Sept. 29, 1964 F. H. LASSITER ETAL 3,150,668

CIGARETTE

Filed Feb. 12, 1960

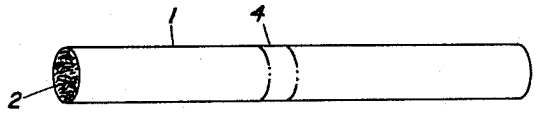

FIG. 1

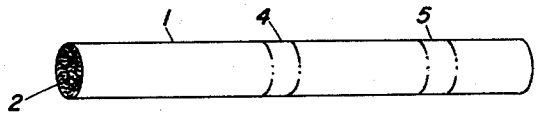

FIG. 2

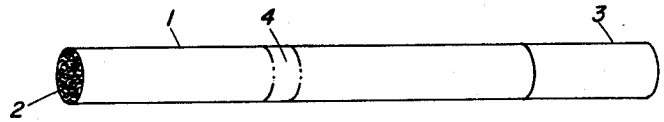

FIG. 3

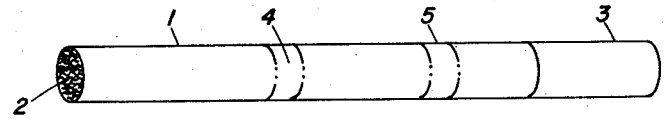

FIG. 4

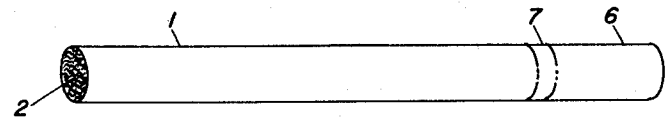

FIG. 5

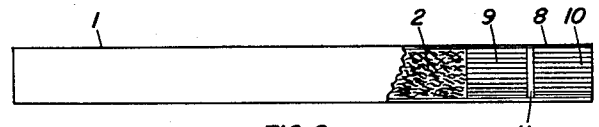

FIG. 6

INVENTORS
FREDERICK H. LASSITER
JACOB M. FAIN
BY
Cleveland B. Holdbrook Jr.
ATTORNEY

United States Patent Office 3,150,668
Patented Sept. 29, 1964

3,150,668

CIGARETTE

Frederic H. Lassiter, 40 E. 62nd St., New York, N.Y., and Jacob M. Fain, Brooklyn, N.Y.; said Fain assignor to said Lassiter

Filed Feb. 12, 1960, Ser. No. 8,299
4 Claims. (Cl. 131—10)

This invention relates to an improved cigarette.

Tobacco smoke carries alkaloids, such as nicotine, combustion products thereof and tars, which are considered to be undesirable. The alkaloids and tars carried by cigarette smoke are deposited on the unburned tobacco of the cigarette as the smoke is drawn through the cigarette, with the result that the tobacco acts as an effective filter for these harmful ingredients of the tobacco smoke. However, as the burning end of the cigarette progresses along the length of the cigarette, the entrapped alkaloids and tars are again released into the cigarette smoke with the result that their concentrations in the tobacco at the non-burning or butt end of the cigarette and in the smoke entering the smoker's mouth are progressively increased. This action is even more pronounced in the case of the so-called "king" size cigarette than in the case of a regular cigarette, when smoked to the same butt length, since a greater quantity of smoke has passed through the unburned tobacco.

Numerous types of filters have been proposed, and quite a number of different types commercially exploited, for the purpose of entrapping the harmful alkaloids and tars carried by cigarette smoke. The different types of filters which have been proposed vary in effectiveness, with some of them being somewhat more effective than the same amount of tobacco in the same length of the cigarette. However, the various filters cannot completely nullify the progressive increase in concentration of the alkaloids and tars in the cigarette smoke as the cigarette is smoked to shorter and shorter lengths.

The ideal point at which to discontinue the smoking of a cigarette is obviously the point at which the burning end of the cigarette begins to nullify the filtering action of the unburned tobacco and that of the filter of the cigarette, if one is present. Even though the smoker may be well aware of these facts, he usually finds difficulty in remembering to discontinue smoking a cigarette when pre-occupied with work, conversation, amusements, etc.

Various devices have been proposed for providing the smoker of a cigarette that he should discontinue the smoking of a cigarette when it is smoked to the length at which the progressive increase of the alkaloids and tars in the smoke becomes high.

Various warning and marker devices have heretofore been proposed for the purpose of warning a smoker to abandon the smoking of a cigarette at the point at which the concentration of the alkaloids and tars in the smoke begins to rise rapidly due to again being released into the cigarette smoke after having been deposited on the tobacco during the initial smoking of the cigarette. The use of a visual marker on the side of the cigarette has been proposed for this purpose. Such a marker is of limited value since a preoccupied smoker seldom glances at the cigarette he is smoking and, in any case, can readily judge the proportion of a cigarette he has smoked merely by glancing at the cigarette without the help of such a marker.

Again, it has been suggested that a material be incorporated into the cigarette tobacco which changes the taste or odor or both of the tobacco smoke when the burning tip of the cigarette approaches the point at which the cigarette should be discharded, and thereby provide a warning to the smoker which cannot pass unnoticed,

but which can, if desired, be ignored and the smoking of the cigarette be continued past the warning point. This suggestion presents difficulty in the selection of a suitable material for the production of the warning odor or taste.

It has been suggested that the warning odor or taste can be produced in either of two different ways. A non-volatile material can be incorporated into the cigarette at the warning point, which produces a distinctive odor or taste when it burns. Cystine, a sulfur containing amino acid found in proteins, tallow, cork and rubber have been suggested for this purpose. Each of these materials gives off a disagreeable odor or taste upon combustion, which is both quite unpleasant to the smoker as a warning and completely prevents him from continuing to smoke the cigarette beyond the warning point should be desire to do so, since the smoke of the cigarette will continue to have the disagreeable taste of the combustion product of the warning material. The selection of a non-volatile material which produces combustion products having an odor or taste which is pleasant and yet distinctively different from that of cigarette smoke is inherently a very difficult problem, since the combustion products are either generally similar in odor and taste to those of tobacco or unpleasant in taste and odor.

The alternative way in which to produce a warning of this type is to incorporate a material into the cigarrette which is sufficiently viotile to be evaporated without thermal decomposition by the increased temperature created by the close approach of the burning tip of the cigarette. Menthol and thymol have been suggested as materials suitable for this purpose. These materials can provide a pleasant odor and taste, but are not effective as warnings for the reason that they migrate through the tobacco of the cigarette, with the result that all of the smoke of the cigarette has the distinctive taste and odor of the material. In short, cigarettes which are intended to provide a warning by the use of these materials are merely cigarettes of the "mentholated" type.

Cigarettes of the mentholated type have been in commercial production for many years. Upon first smoking cigarettes of this type, they have a distinctive flavor of menthol which is pleasant to many people. However, when they are continually smoked, the senses of odor and taste of the smoker soon becomes numbed to the odor and taste involved, and the value of the flavoring is nullified.

It is an object of this invention to provide a cigarette which provides a remainder to stop smoking the cigarette at a predetermined point by the introduction of a pleasant, definitely noticeable, odor or taste into the smoke of the cigarette when the burning tip of the cigarette approaches the predetermined point.

A further object is to provide a cigarette which provides the usual tobacco smoke during the initial stages of its being smoked, and then during the later stages introduces a distinctive flavor into the smoke which serves the dual purpose of providing a refreshing flavor to which the taste of the smoker has not been numbed and of masking the progressive harshness of the natural flavor of the togacco smoke as the cigarette becomes progressively shorter.

Another object of this invention is to provide a pleasant and distinctly noticeable warning to discard the cigarette and at the same time provide a refreshing, pleasant flavor to the smoke to which the smoker has not become immune.

Other objects of this invention and its various advantages will become apparent from the detailed description of this invention which follows.

The cigarette, in accordance with this invention, comprises a tubular paper wrapper filled with tobacco which carries a slightly volatile, high boiling flavoring material

ahead of the rearwardly end of the cigarette which is placed in the mouth and is provided with a retarding material which prevents the volatile flavoring material from being carried out of the cigarette in the smoke during the initial stages of the smoking of the cigarette and in the later stages of the smoking of the cigarette permits the flavoring material to enter the tobacco smoke for the purpose of providing a pleasant and refreshing reminder that it is desirable to discard the cigarette or of masking the increasing harshness of the cigarette smoke as the cigarette is smoked to progressively shorter lengths.

The cigarette, in accordance with this invention, may be of the so-called "plain" type which does not carry a filter tip and carry the flavoring material and the retarding agent within the tobacco itself, its preferred form is one which carries a filter tip and has both the flavoring material and the retarding agent located within the filter tip itself. Extensive tests have demonstrated that the location of both the flavoring material and the retarding agent facilitates the control of the release of the flavoring material into the cigarette smoke, with respect to the proportion of the cigarette which has been smoked.

In one form of this cigarette, the quantity and location of the flavoring material and the physical characteristics, the quantity and the location of the retarding agent are selected to cause the flavoring material to be retained within the cigarette, with no detectable amount of the flavoring material being carried out of the cigarette in the smoke drawn therefrom, until the cigarette has been smoked to a predetermined location at which the nicotine and tars have risen to an undesirable level, and thereafter to permit the flavoring material to escape in the smoke in a quantity which noticeably changes its odor, or flavor, or both. In the smoking of this cigarette the appearance of the flavoring material in the cigarette smoke provides a pleasant reminder that it is desirable to discard the cigarette, by an abrupt change in the flavor of the smoke to which his taste has not become immune. Should the smoker elect to continue smoking the cigarette, the flavoring material masks the increasing harshness of the smoke caused by its increased content of nicotine and tars.

The flavoring material which forms an essential component of this cigarette may be, for example, menthol, thymol, terpin hydrate, oil of wintergreen, oil of peppermint, oil of spearmint, other essential oils, or mixtures thereof.

The retarding agent which is used in the cigarette, in accordance with this invention, may be of a liquid or a solid. Both types function in essentially the same manner in keeping the flavoring material entrapped within the cigarette until the capacity of the retarding agent to retain the flavoring material is satisfied, after which it permits the flavoring material to be carried out of the cigarette in the smoke.

Of these two types of retarding agents, one is a slightly volatile, high-boiling solvent for the flavoring material which is somewhat more volatile than the flavoring material itself and is tasteless, odorless and non-toxic and which has an appreciable vapor pressure at the temperature which it reaches during the smoking of the cigarette. Suitable solvents for this purpose are ethylene glycol, diethylene glycol, propylene glycol and glycerol. Of these polyhydric alcohols, propylene glycol is preferred since its vapor pressure, together with its other requisite properties render it ideally suited for use in the cigarette of this invention.

The solid type of retarding agent which may be used in the cigarette in accordance with this invention, may be any powdered, non-toxic solid which has the property of adsorbing volatile material from a gas stream. Activated carbon, silica gel, activated alumina, and similar materials are suitable solid retarding agents. A number of different grades of activated carbon, which are commercially available are well adapted for this use.

In a plain cigarette, in accordance with this invention, a small volume of the tobacco near the mid-point of the cigarette may be impregnated with a solution of the flavoring material in a liquid retarding agent. If desired, a second small volume of the tobacco near the end of the cigarette which the smoker places in his mouth may be impregnated with the liquid retarding agent or admixed with the solid retarding agent.

In a plain cigarette carrying a zone of its tobacco impregnated with a solution of the flavoring material in the retarding agent, the retarding agent materially slows down the migration of the flavoring material through the remainder of the tobacco of the cigarette. During the smoking of this cigarette, the retarding agent vaporizes as the current of hot gas passes through the impregnated zone of tobacco and then condenses in the unimpregnated tobacco nearer the smoker's lips. This condensed retarding agent entraps the flavoring material which is picked up by the smoke in the impregnated zone and prevents it from leaving the cigarette until such time as the concentration of the flavoring material which is entrapped becomes high. When the burning tip of the cigarette reaches the impregnated zone of tobacco, the concentration of the flavoring material in the smoke passing through the unburned tobacco becomes too high to be retained by the retarding agent and it passes out of the cigarette in quantities which are perceptible to the smoker.

In the alternatives in which a second zone of the cigarette tobacco is impregnated with the liquid retarding agent alone or admixed with a powdered solid retarding agent, this second zone carrying the retarding agent reinforces the action of the retarding agent which vaporizes from the zone causing the flavoring material in retarding the escape of the flavoring material from the cigarette, by furnishing additional capacity to absorb (in the case of the liquid retarding agent) or adsorb (in the case of the solid retarding agent) the vaporized flavoring material.

Filter cigarettes, in accordance with this invention, may have any one of the alternative structures of the plain cigarettes described in the foregoing, with the addition of any one of the conventional filter tips to the end of the cigarette which the smoker is to place in his mouth. The addition of a filter tip to the foregoing alternatives in which a second zone of the cigarette tobacco carries a liquid or a solid retarding agent is advantageous, since it positively identifies the end of the cigarette which the smoker is to place in his mouth, as well as providing any other advantages which may be contributed by the filter itself.

In alternative forms of filter cigarettes, in accordance with this invention, the filter tip itself forms the carrier for both the flavoring material and the retarding agent. These embodiments of the invention are advantageous from a manufacturing standpoint since the filter can be more readily subjected to special treatment than particular zones of the tobacco within the main body of the cigarette.

In one of the alternative forms in which only the filter is treated, the inwardly end of the filter tip, i.e., its end adjacent the tobacco of the cigarette, is impregnated with a small quantity of a solution of the flavoring material in a liquid retarding agent. In this form of the cigarette, the filter acts in the same manner as the tobacco adjacent the smoker's mouth in the embodiment of the plain cigarette in which a solution of the flavoring material in the retarding agent is introduced into a zone of tobacco near the mid-point of the cigarette.

In another alternative form of a filter cigarette, in accordance with this invention, a filter which has two cylindrical sections which are separated by an air space is used. This filter may be, for example, of the cellulosic type which provides a great plurality of parallel channels for the passage of the smoke. The section of this filter adja-

cent the tobacco of the cigarette is treated with a solution of the flavoring material in a retarding agent, while the outer section of the filter may carry either the liquid retarding agent or a powdered solid retarding agent. In this embodiment of the invention, we prefer to use a solid retarding agent in the outer section of the filter. In the smoking of this cigarette, the flavoring material is vaporized in the forward part of the filter by the passing smoke and is absorbed or adsorbed by the retarding agent in the outer or rearwardly part of the filter until the retarding agent has reached its capacity for receiving the flavoring material. After the retarding material in the rearwardly section of the filter has reached its capacity to receive the flavoring material, additional flavoring material passes through the rearwardly section of the filter and into the smoker's mouth. The point at which the cigarette smoke passing out of the cigarette begins to carry the flavoring material can be adjusted in terms of the proportion of the cigarette which has been consumed, by adjusting the relative amounts of the flavoring material carried by the forwardly section of the filter and of the retarding agent carried by the rearwardly section of the filter.

The alternative forms of the cigarette, in accordance with this invention, are illustrated by the accompanying drawings, in which like reference characters are used to refer to like parts wherever they occur. In the drawings:

FIGURE 1 is a perspective view of a plain type of cigarette which has a single zone of its tobacco impregnated with a solution of a flavoring material in a liquid retarding agent,

FIGURE 2 is a perspective view of a plain type of cigarette which has a zone of its tobacco impregnated with a solution of a flavoring material in a liquid retarding agent and has a second zone of its tobacco impregnated with a liquid retarding agent or admixed with a solid retarding agent,

FIGURE 3 is a perspective view of a cigarette which has a special mouth section and has a single zone of its tobacco impregnated with a solution of a flavoring material in a liquid retarding agent,

FIGURE 4 is a perspective view of a cigarette which has a special mouth section and has a zone of its tobacco impregnated with a solution of a flavoring material in a liquid retarding agent and has a second zone of its tobacco impregnated with a liquid or admixed with a solid retarding agent,

FIG. 5 is a perspective view of a filter cigarette which carries a solution of a flavoring material in a liquid retarding agent in the forward part of its filter, and

FIGURE 6 is a side view of a filter cigarette, in partial cross-section, which has a split filter, the forwardly section of which carries a solution of a flavoring material in a liquid retarding agent and the rearwardly section of which carries a liquid or a solid retarding agent.

Referring to the drawings, the numeral 1 designates generally a paper wrapper, surrounding a column of tobacco 2. The paper wrapper 1 and column of tobacco 2 may be of any convenient length and will usually be the two and three-quarter inch length of the so-called "regular" cigarette or the three and five-sixteenths inch length of the so-called "king" size cigarette.

Referring specifically to FIGURES 3 and 4, the numeral 3 designates a special mouth section of the cigarette. This mouth section may be a water-proofed section of the paper wrapper 1, or it may be a section surrounded by a thin layer of cork. It may consist of a short stiff open cylinder of cardboard which prevents fragments of tobacco from getting into the mouth or it may be a section carrying a filtering material, other than tobacco, such as, for example, a cellulosic material or a mineral filter material.

The areas 4, –, 4 shown by the cigarettes illustrated by FIGURES 1, 2, 3 and 4 designate a zone of the tobacco filler 2 of the cigarette which is impregnated with a solution of a flavoring material in a retarding agent. This zone 4 preferably is positioned with respect to the length of the cigarette at the approximate optimum point at which the smoking of the cigarette should be discontinued to avoid excess absorption of the harmful constituents of the tobacco smoke which has accumulated in the unburned tobacco of the butt end of the cigarette. In the case of the cigarette illustrated by FIGURE 1 which has no special mouth section, I prefer to position the zone 4 at the mid-point of the length of the cigarette, since either end of the cigarette may form the butt end.

The position of the zone 4 in the cigarettes illustrated by FIGURES 3 and 4 with respect to the length of the cigarette will preferably be at the exact optimum point with respect to the special mouth section 3 of the cigarette, as determined by robot smoking tests of the particular type of cigarette involved. The exact optimum point as determined by such tests depends upon the tobacco mixture forming the column 2 of the cigarette and the nature of the mouth section 3. As can readily be appreciated, this optimum position will be closer to the end of the mouth section 3 when it is an efficient filter section than when it is, for example, merely a hollow end section.

The area 5 shown by the cigarettes illustrated by FIGURES 2 and 3, designates a zone of the tobacco filler 2 which is impregnated with the liquid retarding agent. It will be noted that this zone 5 is situated between the zone 4 and the end of the cigarette which is placed in the mouth in a position to intercept flavoring material carried out of the zone 4 during the initial smoking of the cigarette.

Referring specifically to FIGURE 5, the numeral 6 designates a filter section which carries a filtering material other than tobacco, such as, for example, a cellulosic material or a mineral filter material. The area 7 of the filter designates a zone at the inner end of the filter which carries a solution of a flavoring material in a liquid retarding agent.

The solution with which zone 4 of the cigarettes illustrated by FIGURES 1, 3 and 4 and zone 7 of the filter tip 6 of the cigarette illustrated by FIGURE 5 may be, for example, a solution of menthol, thymol, terpin hydrate, oil of wintergreen, oil of peppermint, oil of spearment or a similar flavoring material in ethylene glycol, diethylene glycol, propylene glycol or a similar liquid retarding agent. The zone 4 may be impregnated with a solution of the flavoring material in the liquid retarding agent which provides an amount of the flavoring material within the range of about 1.25 milligrams to about 5.0 milligrams and an amount of the retarding agent within the range of about 20 milligrams to about 50 milligrams. The optimum proportions and the amounts of the flavoring material and of the liquid retarding agent depends upon the exact materials selected. When using menthol as the flavoring material and propylene glycol as the retarding agent, the optimum amounts to use in each cigarette is 1.5 milligrams of menthol and 23.5 milligrams of propylene glycol. This solution is prepared by agitating the mixture of the ingredients until complete solution is obtained and a clear homogeneous liquid results.

The amount of liquid retarding agent added to the cigarette tobacco to form the zone 5 of the cigarettes illustrated by FIGURES 2 and 4 can vary over a considerable range. The minimal quantity can be quite low since the zone 4 of the cigarettes furnishes by redeposition retarding agent to the tobacco of the butt end of the cigarette. In general, the quantity of the liquid retarding agent added to form the zone 5 will fall within the range of about 10 milligrams to about 150 milligrams. About 90 milligrams of the retarding agent is usually satisfactory for forming zone 5.

Referring specifically to FIGURE 6, the numeral 8 designates generally a filter tip consisting of two sections 9 and 10 which are separated by an air gap 11. Each of the filters sections 9 and 10 may be, for example of the cellulosic sheet type or of the cellulose fiber type. The section 9 of the filter tip was impregnated with a solution

of a flavoring material in a liquid retarding agent, while section 10 was impregnated with a liquid retarding agent or may carry a solid retarding agent.

In the smoking of the cigarette illustrated by FIGURE 6, the smoke passing through the section 9 of the filter tip 10 volatilizes some of the flavoring material and the retarding agent, which is then removed from the smoke by the retarding agent carried by the section 10 of the filter tip until the retarding agent has picked up all that it can retain. After the retarding agent has picked up all of the flavoring agent that it can retain, additional smoke passing through the filter tip carries the flavoring agent into the mouth of the smoker.

The butt length at which the smoke passing through the filter tip 8 begins to carry the flavoring material into the mouth of the smoker can be adjusted by the adjustment of the relative proportions of the flavoring material and the liquid retarding agent carried by its section 9 and of the liquid or solid retarding agent carried by its section 10.

The amount of the solution of the flavoring material in the liquid retarding agent which is added to the section 9 of the filter tip 8 of the cigarette illustrated by FIGURE 6 is the same as that added to the tobacco of the cigarettes illustrated by FIGURES 1, 2, 3 and 4 to form their zones 4, –, 4. Similarly the amount of a liquid retarding agent added to the section 10 of the filter tip 8 will be the same as that added to the cigarettes illustrated by FIGURES 2 and 3 to form their zones 5, 5.

In the alternative embodiment of the cigarettes illustrated by FIGURE 6 in which a solid retarding agent is used in section 10 of the filter tip 8, instead of a liquid retarding agent, the amount of the solid retarding agent carried by the section 10 will depend upon the particular retarding agent selected. In the case of activated carbon it has been found that about 15 milligrams to about 40 mililgrams can be satisfactorily included in a filter tip section 10 of satisfactory size. Thirty milligrams of activated carbon was fully retained by the filter tip section and is an optimum quantity for this use.

There are many grades of activated carbon on the market. An investigation of the effectiveness of the various grades of activated carbon for this purpose has revealed the fact that a mixture of two different grades of activated carbon was more effective than either grade alone. For example, a mixture of equal parts of Darco HDB and Darco GFP, both manufactured by Altas Powder Co. was more effective than either of the grades when used alone.

In the foregoing, a series of specific embodiments of the improved cigarette have been described, and specific examples of the flavoring materials and the solid or liquid retarding agents which may be used have been given, together with details as to the quantities which have been found suitable. These specific examples and details have been given for the purpose of fully illustrating and explaining the invention and it will be understood that many changes can be made in these details without departing from the spirit of our invention as the scope of the following claims.

We claim:

1. A filter cigarette having a tubular paper wrapper filled with tobacco which has a zone adjacent the tobacco of the cigarette which carries a solution of a flavoring material in a slightly volatile, high-boiling, liquid solvent for the said flavoring material which retards the issuance of the flavoring material in the smoke of the cigarette, an intermediate air space and an outer end zone which carries a solid material which retards the issuance of the flavoring material in the smoke of the cigarette, the said cigarette being characterized by providing tobacco smoke during the initial phases of its burning which is substantially free of the said flavoring material and thereafter providing smoke which is noticeably flavored by the said flavoring material.

2. A filter cigarette having a tubular paper wrapper filled with tobacco and a filter tip which has a zone adjacent the tobacco of the cigarette which carries a solution of a flavoring material in a slightly volatile, high-boiling, liquid solvent for the said flavoring material which retards the issuance of the flavoring material in the smoke of the cigarette, an intermediate air space and an outer end zone which carries activated carbon, the said cigarette being characterized by providing tobacco smoke during the initial phases of its burning which is substantially free of the said flavoring material and thereafter providing smoke which is noticeably flavored by the said flavoring material.

3. A filter tip cigarette having a tubular paper wrapper filled with tobacco and a filter tip which has a zone adjacent the tobacco of the cigarette which carries a solution of menthol in propylene glycol the said solution having a composition and being present in an amount which provides within the said zone an amount of menthol within the range of about 1.25 milligrams to about 50 milligrams and an amount of propylene glycol within the range of about 20 milligrams to about 50 milligrams, an intermediate air-space, and an outer end zone which carries propylene glycol, the said cigarette being characterized by providing tobacco smoke during the initial phases of its burning which is substantially free of menthol and thereafter providing smoke which is noticeably flavored by the said menthol.

4. A filter tip cigarette having a tubular paper wrapper filled with tobacco and a filter tip which has a zone adjacent the tobacco of the cigarette which carries a solution of menthol in propylene glycol, an intermediate air-space and an outer end zone which carries activated carbon.

References Cited in the file of this patent

UNITED STATES PATENTS

1,384,680	Smith et al.	July 12, 1921
1,384,681	Smith et al.	July 12, 1921
1,407,274	Hibbert	Feb. 21, 1922
2,001,709	Davidson	May 21, 1935
2,063,014	Allen	Dec. 8, 1936
2,108,860	Kauffman	Feb. 22, 1938
2,728,346	Crawford	Dec. 27, 1955
2,746,890	Legler	May 22, 1956
2,819,720	Burbig	Jan. 14, 1958

FOREIGN PATENTS

173,262	Austria	Dec. 10, 1952
755,479	Great Britain	Aug. 22, 1956
189,399	Switzerland	May 1, 1937

OTHER REFERENCES

"In re Swingle et al.," 448 O.G. 440 from Commissioners Decisions, 1938, pages 120, 121, 122, and 123.