

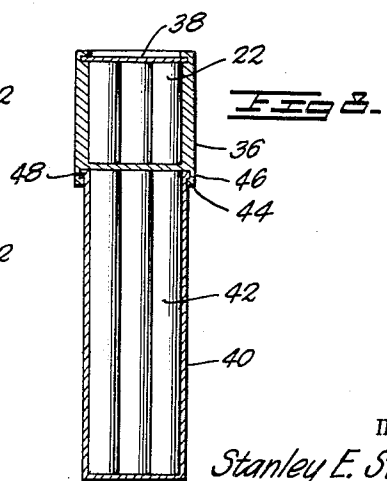
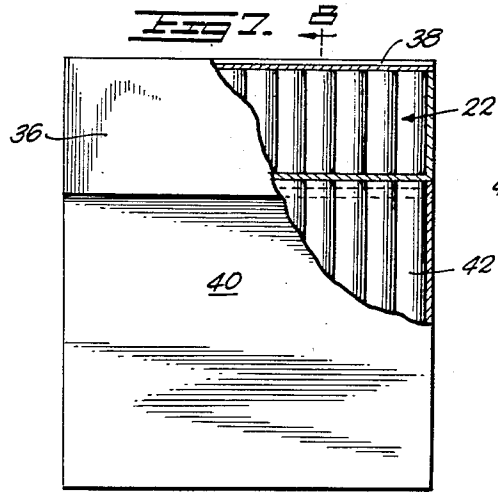
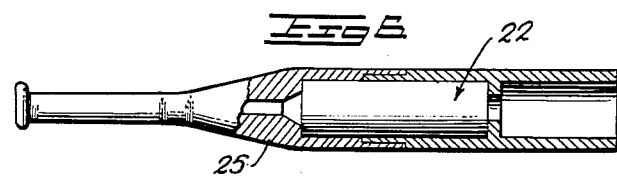
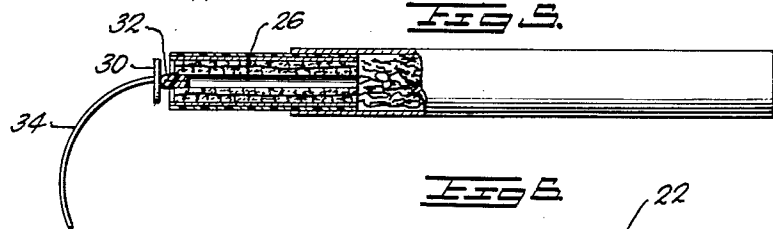
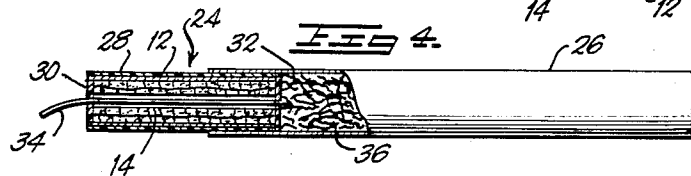
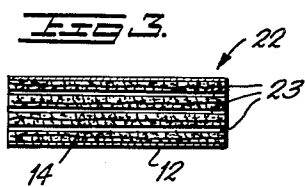
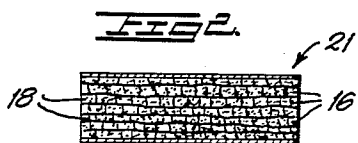
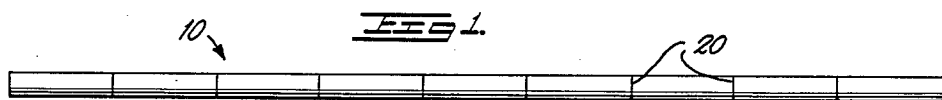
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3,122,145

TOBACCO SMOKE FILTERING

Filed April 23, 1962



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3,122,145

TOBACCO SMOKE FILTERING

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This invention relates to tobacco smoke filtering and, more particularly, it concerns a new and unique method and filter for removing substantially the ingredients of tobacco smoke which are harmful to human tissue regardless of whether the tobacco is burned in cigarettes, cigars, smoking pipes, as well as to a novel method of making the filter.

It has been established in recent years that tobacco smoke contains, among other things, minute droplets of liquids or tars including various chemicals, such as nicotine, harmful to the human anatomy. It is believed that the percentage of such liquid droplets carried by the tobacco smoke is somewhat dependent on the temperature at which the tobacco is burned and correspondingly on the temperature at which the smoke enters the smoker's mouth since the capacity for the smoke to carry liquid is greater at higher temperatures. Hence, it follows logically that if the temperature of the tobacco smoke is reduced sufficiently, a large percentage of the liquid droplets carried thereby will be condensed and thus easily separated and removed from the smoke. This principle has been known since the beginning of tobacco smoking as evidenced by the early development of means by which the tobacco smoke was passed through water before inhaled by the smoker. In more recent times, and particularly since vast quantities of statistical information have been made public by such research organizations as the American Cancer Society, tobacco manufacturers have attempted to reduce the amount of tars in tobacco smoke by the employment of more practical filters applied directly to the smoking device, such as the filter tipped cigarette. Also, in an attempt to cool the smoke so that the droplets of liquid carried by the smoke will be deposited more readily on the particles of tobacco or filter through which the smoke passes, various devices such as providing minute perforations in cigarette paper or the employment of materials having good heat exchange properties, have been developed. Yet, the devices heretofore available have either had little effect on the amount of harmful liquids inhaled by the smoker or have so greatly affected the taste and other desired characteristics of the tobacco smoke that something less than a wholly successful approach to the problem has materialized.

A principal object of this invention, therefore, is to provide a novel method of removing the harmful tar ingredients from tobacco smoke, as well as a new and unique filter by which the objectionable features in filters and other tobacco smoke treating devices heretofore available are substantially and effectively overcome.

Another object of this invention is to provide a smoking filter of the type referred to which is adaptable to all types of smoking appurtenances such as filter tip cigarettes, cigars, cigar and cigarette holders, or pipes.

A further object of this invention is the provision of a smoking filter of the type referred to which lends itself in an especially suitable manner, to saturation with a liquid, either in the form of clear water, water plus a medication such as menthol, and other solutions which effectively reduce the temperature of tobacco smoke to a point lower than normal body temperature, whereby a substantial amount of the tobacco tars are removed by condensation and absorbed and retained by the filter.

Another object of this invention is to provide an extremely effective and unique filter for tobacco smoke

which leaves substantially unaltered, the taste of the tobacco smoke as it passes to the smoker's mouth.

Still another object of this invention is to provide a novel smoking filter and condenser of the type referred to, which requires a minimum of manufacturing costs and facilities.

A further object of this invention is to provide a novel method of filtering tobacco smoke which employs a material found abundantly in nature and by which substantially all of the harmful tars are removed from the smoke without altering the desirable taste characteristics thereof.

Another and more specific object of this invention is the provision of a smoking filter and condenser of the type referred to as well as a method for making the same by which an article found abundantly in nature, namely, a marsh plant of the family Typhaceae, specifically *Typha latifolia* commonly known as cattail, may be economically employed without substantial modification and resulting high cost, regardless of the smoking appurtenance with which the filter is to be used.

Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description, while indicating preferred embodiments of the invention, is given by way of illustration only since it will demonstrate to those skilled in the art that various changes and modifications can be made without departing from the true spirit and scope of this invention.

I have found that the stems of certain marsh plants of the family Typhaceae, particularly *Typha latifolia* more commonly known as cattail or bulrush, possess many extremely desirable characteristics from the standpoint of providing an exceptional filter and/or condenser for tobacco smoke. These marsh plants grow in great abundance in marshes and along the edges of lakes and rivers in the northern regions of this country, particularly along the northern shores of Lake Michigan. They are characterized by a tall stem approximately four to six feet in height having a diameter varying in size up to approximately one-half inch and topped by a cylindrical spike or flower ranging up to one inch in diameter and six to twelve inches in length. One of the especially desirable features of this plant is that upon reaching maturity the pulpy core of the stem thereof becomes dry but is of such physical characteristics that it will absorb and retain a large amount of moisture without swelling. Moreover, the stem will retain a substantial percentage of moisture or liquid for a long period of time without swelling, softening, or disintegration. Also, in its dry state, the pulpy core of the cattail stem, being highly absorbent, provides an excellent filtering material by which various impurities may be filtered from tobacco smoke without affecting the taste thereof. In general, therefore this invention involves the filtering of tobacco smoke by passing it through short severed lengths of marsh plant stems and particularly cattail stems and contemplates the use of such stems with tobacco smoking appurtenances for conditioning the smoke as it passes from the smoking appurtenance to the smoker's mouth. While I have found that such a short length of a cattail stem when perforated longitudinally provides an excellent smoking filter in its dry state, considerably improved results are achieved by saturating the core of the stem with a liquid. The liquid cools the smoke as it passes from the burning tobacco with the result that many of the harmful ingredients of tobacco smoke, such as nicotine, tar and the like, are condensed out of the smoke and absorbed by the pulpy filter core. To employ the filter in this manner, the wet saturated short lengths of cattail stem may be encapsulated by a liquid impervious material capable of being ruptured or opened just prior to use to enable smoke to pass through

3

the wet filter core; or, the filters may be packaged in a liquid to achieve this feature. Also, it is contemplated that various types of liquids may be employed in the event artificial taste or medication is desired. I have found, however, that with water, the true natural taste of the tobacco smoke is virtually unaffected and yet an extremely cool smoke is achieved.

A more complete understanding of the invention and its method of use may be had by reference to the accompanying drawings in which:

FIG. 1 is a view illustrating a cattail stem from which the filters of this invention may be produced;

FIG. 2 is an enlarged cross-sectional view of a filter blank cut from the stem illustrated in FIG. 1;

FIG. 3 is a cross-sectional view similar to FIG. 2, showing one form of the filter of this invention;

FIG. 4 is an enlarged view in partial cross-section, illustrating another form of the invention applied to a conventional cigarette and encapsulated in a liquid impervious envelope to enable the use of a liquid impregnated filter;

FIG. 5 is a view similar to FIG. 4, showing the removal of the end portions of the capsule from the filter;

FIG. 6 is a view in partial cross-section illustrating a conventional cigarette holder equipped with the filter shown in FIG. 3;

FIG. 7 is a front elevation in partial cross-section illustrating an alternative manner of packaging the filters of this invention for use; and

FIG. 8 is a side elevation in partial cross-section taken along lines 8—8 of FIG. 7.

Referring now to FIGS. 1 and 2 of the drawings, the marsh plant or, more specifically, cattail or bulrush stem from which the smoking filters in accordance with this invention are formed, is shown as having an elongated rod-like shape and designated generally by the reference numeral 10. As aforementioned, these stems may vary in length and may grow to a diameter as large as one-half inch. Generally, however, the diameter over most of the stem length approaches the diameter of a conventional cigarette. Preferably, the stems 10 are harvested during the fall of the year, after the plants have reached maturity and become dry. In this form the cross-section of this stem, as illustrated in FIG. 2, has a relatively hard, fibrous form sustaining shell 12 containing a central core 14. The core 14 of the cattail stem is characterized by a plurality of cells 16, each of which is filled with a light, pulpy, highly absorbent material indicated by the dots 18.

Because of the above-mentioned natural characteristics of the cattail stem 10, the filters of this invention are formed by first cutting the stem into the desired lengths, such as at the lines 20, resulting in the open-ended, sheathed blank 21 illustrated in FIG. 2 of the drawings. After cutting, the blanks are sorted as to diameter and those having the desired diameter selected for use. It will be appreciated that the diameter selected will vary, depending on the smoking appurtenance with which the filter is to be used. For example, if the filter is to be used with a conventional cigarette, the diameter will approximate the diameter of the cigarette, whereas, larger diameter stem lengths will be used for cigar filters. Also, various other sizes may be used with cigarette and cigar holders or with smoking pipe stems. While it is preferred that the sorting step will be carried out after the stem 10 is cut into the short lengths referred to because of the greater accuracy which may be achieved in this manner, it is possible, particularly where the stems 10 are of uniform diameter throughout their lengths, to sort the stems as to diameter prior to cutting. After cutting, the short stem lengths or blanks 21 are perforated longitudinally to improve the drawing qualities thereof to provide the filter 22 shown in FIG. 3. In the form of filter illustrated in FIG. 3, a plurality of perforations 23 are formed longitudinally through the core 14. Although the perforations 23 are illustrated in the drawings as having

4

smooth sides, because of the cellular nature of the core 14, the walls of the perforations in practice will be irregular by projection of the walls of the individual cells 16 and the pulpy material 18 into the bores 23. Because of the tortuous path thus taken by the smoke in passing through the filter 22 and the intimate contact with the pulpy absorbent material 18, an easy drawing but yet highly effective filter is formed, which if desired, may be used directly in its dry state affixed to the end of a cigarette or in a cigarette holder 25, as illustrated in FIG. 6 of the drawings. Preferably, however, I desire to saturate the core 14 with a liquid such as water, thereby producing a wet filter and condenser by which extremely satisfactory results obtain.

One practical form of such a wet filter produced in accordance with this invention is illustrated in FIGS. 4 and 5 of the drawings. As shown in these figures, a filter generally designated by the numeral 24, is affixed to one end of a cigarette 26 in conventional fashion. The filter 24 is formed by first perforating the blanks 21 illustrated in FIG. 2 to provide a generally central longitudinal bore 26. Thereafter, the centrally perforated blanks are immersed in a liquid until the proper amount of moisture has been absorbed by the core 14. The wet blank is then encapsulated in a liquid impervious envelope, such as a plastic tube 28, provided at its ends with removable thin flexible discs 30 and 32. The discs 30 and 32 are also formed of liquid impervious plastic material and are removable at least in part by suitable means such as a draw string 34. As shown in FIG. 4, the draw string is attached to the disc 32 adjacent the tobacco 36 in the cigarette so that upon an outward pull on the draw string 34 the disc 32 is drawn through the bore 26 and against the outermost disc 30, such that upon further and complete withdrawal of the draw string 34 both discs 30 and 32 are removed completely. This particular form of the invention is particularly desirable for the reason it enables liquid to be held and sealed within the core 14. Yet, the advantages of a water cooled smoke are made readily available to the smoker by a simple pull on the draw string 34. It is to be understood, however, that variations of this specific form are possible, such as for example, merely rupturing the ends of the capsule or envelope by a pull on a draw string. Also, the capsule might be opened at its ends by forcing a pointed instrument such as a pin or the like completely through the filter. In this manner, the bore 26 could be formed by the instrument simultaneously with the opening or rupturing of the capsule ends.

In FIGS. 7 and 8 there is illustrated a packaging arrangement by which the filter 22 illustrated in FIG. 3 may be impregnated with a liquid and used in practice. As shown, the wet, liquid impregnated filters 22 are enclosed in a plastic container 36 having a slidably removable cover 38 and provided on the bottom with means by which the container may be attached to a box 40 for containing cigarettes 42. The means for attaching the box may be, as shown, depending wall portions 44 on the container 36 having grooves or ways 46 for receiving a complementary bead 48 at the top of the box 40. The container 36 functions as a cover for the box 40 and may be slid to one side for access to the cigarettes 42. In this manner the wet, liquid-impregnated filters 22 may be carried conveniently with a package of cigarettes either for attachment to the individual cigarettes by means (not shown) or for use in a cigarette holder such as the holder 25 illustrated in FIG. 6 of the drawings.

To illustrate the results achieved with the filter of this invention, especially when impregnated with a cooling liquid such as water, I have found that the temperature of smoke passing from a conventional cigarette through the wet filter of this invention is reduced to approximately 79° F., an appreciable drop from the temperature at the burning end of a cigarette (in excess of 1600° F.). Because of this drop in temperature, a substantial portion

5

of the tars present in the tobacco smoke are condensed in the filter and absorbed in the core 14 thereof. Further, I have found that an even lower temperature of the tobacco smoke may be achieved by freezing the liquid impregnated filter. With a tobacco smoke temperature of less than 80° F., as compared with the normal 150° F., at which tobacco smoke normally enters the mouth of the smoker with an unfiltered conventional smoke, it will be seen that an extremely cool smoke results with the use of the filter of this invention. Further, the taste of the cigarette smoke remains substantially unchanged; a characteristic virtually unachievable in filters heretofore available.

Thus, it will be seen from the foregoing description that by this invention, an extremely effective method and filter is provided by which the above-mentioned objectives are completely fulfilled. The physical characteristics of the marsh plant stems referred to render this abundant but hitherto almost useless plant extremely effective for use in removing tars and the like from tobacco smoke, principally because of the cellular highly absorbent quality of the core thereof and its ability to contain a substantial quantity of moisture without in any way affecting its structural characteristics. In addition, the natural size of the stems of these plants and the manner in which they are naturally provided with a fibrous naturally rigid and form sustaining outer shell 12, renders them especially useful not only in the forms illustrated above, but also many other forms are possible. For example, it would be possible to use a short length of the stem 10 directly as the stem of a pipe in a manner similar to those available on pipes formed from corn cobs. Most significantly, however, is perhaps the manner in which the dried stem of the plant *Typha latifolia* may be used to contain a substantial quantity of liquid, thereby enabling for the first time a practical, water cooled smoking filter. This quality is realized in a highly advantageous manner by the filter illustrated in FIGS. 4 and 5 of the drawings and further, by the employment of the simple packaging technique illustrated in FIGS. 7 and 8 thereof. In addition to the mere impregnation of the filter with liquid, it is contemplated that this invention encompasses also the additional step of freezing the liquid impregnated filters so that even greater cooling efficiency may be brought about. In this form, the packaging technique depicted by FIGS. 7 and 8 of the drawings could also be employed with the addition of suitable heat insulation for maintaining the filters in a frozen state for a sufficient duration of time after removal from refrigeration.

Since many forms of this invention are possible in addition to the alternative forms described herein, it is to be distinctly understood that the foregoing description is illustrative of preferred embodiments only and that the true spirit and scope of this invention is to be determined by the appended claims.

I claim:

1. A smoking filter comprising: a core formed of a severed length of marsh plant stem approximating the length of the filter, said core having at least one bore extending longitudinally thereof and being saturated with liquid, a liquid impervious capsule enclosing said core, said capsule including a tubular body and a closure

6

member at each end thereof, and means for opening the ends of said capsule, said means including a draw string extending through said bore connected to said closure members.

2. A smoking filter as recited in claim 1, in which said closure members are thin flexible discs and in which said draw string is affixed to one of said discs and passes through the other of said discs whereby said one disc is pulled through said bore and said other disc removed upon pulling said draw string and said one disc through said bore toward said other disc.

3. A smoking filter comprising: an elongated core of cellular material, each of the cells therein being filled with a light, pulpy, highly absorbent material capable of retaining a substantial percentage of liquid, said core being impregnated with liquid and having at least one bore extending longitudinally throughout the length thereof; a generally tubular, liquid-impervious capsule overlying the outer surface of said core, said capsule having inner and outer ends and including a portion initially closing each end thereof; and means for opening both ends of said capsule to expose said core for the passage of smoke through said bore and past the liquid impregnated cellular material thereof, said last-mentioned means including one portion initially disposed in said bore and secured to the inner end portion of said capsule, and another portion of said last-mentioned means initially extending out of said bore through the outer end portion of said capsule, whereby both of said capsule end portions are opened upon withdrawal of said last-mentioned means from the outer end of said capsule.

4. A smoking filter comprising: a core formed of a severed length of stem from a marsh plant of the family Typhaceae approximating the length of the filter, said core being saturated with liquid and having at least one bore extending longitudinally thereof, a liquid-impervious capsule enclosing said core, and means for opening the ends of said capsule to expose said core for the passage of smoke therethrough, said means being removably disposed in said bore.

5. A smoking filter comprising: a core formed of a severed length of stem from the marsh plant *Typha latifolia* approximating the length of the filter, said core being saturated with liquid and having at least one bore extending longitudinally thereof, a liquid-impervious capsule enclosing said core, and means for opening the ends of said capsule to expose said core for the passage of smoke therethrough, said means being removably disposed in said bore.

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