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CIGARETTE FILTER

Filed April 16, 1964

Fig. 1

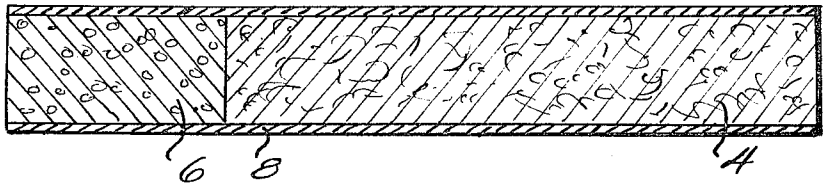


Fig. 2

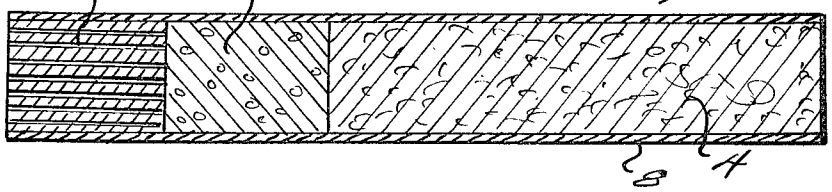


Fig. 3

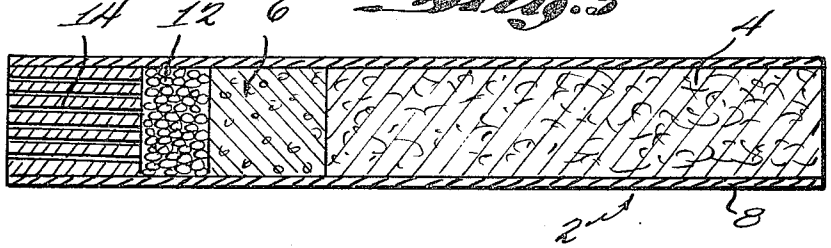


Fig. 4

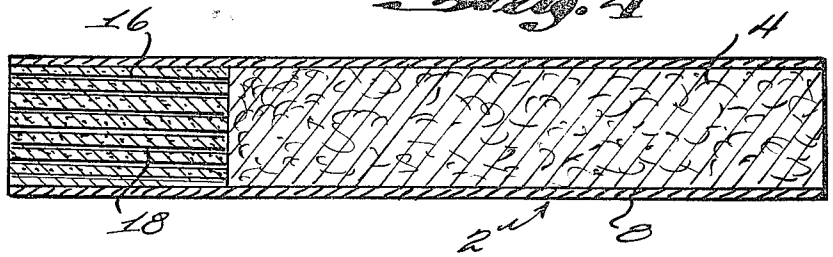
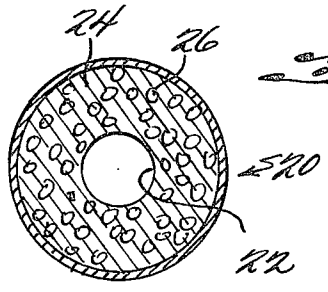


Fig. 5



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CIGARETTE FILTER

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This invention relates to a novel smoker's article filter.

One of the objections to many of the cigarette filters employed today is that the smoke loses the tobacco taste during filtration. In addition tars and nicotine are not always removed to a sufficient extent.

Accordingly, it is an object of the present invention to develop a novel tobacco filter.

Another object is to develop a tobacco filter which retains the tobacco taste and flavor.

An additional object is to develop a tobacco filter which has a high efficiency for removing tars and nicotine.

Still further objects and the entire 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 and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

It has now been found that these objects can be attained by the use of certain novel filters as hereinafter set forth.

While the following disclosure is primarily directed to the use of the novel filters in cigarettes, it is to be understood that the filters can also be employed as filters for other smokers' articles such as cigars and pipes.

In one aspect of the invention a filter or tobacco flavor regenerator is employed which is impregnated with a solvent extract of tobacco.

The solvent is preferably water although there can also be employed other solvents such as methyl, ethyl, propyl or isopropyl alcohol or aqueous alcohol, e.g. 80% ethyl alcohol by weight, to prepare the extract. The tobacco is extracted with water and the aqueous solution is then concentrated, e.g. to ½–¼ of its original volume. Preferably a mild saline solution is employed for the extraction. In a specific example tobacco was soaked with a 1% aqueous salt solution. The aqueous solution drained off and evaporated to ⅓ its original volume.

The aqueous extract solution used in extracting tobacco as discussed in the preceding paragraph may also include the following: A dilute aqueous solution of glycerine or Sorbitol ranging from 2–10%, preferably 5%, or a dilute aqueous solution of organic acid such as gluconic, lactic, tartaric or saccharic in the range from .5–5%, preferably 1%, where the aqueous extract is at a pH no greater than pH 6.

The concentrated tobacco extract thus prepared can then be used to impregnate filter paper, cellulosic fibers, e.g. alpha cellulose or cotton, cellulose ester fibers, e.g. cellulose acetate and cellulose acetatebutyrate, asbestos fibers, viscose rayon, polypyrrolidone fibers, etc. The impregnated fibers are then dried. Most preferably the tobacco impregnated filter, i.e. cigarette flavor regenerator, is placed on the afterside of another filter so that the filtered smoke volatizes the tobacco containing filter flavor so that the smoker can detect the aromatic flavor of the tobacco with the smoke.

Instead of impregnating the filter fibers with the aqueous concentrate of the tobacco extract there can be added to the aqueous concentrate an adhesive gum such as gum acacia (gum arabic), gum tragacanth, inulin, larch gum, guar gum, gum karaya, locust bean gum, or other carbohydrate gums, pectin, e.g. low methoxy pectin, methyl

cellulose, carboxymethyl cellulose and the mixture spray dried to a powder. This powder is then incorporated on the surface of filter paper, or any of the other fibers set forth supra, in the presence of moisture. As a result a substantial amount of powder adheres to the filter paper and on subsequent drying the powder adheres to the paper due to the mucilagenous character of the gum or the like. The preferred mucilagenous gum is gum acacia. In a specific example 50% of gum acacia was added to a water extract of tobacco which had previously been evaporated to ½ its original volume. This mixture was spray dried. The powder was sprinkled on the surface of damp alpha cellulose fibers and these were then dried prior to being used as a cigarette filter.

When employing alcohol to extract the tobacco, the concentrate can be air dried rather than spray dried.

In another alternative the aqueous tobacco extract is added to cigarette paper pulp in the pulping operation. In this manner the end paper contains the tobacco flavor distributed throughout the paper.

There can be employed any of the conventional filtering fibers with the tobacco extract.

There can also be added conventional granular or pulverulent filtering agents such as activated carbon used as filters, for example in Lark and Tareyton brands of cigarettes. A granular activated carbon filter of the type employed in Lark cigarettes is disclosed in Portuguese Patent 40,999. There can also be used granular adsorbents such as silica gel and ion exchange resins, e.g. cation exchange resins such as sulfonated styrene-divinyl benzene copolymer (available commercially as Dowex 50), sulfonated phenol-formaldehyde and ethylene glycol dimethacrylate-methacrylic acid copolymer and anion exchange resins such as phenol-tetraethylene pentamine-formaldehyde resin and quaternary ammonium resins prepared by reacting a tertiary amine with a haloalkylated cross-linked copolymer of a monovinyl hydrocarbon and a polyvinyl hydrocarbon, e.g. the reaction product of trimethyl amine with a chloromethylated cross-linked copolymer of 92% styrene and 8% divinyl benzene by weight (Amberlite IRA–400).

The preferred filter, however, is a novel fat encapsulated filter which can be used as the sole filter or which can be employed with the tobacco flavor regenerator and with or without conventional filters such as those previously set forth, e.g. fibrous filters such as alpha cellulose fibers, cotton fibers, cellulose acetate fibers, viscose rayon fibers or granular filters, e.g. activated carbon, activated alumina, silica gel, cation exchange resins and anion exchange resins.

The fat is preferably encased in gum arabic (gum acacia). There can be used other carbohydrate gums as encasing agents such as gum tragacanth, gum karaya and locust bean gum, pectin, methyl cellulose, hydroxymethyl cellulose, and proteinaceous materials, e.g. sodium caseinate and gelatin. Also, there can be employed ground cellulose or tobacco fibers in some instances to replace the carbohydrate gum. There can also be used lactose, dextrin, starch or corn syrup solids.

There can also be added a small amount, e.g. 0.1 to 30%, preferably 0.5 to 3%, by weight of the fat of a wetting agent such as propylene glycol monostearate, glycerol lacto monopalmitate, glycerol lacto oleate, glycerol lacto stearate, decaglycerol monostearate, decaglycerol tristearate, decaglycerol decastearate, decaglycerol tristearate, triglycerol monooleate, triglycerol monostearate, etc.

As the fat there can be employed any solid fat or oil. As used in the claims, the term fat is designed to cover both liquid and solid fats unless otherwise indicated. Among suitable fats which can be used are cottonseed

oil, safflower oil, corn oil, soybean oil, butterfat, coconut oil, peanut oil, lard, hydrogenated cottonseed oil, hydrogenated corn oil, hydrogenated soybean oil, hydrogenated peanut oil, olive oil, hydrogenated olive oil, hydrogenated coconut oil, e.g. hydrogenated to a melting point of 92° F. In some instances paraffin or wax can be used to replace the fat.

The fat encapsulated filter is preferably employed as a powder plug or as paper with powder impregnated thereon. The gum arabic or similar encasing agent prevents the solid fat or oil from leaking out. The fat extracts the tars and nicotine which are normally present in tobacco. The tars are dissolved in the fat (liquid or solid). This is a different mechanism than the absorption by which most filters operate.

Utilizing fat encased in gum arabic or similar material, there is thus employed a combination in which the gum arabic absorbs by filtration and the fat absorbs by solution of materials therein.

Usually the fat is 5–75%, preferably 30–60% of the total weight of the fat and carbohydrate gum. By varying the ratio of fat to carbohydrate gum or the like there can be varied the amount of nicotine, etc. pulled out from the cigarette, cigar or pipe tobacco by (1) absorption by solution and (2) filtration.

Example 1

The preferred formulation is made from a mixture of 74% hydrogenated soybean oil and 26% gum arabic. This mixture is homogenized and emulsified as a 35% solids emulsion in water and spray dried. By this manner the fat is encased in the gum arabic shell. The fat is impregnated throughout the shell matrix. The shell is not completely impervious and hence the smoke can get to the fat particles and the tars and nicotine dissolved therein. The gum arabic encapsulated fat is in the form of hollow balls.

Example 2

A formulation was preferred of 73 parts hydrogenated soybean oil, 26 parts gum arabic and 1 part decaglycerol tristearate. This mixture was emulsified as a 35% solids emulsion in water and spray dried.

The spray dried particles are usually less than 200 microns in size.

Instead of spray drying the emulsion in Examples 1 and 2, the emulsion can be employed to impregnate paper, alpha cellulose, cellulose acetate, cotton or other filter fibers.

Alternatively, instead of employing spray drying to obtain a product composed of small balls, the emulsion of Example 1 or Example 2 can be roller dried to produce a flake-like product.

The spray dried product of Examples 1 or 2 in powder form, or the roller dried flakes just described, can be used as a plug between the tobacco and the filter fibers or can be used as the sole filter.

The gum arabic encased fat spray dried product of Example 1 proved to be a very good filter for trapping tar from cigarettes when used as plugs ¼" or ⅜" or ½" long and also was successfully used as a ½" plug to filter cigar smoke.

The plugs of the spray dried product of Example 1 successfully removed additional nicotine and tar when placed on the after side of a cigarette having a conventional filter.

The 26% gum arabic-74% hydrogenated cottonseed oil mixture when emulsified as a 10% solids formulation in water was used to impregnate Rapid Flo artificial fibers which were then dried and employed as a cigarette filter. The filter very easily took out nicotine and tars from the smoke. Similar results were obtained when a 34% solids mixture in water of 76% hydrogenated cottonseed oil-24% gum arabic was used to impregnate cotton which was then dried and employed as a cigarette filter.

Humectants are frequently added to the flavor section of the filter. Suitable humectants include glycerol, sorbitol, propylene glycol, ethylene glycol, mannitol, xylitol and the like. The humectant is added to the aqueous tobacco extract in an amount of 0.1–5% by weight prior to concentration. In a specific example 0.5% of glycerol was added to the aqueous tobacco extract prior to concentration. The aqueus mixture was concentrated to ⅓ its volume and then used to impregnate cellulose acetate fibers which were then dried and used as a cigarette filter.

The invention will be understood best in connection with the drawings wherein:

FIGURE 1 is a sectional view of a cigarette having a filter according to the invention;

FIGURE 2 is a sectional view of another cigarette having a modified filter according to the invention;

FIGURE 3 is a sectional view of a cigarette illustrating another embodiment of the invention;

FIGURE 4 is a sectional view of a cigarette illustrating an alternative embodiment of the invention; and

FIGURE 5 is a sectional view of a gum arabic encapsulated fat hollow ball filter particle.

Referring more specifically to FIGURE 1, there is provided a cigarette indicated generically at **2** comprising tobacco **4** and a filter **6** encased in an overall outer paper wrapper **8**. The filter **6** is made of the spray dried powder of gum arabic-hydrogenated soybean oil prepared in Example 1.

In FIGURE 2 the cigarette **2** comprises a rod of tobacco **4** and a filter **6** made of the same spray dried powder as that shown in FIGURE 1. There is also an after filter **10** made of cellulose acetate fibers. The cigarette is encased in an overall outer paper wrapper **8**.

In FIGURE 3 the cigarette **2** comprises tobacco **4** and filter **6** made of the same spray dried powder as that shown in FIGURE 1. There was also provided a granular activated carbon filter **12** and a final filter **14** of alpha cellulose fibers. The alpha cellulose fibers were impregnated with the aqueous extract of tobacco and dried prior to use in the cigarette. Tobacco **4** and filters **6**, **12** and **14** were encased in overall outer paper wrapper **8**.

In FIGURE 4 the cigarette **2** comprises tobacco **4** and filter **16**. Filter **16** was prepared by incorporating particles of a spray dried mixture of 50% gum acacia and 50% concentrated aqueous tobacco extract on filter paper fibers in the presence of moisture to incorporate the powder as particles **18** on the surface of the filter paper fibers and then drying the filter. An overall paper wrapper **8** then was employed to encase the tobacco **4** and filter **16**.

As shown in FIGURE 5, the powder filter **6** of FIGURES 1, 2 and 3 is composed of small balls **20**. The balls are hollow at the center **22** and are made up of gum arabic **24** having hydrogenated soybean oil particles **26** encased therein.

What is claimed is:

1. The combination with a smoker's article having therein a smoke passage of substantial cross-section of a filter section having dispersed therethrough fat particles encased in a protective colloid.

2. The combination according to claim **1** wherein the fat particles are encased in a member of the group consisting of carbohydrates and proteinaceous materials.

3. A cigarette comprising tobacco and a filter section, said filter section having dispersed therethrough fat particles encased in a carbohydrate gum.

4. A cigarette according to claim **3** wherein the carbohydrate gum is gum acacia.

5. A cigarette according to claim **4** wherein the fat is hydrogenated soybean oil.

6. A cigarette comprising a rod of tobacco at one end thereof and a plurality of filter sections, the first of said filter sections being at the opposite end of the cigarette from the tobacco and comprising filter fibers impregnated with an aqueous tobacco extract and a second

filter section being between said first filter section and the tobacco, said second filter section having dispersed therethrough fat particles encased in a carbohydrate gum.

7. A cigarette comprising tobacco and a filter section comprising filter fibers impregnated with fat particles encased in a material selected from the group consisting of carbohydrates and proteinaceous materials, said encased fat being dispersed generally throughout said filter section.

8. A cigarette comprising a rod of tobacco at one end thereof and a plurality of filter sections, the filter section closest to the tobacco having dispersed therethrough fat particles encased in a member of the group consisting of carbohydrates and proteinaceous materials and the other filter section comprising carbon.

9. A combination according to claim 1 wherein the encased fat is in the form of hollow balls.

10. A combination according to claim 1 wherein the encased fat is in flake form.

References Cited by the Examiner

UNITED STATES PATENTS

2,164,702	7/1939	Davidson.	
2,792,006	5/1957	Marek	131—208 X
2,928,400	3/1960	Touey	131—208
3,006,347	10/1961	Keaton	131—15

FOREIGN PATENTS

173,262	12/1952	Austria.
72,210	10/1952	France.

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