "plug wrap." Certain cigarettes incorporate a filter element having multiple segments, and one of those segments can comprise activated charcoal particles. Typically, the filter element is attached to one end of the tobacco rod using a circumscribing wrapping material known as "tipping paper." It also has become desirable to perforate the tipping material and plug wrap in order to provide dilution of drawn mainstream smoke with ambient air. A cigarette is employed by a smoker by lighting one end thereof and burning the tobacco rod. The smoker then receives mainstream smoke into his/her mouth by drawing on the opposite end (e.g., the filter end) of the cigarette.

[0005] Numerous references propose various types of cigarettes possessing various types of paper wrapping materials. See, for example, U.S. Pat. No. 1,909,924 to Schweitzer; U.S. Pat. No. 4,489,650 to Weinert; U.S. Pat. No. 3,030,963 to Cohn; U.S. Pat. No. 4,146,040 to Cohn; U.S. Pat. No. 4,489,738 to Simon; U.S. Pat. No. 4,615,345 to Durocher; U.S. Pat. No. 4,607,647 to Dashley; U.S. Pat. No. 5,060,675 to Milford et al.; U.S. Pat. No. 4,924,888 to Perfetti et al.; U.S. Pat. No. 5,143,098 to Rogers et al.; U.S. Pat. No. 4,998,543 to Goodman; U.S. Pat. No. 5,220,930 to Gentry; and U.S. Pat. No. 5,271,419 to Arzonico et al. Some paper wrapping materials are so-called "banded papers" and possess segments defined by the composition, location and properties of the various materials within those wrapping materials. Numerous references contain disclosures suggesting various banded wrapping material configurations. See, for example, U.S. Pat. No. 1,996,002 to Seaman; U.S. Pat. No. 2,013,508 to Seaman; U.S. Pat. No. 4,452,259 to Norman et al.; U.S. Pat. No. 5,417,228 to Baldwin et al.; U.S. Pat. No. 5,878,753 to Peterson et al., U.S. Pat. No. 5,878,754 to Peterson et al.; and U.S. Pat. No. 6,198,537 to Bokelman et al.; U.S. Patent Application Publication No. 2003/0131860 to Ashcraft et al.; and PCT WO 02/37991. Methods for manufacturing banded-type wrapping materials also have been proposed. See, for example, U.S. Pat. No. 4,739,775 to Hampl, Jr.; U.S. Pat. No. 5,474,095 to Allen et al.; and PCT WO 02/44700 and PCT WO 02/055294. Some references further describe banded papers having segments of paper, fibrous cellulosic material, or particulate material adhered to a paper web. See, for example, U.S. Pat. No. 5,191,906 to Myracle, Jr.; U.S. Pat. No. 5,263,999 to Baldwin et al.; U.S. Pat. No. 5,417,228 to Baldwin et al.; and U.S. Pat. No. 5,450,863 to Collins et al.; and U.S. Patent Application Publication No. 2002/0092621 to Suzuki. In addition, some references describe apparatuses and method for inspecting such papers and wrapping materials, some of which may be capable of operating in an automated and/or high speed process. See, for example, U.S. Pat. No. 4,845,374 to White et al.; U.S. Pat. No. 5,966,218 to Bokelman et al.; U.S. Pat. No. 6,020,969 to Struckhoff et al.; and U.S. Pat. No. 6,198,537 to Bokelman et al.; U.S. Patent Application Publication Nos. 2003/0145869 and 2003/0150466 to Kitao et al., and **2003/0197126** to Sato et al.; and U.S. patent application Ser. Nos. 10/645,996, filed Aug. 22, 2003, and Ser. No. 10/665,066, filed Sep. 17, 2003.

[0006] Since certain properties are often required to provide the desired burn characteristics and/or other characteristics of such wrapping materials and since consistency between individual paper wrappers for a particular product is also desired, it has been desirable, if not necessary, to determine certain physical properties or characteristics of wrapping materials for smoking articles. For example, techniques for measuring the air permeability or porosity of such wrapping papers, as well as the diffusion of gases, such as carbon monoxide, through such wrapping papers, have been developed. For example, the CORESTA method (CORESTA Publication ISO/TC0126/SC I Ni **59**E (1986)) details a procedure for measuring air flow through paper with a specified pressure differential across the paper. Further, for example, Drake et al. (D. G. Drake, D. S. Riley, R. R. Baker and K. D. Kilburn, *On a Cell to Measure Diffusion Coefficients of Gases Through Cigarette Papers*, Int. J. Heat and Mass Transfer, 23 (1980) 127-134) describe a procedure for direct measurement of paper diffusion coefficients. In addition, U.S. Pat. No. 4,615,345 to Durocher proposes an indirect and destructive sample test producing results asserted to be proportional to paper diffusion coefficients.

[0007] It would be desirable, therefore, to nondestructively measure certain physical properties or characteristics of wrapping papers, such as those used for the manufacture of smoking articles. It would also be desirable to expeditiously determine the particular characteristic of the tested sample of the wrapping paper and, in some instances, to have the capability to perform regular or random evaluations of the paper wrappers in an automated fashion. Further, such an apparatus and method should desirably be nondestructive to the paper wrapper, applicable to a small area of the paper wrapper (sample), cost and time effective, and capable of being implemented in an environmentally friendly manner.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention, in one aspect, provides an apparatus adapted to examine a length of a cigarette paper comprising a first pattern (e.g. band) and a second pattern (e.g. band), with the patterns repeating along the length thereof. Such an apparatus comprises a second bobbin capable of receiving the cigarette paper, and to have the cigarette paper advanced thereto and wound thereon, after the cigarette paper is unwound from a first bobbin. A pattern (e.g. band) detection device is disposed between the first and second bobbins, wherein the pattern detection device is configured to detect at least one of the patterns and produce

a signal in response thereto. A testing device is in communication with the pattern detection device and is disposed between the first and second bobbins. Preferably, the testing device is configured to nondestructively determine a property of at least one of the patterns in response to the signal.

[0009] Another aspect of the present invention relates to a system for examining a cigarette paper and manufacturing a cigarette therefrom. Such a system includes a cigarette manufacturing device configured to manufacture the cigarette from a length of the cigarette paper. The cigarette paper is patterned, for example, with a first band and a second band, with the bands repeating along the length thereof. A cigarette paper testing apparatus is adapted to determine a property of at least one of the bands of the cigarette paper before the cigarette paper is used to manufacture the cigarette, and includes a second bobbin configured to be capable of receiving the cigarette paper and to have the cigarette paper advanced thereto and wound thereon after the cigarette paper is unwound from a first bobbin. The second bobbin is further configured to be received by the cigarette manufacturing device so as to provide the cigarette paper thereto. A pattern detection device is disposed between the first and second bobbins. The pattern detection device is configured to detect at least one of the patterns (e.g. bands) and produce a signal in response thereto. A testing device is in communication with the pattern detection device and is disposed between the first and second bobbins. Preferably, the testing device is configured to nondestructively determine a property of at least one of the bands in response to the signal.

[0010] Still another aspect of the present invention involves a method of examining a length of a cigarette paper having a pattern, for example, a first band and a second band, with the bands repeating along the length thereof. Such a method first comprises detecting at least one of the patterns (e.g. bands) with a pattern detection device disposed between the first and second bobbins as the cigarette paper is advanced to and wound on the second bobbin after being unwound from the first bobbin. A signal is then produced in response to the detection of the at least one of the bands. A property of at least one of the patterns (e.g. bands) is thereafter determined, preferably nondestructively, with a testing device, in communication with the pattern detection device and disposed between the first and second bobbins, in response to the signal.

[0011] Yet another aspect of the present invention relates to an apparatus adapted to examine a length of a cigarette paper having opposed ends, wherein the cigarette paper comprises pattern, for example, a first band and a second band, with the bands repeating along the length thereof. Such an apparatus includes a driven roller device configured to receive one of the ends of the length of the cigarette paper and to advance the cigarette paper in a machine direction. A tension device is configured to operably engage the cigarette paper, prior to the driven roller device, and to cooperate with the driven roller device so as to maintain a tension on the cigarette paper therebetween. A pattern (e.g. band) detection device is disposed between the driven roller device and the tension device, and is configured to detect at least one of the bands and produce a signal in response thereto. A testing device is in communication with the pattern detection device and is disposed between the driven roller device and the tension device. Preferably, the testing device is configured to nondestructively determine a property of at least one of the bands in response to the signal.

[0012] Accordingly, aspects and embodiments of the present invention relate to an apparatus, system, and method for examining a wrapping material for smoking article manufacture. The system is particularly well suited for inspection of a web of paper wrapping material that has a discontinuous nature, such as is provided by, for example, application of an additive material to at least a portion of that wrapping material so as to form a pattern, for example, spaced apart bands along the wrapping material. The system allows a roll of the wrapping material, or just a relatively small strip therefrom, to be examined or tested in a nondestructive manner, for example, to determine the suitability and consistency of the wrapping material. The roll of wrapping material (or remainder thereof) can then be used to manufacture a smoking article.

[0013] A cigarette paper testing apparatus, as described herein in one embodiment, can be used in a so-called "off-line" manner in order to nondestructively examine a roll (e.g., a bobbin) of wrapping material, or a relatively small strip therefrom. The roll of the wrapping material (or remainder of the roll after removal of the strip) can then be used to manufacture a smoking article. That is, the associated system for examining an entire roll can be used to first examine properties of a continuous strip of wrapping material wound on a first bobbin using a first device (e.g., the cigarette paper testing apparatus) disposed at a first location, and the wrapping material so examined is then rewound on a second bobbin and used at a later time to produce a smoking article using a second device (e.g., an automated cigarette manufacturing device) disposed at a second location. As such, the cigarette paper testing apparatus is not necessarily integrally associated or configured to be "online" with an automated cigarette manufacturing device, but can be so configured if desired.

[0014] Such an off-line system incorporates a detection system for detecting a feature of a continuous substrate, such as a band of a wrapping material for manufacturing a smoking article manufacture, as the substrate is advanced in the machine direction. In response to the detection system, a testing apparatus performs an appropriate nondestructive evaluation of the wrapping material. Following testing, the wrapping material is rewound on the second bobbin in such a manner that the second bobbin can be removed and stored (or the strip is discarded). That second bobbin can then be used to provide the continuous strip of paper web for the manufacture of a continuous smokable rod using a conventional type of cigarette making machine or other appropriate device.

[0015] Accordingly, embodiments of the present invention provide distinct advantages as further detailed herein.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0016] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[0017] **FIGS. 1 and 2** are schematics of a cigarette paper testing apparatus according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The present inventions now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0019] **FIGS. 1 and 2** illustrates a cigarette paper testing apparatus according to one embodiment of the present invention, the apparatus being indicated generally by the numeral **100**. Such an apparatus **100** is configured to removably receive a first bobbin **150** on an unwind spindle assembly **125**, the first bobbin **150** having a continuous length of a wrapping material, such as a paper web **200** of a cigarette paper, wound thereon. The paper web **200** includes a selected pattern such as, for example, one or more bands (of which two bands **225**, **250** are shown and described for illustrative purposes), wherein the bands **225**, **250** may repeat along the length of the paper web **200**. When the first bobbin **150** is engaged with the apparatus **100**, the paper web **200** is routed from the first bobbin **150** to a second bobbin **300** to be wound thereon. The second bobbin **300** is removably mounted to a rewind spindle assembly **325**, wherein the second bobbin **300** and/or the rewind spindle assembly **325** are configured to be driven by a drive system **350** for unwinding the web **200** from the first bobbin **150** and winding the web **200** onto the second bobbin **300**. The unwinding of the paper web **200** from the first bobbin **150** is regulated by a brake system **400** engaged with the first bobbin **150** and/or unwind spindle assembly **125**. A pattern (e.g. band) detection device **450** is disposed between the first and second bobbins **150**, **300** for detecting one or more of the bands along the length of the paper web **200**.

[0020] Between the first and second bobbins **150**, **300**, a testing system **500** is disposed and configured to nondestructively determine a property of the paper web **200**. Such a testing system **500** may comprise, for example, a first testing device **550** configured to determine a basis weight of the paper web **200** and a second testing device **600** configured to determine a porosity of the paper web **200**. Though the first and second testing devices **550**, **600** are provided and described herein for illustrative purposes, one skilled in the art will appreciate that only one of those devices **550**, **600** may be provided, or many other testing devices, in varying numbers, types, and/or combinations, may be provided and configured to nondestructively examine the paper web **200** between the first and second bobbins **150**, **300**, when necessary. Further, one skilled in the art will appreciate that other systems may also be provided for acting on the web **200**, wherein such systems may be configured to, for example, apply a material such as an adhesive, coating, ink or the like to the web **200**, or to otherwise act on the web **200** such as, for example, to emboss a pattern thereon or to perforate the web **200**, before the web **200** is rewound on the second bobbin **300**. The drive system **350**, the pattern detection device **450**, and the first and second testing devices **550**, **600** (and the brake system **400**, when appropriate) may, where necessary, be connected to communicate with a controller **650**. In some instances, those components may be connected to communicate with the controller **650** through a control interface **700**. Examples of various techniques and equipment for handling, unwinding, and rewinding bobbins are set forth in U.S. Pat. No. 4,619,278 to Smeed et al., U.S. Pat. No. 5,156,169 to Holmes et al., and U.S. Pat. No. 5,966,218 to Bokelman et al., and U.S. patent application Ser. No. 10/682,570, filed Oct. 9, 2003.

[0021] Certain paper wrapping materials that may be examined by embodiments of the present invention are useful in the manufacture of cigarettes designed to exhibit reduced ignition propensity. That is, cigarettes incorporating certain wrapping materials, when placed on a flammable substrate, tend to self extinguish before burning that substrate. Of particular interest are those cigarettes possessing tobacco rods manufactured using appropriate wrapping materials having bands comprised of appropriate amounts of suitable components so as to have the ability to meet certain cigarette extinction criteria.

[0022] The paper wrapping material that is further processed to provide the banded, or otherwise patterned, wrapping material can have a wide range of compositions and properties. The selection of a particular wrapping material will be readily apparent to those skilled in the art of cigarette design and manufacture. Typical paper wrapping materials are manufactured from fibrous materials, and optional filler materials, to form so-called "base sheets." Typical wrapping material base sheets suitable for use as the circumscribing wrappers of tobacco rods for cigarettes have basis weights that can vary. Typical dry basis weights of base sheets are at least about 15 g/m^2, while typical dry basis weights do not exceed about 80 g/m^2.

[0023] Typical wrapping material base sheets suitable for use as the circumscribing wrappers of tobacco rods for cigarettes have inherent porosities that can vary. Typical base sheets have inherent porosities that are at least about 5 CORESTA units and less than about 200 CORESTA units. A CORESTA unit is a measure of the linear air velocity that passes through a 1 cm^2 area of wrapping material at a constant pressure of 1 centibar. See, CORESTA Publication ISO/TC0126/SC I N159E (1986). The term "inherent porosity" refers to the porosity of that wrapping material with respect to the flow of air. A particular paper wrapping material base sheet, for example, is comprised of wood pulp and calcium carbonate, and exhibits an inherent porosity of about 20 to about 50 CORESTA units.

[0024] Typical paper wrapping material base sheets suitable for use as the circumscribing wrappers of tobacco rods for cigarettes incorporate at least one type of fibrous material, and can incorporate at least one filler material, in amounts and type of material that can vary. Both components may affect the porosity and/or basis weight of the wrapping material. The fibrous material can be a cellulosic material, and the cellulosic material can be a lignocellulosic material. Exemplary cellulosic materials include flax fibers, hardwood pulp, softwood pulp, hemp fibers, esparto fibers, kenaf fibers, jute fibers and sisal fibers. Mixtures of two or more types of cellulosic materials can be employed. For example, wrapping materials can incorporate mixtures of flax fibers and wood pulp. The fibers can be bleached or unbleached. Other fibrous materials that can be incorporated within wrapping materials include microfibers materials and fibrous synthetic cellulosic materials. See, for example, U.S.

Pat. No. 4,779,631 to Durocher and U.S. Pat. No. 5,849,153 to Ishino. Representative fibrous materials, and methods for making wrapping materials therefrom, are set forth in U.S. Pat. No. 2,754,207 to Schur et al.; and U.S. Pat. No. 5,474,095 to Allen et al.; and PCT WO 01/48318.

[0025] The wrapping material may also normally incorporate a filler material such as, for example, those set forth in PCT WO 03/043450. The filler material may have the form of essentially water insoluble particles and may normally incorporate inorganic components such as calcium salts or calcium carbonate, wherein calcium carbonate is typically used in particulate form. See, for example, U.S. Pat. No. 4,805,644 to Hampl; U.S. Pat. No. 5,161,551 to Sanders; and U.S. Pat. No. 5,263,500 to Baldwin et al.; and PCT WO 01/48,316. Other filler materials include, for example, agglomerated calcium carbonate particles, calcium tartrate particles, magnesium oxide particles, magnesium hydroxide gels; magnesium carbonate-type materials, clays, diatomaceous earth materials, titanium dioxide particles, gamma alumina materials and calcium sulfate particles. See, for example, U.S. Pat. No. 3,049,449 to Allegrini; U.S. Pat. No. 4,108,151 to Martin; U.S. Pat. No. 4,231,377 to Cline; U.S. Pat. No. 4,450,847 to Owens; U.S. Pat. No. 4,779,631 to Durocher; U.S. Pat. No. 4,915,118 to Kaufman; U.S. Pat. No. 5,092,306 to Bokelman; U.S. Pat. No. 5,109,876 to Hayden; U.S. Pat. No. 5,699,811 to Paine; U.S. Pat. No. 5,927,288 to Bensalem; U.S. Pat. No. 5,979,461 to Bensalem; and U.S. Pat. No. 6,138,684 to Yamazaki; and European Patent Application 357359. Certain filler-type materials that can be incorporated into the wrapping materials can have fibrous forms, having components which may include materials such as glass fibers, ceramic fibers, carbon fibers and calcium sulfate fibers. See, for example, U.S. Pat. No. 2,998,012 to Lamm; U.S. Pat. No. 4,433,679 to Cline; and U.S. Pat. No. 5,103,844 to Hayden et al.; PCT WO 01/41590; and European Patent Application 1,084,629. Mixtures of filler materials can also be used.

[0026] There are various ways by which the various additive components can be added to, or otherwise incorporated into, the base sheet. Certain additives can be incorporated into the wrapping material as part of the paper manufacturing process associated with the production of that wrapping material. Alternatively, additives can be incorporated into the wrapping material using size press techniques, spraying techniques, printing techniques, or the like. Such techniques, known as "off-line" techniques, are used to apply additives to wrapping materials after those wrapping materials have been manufactured. Various additives can be added to, or otherwise incorporated into, the wrapping material simultaneously or at different stages during or after the paper manufacturing process.

[0027] The base sheets can be treated further, and those base sheets can be treated so as to impart a change to the overall physical characteristics thereof and/or so as to introduce a change in the overall chemical compositions thereof. For example, the base sheet can be electrostatically perforated (see, for example, U.S. Pat. No. 4,924,888 to Perfetti et al.) or embossed to provide texture to a surface thereof. Additives can be incorporated into the wrapping material, with representative additives, and methods for incorporating those additives to wrapping materials, being set forth in, for example, U.S. Pat. No. 5,220,930 to Gentry and U.S. Pat. No. 5,168,884 to Baldwin et al. Certain components, such as alkali metal salts, can act as burn control additives and include, for example, alkali metal succinates, citrates, acetates, malates, carbonates, chlorides, tartrates, propionates, nitrates and glycolates; including sodium succinate, potassium succinate, sodium citrate, potassium citrate, sodium acetate, potassium acetate, sodium malate, potassium malate, sodium carbonate, potassium carbonate, sodium chloride, potassium chloride, sodium tartrate, potassium tartrate, sodium propionate, potassium propionate, sodium nitrate, potassium nitrate, sodium glycolate and potassium glycolate; and other salts such as monoammonium phosphate. Certain alkali earth metal salts also can be used. See, for example, U.S. Pat. No. 2,580,568 to Matthews; U.S. Pat. No. 4,461,311 to Matthews; U.S. Pat. No. 4,622,983 to Matthews; U.S. Pat. No. 4,941,485 to Perfetti et al.; U.S. Pat. No. 4,998,541 to Perfetti et al.; and PCT WO 01/08514. Certain components, such as metal citrates, can act as ash conditioners or ash sealers. See, for example, European Patent Application 1,084,630.

[0028] Other representative components include organic and inorganic acids, such as malic, levulinic, boric and lactic acids (see, for example, U.S. Pat. No. 4,230,131 to Simon) or catalytic materials (see, for example, U.S. Pat. No. 2,755,207 to Frankenburg). Typically, the amount of chemical additive does not exceed about 3 percent, based on the dry weight of the wrapping material to which the chemical additive is applied. For certain wrapping materials, the amount of certain additive salts, such as burn chemicals such as potassium citrate and monoammonium phosphate, preferably are in the range of about 0.5 to about 0.8 percent, based on the dry weight of the wrapping material to which those additive salts are applied. Relatively high levels of such additive salts can be used on certain types of wrapping materials printed with printed regions that are very effective at causing extinction of cigarettes manufactured from those wrapping materials.

[0029] Flavoring agents and/or flavor and aroma precursors (e.g., vanillin glucoside and/or ethyl vanillin glucoside) also can be incorporated into the paper wrapping material (see, for example, U.S. Pat. No. 4,804,002 to Herron; and U.S. Pat. No. 4,941,486 to Dube et al.) or printed onto cigarette papers. Some types of flavoring agents used in cigarette manufacture that are set forth in, for example, Gutcho, *Tobacco Flavoring Substances and Methods*, Noyes Data Corp. (1972) and Leffingwell et al., *Tobacco Flavoring for Smoking Products* (1972). Films can be applied to the paper (see, for example, U.S. Pat. No. 4,889,145 to Adams; U.S. Pat. No. 5,060,675 to Milford et al., and PCT WO 02/43513 and PCT WO 02/055294), while catalytic materials can be incorporated into the paper. See, for example, PCT WO 02/435134.

[0030] The composition of the additive material or coating formulation can vary, and is generally determined by the ingredients of the coating formulation. Preferably, the coating formulation has an overall composition, and is applied in a manner and in an amount, such that the physical integrity of the wrapping material is not adversely affected when the coating formulation is applied to selected regions of the wrapping material. It also is desirable that components of the coating formulation not introduce undesirable sensory characteristics to the smoke generated by a smoke article incorporating a wrapping material treated with that coating formulation. Thus, suitable combinations of various

components can act to reduce the effect of coatings on sensory characteristics of smoke generated by the smoking article during use. Some coatings also provide desirable physical characteristics to cigarettes manufactured from wrapping materials incorporating those coatings, and can be considered as adhesives since those coatings typically remain in contact with (e.g., to adhere to or otherwise remain secured to) desired locations on the wrapping material. Some examples of coating formulations and components thereof are set forth in U.S. Pat. No. 4,889,145 to Adams; and U.S. Pat. No. 5,060,675 to Milford et al.; U.S. Patent Application Publication Nos. 2003/0145869 to Kitao et al., 2003/0150466 to Kitao et al., and 2003/0131860 to Ashcraft et al.; U.S. patent application Ser. No. 09/892,834, filed Jun. 27, 2001, and Ser. No. 10/682,570, filed Oct. 9, 2003; PCT WO 02/043513; PCT WO 02/055294; and European Patent Application 1,234,514.

[0031] The coating formulation may include a film-forming agent, such as a polymeric material or resin. Exemplary film-forming agents include alginates (e.g., sodium alginate or ammonium alginate), pectins, derivatives of cellulose (e.g., carboxymethylcellulose and other polymeric materials such as hydroxypropylcellulose and hydroxyethylcellulose), ethylene vinyl acetate copolymers, guar gum, xanthan gum, starch (e.g., corn starch, rice starch and dextrin), modified starch (e.g., oxidized tapioca starch and oxidized corn starch), polyvinyl acetate, polyvinyl alcohol, and combinations thereof. Exemplary blends include water-based blends of an ethylene vinyl acetate copolymer emulsion and polyvinyl alcohol, or water-based blends provided by mixing starches or modified starches with emulsion polymers or copolymers. The solvent or liquid carrier for the coating formulation can vary, and can be a liquid having an aqueous character, such as relatively pure water, or a non-aqueous solvent, such as ethanol, n-propyl alcohol, iso-propyl alcohol, ethyl acetate, n-propyl acetate, iso-propyl acetate, toluene, and the like.

[0032] The coating formulation also can include a filler material such as, for example, the essentially water insoluble types of filler materials previously described, preferably with a finely divided (e.g., particulate) form. Typical fillers are those that have particle sizes that are less than about 3 microns in diameter and suitably range from about 0.3 micron to 2 microns in diameter. Exemplary filler materials may comprise inorganic materials including metal particles and filings, calcium carbonate (e.g., precipitated-type fillers, including those having a prismatic form), calcium phosphate, clays (e.g., attapulgite clay), talc, aluminum oxide, mica, magnesium oxide, calcium sulfate, magnesium carbonate, magnesium hydroxide, aluminum oxide and titanium dioxide. See, for example, the types of filler materials set forth in U.S. Pat. No. 5,878,753 to Peterson et al. Exemplary filler materials also can be composed of organic materials including starches, modified starches and flours (e.g., rice flour), particles of polyvinyl alcohol, particles of tobacco (e.g., tobacco dust), fibrous cellulosic materials, and other like materials. See, for example, U.S. Pat. No. 5,417,228 to Baldwin et al. Alternate fillers can include carbon-based materials (e.g., graphite-type materials, carbon fiber materials and ceramics), metallic materials (e.g., particles of iron), and the like. The filler material also can be a water soluble salt (e.g., potassium chloride, sodium chloride, potassium citrate, sodium citrate, calcium chloride or magnesium chloride).

[0033] The coating formulations can incorporate other ingredients that may be dispersed or suspended therein so as to provide specific properties or characteristics to the wrapping material. Those ingredients can be, for example, preservatives (e.g., potassium sorbate), humectants (e.g., ethylene glycol and propylene glycol), pigments, dyes, colorants, burn promoters and enhancers, burn retardants and inhibitors, plasticers (e.g., dibutyl phthalate, polyethylene glycol, polypropylene glycol and triacetin), sizing agents, syrups (e.g., high fructose corn syrup), flavoring agents (e.g., ethyl vanillin and caryophyllene oxide), sugars (e.g., rhamnose), flavor precursors, hydrate materials, such as metal hydrates (e.g., borax, magnesium sulfate decahydrate, sodium silicate pentahydrate and sodium sulfate decahydrate), viscosity reducing agents (e.g., urea), and the like.

[0034] The amount of coating formulation that is applied to the paper wrapping material can vary, but typically provides a coated wrapping material having an overall dry basis weight (i.e., the basis weight of the whole wrapping material, including coated and uncoated regions) of at least about 1.05 times that of the dry basis weight of that wrapping material prior to the application of coating thereto, and an overall dry basis weight of not more about 1.4 times that of the dry basis weight of the wrapping material that has the coating applied thereto. Typical overall dry basis weights of those wrapping materials are between about 20 g/m^2 to about 40 g/m^2.

[0035] The dry weights of the coated regions of wrapping material of the present invention can vary. For wrapping materials that are used for the manufacture of cigarettes designed to meet certain cigarette extinction test criteria, it is generally desirable that the wrapping materials have sufficient coating formulation applied thereto in the form of appropriately shaped and spaced bands in order that the dry weight of additive material applied to those wrapping materials totals at least about 1 pound/ream, while the total dry weight of that applied additive material normally does not exceed about 10 pounds/ream. As such, typical coated regions of paper wrapping materials suitable for use as the circumscribing wrappers of tobacco rods for cigarettes have inherent porosities that can vary. Typically, the inherent porosities of the coated regions of the wrapping materials are less than about 8.5 CORESTA units, and at least about 0.1 CORESTA unit. Preferably, the inherent porosities of the coated regions of the wrapping materials, particularly those wrapping materials that are used for the manufacture of cigarettes designed to meet certain cigarette extinction test criteria, are between about 0.1 CORESTA unit and about 4 CORESTA units.

[0036] Certain wrapping materials possess coatings in the form of patterns (e.g. bands) that extend across the wrapping material, generally perpendicular to the longitudinal axis of the wrapping material. The widths of the individual bands can vary, as well as the spacings between those bands. Typically, those bands have widths of between at least about 0.5 mm and about 8 mm. Such bands can be spaced apart such that the spacing between the bands is at least about 10 mm, but usually no more than about 50 mm.

[0037] Cigarettes designed to meet certain cigarette extinction test criteria can be produced from such wrapping materials, wherein the banded regions are produced using

additive materials that are effective in reducing the inherent porosity of the wrapping material in those regions. Film-forming materials and fillers applied to the wrapping material in those banded regions are effective in increasing the weight of the wrapping material in those regions. Filler materials that are applied to the wrapping material in those banded regions are effective in decreasing the burn rate of the wrapping materials in those regions. Typically, when wrapping materials of relatively high inherent porosity are used to manufacture cigarettes, those wrapping materials possess relatively high weight bands that introduce a relatively low inherent porosity to the banded regions. Film-forming materials have a tendency to reduce the porosity of the wrapping material, whether or not those materials are used in conjunction with fillers. However, coatings that combine porosity reduction with added coating weight to wrapping materials also are effective in facilitating extinction of cigarettes manufactured from those wrapping materials. Low porosity in selected regions of a wrapping material tends to cause a lit cigarette to extinguish due to the decrease in access to oxygen for combustion for the smokable material within that wrapping material. Increased weight of the wrapping material also tends to cause lit cigarette incorporating that wrapping material to extinguish. As the inherent porosity of the wrapping material increases, it also is desirable to (a) select a film-forming material so as to cause a decrease the inherent porosity of the coated region of the wrapping material and/or (b) provide a coating that provides a relatively large amount of added weight to the coated region of the wrapping material.

[**0038**] The basis weight and porosity effects resulting from treatment of the wrapping material base sheet are indicators of the characteristics of the smoking article produced therefrom. Accordingly, before such wrapping material is used to produce the smoking article, significant time and cost saving may be realized by first analyzing such factors of the wrapping material in order to determine that the characteristics of the wrapping material are within desired specifications and that the treatment of the wrapping material is consistent along the length of the wrapping material used in an automated cigarette manufacturing device.

[**0039**] As such, as the paper web **200** is unwound from the first bobbin **150**, the paper web **200** is directed around an arrangement of rollers (shown as rollers **160**, **165**, **170**), otherwise referred to herein as a paper-engaging member or dancer assembly **175**. The brake system **400** comprising, for example, a magnetic brake **405**, is configured to cooperate with the first bobbin **150** such that the magnetic brake **405**, in cooperation with the dancer assembly **175**, takes up slack in the paper web **200** and maintains a certain amount of tension on the paper web **200** as the web **200** is unwound from the first bobbin **150** and wound onto the second bobbin **300** by the drive system **350**. The magnetic brake **405**/dancer assembly **175** may be, for example, a Model DDC (Digital Dancer Controller) System manufactured by Magpower. A tension sensor **180** may, in some instances, be configured to cooperate with the brake system **400** and/or the dancer assembly **175** in order to provide the selected tension on the paper web **200**.

[**0040**] The drive system **350** operably engaged with the second bobbin **300** may comprise, for example, a stepper motor **355**, configured to cooperate with the second bobbin **300** to wind the paper web **200** onto the second bobbin **300** while cooperating with the first bobbin **150**/magnetic brake **405**/dancer assembly **175** to maintain a certain amount of tension on the paper web **200** between the first and second bobbins **150**, **300**. The drive system **350** may particularly comprise, for example, a Model 583-135-MO stepper motor **355** and a Model 6104 stepper driver **360**, both manufactured by Compumotor. One skilled in the art will appreciate that, between the first and second bobbins **150**, **300**, the paper web **200** may be supported, routed, and/or guided by a suitably aligned series of any number of, for example, idler rollers, guideposts, air bars, turning bars, guides, tracks, tunnels, or the like, for directing the paper web **200** along the desired path. Typical bobbins used by conventional automated cigarette making apparatuses often contain a continuous strip of wrapping material **200** that is on the order of about 6,500 meters in length, though the length of the web **200** may vary. As such, the apparatus **100** described herein is appropriately configured so as to handle bobbins of that type and size.

[**0041**] According to one embodiment of the present invention, the apparatus **100** may be configured to handle and examine a relatively small strip of the web **200**, instead of an entire bobbin, as being representative of the remainder of the web **200** wound on that bobbin. For example, in some instances, it may be desirable to test only a small length of the web **200** unwound from the first bobbin **150**. In such instances, a pair of counter-rotating rollers (otherwise referred to herein as a driven roller device or capstan drive **295**) comprising, for example, a drive pressure roller **285** and a capstan roller **290**, is disposed downstream of the first and second testing devices **550**, **600** and is configured to receive the leading edge of the small strip (not shown) of the paper web **200** and to advance the strip downstream in the machine direction. The capstan roller **290** is engaged with an indexer/driver system **275** comprising, for example, a Model M2-2240 stepper motor and a Model IM4831 indexer/driver control, both manufactured by IMS. The drive pressure roller **285** may be mounted on a free end of a pivoting arm so as to be pivotable away from the capstan roller **290** when the apparatus **100** is not testing a strip or the capstan drive **295** is otherwise not needed.

[**0042**] A tension device comprising, for example, a tension roller **190** in cooperation with a guide post **195**, is disposed upstream of the pattern detection device **450** and the first and second testing devices **550**, **600**, and cooperates with the capstan drive **295** to maintain a tension in the strip of the web **200** therebetween as the strip is tested. More particularly, the tension roller **190** may be weighted and attached to the free end of a pivoting arm such that the tension roller **190** may be pivoted toward the guide post **195** so as to engage the strip of the web **200** therebetween. The leading edge of the strip of the web **200** is then extended past the pattern detection device **450** and the first and second testing devices **550**, **600** and into engagement with the capstan drive **295** for advancing the strip in the machine direction. In one advantageous embodiment, the capstan roller **290** is separated from the guide post **195** by a center-to-center distance of about 350 mm and configured such that a strip of at least about 500 mm in length can be tested by the apparatus **100**, though one skilled in the art will appreciate that the center-to center distance, as well as the minimum strip length, may vary considerably.

[0043] Accordingly, the first and second testing devices **550**, **600**, as well as the pattern detection device **450**, are generally disposed between the first and second bobbins **150**, **300**, preferably between the dancer assembly **175** and the second bobbin **300** and, in one embodiment, between the tension device, comprising the tension roller **190** and guide post **195**, and the capstan drive **295**. The first testing device **550** may comprise, for example, a Beta gauge manufactured by Pettit Applied Technology, configured to determine a basis weight of a measured sample area (not shown) of the web **200**. Such a Beta gauge may use, for example, a Kr-85 radioactive source and may be configured to take the appropriate nondestructive measurement of the paper web **200** using a measurement time, for instance, on the order of about 4 seconds over a sampling area of the web **200** of about 2 mm (length) by about 15 mm (width). One skilled in the art will appreciate, however, that the first testing device **550** described herein is provided for exemplary purposes and that the measurement parameters may vary considerably.

[0044] The pattern detection device **450** is configured to detect at least one of the bands **225**, **250** (or other pattern) of the web **200** as the web **200** is routed past the pattern detection device **450**. The pattern detection device **450** may comprise, for example, an optical sensor using, for instance, a Model E3X-NL11 sensor and a Model ES32-S15-1 fiber optic element, both manufactured by OMRON. One skilled in the art will appreciate, however, that many other detection methods, schemes, and devices may be used to detect the bands **225**, **250** (as well as other patterns) of the web **200**. For example, the pattern detection device **450** may, in some instances comprise a non-optical spectroscopic system, such as a non-contact ultrasonic transmission system or a near infrared (NIR) absorption system.

[0045] The second testing device **600** may comprise, for example, a CES Model 477LF porosity measuring system configured to test a sampling area of the web **200** of about 2 mm (length) by about 15 mm (width), and may be disposed either upstream or downstream of the first testing device **550**, as will be appreciated by one skilled in the art. The pattern detection device **450** is preferably disposed in a known spaced relation with the first and second testing devices **550**, **600** with respect to the route traveled by the web **200** though, in some instances, the pattern detection device **450** and the first and second testing devices **550**, **600** may be configured so as to be movable with respect to each other along the route traveled by the web **200** such that the spacing between respective components is adjustable.

[0046] As previously described, the length of the web **200** wound on the first bobbin **150** (or the small strip therefrom) may include a pattern such as, for example, adjacent bands **225**, **250**, with the bands regularly repeating along the length of the web **200**. The characteristics of such bands **225**, **250** are generally determined by the treatment (or lack thereof) of the wrapping material base sheet in any of the manners previously described. Accordingly, for a band of particular interest to be tested along the length of the web **200**, the distance between successive occurrences of that band (the band pitch) is determined and the appropriate distance is set between the pattern detection device **450** and each of the first and second testing devices **550**, **600**, and/or between the first and second testing devices **550**, **600**. This spacing may be set manually or, in some instances, may be entered into the controller **650**, along with the desired measurement scheme, such that the testing parameters are automatically determined and set by the apparatus **100**. In some instances, for example, the width of the web **200** may be about 27 mm with a particular band extending for between about 5 mm and about 6 mm, and repeating at an interval of between about 25 mm and about 60 mm. In the alternative, the apparatus **100** may implement a search algorithm using any combination of the pattern detection device **450**, the first and second testing devices **550**, **600**, and/or other components in order to locate the band or pattern of interest and determine the pitch between successive occurrences thereof.

[0047] One skilled in the art will appreciate that both testing devices **550**, **600** may be configured to test the same band of particular interest or each testing device may be configured to test different bands. Further, the apparatus **100** may, in some instances, be configured so as to allow either of the testing devices **550**, **600**, or both, to examine the web **200** as the web **200** is advanced to the second bobbin **300** from the first bobbin **150** or to the capstan drive **295** from the tension device, comprising the tension roller **190** and guide post **195**. In some instances, the apparatus **100** may include multiples of each of the testing devices so as to allow similar measurements of different bands to occur concurrently.

[0048] The pattern detection device **450** is configured to detect the band or pattern of particular interest as the web **200** is advanced by the capstan drive **295** or the drive system **350**/second bobbin **300**. Accordingly, in order for one or more of the testing devices **550**, **600** to examine the web **200**, the pattern detection device **450** communicates with the capstan roller **290** or the drive system **350** through the controller **650** and/or the control interface **700**, and cooperates therewith to stop the advancement of the web **200** when a particular band is detected and a measurement is to be made. In addition, the pattern detection device **450** concurrently communicates with either or both of the testing devices **500**, **600** through the controller **650** and/or the control interface **700**, and cooperates therewith to direct the appropriate testing device to perform the desired measurement on the web **200** once advancement of the web **200** is stopped. However, in some instances, the testing devices **550**, **600** may be configured to perform the appropriate examination of the web **200** without requiring the advancement of the web **200** to be stopped by the apparatus **100**.

[0049] One skilled in the art will also appreciate that the measurements along the web **200** may occur in many different manners. For example, the apparatus **100** may be configured to measure every occurrence of a particular band or other pattern. In other instances, the apparatus **100** may be configured to perform the measurements at a particular interval along the length of the web **200**, or at randomly selected points, so as to form a data profile of the web **200**. In other instances, when considering the entire length of the strip of the web **200** (or an entire bobbin), the testing or sampling scheme may divide the web **200** into sections where, for example, the apparatus **100** may perform and average a certain number of measurements per section using parameters such as, for instance, distance between points in a section and distance between sections. Thus, the apparatus **100** may be configured to analyze the web **200** using many different measurement schemes. In any instance, the data collected by the first and/or second testing device(s) **550**,

600, as well as other components of the apparatus **100**, can be stored by the controller **650** or other storage device (not shown) for further analysis.

[**0050**] Once the web **200** has been examined by the first and/or second testing devices **550**, **600**, the strip can be removed and discarded, or the second bobbin **300** can be removed from the apparatus **100** and stored as necessary. In other instances, the second bobbin **300** can be mounted onto a conventional type of automated cigarette making apparatus (not shown) in order to manufacture cigarettes using the examined web **200**. In other instances, the apparatus **100** may also include an automatic bobbin changer device (not shown) configured to automatically move the second bobbin **300** to the automated cigarette making apparatus (not shown) once the desired length of the web **200** has been examined. If desired, the apparatus **100** can be operated so as to provide one examined second bobbin **300** at a time. Alternatively, the apparatus **100** can be adapted so as to provide a examined master roll or bobbin of the web **200**, which then can be divided one or more times across the width of the roll to provide a plurality of bobbins, each of the desired width and having the desired length of the web **200** wound thereon. Alternatively, the apparatus **100** can be suitably adapted to simultaneously examine several strips or produce several examined second bobbins **300** at a time. Preferably, the second bobbin **300** can be transferred to a cigarette manufacturing device and the web **200** subsequently used to produce cigarettes. In addition, it may also be preferable for the first and second bobbins **150**, **300** to be interchangeable such that, once the first bobbin **150** is emptied by the apparatus **100**, the first bobbin **150** can then be moved to replace the removed full second bobbin **300** such that the first bobbin **150** essentially becomes a new second bobbin **300**.

[**0051**] Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. For example, the apparatus **100** may also be configured to measure or otherwise determine that the appropriate amount of the paper web **200** is wound on either of the first and second bobbins **150**, **300**. In such instances, the apparatus **100** may also include components capable of allowing for automatic bobbin changing of the first bobbin **150** and splicing of the web **200**, as well as an automatic rewind bobbin changer for changing the second bobbin **300** when the second bobbin **300** is full. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

That which is claimed:

1. An apparatus adapted to examine a length of a cigarette paper comprising a pattern including a first band and a second band, the pattern repeating along the length thereof, the apparatus comprising:

a second bobbin configured to be capable of receiving the cigarette paper and to have the cigarette paper advanced thereto and wound thereon after the cigarette paper is unwound from a first bobbin;

a pattern detection device disposed between the first and second bobbins, the pattern detection device being configured to detect at least one of the bands and produce a signal in response thereto; and

a testing device in communication with the pattern detection device and disposed between the first and second bobbins, the testing device being configured to nondestructively determine a property of at least one of the bands in response to the signal.

2. An apparatus according to claim 1 wherein the second bobbin is responsive to the signal to selectively stop advancement of the cigarette paper to the second bobbin and the testing device is responsive to the signal to determine the property of the at least one of the bands when advancement of the cigarette paper is stopped.

3. An apparatus according to claim 1 wherein the second bobbin is adapted to be received by a cigarette manufacturing machine such that the cigarette paper wound thereon can be used to manufacture a cigarette.

4. An apparatus according to claim 1 wherein the testing device is configured to measure at least one of a porosity and a basis weight of at least one of the bands of the cigarette paper.

5. An apparatus according to claim 1 further comprising a drive system capable of being operably engaged with the second bobbin so as to wind the cigarette paper thereon, the drive system being operably engaged with the pattern detection device and responsive thereto so as to allow selective advancement of the cigarette paper onto the second bobbin.

6. An apparatus according to claim 1 further comprising a brake system operably engaged with the first bobbin and configured to cooperate therewith so as to maintain a tension on the cigarette paper between the first bobbin and the second bobbin.

7. An apparatus according to claim 1 further comprising a paper-engaging member configured to operably engage the cigarette paper between the first and second bobbins so as to maintain a tension on the cigarette paper.

8. An apparatus according to claim 1 further comprising a controller in communication with the pattern detection device and the testing device, the controller being configured to control advancement of the cigarette paper onto the second bobbin in response to the pattern detection device and to direct the testing device to determine the property of the cigarette paper.

9. An apparatus according to claim 1 wherein the first bobbin is interchangeable with the second bobbin.

10. A system for examining a cigarette paper and manufacturing a cigarette therefrom, the system comprising:

a cigarette manufacturing device configured to manufacture the cigarette from a length of the cigarette paper, the cigarette paper having a pattern including a first band and a second band, with the pattern repeating along the length thereof; and

a cigarette paper testing apparatus adapted to determine a property of one of the bands of the cigarette paper before the cigarette paper is used to manufacture the cigarette, the cigarette paper testing apparatus comprising:

a second bobbin configured to be capable of receiving the cigarette paper and to have the cigarette paper advanced thereto and wound thereon after the ciga-

rette paper is unwound from a first bobbin, the second bobbin being configured to be received by the cigarette manufacturing apparatus so as to provide the cigarette paper thereto;

a pattern detection device disposed between the first and second bobbins, the pattern detection device being configured to detect at least one of the bands and produce a signal in response thereto; and

a testing device in communication with the pattern detection device and disposed between the first and second bobbins, the testing device being configured to nondestructively determine a property of at least one of the bands in response to the signal.

11. A system according to claim 10 wherein the second bobbin is responsive to the signal to selectively stop advancement of the cigarette paper to the second bobbin and the testing device is responsive to the signal to determine the property of the at least one of the bands when advancement of the cigarette paper is stopped.

12. A system according to claim 10 wherein the first bobbin is interchangeable with the second bobbin.

13. A system according to claim 10 wherein the testing device is configured to measure at least one of a porosity and a basis weight of at least one of the bands of the cigarette paper.

14. A system according to claim 10 further comprising a drive system capable of being operably engaged with the second bobbin so as to wind the cigarette paper thereon, the drive system being operably engaged with the pattern detection device and responsive thereto so as to allow selective advancement of the cigarette paper onto the second bobbin.

15. A system according to claim 10 further comprising a brake system operably engaged with the first bobbin and configured to cooperate therewith so as to maintain a tension on the cigarette paper between the first bobbin and the second bobbin.

16. A system according to claim 10 further comprising a paper-engaging member configured to operably engage the cigarette paper between the first and second bobbins so as to maintain a tension on the cigarette paper.

17. A system according to claim 10 further comprising a controller in communication with the pattern detection device and the testing device, the controller being configured to control advancement of the cigarette paper onto the second bobbin in response to the pattern detection device and to direct the testing device to determine the property of the cigarette paper.

18. A method of examining a length of a cigarette paper having a pattern including a first band and a second band, the pattern repeating along the length thereof, said method comprising:

detecting at least one of the bands with a pattern detection device disposed between the first and second bobbins as the cigarette paper is advanced to and wound on the second bobbin after being unwound from the first bobbin;

producing a signal in response to the detection of the at least one of the bands; and

nondestructively determining a property of at least one of the bands with a testing device in communication with the pattern detection device and disposed between the first and second bobbins in response to the signal.

19. A method according to claim 18 further comprising selectively stopping advancement of the cigarette paper to the second bobbin in response to the signal and determining the property of the at least one of the bands when advancement of the cigarette paper is stopped.

20. A method according to claim 18 further comprising installing the second bobbin on a cigarette manufacturing device such that the cigarette paper wound thereon can be used to manufacture a cigarette.

21. A method according to claim 18 wherein nondestructively determining a property further comprises determining at least one of a porosity and a basis weight of at least one of the bands of the cigarette paper with the testing device.

22. A method according to claim 18 further comprising selectively advancing the cigarette paper onto the second bobbin with a drive system operably engaged therewith, the drive system being operably engaged with the pattern detection device and responsive thereto so as to determine the selective advancement of the cigarette paper.

23. A method according to claim 18 further comprising maintaining a tension on the cigarette paper between the first bobbin and the second bobbin with a brake system operably engaged and cooperable with the first bobbin.

24. A method according to claim 18 further comprising maintaining a tension on the cigarette paper with a paper-engaging member configured to operably engage the cigarette paper between the first and second bobbins.

25. A method according to claim 18 further comprising controlling advancement of the cigarette paper onto the second bobbin, in response to the pattern detection device, with a controller in communication with the pattern detection device and the testing device.

26. A method according to claim 18 wherein nondestructively determining a property further comprises directing the testing device to nondestructively determine the property of the cigarette paper with a controller in communication with the pattern detection device and the testing device.

27. A method according to claim 18 further comprising removing the second bobbin and replacing the second bobbin with the first bobbin.

28. An apparatus adapted to examine a length of a cigarette paper having opposed ends and comprising a pattern including a first band and a second band, the pattern repeating along the length thereof, the apparatus comprising:

a driven roller device configured to receive one of the ends and to advance the length of the cigarette paper in a machine direction;

a tension device configured to operably engage the cigarette paper prior to the driven roller device, with respect to the machine direction, and to cooperate with the driven roller device so as to maintain a tension on the cigarette paper therebetween;

a pattern detection device disposed between the driven roller device and the tension device, the pattern detection device being configured to detect at least one of the bands and produce a signal in response thereto; and

a testing device in communication with the pattern detection device and disposed between the driven roller device and the tension device, the testing device being configured to nondestructively determine a property of at least one of the bands in response to the signal.

29. An apparatus according to claim 28 wherein the driven roller device is responsive to the signal to selectively stop advancement of the cigarette paper and the testing device is responsive to the signal to determine the property of the at least one of the bands.

30. An apparatus according to claim 28 wherein the testing device is configured to measure at least one of a porosity and a basis weight of at least one of the bands of the cigarette paper.

31. An apparatus according to claim 28 further comprising a controller in communication with the pattern detection device and the testing device, the controller being configured to control advancement of the cigarette paper by the driven roller device in response to the pattern detection device and to direct the testing device to determine the property of the cigarette paper.

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