Aug. 30, 1966 J. A. CURTIS, JR 3,269,394

SMOKING ACCESSORY

Filed Nov. 26, 1963

FIG. 1

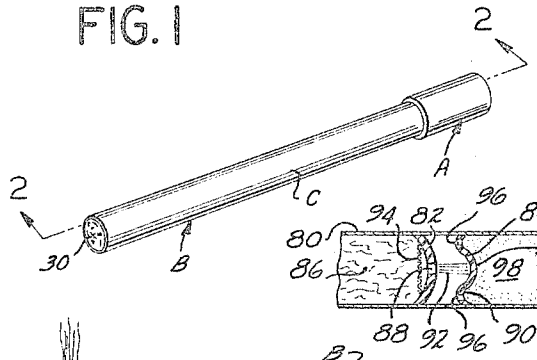


FIG. 4

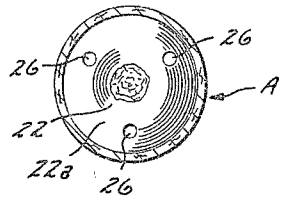


FIG. 9

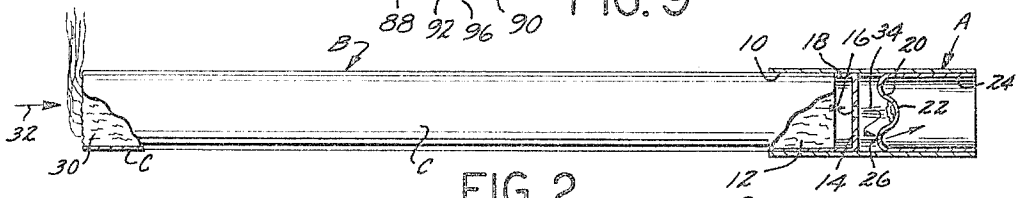


FIG. 2

FIG. 3

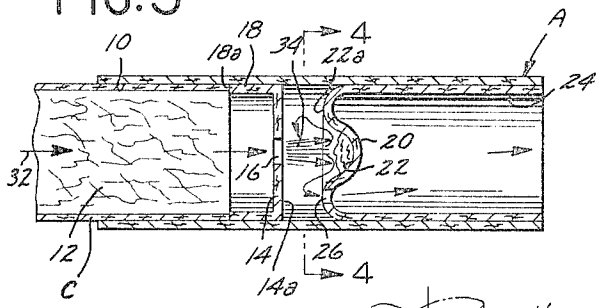
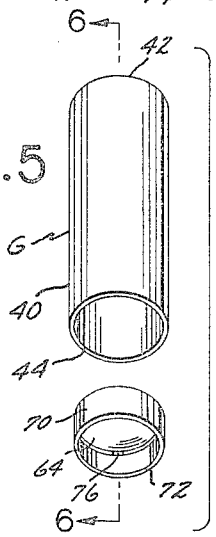


FIG. 5



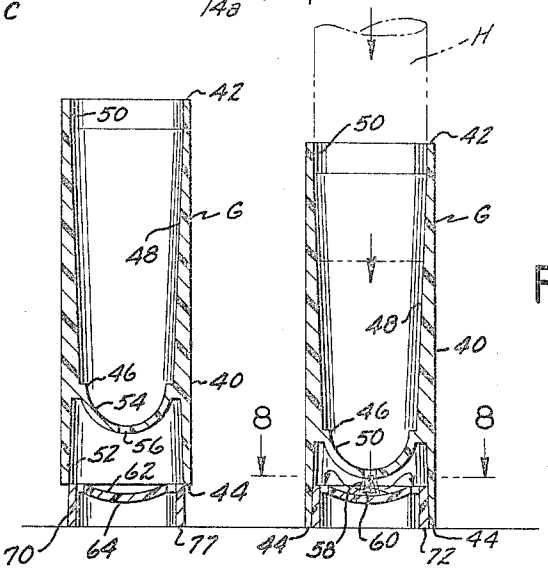
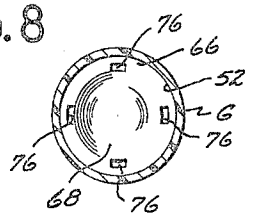


FIG. 6

FIG. 7

FIG. 8



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SMOKING ACCESSORY

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The present application is a continuation-in-part of patent application Serial No. 203,678, filed June 1, 1962, and entitled, Smoking Accessory, and now abandoned.

The present invention relates generally to the field of smoking accessories, and more particularly to a device for removing nicotine, coal tar and water vapor from tobacco smoke prior to inhalation thereof by the smoker.

The desirability of removing the maximum amount of nicotine, coal tar, water vapor, and other products of combustion from tobacco smoke, particularly from cigarettes, has long been recognized, and numerous devices have been designed and used in the past in an effort to achieve this objective. However, the devices available heretofore have been either in the form of filters, or torturous passage-defining means through which the cigarette smoke traveled.

While cigarette filters are widely used and publicized, they have been found unsatisfactory for the removal of nicotine and coal tar products from the tobacco smoke, for in order to remove any substantial amount of materials from cigarette smoke the filters must be so tightly packed that it is most difficult to draw sufficient smoke therethrough for the smoker to derive any pleasure therefrom. Tobacco companies have encountered considerable market resistance to the sale of cigarettes embodying such tightly packed filters. Accordingly, most cigarette companies compromise by producing cigarettes with filters which are so loosely packed that but a slight amount of nicotine and coal tar products is trapped therein as the tobacco smoke passes therethrough.

Removal of nicotine and coal tar products carried by cigarette smoke passing through tortuous passage-defining means is likewise unsatisfactory, for the passages soon become clogged with this residue and require frequent cleaning, which the average smoker is loath to do.

The major object of the present invention is to provide a smoking accessory which is highly efficient in removing nicotine, coal tar and water vapor from tobacco smoke, without the attendant disadvantages encountered in previously available filters and tortuous passage-defining means just described.

Another object of the invention is to provide a smoking accessory of extremely simple structure which is so inexpensive to manufacture that it is expendable after one use thereof, and provides the operational advantage of removing a high percentage of nicotine, coal tar and water vapor from tobacco smoke without appreciable increased effort on the part of the smoker in drawing tobacco smoke therethrough, and in a second form of the device which visually indicates the quantity of said materials so removed.

Yet another object of the invention is to supply a smoking accessory, which due to the compact nature thereof, may either be incorporated in a cigarette mouthpiece, or actually serve as a cigarette mouthpiece.

A still further object of the invention is to provide a smoking accessory of the character described which is so compact as to be adapted to be inserted in a cigarette, cigar holder or pipe without the necessity of increasing the size thereof.

These and other objects and advantages of the invention will become apparent from the following description thereof, and from the accompanying drawing illustrating the same, in which:

FIGURE 1 is a perspective view of a cigarette embodying a first form of smoking accessory of the present invention;

FIGURE 2 is a side elevational view of the device shown in FIGURE 1, parts of which are shown in section, taken on the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged longitudinal cross-sectional view of the invention;

FIGURE 4 is a transverse cross-sectional view of the accessory, taken on the line 4—4 of FIGURE 3;

FIGURE 5 is an exploded perspective view of the second form of the smoking accessory;

FIGURE 6 is a longitudinal cross-sectional view of the second form of the device prior to complete assembly thereof;

FIGURE 7 is a longitudinal cross-sectional view of the second form of the device after assembly;

FIGURE 8 is a transverse cross-sectional view of the second form of the accessory, taken on the line 8—8 of FIGURE 7; and

FIGURE 9 is a longitudinal cross-sectional view of a third form of the invention incorporated in a cigarette.

With continuing reference to the drawing for the general arrangement of the first form of the invention, it will be seen to include a tubular member or cylindrical shell A that serves either as the mouthpiece for a cigarette B, or one in which the rear end portion of the paper C of the cigarette may be fitted to provide a tip that is a permanent part of the cigarette.

Shell A has a first open end **10** in which the rear portion **12** of cigarette B is inserted and adhered thereto by conventional bonding means (not shown). Situated within shell A and to the rear of cigarette portion **12** is a first transversely disposed partition **14** in which an orifice **16** is preferably formed in the center thereof. Partition **14** is provided with a cylindrical rim **18** extending forwardly from the circumferential edge thereof, and the forward edge **18***a* of this rim serves as a shoulder against which the rear edge of paper C abuts. The exterior surface of rim **18** is bonded to the interior surface of shell A by an adhesive (not shown), or the like.

A second partition **20** is transversely positioned in shell A rearwardly from the first partition **14**, longitudinally spaced a substantial distance therefrom. As best seen in FIGURE 3, a rearwardly recessed portion **22** is formed in partition **20** that is in coaxial alignment with orifice **16**. A cylindrical wall **24** projects rearwardly from the circumferential edge of partition **20**.

A number of ports **26** are formed in partition **20** that are circumferentially spaced and located outwardly from recessed portion **22**. When a smoker draws on the rear portion of shell A, or a tubular member (not shown) communicating therewith, the pressure within the tubular member and inside cigarette B is lowered below that of the ambient atmosphere. Smoke from the burning end **30** of cigarette B is drawn rearwardly in the normal manner through the cigarette as a result of this differential in pressure. The path of this smoke is indicated by the arrows **32** (FIGURE 3) which assumes the form of a jet **34** of high velocity as it passes through orifice **16** due to the restricted cross section of this orifice.

As the jet of smoke **34** emerges from the rear of orifice **16** it expands and assumes a truncated cone shape. Droplets of nicotine and other hydrocarbonous liquids entrained in the rearwardly moving smoke may be located at any position in the jet **34**. This material in the form of droplets is viscous which cling together as well as adhere to the partition **20** when they impinge at high velocity thereon. Inasmuch as it is desirable that this material in the form of droplets and particles be confined within the recessed portion **22**, the forward transverse cross section of the recessed portion must be at least as large as the transverse cross section of the rearward-

most section of the jet 34. It is for this reason that the longitudinal spacing between the rear surface 14*a* and the forward extremities 22*a* of the recessed portion 22 is critical.

After the smoke jet 34 impinges on recessed portion 22 the direction of flow thereof reverses to first move forwardly and then rearwardly to pass through ports 26 and thereafter be drawn into the smoker's mouth. Particled material such as ash, carbon and other products of combustion which have little or no adhesive qualities, are kept within the confines of recessed portion 22 due to the high velocity contact thereof with the viscous liquid nicotine and other hydrocarbonous liquids deposited therein as previously described.

The length of the shell A, as well as the rim 18, and wall 24 is critical, as is the diameter of the orifice 16, and the longitudinal spacing of the recessed portion relative to the first partition 14. From experience it has been found that the orifice 16 may vary in diameter between 0.005 and 0.1 inch and still produce a jet 34 of sufficiently high velocity to deposit hydrocarbonous liquids and particles of solids on the forward surface of recessed portion 22 when the rear extremity of the forward face of the latter is spaced between 0.005 and 0.1 inch from the rear face of the first partition 14. The larger the size of the orifice 16, the closer must be the forward surface of the recessed portion 22 relative to the rear surface of the first partition 14.

The position of the shoulder 18*a* or rim edge determines the length of the rear portion of the cigarette B that is disposed inside the device, as well as the length of the cigarette which projects forwardly therefrom. The length of the rim 18 and its position in shell A are so chosen that a desired portion of cigarette B projects forwardly from the shell, and also governs the location of the first partition 14 within the shell.

The length of wall 24 relative to the length of shell A is so selected that when the wall 24 is inserted in the rear of the shell and advanced therein until the rear edges of the wall and shell are flush, the recessed portion 22 will be spaced rearwardly of the first partition within the range mentioned above. Wall 24 is held within the confines of shell A in the manner described by a bonding or adhesive agent (not shown) or by a friction fit. The positioning of the second partition 20 and wall 24 relative to shell A eliminates the necessity of measurements in assembling the device.

Shell A, as well as partitions 14 and 20, rim 18, and wall 24, can be formed from any desired material such as a polymerized resin, coated paper, paper, or pressure formed paper. Also, metallic foils and light metal sheets may be utilized, particularly in the formation of the second partition 20.

The use of a metal such as aluminum, magnesium, or silver having a high rate of heat transfer is particularly desirable in forming the second partition 20, as shown in FIGURE 3, as well as the wall 24 projecting therefrom, for the following reasons.

Tobacco, being an organic plant material, has a high water content. When a cigarette B burns (FIGURE 2), moisture in the tobacco in the burning end thereof is heated and transformed into steam which is drawn rearwardly through the cigarette with the tobacco smoke. The tobacco in the rear portion of the cigarete is initially sufficiently cool to cause condensation of this steam, but with concurrent enrichment of the water content of this rearwardly disposed tobacco.

Thus, as a cigarette is consumed, the unburned tobacco therein constantly gains in moisture content. By the time the last portion of a cigarette is consumed, the smoker's tongue, if sensitive, may feel a biting, burning sensation caused by burning of the moisture-enriched steam. Direct contact of the tongue with this steam is not only highly undesirable from a practical standpoint, but is even more undesirable in that nicotine and other hydrocarbonous materials present in tobacco are volatile with steam, and may be drawn into the smoker's mouth therewith. Therefore, if second partition 20 is formed of a metal or metallic alloy having a high rate of heat transfer, it will at all times tend to remain at a temperature below that at which water vapor or steam condenses. Heat is dissipated from the metallic partition 20 by radiation, heat conduction or both. Thus, the steam or water vapor in the jet of smoke 34 will condense when it impinges on the heat conductive recessed portion 22 and be transformed into water that adheres thereto. The longer the wall 24, the greater the area available for heat radiation, and the cooler the partition 20 and recessed portion 22 will be maintained during the smoking of the cigarette. It will be obvious that if the heated water vapor or steam is not drawn into the smoker's mouth, the smoker will enjoy a cool, dry smoke.

Maintenance of the recessed portion 22 at as low a temperature as possible by use of a metal or alloy having heat conduction properties is also highly desirable, for nicotine and other hydrocarbonous liquids contained in tobacco smoking start to partially decompose at as low as 123° to 125° centigrade. These products of decomposition are complex, and some or all of them may be just as toxic as the nicotine and other hydrocarbonous materials carried in the tobacco smoke.

A second form of the device is shown in FIGURES 5, 6 and 7, which not only removes condensable products of combustion and solid particles from tobacco smoke passing therethrough, but permits the quantity of the materials so removed to be observed. This second form of the smoking accessory G includes a cylindrical shell 40 having a forward end 42 and rear end 44. Shell 40 is formed from a rigid, transparent material, preferably a polymerized resin, and has a circumferentially extending, transverse body shoulder 46 on the interior thereof, as may best be seen in FIGURES 6 and 7.

The interior of shell 40 forwardly of body shoulder 46 is defined by a slightly frusto-conical first surface 48 that tapers forwardly and outwardly. The forward extremity of surface 48 merges into a straight-walled cylindrical surface 50 that is slightly greater in diameter than the external diameter of the tip (not shown) of a cigarette H. The interior of shell 40 rearwardly of body shoulder 46 is defined by a slightly frusto-conical surface 52 that tapers rearwardly and outwardly.

A first partition 54 of concave-convex configuration is transversely positioned in shell 40 and supported from body shoulder 46. Partition 54 curves rearwardly, as can best be seen in FIGURES 6 and 7, and a centrally disposed orifice 56 is formed therein. Orifice 56 is of such diameter as to form smoke from cigarette H into a high velocity jet 58 as the smoke flows rearwardly therethrough. The velocity of jet 58 is sufficiently high to deposit products of combustion and solid particles 60 carried therewith onto a surface 62 when this surface is disposed within a predetermined range rearwardly of that portion of first partition 54 in which orifice 56 is formed.

A second partition 64 is provided that includes a flat exterior ring 66, and a rearwardly extending center concave area 68 that provides the forward surface 62 on which the high velocity jet 58 may impinge. A frusto-conical wall 70 extends rearwardly from partition 64 that is of such angulation as to frictionally engage surface 52.

Wall 70 is of such length that when inserted in the rear portion of shell 40, with the rear edge thereof positioned flush with end 44, the forward surface 62 will be positioned within a predetermined range relative to the rear extremity of center portion 68, that the solids 60 will be deposited on surface 62 by jet 58. The critical limits of the second form of the smoking accessory are the same as those of the first form thereof.

In FIGURE 7 it will be seen that the curvature of the first partition 54 and center portion 68 cooperatively de-

fined a confined space 74 therebetween of maximum volume in which the solid material 60 can accumulate after separating from jet 58. The ring 66, as shown in FIGURE 8, has a number of circumferentially spaced openings 76 formed therein through which smoke from the confined space 74 may pass rearwardly into the smoker's mouth (not shown) after the solids 60 have been separated therefrom. Surface 48 is tapered at such an angle as to frictionally grip the rear portion of an untipped cigarette when the rear edge thereof is in abutting contact with the forward surface of shoulder 46. Surface 48 also frictionally grips the tipped end portion (not shown) of a cigarette when the rear extremity thereof is intermediately disposed in shell 40 between shoulder 46 and end 42.

When in use the second form of the accessory performs the same function as the first form, but also permits the quantity of the solid material 60 removed from the cigarette tobacco to be observed. Thus, by smoking two cigarettes of different brands with two of the second forms of the device, the quantity of solids 60 removed from each cigarette can be visually compared.

The second form of the invention requires no measurements in the assembly thereof, for the relative positioning of the first partition 54 and second partition 64 is attained by placing the edges 44 and 72 flush with one another in the manner shown in FIGURE 7.

The second form of the invention operates in the same manner as the first form, and accordingly a description of the use thereof is not required.

A third form of the invention is shown in FIGURE 9 wherein a cylindrical roll 80 of cigarette paper is provided which has two longitudinally spaced, first and second partitions 82 and 84 respectively, in the rear end portion thereof. Tobacco 86 is disposed in roll 80 forwardly of the first partition 82.

The edge portions of the first and second partitions 82 and 84 are each attached by adhesive or other conventional means to the interior surface of roll 80. The first partition 82 is preferably of concave-convex configuration, as shown in FIGURE 9, and an orifice 88 is formed in the center thereof.

Second partition 84 includes a ring-shaped portion 90 that supports a rearwardly extending recessed portion 91. A number of circumferentially spaced openings 96 are formed in the ring-shaped portion 90. The orifice 88 can vary in diameter between 0.005 and 0.1 inch, and still form tobacco smoke into a high velocity jet 92 that will deposit coal tar products and particles of solid materials on the forward surface of recessed portion 91. The second partition 84 may be disposed rearwardly of first partition 82 within a range of distances between 0.005 and 0.1 inch.

To prevent entry of particles of tobacco 86 into orifice 88 whereby it may become clogged or plugged up, a screen 94 or other perforated body (not shown) is disposed forwardly of the orifice (FIGURE 9). It is preferable that the screen 94 be physically connected to the first partition, such as by adhering the edges thereof to the forward surface of the first partition 82. To prevent collapse of the roll 80 rearwardly of second partition 84, a body 98 of porous material is preferably disposed therein.

The operation of the third form of the invention is the same as the first form thereof, and hence need not be repeated.

Although the present invention is fully capable of achieving the objects and providing the advantages hereinbefore mentioned, it is to be understood that it is merely illustrative of the presently preferred embodiments thereof and I do not mean to be limited to the details of construction herein shown and described, other than as defined in the appended claims.

I claim:

1. A device for use with either a tipped or untipped cigarette to remove condensable products of combustion and solid particles from the smoke thereof and to visually indicate the quantity of said products and particles so removed, including:

(a) a cylindrical shell having a forward and rear end and a transverse circumferentially extending body shoulder on the interior thereof intermediate said ends, with the interior of said shell forwardly of said shoulder being defined by a slightly frusto-conical first surface that diverges forwardly and outwardly and of such dimensions as to frictionally grip either a tipped or untipped end of a cigarette which is moved rearwardly therein, and with that portion of said shell interior rearwardly of said body shoulder being defined by a slightly frusto-conical second surface which diverges rearwardly and outwardly;

(b) a first partition transversely disposed in said shell and supported by said body shoulder, said partition having a centrally disposed orifice formed therein which forms smoke from said cigarette passing therethrough into a rearwardly directed high velocity jet that deposits said products of combustion and particles on a surface disposed within a predetermined range rearwardly of that portion of said partition in which said orifice is formed;

(c) a second partition that includes an exterior ring and a rearwardly extending center concave area that defines said surface, which ring has a plurality of circumferentially spaced openings formed therein;

(d) a frusto-conical wall that extends rearwardly from said ring, which wall is of such angulation as to frictionally grip said second surface of said shell when said wall is moved forwardly therein, with said wall being of such length as to position said surface of said concave portion within said range when the rear edges of said wall and shell are flush, which first and second partitions cooperatively define a confined space therebetween in which said products of combustion and solid particles may build up after separation from the smoke of said cigarette and from which smoke freed of said products of combustion and particles may pass through said openings into the mouth of the user, with said shell, first and second partitions, and said wall being formed of a transparent, water impervious, rigid material to permit the quantity of said products of combustion and solid particles to be observed after said cigarette has been consumed.

2. A device as defined in claim 1 wherein said material is a polymerized resin and said shell, shoulder and first partition are formed as an integral unit.

3. A device as defined in claim 1 wherein said shell forwardly of said first partition has an interior straight-walled cylindrical surfaces slightly larger in diameter than the external diameter of the tipped end of a cigarette, which interior surface is situated forwardly of said first frusto-conical surface to permit easy insertion of a tipped or untipped end of a cigarette into said device.

4. A device as defined in claim 1 wherein said first partition is of concave-convex shape and curves rearwardly towards said second partition to cooperate therewith in providing maximum volume within said confined space therebetween while maintaining the forward surface of said center concave portion within said predetermined range relative to said jet.

5. A device as defined in claim 4 wherein said orifice may vary in size abetween 0.005 and 0.1 inch in diameter and the forward surface of said center concave area can be disposed in a range of between 0.005 and 0.1

inch rearwardly of the center rear extremity of said first partition.

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