

Description

The invention relates to a tar removing cartridge for a cigarette holder according to the pre-characterizing part of claim 1.

In the past, a number of different structures have been proposed for a cigarette holder equipped with a tar removing cartridge. Many of these have had a renewable tar removing cartridge. Such a renewable cartridge can be removed from the cigarette holder when the cartridge's efficiency in filtering smoke has dropped below an acceptable level, and can then be replaced by a fresh cartridge.

A cartridge device with a structure similar to the structure of a cartridge according to the invention is disclosed in the US—A—3 877 470, figure 2. In this known cartridge unit the relatively small apertures formed through the side wall portion of a cup member are all located very close to the disk forming part of the disk member. The cup member is clamped between the disk forming part of the disk member and an uneven portion of the tubular side wall portion of the first hollow tubular portion.

In the case of the device according to this document, it is necessary to provide the cup member with a relatively thick flange portion for stably holding the cup member in axial alignment with the inner wall surface of the first hollow tubular portion to provide a narrow space therebetween. Nevertheless it is possible that the smoke passage is partly or completely interrupted by surface contact between the inner wall surface of the first hollow tubular portion and the outer wall surface of the cup member.

It is therefore an object of the present invention to solve the problem of a stable fixation of the cup member to the inner wall surface of the first hollow tubular portion without risking an interruption of the smoke passage.

This problem is solved by the features of the characterizing part of claim 1.

The function of the ribs is to bear against the first inner cylindrical surface portion having the large diameter of the first hollow tubular portion of the outer shell throughout its entire length, so as to maintain a predetermined mutual positioning between the outer cylindrical surface of the substantially cylindrical tubular side wall portion of the cup member and the first inner cylindrical surface portion of the first hollow tubular portion thereby providing a narrow passage for conducting tobacco smoke therethrough to remove tar particles therefrom. The longitudinal ribs operate stably to ensure the necessary radial spacing over the entire length of the cup member as well as the longitudinal spacing at the bottom of the cup member.

Special advantages result from the feature according to claim 2. To form a notch at the open edge of the cup member is much easier than to form a hole at the middle portion of the side wall portion of the cup member. The notch thus easily formed can provide a hole for ejecting a stream of

tobacco smoke by cooperation with the disk member. Further, according to the structure, the smoke ejecting hole is located at the most upstream end of the smoke conducting passage to avoid provision of any useless length of smoke passage at the upstream side of the smoke ejecting hole, thereby shortening the length of the cartridge to the necessary minimum length.

These and other objects and advantages of the present invention will become more apparent by referring to the following details in description and accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of a generally tubular cigarette holder, which is adapted for removably receiving a cartridge according to the present invention for purifying the smoke inhaled through said cigarette holder, also showing in perspective view a preferred embodiment of the cartridge according to the present invention as fitted in a cartridge chamber defined within said cigarette holder, said sectional view being taken in a plane which includes the central axis of said cigarette holder and of said cartridge;

Fig. 2 is a sectional view through said preferred embodiment of the cartridge according to the present invention, for fitting in the cartridge chamber of the cigarette holder shown in Fig. 1, taken in a plane which includes the central axis of said cartridge;

Fig. 3 is an end on view of said preferred embodiment of the cartridge according to the present invention, as seen in a direction indicated in Fig. 2 by the lines III—III;

Fig. 4 is an end on view of a cup shaped member incorporated in said preferred embodiment of the cartridge according to the present invention, as seen in a direction indicated in Fig. 4 by the lines V—V, i.e. looking down into the cavity defined in said cup member;

Fig. 5 is a side view of said cup shaped member, as seen in a direction indicated in Fig. 2 by the lines IV—IV; and

Fig. 6 is an end on view of a filter element incorporated in said preferred embodiment of the cartridge according to the present invention, as seen in a direction indicated in Fig. 2 by the lines VI—VI.

The present invention will now be described with reference to the preferred embodiment thereof, and with reference to the appended drawings. In the drawings, parts, openings, and gaps are designated by the same reference numerals and symbols throughout all the figures thereof.

Fig. 1 shows a sectional view through a cigarette holder which is designed for using a cartridge according to the present invention. This cigarette holder is made up of a cigarette receiving member 1 and a mouthpiece member 2. The cigarette receiving member 1 is formed with a cigarette mounting portion 3 which is formed as an aperture and is adapted for the non burning end of a lit cigarette to be inserted and jammed thereinto, so as to fix the cigarette in a smoke

sealing fashion into the cigarette receiving member 1; and the mouthpiece member 2 is formed with a sucking portion 4 which is adapted to be sucked by the lips of a smoker. Both the cigarette receiving member 1 and the mouthpiece member 2 are formed as hollow tubular members, and are attached together in a coaxial fashion by, in this particular construction, a male thread which is formed on the mouthpiece member 2 being screwingly engaged into a female thread which is formed on the cigarette receiving member 1. Thus, an axially extending smoke passage is defined through the cigarette holder, from the cigarette mounting portion 3 of the cigarette receiving member 1 through to the sucking portion 4 of the mouthpiece member 2.

Within a cartridge chamber 5 defined at an intermediate part of this smoke passage there is fitted a cartridge 6, which is a preferred embodiment of the present invention. The cartridge 6, as will be seen hereinafter, is generally constructed in the form of two cylinders axially abutted together, said cylinders being of somewhat differing diameters; and, corresponding to this, the cartridge chamber 5, in the shown construction, is formed as two cylindrical chambers axially abutted together, the larger of these two cylindrical chambers being defined in the cigarette receiving member 1 and being of a length and diameter adapted snugly to receive the larger of the two cylindrical portions of the cartridge 6, while the smaller of these two cylindrical chambers is defined in the mouthpiece member 2 and is of a size adapted snugly to receive the smaller of the two cylindrical portions of the cartridge 6. In other words, in this shown construction, the junction between the cigarette receiving member 1 and the mouthpiece member 2, i.e. the place of engagement of the above mentioned two screw threads, is arranged to be, in the axial direction of the cigarette holder, at the junction between the above mentioned two cylindrical chambers. Thus, when the two screw threads are unscrewed from one another, and the cigarette receiving member 1 and the mouthpiece member 2 are separated from one another, then an unserviceable cartridge 6 can be removed from within the cigarette holder, and a new fresh cartridge 6 can be substituted for such an old used one. On the other hand, when the two screw threads are tightened together, and thus the cigarette receiving member 1 and the mouthpiece member 2 are tightly fixed together, a cartridge 6 within the cartridge chamber 5 is tightly held therein, and is prevented from moving therein, both in the axial direction and in the radial direction of the cigarette holder.

In Fig. 2, the detailed internal structure of the preferred embodiment of the cartridge according to the present invention can be seen. As mentioned above, the outer shell 10 of this cartridge 6 is constructed in the general form of two hollow tubular portions axially abutted together which are of somewhat differing diameters. The first of these hollow tubular portions 12 (as seen in the

direction of progression of smoke through the cartridge 6, and located on the left in Fig. 2) is the one which is of a larger diameter, and as will be seen later this larger diameter hollow tubular portion 12 incorporates in its inside cavity a means for purifying the smoke of its coarser tar particles. On the other hand, the second of these hollow tubular portions 14 (again as seen in the direction of progression of smoke through the cartridge 6, and located on the right in Fig. 2) is the one which is of a smaller diameter, and as will be seen later this smaller diameter tubular portion 14 incorporates in its inside cavity a means for purifying the smoke of its finer tar particles. Thus, in combination, the cartridge according to the present invention is capable of a good performance of purifying smoke of both its finer and its coarser tar particles, without said means for purifying smoke of its finer tar particles running any risk of prematurely becoming choked up with coarser tar particles, because these larger tar particles, before they can reach said means for purifying smoke of its finer tar particles, have already been filtered out from the smoke by said means for purifying smoke of its coarser tar particles.

Between the first tubular portion 12 and the second tubular portion 14, generally separating the inside cavities thereof, there extends a dividing wall portion 16, which is generally perpendicular to the common central axis of said tubular portions 12 and 14. Through the center of said dividing wall portion 16 there is formed a hole 20, which thus communicates the inside cavity of the first tubular portion 12 to the inside cavity of the second tubular portion 14, and all around the edge of said hole 20, extending in the direction towards said first tubular portion 12 and for quite a distance into the inside cavity therein, i.e. to the left in the figure, there is formed a tubular lip 18. Thus, radially outwards of said tubular lip 18, as seen from the left in Fig. 2, there is defined at the bottom of the interior cavity of said first tubular portion 12 a toroidal trough 19. The purpose of this trough 19 will be explained later.

In the shown preferred embodiment of the present invention, the interior cavity of the first tubular portion 12 is defined by two abutting inner cylindrical surfaces of slightly different diameters. The larger of these, designated by the reference numeral 22, is to the left in the figure of the smaller one, which is designated by the reference numeral 23; and a step 31 facing towards the left in the figure is thus defined where these inner cylindrical surfaces 22 and 23 meet one another. Against this step 31 there is clamped, within the space defined by said larger inner cylindrical surface 22, a cup shaped member 24, which will be described in detail hereinafter, with the open end thereof facing away from the dividing wall 16. This clamping is performed by the pressure of a disk member 26, which is mounted within the end part of the larger inner cylindrical surface 22 of the first tubular portion 12, at the left hand end of

the first tubular portion 12 in Fig. 2, so as to extend completely across the opening of the first tubular portion 12 to the left in the figure. In the shown preferred embodiment of the cartridge according to the present invention, this mounting is performed simply by jamming the disk member 26 into the end of said larger inner cylindrical surface 22, because the disk member 26 is constructed to have a slightly larger outer diameter than the inner diameter of the larger inner cylindrical surface 22, when both the disk member 26 and the first tubular portion 12 are in their unstressed states.

Thus, the right hand side in Fig. 2 of the disk member 26 presses against the part of said cup shaped member 24 which extends to the greatest degree to the left in the figure, i.e. against the upper edge of the wall of the cup shaped member 24, and presses the cup shaped member 24 to the right in the figure, so as to impel the parts of said cup member 24 which extend to the greatest degree to the right in the figure against said step 31 defined where the inner cylindrical surfaces 22 and 23 meet one another. The outer edge of the disk member 26 seals against the larger inner cylindrical surface 22 of the first tubular portion 12. A hole 33 is formed through the center of said disk member 26, and as will be explained later this hole 33 communicates with a space defined within the cup shape of said cup shaped member 24 to the outside of the cartridge 6 according to the present invention. In the shown preferred embodiment, this disk member 26 is also formed with a tubular lip 32, which extends to the right in Fig. 2, some way into said space defined within the cup shape of said cup shaped member 24, for reasons which will be explained later.

Now, the detailed structure of the cup shaped member 24 will be explained, along with reasons for various features thereof.

The cup member 24 is formed with a bottom portion 37 and a substantially cylindrical tubular side wall portion 35, which are conjoined together so as to form a cup shape. Along the outer cylindrical surface of the side wall portion 35, extending in the axial direction of said cylindrical surface (i.e. along generatrices thereof), there are provided a plurality of ribs 28, which project somewhat in the radial direction out from said outer surface of said side wall portion 35. In the shown preferred embodiment, in fact, there are provided two of these ribs 28, which are spaced 180° apart around the periphery of said outer cylindrical surface of said side wall portion 35. These ribs 28 can be seen clearly in Fig. 4 and Fig. 5, and, as can be seen in Fig. 5, the ribs 28 extend somewhat beyond the bottom portion 37 of the cup member 24, to form two small projections 28a, but terminate flush with the upper edge of the side wall portion 35 of the cup member 24 remote from the bottom portion 37 thereof. Finally, through the circular upper edge of the cylindrical side wall portion 35 of the cup member 24, there are formed two notches 30, at the two positions equally spaced between the two ribs 28, i.e. at

positions 90° away from each of the ribs 28.

Thus, because of the provision of the two ribs 28, the outer cylindrical surface of the side wall portion 35 of the cup member 24 is held a little distance away from the larger inner cylindrical surface 22 of the first tubular portion 12. It is important for the principle of the present invention that this gap formed between the inner cylindrical surface 22 and the outer cylindrical surface of the cup member 24 should be relatively narrow, for reasons which will be explained later. Further, it is important for the principle of the present invention that the notches or apertures 30 should be relatively small, again for reasons which will be explained later. In fact, because the ribs 28 are continuous, two separate spaces 39 and 40 are defined between the outer wall surface 35 of the cup member 24 and the inner cylindrical surface 22 of the first tubular portion 12, to each one of which one of the notches 30 communicates; and this is a useful specialization of the present invention, and explains the reason for the provision of two of the notches 30. Thus, via the notches 30, the spaces 39 and 40 are communicated to the space defined within said cup shaped member 24. Further, because of the provision of the two small projections 28a of the ribs 28 extending beyond the bottom portion 37 of the cup member 24, said bottom portion 37 is held a little away from the step 31 defined where the inner cylindrical surfaces 22 and 23 of the first tubular portion 12 meet one another, and thereby these two spaces 39 and 40 are communicated to the internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12. Thus, in summary, the outside space to the left of the cartridge 6 in Fig. 2 is communicated, via in order said hole 33, said space defined within said cup shaped member 24, said notches 30, said two spaces 39 and 40, said internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12, and said hole 20, to the inner space within the second tubular portion 14.

In this inner space within said second tubular portion 14 there is fitted a filter 34, which is formed with a tubular shape. In fact, as can be best seen in Fig. 6, this filter 34 comprises an outer tube 36 made of plastic or the like, which is of an external diameter slightly larger than the inner diameter of the second tubular portion 14. Within this outer tube 36 there is stuffed a bundle 38 formed of a large number of plastic fibers, said fibers extending in the axial direction of said outer tube 36. Thus, the filter 34 is securely jammed into the inner cylindrical surface of said second tubular portion 34.

The operation of this cartridge 6 for purifying smoke of tar particles contained therein will now be described.

When said cartridge 6 is fitted within the cigarette holder shown in Fig. 1, when a lit cigarette is inserted into the cigarette mounting portion 3, and when the mouth of a cigarette user sucks on the sucking portion 4, then cigarette smoke is sucked from the cigarette, into the hole

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within the cigarette receiving member 1 opening off from the cigarette mounting portion 3, into the left end of the cartridge 6 as seen in Fig. 2 and out from its right end as seen therein, and through the hole in the mouthpiece member 2 opening to the sucking portion 4 into the mouth of the cigarette user. As this smoke is thus sucked through the cartridge 6, it passes in through the hole 33 formed in the disk member 16, past said tubular lip 32 into said space defined within the cup shaped member 24, swirls around within said space defined within said cup shaped member 24, and then rushes through said two notches 30, so as to enter into said two spaces 39 and 40 and so as to impinge against the larger inner cylindrical surface 22 of the first tubular portion 12. At this time, because the notches 30 are quite small, the smoke is moving quite quickly when it thus impinges upon the inner cylindrical surface 22, and, because this impingement occurs at substantially an angle of 90°, the heavier tarry particles within the smoke, which have a substantial inertia relative to air frictional forces acting on their outside surfaces and relative to electrostatic forces and the like which also act on said particles, are dashed against said inner cylindrical surface 22 and are stuck thereto. Thus, the smoke is purified of its coarser tar particles, which remain stuck to said inner cylindrical surface 22.

Thereafter, the smoke proceeds through the two spaces 39 and 40 in the rightwards direction. In Fig. 2, passes between the bottom portion 37 of the cup shaped member 24 and the step 31 defined where the inner cylindrical surfaces 22 and 23 meet one another, and enters into the internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12, whence said smoke passes through said hole 20 in said dividing wall 19 into the inner space within the second tubular portion 14. Here, the smoke enters into the left hand side in Fig. 2 of the filter 34, and then passes through the filter 34 wherein it is purified of the finer tar particles which are present in said smoke by said finer tar particles sticking to the sides of the many fibers of the fiber bundle 38 in a per se well known way, the total surface area of all the sides of all said fibers being very large. Subsequently, this more or less purified smoke passes out of the right hand side in Fig. 2 of the filter 34, whence, as explained above, said smoke then is sucked into the mouth and the lungs of the user.

As this purification action proceeds over some time, of course the parts of the larger inner cylindrical surface 22 of the first tubular portion 12 against which the smoke is primarily impinging, i.e. the parts thereof opposing the notches 30, quickly become plastered with tarry particles. However, because according to the present invention the two spaces 39 and 40 are rather restricted, and hence the smoke and gas velocity in them is rather high, these tarry particles are swept gradually by said gas velocity along said inner cylindrical surface 22, to the right in Fig. 2, over the step 31, and along the smaller inner cylindrical

surface 23 in its axial direction, until they are accumulated in the toroidal trough 19. After this, because of the provision of the tubular lip 18, these tarry particles, even when eventually a large quantity of them has accumulated in said trough 19, are effectively prevented from passing through the hole 20 to enter into and choke the filter 34. This is why the provision of the tubular lip 18 is essential for the present invention.

It should be noted that the provision of the step 31 defined where the inner cylindrical surfaces 22 and 23 meet one another, although it is not strictly necessary for the present invention, is a useful specialization thereof. This is because, as the smoke passes from the two spaces 39 and 40 over this step 31 into the internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12, this smoke is further subjected to an impacting action against said step 31, and this causes further quantities of tarry particles to be deposited out of the smoke onto the step 31, whence they join the other tarry particles which have accumulated on the larger inner cylindrical surface 22 and are sliding down past the step 31 to be accumulated in the toroidal trough 19, as explained above. Therefore, the provision of this step 31 provides a secondary coarse tar particle trap, which the smoke must pass before entering the filter 34.

Thus, the smoke is subjected to a two stage filtration action: first the larger or coarser tar particles are removed from said smoke by being impinged against and stuck to the inner cylindrical surface 22 of the first tubular portion 12, as explained above; and then subsequently the smaller or finer tar particles are removed from said smoke, by passing said smoke through the filter 34. This double purification action is essential to the good results obtained from the cartridge according to the present invention; the means provided for removal of the finer tar particles, i.e. the filter 34, is effectively prevented from being quickly choked by coarse tar particles present in the smoke, because said coarser tar particles are removed from the smoke before it is supplied to said filter. Thus, a synergistic effect is obtained by the combination of these two tar particle removing constructions, which have somewhat different performance characteristics, which would not be obtained by the use of either of them by itself. In other words, the construction for removing coarser tar particles, i.e. the construction incorporating the cup member 24 etc., is not by itself very good for purifying smoke of tar, because said construction has no purification effect on the finer or smaller tar particles in said smoke, which have no substantial inertia. Further, the construction for removing fine tar particles, i.e. the filter 34, is not by itself very good for purifying smoke of tar, because, although when said construction is actually functioning its purifying effectiveness is good, such a filter, if supplied with raw smoke, is quickly choked by being filled up with the coarser or larger tar particles present in said smoke. On the other hand, when they are

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used together in the shown order, each of these purifying constructions remedies the defects inherent in the other, thus resulting in a combined smoke purifying construction, i.e. the cartridge according to the present invention, of superior performance characteristics, which is capable of functioning over an extended time period, without becoming choked up.

During this smoke purification process, the action of the tubular lip 32, which extends to a certain distance within the internal space of the cup shaped member 24, is helpful, although not essential to the present invention. Because the smoke which passes through the hole 33 to enter said internal space is thus delivered to a part of this internal space within the cup shaped member 24 which is quite near the bottom portion 37 thereof, thereby this smoke is forced to reverse its direction of motion through an angle of almost 180° before passing through the notches 30 so as to be impinged against the inner cylindrical surface 22 of the first tubular portion 12. This forced reversing of direction of motion of the smoke causes a considerable amount of turbulence in the smoke, and this turbulence aids in causing the coarser tar particles therein to impinge against and stick to said inner cylindrical surface 22. This is a very useful specialization of the present invention.

Although the present invention has been shown and described with reference to a preferred embodiment thereof, and in terms of the illustrative drawings, the scope of the claims should not be considered as limited thereby.

For example, the notches 30 could be replaced by small holes bored through the side wall portion 35 of the cup member 24, from its inside cylindrical surface to its outside cylindrical surface, although it is essential to the present invention that such holes should be relatively small, in order to induce a high velocity in the smoke passing therethrough to impinge upon the inner cylindrical surface 22 of the first tubular portion 12, as explained above. Such holes would not need to be formed absolutely at the top edge of the side wall portion 35, at the maximum possible distance away from the bottom portion 37 of the cup member 24, although it is preferable that they should be so positioned, since it is desirable from the point of view of maintaining a good flowing of the condensed larger tar particles along the inner cylindrical surface 22 that the smoke flow through the two spaces 39 and 40 should be essentially unidirectional, i.e. should occur substantially only in the rightwards direction in Fig. 2; and, if such holes or apertures corresponding to the notches 30 are not very close to the inner surface of the disk member 26, then the parts of these spaces 39 and 40 nearest to said inner surface of the disk member 26 will in fact be stagnant spaces, with no quick and positive gas flow therein. This would engender a risk of accumulation of tarry particles in these stagnant areas, and such an accumulation could cause blocking of the apertures corresponding to the notches 30.

Nor is the shown particular construction incorporating the projections 28a of the ribs 28 the only possible one; any other construction which allowed communication of the right hand ends in Fig. 2 of the relatively narrow spaces 39 and 40 with the internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12 would be satisfactory.

Claims

1. A tar removing cartridge (6) for a cigarette holder adapted to be fitted into a cartridge receiving chamber (5) formed in the cigarette holder so as to receive tobacco smoke from one axial end (3) thereof, to purify the smoke therein, and to deliver purified smoke from the other axial end (2) thereof, comprising:

(a) an outer shell (10), comprising: a first hollow tubular portion (12); a second hollow tubular portion (14), connected substantially coaxially with said first hollow tubular portion (12); a dividing wall portion (16), generally separating the interior space within said first hollow tubular portion (12) from the interior space within said second hollow tubular portion (14), extending generally perpendicularly to the central axis of said first (12) and second (14) hollow tubular portions, and formed with a hole (20), said hole (20) communicating said interior spaces within said first (12) and second (14) hollow tubular portions; and a tubular inner lip (18), which extends all round the periphery of said hole (20) formed in said dividing wall (16), and which extends from said periphery of said hole (20) formed in said dividing wall (16) in the direction of said central axis of said first hollow tubular portion (12) on the side of said dividing wall portion (16) towards said first hollow tubular portion (12);

(b) a cup member (24), formed with a substantially cylindrical tubular side wall portion (35) and a bottom portion (37), mounted within said first hollow tubular portion (12) at a position therein remote from said dividing wall portion (16) with the central axis of said substantially cylindrical tubular side wall portion (35) thereof substantially in coincidence with said central axis of said first hollow tubular portion (12), and with the open end of said cup member (24) facing away from said dividing wall (16); said cup member (24) intercepting across said interior space within said first hollow tubular portion (12) except for a set of one or more relatively narrow spaces (39, 40) defined between the outer wall surface of said cup member (24) and the inner wall surface of said first hollow tubular portion (12), the parts of said relatively narrow spaces (39, 40) nearer said dividing wall portion (16) being communicated to the interior space within said first hollow tubular portion (12) between said cup member (24) and said dividing wall portion (16); a set of one or more relatively small apertures (30) being formed through said side wall portion (35) of said cup member (24) and communicating between said

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used together in the shown order, each of these purifying constructions remedies the defects inherent in the other, thus resulting in a combined smoke purifying construction, i.e. the cartridge according to the present invention, of superior performance characteristics, which is capable of functioning over an extended time period, without becoming choked up.

During this smoke purification process, the action of the tubular lip 32, which extends to a certain distance within the internal space of the cup shaped member 24, is helpful, although not essential to the present invention. Because the smoke which passes through the hole 33 to enter said internal space is thus delivered to a part of this internal space within the cup shaped member 24 which is quite near the bottom portion 37 thereof, thereby this smoke is forced to reverse its direction of motion through an angle of almost 180° before passing through the notches 30 so as to be impinged against the inner cylindrical surface 22 of the first tubular portion 12. This forced reversing of direction of motion of the smoke causes a considerable amount of turbulence in the smoke, and this turbulence aids in causing the coarser tar particles therein to impinge against and stick to said inner cylindrical surface 22. This is a very useful specialization of the present invention.

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For example, the notches 30 could be replaced by small holes bored through the side wall portion 35 of the cup member 24, from its inside cylindrical surface to its outside cylindrical surface, although it is essential to the present invention that such holes should be relatively small, in order to induce a high velocity in the smoke passing therethrough to impinge upon the inner cylindrical surface 22 of the first tubular portion 12, as explained above. Such holes would not need to be formed absolutely at the top edge of the side wall portion 35, at the maximum possible distance away from the bottom portion 37 of the cup member 24, although it is preferable that they should be so positioned, since it is desirable from the point of view of maintaining a good flowing of the condensed larger tar particles along the inner cylindrical surface 22 that the smoke flow through the two spaces 39 and 40 should be essentially unidirectional, i.e. should occur substantially only in the rightwards direction in Fig. 2; and, if such holes or apertures corresponding to the notches 30 are not very close to the inner surface of the disk member 26, then the parts of these spaces 39 and 40 nearest to said inner surface of the disk member 26 will in fact be stagnant spaces, with no quick and positive gas flow therein. This would engender a risk of accumulation of tarry particles in these stagnant areas, and such an accumulation could cause blocking of the apertures corresponding to the notches 30.

Nor is the shown particular construction incorporating the projections 28a of the ribs 28 the only possible one; any other construction which allowed communication of the right hand ends in Fig. 2 of the relatively narrow spaces 39 and 40 with the internal space within the smaller inner cylindrical surface 23 of the first tubular portion 12 would be satisfactory.

Claims

1. A tar removing cartridge (6) for a cigarette holder adapted to be fitted into a cartridge receiving chamber (5) formed in the cigarette holder so as to receive tobacco smoke from one axial end (3) thereof, to purify the smoke therein, and to deliver purified smoke from the other axial end (2) thereof, comprising:

(a) an outer shell (10), comprising: a first hollow tubular portion (12); a second hollow tubular portion (14), connected substantially coaxially with said first hollow tubular portion (12); a dividing wall portion (16), generally separating the interior space within said first hollow tubular portion (12) from the interior space within said second hollow tubular portion (14), extending generally perpendicularly to the central axis of said first (12) and second (14) hollow tubular portions, and formed with a hole (20), said hole (20) communicating said interior spaces within said first (12) and second (14) hollow tubular portions; and a tubular inner lip (18), which extends all round the periphery of said hole (20) formed in said dividing wall (16), and which extends from said periphery of said hole (20) formed in said dividing wall (16) in the direction of said central axis of said first hollow tubular portion (12) on the side of said dividing wall portion (16) towards said first hollow tubular portion (12);

(b) a cup member (24), formed with a substantially cylindrical tubular side wall portion (35) and a bottom portion (37), mounted within said first hollow tubular portion (12) at a position therein remote from said dividing wall portion (16) with the central axis of said substantially cylindrical tubular side wall portion (35) thereof substantially in coincidence with said central axis of said first hollow tubular portion (12), and with the open end of said cup member (24) facing away from said dividing wall (16); said cup member (24) intercepting across said interior space within said first hollow tubular portion (12) except for a set of one or more relatively narrow spaces (39, 40) defined between the outer wall surface of said cup member (24) and the inner wall surface of said first hollow tubular portion (12), the parts of said relatively narrow spaces (39, 40) nearer said dividing wall portion (16) being communicated to the interior space within said first hollow tubular portion (12) between said cup member (24) and said dividing wall portion (16); a set of one or more relatively small apertures (30) being formed through said side wall portion (35) of said cup member (24) and communicating between said



interior space within said cup member (24) and said set of relatively narrow spaces (39, 40);

(c) a disk member (26), mounted so as to extend completely across said interior space within said first hollow tubular portion (12) on the side of said cup member (24) remote from said dividing wall portion (16), and generally contacting, with its side which faces towards said cup member (24), the edge of said substantially tubular side wall portion (35) of said cup member (24) remote from said bottom (37) thereof; a hole (33) being formed through said disk member (26) and communicating the space on the side of said disk member (26) remote from said cup member (24) with said interior space within said cup member (24); said space on said side of said disk member (26) remote from said cup member (24) being communicated with said interior space within said first hollow tubular portion (12) between said cup member (24) and said dividing wall portion (16) only via, in the specified order: said hole (33) formed through said disk member (26), said interior space within said cup member (24), said set of relatively small apertures (30) formed through said side wall (35) of said cup member (24), and said set of relatively narrow spaces (39, 40) defined between said side wall portion (35) of said cup member (24) and said inner wall of said first hollow tubular portion (12); and

(d) a filter (34), mounted in said interior space within said second hollow tubular portion (14) so as to intercept passage of smoke from said hole (20) in said dividing wall portion (16) towards the end of said second hollow tubular portion (14) remote from said dividing wall portion (16);

characterized in that:

(e) said first hollow tubular portion (12) being formed with a first inner cylindrical surface portion (22) of a first diameter adjacent one end thereof remote from said second hollow tubular portion (14) and a second inner cylindrical surface portion (23) of a second diameter which is smaller than first diameter, an annular step (31) being formed between said first inner cylindrical surface portion (22) and said second inner cylindrical surface portion (23); and

(f) said cup member (24) has a plurality of ribs (28) each extending longitudinally along the outside surface of said substantially cylindrical tubular side wall portion (35) thereof from the opening end thereof to and beyond the bottom portion (37) thereof for a predetermined small amount, the height of said ribs (28) being so determined that said cup member (24) is received in said first hollow tubular portion (12) with said ribs (28) being just fitted onto said first inner cylindrical surface portion (22), the end of said ribs (28a) projecting from the bottom portion (37) of said cup member (24) being abutted against said annular step (31), said apertures (30) each being circumferentially located between two adjacent ones of said plurality of ribs (28).

2. A cartridge (6) according to claim 1, wherein said apertures (30) formed through said side wall portion (35) of said cup member (24) are each a

notch (30) cut into said side wall portion (35) from the open end thereof, the open side of said notch (30) being closed by said disk member (26).

Revendications

1. Une cartouche (6) éliminant le goudron pour un porte-cigarettes, conçue pour être introduite dans une chambre (5) destinée à recevoir un cartouche aménagée dans le porte-cigarettes de façon à recevoir de la fumée de tabac par une extrémité axiale (3) de celle-ci, pour y purifier la fumée, et alimenter l'autre extrémité axiale (2) de celle-ci en fumée purifiée, constituée de:

(a) une enveloppe externe (10) comprenant: une première portion tubulaire creuse (12); une deuxième portion tubulaire creuse (14) connectée essentiellement coaxialement avec la dite première portion tubulaire creuse (12); une portion paroi de séparation (16), généralement séparant l'espace intérieur de la dite première portion tubulaire creuse (12) de l'espace intérieur de la dite deuxième portion tubulaire creuse (14), s'étendant généralement perpendiculairement à l'axe central des dites première (12) et deuxième (14) portions tubulaires creuses et comportant un orifice (20) le dit orifice (20) faisant communiquer les espaces intérieurs des dites première (12) et deuxième (14) portions tubulaires creuses; et une lèvre tubulaire interne (18) qui s'étend tout autour de la périphérie du dit orifice (20) aménagé dans la dite paroi de séparation (16) et qui s'étend de la dite périphérie du dit orifice (20) aménagé dans la dite paroi de séparation (16) dans la direction du dit axe central de la dite première portion tubulaire creuse (12) sur la face de la dite portion paroi de séparation (16) tournée vers la dite première portion tubulaire creuse (12);

(b) une coupelle (24) constituée d'un portion paroi latérale tubulaire essentiellement cylindrique (35) et d'une portion de base (37), montée dans la dite première portion tubulaire creuse (12) loin de la dite portion paroi de séparation (16), l'axe central de la dite portion paroi latérale tubulaire essentiellement cylindrique (35) coïncidant essentiellement avec le dit axe central de la dite première portion tubulaire creuse (12), l'extrémité ouverte de la dite coupelle (24) étant tournée dans le sens inverse de la dite portion paroi de séparation (16); la dite coupelle (24) barrant le dit espace intérieur de la dite première portion tubulaire creuse (12) à l'exception d'un ensemble d'un ou plusieurs espaces relativement étroits (39, 40) définis par la surface de la paroi externe de la dite coupelle (24) et la surface de la paroi interne de la dite première portion tubulaire creuse (12), le parties des dits espaces relativement étroits (39, 40) plus proches de la dite portion paroi de séparation (16) communiquant avec l'espace intérieur de la dite première portion tubulaire creuse (12) entre la dite coupelle (24) et la dite portion paroi de séparation (16); un ensemble d'une ou plusieurs ouvertures relativement réduites (30) étant aménagé dans la dite portion paroi latérale (35) de la dite coupelle (24) et faisant com-



muniquer le dit espace intérieur de la dite coupelle (24) avec le dit ensemble d'espaces relativement étroits (39, 40);

(c) un disque (26) monté de façon à recouvrir complètement la section du dit espace intérieur de la dite première portion tubulaire creuse (12) sur la face de la dite coupelle (24) loin de la dite portion paroi de séparation (16) et généralement en contact, par sa face tournée vers la dite coupelle (24), avec le bord de la dite portion paroi latérale essentiellement tubulaire (35) de la dite coupelle (24) loin de la dite base (37) de celle-ci; un orifice (33) étant aménagé dans le dit disque (26) et faisant communiquer l'espace situé du côté du dit disque (26) loin de la dite coupelle (24) avec le dit espace intérieur de la dite coupelle (24); le dit espace du dit côté du dit disque (26), loin de la dite coupelle (24) communiquant avec le dit espace intérieur de la dite première portion tubulaire creuse (12) entre la dite coupelle (24) et la dite portion paroi de séparation (16) seulement par l'intermédiaire de, dans l'ordre spécifié: le dit orifice (33) aménagé dans le dit disque (26), le dit espace intérieur dans la dite coupelle (24), le dit ensemble d'ouvertures relativement réduites (30) aménagé dans la dite paroi latérale (35) de la dite coupelle (24) et le dit ensemble d'espaces relativement étroits (39, 40) définis par la dite portion paroi latérale (35) de la dite coupelle (24) et la dite paroi interne de la dite première portion tubulaire creuse (12); et

(d) un filtre (34) monté dans le dit espace intérieur dans la dite deuxième portion tubulaire creuse (14) de façon à intercepter le passage de la fumée provenant du dit orifice (20) dans la dite portion paroi de séparation (16) vers l'extrémité de la dite deuxième portion tubulaire creuse (14) loin de la dite portion paroi de séparation (16), caractérisée en ce que:

(e) la dite première portion tubulaire creuse (12) étant constituée par une première portion surface cylindrique interne (22) d'un premier diamètre adjacent à l'extrémité de celle-ci éloignée de la dite deuxième portion tubulaire creuse (14) et d'une deuxième portion surface cylindrique interne (23) d'un deuxième diamètre qui est inférieur au dit premier diamètre, un gradin annulaire (31) étant formé entre la dite première portion surface cylindrique interne (22) et la dite deuxième portion surface cylindrique interne (23), et

(f) la dite coupelle (24) présente une pluralité de nervures (28), chaque nervure s'étendant de façon longitudinale le long de la surface externe de la dite portion paroi latérale tubulaire essentiellement cylindrique (35) partant de l'extrémité ouverte de celle-ci jusqu'à et au-delà de la portion de base (37) de celle-ci pour une petite distance prédéterminée, la hauteur des dites nervures (28) étant dimensionnée de telle façon que la dite coupelle (24) entre dans la dite première portion tubulaire creuse (12), avec les dites nervures correspondant exactement à la dite première portion surface cylindrique interne (22), l'extrémité des dites nervures (29a) dépassant la portion

de base (37) de la dite coupelle (24) s'appuyant sur le dit gradin annulaire (31), la circonférence de chacune des dites ouvertures (30) étant située entre deux nervures adjacentes appartenant à la dite pluralité de nervures (28).

2. Une cartouche (6) conformément à la revendication 1, dans laquelle chacune des dites ouvertures (30) aménagées dans la dite portion paroi latérale (35) de la dite coupelle (24) est une encoche (30) taillée dans la dite portion paroi latérale (35) à partir de l'extrémité ouverte de celle-ci, la face ouverte de la dite encoche (30) étant fermée par le dit disque (26).

Patentansprüche

1. Patrone (6) zur Teerbeseitigung für eine Zigarettenspitze, die in eine in der Zigarettenspitze ausgebildete Patronenaufnahmekammer (5) einzusetzen ist, um vom einen axialen Ende (3) der Zigarettenspitze Tabakrauch zu empfangen, den Rauch in ihrem Inneren zu reinigen und am anderen Ende (2) der Zigarettenspitze gereinigten Rauch abzugeben, und die umfaßt:

a) einen Außenmantel (10), der enthält: ein erstes hohles Rohrstück (12); ein zweites, im wesentlichen koaxial mit dem ersten hohlen Rohrstück (12) verbundenes Rohrstück (14); ein den Innenraum innerhalb des ersten hohlen Rohrstücks (12) im großen und ganzen vom Innenraum innerhalb des zweiten hohlen Rohrstücks (14) trennendes Trennwandteil (16), das sich allgemein rechtwinklig zur zentralen Achse des ersten (12) sowie zweiten (14) hohlen Rohrstücks erstreckt und mit einer Öffnung (20) ausgestaltet ist, die die Innenräume innerhalb des ersten (12) sowie zweiten (14) hohlen Rohrstücks miteinander verbindet; und einen rohrförmigen inneren Ringkragen (18), der rund um den gesamten Umfang der in der Trennwand (16) ausgebildeten Öffnung (20) verläuft und sich von diesem Umfang der in der Trennwand (16) ausgebildeten Öffnung (20) in Richtung der zentralen Achse des ersten hohlen Rohrstücks (12) an der Seite des Trennwandteils (16) zum ersten hohlen Rohrstück (12) hin erstreckt;

b) ein mit einem im wesentlichen zylindrischen, rohrförmigen Seitenwandabschnitt (35) und einem Bodenteil (37) ausgestattetes topfförmiges Teil (24), das innerhalb des ersten hohlen Rohrstücks (12) an einer vom Trennwandteil (16) entfernt gelegenen Stelle befestigt ist, wobei die zentrale Achse des im wesentlichen zylindrischen, rohrförmigen Seitenwandabschnitts (35) im wesentlichen mit der zentralen Achse des ersten hohlen Rohrstücks (12) zusammenfällt und das offene Ende des topfförmigen Teils (24) von der Trennwand (16) abgewandt ist; das topfförmige Teil (24) liegt verschließend quer über dem Innenraum innerhalb des ersten hohlen Rohrstücks (12) mit Ausnahme eines Satzes von einem oder mehreren relativ engen Räumen (39, 40), die zwischen der Außenwandfläche des topfförmigen Teils (24) und der Innenwandfläche des ersten hohlen Rohrstücks (12) abgegrenzt sind, wobei



die dem Trennwandteil (16) näher gelegenen Bereiche der relativ engen Räume (39, 40) zwischen dem topfförmigen Teil (24) sowie dem Trennwandteil (16) mit dem Innenraum des ersten hohlen Rohrstücks (12) verbunden sind; ein Satz von einem oder mehreren relativ kleinen Durchtritten (30) ist durch den Seitenwandabschnitt (35) des topfförmigen Teils (24) hindurch ausgestaltet und stellt eine Verbindung zwischen dem Innenraum innerhalb des topfförmigen Teils (24) sowie dem Satz von relativ engen Räumen (39, 40) her;

c) ein Scheibenteil (26), das so befestigt ist, daß es sich quer insgesamt über den innerhalb des ersten hohlen Rohrstücks (12) befindlichen Innenraum an der vom Trennwandteil (16) entfernt gelegenen Seite des topfförmigen Teils (24) erstreckt und mit seiner dem topfförmigen Teil (24) zugewandten Seite die Kante des vom Boden (37) des rohrförmigen Teils (24) entfernt gelegenen, im wesentlichen rohrförmigen Seitenwandabschnitts (35) des rohrförmigen Teils (24) berührt; durch das Scheibenteil (26) hindurch ist eine Durchlaß (33) ausgebildet, der den Raum auf der vom topfförmigen Teil (24) entfernt gelegenen Seite des Scheibenteils (26) mit dem Innenraum des topfförmigen Teils (24) verbindet; der Raum auf der vom topfförmigen Teil (24) entfernten Seite des Scheibenteils (26) ist mit dem Innenraum des ersten hohlen Rohrstücks (12) zwischen dem topfförmigen Teil (24) und dem Trennwandteil (16) nur in der bestimmten Folge verbunden: durch den durch das Scheibenteil (26) geführten Durchlaß (33), den Innenraum innerhalb des topfförmigen Teils (24), den Satz von relativ kleinen Durchtritten (30), die durch die Seitenwand (35) des topfförmigen Teils (24) hindurch ausgebildet sind, und den Satz von relativ engen Räumen (39, 40), die zwischen dem Seitenwandabschnitt (35) des topfförmigen Teils (24) und der Innenwand des ersten hohlen Rohrstücks (12) abgegrenzt sind;

d) einen im Innenraum innerhalb des zweiten hohlen Rohrstücks (14) derart befestigten Filter

(34), daß dieser den Durchgang des Rauches von der Öffnung (20) in dem Trennwandteil (16) zum vom Trennwandteil (16) entfernt gelegenen Ende des zweiten hohlen Rohrstücks (14) hemmt,

dadurch gekennzeichnet, daß

e) das erste hohle Rohrstück (12) mit einem ersten Zylinderinnenflächenabschnitt (22), der angrenzend an dessen vom zweiten hohlen Rohrstück (14) entfernt gelegenen Ende einen ersten Durchmesser aufweist, sowie mit einem zweiten Zylinderinnenflächenabschnitt (23), dessen Durchmesser geringer als der erste Durchmesser ist, ausgestaltet ist, wobei zwischen dem ersten Zylinderflächenabschnitt (22) und dem zweiten Zylinderflächenabschnitt (23) eine Stufe (31) gebildet ist; und

f) das topfförmige Teil (24) eine Mehrzahl von Rippen (28) hat, von denen sich jede in Längsrichtung entlang der Außenfläche des im wesentlichen zylindrischen, rohrförmigen Seitenwandabschnitts (35) des topfförmigen Teils (24) von dessen offenem Ende zu dessen Bodenteil (37) dieses hinaus erstreckt, wobei die Höhe der Rippen (28) so bestimmt ist, daß das topfförmige Teil (24) im ersten hohlen Rohrstück (12) mit den Rippen (28) genau an den ersten Zylinderinnenflächenabschnitt (22) angepaßt aufgenommen wird, das Ende der über das Bodenteil (27) des topfförmigen Teils (24) hinausragenden Rippenfortsätze (28a) gegen die Stufe (31) zum Anstoßen kommt und jeder der Durchtritte (30) in Umfangsrichtung zwischen zwei aus der Mehrzahl der Rippen (28) einander benachbarten Rippen angeordnet ist.

2. Patrone (6) nach Anspruch 1, dadurch gekennzeichnet, daß die durch den Seitenwandabschnitt (35) des topfförmigen Teils (24) hindurch ausgestalteten Durchtritte (30) jeweils eine vom offenen Ende des Seitenwandabschnitts (35) her in diesen eingeschnittene Nut (30) sind, deren offene Seite vom Scheibenteil (26) verschlossen wird.

