METHOD FOR PRODUCING A RECONSTITUTED TOBACCO WEB

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In recent years interest has developed in the tobacco industry in the reformation of tobacco, particularly tobacco waste, as a web in strip or sheet form for use either as filler or as a wrapper for cigarettes and cigars. This has not been entirely successful, even when the web is made from good quality lamina or stem because tobacco has an inherently short fibre length and much of the natural gum in the tobacco is lost during the processing of the tobacco into web form. As a result, the web has low strength. It is not always permissible or desirable to adulterate tobacco products with binders, fillers, gums, or other additives to increase the strength of the web.

Another previous disadvantage in using a tobacco web, either as a filler or as a wrapper, has been that the reconstituted web does not have the full aroma and flavour of original tobacco. Normal paper web production techniques have to be modified when making a tobacco web because the essential constituents of the tobacco which give it its characteristic flavour and aroma are water soluble and would be lost during the preparation and concentration of a fibre slurry corresponding to a paper-maker's slurry. One way of overcoming this problem has been to extract the soluble constituents of the tobacco, and these may amount to between 30% and 60% by weight, with water and to concentrate the solution to a thick viscous liquid using, for example, a climbing film evaporator. A paper web is then made out of the insoluble constituents of the original tobacco, which are usually found to be mainly cellulose, and subsequently the two faces of the web are coated with the concentrated solution. However this is not entirely successful because excessive heating is required to concentrate the solution of the soluble constituents of tobacco and this heating breaks down many of the constituents, such as protein, causes some constituents to interact chemically so changing their composition, and resinsifies other constituents, such as pectin, a natural gum present in tobacco. The resulting flavour and aroma of the tobacco is poor and a burnt taste is introduced.

In accordance with the present invention a method of producing a powdered tobacco extract comprises extracting the solute constituents from tobacco with solvent, atomising the solution and evaporating the minute droplets quickly with a hot gas to form a powder of the solute.

The solute of the essential constituents of the tobacco must be brought about extremely quickly so that the solute in the atomised solution is not at the temperature of the hot drying gas for long enough for any appreciable degradation of the flavour-giving constituents or pectin to take place. We find that these criteria are satisfied if the atomisation and evaporation is carried out in a spray drier. The pressure in the spray drier may be sub-atmospheric in which case the evaporation will take place at a lower temperature and even less degradation will take place.

The extraction of the solute constituents of the original tobacco is preferably carried out with water although other solvents which do not react chemically with the tobacco may be used. The gas with which the atomised solution is evaporated may be, for example, air or nitrogen, air being preferred owing to its convenience.

The powdered solute which is produced by evaporating the atomised solution forms in effect a concentrated tobacco extract and contains substantially in their original form, all the essential constituents of the original tobacco which give it its characteristic flavour and aroma. This powdered extract itself becomes an important intermediate product and it may prove to be an efficient way of transporting the essential constituents of tobacco in a light form. The powder must, however, be kept in an airtight container, because it is hygroscopic.

The most important use for the powdered tobacco extract is in the preparation of a tobacco web wherein a concentrated solution of the tobacco extract is applied as a coating to a paper web.

Although the paper web may be any suitable absorbent paper, it is preferably itself prepared by conventional paper making techniques from the non-soluble residue of an extraction process in which the soluble constituents of the tobacco have been extracted with water, particularly during the preparation of the powdered tobacco extract.

In the latter case all the constituents of the original tobacco sample are used and the coated tobacco web has many valuable uses. Thus it has substantially the same smoking qualities and burning rate as a natural web but has a very much more even texture and colouring and is extremely strong and flexible. We believe that this is due to the fact that no pectin is lost during the processing of the tobacco used in the coating solution and the hygroscopicity of the pectin gives the tobacco web a high moisture content. Consequently the tobacco web does not dry out and is not subject to fragmentation and tobacco products made from it do not have to be kept in an absolutely airtight package. The web may be shreded for use as a filler in cigars or cigarettes or as a pipe tobacco but the real advantage lies in the use of the web as a binder or wrapper for cigars products. Indeed, we believe that strips of the coated web can be used as a wrapper in a continuous tobacco rod making machine. Not only is there the advantage that the web can be made from otherwise waste tobacco, which itself represents a big saving, but in the case of use as a cigar wrapper it replaces, and in many cases superior to conventional wrapper which consists of the very finest quality and most expensive leaf.

When the coated tobacco web is to be used as an outer wrapper, the appearance of its surface which is to be used outmost, may subsequently be improved by spray or roller painting with a dispersion of finely divided tobacco in water. The finely divided tobacco may be produced by a jet pulverisation technique.

The process is open to infinite variation in the blending of different tobaccos both in the production of the uncoated tobacco web and in the production of the coating solution. Thus in order to vary the quality and strength of the coated tobacco web, the powder extracted from one sample of tobacco may be used to coat a tobacco web prepared from the residue of a different extraction. Also the amount of tobacco extract with which a particular tobacco web is coated may be significantly different from the amount extracted from the sample the residue of which is made up into that particular tobacco web. Typically the coating solution may have a concentration varying between 2 lbs. and 10 lbs. per gallon of water which the uncoated tobacco web will absorb. The coating gives the web good smoking qualities and a satisfactory burning rate.

The tobacco stem and lamina have different contributions to make to the final product. The stem contains a greater proportion of fibrous material than the lamina and the uncoated tobacco web made from stem residue will have a greater strength than a web made from lamina residue. On the other hand, lamina contains a greater proportion of the flavour-giving constituents than stem. Although
therefore the uncoated tobacco web may in theory be prepared from the residue of a stem or lamina extraction alone, in practice it will be prepared from about 50% of each. In all circumstances both stem and lamina may be mixed prior to extraction. However, in some circumstances, for example in making a superior quality wrapper, it may be desirable to make up the coating solution from a greater proportion of powder extracted from lamina than from stem. In this case it is necessary to extract from the stem and lamina separately and then if necessary blend suitable proportions of stem and lamina extracts from the same or different tobaccos prior to making up the coating solution.

One example of the preparation of a coated tobacco web using a powdered tobacco extract in accordance with the invention is illustrated in the accompanying diagram.

Two hundred gallons of water from a back water storage tank 1, which can be made up with fresh water through a line 2, are fed through a line 3 to a mixing vessel 4 containing a perforated bottom plate 5 and a paddle 6. The water is raised to a temperature of 70° C. by means of steam supplied through a line 7 to a jacket around the vessel 4. 200 lbs. of Sumatra stem and 200 lbs. of assorted scrap cigar lamina are then added to the water in the vessel 4 above the plate 5. With the temperature maintained at 70° C., the mixture is gently agitated by the paddle 6 for thirty minutes and the water is continuously extracted from the bottom of the vessel below the plate 5 by a pump 9 and recirculated back to the vessel through lines 10 and 11. After this period, during which the water extracts a large proportion of the soluble constituents of the tobacco, the solution is pumped by the pump 9 from beneath the plate 5 through the line 10 and a line 12 into a tank 13 where it is kept moving by a paddle 14. The solution pumped into the tank 13 has a concentration of extracted tobacco of about 4.5% by weight. A further 200 gallons of water are then added from the tank 1 through the line 3 to the wet tobacco in the vessel 4. With the vessel still maintained at 70° C., this second batch of water is recirculated for a further 30 minutes through the vessel 4 and around the lines 10 and 11. The solution resulting from this second percolation is then pumped from beneath the plate 4 through the lines 10 and 12 into the tank 13. The second volume of solution has a concentration of approximately 2% by weight and the total volume collected in the tank 13 from the two percolations is about 250 gallons with a concentration of about 3%. This represents the larger part of the solution-flavour-giving constituents and pectin present in the original tobacco. The lost 150 gallons of water remain absorbed in the fibrous residue of the tobacco in the vessel 4 above the plate 5.

The homogeneous solution in the tank 13 is then pumped by a pump 15 through a line 16 into a header tank 17 in which the head is kept constant by an overflow line 18 leading back to the tank 13. The solution in the tank 17, which has now cooled to below 60° C., is allowed to flow under gravity through a line 19 at a flow rate of 50 gallons per hour into a centrifugal atomizing head 20 of a spray drier 21. The spray drier is fed through a line 22 with air at between 200 and 250° C. and a flow rate of 2000 cubic feet per minute. The extracted tobacco solution thrown outwards from the head 20 atomizes and is almost instantaneously evaporated by the air into a fine powder with a particle size of slightly larger than ten microns. The powder is carried by the air flow, as shown by the arrows in the drawing, through the bottom outlet of the spray drier 21 through a line 22 into a twin cyclone 23 where the air is exhausted through a line 24 and the powder settles into a container 25. The outlet air temperatures from the spray drier is between 105 and 110° C. The container 25 is sealed when full to prevent moisture reaching the hygroscopic tobacco extract powder which is stored for subsequent use.

A paper web is then made from the fibrous residue in the vessel 4 as follows.

940 gallons of fresh water from the tank 1 are added to the residue in the vessel 4 through the line 3 and the mixture is agitated by the paddle 6 for an hour to break up the fibre whilst the temperature is maintained at 90° C. The fibre is then continuously recirculated from above the plate 5 by a pump 26 through a line 27, a cone refiner 28, and lines 29 and 30 back to the vessel 1. A bypass line 31 enables the refiner 28 to be bypassed for a short period if desired. The recirculation of the mixture in the vessel is maintained at 90° C. and a motor load of 100 amp. on the refiner 28. The required degree of refining, which controls the fibrillation and hence the strength of the web to be made is reached after between 1 and 2 hours, usually about 1½ hours. The suspension is then diluted to 2½% by weight and pumped through a line 32 into tanks 33 and 34 where the suspension is agitated by paddles 35 in the tanks 33 and 34. If any unsized particles remain, they may be eliminated by passing the suspension through a deflaker 36 in a line 37 in parallel with the line 29 as the suspension is pumped over into the tanks 33 and 34.

The agitated suspension is then pumped over from the tanks 33 and 34 by a pump 38 through a line 39 into a header tank 40 in which a constant head is maintained by an overflow line 41 returning to the tanks 33 and 34. A separator 42, is provided for pumping the suspension from the tanks 33 and 34 back to the further refining in the refiner 28 and is found to be necessary.

The fibre suspension is allowed to flow from the header tank 40 under gravity through a feed line 43 into a mixing box 44 in which it flows over a weir 45 and out through a feed line 43 into a mixing box 44 in which it flows over a weir 45 and out through a line 46 into a trough 47 at the end of a conventional paper making machine 48. The suspension is distributed by the trough 47 over the upper surface of a moving wire bed 49 with a concentration of between 25 and 75, but preferably about 45, gms. per sq. metre dry weight. The backwater drains through the bed 49 onto a table 50 and into a backwater tank 51. The backwater is pumped by a pump 52 through a line 53 into the mixing box 44, so that tobacco particles draining through the bed 49 are recovered, and in order to maintain the concentration in the mixing box 44 at approximately 34% by weight tobacco fibre. If the tank 51 becomes too full the water over pours into a tank 54 and is pumped by a pump 55 through a line 56 back into the back water storage tank 1. The fibres on the moving table 49 mount together and form a tobacco web 57 which is picked up and squeezed by felt rollers 58, and passes over a hot drum 59, heated by steam through a line 60, before the web is wound on a reel 61 with a moisture content of 25% to 35% by weight.

The tobacco web 57 from the reel 61 is then coated with a concentrated solution of the powder tobacco extract, or blend of such extracts, from the, or similar, containers 25. The solution is made up in a header tank 62 which is supplied by an electrical heating mantle. The powder is placed in the tank 62 and water from the tank 1 is added through a line 63 until the concentration of tobacco powder in water is at a desired figure of between 2 lbs. and 10 lbs. per gallon. The mixture is stirred with a paddle 64 until all the powder has dissolved and the solution is preheated up to 50° C. The coating can then begin. The tobacco web 57 on the reel 61 is trained over an inliner roller 65 and down a pair of nip rollers 66. The solution from the tank 62 passes down under gravity through a line 67 and forms a pool on top of the nip on both sides of the web 57. As the web 57 passes down through the nip, it absorbs through both its faces the solution of tobacco powder before passing through a first tunnel dryer 68 which reduces its moisture content from between 40 and 45% by weight down to approximately 30% by weight. The excess coating solution from the pool on top of the nip drops into a tank
The upper surface of the coated web is then spray painted, to give it a desired even colour and finish, through a spray head 72. The paint is a suspension of finely comminuted tobacco which has a concentration of one part of comminuted tobacco to three and a half parts of water and is prepared in a tank 73 containing a paddle 74. The comminuted tobacco has a particle size of between 1 and 6 microns, preferably about 3 microns and is produced in a fluid energy mill. The painted coated tobacco web then passes through a second tunnel dryer 75 which reduces its moisture content down to between 20% and 30% by weight after which it is wound on a reel 76.

The web on the reel 76 is then ready for use as a binder or wrapper, after slitting; or for use as a filler, after shredding. The spray painting step would normally be omitted if the web was to be used other than as a wrapper.

The equilibrium moisture content of the web is 15% at 60% relative humidity and 17% at 70% relative humidity. These high values ensure that the web is strong and yet flexible.

The reeling and unreeling of the web 57 on the reel 61 could be eliminated in which case the web would pass directly from the drying drum 59 to the nip between the rollers 66.

I claim:

1. A method of producing a reconstituted tobacco web, said method comprising extracting from a sample of tobacco its water soluble components with water to form a solution, immediately feeding said solution to a spray drier whereby said solution is atomised and evaporated with hot air in said spray drier to form a powder tobacco extract, breaking up and refining the non-soluble residue of said water extraction to form a fibrous mass, preparing a paper web from a suspension of said fibrous mass and coating at least one surface of said paper web with a concentrated solution of said powdered tobacco extract in water.

2. A method according to claim 1, wherein said paper web is coated with said solution as said paper web passes downwards through a pair of nip rolls.

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MELVIN D. REIN, Acting Primary Examiner.