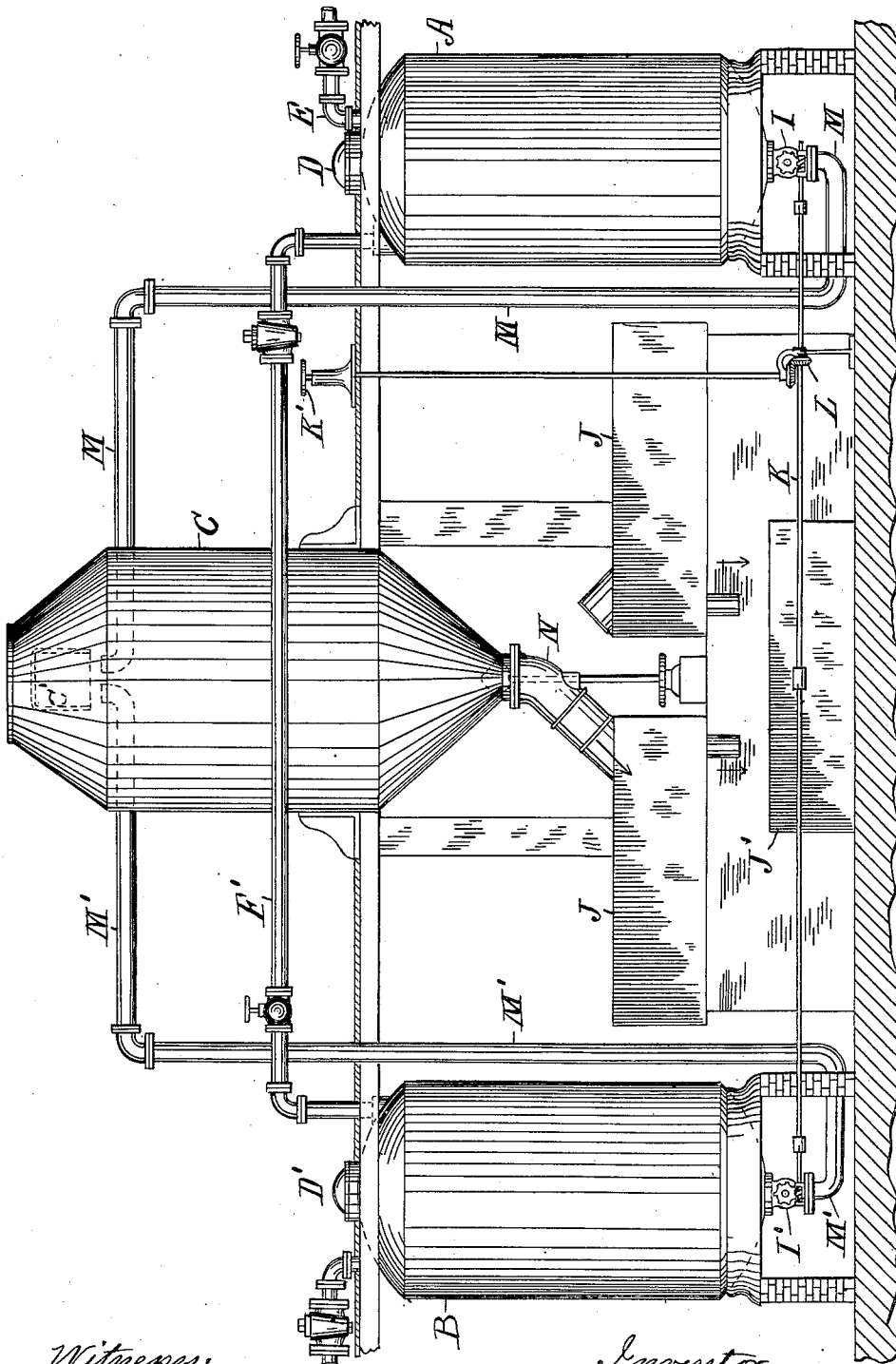


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 COMPOSITE FIBER AND PROCESS OF MAKING THE SAME.
 APPLICATION FILED MAY 25, 1907.

931,865.

Patented Aug. 24, 1909.



Witnesses:
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UNITED STATES PATENT OFFICE.

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COMPOSITE FIBER AND PROCESS OF MAKING THE SAME.

931,865.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed May 25, 1907. Serial No. 375,567.

To all whom it may concern:

Be it known that I, PULASKI M. HAMLIN, a citizen of the United States, residing at Shuman street, Catawissa, county of Columbia and State of Pennsylvania, have invented certain new and useful Improvements in Composite Fiber and Processes of Making the Same, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present invention consists of a composite fiber and the process of manufacturing the same.

The fiber embodies wood cellulose and straw cellulose incorporated together when first reduced from the wood and straw, so as to produce a fiber of composite nature having a substance of homogeneous character.

The object of the invention is to produce a fiber having the qualities of both wood and straw cellulose, but possessing characteristics very different from, and superior to any mere mixture made from previously manufactured wood and straw cellulose.

The incorporation of the two fibers is effected in a manner which avoids the use of a beating engine to intimately mingle the fibers, the two fibers being mingled while in a heated condition immediately upon their extraction from the raw materials. This is effected by reducing the fibers simultaneously in separate digesting vessels by any suitable chemical treatment, and commingling the resulting fibers by blowing the contents of the digesters into contact with one another in a suitable blow-tank. The fibers are thus combined while mingled with the chemical liquor required in the digesting process, and while they are still in a heated condition, which greatly softens the fibers and adapts them to commingle and interlace in a manner which can never be effected after they have cooled and the liquor has been washed from them. The amalgamation of the fibers is greatly facilitated by the expansion or explosion of the steam in the tissues. The product thus obtained is not a mixture of fibers, but is a composite fiber of unbleached character, which is readily distinguished by its characteristics from any

mere mixture of previously finished and bleached fibers.

The product is not claimed in the present application, but only the process for producing it.

Pine and analogous woods are largely employed for the manufacture of wood cellulose; but it is a well known fact that the cellulose obtained from pine and other analogous woods, while possessing considerable strength, is unsatisfactory for the manufacture of strong fine papers until subsequently treated in the refining engine.

The process employed for making wood fiber from pine or other analogous woods produces a pulp of soft spongy character and uneven appearance, technically known as "mottled," and this appearance can only be corrected by treating the fiber in beating and refining engines for a sufficient time to make the fiber smooth and uniform in appearance.

The chemical treatment employed in reducing the wood produces a long fiber; but the treatment required to make the fiber smooth tends to shorten the fiber, and is in any case detrimental to the strength of the paper made from such wood fibers.

One object of this invention is to utilize the long fiber of wood without treating it in a beating engine, and thus avoid the shortening and weakening of the fiber.

My invention furnishes a means of smoothing and hardening the wood fiber, without diminishing its strength by the admixture of the harder fiber of straw.

Straw fiber possesses a fiber of hard, dense character but too short to be used for making strong paper, and I have found that by combining such straw cellulose with the long fiber of wood cellulose, the straw cellulose in a peculiar manner is greatly strengthened while the wood cellulose is rendered harder and smoother, thus producing composite fiber which possesses a greater strength than the straw cellulose, and a greater smoothness and hardness than the wood cellulose.

My invention can be practiced by combining the cellulose from pine or other analogous wood with the cellulose made from rice, rye, wheat, or other straw.

An apparatus which may be employed to

practice this invention is shown in a diagrammatic manner in the annexed drawing, A being the wood digester, B the straw digester and C the blow-tank.

5 D is a manhole upon the wood digester to introduce the wood and the chemicals required for reducing the same.

E is a pipe supplying steam of suitable temperature and pressure to the digester A;

10 I a blow-off cock at the bottom of the digester A, and M a pipe connecting such cock with the blow-tank.

D' is a manhole upon the straw digester to introduce the straw and chemicals required for reducing the same; F' the pipe supplying the steam to such digester to cook the straw, the waste steam from the digester A being used in practice.

I' is the draw-off cock at the bottom of the 20 digester B, and M' a pipe connecting the cock I' with the blow-tank C.

The pipes M and M' discharge pulp, in practice, into a baffle-tank C' within the blow-tank so that it is thoroughly disintegrated 25 and mingled; and wash-pans J are shown beneath the blow-tank into which the contents of the tank are discharged by a movable nozzle N. A receptacle J is shown below the wash-pans J to receive the fiber when 30 washed. The worm-wheels of the blow-off cocks I, I', are connected by a shaft K, and a shaft having a hand-wheel K' is connected therewith by bevel-gears L so that an operator can empty both of the digesters simultaneously into the blow-tank. 35

The materials are introduced into the respective digesters and treated in such a manner that the reduction of both to fiber is concluded at the same time, and the blow-off 40 cocks I, I', are then simultaneously opened and the products of both digesters are discharged together into the blow-tank. The blow-tank is commonly open at the top. The two fibers are discharged from the digesters under such pressure and velocity that 45 they are thoroughly disintegrated and intimately mingled with one another, and are so thoroughly amalgamated as to produce a homogeneous substance possessing the qualities of both fibers and having different characteristics from any fiber heretofore known. Such result is produced by the disruption of the tissues in contact with one another, in a heated and consequently soft condition, by 50 the expansion of the steam, and the explosive nature of the discharge; which mingles the wood and straw cellulose together when discharged simultaneously from separate digesters.

60 The presence of the reducing liquor during such intermingling of the tissues also has a solvent effect upon the cellulose in the wood and straw, and unites them in a more perfect manner than is possible after they 65 have been washed or bleached, or subjected

to any refining process which would shorten them or diminish their capacity for such union.

The product claimed herein is an unbleached composite fiber in which the long 70 fiber of wood and the short fiber of straw are intimately mingled without any mechanical treatment and so effectively combined that they will not separate when properly treated for use in making paper upon a 75 paper machine. This composite fiber is readily distinguished by its color from any mixture of previously manufactured or bleached fibers. This duplex or composite fiber is capable of making a dense, strong, 80 high-grade paper, and can be used without treating it injuriously in a beating engine, and its method of manufacture therefore avoids injury to the wood fiber while it saves expense and labor in its preparation. 85 The composite fiber may thus be prepared for use in making high-grade papers, without impairing the strength of the fiber. The means for making this composite fiber by reduction of the two materials separately and blowing the products together, under 90 pressure, is not claimed herein; but is made the subject of a separate application. No. 375,568 filed May 25, 1907.

Having thus set forth the nature of the 95 invention what is claimed herein is:

1. The process of making a composite fiber of wood cellulose and straw cellulose, which consists in simultaneously but separately reducing the wood to produce wood 100 cellulose and the straw to produce straw cellulose, and then mingling the wood cellulose with the straw cellulose while in a heated condition and mixed with the reducing liquor. 105

2. The process of making a composite fiber of wood cellulose and straw cellulose, which consists first, in reducing the wood and straw to fiber with chemical liquor simultaneously by separate treatments, and 110 second, simultaneously discharging the two fibers with the chemical liquor under pressure into contact with one another to disintegrate them and unite them into a composite fiber. 115

3. The process of making a composite fiber of wood cellulose and straw cellulose, which consists first, in reducing the wood and straw to fiber with chemical liquor simultaneously by separate treatments, and 120 second, simultaneously disintegrating the two fibers in contact with one another to mingle and amalgamate them thoroughly.

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

PULASKI M. HAMLIN.

Witnesses:

JESSIE G. VANDINE,
ELIZABETH DE HART.