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G. DEARSLEY
SMOKING ARTICLE

3,230,958

Filed March 8, 1962

2 Sheets-Sheet 2

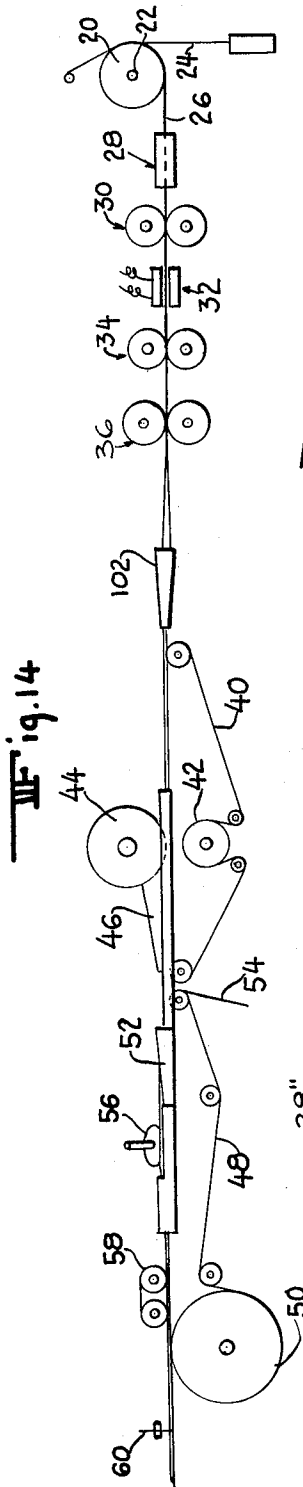


Fig. 14

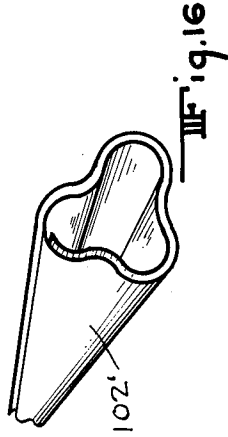


Fig. 16

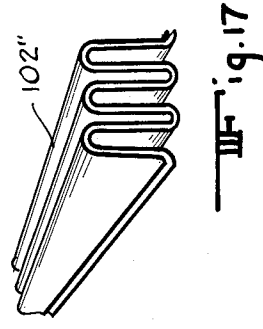


Fig. 17

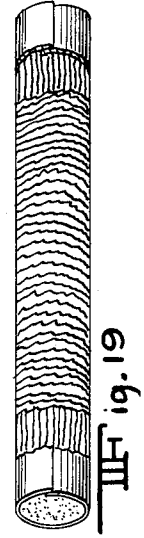


Fig. 19

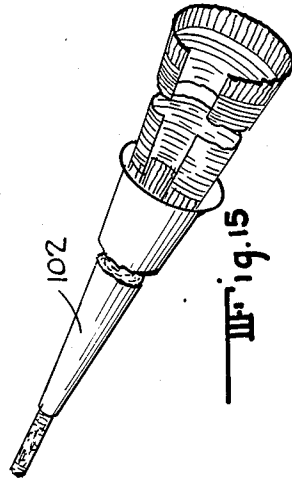


Fig. 15

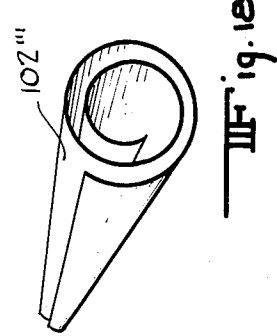


Fig. 18

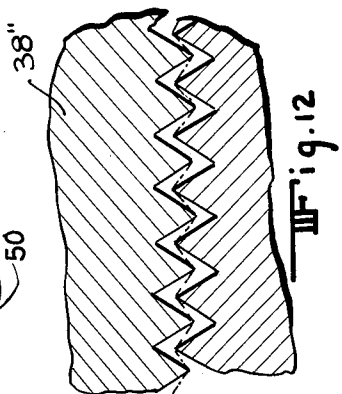


Fig. 12

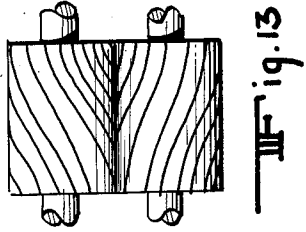


Fig. 13

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3,230,958
SMOKING ARTICLE

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2 Claims. (Cl. 131-8)

This application is a continuation-in-part of application Serial No. 31,858, filed by me on May 26, 1960 for Cigarette or Cigar Making Machine and Method, now abandoned, and claim is made to all of the equitable and legal benefits derivable therefrom.

This invention relates to cigarettes or cigars made from reconstituted or homogenized tobacco.

Currently, cigarettes are made from shredded tobacco which is usually prepared from a blend of a number of varieties of tobacco leaves from which the coarse middle rib or "stem" has been removed. The operations of removing the "stem" and the mixing the various tobacco varieties cannot be carried out without undesirable breakage of the tobacco which results in small pieces and dust, which are in many ways undesirable in the finished cigarette or cigar.

The action of cutting the tobacco leaf into shreds produces further short strands in addition to the breakage which must occur in the handling of any weak strands. The random shape of the leaf pieces before cutting also inevitably results in short pieces being produced from the small corners of larger sheets.

The feeding of the required quantity of shredded tobacco to form an endless uniform stream of tobacco such as is generally employed in the cigarette making process poses formidable problems and the equipment used has become progressively more elaborate and costly. Here again, the separating of the endless stream of tobacco from the bulk mass results in further breakage so that the overall process produces a quantity of small tobacco particles and dust which, whilst it may be of excellent quality as tobacco, is in an unsuitable form for cigarette or cigar manufacture.

Within recent years inventors have been stimulated to search for means whereby tobacco dust and small particles may be upgraded, thus realizing considerable economies in the manufacturing process. The most successful of these efforts has resulted in the production of a tobacco sheet which, in the case of cigarettes, is employed in the same way as leaf tobacco; that is, it is cut to leaf-sized sheets, mixed with natural leaf and cut into shreds which are formed into cigarettes, employing the existing complicated and costly tobacco feeding apparatus.

It is an object of this invention to provide cigarettes or cigars made from reconstituted or homogenized tobacco sheet.

Another object of this invention is to shred the tobacco sheet.

Another object is to provide means whereby the strands of tobacco may be arranged in the desired configuration within the cigarette.

Other objects of the invention will become apparent upon reading the following specification and referring to the accompanying drawings which form a material part of this disclosure.

The invention accordingly consists in the features of construction and combinations and arrangements of ele-

ments which will be exemplified in the construction heretofore described and of which the scope will be indicated by the appended claims.

FIG. 1 is a front elevational view of one embodiment of the invention as employed for producing shredded tobacco cigarettes in association with the cooperating elements of a conventional cigarette making machine.

FIG. 2 is an end elevation along line 2-2 of FIG. 1 showing how the tobacco stream is formed into a circular cross-section.

FIG. 3 shows the apparatus employed to trim the edge of the tobacco sheet in response to the signal received from the mass measuring gauge.

FIG. 4 shows apparatus for slitting the tobacco web.

FIG. 5 shows alternative apparatus for slitting the tobacco web.

FIGS. 6, 7, 8, 9 and 10 show some variations in patterns for slitting the tobacco web into shreds.

FIG. 11 shows rollers employed for crimping the web or strands of tobacco.

FIG. 12 shows rollers employed for providing incipient tears and slits in a web of tobacco.

FIG. 13 shows one form of alternative roller for treating the tobacco web.

FIG. 14 is a front elevation of one embodiment of the invention as employed for producing cigarettes or cigars filled with unshredded tobacco, including the cooperating elements of a conventional cigarette machine.

FIGS. 15, 16, 17 and 18 show three of many possible configurations of apparatus employed for producing controlled lateral crumpling of the tobacco web.

FIG. 19 is a longitudinal section of the finished article.

In an effort to overcome the problems of excess labor, material waste, and to create uniformity of the finished product, the homogenized tobacco sheet, also known as reconstituted or reconstructed tobacco was developed. This material is a more uniform blend of the tobacco than can possibly be obtained by conventional methods of physical mixing in leaf form of different tobacco types. The uniformity is made possible by the process of grinding the basic tobacco ingredients to a powder fine consistency, and thoroughly mixing them prior to forming a sheet of a specified thickness. Such a process leaves freedom to reprocess or rework all scrap and machine loss to basic specification.

U.S. Patent 2,769,734 granted November 6, 1956, to David Bandel, and U.S. Patent 2,734,510 granted February 14, 1956, to Gordon P. Hungerford and Delbert F. Jurgensen, Jr., describe and illustrate methods and apparatus for making reconstructed tobacco sheets in this manner. Any other suitable method or apparatus for making sheet tobacco or smoking material could be used equally as well with my present invention.

To make cigarettes, it has been the practice to shred this tobacco sheet in just the same manner as tobacco leaves have been shredded in the past, and then by different showering and metering techniques to form an endless stream or rope of shredded tobacco.

In spite of the complexity of the apparatus employed in the past to form this stream from a bulk mass of tobacco, the end result is far from uniform.

In order to solve this problem, I conceived and devised the present invention which enables one to obtain and more readily maintain a constantly uniform filler in a cigarette made up of shredded tobacco without

using the complex feeding mechanism which was hitherto necessary and which alternatively provides means whereby a cigarette-like article may be produced from a crumpled web of unshredded tobacco.

Homogenized, reconstituted, or reconstructed tobacco is usually manufactured in sheets from 4 to 8 feet in width, the thickness of the sheet usually being approximately that of a tobacco plant leaf. This sheet may be wound into rolls and may then be handled by orthodox paper converting techniques. For purposes of this invention, the original rolls are slit and re-wound into bobbins of tobacco sheet of a width which have a mass per unit length substantially equal to the mass per unit length of the cigarette article to be produced. If more than one web is to be employed to form the cigarette, then the webs will be slit so that their total mass per unit length is substantially equal to the mass per unit length of the cigarettes to be produced.

It is these bobbins of tobacco sheet which are mounted on the cigarette making machine to supply a continuous indefinite length of web or webs of tobacco which is processed to form an endless cigarette rod of the desired characteristics.

The advantages of this will be obvious. If the tobacco sheet is of uniform thickness, the mass per unit length of the cigarette produced may be determined solely by controlling the width of the slit bobbins of tobacco. The simple slitting machinery performs the same function as the elaborate and costly tobacco feed universally employed at present.

Also, the wound bobbin of tobacco is very dense; thus the storage and transport of tobacco to the making machine is much facilitated by the convenient form and size of tobacco bulk which must be supplied to the machine.

However, in practice, it is found that the mass per unit area of the tobacco sheet cannot be kept precisely uniform. Under some conditions and for certain classes of cigarettes this may be of no consequence, for the accuracy obtained is such that an excellent smoking article is still produced.

Under other conditions, the maximum possible uniformity is desirable, in which case the slit web is made of such a width that its mass per unit length is never less than the mass per unit length of the desired finished cigarette. This overweight web is then passed through a mass sensing device which controls a second device which removes material from the web in proportion to the signal received, producing a web which has a variable area per unit length but which has a constant mass per unit length by reason of the variable thickness.

This correcting operation may be performed in conjunction with the slitting operation before the bobbin is re-wound or it may be performed on the cigarette making machine itself when the bobbin is finally unwound for processing into the finished article.

The mass sensing devices may be of any suitable type, for example, dielectric or radiation detecting type gauges have been employed. Such devices are shown and described in the articles, Radioactive Thickness Gage for Moving Materials, by J. R. Carlin, published in Electronics, October 1949, and Beta Ray Thickness Gage, published in Electronics, October 1947, and in U.S. patent to W. E. Shoupp et al. No. 2,264,725, granted December 2, 1941. Any other suitable sensing technique could, of course, be employed, the important factor being that the detecting device determine the mass per unit area of the material passing through the gauging station.

Various methods of making cigarettes or cigars according to the invention will now be described.

Referring to FIG. 1, 20 represents the bobbin of tobacco sheet which is mounted on a spindle 22 and is provided with a conventional brake band 24. The web of tobacco 26 is passed through a guiding device 28, which controls its lateral position and through a pair of pulling rollers

30 which grip the web 26 and unwind it from the bobbin 20 at the required rate. The mass sensing device is shown at 32, and 34 shows the device for removing material from the web 26 in response to the sensing device 32. Another pair of pulling rollers 36 is provided similar to those shown at 30 but slightly larger in diameter (approximately .002") so that the tobacco web is maintained under proper tension while being gauged and corrected.

A pair of slitting rollers 38 is provided for shredding the web 26 into the desired form, from which it passes onto the endless tape 40 which passes over the series of rollers as shown, being driven by the drum 42. The tape 40 is plowed up into a U formation by suitable guides as is conventionally done so that in conjunction with the wheel 44 the tobacco strands are moulded into a continuous rod of substantially circular cross section. FIG. 2 shows how the wheel 44 and the tape 40 cooperate to achieve this end.

The top guide 46 scrapes the wheel 44 to strip the tobacco therefrom and acts as a top guide which extends along band 40 to the end of its travel. Here, the tobacco is transferred onto the paper or other (e.g. reconstituted tobacco) web 54 of continuous indefinite length which is supported on the endless tape 48 driven by drum 50 after which it passes through conventional apparatus to form a continuous rod which is cut into discrete lengths by the cutoff mechanism 60. The conventional apparatus here employed comprises the tongue 52 which gathers and compresses the tobacco into a substantially circular cross section smaller than the finished cigarette so that the web 54 may be partially wrapped around it, leaving one edge projecting to gather adhesive from the wheel 56, after which the pasted edge is plowed into contact with the opposite edge in which form it passes under the heated mechanism 58 which dries the adhesive completing the rod.

It will be understood that those who do not desire to use the mass sensing device 32 and the controlled trimmer 34 would have need for only one pair of pulling rollers 36, the rollers 30 being unnecessary in this case.

An enlarged view showing details of one suitable form of trimmer is shown at FIG. 3. With this apparatus it is proposed to trim one edge of the moving tobacco web 26 varying the width of the amount trimmed in response to a signal initiated by the gauge 32.

An electric motor 62 has fastened to it an extension bracket 64 which supports the motor shaft 66 carrying at its extremity a circular knife 68. A second shaft 70 is supported in the bracket 64 which shaft carries knife 72 being driven by gears 74. The knives 68 and 72 are shaped and positioned relative to each other to efficiently shear the web 26 passing between them when the motor 62 is energized.

The motor 62 is provided with a suitable base 76 by which it is slidably supported. The screw 80 is provided, which may be rotated by means of the worm wheel 82 and worm 84 which may be driven in either direction by the reversible electric motor 86 to move the motor assembly 62 and 64 relative to the web 26.

The mass sensing device 32 generates an electric current which is proportional to the mass of the web 26 passing through it. The current is amplified and manipulated by known means (not shown) and fed into the motor 86, which by the means described, positions the knives 68 and 72 relative to the web 26 to remove the requisite amount of material from one edge, leaving the remainder of the web 26 with uniform mass per unit length, which results in the cigarettes produced being of uniform mass per unit lengths.

FIG. 4 shows a side view of one form of slitter which may be used at 38. It consists of two stacks of complementary shear knives through which the web 26 passes, slitting it into continuous axial strands. If desired, the second of pulling rolls 36 may be shaped to crimp the

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strands to any desired patterns. FIG. 11 shows one suitable arrangement 36'.

FIG. 5 shows an alternative web shredding mechanism 38' which may be employed in position 38. This consists of an upper roller 88 on whose periphery is carried the desired pattern of V shaped cutting edges 90, 92, etc., which, in conjunction with the plain lower roller 94 comprises mechanism which is capable of "crush cutting" the web fed between the rolls. These rolls are driven in timed relationship with the remainder of the machine so that the desired pattern of cut strands may be repeatedly provided in each cigarette produced.

It will be understood that the pattern arrangement of the knives carried on roller 88 is limitless, making possible any desired strand arrangement in the cigarette, for with the mechanism described, the cut strands will be transferred into the cigarette rod forming mechanism undisturbed, making possible full control of strand orientation in the finished article.

FIG. 6 shows a lateral pattern which may be left joined together by narrow longitudinal strands at intervals across the width, the example illustrated showing lateral strands at the edges only.

FIG. 7 shows a chevron pattern joined laterally at the edges and center.

FIGS. 8 and 9 show curved patterns and connections between the strands being left at any desired points, or it may be made with no connections at all, although some connections are desirable, to ensure that the strands are conveyed to the finished cigarette in a substantially unchanged position.

It will be understood by those versed in the art that various strand orientations will result in cigarettes of differing degrees of "firmness." For instance, if all the strands are arranged diametrically across the cigarette it will feel much harder and firmer than it would if the same weight of strands were arranged longitudinally. Alternatively, the longitudinal strands will provide a more stable cigarette end.

In order to obtain the advantages of both of these strand arrangements in a single cigarette, the tobacco web may be cut as shown in FIG. 10, the diametrical strands 96 being provided for the body of the cigarette while the longitudinal strands 98 are provided for the ends. The repeatable pitch of this arrangement will be equal to the finished cigarette lengths so that the ends will be cut on the lines 100, producing the desired result.

FIG. 12 shows yet another roller arrangement 38'' for position 38. Each roller is provided with a coating V projection to run longitudinally along the web. These rolls will not be set closely together but will be set just far enough apart to cause each V projection to stretch the web causing incipient longitudinal tears which will be of a random nature.

FIG. 13 shows another groove arrangement, one of many which may be employed for rollers shown in FIGS. 11 and 12.

It is obvious that a smoking article may be made with tobacco in forms different from the shredded tobacco commonly employed in cigarettes, indeed some cigars have always been made from bunches of large pieces of tobacco leaves crumpled together into the desired shape and density.

FIG. 14 shows apparatus similar to that shown in FIG. 1 which is adapted for this class of work. The bobbin of tobacco sheet 20 is mounted as before, the tobacco web 26 passing through guide 28, being pulled from the bobbin 20 by means of pulling rollers 30.

If the mass sensing device is used, the sensing apparatus 32, the controlled slitting device 34 and the second pulling rolls 36 are provided after which the web passes through a trumpet shaped guide 102 which crumples the web and gathers it into a small compass prior to laying on to tape 40 where it is drawn into the apparatus to

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be formed into a finished rod exactly as described in reaction to FIG. 1. It will be understood that the tobacco stream so formed will fit tightly in the U shape of tape 40 under wheel 44 so as to provide sufficient tension in the web to pull it through the trumpet 102.

In its simplest form, trumpet 102 may be similar to that shown in FIG. 15 consisting of a simple hollow cone configuration, the large end being adapted to receive the tobacco web, the small end being of suitable size to permit of reasonably free movement of the crimped web.

FIG. 16 shows an alternative 102' of a metal sheet bent to the desired shape, which may be altered to produce various results, folded over itself and also tapering from the large entrance end to the small exit end. The web of tobacco is threaded into the space between the surfaces of the plate so that the crimping which will occur as it progresses from the large to the small end is under control.

FIG. 17 shows another arrangement 102'' as an alternative for the trumpet 102 comprising two corrugated sheets of metal tapering from one end to the other. The tobacco sheet is passed through the space between the corrugations to control the crimping which takes place as the web passes from the large to the small end.

FIG. 18 shows another alternative 102''' for 102 being the special case of a circular form of the apparatus shown in FIG. 16.

In addition to this longitudinal crimping the web may be crimped by rollers of the general type shown in FIG. 11 or partially split by rollers of the general type shown in FIG. 12.

It will be noticed that part of the mechanism shown in FIGS. 1 and 14 which is to the left of the roller over which the web 54 enters the apparatus is quite separate from the apparatus to the right. It is therefore possible to drive these two separate portions of the mechanism at different speeds.

Thus, if the R. H. apparatus is driven faster than the L. H. apparatus the tobacco will be crowded together or shortened axially as it is transferred onto the web 54. By so employing different velocities the characteristics of the crimping of the tobacco in the finished articles may be adjusted and at the same time the mass per unit length of the cigarette may be changed in relation to the specific tobacco web whose mass per unit length may be less than that of the article produced.

By making a mass measurement of the finished article a signal may be obtained whereby the velocity of the R. H. apparatus may be varied relative to that of the L. H. apparatus in such a manner that the mass per unit length of the finished article may be maintained constant, in spite of variations existing in the mass per unit length of the tobacco web supplied.

Alternatively, a mass measurement of the web may be made at position 32, FIG. 1 and the correcting apparatus 34 may be omitted, the signal from the mass measurement changing the velocity of the R. H. apparatus in such a manner that the mass per unit length of the finished article is maintained constant in spite of variations in the mass per unit length of the web.

The invention being described above may be varied in construction within the scope of the claims, for the variations of the device selected to illustrate the invention are only a few of the many possible embodiments of the same. Also various combinations of the different mechanisms may be employed according to the particular end result required. The invention, therefore, is not to be restricted to the precise details of the structures shown and described.

What is claimed is:

1. A smoking article comprising strands of tobacco encased in a wrapper sheet in which all the strands are integrally joined at their ends and in which a major portion of the strands are arranged substantially normal to

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the axis of the article to provide greater firmness with less tobacco than would otherwise be obtainable.

2. A smoking article comprising strands of tobacco encased in a wrapper sheet in which the orientation of these strands in one portion of the article is entirely substantially axial of the article and in another major part of the article is entirely substantially in planes at right angles to the strands in said one portion.

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