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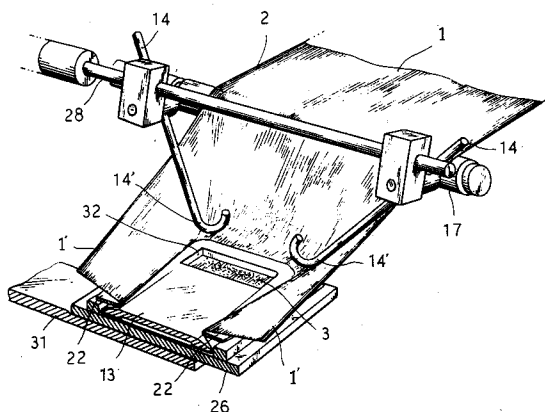
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54 **Cigarette filter rod, method and apparatus for producing the same.**

57 The invention relates to a paper cigarette filter rod for being continuously connected to an end of a cigarette in which creases (2) for absorbing nicotine and tar are formed in an interior of the filter rod, and that active charcoal particles (3) for deodorizing odors of tobacco leaves are held in the creases (2) only by a resiliency of a filter material (1) and by the creases. The method and apparatus for producing the filter rod are also disclosed therein. Instead of or together with the charcoal particles, flavor granular powders may be used.

FIG. 3



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BACKGROUND OF THE INVENTION

The present invention relates to a cigarette filter rod for a paper filter attached to a tip end of a cigarette, and its producing method and apparatus.

In general, the filters to be attached to ends of cigarettes are categorized into a paper filter type using paper (i.e., pure pulp) as a filter material and an acetate filter type using acetate fiber as a filter material.

In such a paper filter type and a acetate filter type, there is a type in which active charcoal particles are mixed into a filter for deodorizing odor of cigarettes.

The following means are used as means for mixing active charcoal particles into a filter according to the conventional technique:

- i) Means for simply diffusing the active charcoal particles into the acetate filter material; and
- ii) Means for attaching the active charcoal particles to the paper filter material after application of binders to the paper filter material. In this case, there are two kinds of process in which after the filter material has been fed from its original roll, the binder is applied thereto and then the active charcoal particles are attached thereto and in which, on the other hand, it is possible to use an original roll of filter material which has been subjected to the active charcoal filter in advance. In any case, it is necessary to apply the binder to the paper filter material.

However, these means suffer from the following difficulties:

The means i) is used for the acetate filter material but is not applicable to the paper filter material. In general, after the diffusion or spreading of the active charcoal particles, the filter material is throttled into a thin rod shape and then the subsequent step of lapping the filter material with the paper. However, in the case of the paper filter material, in the step of throttling the material into the thin rod, the active charcoal particles would be dispersed away from the filter material. Also, if the feeding rate of the filter material would be increased, the active charcoal particles would be dispersed due to the feeding operation of the filter material. In other words, if the feeding rate would be increased, the dispersion of the active charcoal particles would be further accelerated.

On the other hand, in the case of the acetate filter material, the applied or diffused active charcoal particles are retained on the acetate fibers. For this reason, there is no dispersion problem of the active charcoal particles.

Turning to the means ii), the binders applied to the paper filter material would be attached to the surfaces of the active charcoal particles to considerably reduce the deodorising effect of the active charcoal particles.

SUMMANRY OF THE INVENTION

Accordingly, a primary object of the invention is to overcome the above-noted difficulties inherent in the prior art.

Another object of the invention is to provide a cigarette filter producing technique that does not reduce the flavor effect of the deodorant effect of the active charcoal particles and the flavor effect of the flavor particles and which prevents the dispersion of the active charcoal particles and/or flavor granular particles.

In order to attain these or other objects, according to the invention, there is provided a method for producing a cigarette filter rod, comprising the following steps of: dispersing active charcoal particles to a paper filter material continuously fed; subsequently folding said filter material with its edge portions being overlapped with each other; gathering, into a thin rod shape, the filter material that laps therein the active charcoal particles with its folded edge portions; and subsequently coating the thin rod-shaped filter material with a coating material to thereby produce a paper filter rod with active charcoal particles.

According to the present invention, there is provided an apparatus for producing a cigarette filter rod, comprising: a paper filter material feeding means for continuously feeding a paper filter material; an active charcoal particles dispersion section for dispersively applying active charcoal particles to the paper filter material; a filter material folding means for folding both edge portions of the paper filter material inwardly so as to lap the active charcoal particles dispersively applied onto the paper filter material; a forming means for gathering, into a thin rod shape, the filter material that laps therein the active charcoal particles; and a winding means for winding the filter material, gathered into the thin rod-shaped paper filter material, with a lapping paper.

According to another aspect of the invention, there is provided a paper cigarette filter rod for being continuously connected to an end of a cigarette, characterized in that creases for absorbing nicotine and tar are formed in an interior of the filter rod, and that active charcoal particles for deodorising odors of tobacco leaves are held in the creases only by a resiliency of a filter material and by the creases.

According to still another aspect of the invention, there is provided a method for producing a cigarette filter rod, comprising the following steps of: dispersing granular material, which stimulates human taste, to a paper filter material continuously fed; subsequently folding the filter material with its edge portions being overlapped with each other; gathering, into a thin rod shape, the filter material that laps therein the granular material with its folded edge portions; and subsequently coating the thin rod-shaped filter material with a coating material to thereby produce a paper filter rod with granular material.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Fig. 1 is an illustration of producing process according to the present invention;

Figs. 2 and 3 are perspective views showing the filter material folding section shown in Fig. 1;

Fig. 4 is a cross-sectional view showing the filter folding section and active charcoal particle dispersion section shown in Fig. 1;

Figs. 5, 6 and 7 are illustrations of the operation of the filter folding section shown in Fig. 1;

Fig. 8 is a front view showing a craping rollers shown in Fig. 1; and

Fig. 9 is a cross-sectional view showing an active charcoal particle dispersion section in accordance with another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described with reference to Figs. 1 through 9 which show one example for producing cigarette filter rod with active charcoal particles 3 diffused or dispersed into a filter material 1.

The paper filter material 1 is wound in an original roll 5 from which the paper filter material 1 is continuously drawn. A craping station 6 serves to continuously form longitudinal thin creases in the paper filter material 1. A pair of craping rolls 7 each having a number of circumferential grooves and projections on their outer periphery are rotatably mounted in a suitable position. The longitudinal thin creases 2 are formed in the filter material 1 by means of the craping section 6 so that an air ventilation resistance thereof is increased when the filter material 1 is formed into a rod and therefore, a filtration efficiency of the filter for the nicotine and tar is also increased.

An active charcoal particle dispersing section serves to disperse active charcoal particles. A hopper 10 is provided above the rotary dispersion

roller 9. A guide case 11 is provided in front of the rotary dispersion roller 9. The active charcoal particles 3 fed in the hopper 10 is uniformly applied to the paper filter material continuously fed below the rotary dispersion roller 9.

Fig. 9 shows another embodiment of the active charcoal particle dispersing section 8 in which the guide case 11 is obliquely provided at a predetermined angle.

It is apparent that the active charcoal particle dispersing section 8 is not limited to those shown in the drawings but any structure may be used as the dispersing section as far as it is possible to disperse the active charcoal particles 3 immediately before the commencement of the folding operation of the paper filter material 1.

A filter material folding section 12 serves to fold the paper filter material 1. A retainer plate 13 adjustably suspended from a support rod 25 projecting from a machine body 27 is provided horizontally through a gap corresponding to a thickness of the paper filter material 1 above an upper surface of a receiving plate 26 projecting from the machine body 27. A pair of curved rods 14 which are obliquely close to each other on the front side of the retainer plate 13 are provided on a mount rod 28 projecting from the machine body 27 as best shown in Fig. 3. A curved portion 14' of each curved rod 14 is obliquely provided so as to depress downwardly both edge portions of the paper filter material 1 which has been subjected to the creases or steps by the roller 17.

A pair of clamping thin plates 22 are provided on both sides on the upper surface of the retainer plate 13 for clamping, inwardly gathering and folding the edge portions 1' depressed downwardly and pressed inwardly by the curved portions 14' of the curved rods 14.

The pair of clamping thin plate 22 cause both the edge portions 1' of the paper filter material 1 raised inwardly by the curved portions 14' of the curved rods 14 to be well drawn inwardly to thereby continuously form overlapping portions along the edge portions of the filter material 1. At the same time, the clamping thin plates 22 are arranged so as to intersect with each other from the front side (upstream side) to the rear side (downstream side) of the retainer plate 13 (as best shown in Fig. 2) and so as to increase a distance between the clamping plates 22 and the retainer plate 13 toward the rear side (downstream side) for retaining the overlapping portion 24 in cooperation with the retainer plate 13.

Reference numeral 31 denotes a mount support portion and numeral 32 denotes an introduction window for the active charcoal particles 3.

Reference numeral 15 denotes a forming section for forming into a thin rod-shaped bundle the paper filter material 1 which has been dispersively coated with the active charcoal particles 3 and which laps the active charcoal particles 3 by the curved rods 14 and the clamping thin plates 22. The filter material 1 is passed through a sleeve portion 16 which is gradually tapered forwardly, so that the filter material 1 is continuously throttled to form a thin rod-shaped bundle.

Reference numeral 18 denotes a lapping section for continuously coating the thin rod-shaped filter material 1 with a lapping paper 19. Reference numeral 20 denotes a wind roll of the lapping paper 19, numeral 21 denotes a pressure indicator of filter feeding air, numeral 29 denotes a cutter section and numeral 30 denotes a filter rod.

The operation of the thus constructed apparatus will be described.

Longitudinal thin creases 2 are formed in the paper filter material 1 continuously drawn from the original roll 5 through the craping section 6 and are fed into the filter folding section 12. The longitudinal thin creases 2 serve as final creases formed in the interior of the filter rod.

The opposite edge portions of the filter material 1 are inwardly raised by the curved portions 14' of the curved rods 14. Subsequently, the active charcoal particles 3 are dispersed through the guide case 11 from the rotary dispersion roller 9 located in the upper portion. Since the rear surfaces of the opposite edge portions 1' raised by the curved portions 14' are in contact with the inner edges of the clamping thin plates 22, the clamping thin plates 22 are arranged so as to intersect with each other, and the distance between the clamping plates 22 and the retainer plate 13 is increased toward the rear side (i.e., the downstream side), the opposite edge portions 1' are drawn inwardly to each other by the feed of the filter material 1. At the same time, the edge portions 1' are overlapped to form the overlapping portion 24 which is fed in this state. Accordingly, the opposite edge portions 1' of the paper filter material 1 lap the active charcoal particles 3 (see Fig. 2) and are led to the sleeve portion 16 of the forming section 15. Thus, it is possible to overcome the problem that the active charcoal particles are dispersed outwardly when the feed rate of the filter material 1 is increased.

After the filter material 1 has been introduced into the sleeve portion 16, in the lapping section 18, the lapping paper 19 laps the thin rod-shaped bundle of paper filter material 1 to form a continuous filter material containing the active charcoal. Thereafter, the filter is cut into a predetermined length in the cutter section 29 to complete the formation of the filter rod 30 containing the active charcoal.

It should be noted that the paper filter rod 30 is a filter in which the active charcoal particles 3 are held only by the resiliency of the paper due to the provision of the internal creases (longitudinal creases or crapes 2) and the throttle effect imparted in the forming section 15, and it is unnecessary to use the binders or the like.

The filter rod 30 is further cut and attached to the end of the cigarette for use as the cigarette filter.

If, instead of the active charcoal particles 3 or together with the active charcoal particles 3, flavor particles such as lemon flavor and peppermint flavor or powders such as dry fine granular powders of fruit juice which stimulate the human taste such palate or odor taste are used, the particles are not dispersed outside, and the flavor effect is not reduced in the filter rod with powders.

According to the present invention as described above, the step of applying binders to the paper filter material may be dispensed with. Accordingly, it is unnecessary to effect the binder drying step. Also, since the granular material such as active charcoal particles and flavor particles are delivered under the condition that the particles are lapped by the folded paper filter material even if the paper filter material is delivered at a high feed rate, there is no fear that the charcoal particles, flavor particles or the like would be dispersed to the outside. It is therefore possible to produce filter rods at a high speed production rate. Since no binders are attached to the surfaces of the active charcoal particles, the deodorant effect would not degraded and the flavor effect of the flavor material or the like would not deteriorate.

In addition, since the thus produced cigarette filter rods have a desired exact content of the active charcoal particles and no binders are used therein, it is possible to provide cigarette filter rods which are capable of effectively deodorising the odor of the tobacco leaves. As described above, according to the invention, it is possible to enjoy the various advantages.

Claims

1. A method for producing a cigarette filter rod, comprising the following steps of:
 - dispersing dispersible particles to a paper filter material continuously fed;
 - subsequently folding said filter material with its edge portions being overlapped with each other;
 - gathering, into a thin rod shape, said filter material that laps therein said dispersible particles with its folded edge portions; and
 - Subsequently coating the thin rod-shaped

- filter material with a coating material to thereby produce a paper filter rod with said dispersible particles.
2. The method according to claim 1, wherein said dispersible particles include active charcoal particles. 5
 3. The method according to claim 1 or 2, wherein said dispersible particles include stimulant flavor granular particles. 10
 4. The method according to claim 1 or 2, wherein no binder applying step is effected between said dispersing step and said folding step. 15
 5. The method according to claim 1 or 2, wherein no binder applying step is effected between said dispersing step and said gathering step. 20
 6. The method according to claim 1 or 2, wherein no binder applying step is effected during a period of all the steps.
 7. An apparatus for producing a cigarette filter rod, comprising: 25
 - a paper filter material feeding means for continuously feeding a paper filter material;
 - a dispersible particle dispersion means for dispersively applying dispersible particles to said paper filter material; 30
 - a filter material folding means for folding both edge portions of said paper filter material inwardly so as to lap the dispersible particles dispersively applied onto said paper filter material; 35
 - a forming means for gathering, into a thin rod shape, said filter material that laps therein the dispersible particles; and
 - a winding means for winding said filter material, gathered into the thin rod-shaped paper filter material, with a lapping paper. 40
 8. The apparatus according to claim 7, wherein said dispersible particles include active charcoal particles. 45
 9. The apparatus according to claim 7 or 8, wherein said dispersible particles include stimulant flavor granular particles. 50
 10. The apparatus according to claim 7 or 8, wherein no binder applying means is provided between said dispersing means and said folding means. 55
 11. The apparatus according to claim 7 or 8, wherein no binding applying means is provided between said dispersion means and said gathering means.
 12. The apparatus according to claim 7 or 8, wherein no binder applying means is provided in the overall means of said apparatus.
 13. The apparatus according to claim 7, wherein said dispersion means includes a hopper for the dispersible particles and a guide case for guiding said dispersible particles to said filter material.
 14. The apparatus according to claim 7, wherein said guide case is obliquely provided for uniformly applying said dispersible particles onto said filter material.
 15. The apparatus according to claim 7, further comprising a craping means for applying creases to said filter material, said craping means being located upstream of said folding means.
 16. The apparatus according to claim 7, wherein said folding means includes a pair of curved rod members 14, a pair of clamping thin rods 22 serving in cooperation with said rod members 14, and a retainer plate 13.
 17. The apparatus according to claim 16, wherein a distance between said clamping plates 22 and said retainer plate 13 is increased toward the downstream side of said filter material.
 18. The apparatus according to claim 7, wherein said particle dispersion means is located substantially above said filter material folding means.
 19. A paper cigarette filter rod for being continuously connected to an end of a cigarette, characterized in that creases for absorbing nicotine and tar are formed in an interior of said filter rod, and that dispersible particles are held in the creases only a resiliency of a filter material and by said creases.
 20. The filter rod according to claim 19, wherein said dispersible particles include active charcoal particles.
 21. The filter rod according to claim 19 or 20, wherein said dispersible particles include stimulant flavor particles.

22. The filter rod produced by said process according to claim 1.

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FIG. 1

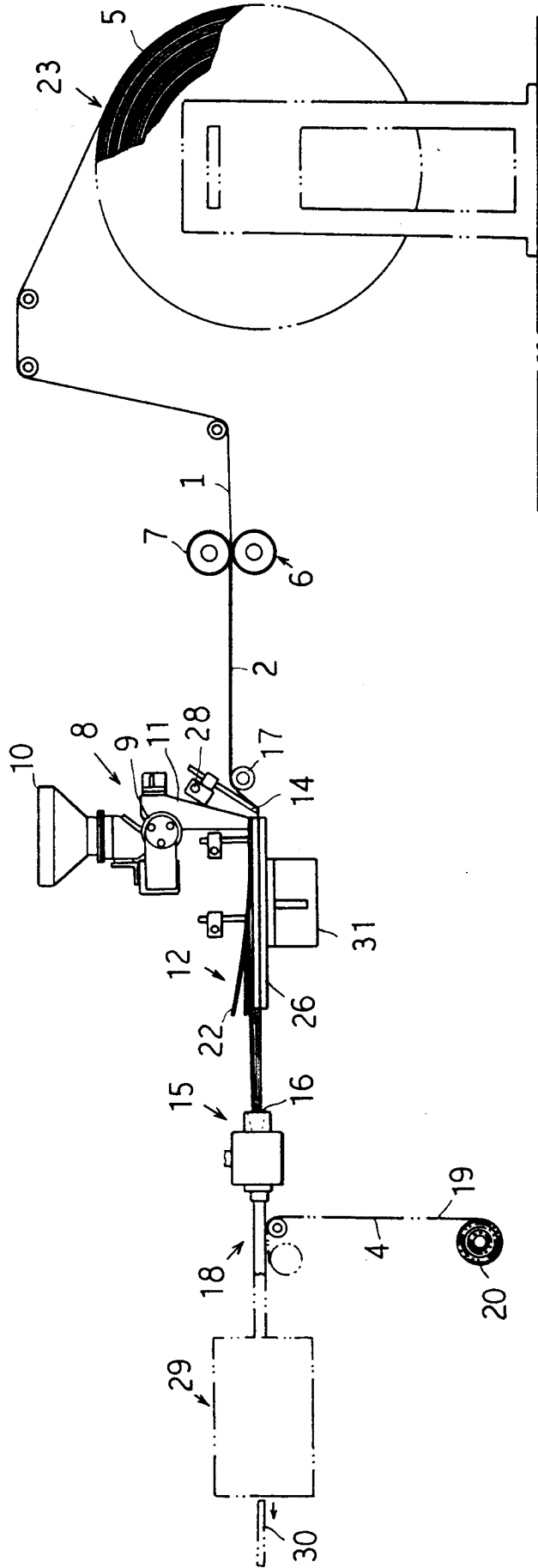


FIG. 2

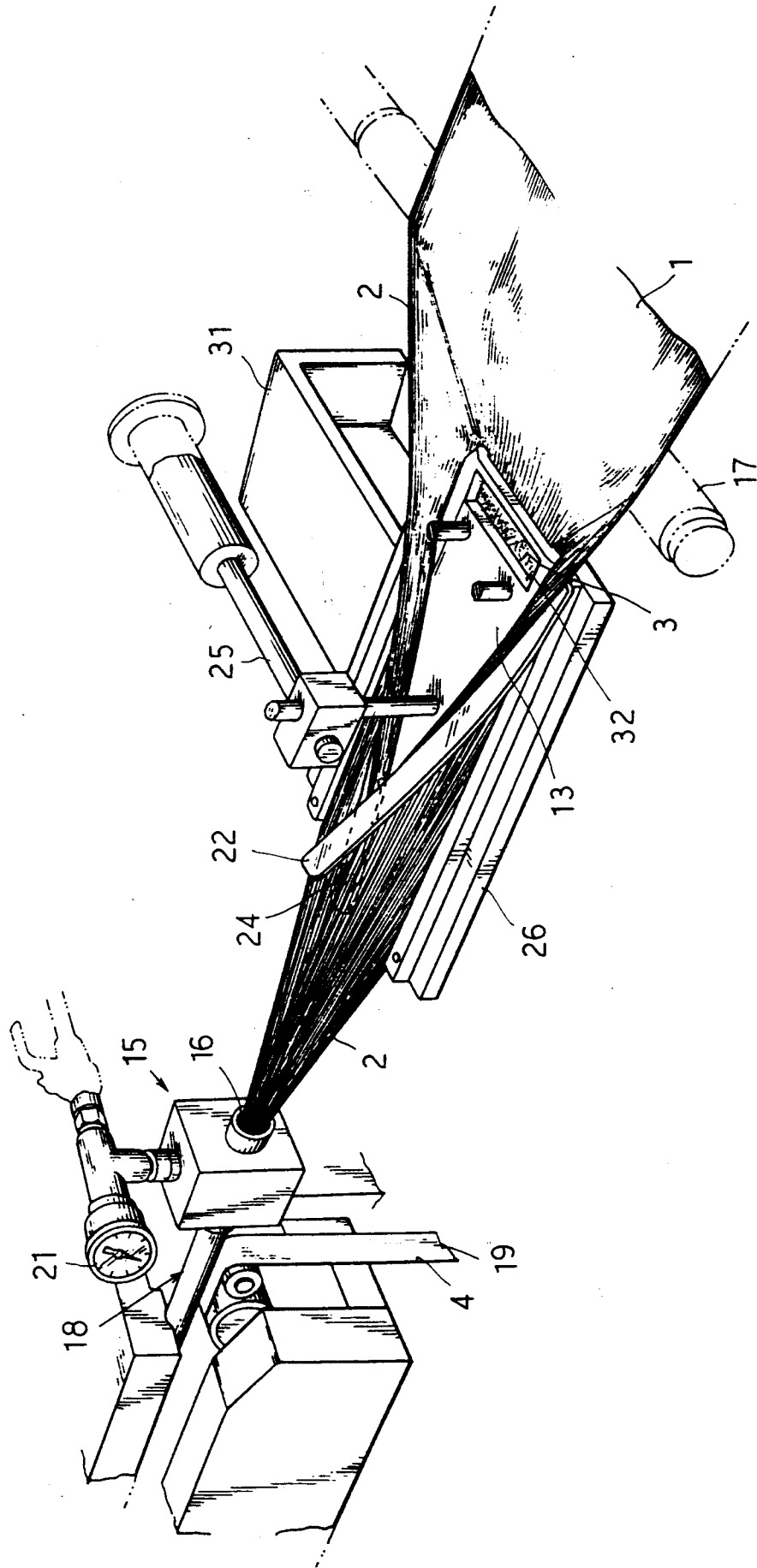


FIG. 3

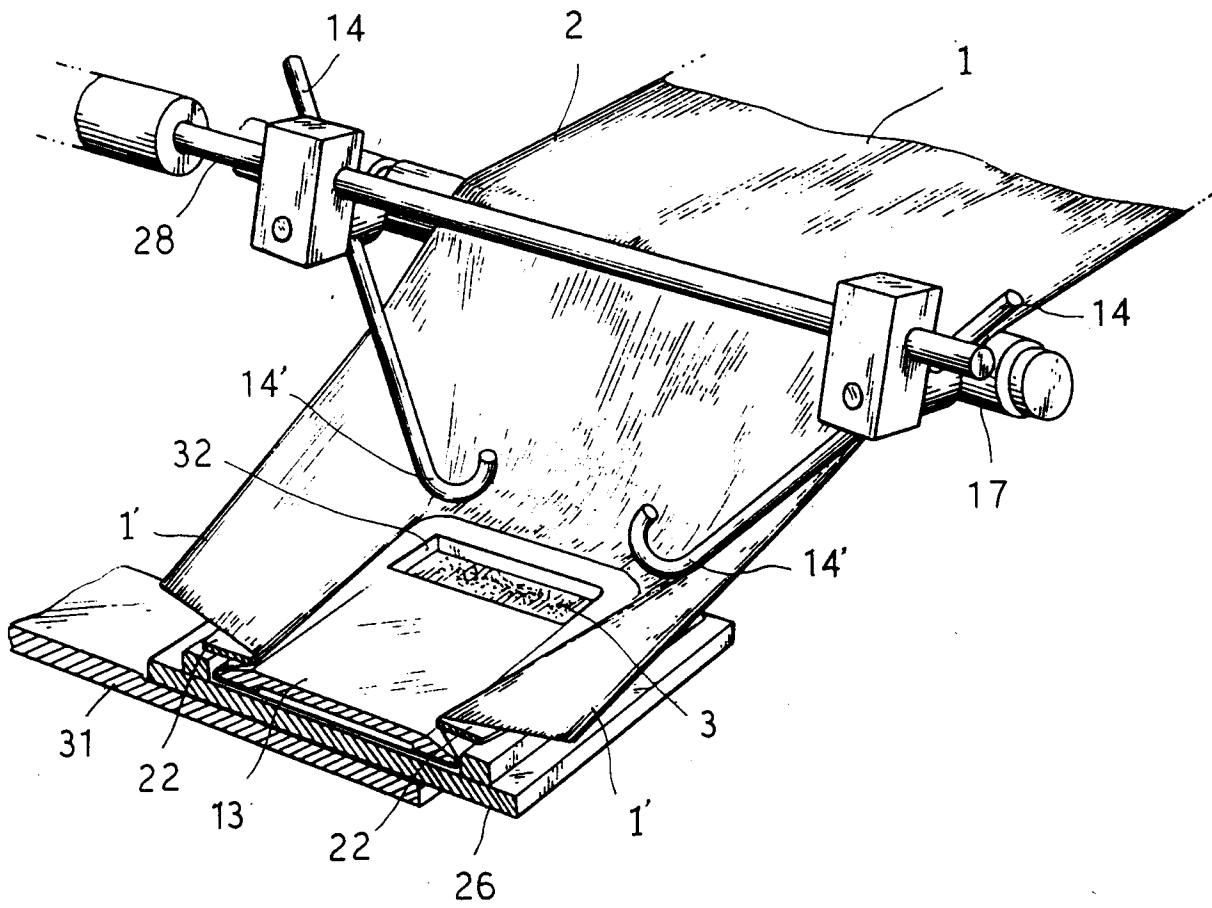


FIG. 5

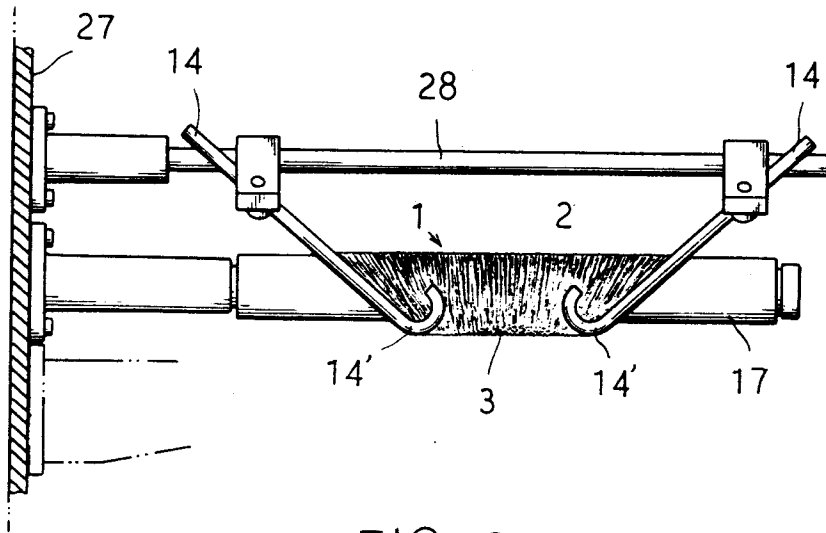


FIG. 6

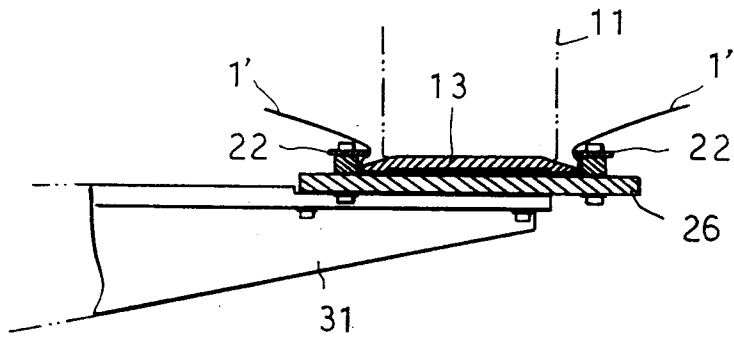


FIG. 7

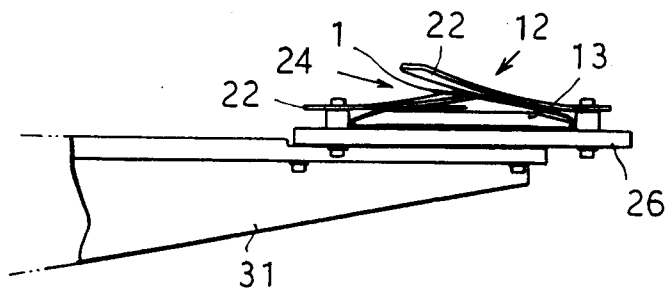


FIG. 8

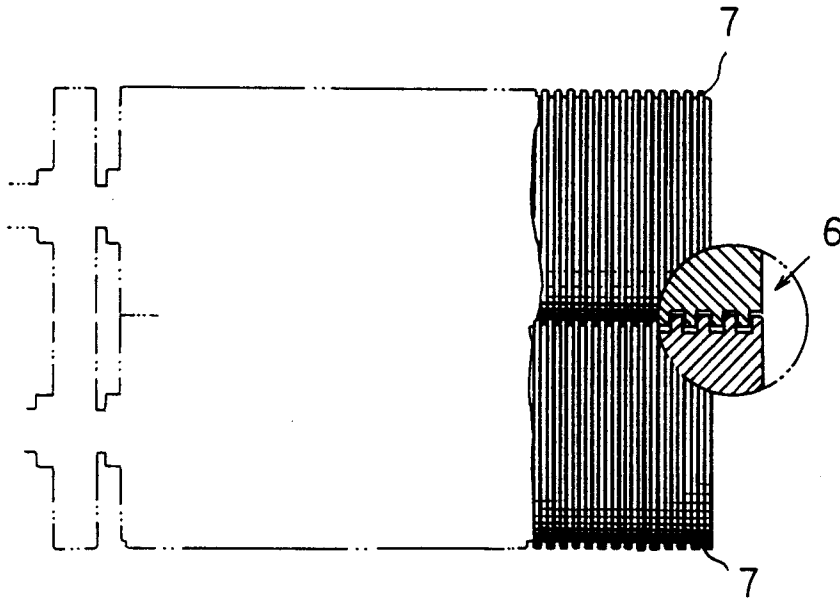
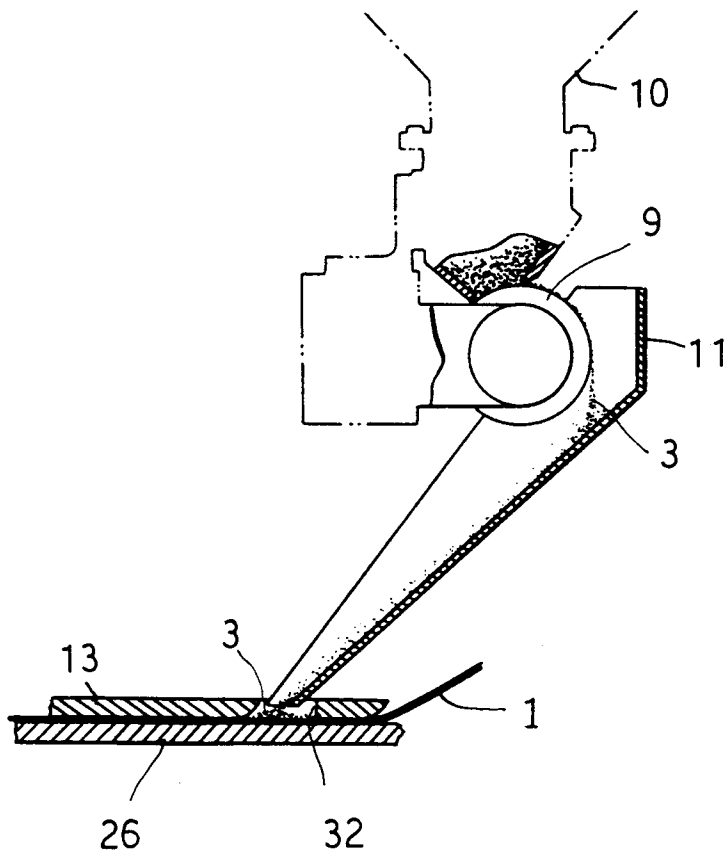


FIG. 9





**EUROPEAN SEARCH
REPORT**

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-1 250 170 (MOLINS) * the whole document ** - - - -	1,7,13,14, 19	A 24 D 3/02
A	GB-A-1 397 367 (BRITISH-AMERICAN TOBACCO COMPANY LIMITED) * the whole document ** - - - -	1,7	
A	GB-A-394 340 (WIX) * page 3, line 40 - page 4, line 86; figure 10 ** - - - -	1,7	
A	DE-A-2 504 134 (BRITISH-AMERICAN TOBACCO CO. LTD.) * page 8, line 15 - page 15; figures 1,2 ** - - - -	1,2,7,8	
A	US-A-3 844 200 (SEXSTONE) - - - -		
A	US-A-3 943 832 (SEXSTONE) - - - -		
A	EP-A-0 014 477 (PHILIP MORRIS INCORPORATED) - - - -		
A	US-A-3 128 680 (SCHAAF) - - - - -		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A 24 D A 24 C
Place of search	Date of completion of search	Examiner	
The Hague	05 February 92	RIEGEL R.E.	
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention		E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document	