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U. S. McMILLAN

ARTICLE OF MANUFACTURE AND METHOD FOR THE PRODUCTION THEREOF

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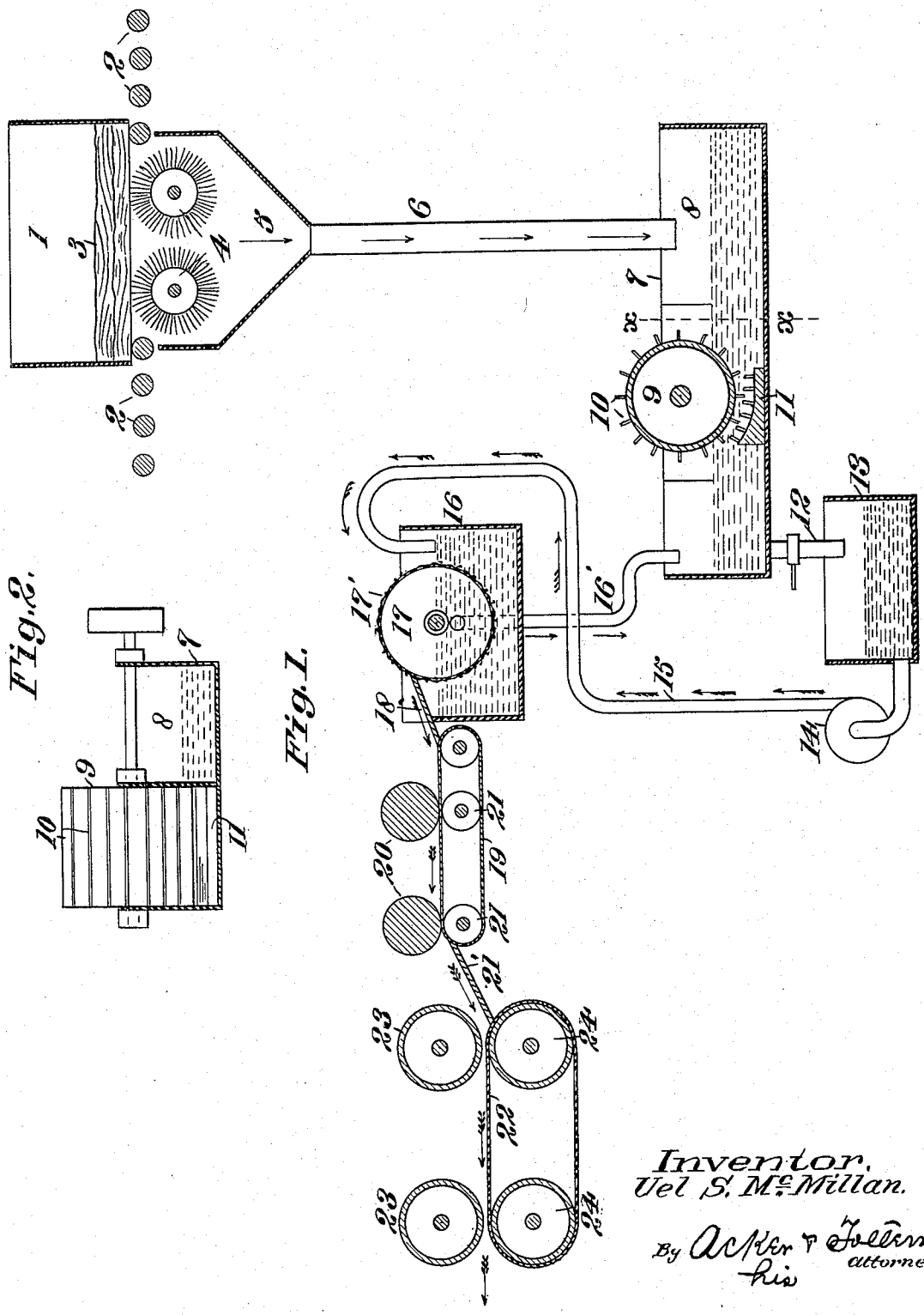


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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ARTICLE OF MANUFACTURE AND METHOD FOR THE PRODUCTION THEREOF.

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To all whom it may concern:

Be it known that I, UEL S. McMILLAN, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Articles of Manufacture and Methods for the Production Thereof, of which the following is a specification.

The hereinafter described invention comprises mechanical wood pulp and the method for the production thereof, the said pulp being utilized mainly in connection with the manufacture of paper, and the method of producing the wood pulp consists in the defiberization of wood and subjecting the fiber recovered therefrom to a beating action in the presence of water, whereby the fiber is reduced to intermassed pulp formation and the pulp so produced subjected to an action for the elimination of the excess moisture contained therein and thereafter, preferably passed between heated rollers for the final pressing of the pulp and the drying thereof; the mechanical paper pulp thus produced being free of cooking treatment either before or during the process of the pulp formation.

Heretofore, the production of mechanical wood pulp for use in connection with the manufacture of paper therefrom has been carried out by subjecting solid wood to an abrasive or grinding action for reducing the wood to a powdered or pulverized condition, the wood powder so produced being then formed into a pulp in the presence of water, and the pulp so formed from the powdered or pulverized wood being utilized as a filler, it being necessary to add chemically prepared pulp thereto to serve as a binder in order to manufacture paper therefrom. Under my invention, it is not required that as much chemically prepared pulp be added to the produced mechanical wood pulp, inasmuch as the defiberized wood produces a pulp of such formation that the intermatted wood fibers form the binder and filler for the paper. The object of the invention is the production of a more economical mechanical wood pulp than that formed by the present method, to materially improve the quality of the mechanical wood pulp and to produce a mechanical wood pulp better adapted for the manufacture therefrom of high grade paper than the pulp at present supplied to the paper manufacturers.

In the carrying out of my method invention the wood is first defiberized by being subjected to a combing action in line with the length of the fibers of the same and the defiberized wood is then transferred to within a tank or receptacle containing a body of water and while within said receptacle the defiberized wood is subjected to a beating action in the presence of the water for a given length of time, which beating action serves to reduce each fiber of the wood into component parts or a number of finer fibers and these fibers being subjected repeatedly to the beating action of the means within the body of water, are interlaced or intermatted to such an extent that the same may be removed as a moistened body from within the tank of water and transferred as moistened pulp to suitable means for extracting moisture therefrom and drying the body of pulp, so that the resultant product is mechanical wood pulp of any desired thickness and as such is in condition for the manufacture of high grade paper therefrom. Any suitably constructed apparatus may be employed for the carrying out of the method invention, there being illustrated in the accompanying sheet of drawings a simple, efficient and practical form of an apparatus for such purpose, wherein:—

Fig. 1 is a vertical sectional diagrammatic view illustrating one form of means for the defiberization of the wood, the tank into which the defiberized wood is transferred, means within the tank for subjecting the wood fiber to a beating action for the production of wood pulp therefrom and the means for removing the pulp and the drying thereof.

Fig. 2 is a transverse vertical sectional view taken on the line X—X, Fig. 1 of the drawings.

In the drawings, the numeral 1 is used to designate a hopper mounted for longitudinal reciprocating movement over a series of transversely disposed rolls 2, the hopper being an open-bottomed one and adapted to receive layers of wood 3 to be defiberized. The hopper 1 is mounted for longitudinal reciprocating movement above a plurality of oppositely rotating combing elements 4, which are adapted to be driven at high rotative speed. These combing elements 4 are

what may be termed defiberizing brushes, against the periphery of which the layers or slabs 3 of wood to be defiberized are held by gravity. In the present case, the defiberizing brushes 4 are mounted for rotation within a hopper 5, into which falls the fibers as the wood is defiberized and passes therefrom through a conduit 6 into a tank 7, which tank is substantially filled with a body of water 8. This tank is preferably approximately 20 feet in length and 15 feet in width, having a depth of approximately 5 feet. Within one portion of the tank is mounted for rotation a transversely disposed beater 9, the longitudinally radially extended circumferentially disposed ribs 10 thereof coacting with a longitudinally ribbed beater plate 11 between which and the ribs or blades of the beater 9 the defiberized wood delivered within the tank 7 passes and during such passage therethrough the moistened fibers of the wood are separated into component units or smaller fibers and these fibers during the repeated action of the beater are interlaced or interwoven one with the other in such a manner as to produce an interlaced body of pulp. In the present case the body of pulp is withdrawn from within the tank 7 and discharged by the valve controlled outlet pipe 12 into a suction tank 13, from which the same is removed by the suction pump 14 and delivered by means of the conduit 15 into an upper disposed tank 16. Within the tank 16 is mounted for rotation a transversely disposed hollow drum 17, the periphery of which is formed of reticulated material 17' and this drum during the rotary movement thereof picks up the pulp delivered into the tank 16 and deposits the same onto a downwardly inclined plate 18 from which the pulp moves onto an endless traveling belt or conveyor 19 and carried thereby between the pressure rolls 20 which coacting with the supporting rollers 21 for the belt 19 presses excess moisture from within the pulp, the pressed pulp being then delivered by the endless conveyor 19 onto the downwardly inclined plate 21 which deposits the same onto the endless traveling belt 22. The conveyor 22 carries the body of wood pulp between the heated rollers 23 and 24 for a drying of the pulp.

The thickness of the pulp as delivered from the conveyor 22 will depend entirely upon the amount of pulp which is permitted to build up on the screened or reticulated periphery of the drum 17 prior to the delivery thereof onto the downwardly inclined plate or apron 18, but the pulp when delivered from the conveyor 22 is in the appearance of a coarse, heavy, thick paper-like structure and as such is in condition for delivery to the paper mills for use in the manufacture of high grade paper therefrom.

As the wood pulp which adheres to the screened or reticulated surface of the drum 17 is raised from within the tank 16, the water contents thereof drains through the said screened surface and is returned to the interior of the drum 17 and flows therefrom through the downwardly extended pipe 16' into the pulp holding tank or reservoir 7.

If so desired, the pulp formed within the tank 7, by the beating action of the defiberized wood in the presence of water and within the said tank, may be bleached by adding to the water any suitable chemical for such purpose, and it is apparent that by varying the period of the beating action of the defiberized wood within the tank, wood pulp of varying degrees of fineness may be produced.

So far as applicant is aware, he is the first to produce mechanical wood pulp for use in connection with the manufacture of paper therefrom, which pulp is prepared from defiberized wood placed by a beating action in the presence of water into a matted or interlaced condition without the requirement of incorporating therein chemicals of any kind, whereby there is produced a finished mechanical wood pulp as a product of manufacture in a condition for the manufacture of paper therefrom in the usual manner resorted to by paper manufacturers, and the wood pulp so produced is of such a character that paper may be manufactured therefrom without the addition thereto of other forms of treated pulp to serve as a binder therefor, due to the fact that the defiberized wood when subjected to a beating action in the presence of water produces a pulp which serves as a binder and filler for the paper and therefore the expense incident to the manufacture of paper is reduced to a minimum.

The pulp mixture withdrawn from the tank 7 is in the form of a somewhat thickened body, the degree thereof depending upon the period of time allowed for the beating action of the defiberized wood; and while preference is given to the formation of the wood pulp without chemicals for bleaching or other purposes, and without the incorporation of chemical pulp therein, nevertheless, if so desired, such chemicals may be added to the pulp mixture as formed within the said tank 7.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. The method of producing sheets of mechanical wood pulp for use as paper stock, the same comprising the defiberization of solid wood in line with the length of the fibers thereof for the production of individual fibers of the wood, transferring the fibers so separated and depositing the same within a vessel containing water, subjecting the

fibers while immersed therein to a beating action for reducing the fibers to component units and causing an interlacing thereof, then removing the matted formed pulp from within the vessel and separating excess moisture therefrom, placing the pulp in sheet formation and finally drying the same.

2. The method of producing sheets of mechanical wood pulp for use as paper stock, the same comprising defiberizing solid wood in line with the length of its fibres for the production of individual fibers of the wood, transferring the fibers so separated and depositing the same within a vessel containing water, subjecting the fibers while immersed therein to a beating action for reducing the fibers to component units and causing an interlacing thereof, removing the matted formed pulp from within the vessel and separating the water therefrom, passing the separated pulp between pressure rollers for removing excess moisture therefrom, and placing the same in sheet formation, and finally passing the same between heated pressure rollers for a drying thereof.

In testimony whereof I have signed my name to this specification.

UEL S. McMILLAN.