

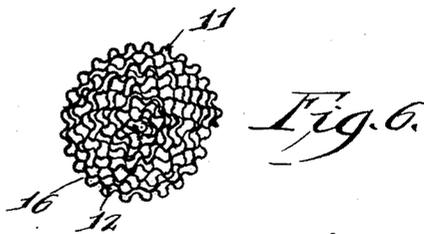
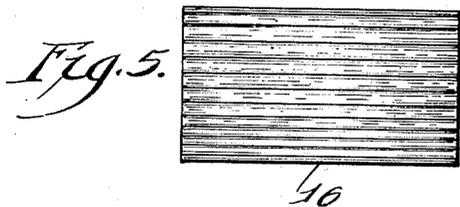
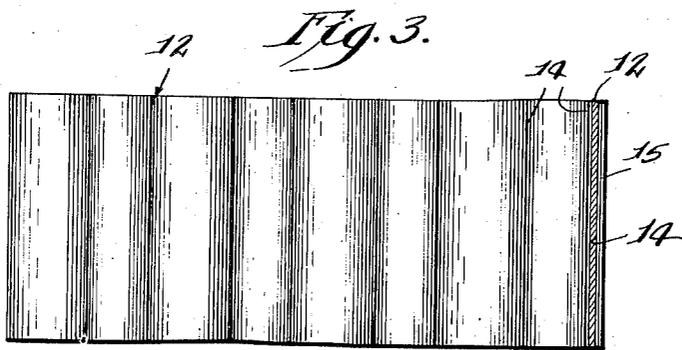
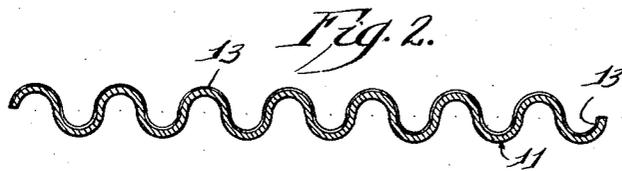
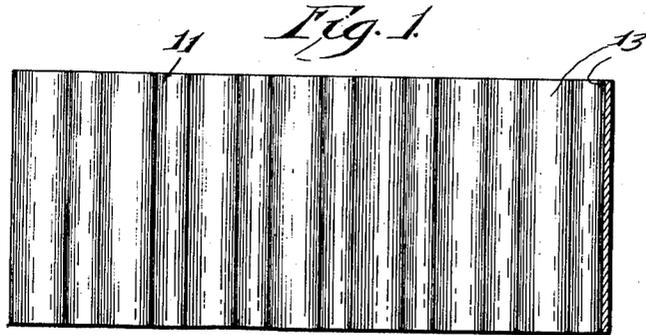
May 21, 1957

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2,792,841

TOBACCO SMOKE FILTER

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1

2,792,841

TOBACCO SMOKE FILTER

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4 Claims. (Cl. 131-208)

This invention relates in general to filtering devices, and more particularly to a filter for removing from tobacco smoke one of the injurious constituents contained in the tobacco smoke which, because it is in gaseous form as the result of combustion, is not removed from the smoke by filters heretofore employed.

This component of cigarette smoke which is readily absorbed by the red cells of the blood upon being inhaled into the lungs and produces extremely deleterious effects upon the human system, is a toxin in the form of ammonium cyanide.

The purpose of my present invention is to provide a filter which will remove from the products of combustion of tobacco this deleterious ammonium cyanide by precipitating it and retaining it in the filter, so as to prevent its entrance into the lungs of the smoker where its evil effects are most pronounced.

In carrying out the principles of my invention, I contemplate the production of a filter relatively small in size which is capable of incorporation in the mouthpiece end of a cigarette or in a cigarette or cigar holder, or in a pipe, the filter being in each instance in the form of a cartridge of such dimensions as are best suited to the particular purpose for which it is to be used. Preferably the filter is of cylindrical form consisting of a helically wound cylinder of paper or other suitable material treated, as will be later explained, with selective detoxicating chemicals adapted to precipitate in the filter from the smoke passing therethrough the deleterious ammonium cyanide contained in the tobacco smoke. While such a helically wound cylinder of paper or other suitable material at present seems preferable as a carrier for the detoxicant, it should be understood that my invention contemplates the employment of other forms of carrier, such as cotton, fiber or other cellulosic material capable of serving as a carrier for the detoxicant.

In order to facilitate an understanding of my invention reference may be had to the accompanying drawing on which:

Figure 1 is a plan view of a treated paper strip embodied in my invention;

Fig. 2 is an edge view thereof;

Fig. 3 is a plan view of another differently treated paper strip;

Fig. 4 is an edge view thereof;

Fig. 5 is a side view of a completed filter; and

Fig. 6 is an end view thereof.

It will be obvious that all of the drawings are on a greatly enlarged scale.

In the production of the preferred embodiment of my invention, the carrier includes one or more strips of paper preferably corrugated or crinkled transversely so that, when rolled into a cylindrical shape, pores or interstices are formed through which the smoke will travel in surface contact with the treated carrier.

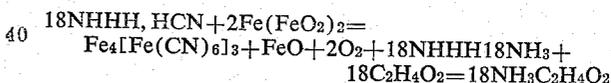
Preferably two similar strips of paper such as above described and designated 11 and 12, respectively, are employed, each chemically treated as will now be ex-

2

plained. One strip 11 is submerged in or has applied thereto acetic acid (C₂H₄O₂) indicated by 13. The other strip 12 is first supplied with a thin film of mild adhesive 14 such as dextrin which is applied to both surfaces thereof by dipping, spraying, or other preferred method of application. Before the adhesive has set the strip is subjected to a treatment with ferrous ferrite (Fe(FeO₂)₂) 15 in powdered form which is spread upon one or both surfaces of the strip where it is retained by the previously applied adhesive. Any surplus of the ferrous ferrite adhering to the strip is removed by shaking, blowing or otherwise dispersing the excess. The two strips of paper are then wound in superposed relation into a cylindrical cartridge 16 which may be sealed within a surrounding paper strip, the ends of the cartridge, however, being left open as shown in Fig. 6. The cartridge thus formed may be incorporated in a cigarette or in a holder or in a pipe, so that the smoke in passing through the filter will be brought into intimate contact with the chemically treated surfaces of the carrier.

The ammonium cyanide component of cigarette smoke which is rendered volatile by the combustion of the tobacco and which has heretofore passed unimpeded through filters adapted to remove solid and liquid particles only, in passing through my improved filter is combined with the chemicals of my filter in the following manner.

The tobacco smoke including the volatilized ammonium cyanide in passing through the filter is brought into intimate contact with the ferrous ferrite (Fe(Fe₂)₂) by which it is dissociated into ammonia (NHHH) and hydrocyanic acid (HCN), the latter component combining with the ferrous ferrite (Fe(Fe₂)₂) to form ferric ferrocyanide (Fe₄[Fe(CN)₆]₃) a blue crystalline precipitate. The detached ammonia (NHHH) at the same time combines with the acetic acid (C₂H₄O₂) of the carrier to form ammonium acetate (NHHH, C₂H₄O₂) a white crystalline precipitate. The reactions above indicated are as follows:



The two precipitates, the ferric ferrocyanide and the ammonium acetate into which the volatilized deleterious ammonium cyanide has been converted are retained in their crystalline form within the filter and thereby prevented from being inhaled as well as the original cyanide from which they were derived.

Instead of employing two strips of paper, one treated with acetic acid and the other with ferrous ferrite as above described, my invention contemplates also the employment of a single strip of paper or similar material treated with both acetic acid and ferrous ferrite. In this form of my invention, the paper strip would first be subjected to an application of acetic acid by dipping, spraying or otherwise, whereupon a light adhesive would then be applied. In this manner a single strip of carrier would present to the smoke passing through the coiled filter alternate surfaces bearing acetic acid and ferrous ferrite, respectively. Contact of the smoke carrying the deleterious ammonium cyanide with such surfaces would result in the conversion of the volatilized cyanide into crystalline precipitates in accordance with the reactions above set forth.

A filter cartridge made in accordance with my invention may, therefore, consist either of coiled superposed strips of carrier each carrying a different chemical or the chemicals may be applied to a single strip so as to present in alternation to the passing smoke chemically treated surfaces adapted to produce the reactions above described which result in the removal from the smoke of the del-

3

eterious ammonium cyanide and the conversion of it into crystalline precipitates capable of being mechanically retained in the filter.

It will be apparent from the foregoing that I have provided a filter which enables the deleterious constituent of nicotine contained in tobacco to be precipitated in the filter, thereby protecting and freeing the smoker from the harmful effects of this toxic substance.

Variations in the form of carrier and in the method of assembly may obviously be resorted to without departing from the spirit of my invention as defined in the following claims.

I claim:

1. A tobacco smoke filter comprised of the detoxicating agents acetic acid and ferrous ferrite ($\text{Fe}(\text{FeO}_2)_2$) to form precipitates of crystalline character on reaction with deleterious products contained in tobacco smoke which are adapted to be retained in the filter.

2. A tobacco smoke filter comprising a cartridge containing as detoxicating agents acetic acid and ferrous ferrite ($\text{Fe}(\text{FeO}_2)_2$) with which the smoke comes in contact in passing through the filter.

3. A tobacco smoke filter comprising a carrier of fibrous material arranged to provide interstices for the passage of smoke therethrough and having acetic acid and ferrous ferrite ($\text{Fe}(\text{FeO}_2)_2$) carried upon the walls of said interstices,

4

4. A filter for removing deleterious products from tobacco smoke, comprising a body of paper or the like arranged to form passages for the passage of smoke therethrough, the walls of said passages being provided with a coating of acetic acid and ferrous ferrite ($\text{Fe}(\text{FeO}_2)_2$) capable of chemically reacting with the deleterious products in the smoke to convert the same into precipitates which will be retained in the filter.

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