

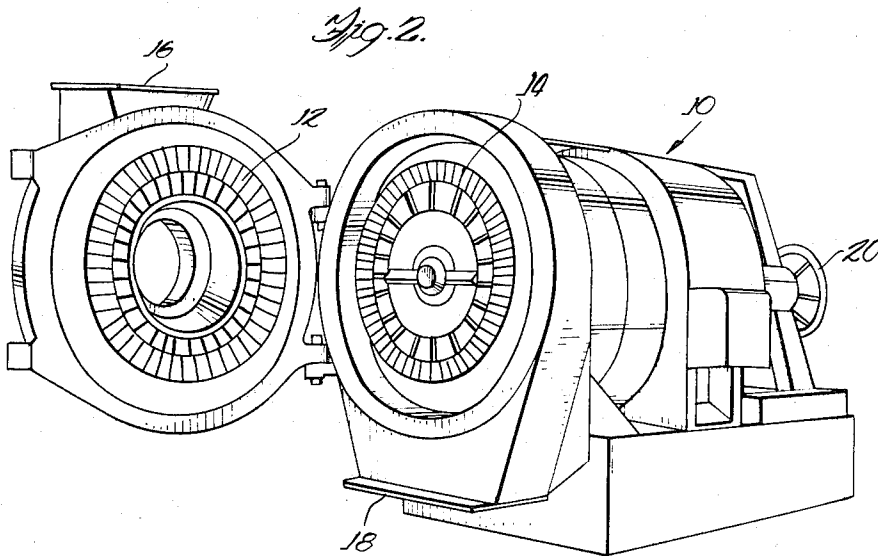
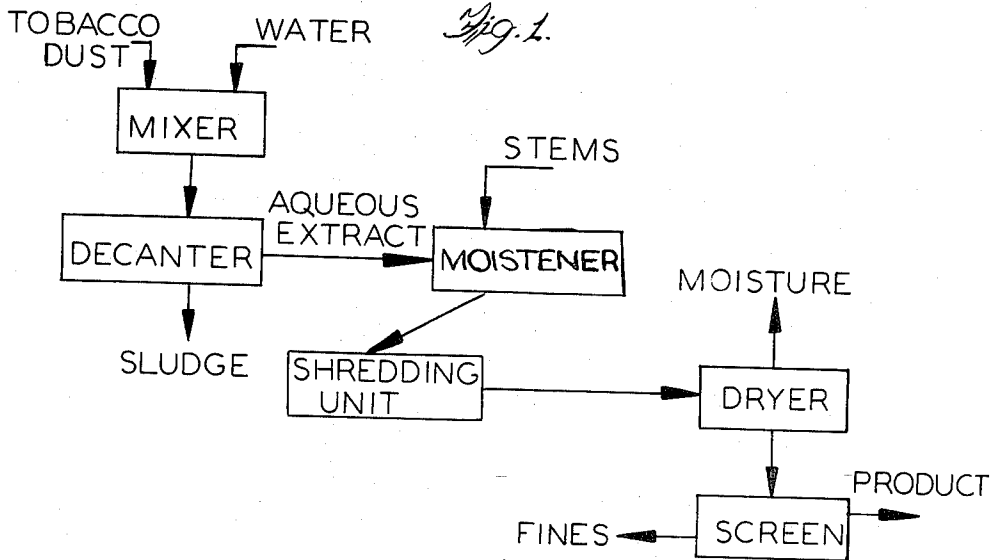
Sept. 7, 1965

S. O'BRIEN JONES

3,204,641

METHODS OF PROCESSING TOBACCO LEAF STEM MATERIAL

Filed Feb. 7, 1963



Inventor  
Samuel O. Jones  
Perdette, Newman  
Seibold & Williams  
Attorneys

1

3,204,641

**METHODS OF PROCESSING TOBACCO LEAF STEM MATERIAL**

Samuel O'Brien Jones, Winston-Salem, N.C., assignor to R. J. Reynolds Tobacco Company, Winston-Salem, N.C., a corporation of New Jersey  
 Filed Feb. 7, 1963, Ser. No. 256,937  
 16 Claims. (Cl. 131-140)

This invention relates to the manufacture of tobacco products suitable for smoking.

Tobacco leaves of the type employed for the manufacture of cigarettes and like smoking products generally contain from about 20 to 35% or more stems. The physical and chemical nature of the tobacco leaf stems are such that it is desirable to remove the stems before the tobacco leaves are shredded into a form suitable for use in cigarettes and like smoking products. If the stems of the tobacco plant are not removed before the leaves are shredded, the resulting cigarette filler material contains undesirably woody slivers and "bird eyes". These cause an irregular flow of tobacco during the cigarette making process with the result that the cigarettes are not properly and uniformly filled, the cigarette paper is frequently punctured and ashes unexpectedly drop from the cigarettes upon smoking thereof. Furthermore, the chemical nature of the tobacco leaf stems is such that the stems impart an irritating and unpleasant taste to the smoke. All of these reasons necessitate removal of the stems from the tobacco plant for the satisfactory manufacture of cigarettes.

The removal and discarding of stems with the corresponding weight loss represents a great economic loss in the cigarette making industry. Many attempts have been made to develop methods for converting the stems into products suitable for use in the manufacture of cigarettes. One such prior art method for processing stems into a usable product has been to moisten the stems to a moisture content of about 20 to 30%, roll the moistened material between rollers utilizing light pressures sufficient only to flatten the stems, and then cutting the rolled stems into a product resembling a cigarette cut filler material. However, associated with this prior art process are several disadvantages which seriously lessen its attractiveness. For example, the product produced by this prior art process has a relatively low cigarette filling capacity, generally not more than 72% of ordinary leaf strips. One possible explanation for this low filling capacity is the fact that when stems are rolled the fibre structure is broken down in such manner that the natural resilience of the stem fiber is destroyed. Also, in the process of making cigarettes, this product readily tends to break up into waste dust or fines and the process is applicable only to flue-cured tobacco stems. When burley stems are processed by this method, the product has a whitish, woody appearance, unlike that of ordinary cigarette tobaccos, and the smoking properties of the cigarettes are not as good as cigarettes made from flue-cured stems.

A process for converting stems, both flue-cured and burley stems, into a product usable as a cigarette filler material having a high cigarette filling capacity and which process is free of the disadvantages indicated above is of interest to the tobacco industry.

It is therefore a principal object of the present invention to provide a process for converting the stems of tobacco leaves into a product suitable for use as a cigarette filler.

2

It is a further object of the present invention to provide a process for converting tobacco leaf stems into a cigarette filler product exhibiting excellent smoking properties and high filling capacity which process can be easily carried out with low capital investment utilizing readily available processing equipment.

Another object of the invention is to provide a process which utilizes tobacco dust or fines resulting from the processing of tobacco together with the tobacco leaf stems to produce a product eminently satisfactory for cigarette making.

In accordance with the present invention, stems from a tobacco plant are moistened with a liquid under conditions to insure thorough liquid penetration of the stems. In general, moistening of the stems is carried out until the moisture content of the stems is in the range from about 40 to 65%, preferably 50 to 60% by weight (wet basis). After moistening, the stems are shredded to a size suitable for use in cigarettes by passing the moistened stems through suitable shredding apparatus. Thereafter the stems are dried to a suitable moisture content, screened if desired to a particular particle size, and either stored or used immediately for the manufacture of cigarettes.

FIGURE 1 is a diagram showing the various steps of one preferred embodiment of the process wherein the stems are moistened with an aqueous extract of tobacco dust.

FIG. 2 shows a disc refiner unit suitable for carrying out the shredding step in the process diagrammed in FIG. 1.

Moistening of the tobacco leaf stem can be effected by soaking the stems in water for a period of time sufficient to insure the proper moisture content. Water or other liquids such as, for example, aqueous glycerine solutions or aqueous alcohol solutions can be employed to moisten the stems. Moistening of the stems to the proper moisture content can be accomplished other than by soaking; for example, the stems can be steamed, which method ordinarily reduces the time required for moisture penetration. In any event, the stems are moistened to a moisture content from about 40 to 65%, preferably 50 to 60% by weight (wet basis). If the moisture content of the stems is appreciably lower than about 40% an excessive amount of fines are produced in the shredding operation. On the other hand, if the moisture content of the stems is excessively high, the stems agglomerate and do not shred properly.

After the stems have been moistened to a proper moisture content the stems are shredded to a size suitable for use in cigarettes as indicated. Generally, tobacco employed in the manufacture of cigarettes ranges in particle size from about 6 mesh to about 30 mesh, U.S. Sieve series. We have found a disc refiner shredding unit to be particularly advantageous for shredding the stems. These disc refiner shredding units are standard equipment, commercially available from the Sprout-Waldron Company and others. One suitable disc refiner unit is diagrammatically illustrated in FIG. 2, commercially available units of this general type being frequently employed in the pulp and paper industry. As shown in FIG. 2, a disc refiner 10 of this type is equipped with a plurality of plates 12 and 14 which can be set as desired to maintain a predetermined clearance therebetween. In this operation, the stems to be shredded are introduced into the refiner through feed opening 16 and into the area between the plates 12 and 14. Centrifugal force created by rotation of the rotating disc or plate 14 forces the shredded stems

3

toward the periphery and they are removed through discharge 18.

The clearance between the plates 12 and 14 can be adjusted by handwheel 20 at the rear of the refiner and is indicated by a dial micrometer located near the handwheel. It is preferred to shred the moistened stems in a single pass through the disc refiner with the plates within the disc refiner set at a predetermined clearance to provide optimum particle size. The feasibility of shredding the stems in a single pass depends to large extent upon the size of the refiner unit and with exceedingly small disc refiners several passes through the unit may be required for proper shredding. In this event, the clearance between the plates is greater initially and decreased during the operation. For example, tobacco plant stems can be shredded in a disc refiner using the following cycle: 1 pass at 0.075 inch plate clearance, 1 pass at 0.050 inch plate clearance, and 1 pass at 0.010 inch plate clearance.

After shredding of the tobacco stems in a disc refiner, the shredded material can then be dried to a moisture content approximating that normally found in tobaccos employed for cigarette manufacture, generally from about 11 to 15%. Drying can be accomplished in any convenient manner such as by passing the shredded material through an overhead infrared electric resistance drier where a major part of the content of moisture is evaporated within a few seconds. The shredded stems are then screened, if desired, to obtain a rather uniform particle size suitable for use in cigarettes. Oversize particles of the shredded stems can be subjected to further treatment according to the process of the invention.

In order to improve the flavor of the cigarettes made from tobacco plant stems it is sometimes desirable to incorporate with the stems at some stage during the manufacture of cigarettes a flavor extract of tobacco. In accordance with a preferred practice of this invention, such a tobacco flavor extract is obtained from other tobacco sources, such as dust or scrap tobacco, and incorporated with the stems. This preferred practice can be accomplished in several ways. In one preferred manner of operation tobacco dust is added to hot water or hot water-alcohol solutions, and permitted to separate therefrom and the resulting hot water extract and suspension of the tobacco dust employed for moistening the stems. In another embodiment, in order to transfer and utilize the flavor of the tobacco dust, the tobacco plant stems together with the tobacco dust or tobacco scraps are shredded in a disc refiner with the mass being maintained at a moisture content of between 40 and 65% by weight. In addition to the foregoing embodiments, the tobacco extract obtained from waste tobacco dust or scraps can be applied to the shredded stems in a separate operation prior to their use in the manufacture of cigarettes. For example, an aqueous or aqueous alcohol extract of the tobacco dust can be sprayed on the stems after they have been shredded in the disc refiner.

In another embodiment of the invention, the tobacco plant stems are subjected to an extraction with water or water-alcohol mixtures to remove undesirable components of the stems such as mineral salts. Thereafter the stems, at a moisture content of between 40 and 65% by weight (wet basis), are shredded in the disc refiner and the shredded stems, preferably after drying, treated with a flavor extract from other tobacco sources as indicated.

A greater appreciation of the invention and its advantages will be apparent from the following specific examples.

#### EXAMPLE I

One thousand grams of flue-cured stems and 1000 milliliters of water were mixed, allowed to stand two hours and shredded in a disc refiner shredding unit of the type shown in FIG. 2 using the following cycle: 2 passes at 0.075 inch plate clearance, 5 passes each at 0.050, 0.040

4

and 0.025 inch plate clearance. Moisture content of the finished product was 51.2 percent. On a dry weight basis the yield of product was 88.1 percent of a material above 30 mesh particle size. This sample was dried and conditioned at 59 percent relative humidity for comparison in filling capacity with other cigarette tobaccos. The following samples were tested: (1) conventional cigarette cut filler material before going into the cigarette making machine, (2) the conventional cigarette cut filler material after being made into cigarettes, (3) a filler material made from stems by the prior art process of rolling and cutting the stems, (4) tobacco leaf stems containing about 20% leaf prepared by the process of the invention. All the samples had been conditioned at 59 percent relative humidity so as to be in substantially the same condition normally present in cigarettes. Results are shown in the following table:

Table I

FILLING CAPACITY OF SHREDDED STEMS AND VARIOUS TOBACCO PRODUCTS

Pressure, lbs./sq. in.	Vol., ml. per 100 g.			
	Sample #1	Sample #2	Sample #3	Sample #4
1.49	448	414	338	436
1.86	419	382	318	411
2.23	397	361	304	386
2.60	378	343	296	371

The above results showed the filling capacity of the shredded stems to be about equal to that of the conventional cigarette cut filler (leaf) and approximately 25 percent more than that of the stems produced by the prior art process.

#### EXAMPLE II

Two hundred fifty grams of short flue-cured stems and 250 grams of cigarette dust were mixed with 750 milliliters of 10 percent aqueous isopropanol solution and allowed to stand several days. This sample was then shredded on the disc refiner using the following cycle: 2 passes at 0.075, 10 passes at 0.050, 5 passes at 0.040, 5 passes at 0.025, and 5 passes at 0.020 inch plate clearance. The resulting product was dried and dust removed by screening. Cigarettes were rolled from the material and smoked. The smoking quality was satisfactory.

#### EXAMPLE III

One thousand grams of tobacco leaf stems were treated with dust extract prepared as follows. One hundred grams of leaf dust, 25 grams of cutting dust and 107 grams of making room dust were stirred into 1250 milliliters of water at 140° F. The slurry was allowed to settle for 30 minutes and 1050 milliliters of the extract poured off from the sand portion. Two hundred milliliters of water at 140° F. were stirred into the sand portion, the mixture allowed to settle and the extract poured off. The combined 1250 milliliters of extract were added to the 1000 grams of stems, mixed thoroughly, allowed to soak for two hours and the mixture shredded on the laboratory disc refiner using one pass each at 0.075, 0.050 and 0.010 inch plate clearances. The resulting product was screened on a 6 mesh screen and the material remaining on the 6 mesh run through the refiner three more times at 0.010 inch clearance. After screening on a 6 mesh screen, the product was dried to 15-16 percent moisture and then screened over 28 mesh for use in making cigarette tobacco blend. A cigarette tobacco blend was made using a filler product made from stems by the prior art rolling and cutting process and a second blend was made using the disc refiner prepared product. Cigarettes were made from the blends and submitted to a weight versus firmness check for determination of filling capacity. The results are shown below.

5  
Table II

	Stem Product Produced by Present Inven- tion	Stem Product Produced by Prior Art Process
Av. Wt./cigt., gms.-----	1.2007	1.2226
Tipping and Paper Wt./cigt., g.-----	0.2350	0.2350
Tobacco Wt./cigt., g.-----	0.9657	0.9876
Av. Rod Firmness, Penetrometer-----	12.65	13.15
Av. Tobacco Savings/cigt., g.-----	0.0219	-----
Av. Tobacco Savings, percent.-----	2.22	-----

The above results show that at a 2.22 percent tobacco weight reduction the cigarettes utilizing stems prepared by the present process were firmer (lower Penetrometer) than the regular tobacco cigarette. Thus a 2.22 percent tobacco savings could be effected with an increase in cigarette firmness.

#### EXAMPLE IV

Two hundred fifty grams of flue-cured stems were soaked for 30 minutes in 1.25 gallons of water and shredded using 10 passes at 0.050 inch plate clearance. Part of the stem residue was dried and 20 grams of the dried stem fibers sprayed with five 20 milliliter portions of 50 percent alcoholic tobacco dust extract with drying after each portion. The residue was rolled into cigarettes by hand and smoked. This product had much better smoking qualities than the untreated stems.

#### EXAMPLE V

Two hundred fifty grams of flue-cured stems were dipped in water for a few seconds, drained of excess water, soaked two hours and shredded using 2 passes at 0.075 inch and 10 passes at 0.050 inch plate clearance. The product was dried and 20 grams of the stem residue sprayed with two 25 milliliter portions of alcoholic tobacco dust extract with drying after addition of each portion. The product was made into cigarettes and smoked. This product had much better smoking properties than untreated stems.

The process of the present invention is economically advantageous in that it makes possible the use of stems or mid-ribs of flue-cured, burley or cigar type tobaccos. The product produced by the novel process has high cigarette filling capacity and eminently satisfactory smoking properties. The efficient utilization in the process of the flavor from waste tobacco scraps or fines is an added economical advantage. Moreover, high capital investment is not required for the process which can be readily carried out using readily available equipment which can be easily purchased and installed.

Those modifications and equivalents which fall within the spirit of the invention and the scope of the appended claims are to be considered part of the invention.

I claim:

1. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

2. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of tobacco leaf stems to between 50 and 60% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

3. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of tobacco leaf stems to between 40 and 65% by weight (wet basis), then shredd-

6  
ing the moistened stems in a shredding unit provided with a plurality of shredding plates adapted to be set with a predetermined clearance therebetween and at least one plate of which is rotatable with respect to a second plate, the moistened stems being shredded to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

4. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of tobacco leaf stems to between 50 and 60% by weight (wet basis), then shredding the moistened stems in a shredding unit provided with a plurality of shredding plates adapted to be set with a predetermined clearance therebetween and at least one plate of which is rotatable with respect to a second plate, the moistened stems being shredded to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

5. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of the tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content from about 11 to 15% by weight (wet basis).

6. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of the tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then passing the moistened stems through a shredding unit several times, said shredding unit being provided with a plurality of shredding plates adapted to be set with a predetermined clearance therebetween and at least one plate of which is rotatable with respect to a second plate, the moistened stems being shredded to a particle size suitable for use in cigarettes and drying the shredded material to a final moisture content suitable for use in cigarettes.

7. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of the tobacco leaf stems to between about 40 and about 65% by weight (wet basis) with an aqueous flavor extract of tobacco, then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

8. The process of claim 7 wherein adjustment of the moisture content is carried out by soaking the tobacco leaf stems in an aqueous flavor extract of tobacco.

9. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises mixing tobacco dust and tobacco leaf stems, adjusting the moisture content of the mixture to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

10. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes, applying to the shredded stems an aqueous flavor extract of tobacco and drying the shredded material to a moisture content suitable for use in cigarettes.

11. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of the tobacco leaf stems to between about 50 and about 60% by weight (wet basis) with an aqueous flavor extract of tobacco, then

7

shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

12. The process of claim 11 wherein adjustment of the moisture content is carried out by soaking the tobacco leaf stems in an aqueous flavor extract of tobacco.

13. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises mixing tobacco dust and tobacco leaf stems, adjusting the moisture content of the mixture to between about 50 and about 60% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

14. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises adjusting the moisture content of the tobacco leaf stems to between about 40 and about 65% by weight (wet basis) with an aqueous flavor extract of tobacco, then shredding the moistened stems in a shredding unit provided with a plurality of shredding plates adapted to be set with a predetermined clearance therebetween and at least one plate of which is rotatable with respect to a second plate, the moistened stems being shredded to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

15. A method of producing from tobacco leaf stems a product adapted for use in cigarettes which comprises contacting tobacco leaf stems with a liquid capable of

8

extracting undesirable components from the stems, separating the stems from the extract, then adjusting the moisture content of the tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes and drying the shredded material to a moisture content suitable for use in cigarettes.

16. A method of making cigarettes from tobacco leaf stems which comprises adjusting the moisture content of tobacco leaf stems to between about 40 and about 65% by weight (wet basis), then shredding the moistened stems to a particle size suitable for use in cigarettes, drying the shredded material to a moisture content suitable for use in cigarettes and incorporating the shredded material in cigarettes.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

22,668	1/59	Payn	-----	131—140
86,368	2/69	Consuegra et al.		
155,388	9/74	Rivero	-----	131—140
267,764	11/82	Wood.		
772,892	10/04	Lauhoff	-----	131—140 X
1,016,844	2/12	Moonelis.		
1,968,403	7/34	Kinker.		
2,799,278	7/57	Bogaty	-----	131—145 X

ABRAHAM G. STONE, *Primary Examiner.*

F. RAY CHAPPELL, *Examiner.*