

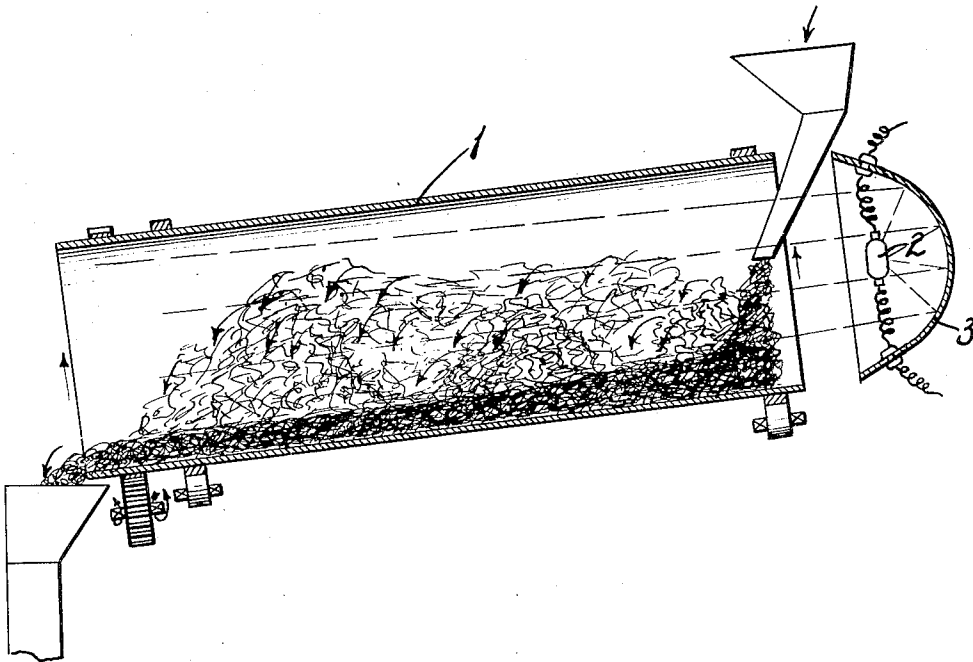
Aug. 1, 1933.

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1,920,588

METHOD OF TREATING TOBACCO

Filed Dec. 5, 1930



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UNITED STATES PATENT OFFICE

1,920,588

METHOD OF TREATING TOBACCO

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Application December 5, 1930. Serial No. 500,295

12 Claims. (Cl. 131-6)

This invention relates to a treatment for tobacco, and with regard to certain more specific features, to such treatment for the reduction of nicotine toxicity.

tent being in general that portion to which the specific injurious irritations and the like are due in smoking tobacco.

5 Among the several objects of the invention may be noted the provision of a treatment for tobacco whereby the toxicity of the nicotine content thereof is decreased without an attendant impairment of the aroma of the tobacco; a treatment of the class described wherein light-form irradiations are utilized under irradiation conditions producing optimum effects; a treatment whereby the irradiation is made at such a time as the tobacco substrate is in an optimum condition for the absorption of the rays; a treatment wherein provision is made for the neutralization of the opacity of certain sauces, flavoring agents, and the like, which are added to the tobacco, and which present an opaque blocking screen for the penetration of the light rays; a treatment wherein an increased amount of irradiation is accomplished with a decreased amount of generated rays; a treatment which is adapted readily to fit into a usual, existing tobacco manufactory without expensive rearrangement and discarding of existing machinery; the provision of apparatus for effecting treatment of the class described which is simple in construction and manipulation; and the provision of an improved tobacco product which has an improved aroma and flavor and at the same time has desirable decreased nicotine toxicity, harshness, irritancy, and the like. Other objects will be in part obvious and in part pointed out hereinafter.

35 The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts, and steps and sequence of steps, which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

40 The accompanying drawing illustrates, in diagrammatic longitudinal cross section, one embodiment of the present invention.

45 In my United States Patent No. 1,754,117, dated April 8, 1930, I have disclosed that the nicotine in tobacco is decreased in its toxicity by irradiation of the tobacco, in its cured state, with ultra-violet and other rays. In my co-pending United States patent application, Serial No. 479,418, filed September 2, 1930, I have disclosed that such irradiation, if carried out by a method therein described, directs the detoxification more to the free nicotine content of the tobacco, relative to the combined nicotine content, such free nicotine con-

60 The present invention discloses a process for the treatment of tobacco which embodies the elements of my previous inventions and which is directed primarily to the application of the steps of my previous inventions in such manner that there shall be no impairment of the aromatic and other qualities which are generally sought in tobaccos. Since tobacco is highly susceptible to alterations in aroma merely by apparently minor changes in the fixed formula or procedure for the handling of a given product, as every manufacturer knows, it is desirable that the addition of an irradiation process shall be such as to fit the manufacturing formula without affecting or altering the aroma. For example, after cigarette tobacco is shredded, the time and the temperature at which the cut shreds are gradually loosened are both material factors in preserving and developing the aromatic qualities of the tobacco. If either the time or the temperature is materially altered, there is a corresponding alteration in the final aroma of the product. So, too, the time that the gradually cooled tobacco shreds are allowed to remain covered in the "saratogas" contributes materially to the perfection of the finished product. It is clear that the introduction of such steps in the handling of tobacco as may essentially alter these delicately adjusted factory procedures for manufacture, may impair the final standard of the product, although the newly introduced steps of themselves need not be the cause of such impairment. Thus, unless the irradiation of tobacco, for whatever purpose the tobacco is intended, whether for smoking as pipe tobacco, cigars or cigarettes, is processed properly, the mere alteration of the routine required to introduce the new step of irradiation may of itself influence the product adversely, although the rays used for the irradiation would not, alone, detract from the product. Any experienced manufacturer in the art of tobacco handling is fully conversant with these principles.

I have discovered that, in the manufacture of cigarettes as an illustration, the conditions under which the application of radiation to effect the detoxification referred to in my previously mentioned inventions, is best accomplished when the following conditions prevail:

First, when the tobacco, after it has been blended, sauced (when saucing is employed), compressed, cut, and loosened, retains a mois-

ture content of from twenty to thirty per cent. of its weight.

Second, when the tobacco is so agitated and separated that, within practical limits, the individual shreds are more or less isolated one from another, whereby a greater surface is presented to the irradiating rays.

Third, when the irradiating rays are projected into the tobacco, already in the conditions described above, in a confined region, as for example, a revolving drum, and are presented as parallel rays, such as are projected by a search-light.

The effect of the high moisture content, I have discovered, is that of presenting the individual cells of the tobacco shreds, or leaf in the case of cigars and the like, to the radiation in a greatly distended condition. A moisture distended cell reacts more rapidly to the effect of radiation than does one encased in dry, hardened and impervious leaf parenchyma. Certain agents, among them glycerine, and as I have discovered, ethylene glycol and diethylene glycol, either alone or together with from 1 to 5% of calcium chloride, which may be used in limited quantities to sweeten the tobacco and at the same time to preserve the hygroscopic qualities whereby the finished product shall not become too dry on prolonged standing, act as clearing agents and foster the more thorough permeation of the leaf with ultraviolet rays thereby. Chloral hydrate and other agents, used in varying amounts are likewise valuable substances, I have discovered, to foster this desired effect. My process, therefore, includes where necessary or desirable the addition to the sauce of such clearing agents of the type I have mentioned and for the purposes disclosed in replacement of or in addition to the glycerine now employed.

The presentation, as nearly as possible, of the individual shreds of tobacco to the effect of the rays, such presentation being obtained by separation and agitation in a cylindrical drum 1 through which the tobacco passes as the drum 1 revolves, and in which the agitation and separation is accomplished by means of worming and/or the like, is conducive to a more uniformly irradiated product and to effective economy in the use of radiation; since, by this method, less energy is made to reach a greater volume (surface) of product. I have found this to be advantageous over the usual method of exposing more or less thick layers of shredded or other tobacco carried by conveyor belts or their equivalent over which suitable sources of rays are suspended. Further, the rays, being contained within the cylindrical drum 1 are further conserved by their reflection from the walls of the drum back into the agitated tobacco shreds, instead of being lost as they would be when a conveyor belt is used. Furthermore, the drum 1 itself protects the tobacco from attack by the atmospheric moisture and gases and the tobacco is thus less likely to be altered in its final aromatic desirability. The interior of the drum 1 should preferably be metallic and finished with a surface best adapted for the maximum reflection of the rays involved. When ultraviolet rays are used, the interior plating 5 of the drum is desirably of chromium, or nickel, or aluminum. When light, in the visible region is used, as also with infra-red rays, the interior plating is preferably chromium. When wooden cylinders are used, the interior may be painted with any suitable aluminum paint. The point is that the interior walls of the revolving cylinder are desirably conducive to conservation of light by select-

ing that coating which shall more greatly reflect the kind of rays used back into the mass.

The manner of projection of the beam is important. I have discovered that the search-light principle of projection effectively answers the purpose. By the search-light principle I mean to include the use of a parabolic or paraboloid reflecting surface 3, finished in whatever material, such as chromium plating or the like, which will reflect the greatest volume of light and which will absorb the least. In the focus of this reflector there is positioned the radiation source 2, which, as nearly as is practically convenient, approximates a point source in the case of the parabolic projector, and a line source in the case of a paraboloid projector. If it is desired to use the combination of ultra-violet, visible and infrared rays, the point source may be a suitably selected arc across carbons, plain or impregnated, to deliver the desired type of radiation. Metallic arcs may also be used. If it is desired to use principally ultra-violet rays, a small but concentrated ultra-violet tube, such as a quartz mercury vapor lamp, may be employed. If it is desired to use visible light, principally, a concentrated filament tungsten lamp of high wattage, such as 1000, 2000 or 3000 watts, may be used. If, finally, principally infrared rays are sought, the element may be any hot glowing body such as a heated invar metal element or any other usual source of infrared rays, of which there are numerous practically available examples.

The point in connection with the search-light principle is that of being able to project, as nearly as possible, a parallel beam of light throughout the cylinder, thereby eliminating the loss of energy sustained by the use of non-searchlight principle lamps, in which latter the energy intensity varies inversely as the square of the distance from the light source; but in which former, searchlight types, the light intensity is practically equal throughout the entire length of the beam (allowing for imperfections in the design of the parabola or paraboloid reflector, from diffusion, and from the practical variation from a theoretical point source and the like). Thus, by this search-light principle, I may properly gauge the amount of energy required to produce a required degree of detoxification by suitably selecting the original intensity of the ray source and by knowing the rate of travel of the tobacco throughout the rotating drum. It is not feasible to give the actual values for these different constants; the tobacco used, its original nicotine content, both free and combined, the degree of detoxification sought, the kind of light used, the amount of moisture, the presence or absence of clearing agents, and the addition or not of photo-sensitive materials, are all important factors which anyone conversant with the art will recognize and which must be individually evaluated for any given manufacturing formula or procedure and for any desired product (whether cigarette, pipe-tobacco, cigar, or the like).

Since it is the custom to add coumarin or its derivatives to certain tobaccos to reenforce their aromatic principles this addition being made in the so-called casing or saucing, and since the ingredients of these sauces, which are usually secrets of the trade, I have found frequently to be impervious to ultraviolet rays in particular, another step in my process is that of mixing with the sauce or casing a material which I have found effective in counter-acting the ultraviolet absorbing properties of the coumarin and similar

sauce materials. Such counteracting substances, I have discovered, include malic acid, tartaric acid, acid salts of these, oil of vitriol, manganous acetate and others. These are to be mixed with

5 the original saucing or casing material in appropriate amounts, which depend upon the amount of coumarin and the like whose light-screening effect is to be overcome. In general, the substances which I have designated form from one-fourth to five per cent of the sauce. The choice
10 in the use of these counteracting agents or sensitizers and others is governed by the quality of light used, its intensity and the opacity factor introduced by the sauce or casing, which can in each individual instance be readily determined.

15 Having described in detail the steps and the sequence of steps which together form a process for the application of radiation to tobacco designed to detoxify the nicotine, either free or combined, in part or wholly, I wish now to co-ordinate the various steps, by way of illustration only, and by no means in a limiting sense, into an exemplary procedure:

25 The properly blended tobacco leaves (referring only to cigarette manufacture for this example) are sauced, into which sauce there is added a sufficient amount of clearing and hygroscopic agent, such as I have designated above, and an amount of counteracting or sensitizing agent
30 sufficient to overcome the opacity of coumarin, if such or its homologues are present. The moistened, cased or sauced tobacco is now compressed, shredded and gradually steamed in the usual manner. It now ordinarily passes into
35 what is called a "cooling chamber", which comprises a rotating drum where the temperature of the tobacco is moderately reduced. It is this drum which I use particularly to achieve the irradiation effects described above.

40 Irradiating as described supra does not involve any interruption of the commonly practiced processes. In most instances, only minor changes are required in the construction of this drum as compared with those ordinarily employed heretofore, the changes including such as the proper plating of the metallic interior and the like. Into
45 this drum there is projected the beam of radiation, by the search-light principle. The quality, quantity and time of irradiation will vary with the rays used, whether ultraviolet, visible or infrared, and will depend upon their original intensity and the degree of detoxification sought. The tobacco
50 is received in the usual "saratogas" and the process is finished in its usual way.

55 It is to be understood that the process outlined above can with equal success be applied to tobacco in forms other than shreds for cigarettes. Cigar tobacco, pipe tobacco, chewing tobacco and other forms are likewise benefited.

60 The tobacco product coming from the cylinder has the following characteristics: it has a full and delightful unimpaired aroma, the free and, to an extent, the combined nicotine content of the tobacco has been decreased in toxicity, and the harshness and irritancy are lessened. Other desirable characteristics are present.

65 In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

70 As many changes could be made in carrying out the above constructions, compositions, and processes without departing from the scope of

the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The process of treating tobacco which comprises dampening said tobacco with water to which has been added a sauce and an agent which counteracts the opacity of constituents of said sauce, and irradiating said dampened tobacco.

2. The process of treating tobacco which comprises dampening said tobacco with water to which has been added a sauce containing coumarin and an agent which counteracts the opacity of said coumarin, and irradiating said dampened tobacco.

3. The process of treating tobacco which comprises dampening said tobacco with water to which has been added a sauce containing coumarin and manganous acetate for counteracting the opacity of said coumarin, and irradiating said dampened tobacco with ultra-violet rays.

4. The process of treating tobacco which comprises dampening said tobacco with water to which has been added a sauce containing coumarin and manganous acetate for counteracting the opacity of said coumarin, and irradiating said dampened tobacco with infrared rays.

5. The process of treating tobacco which comprises dampening said tobacco with water to which has been added a sauce containing coumarin and manganous acetate for counteracting the opacity of said coumarin, and irradiating said dampened tobacco with intensified visible light rays.

6. The process of treating tobacco which comprises distending the cells of said tobacco with water to which has been added a clearing agent and subjecting said tobacco, while in said distended condition, to irradiation.

7. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce including a clearing agent as a constituent thereof, and subjecting said tobacco, while in said distended condition, to irradiation.

8. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce containing glycerine and subjecting said tobacco, while in said distended condition, to irradiation.

9. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce containing ethylene glycol and subjecting said tobacco, while in said distended condition, to irradiation.

10. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce containing diethylene glycol and subjecting said tobacco, while in said distended condition, to irradiation.

11. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce containing ethylene glycol and calcium chloride and subjecting said tobacco, while in said distended condition, to irradiation.

12. The process of treating tobacco which comprises distending the cells of said tobacco with a sauce containing diethylene glycol and calcium chloride and subjecting said tobacco, while in said distended condition, to irradiation.

AUGUST J. PACINI.