

# UNITED STATES PATENT OFFICE.

WILLIAM WINSLOW BENNETT, OF NEW YORK, N. Y.

## MANUFACTURE OF PAPER FROM THE TOBACCO-PLANT.

SPECIFICATION forming part of Letters Patent No. 346,887, dated August 10, 1886.

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### *To all whom it may concern:*

Be it known that I, WILLIAM WINSLOW BENNETT, a citizen of the United States, residing in the city of New York, county and State of New York, have invented new and useful improvements in pulp-making, for the purpose of manufacturing commercial paper (white or colored) wholly or in part from pulp made from the tobacco plant, the said pulp being also well fitted for other industrial purposes wherein paper-making fibers enter; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others who are skilled in the art to which it appertains to make and use the same.

The object of my invention is to add to the public supply a new indigenous paper-making stock or raw material equal in quality and at a less cost than that for which the best paper-making fiber can now be obtained, and also thereby to lessen the risk to life and health of the public, dealers, mill-operatives, and employers, which now occurs from importing, transporting, and manipulating the thousands of tons of foreign and domestic rags for paper-making; and, furthermore, my invention or discovery will result in furnishing better paper at less than present prices by utilizing the ever-available natural supply of paper-stock I have found in the tobacco-plant, as and in the manner herein set forth.

For these purposes my said invention appropriates the large annually-increasing source of commercial paper-producing fiber to be obtained from said plant, which I have made practically useful by bringing it to the state or condition of commercial paper-pulp upon account of cheapness and nearly universal abundance from the hitherto almost valueless waste products of said plant—viz., the “stripping,” stalks, refuse tobacco of curing-houses, and second growth of tobacco-fields or from the whole vegetable.

I have discovered and practically demonstrated with the usual paper-mill appliances that pulp made from tobacco is singularly adhesive, cohesive, holds together, and readily amalgamates and works in with other paper-making fiber, and that when it is added to and worked in with low-grade cheap cotton-rag

fiber it yields a paper in all desirable qualities equal to that composed of linen or other high-grade fiber, if worked with the same kind of cotton stock. Herein rests the value and importance of my invention, that it permits the production of commercial paper of any desired grade, and in a large degree fills the place of the best paper trade-stock from a waste domestic production at a less cost, affording equal strength, color, resistance to moisture, inking quality, and “tone” by simple means and cheap processes.

Having devoted several years of time and attention to the tobacco-plant with the particular object of making its waste useful, I discovered that the leaves, stems, pith, and stalks are all paper-producing fiber, and that when fiberized the pulp possesses an inherent capacity or natural tendency to felt, interlace, or intertwine in a degree and manner peculiar to itself, a quality not known to me as being equalled or possessed by any other vegetable fiber, the said tobacco fiber being nearly allied or equal to wool for felting, beating, matting, or compressing into sheets, and when pressed or dried being of wonderful hardness and tenacity, resilient, and resistant to impact or wear. These natural qualities render it remarkably adapted for the production and processes of paper-pulp herein set forth and described, and for the subsequent use of paper-makers for common as well as for the finer grade of goods, thus opening up by my said invention a new source of supply for the almost insatiable modern demand for paper-fiber products. An immense amount of paper-making material is thus afforded by my processes for working up the “waste” of said tobacco plant, which is equal to nearly one-half the entire crop, which at present amounts to about ten million pounds per annum.

The object and purpose of my herein-described process, an invention arising from my said observation of and experiments with the hereinbefore-described natural properties of said tobacco fiber, is to directly utilize the said enormous waste product of the tobacco-plant or the whole plant in the industrial arts for the production of a commercial paper, composed entirely or in part of said pulped tobacco, that is colorless when bleached, odor-

less and tasteless, in contradistinction to any previous use of said plant or of any part thereof for mechanically or by process producing a paper, sheet, or product imitating, resembling, or designed to take the place of the natural tobacco-leaf, either for wrapping, filling, chewing, smoking, disinfecting, perfuming, or employing as, for, in the place or representing the purposes of, the prepared or cured natural tobacco-leaf, none of which aims or purposes form any part of the object or scope of my present herein-recited invention, the paper resulting from the manipulation and processes shown and referred to in the herein set forth discovery being, except from its peculiar tenacity, undistinguishable from commercial papers of like weight and grade at present known to the paper trade.

My aforesaid discovery of the felting property of the fiber of the tobacco-plant and my observation of the enormous yearly waste thereof as refuse in factories, on plantations, and in compost heaps lead to the present invention, and to the practical and immediate utilization of said waste by working it in large quantities for the purposes herein mentioned, which discovery renders my invention of great public importance, as my said invention thereby makes public a new industrial product to the world, and particularly to the paper trade, and the interests and business appertaining thereto and dependent thereon. Moreover, the hitherto waste of tobacco will thus, through my invention, yield an additional income to the tobacco planter and manufacturer, as by my said invention their heretofore waste products can always hereafter be used in the manufacture of cheap durable paper of all grades, the said tobacco pulp for mixing with common rags or rag pulp or other auxiliary fiber being equal to linen, hemp, manila, or other costly "hard stock," the said pulped tobacco fiber being hard, tenacious, flexible, elastic, and when worked into paper mingled or in combination with soft or cotton fiber "stock," giving the hereinbefore described results.

To carry my said invention into effect, first, I sort out the foreign substances, if any be in the tobacco stock, and while, in some cases, I treat the tobacco without previous cutting, shredding, crushing, or breaking, I prefer, secondly, to reduce the tobacco to a fine disintegrated or semi-fibrous condition, taking care not to destroy its fiber. This reduction may be accomplished by a cutting, shredding, hatching, combing, crushing, carding, or breaking machine. While the tobacco is dry, moist, or wet, the strippings in the condition usually obtained from tobacco manufacturers work satisfactorily. When cut, I prefer it in about one-quarter-inch lengths. Thirdly, for making pulp for cheap common colored paper, I place the tobacco in a beating or fining engine or other suitable apparatus, and reduce

it to a pulp fit for paper-makers' use, as shown in Exhibit No. 8 of natural pulp, and in No. 12 wrapping-paper; but for use in producing a better grade of paper I prefer, fourthly, to extract the gummy and soluble elements contained in the plant. This may be done in several ways—by still-leaching in the manner tanners extract tannin from bark in vats, in agitators similar to those used by brewers, by means of the rag or beating engines used in all paper-mills, or with a rotary or encasement acting as a still, using water or a suitable equivalent to act as the extracting-vehicle, or in combination with such lixiviating chemicals as help to soften the tobacco fiber and permit or assist a rapid penetration of the extracting liquid or fluid, and thereby hasten the elimination of the soluble gums, colors, and undesirable elements present in the plant. Usually I prefer to use the bicarbonate of soda as a softener and aid to my extracting-vehicle and at a heat not to exceed 170° Fahrenheit. Where a liquid is used the proportion of chemicals should be sufficient to make it feel greasy to the touch. The qualities of the water used govern the proportions. When the pure charge of the extracting-vehicle has become impregnated or highly colored from the tobacco, I renew said vehicle from time to time until it runs off clear and colorless, or a continuous inlet of fresh extractor may be maintained with a counterbalancing outflow of the colored extract. I have found that if the mass is brought to a boiling-point it "sets" a part of the otherwise soluble elements in the tobacco and renders it difficult thereafter to bleach the stock whitespeedily. If the charge of tobacco is designed to make white pulp, the leaching, digesting, or distilling should be continued until the tobacco ceases to yield any coloring; but when the pulp is intended for colored paper the extraction need not be so complete, thus saving time and expense. The quality of the paper-pulp required will readily indicate to a paper-maker when to discontinue the lixiviating process. After the aforesaid leaching, distillation, digestion, or lixiviation is completed, the tobacco stock will not thereby be of much lighter color, as may be seen in Exhibit No. 5. At this stage of the process for colored paper-stock, the tobacco is in the best condition to fiber, fine, or beat into paper-pulp, or it may be marketed without fining, which latter operation may be performed in the paper mill or engine. The combined method of extracting the gum, &c., and simultaneously bleaching the tobacco while the stock is in its natural condition or while it is in a whole, cut, or shredded state may be used; but I prefer the successive operations herein set forth as producing the most desirable results, especially if white pulp is the object and if the means, men, and appliances in common use in paper-mills are to be employed. It should be here noted that non-corrosive

utensils should be used where requisite. Vapor or steam as an extracting vehicle or bleacher in connection with the whole, or part of my said process of pulp-making may be employed; but I prefer the process previously and hereinafter described, on account of its being less expensive and not so dangerous as the steam or vapor process, and as it does not require so highly-skilled labor or intricate apparatus. Fifth, I place my leached tobacco in a rag or fining engine and add a suitable bleaching chemical (my favorite being chloride of lime) and water in about the same proportions as is customary for bleaching a like weight of rag stock, and work or beat until the tobacco is of the desired color and fineness required for paper-mill uses. Heat may be applied hereto advantageously, as it affords the requisite results in about one-third less time than that obtained by the use of cold liquid, 170° Fahrenheit, being the ordinary limit, I advise. Then, sixth, after the pulp has been brought to the desired color and fineness, I wash out the chemical, and the liquid may be extracted by press, drain, centrifugal machine, diffusion, evaporation, or by running the pulp out on a card-board machine to bring the pulp to a marketable condition of stock in sheets of suitable thickness, or it may be ground to powder or thoroughly disintegrated.

It is not necessary that the different steps or parts of the process should be continuous as to time and place to fit the tobacco pulp for paper-mill uses, as it may, under certain circumstances, be desirable or more convenient and profitable to partly prepare the tobacco in one locality and transport it in an unfinished state elsewhere to complete the process.

The following general rules for proceeding and working tobacco stock will be understood by all practical paper-mill men. For a "charge" of tobacco stock in any given machine, follow the customary proportions used for working rag stock, add sufficient tobacco stock to the extracting vehicle, when a liquid is used, so that it will flow properly and not clog to and from the friction wheel or surface. I state further that when the tobacco pulp comes to the hands of the paper-makers they may add to it any proportion of cotton, linen, or other paper-making fiber and treat and test the mass just as if the charge were all cotton or linen. I have no doubt that certain grades of paper or card board may be made entirely from said tobacco pulp. As different crops of tobacco vary greatly in the amount of gums and soluble elements they contain, no exact time can be named for leaching or bleaching.

I present herewith exhibits of my tobacco stock in several stages of the process and sample of the kind of waste tobacco they were made from, together with three samples of dif-

ferent kinds of commercial paper in large part from tobacco pulp.

*List of exhibits.*—No. 1, natural tobacco strippings; No. 2, cut strippings; No. 3, shredded strippings; No. 4, crushed strippings; No. 5, strippings leached, gum, &c., extracted; No. 6, leached and bleached cut strippings; No. 7, bunch of natural cut stems in part leached and bleached; No. 8, tobacco pulp made from unleached strippings; No. 9, white pulp made from leached and bleached strippings; No. 10, white paper containing fifty per cent. of white tobacco pulp (accidentally soiled) and fifty per cent. of common cotton rags; No. 11, light brown paper containing seventy per cent. of tobacco pulp, partly beat and imperfectly bleached, (all this experimental,) and thirty per cent. of common cotton rags; No. 12, wrapping-paper (brown) containing fifty per cent. of unleached and unbleached tobacco pulp and fifty per cent. of mixed "brokers' waste Manila" paper; No. 13, tobacco stalks partly pulped and bleached slightly; No. 14, pulp made from leached tobacco.

Having fully described my invention, what I hereby claim, and desire to secure by Letters Patent, is—

1. The process of manufacturing pulp from the tobacco-plant for the purpose of making commercial paper and other articles wholly or in part therefrom, which consists in sorting out foreign matter present therein, disintegrating and softening the tobacco, beating it to a fibrous mass, and removing the liquid therefrom, substantially as hereinbefore described, and shown in Exhibit No. 8, which is pulp made from unleached tobacco.

2. In the treatment of the tobacco-plant for conversion into the aforesaid paper-pulp, the process hereinbefore described, which consists of sorting, disintegrating, softening the tobacco, and extracting the gummy and soluble elements present in the plant, beating it into a fibrous mass, and removing the liquid therefrom, substantially as hereinbefore described, and shown in Exhibit No. 14, which is pulp made from leached tobacco.

3. In the treatment of the tobacco-plant for conversion into the aforesaid paper-pulp, the process hereinbefore described, which consists of sorting, disintegrating, softening the tobacco, extracting the gummy and soluble elements present in the plant, beating it to a fibrous mass, and chemically treating the product to eliminate the color therefrom, and removing the chemical and liquid therefrom, substantially as hereinbefore described, and shown in Exhibit No. 9, which is pulp made from leached and bleached tobacco.

4. The product, a pulp for paper and other industrial uses made from the tobacco-plant, wholly or in part freed from gummy matter, soluble elements, and natural coloring, or not freed therefrom, as described hereinbefore substantially.

5 5. The treatment of the tobacco-plant for conversion into a paper filler for the production of "body" in the paper sheet, the process hereinbefore described, which consists in sorting, disintegrating, grinding, or powdering said plant before or after being leached or bleached, substantially as and for the purposes hereinbefore set forth and described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM WINSLOW BENNETT.

Witnesses:

L. LEMON,

JAS. J. KENNEDY.