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(54) **METHOD OF AND APPARATUS FOR SIMULTANEOUSLY MAKING PLURAL RODS OF SMOKABLE MATERIAL**

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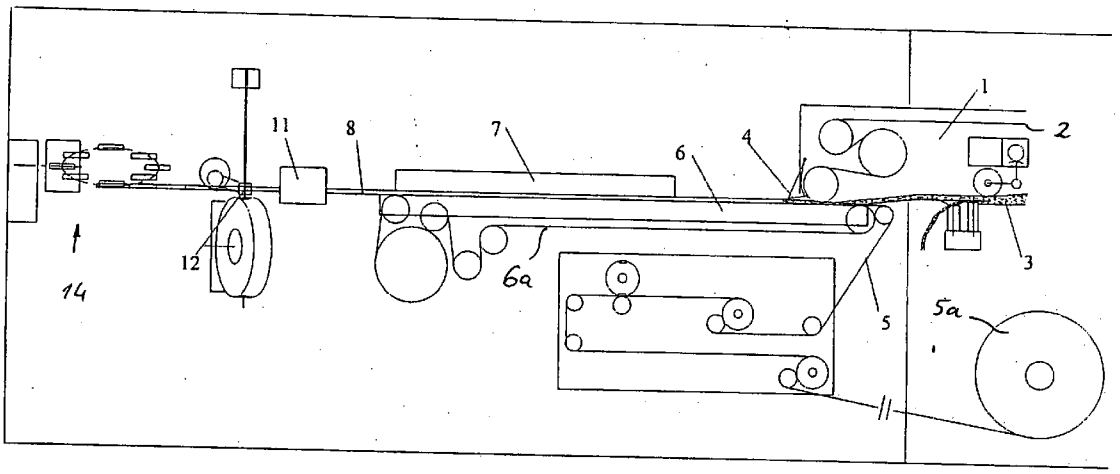
(57) **ABSTRACT**

The invention relates to a method of and to an apparatus for at least substantially simultaneously producing at least two wrapped rod-like fillers of smokable material. The fillers are advanced lengthwise along discrete paths having spaced-apart upstream portions where the fillers are draped into discrete webs of cigarette paper or the like, and downstream portions which are nearer to each other than the upstream portions and wherein the draped fillers are severed at least substantially simultaneously to yield discrete series of successive rod-shaped cigarettes or the like having desired lengths. The distance or distances between discrete paths can decrease gradually along the upstream portions of such paths, the minimum distance can be less than the width of a web, and the maximum distance can match or exceed the width of a web.



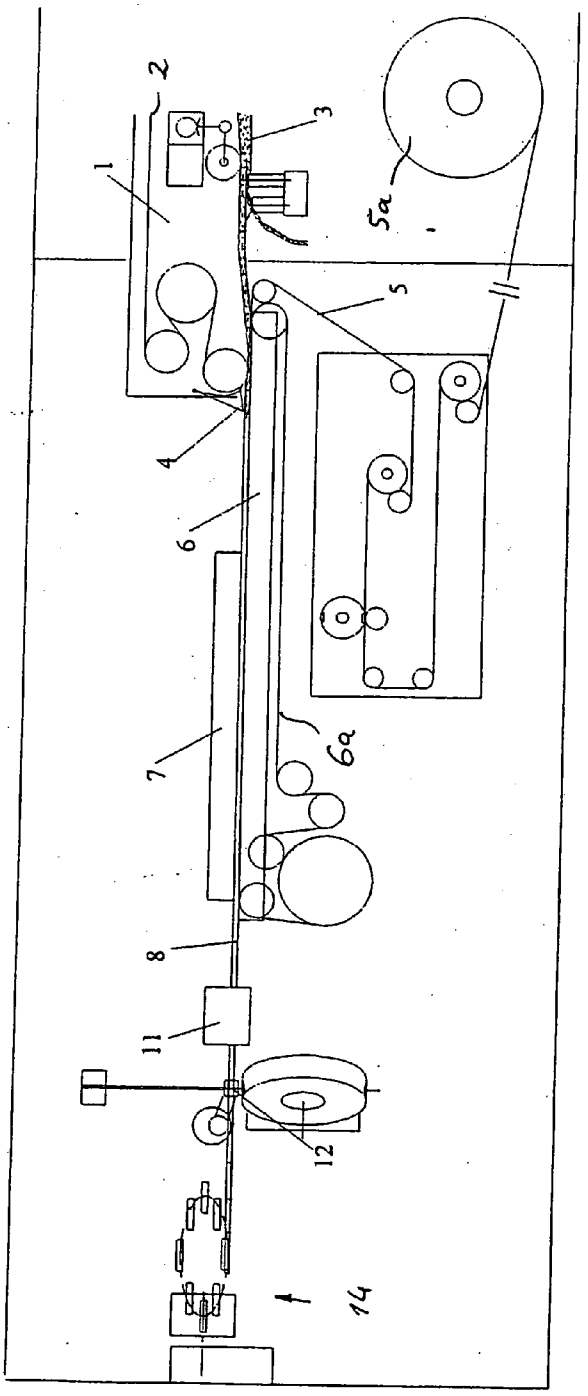


Fig. 1

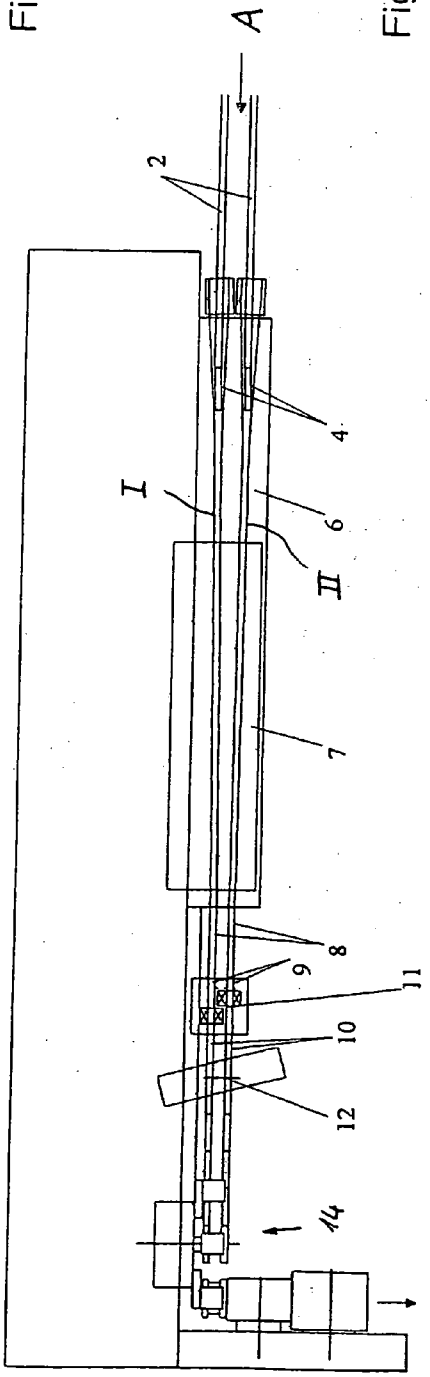


Fig. 2

METHOD OF AND APPARATUS FOR SIMULTANEOUSLY MAKING PLURAL RODS OF SMOKABLE MATERIAL

CROSS-REFERENCE TO RELATED CASES

[0001] This application claims the priority of the commonly owned copending European patent application. Serial No. 03 025 598.8 filed Nov. 7, 2003.

[0002] The disclosure of the above-referenced European patent application, as well as the disclosures of all other patent applications, patents and other publications identified in the specification of the present application, are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0003] The present invention relates to improvements in methods of and in apparatus for making rods which contain smokable material, such as natural tobacco, artificial tobacco, reconstituted tobacco and the like. More particularly, the invention relates to improvements in methods of and in apparatus for essentially simultaneously producing a plurality of (e.g., at least two) rods of the type wherein tubular wrappers consisting of cigarette paper or the like surround rod-like fillers of smokable material. Typical examples of such rods are those which can be subdivided into cigarettes, cigars or cigarillos of unit length or multiple unit length.

[0004] It is well known to simultaneously produce pairs of rods which consist of rod-like fillers containing a smokable material and tubular wrappers which surround the fillers and can consist of cigarette paper or the like. Examples of methods of and machines or apparatus for simultaneously producing plural tobacco-containing rods are those disclosed in commonly owned U.S. Pat. No. 5,072,741 (granted Dec. 17, 1991 to Heitmann for "METHOD OF AND APPARATUS FOR SIMULTANEOUSLY MAKING PLURAL TOBACCO FILLER STREAMS") and U.S. Pat. No. 4,893,640 (granted Jan. 16, 1990 to Heitmann et al. for "MULTIPLE-ROD CIGARETTE MAKING MACHINE").

[0005] As a rule, or at least in many instances, each conventional apparatus employs means for at least substantially simultaneously forming and trimming plural tobacco streams, means for thereupon advancing the trimmed streams (called fillers) through one or more wrapping mechanisms wherein the streams are draped into webs of cigarette paper or the like, and means (known as cutoffs) for subdividing the thus obtained wrapped fillers into discrete smokers' products of unit length or multiple unit length. The wrapped fillers are advanced along discrete paths which lead to the subdividing means.

[0006] Problems are likely to arise if the wrapped fillers are advanced at a relatively high or very high speed, such as is resorted to in modern cigarette making and like machines. For example, the severing of plural discrete wrapped tobacco fillers into discrete rod-shaped smokers' products of desired length is likely to entail the development of dynamically generated problems involving the quality of the cuts across the fillers and their wrappers, premature fatigue of certain component parts of the advancing, trimming, wrapping and subdividing units in such machines or apparatus, and the generation of excessive noise which is particularly unpleasant when large numbers (e.g., hundreds) of cigarette making or analogous machines are installed in a common hall of a cigarette making or similar plant.

OBJECTS OF THE INVENTION

[0007] An important object of the instant invention is to improve the methods and apparatus of the above outlined character so that they are less likely to exhibit the drawbacks of presently known apparatus and methods, especially as concerns the generation of noise, fatigue of certain parts and/or the quality of the ultimate products.

[0008] Another object of this invention is to provide a cigarette making or like machine or apparatus with novel and improved means for guiding at least two streams, fillers and/or rods of comminuted smokable material along discrete paths, at least during certain stages of transport of such commodities in the machine or apparatus.

[0009] A further object of the invention is to provide a method and an apparatus of the above outlined character wherein the wrapped fillers of smokable material are guided to the cutoff or cutoffs in a novel and improved way.

[0010] An additional object of the present invention is to provide a machine for the making of cigarettes or analogous rod-shaped smokers' products wherein the making of such products involves resort to apparatus of the above outlined character.

[0011] Still another object of the invention is to provide a method which can be practiced by resorting to the improved apparatus and which ensures the making of high-quality cigarettes or analogous rod-shaped smokers' products regardless of the selected speed of the apparatus.

[0012] A further object of this invention is to turn out high-quality rod-shaped smokers' products by resorting to the improved method and apparatus.

SUMMARY OF THE INVENTION

[0013] One feature of the present invention resides in the provision of an apparatus for simultaneously producing at least two wrapped rod-like fillers of smokable material. The apparatus comprises means for advancing the fillers lengthwise in a predetermined direction along discrete paths having first portions disposed at a first distance from each other, means for confining the fillers in discrete tubular wrappers in the first portions of the respective paths, and means for subdividing the thus confined fillers into series of discrete rod-shaped smokers' products in second portions of the respective paths located downstream of the respective first portions, as seen in the predetermined direction. In accordance with an important feature of the invention, the second portions of the paths are disposed at a second distance from each other less than the first distance.

[0014] The mutual spacing of the paths can decrease gradually as seen in the predetermined direction.

[0015] The advancing means can include discrete conveyors which are adjacent at least the first portions of the aforementioned paths.

[0016] The second distance is or can be fixed in the region of the subdividing means, and the paths can converge toward each other at least substantially gradually upstream of their second portions.

[0017] The arrangement can be such that the first portions of the paths converge toward each other at least during certain portions of advancement of the fillers in the range of the confining means.

[0018] The confining means can comprise a driven endless flexible conveyor for each of the fillers, and such conveyors can include elongated stretches which converge toward each other in the predetermined direction ahead (i.e., upstream) of the subdividing means.

[0019] The just mentioned conveyors can form part of means for draping the fillers into discrete elongated wrappers having predetermined widths greater than the second distance but preferably at most equal to the first distance. The second distance is or can be at least substantially constant.

[0020] In a presently preferred embodiment, the paths converge toward each other within the confining means, and the second distance is at least substantially constant downstream of the confining means.

[0021] Another feature of the present invention resides in the provision of a method of at least substantially simultaneously producing at least two wrapped rod-like fillers of smokable material. The method comprises the steps of advancing the fillers lengthwise in a predetermined direction along discrete elongated paths having first portions disposed at a first distance from each other, confining the fillers in discrete wrappers in the first portions of the respective paths, subdividing the thus confined fillers into individual series of discrete rod-shaped smokers' products in second portions of the respective paths downstream of the respective first portions, as seen in the predetermined direction, and maintaining the second portions of the paths at a second distance from each other less than the first distance.

[0022] The second distance is or can be at least substantially constant, and the first distance can decrease, at least substantially gradually, while the fillers undergo the confining treatment.

[0023] The confining step can include draping the fillers into webs consisting of cigarette paper or another suitable wrapping material and having a width less than the first distance. Such width can exceed the second distance.

[0024] The subdividing step can include repeatedly severing the confined fillers to form series of discrete plain cigarettes if the improved method is practiced with an apparatus which is installed in a cigarette making machine.

[0025] The first distance can include a narrowed or narrower portion which equals or approximates the second distance.

[0026] The wrappers can consist of cigarette paper and the advancing step can include advancing two fillers, particularly two identical fillers.

[0027] The novel features which are considered as being characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and the modes of assembling and operating the same, together with numerous additional important and advantageous features and attributes thereof, will be best understood upon perusal of the following detailed description of certain presently preferred specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

[0028] **FIG. 1** is a schematic side elevational view of certain parts of a cigarette making machine which is designed to simultaneously produce two series of plain cigarettes or the like and includes an apparatus embodying one form of the present invention; and

[0029] **FIG. 2** is a plan view of the structure which is shown in **FIG. 1**.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0030] The machine which includes the structure shown in **FIGS. 1 and 2** is designed to produce two rod-like fillers normally consisting of tobacco particles. (e.g., shreds of tobacco leaf laminae) and being arranged to advance lengthwise in a predetermined direction (see the arrow A in **FIG. 2**) along discrete elongated paths I and II the positions of which relative to each other and relative to certain constituents of the machine are selected in accordance with a feature of the present invention. The rod-like fillers can be constructed and admitted into the first or upstream portions of the respective paths I and II in a manner as disclosed in the aforementioned U.S. Pat. No. 4,893,640 or 5,072,741.

[0031] The character **1** denotes in **FIG. 1 a** housing having an open underside for the lower reaches of two prefeably foraminous (such as perforated) endless belt conveyors **2** which advance above a tobacco duct (not shown) and at the open underside of a suction chamber which attracts the ascending tobacco particles to the undersides of lower reaches of the belt conveyors **2** in order to gather two discrete rod-shaped tobacco fillers **3** (one can be seen in **FIG. 1**) in the first or upstream portions of the respective paths I and II. The means for driving the endless belt conveyors **2** is not shown in **FIGS. 1 and 2**; such driving means can include at least one electric motor or the like. **FIG. 1** further shows one of the trimming devices **3***a* which serve to remove surpluses of tobacco particles from the fillers **3** at the undersides of the lower reaches of the endless belt or band conveyors **2**.

[0032] As can be seen in **FIG. 2**, the first or right-hand portions of the paths I and II are spaced apart from each other a distance which decreases gradually in the direction indicated by the arrow A. For example, the maximum distance between the path portions at the housing **1** can equal or approximate the widths of uniting bands **5** (e.g., strips or webs of cigarette paper) which are applied to the fillers **3** in a wrapping or confining unit **6** serving to convert the fillers **3** and the respective webs or strips **5** into two discrete continuous cigarette rods **8**. The wrapping or confining unit **6** comprises so-called garnitures **6***a* which are endless belts or bands serving to draw the webs **5** off the respective bobbins or reels Sa of convoluted web material and cooperate with suitable pasters (not shown) which apply strips of adhesive to one longitudinally extending marginal portion of each web **5** before the webs are converted into tubular envelopes surrounding the respective trimmed fillers **3**.

[0033] The distance between the paths I and II decreases gradually in the direction which is indicated by the arrow A

while the fillers **3** in such paths advance through the wrapping mechanism **6** and toward a subdividing station accommodating one or two cutoffs **12** serving to subdivide each wrapped filler **3** (i.e., each continuous cigarette rod **8**) into a series of successive plain cigarettes of unit length or multiple unit length. Cigarettes of multiple unit length can be utilized, for example, in certain filter cigarette making machines wherein a plain cigarette of double unit length is severed midway between its ends to yield two plain cigarettes of unit length which are caused to provide room for a filter mouthpiece of double unit length between them. The filter is secured to the respective plain cigarettes of unit length by a piece of adhesive-coated tipping paper. Reference may be had, for example, to commonly owned U.S. Pat. No. 5,135,008 granted Aug. 4, 1992 to Oesterling et al. for "METHOD OF AND APPARATUS FOR MAKING FILTER CIGARETTES".

[**0034**] The belt conveyors **2** are spaced apart from each other a distance which is a function of the widths of the webs **5** of wrappping material. Such webs are drawn off the aforementioned bobbins or reels Sa only one of which can be seen in **FIG. 1**. The conveyors **2** advance the respective trimmed fillers **3** past discrete shaping fingers **4** which are adjacent the downstream end of the housing **1** and are slightly inclined relative to each other (see **FIG. 2**). The reason for such mutual inclination of the fingers **4** is to ensure that successive increments of the two fillers **3** advance sideways toward each other while simultaneously moving in the direction of the arrow A, namely toward and through the wrapping or confining unit **6** of the cigarette making machine. **FIG. 2** clearly shows that the distance between the paths I and II decreases gradually in a direction from the housing **2** toward and through the wrapping unit **6**.

[**0035**] The maximum distance between those (first) portions of the paths I and II which are located at the housing **1** and at the wrapping unit **6** can equal or approximate the width of one of the webs **5** of wrapping material, and the minimum distance between the downstream portions of such paths (i.e., between those portions which are remote from the fingers **4**) is preferably less than the width of a web **5**. The exact construction of the wrappping unit **6** forms no part of the present invention. As already mentioned hereinbefore, this wrapping unit comprises a paster which applies a strip of suitable adhesive to one side of one longitudinal marginal portion of each web **5**, and such marginal portions are caused to adhere to the other longitudinal marginal portions of the respective webs by the endless belts **6***a* (known as garnitures) of the wrapping unit **6**. Such garnitures can be driven by electric motor means or by any other suitable prime mover. As can be seen in **FIG. 1**, the garniture **6***a* which is shown therein engages the underside of the respective advancing filler **3** at or close to the location where the upper side of such filler is contacted by the respective finger **4**. The garniture **6***a* then proceeds to drape the respective web **5** of wrapping material around that portion of the filler **3** which advances from the finger **4** toward the cutoff **12**, i.e., along that (upstream) portion of the respective path (II) which converges toward the adjacent upstream portion of the path I.

[**0036**] The illustrated wrapping unit **6** further comprises or cooperates with a drying unit **7** which causes the adhesive between the overlapping marginal portions of the webs **5** to set sufficiently in order to prevent an opening of the seams during subdivision of the finished cigarette rods **8** by the cutoff **12**. The reference characters **11** denote in **FIGS. 1 and 2** a testing unit for the two cigarette rods; such testing unit is or can be installed close to or immediately upstream of the cutoff **12**. The conveyors **6***a*, the drying unit **7** and the garnitures **6***a* can be said to constitute component parts of the wrapping unit **6**. As already mentioned hereinbefore, those (upstream) portions of the paths I and II which extend along the fingers **4** and through the wrapping unit **6** converge toward each other in such a way that the maximum distances between them can equal or exceed the width of a spread-out web **5** and that the distance between the downstream portions of these paths a the cutoff **12** is less than the width of a web S.

[**0037**] Successive freshly confined increments of the two fillers **3** are surrounded by cylindrical or substantially cylindrical or oval (tubular) envelopes which advance through discrete guides **9** located downstream of the wrapping unit **6** and serving to establish downstream portions **10** of the paths I and II, namely those portions which are or which can be at least substantially parallel to each other and guide the respective cigarette rods **8** toward and in the cutoff **12**. The two rows of successive discrete cigarettes which are formed by the cutoff **12** advance to a further processing station **14**, e.g., to the aforedescribed part of a filter cigarette making machine of the type disclosed in U.S. Pat. No. 5,135,008 to Oesterling et al., to a cigarette packing machine, to storage or to another destination.

[**0038**] It has been ascertained that, by placing the portions **10** of the paths I and II close or very close to each other (i.e., closer than the upstream path portions at the fingers **4**), the cutoff **12** is much more effective than in apparatus wherein the paths for plural rod-like fillers of tobacco or the like are parallel to each other all the way between as well as at the filler forming and rod severing stations. This holds true even if the fillers are caused to advance at relatively high or very high speeds. The quality of cuts across the wrapped fillers (cigarette rods) **8** is surprisingly high and the component parts of the cutoff **12**, as well as of several other component parts, are less prone to undergo rapid fatigue than in presently known apparatus. Furthermore, the improved apparatus generates less noise than heretofore known apparatus; in fact, it has been ascertained that at least one of the aforementioned drawbacks (generation of excessive noise, fatigue of certain parts and unsatisfactory quality of the cuts across the fillers and their envelopes) can be eliminated, either entirely or for all practical purposes.

[**0039**] The feature that the distance between the paths I and II can be reduced to that which, in accordance with an aspect of the present invention, is best suited for transport of the wrapped fillers **8** through the severing unit **12** is desirable on the additional ground that this entails substantial savings in space requirements of the improved apparatus and of the machine which embodies such apparatus. Once the wrapped increments of the fillers **3** emerge from or advance beyond the wrapping unit **6**, their mutual spacing can remain unchanged and, as already mentioned hereinbefore, is preferably less than the width of a web **5** of wrapping material.

[**0040**] Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the stand-

point of prior art, fairly constitute essential characteristics of the generic and specific aspects of the above outlined contribution to the art of simultaneously making plural rods of smokable material and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the appended claims.

What is claimed is:

1. Apparatus for simultaneously producing at least two wrapped rod-like fillers of smokable material, comprising:

means for advancing the fillers lengthwise in a predetermined direction along discrete paths having first portions disposed at a first distance from each other;

means for confining the fillers in discrete tubular wrappers in said first portions of the respective paths; and

means for subdividing the thus confined fillers into series of discrete rod-shaped smokers' products in second portions of the respective paths located downstream of the respective first portions, as seen in said direction, said second portions of the paths being disposed at a second distance from each other less than said first distance.

2. The apparatus of claim 1, wherein the mutual spacing of said paths decreases gradually as seen in said direction.

3. The apparatus of claim 1, wherein said advancing means includes discrete conveyors adjacent at least said first portions of said paths.

4. The apparatus of claim 1, wherein said second distance is fixed in the region of said subdividing means.

5. The apparatus of claim 3, wherein said paths converge toward each other at least substantially gradually upstream of said second portions thereof.

6. The apparatus of claim 1, wherein said first portions of said paths converge toward each other at least during portions of advancement of the fillers in the range of said confining means.

7. The apparatus of claim 1, wherein said confining means comprises a driven endless flexible conveyor for each of the fillers, said conveyors having elongated stretches which converge toward each other in said direction ahead of said subdividing means.

8. The apparatus of claim 1, wherein said confining means includes means for draping the fillers into discrete elongated wrappers having predetermined widths greater than said second distance.

9. The apparatus of claim 8, wherein said first distance at least equals the widths of said wrappers.

10. The apparatus of claim 1, wherein said second distance is at least substantially constant.

11. The apparatus of claim 1, wherein said paths converge toward each other within said confining means and said second distance is at least substantially constant downstream of said confining means.

12. A method of at least substantially simultaneously producing at least two wrapped rod-like fillers of smokable material, comprising the steps of:

advancing the fillers lengthwise in a predetermined direction along discrete paths having first portions disposed at a first distance from each other;

confining the fillers in discrete wrappers in said first portions of the respective paths;

subdividing the thus confined fillers into series of discrete rod-shaped smokers' products in second portions of the respective paths downstream of the respective first portions, as seen in said direction; and

maintaining said second portions of said paths at a second distance from each other less than said first distance.

13. The method of claim 12, wherein said second distance is at least substantially constant.

14. The method of claim 12, wherein said first distance decreases at least substantially gradually while the fillers undergo said confining step.

15. The method of claim 12, wherein said confining step includes draping the fillers into webs consisting of a wrapping material and having a width less than said first distance.

16. The method of claim 15, wherein said width exceeds said second distance.

17. The method of claim 12, wherein said subdividing step includes repeatedly severing the confined fillers to form series of discrete plain cigarettes.

18. The method of claim 12, wherein said first distance has a narrowed portion at least approximating said second distance.

19. The method of claim 12, wherein the wrappers consist of cigarette paper.

20. The method of claim 12, wherein said advancing step includes advancing two fillers.

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