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P. A. SARTORETTO ET AL

2,613,673

TOBACCO SHEET MATERIAL AND METHOD OF PRODUCING THE SAME

Filed July 11, 1946

FIG. 1

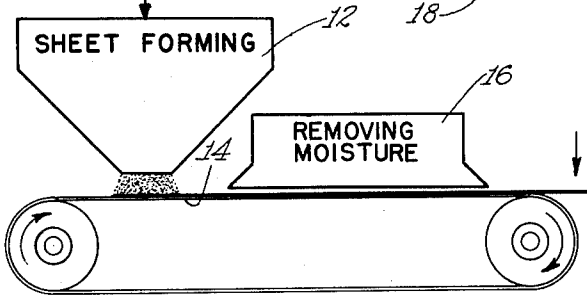
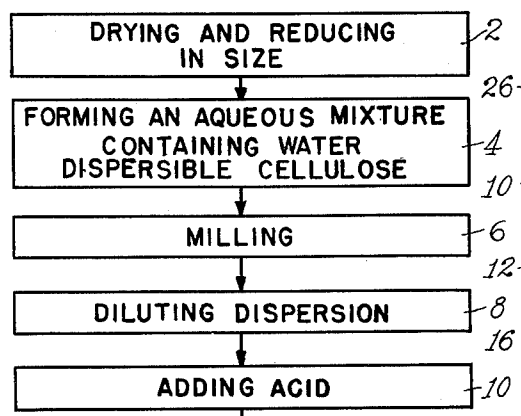


FIG. 2

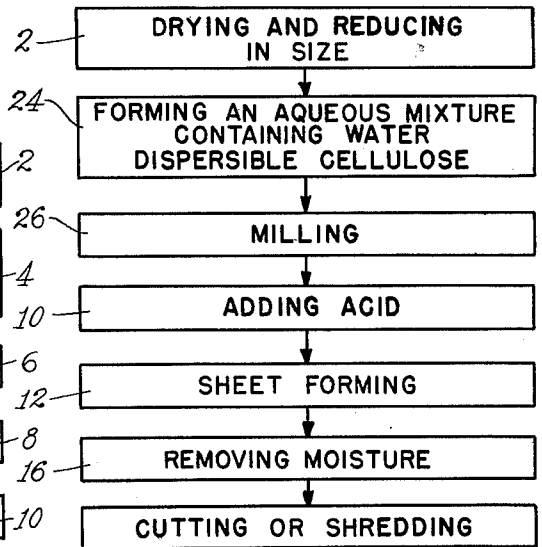


FIG. 4

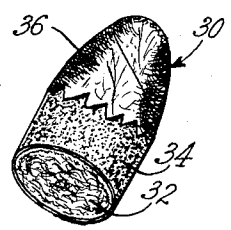


FIG. 5

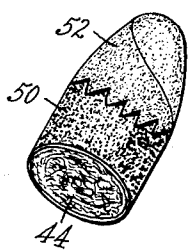


FIG. 6

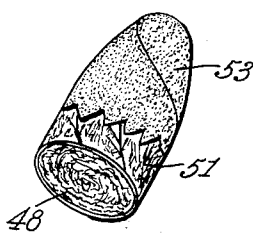


FIG. 7



FIG. 3

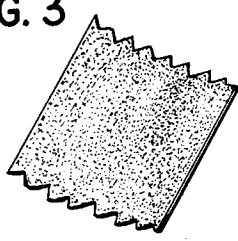
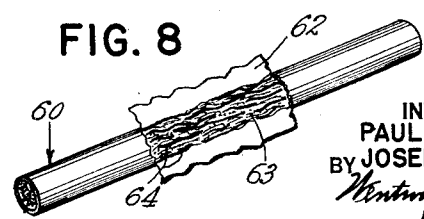


FIG. 8



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TOBACCO SHEET MATERIAL AND METHOD
OF PRODUCING THE SAME

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Application July 11, 1946, Serial No. 682,860

21 Claims. (Cl. 131-15)

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This invention relates to reconstituted tobacco sheets, films and filaments, and the method of producing such sheets, films and filaments, and to cigars, cigarettes and smoking articles incorporating such materials, and more particularly to the formation of reconstituted tobacco sheets and films which are self-supporting, tough, flexible and possess wet and dry strength as good or better than natural leaf tobacco. Our sheets, films and filaments simulate natural tobacco leaves and pieces thereof, and retain substantially all the natural characteristics of tobacco such as color, taste and aroma.

Each year large quantities of tobacco which may be considered by-products are discarded as unsuitable for use in forming smoking articles, and sold at low prices with considerable loss to manufacturers. Actually, except for size, much of these types of tobacco is valuable, and in many cases its salvage for use in smoking articles would represent an important gain to manufacturers. Attempts have been made from time to time to convert these tobacco materials, such as stems, shorts, broken pieces, scrap or dust, and other tobacco waste into sheets or tobacco paper. In all instances, however, so far as is known, none of these attempts has proven satisfactory and such tobacco sheet materials have proven to be of no use in the manufacture of smoking tobacco articles such as cigars or cigarettes.

Paper has been produced by the reduction of tobacco stems and scrap to paper-forming pulp by the use of chemicals added according to conventional paper making practices wherein the fibers of the stock are separated from their binding materials in producing a cellulose pulp in which the fibers can interlock to provide the mat in the finally resulting product or paper sheet. These practices, however, when applied to the production of paper simulating tobacco (or tobacco leaf) have proved unsatisfactory because in making such paper, the reduction of the tobacco stock in forming the necessary pulp destroys and/or removes practically all of the essential and valuable characteristics of tobacco such as color, taste and aroma. Hence the resulting products have little value as a material for use in making cigars or cigarettes, or other tobacco products.

Other attempts have been made to form tobacco paper without the use of chemicals as by beating tobacco waste to reduce the fibers to a predetermined length after which the soluble portions have been strained off and the resulting

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pulp has been run through a Fourdrinier machine to form tobacco paper. Here again the resulting product has failed in the simulation of natural tobacco because of the removal of the desired soluble constituents which are essential to and characteristic of natural tobacco, such for instance as color, taste and aroma.

Also in connection with the prior art tobacco papers mentioned above, the resulting products have lacked strength and flexibility necessary to the use of such material in the manufacture of smoking articles.

One of the main problems, therefore, solved by this invention is that of using tobacco in the formation of reconstituted tobacco sheet material or film or filaments is that of forming a sheet or film which will have the requisite strength and flexibility yet simulate tobacco in appearance, retain characteristics and aroma of tobacco, and be suitable for the purposes required in subsequent use in forming cigars and other tobacco products for oral use. It is obvious, however, that our invention is not limited only to types of tobacco discarded in the processes of making smoking articles or products, and that other grades of tobacco can be used.

The present invention teaches a method of forming tobacco sheet material in self-supporting continuous sheets, films, or filaments from tobacco, preferably tobacco by-products such as dust, scrap, stems, clippings and the like, which have both the strength and flexibility required for utilization as cigar binders and wrappers or which can be shredded and added to natural shredded cigarette tobacco without breaking down, both during the manufacture of such smoking articles or the subsequent handling thereof by the ultimate consumer, the smoker.

Materials made in accordance with the invention have the desired wet strength, which feature is of special importance in the case of cigar binders because it enables the sheet or film to be moistened a desired amount before being cut and wrapped about a cigar filler without failure or rupture of the sheet when rolled about a cigar filler.

While wet strength is not as important when these tobacco sheets, films or filaments are used for cigarette manufacture, it nevertheless, contributes materially to the strength of shreds made therefrom, and tends to insure that each shred will hold up and not be crushed or broken when made into cigarettes. Such sheet materials, made in accordance with the present invention, retain substantially unchanged the

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natural tobacco characteristics of color, taste and aroma, and when smoking articles made therefrom are smoked, a smoke essentially the same in taste and aroma as that from the constituent tobaccos of the reconstituted sheet is obtained.

According to the present invention, tobacco in the form of stems, scraps, dust or shorts is converted into a dispersion in the presence of an agent which acts as a means for preventing separation of the solution and also reacts to perform a moisture resisting function in the final product or sheet.

Our reconstituted tobacco sheet material has a wet and dry strength closely approximating natural leaf tobacco so that it adds greatly to the smoking qualities of cigars and cigarettes formed therefrom. It can be used as a binder or wrapper in cigars without disintegrating in the smoker's mouth. Since it has a high wet strength, it is especially adapted for use as a binder or wrapper in cigar manufacture because it can be moisture conditioned in the same manner as binder or wrapper leaf and applied about a bunch without breaking or tearing. The color closely approximates natural leaf tobacco so that its use as a binder or wrapper or both does not detract from the appearance of the finished cigar.

We may form filaments directly from the slurry or dispersion or shred the sheet according to known practices. Such materials can be admixed with natural shredded leaf tobacco in any desired proportion according to the requirements of a particular blend. Due to the moisture resisting qualities of the filaments or shreds the smoker is not subjected to separation of shreds in his mouth. Also, as in the case of cigars, when made from our novel reconstituted tobacco sheet material, since substantially all soluble and insoluble constituents and properties of the tobacco are retained in the final sheet, films, shreds and filaments, the smoking qualities remain approximately the same as natural tobacco.

It is an object of the invention, therefore, to produce novel self-supporting continuous tobacco sheet or film material which is tough and flexible, having some elastic properties when humidified and which has sufficient wet strength to prevent disintegration of the film or sheet when subjected to moisture.

It is a further object of the invention to provide an improved method of forming self-supporting continuous reconstituted tobacco sheets and films having the general appearance of natural leaf tobacco except for vein and stem arrangement in which the wet strength is substantially equal to or better than that of the natural tobacco from which such films and sheets are made.

It is a further object of our invention to form reconstituted tobacco sheets, films or filaments containing regenerated carboxy methyl cellulose which contributes materially to the wet strength or moisture resisting properties of the material which remains approximately the same as natural tobacco.

It is a further object of our invention to provide novel smoking articles and products, such as cigarettes and cigars containing desired quantities of our novel reconstituted tobacco material. Our novel reconstituted tobacco material resists disintegration when brought into contact with moisture, and at the same time its

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smoking qualities remain approximately the same as natural tobacco.

It is also an object of our invention to provide novel smoking articles such as cigars and cigarettes wherein elements of these articles consists of our reconstituted tobacco sheet material which contributes both to their physical strength and smoking qualities.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully described, and then set forth in the claims hereunto appended.

In the accompanying drawings which illustrate a preferred embodiment of the invention, and form a part of this specification, and in which like characters of reference indicate the same or like parts:

Figure 1 discloses a diagrammatic showing of one way of carrying out the method of the invention;

Figure 2 discloses a diagrammatic showing of a modified method of carrying out the invention;

Figure 3 discloses a diagrammatic showing of the completed product;

Figure 4 shows a typical cigar having a binder formed from our reconstituted tobacco sheet material;

Figure 5 shows a cross-sectional view of a cigar in which the wrapper and binder are formed of our novel reconstituted tobacco sheet material;

Figure 6 is a cross-sectional view of a cigar having a reconstituted tobacco sheet wrapper;

Figure 7 is a cross-sectional view of a cigar in which the filler, in whole or in part, consists of reconstituted tobacco sheet material; and

Figure 8 is a view of a cigarette in which our novel reconstituted tobacco sheet material forms a part of the filler.

The reduction of the tobacco employed can be generally carried out much in the same procedure specified in the co-pending Wells and Sowa application, Serial No. 414,221, filed October 9, 1941, now Patent 2,433,877, granted January 6, 1948. The reduction, however, to a colloidal dispersion or a liquid solution containing colloiddally dispersed tobacco may be simplified by using a colloid mill, such as a Premier Colloid Mill, employing carborundum faced rotor and stator.

Referring to Figure 1 which shows a preferred method of performing the invention, it will be observed that a given quantity of tobacco, preferably dried is reduced to small size, by suitable conventional drying and comminuting mechanism designated 2. The tobacco, which may consist of stems, scrap, shorts, dust or a mixture of either, is mixed with a quantity of neutral fluid such as water. To the mixture is also added from one percent to twenty percent by weight of the tobacco in the mixture, of a water dispersible cellulose. For example, a carboxy methylcellulose salt, such as sodium salt, may be added before or during the milling. Other alkali metal salts of carboxy methyl cellulose including the ammonium salt may be used. We have found that best results are obtained when using between five and ten percent of the sodium carboxy methyl cellulose salt.

As a typical example, the mixture may be made up of ninety-five grams of tobacco waste, five grams sodium carboxy methyl cellulose, and four hundred cubic centimeters of water. This is mixed together in a suitable conventional container, designated generally at 4, and then poured into a colloid mill such as a Premier col-

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loid mill, or a conventional type of ball mill may be used. The mixture is milled, designated generally at 6 in Figure 1, for a period of time sufficient to reduce the tobacco to a point where preferably a large proportion thereof is colloidal in size. The dispersion is then diluted. A quantity of water, say 1100 cubic centimeters in the example given, is then added to the dispersion, as indicated at 8 and the diluted dispersion is agitated. Ten percent by weight of eighty-five percent phosphoric acid solution based on the weight of the solids in the dispersion is added, as indicated at 10, to the dispersion which is then agitated for a period of time sufficient to uniformly distribute the acid. The water-solids ratio given is exemplary. Other ratios of solids to fluids can be used. The phosphoric acid can be added to the mixture during the last part of the milling operation but it is preferred to add it at the conclusion of the milling. Experiments have shown that a large number of acids can be used as substitutes for phosphoric acid and perform substantially the same results. These include phosphoric, hydrochloric, nitric, acetic and lactic acids. We have, however, obtained the best results with phosphoric acid.

The phosphoric acid added to the dispersion coming from the colloid mill or ball mill, as the case may be, reacts with the carboxy methyl cellulose salt and regenerates water insoluble carboxy methyl cellulose therefrom. This imparts to the resulting film the desired water-proofing or moisture-resisting characteristics, or the desired wet strength.

It is believed that the regeneration of the carboxy methyl cellulose in the dispersion is accelerated when the wet cast film is subjected to drying or moisture removal in forming the finished product. The phosphoric acid also functions as a fire retarding agent so that when a smoking article incorporating the sheet or film is burned, the rate of burn is lower and a cooler smoke results. The fire retarding properties of a sheet or film made as above is believed to be due to the presence of a fire retarding salt. Phosphoric acid, when added to a slurry containing an alkali metal salt of carboxy methyl cellulose, reacts with the alkali metal ion and forms an alkali metal phosphate. When sodium carboxy methyl cellulose is used, sodium phosphate is formed.

Following the addition of the acid to the dispersion the slurry is placed in a film forming device of suitable conventional construction, indicated generally at 12, and cast into sheets or webs, preferably upon an imperforate surface, such as a traveling endless stainless steel conveyor moving through a heating or moisture removing zone. The film forming surface is designated generally at 14 and the moisture removing mechanism is indicated at 16. The latter may be any suitable conventional device employed for this purpose.

The use of a stainless steel belt or equivalent imperforate surface prevents staining of the sheet being formed and also makes it relatively impossible to lose any of the desired and valuable soluble constituents of tobacco. The dried sheets, as shown in Figure 3, are stripped from the casting surface in any known manner and passed to cutters 18 where the sheets or films are cut to predetermined length for use, say in cigar manufacture, or shredded to desired width for use, say in cigarette manufacture. Any conventional

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stripping, shredding and cutting mechanisms may be used for these purposes.

It will be seen from the above described method that at all stages of the process, care is taken not to lose from the aqueous dispersion or from the cast sheet or film, any of the natural soluble ingredients or constituents of the tobacco. These soluble constituents are, therefore, reincorporated in the finished sheet, film, filaments or shreds in substantially the proportions in which they occur in the component tobaccos employed in the process after evaporation of the excess moisture present in the aqueous colloidal dispersion.

Another result of the use of phosphoric acid is that it acts as a blandizing agent such that a milder smoke results when applicants' reconstituted tobacco sheet material is smoked. It is believed that this result is obtained because the phosphoric acid slows down the decomposition of volatile aromatic ingredients of the tobacco in the sheet material when it is burned.

In the above description, reference has been made, chiefly to the formation of sheets or films. If desired, the acidified slurry can be placed in an extruding device of any conventional design and formed directly into filaments of any desired thickness or width. The filaments can then be passed through a heating zone such as 16 and cut to length by means of conventional cutting devices, indicated generally at 18.

Films have been made utilizing from one percent to twenty percent by weight of sodium carboxy methyl cellulose in the initial mixture prior to milling and the use of one percent to twenty percent phosphoric acid based on the weight of tobacco solids used. In general, it has been found that best results are obtained when from five to ten percent by weight of sodium carboxy methyl cellulose and five to ten percent by weight of phosphoric acid are used. In such cases the smoking articles, such as cigars or cigarettes, made from these sheets have compared satisfactorily with natural tobacco without material notice of the presence of regenerated carboxy methyl cellulose or the phosphoric acid.

It has also been found that the presence of carboxy methyl cellulose in the dispersion or slurry prevents a separation of the dispersion so that when the colloidal dispersion is formed into sheets the resulting product is extremely uniform.

The wet strength required or desirable in reconstituted tobacco sheet material, films or filaments produced in accordance with our invention depends upon the ultimate use to which this product is to be put. If our novel films or sheets are to be used in the manufacture of cigars, say as binders or wrappers therefor, a relatively high wet strength is important. This is because when the sheets or films so used are moisture-conditioned they can be handled or manipulated either manually or on machines in the same manner as natural leaf tobacco binders and wrappers without breaking, splitting, or tearing. Also this property tends to prevent disintegration of the material in the smoker's mouth from contact with saliva, or when the smoking end of a cigar is chewed.

When our novel sheets or films are to be shredded or employed in the form of filaments in the manufacture of cigarettes wet strength is not quite as important although it is desirable and hence with this type of reconstituted tobacco

sheet material a lesser degree of wet strength

may suffice for all practical purposes. One of the chief reasons for some degree of wet strength in tobacco film or sheet material being used in cigarette manufacture is in the processing or preparatory stages before the cigarette tobacco filler containing shredded reconstituted tobacco sheet or filaments thereof is made into cigarettes. We have found that shreds or filaments having the requisite dry strength may be formed without the addition of phosphoric or other acid. In this case, in the methods described above, an alkali metal salt of carboxy methyl cellulose such as the sodium salt thereof, is added as set forth above. This functions to maintain the tobacco in dispersion and also acts as a binding agent. When, therefore, the resulting slurry is cast into sheets, which are subsequently shredded, or formed into filaments and excess moisture is removed therefrom, a tough, self-supporting, pliable sheet or film results. Some cigarette manufacturers may desire to admix with natural cigarette tobacco a reconstituted tobacco sheet product having high wet strength. For this reason it is obvious that a cigarette type reconstituted tobacco sheet, film or filament may be formed in the same manner as described in connection with the formation of types of reconstituted tobacco sheet material, primarily suitable for cigar manufacture.

Figure 2 shows a modified method of producing our sheets, films or filaments. The method of Figure 2 is generally the same with the exception that the diluting step of the preferred method disclosed in Figure 1 is omitted. According to the method shown in Figure 2, after a batch of tobacco, say 95 grams, is dried and comminuted at 2, it is mixed with a given quantity of water, say 1500 cc., and a quantity of water dispersible cellulose, such as the sodium salt of carboxy methyl cellulose, as described above in the first example. This mixture, which is made in any suitable container, designated generally 24, is then placed in a ball mill or a colloid mill, designated 26. Milling continues until a fluid tobacco dispersion is formed in which a large proportion of the tobacco is colloidal in size. The resulting slurry or dispersion is then acidified and processed in the same manner as described above, and formed into thin, self-supporting sheets, films or filaments. In the same manner the sheets or films can be cut to length, or shredded depending upon the ultimate use of the product.

In the methods illustrated in Figures 1 and 2, we may employ the ammonium salt of carboxy methyl cellulose, both as a dispersing agent and also for the purpose of providing cellulose which can be regenerated, as described above, in connection with alkali metal salts of carboxy methyl cellulose to provide films, sheets and filaments having high wet strength.

When the ammonium salt of carboxy methyl cellulose is used, it has been found the regeneration of cellulose will take place without the addition of acid. Although the addition of a small quantity of acid will accelerate the regeneration of the cellulose of the dispersed cellulose in the dispersion, the quantity of ammonium salt of carboxy methyl cellulose employed can be substantially the same as in the examples given above. It may range from between two and twenty percent by weight of tobacco in the dispersion. The completed slurry containing tobacco and ammonium salt of carboxy methyl cellulose

is cast into sheets, films or extruded into filaments, as in the manner described above in connection with Figures 1 and 2. The sheets or films or filaments are then passed through a heating zone where moisture is removed therefrom down to a given point generally between ten and fifteen percent, although this may vary. During the moisture removing operation, the ammonium carboxy methyl cellulose in the sheet, film or filaments being treated loses ammonia on heating to 50°-60° C. and the carboxy methyl cellulose is regenerated into an insoluble cellulosic compound. If acid has been employed, it is believed that a major part of the regeneration of cellulose in the dispersion or slurry will have taken place prior to the moisture removing operation.

Figures 4 to 8, inclusive, disclose smoking articles in which our novel reconstituted tobacco sheet or film material is used.

Figure 4 shows a typical cigar 30 consisting of filler tobacco 32, which may be either long or short filler tobacco. A binder 34 formed from a piece of reconstituted tobacco sheet material composed preferably of tobaccos or tobacco by-products resulting from the normal manufacture of cigars. The wrapper 36 is natural leaf tobacco of any desired type customarily used for this purpose. Since our reconstituted tobacco sheet has at least the same or better dry and wet strength, as normal leaf tobacco binders and wrappers, and since it does not break down or disintegrate when placed in a smoker's mouth, its use as a binder or a wrapper is very satisfactory.

In the cigar of Figure 5, both the binder 50 and wrapper 52 are made of our novel reconstituted tobacco sheet. The filler 44 may be natural tobacco leaves or particles, respectively, depending upon whether the particular cigar is a long filler or a short filler type.

The cigar illustrated in Figure 6 has a natural leaf filler 48, a natural leaf binder 51, and a reconstituted tobacco sheet wrapper 53.

Obviously if desired for purposes of blending, valuable cigar tobaccos which because of size are not satisfactory for manufacture into cigars, can be processed in the manner described hereinabove to form reconstituted tobacco sheets for use in cigars. Therefore, the cigar filler 56 can be made entirely from reconstituted tobacco sheet or contain desired quantities as an admixture with the normal tobacco leaf filler employed. This type of cigar is shown in Figure 7 in which the filler 56 consists in whole or in part of cigar type reconstituted tobacco sheet.

Figure 8 illustrates the use of our novel reconstituted tobacco sheet in cigarettes. A cigarette 60 having the usual paper wrapper 62 is provided with a filler consisting of the customary shredded tobacco 63, and in addition shredded reconstituted tobacco sheet or filaments 64. The reconstituted tobacco sheet material can be a straight tobacco or a blend. The quantity of reconstituted tobacco sheet used depends upon a particular blend and the characteristics of the reconstituted tobacco sheet which can be controlled as desired.

The invention above described may be varied in construction within the scope of the claims, for the particular device, selected to illustrate the invention is but one of many possible concrete embodiments of the same. It is not, therefore, to be restricted to the precise details of the structure shown and described.

What we claim is:

1. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use, comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between 1 and 20% by weight of said tobacco of a water dispersible acid regeneratable cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding additional aqueous fluid to said mixture to increase the fluidity thereof, adding a relatively small quantity of acid to said dispersion to regenerate the dispersed cellulose in said tobacco dispersion, applying said dispersion to a film forming surface, evaporating moisture from said material on said surface, and forming substantially water impermeable reconstituted tobacco films or sheets, said films or sheets having high wet strength and retaining substantially all natural tobacco characteristics including color, taste and aroma.

2. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use, comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between 1 and 20% by weight of said tobacco of sodium carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding additional aqueous fluid to said mixture to increase the fluidity thereof, adding a relatively small quantity of acid to said dispersion to regenerate carboxy methyl cellulose, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface to produce substantially water impermeable films or sheets, said films or sheets having high wet strength and retaining substantially all natural tobacco characteristics including color, taste and aroma.

3. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use, comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between 1 and 20% by weight of said tobacco of a water dispersible acid regeneratable cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding a relatively small quantity of acid to said dispersion to regenerate the dispersed cellulose in said dispersion, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface to produce substantially water impermeable reconstituted tobacco films, or sheets, said films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

4. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between 1 and 20 percent by weight of tobacco of a water dispersible acid regeneratable cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding additional aqueous fluid to said mixture to increase the fluidity thereof, adding a relatively small quantity of acid to said dispersion to re-

generate the dispersed cellulose in said dispersion, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface to accelerate and complete the regeneration of said dispersed cellulose in said films and to produce substantially water impermeable films or sheets, said films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

5. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between one and twenty percent by weight of tobacco of a water dispersible acid regeneratable cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding a relatively small quantity of acid to said dispersion to regenerate the dispersed cellulose in situ in said dispersion, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface by subjecting said material to heat, said heat functioning to accelerate the regeneration of said dispersed cellulose in said film and thereby produce substantially water impermeable reconstituted tobacco films or sheets, said films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

6. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between one and twenty percent by weight of tobacco of sodium carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding phosphoric acid to said dispersion as a regenerator for said carboxy methyl cellulose in said dispersion, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface to accelerate and complete the regeneration of said dispersed cellulose and produce said reconstituted tobacco films or sheets, said reconstituted tobacco films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

7. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between 1 and 20% by weight of said tobacco of sodium carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding additional aqueous fluid to said mixture to increase the fluidity thereof, adding between one and twenty percent by weight of tobacco in the mixture of phosphoric acid to said dispersion to regenerate carboxy methyl cellulose, applying said acidified tobacco-water dispersion containing said relatively small quantity of sodium carboxy methyl cellulose to a film forming surface, and evaporating moisture from said material on said surface to produce said reconstituted tobacco films or sheets containing regenerated cellulose dispersed therethrough, said reconstituted tobacco films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

8. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding a quantity of a water dispersible acid regeneratable cellulose ranging between 1 and 20% by weight of said tobacco to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding between one and twenty percent by weight of tobacco in the mixture of phosphoric acid to said dispersion as a regenerator for said water dispersible cellulose in said dispersion, applying said dispersion containing said regenerated cellulose to a film forming surface, and evaporating moisture from said material on said surface to produce said reconstituted tobacco films or sheets, said reconstituted tobacco films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

9. The method of reconstituting tobacco to form self-supporting continuous sheets or films for use in making tobacco products for oral use comprising reducing a quantity of tobacco such as stems, short and small pieces to a finely divided state, mixing said finely divided tobacco with water, adding between five to ten percent by weight of tobacco in the mixture of sodium carboxy methyl cellulose, reducing said tobacco in said mixture to form a dispersion containing colloidal tobacco and tobacco fibers, adding additional water to said dispersion, adding between five and ten percent by weight of the tobacco in said dispersion of phosphoric acid to said mixture as a regenerator of said carboxy methyl cellulose in said dispersion, forming said dispersion into sheets and evaporating moisture therefrom and simultaneously therewith accelerate and complete the regeneration of said cellulose dispersed throughout said sheets and intimately associated with said tobacco, the resulting reconstituted tobacco sheets retaining substantially all essential characteristics of natural tobacco including color, taste and aroma.

10. The method of forming self-supporting continuous tobacco sheets and films for use in making tobacco products for oral use comprising, reducing a quantity of tobacco to a finely divided state, mixing said finely divided tobacco with water, adding between one to twenty percent by weight of the tobacco in said mixture of water soluble sodium carboxy methyl cellulose, converting said mixture into a dispersion containing colloidal tobacco, wherein said sodium carboxy methyl cellulose prevents substantial separation of said colloidal dispersion, converting said sodium carboxymethylcellulose in situ in said dispersion into a water insoluble cellulosic compound intimately associated with said finely divided tobacco in said dispersion forming said dispersion into sheets, and removing excess moisture therefrom and thereby producing substantially water impermeable reconstituted tobacco sheets, said reconstituted tobacco sheets retaining all soluble and insoluble constituents of natural tobacco and having substantially all characteristic properties of natural leaf tobacco.

11. A reconstituted self-supporting continuous tobacco film containing colloidal whole tobacco and between 1 and 20% by weight of said tobacco regenerated carboxy methyl cellulose dispersed throughout said film, said film retaining

substantially all natural essential characteristics of tobacco including color, taste and aroma.

12. A tobacco film containing substantially all essential soluble and insoluble elements of natural tobacco including color, taste and aroma comprising, finely divided whole tobacco, and between 1 and 20% by weight of said tobacco, regenerated insoluble cellulosic compound being intimately associated with said tobacco and forming a matrix therefor, said film being substantially resistant to disintegration when subjected to the influence of moisture.

13. A reconstituted self-supporting continuous tobacco film containing colloidal whole tobacco, and between one and twenty percent by weight of the included tobacco regenerated carboxy methyl cellulose dispersed throughout said film, said film retaining substantially all natural characteristics of tobacco including color, taste and aroma.

14. A reconstituted self-supporting continuous tobacco film containing colloidal whole tobacco, and five percent by weight of regenerated carboxy methyl cellulose dispersed throughout said film, said film retaining substantially all natural characteristics of tobacco including color, taste and aroma.

15. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use, comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding a relatively small quantity of an alkali metal salt of carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding a relatively small quantity of acid to said dispersion as a regenerator of said carboxy methyl cellulose in said dispersion, applying said dispersion to a film forming surface, and evaporating moisture from said material on said surface to accelerate and complete the regeneration of said carboxy methyl cellulose and produce substantially water impermeable films or sheets, said films or sheets retaining and containing substantially all natural tobacco characteristics including color, taste and aroma.

16. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said tobacco with an aqueous fluid, adding between one and twenty percent by weight of tobacco of an alkali metal salt of carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding a relatively small quantity of acid to said dispersion as a regenerator of said carboxy methyl cellulose, applying said dispersion to a film forming surface, and heating said material on said surface to simultaneously evaporate moisture from said material and convert said carboxy methyl cellulose into an insoluble cellulosic compound, thereby producing substantially water impermeable reconstituted tobacco films or sheets, said films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

17. The method of reconstituting tobacco to form self-supporting continuous tobacco films or sheets for use in making tobacco products for oral use comprising reducing a quantity of tobacco to a finely divided state, mixing said to-

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bacco with an aqueous fluid, adding between one and twenty percent by weight of tobacco of an alkali metal salt of carboxy methyl cellulose to said mixture, reducing said tobacco in said mixture to a dispersion containing colloidal tobacco, adding phosphoric acid to said dispersion in a quantity sufficient to regenerate the dispersed cellulose in said dispersion, applying said acidified dispersion to a film forming surface, and evaporating moisture from said material on said surface to produce said reconstituted tobacco films or sheets containing an insolubilized cellulosic compound distributed throughout said films or sheets, said films or sheets retaining substantially all natural tobacco characteristics including color, taste and aroma.

18. The method of forming self-supporting continuous tobacco sheets and films for use in making tobacco products for oral use, comprising reducing a quantity of tobacco to a finely divided state, mixing with said quantity of tobacco between one and twenty percent by weight of tobacco of ammonium carboxy methyl cellulose to form a tobacco and ammonium carboxy methyl cellulose mixture, forming said mixture into a dispersion containing colloidal tobacco, forming said dispersion into sheets, and subjecting said sheets to heat to remove excess moisture therefrom and regenerate said carboxy methyl cellulose into an insoluble cellulosic compound.

19. The method of forming self-supporting continuous sheets and films for use in making tobacco products for oral use comprising, reducing a quantity of tobacco to a finely divided state, mixing said finely divided tobacco with water, adding between one to twenty percent by weight of said tobacco in said mixture of ammonium carboxy methyl cellulose to said mixture, converting said mixture into a dispersion wherein said ammonium carboxy methyl cellulose prevents substantial separation of said tobacco from said water, forming said dispersion into sheets, and passing said sheets through a heating zone to remove excess moisture therefrom and regenerate an insoluble cellulosic compound in said sheets.

20. The method of reconstituting tobacco to form self-supporting, continuous tobacco films or sheets for use in making tobacco products for oral use, comprising forming a tobacco-water dispersion containing finely divided tobacco particles and between 1 and 20% by weight of said tobacco of an alkali salt of carboxy methyl cel-

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lulose, converting said alkali salt and carboxy methyl cellulose into an insoluble cellulosic compound in said dispersion and forming said tobacco-water dispersion containing said converted insolubilized cellulosic compound into continuous, self-supporting tobacco sheets or films, said tobacco sheets or films being substantially water impermeable, and containing substantially all soluble and insoluble constituents present in said original tobacco, and also substantially all characteristic properties of natural tobacco.

21. A tobacco film for use in making tobacco products for oral use containing finely ground tobacco particles and between 1 and 20% by weight of the tobacco in said film of cellulose glycolic acid, said regenerated cellulose glycolic acid being substantially free from deleterious effect upon said tobacco when said film is used, said film having substantially the appearance of natural leaf tobacco, and all essential natural tobacco characteristics such as color, taste and aroma.

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