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2,924,223

METHOD AND APPARATUS FOR PRODUCING PERFORATED CIGARETTES

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2 Sheets-Sheet 1

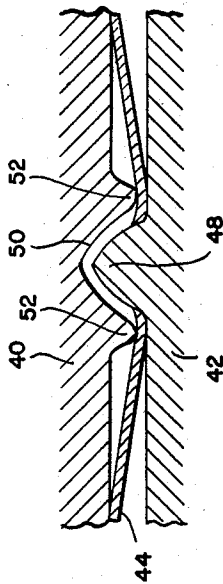


FIG. 4.

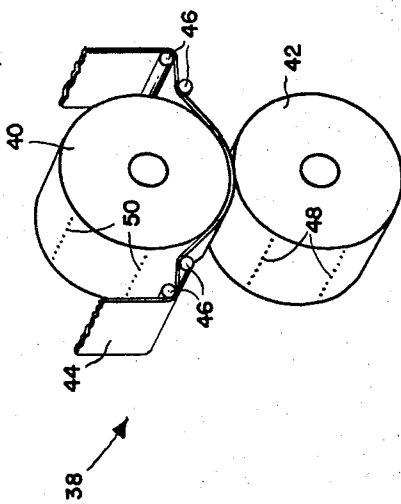


FIG. 3.

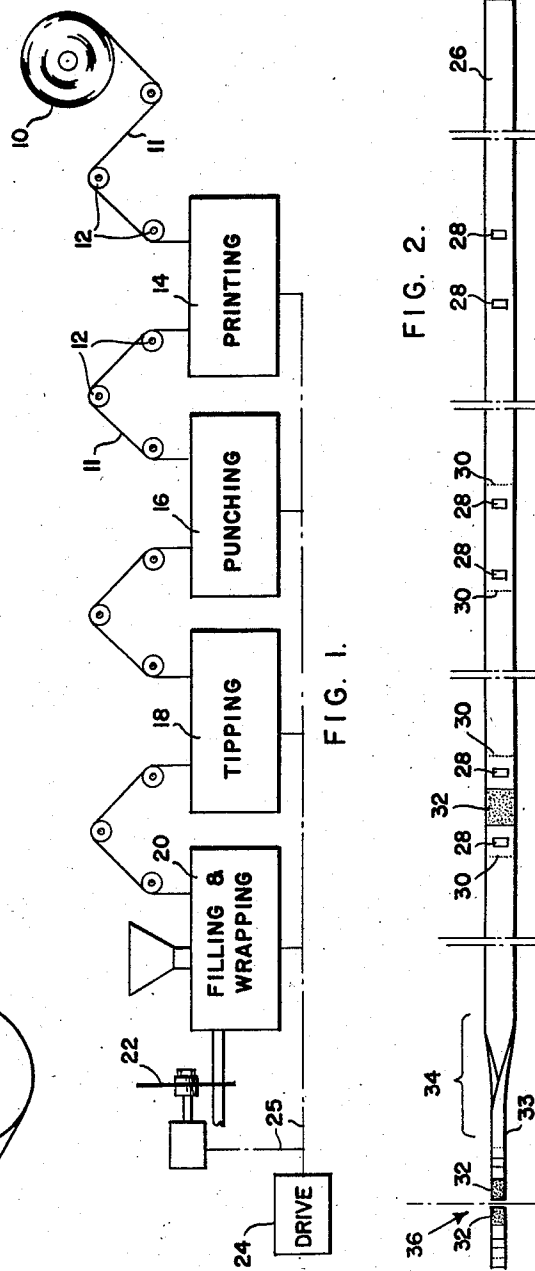


FIG. 1.

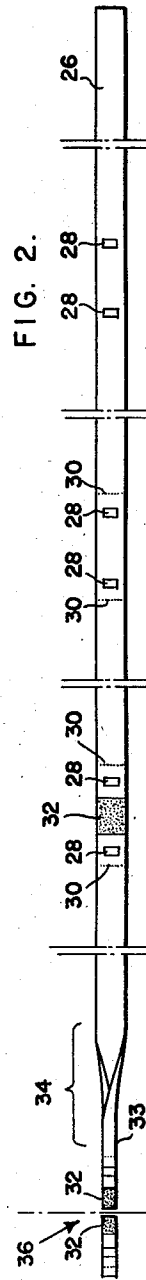


FIG. 2.

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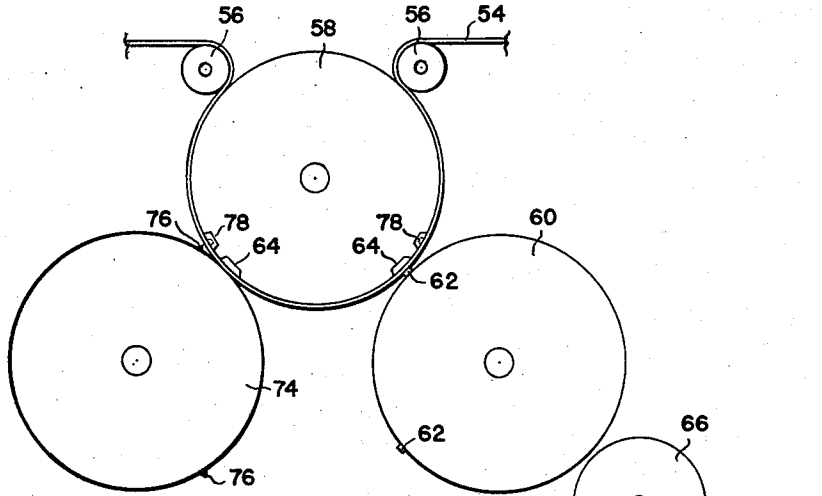


FIG. 5.

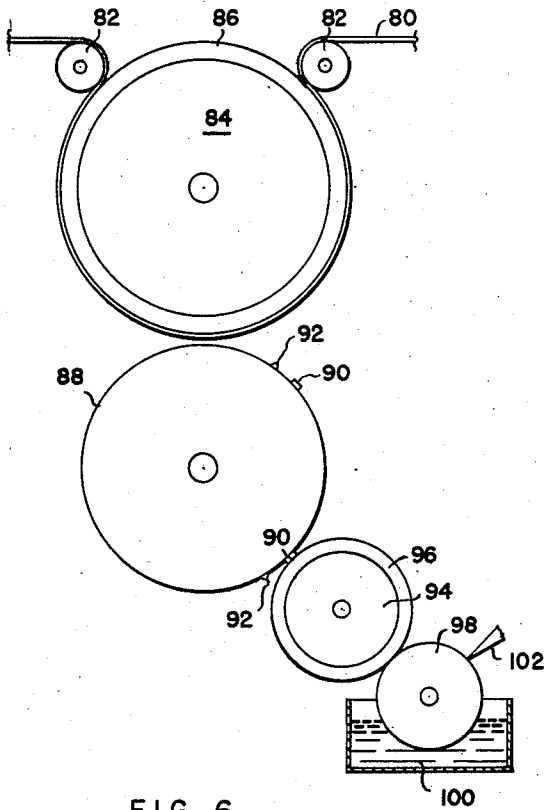


FIG. 6.

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**METHOD AND APPARATUS FOR PRODUCING PERFORATED CIGARETTES**

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Application April 4, 1956, Serial No. 576,098

6 Claims. (Cl. 131-24)

This invention relates to a method and apparatus for producing perforated cigarettes and, more particularly, to a method and apparatus for producing a cigarette having an annular array of openings through the wrapper thereof adjacent to the end held by the smoker.

The use of smoking tobacco is today both well known and wide spread in spite of the fact that it is recognized by some authorities that smoking is injurious to the delicate membranes of the nose and throat of the smoker and is credited with inducing cancer of the mouth, throat and lungs and with inducing heart ailments.

The principal products of tobacco smoke are carbon dioxide, carbon monoxide, water vapor, acid fumes, nicotine vapors and tars. The first of these products is not generally regarded as harmful to the smoker. The remainder of these products are generally considered harmful and, even though only a small proportion of the total quantity of these products resulting from the combustion of the entire cigarette actually enter the smoker's system, that quantity is sufficient to be considered by some authorities as being harmful to the smoker as noted above.

It is particularly noted that the air drawn through a burning cigarette has substantially all of the oxygen removed therefrom and the various combustion products drawn into the mouth and lungs of the smoker are at a substantially elevated temperature which further contributes to the degree of harm produced by the harmful products of combustion noted above.

Various means have been employed in attempts to reduce the harmful effects of the heated oxygen-free combustion products on the smoker. Various chemicals have been employed in admixture with the tobacco in an endeavor to nullify the harmful ingredients of the smoke. These chemical additives have, in some cases, produced more harmful results than would have been created by the conditions which were sought to be overcome. Numerous types of mechanical filters have been devised. These filters generally accomplish little more than a removal of the larger tar globules in suspension in the cigarette smoke. Beyond this, cigarette filters are generally of little value.

It is the primary object of the present invention to provide a method and apparatus for producing a cigarette which will provide the smoker with a cooler smoke which has been made less harmful and more pleasing to the smoker by the addition of oxygen to the smoke drawn into the mouth and lungs of the smoker as well as by the reduction of the temperature of the smoke drawn into the mouth and the lungs of the smoker.

It is a further object of the invention to provide for a cooling of the cigarette smoke before it passes through the end of the cigarette held by the smoker, and to thus increase the effectiveness of a filter built into the cigarette or to increase the effectiveness of the tobacco in the cigarette which, in part, acts as a filter and provides surfaces upon which the less volatile products of combustion may condense.

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It may be noted that, at least with regard to cooling and condensation of the less volatile products of combustion, various cigarette holders provided with filtering or cooling means may produce the same general effect.

5 However, by my invention, I achieve this effect without the need for the use of inconvenient and relatively expensive cigarette holders and provide the further beneficial effect of the addition of oxygen to the gases drawn through the cigarette.

10 These and other objects of the invention will become evident from the following description when read in conjunction with the accompanying drawings in which:

Figure 1 is a diagrammatic representation of apparatus performing various operations on an extended length of cigarette wrapper in the manufacture of cigarettes;

Figure 2 is a diagrammatic showing of a strip of cigarette wrapper paper on which the various operations have been successively performed;

Figure 3 is a fragmentary showing of apparatus for perforating the cigarette paper;

Figure 4 is a greatly enlarged showing of a fragmentary portion of the apparatus shown in Figure 3;

Figure 5 is an embodiment of a modified form of the invention; and

Figure 6 is a showing of an alternative embodiment of the form of the invention shown in Figure 5.

In Figure 1 there is shown diagrammatically the course of a strip of cigarette wrapper paper 11 which is carried from a reel 10 over various guiding rollers 12 through the successive stages of printing, as indicated at 14, punching as indicated at 16, tipping as indicated at 18, wrapping and filling as indicated at 20 for the production of a continuous cigarette rod, and shearing as indicated at 22 for the production of individual cigarettes. The various operation performing devices may be driven in synchronism from a drive means indicated at 24 and the various operations synchronized with regard to successive cigarette lengths on the paper strip as indicated at 25 in accordance with well known practice. Filling, tipping and printing operations are shown in the patent to Arelt 2,208,504, and printing synchronizing operations are shown in the patent to Friedwald 2,366,187. These various operations are entirely conventional and apparatus therefor need not be described in detail herein.

In Figure 2 there is shown a strip of cigarette wrapping paper 26 on which manufacturer identifying indicia 28 has been printed by means of printing apparatus such as shown at 14 in Figure 1. The strip 26 is then provided with transversely extending rows of perforations 30 adjacent to the indicia bearing areas 28 by means of the punching apparatus shown at 16 in Figure 1. Following the punching apparatus a double length tip 32 is applied between the indicia bearing areas 28 by the tipping apparatus shown at 18 in Figure 1. A cigarette rod 33 is formed in the region 34 by the filling and wrapping apparatus shown at 20 in Figure 1, and the tipped portion of the cigarette rod is severed intermediate the ends thereof as shown at 36 by the severing means shown at 22 in Figure 1. It will be evident that the butt-to-butt arrangement of cigarettes is employed in order to permit some degree of tolerance in the cutting. If tipping material is not employed, the cigarettes can equally well be manufactured with all of the butt ends in one direction along the strip and, in this instance, equal spacing would appear between the printed places and the perforated areas of successive cigarettes in the strip.

In Figure 3 there is shown generally at 38 one form of perforating or punching apparatus employing a pair of rollers 40 and 42. The cigarette wrapper strip 44 is carried around a substantial portion of the roller 40 by means of guide rollers 46. The roller 42 is of a circum-

ference equal to the length of two cigarettes and is provided with two transversely extending rows of projections 48 of size and spacing to provide the desired size and number of holes in the cigarette wrapper. The rows of perforations 48 are spaced apart at proper spacing as required between the rows of perforations 30 shown in Figure 2. Two rows of projection receiving depressions 50 are provided in the roller 40 which also has a circumference equal to the length of two cigarettes. The rollers 40 and 42 are driven in synchronized relation in order that each row of projections 48 meshes with a row of recesses 50 in the roller 40.

Figure 4 is a greatly enlarged showing of a fragmentary portion of the rollers 40 and 42 positioned with a projection 48 entered within the projection receiving recess 50. The paper strip 44 passes between the two rollers and is pressed against the surface of the roller 42 by means of a projecting rim 52 positioned around the recess 50. It will be observed from Figure 4 that the adjacent surface of the rollers 40 and 42 are sufficiently spaced that the cigarette wrapper 44 may pass between the two rollers without having pressure applied thereto except for the brief intervals during which perforations are being formed in the wrapper. The arrangement not only permits increased pressure during the perforating operation, but also facilitates take-up of the wrapper strip as is necessary to maintain proper synchronization between the printing, punching and tipping operations in order to provide for proper register of the printing, the perforations, the tips in each cigarette length.

By carrying the cigarette wrapper 44 around a substantial portion of the roller 40 and by providing rollers 40 and 42 which are at least the length of two cigarettes, the perforating projection 48 may enter and leave the cigarette wrapper without tearing the wrapper along the longitudinal length thereof.

While the arrangement discussed thus far contemplates separate printing and punching operations, these operations may desirably be combined to the extent that they are performed against a common back-up roller. Such an arrangement is shown in Figure 5 in which a wrapper strip 54 passes over guide rollers 56 and around a major portion of a mandrel roller 58 which has a circumference equal to twice the length of a cigarette.

A printing roller 60, which also has a circumference equal to twice the length of a cigarette, carries projecting type faces 62 adapted to print desired indicia upon the cigarette wrapper 54 and positioned so as to bear upon the surface of the roller 58. Inserts 64 are provided in the surface of the roller 58 at spaced intervals thereon equal to the spacing between the type 62 in order to provide suitable surfaces against which the printing type may bear. It will be evident that the rollers 58 and 60 are driven in synchronism and are properly phased in order that the type 62 and the type cooperating inserts 64 will come into engagement with each other in order to properly effect printing of the strip wrapper.

Ink is applied to the type faces 62 in any conventional fashion such as, for example, by means of an inking roller 66 which is in engagement with a roller 68 located in an ink bath 70 and provided with a scraper 72 for controlling the thickness of the ink layer carried out of the bath by the roller 68.

A third roller 74 also has a circumference equal to twice the length of a cigarette and carries two rows of perforating projections 76 properly spaced to provide rows of perforations in the wrapper at desired intervals. The mandrel roller 58 is provided with rows of projection receiving recesses 78 positioned thereon in properly spaced relation to receive the rows of projections 76. The rollers 74 and 58 are synchronized and properly phased so as to provide for entrance of the projections 76 into the recesses 78 upon rotation of the rollers and the three rollers 58, 60 and 74 and the various operation performing elements thereon are so positioned as to provide on

the cigarette wrapper passing therebetween rows of perforations and areas of printed indicia in the manner similar to the printings 28 and perforations 30 shown on the strip 26 in Figure 2.

It will be evident that the arrangement shown in Figure 5 may employ a similar arrangement of projections, recesses and rims around the recesses as shown at 48, 50 and 52, respectively, in Figure 4. It will also be evident that the arrangement shown in Figure 5 minimizes the synchronizing and phasing problems involved in providing printing and perforating on the cigarette wrapper strip in proper spaced relation.

In the embodiment of the invention shown in Figure 6 a wrapper strip 80 passes over guide rollers 82 and around a mandrel roller 84. The roller 84 is provided with a surface layer 86 of yielding material such as, for example, a suitable hard rubber against which both printing and perforating may be accomplished. Acting in conjunction with the roller 84 is a roller 88 carrying, projecting from its surface, spaced type faces 90 and perforation performing projections 92. The roller 88 has a circumference equal to twice the length of a cigarette and the type faces 90 and the rows of projections 92 are properly spaced to provide rows of perforations and printing such as indicated at 28 and 30 in Figure 2. The yielding surface 86 of the roller 84 is normally positioned out of engagement with the surface of the rollers 88 but the spacing between these rollers is such that the perforation performing projections 92 and type faces 90 will bear against the yielding surface 86 and accomplish the desired perforation performing and printing of the wrapper strip 80. The circumference of the surface of the roller 84 is preferably somewhat greater than the circumference of the roller 88 and selected so as not to be any even multiple of the spacings between the type faces 90 and/or the perforation performing projections 92. Thus the working of the surface 86 of the roller 84 during printing and perforating will be distributed over the entire surface of the roller 84 and uneven wear over any portion of this surface will be avoided.

An inking roller 94 provided with a deformable surface 96 is positioned to be engaged by the type faces 90 for the transfer of ink to the type faces. It will be evident that the projections 92 will extend somewhat beyond the radially outermost point of extension of the type faces 90 and will thus depress the surface 96 of the inking roller. The circumference of the inking roller is selected to be something other than an even multiple of the distances between the type faces 90 and/or the projections 92, and thus wear will be distributed over the surface of the roller 94. While ink will be applied to the projections 92 by the inking roller as well as to the type faces 90, this inking is not objectionable for the reason that the perforations in the cigarette ultimately formed will be a desirable feature and it is desirable that the existence of these perforations be accentuated by a slight ink mark. Ink is applied to the inking roller 96 by means of a conventional ink carrying roller 98 rolling in an ink bath 100 and having the ink layer thereon controlled by a scraper 102.

The circumference of the perforation projection carrying rollers shown in Figures 3, 5 and 6 and of the type carrying rollers shown in Figures 5 and 6 have been described as being equal to the length of two cigarettes. These rollers may, if desired, have a circumference equal to more than two cigarettes and, if the cigarettes are not formed in a butt-to-butt arrangement as shown in Figure 2, the rollers may be of a circumference equal to an uneven number of cigarettes. It is essential, however, that in the perforation performing operations coating rollers of sufficient diameter be employed so that the wrapper strip and the perforation performing projection come together and separate with sufficiently little angular displacement between a perpendicular to the paper surface

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and the longitudinal axis of the projection that longitudinal tearing of the strip is avoided. If it is considered that a cigarette wrapper has a thickness of the order of 0.002 inch and a perforation be provided of the order of 0.010 inch in diameter, it will be recognized that the diameter of the perforation performing punch will be sufficiently greater than its necessary length to permit the roller perforating employed, provided suitable roller diameters are maintained.

What is claimed is:

1. Apparatus for producing cigarettes comprising means for filling and wrapping a strip of paper to form a cigarette rod, means for feeding a strip of paper from a supply thereof to said filling and wrapping means, means for cutting the continuously formed rod into cigarette lengths, means providing a convex surface between said strip supply and said filling and wrapping means, means for passing the strip over said convex surface, and means acting against said surface for printing and perforating each of successive cigarette lengths of the strip.

2. Apparatus for producing cigarettes comprising means for filling and wrapping a strip of paper to form a cigarette rod, means for feeding a strip of paper from a supply thereof to said filling and wrapping means, means for cutting the continuously formed rod into cigarette lengths, a roller positioned between said strip supply and said filling and wrapping means, means for passing the strip around a portion of said roller, a second roller positioned adjacent to said first mentioned roller, said first and second mentioned rollers mounting means providing in combination for applying printing on and providing a transversely spaced row of perforations in each of successive cigarette lengths of said strip.

3. Apparatus for producing cigarettes comprising means for filling and wrapping a strip of paper to form a cigarette rod, means for feeding a strip of paper from a supply thereof to said filling and wrapping means, means for cutting the continuously formed rod into cigarette lengths, a roller positioned between said strip supply and said filling and wrapping means, means for passing the strip around a portion of said roller, a second roller positioned adjacent to said first mentioned roller, said first and second mentioned rollers mounting means providing in combination for applying printing on and providing a transversely spaced row of perforations having printed edges in each of successive cigarette lengths of said strip.

4. Apparatus for producing cigarettes comprising means for filling and wrapping a strip of paper to form a cigarette rod, means for feeding a strip of paper from a supply thereof to said filling and wrapping means, means for cutting the continuously formed rod into cigarette lengths, a roller positioned between said strip supply and said filling and wrapping means, means for passing the strip around a portion of said roller, a second roller positioned adjacent to said first mentioned roller, said first and second rollers mounting means acting in combination for printing successive cigarette lengths of the strip, and said first and second rollers mounting means in combination producing a transversely extending row of perforations across each of successive cigarette lengths of said

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strip, said last mentioned means including a projection on one of said rollers and a projecting rim on the other of said rollers surrounding a depression adapted to receive the projection.

5. Apparatus for producing cigarettes comprising means for filling and wrapping a strip of paper to form a cigarette rod, means for feeding a strip of paper from a supply thereof to said filling and wrapping means, means for cutting the continuously formed rod into cigarette lengths, a roller positioned between said strip supply and said filling and wrapping means, means for passing the strip around a portion of said roller, a second roller positioned adjacent to said first mentioned roller, said first and second rollers mounting means acting in combination for printing successive cigarette lengths of the strip, and said first and second rollers mounting means in combination producing a transversely extending row of perforations across each of successive cigarette lengths of said strip, said last mentioned means including a projection on one of said rollers and a projecting rim on the other of said rollers surrounding a depression adapted to receive the projection, and means for applying ink to one of said rim and projection.

6. Apparatus for producing cigarettes comprising means for feeding a strip of paper from a supply thereof, means for continuously filling and wrapping said strip to form a cigarette rod, means for cutting the continuously formed rod into cigarette lengths, and means interposed between said feeding means and filling and wrapping means for producing a transversely extending row of perforations across each successive cigarette length of said strip, the last-recited means comprising: a pair of rollers disposed at opposite sides of said strip and driven in opposite directions but at the same peripheral speed, projections on one of said rollers arranged substantially in a row, means for passing the strip around a substantial portion of the other of said rollers, said other roller having depressions therein, adapted to receive said projections, and projecting rim portions surrounding said depressions, said rim portions being adapted to engage and grip said strip in the areas thereof surrounding the perforations formed by said projections, whereby tearing of the strip is prevented and synchronism of the apparatus is maintained.

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