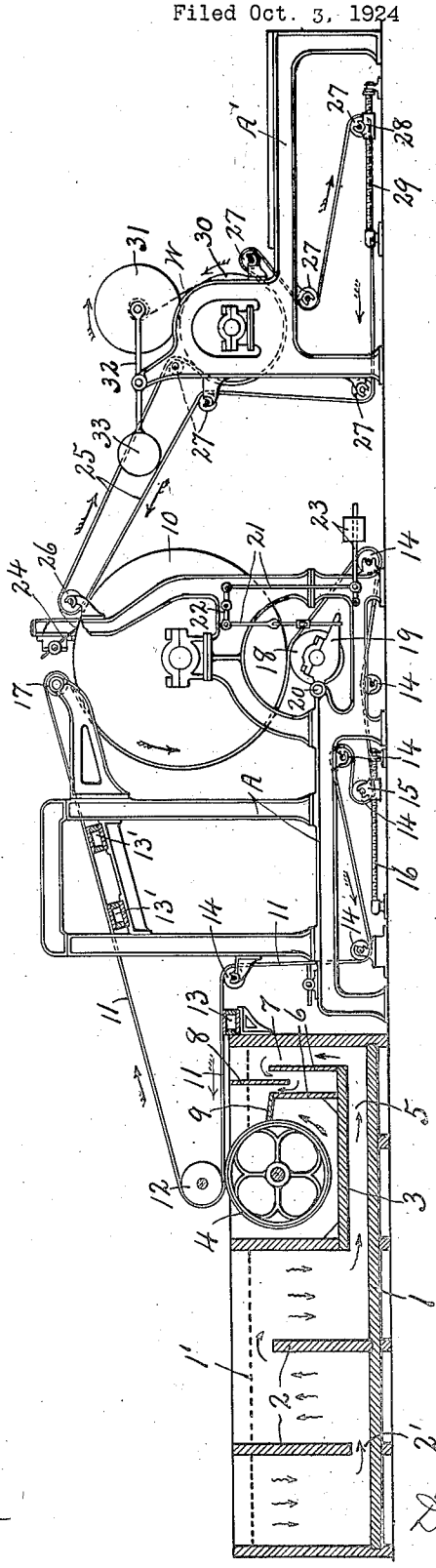
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E. M. HALL

MACHINE FOR MAKING MEMBRANOUS SHEET WADDING

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WITNESS
H. W. Hurst

INVENTOR
E. M. Hall
BY
Davison & Thompson
ATTORNEYS

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EDWARD M. HALL, OF CAMILLUS, NEW YORK.

MACHINE FOR MAKING MEMBRANOUS SHEET WADDING.

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This invention relates to a process and apparatus for making a membranous wadding from pulp stock which is reduced to a more or less finely divided or comminuted fibrous condition by any of the well known processes commonly employed in the manufacture of paper stock.

The main object of the present invention is to provide a more economical and expeditious method of and apparatus for converting this fluid stock into an extremely light and highly absorptive membranous sheet wadding as a finished product which is readily soluble in water.

In other words, I have sought to produce the finished product from the fluid stock with the use of a single felt and dryer as distinguished from the multiplicity of felts and dryers commonly used in paper making.

Other object and uses relating to specific steps or structural features of the process and apparatus will be brought out in the following description.

The drawing is a side elevation partly in section and partly diagrammatic of an apparatus embodying the various features of my invention for carrying out the process.

As illustrated this apparatus comprises a pulp containing vat —1— divided into a series of compartments by transverse partitions —2— and containing a supplemental housing —3— in which is located a wire covered cylinder mold —4—.

The first partition —2—, reading from the left hand toward the right hand, extends from the top of the vat downwardly below the liquid level and is provided with an opening —2'— near the bottom of the vat to allow the pulp to flow from the first compartment to the second compartment while the second partition extends from the bottom of the vat upwardly to a level some distance below the level of the liquid pulp to permit the overflow of the stock from the second compartment to the third compartment.

The housing —3— extends from the top of the vat downwardly some distance below the level of the liquid stock and forms with the bottom of the vat an underlying passage —5—, the left hand end of the housing —3— serving as a partition to prevent the flow of the stock into the interior of said housing.

The opposite or rear end of the housing —3— is provided with longitudinally spaced partitions —6— extending upwardly from the bottom thereof to the rear of the cylinder mold —4— to a level of the liquid pulp in the vat and slightly above the horizontal plane of the axis of the cylinder mold —4—, the rearmost partition —6— being spaced from the corresponding end of the vat —1— to form an upward passage —7— thus permitting the stock to flow from the compartment directly in front of the housing —3— through the passages 5 and 7 and allowing the finer floating stock to overflow into the space between the partitions —6—.

A baffle plate or partition —8— extends from the top of the vat downwardly into the upper end of the space between the partitions —6— and in spaced relation thereto and also in spaced relation to the bottom of the housing —3— to cause the finer floating stock to flow over the top of the rearmost partition —6— and thence downwardly and upwardly around the bottom of the partition —8— and thence over the top of the front partition —6— into direct contact with a relatively small area of the upwardly moving side of the cylinder mold —4—.

A shelf or table —9— commonly known as a "making board" extends from the upper edge of the front partition —6— into close proximity to the adjacent face of the cylinder mold —4— and also extends from side to side of the housing —3— to prevent the flow of the surface stock into the lower portion of the chamber in which the cylinder mold —4— is located, said "making board" being slightly inclined upwardly and forwardly from the front partition —6— to cause the finer stock to flow against the adjacent surface of the upwardly moving portion of the cylinder mold.

The cylinder mold —4— is adapted to be rotated in the direction indicated by the arrow by any suitable driving means, not necessary to herein illustrate or describe, to cause the floating pulp contacting with the upwardly moving side thereof to be carried upwardly by adhesion thereto.

A longitudinally extending frame —A— is suitably supported at the rear end of the vat —1— and upon this frame is mounted a rotary drying cylinder —10— some distance to the rear of the vat and adapted to be heated by steam or other suitable heating means, not necessary to illustrate or describe since the heating means forms no part of my present invention.

A felt belt —11—, commonly known as a "wet felt" serves to convey the wet stock picked up by the surface of the cylinder mold —4— directly to the cylindrical dryer —10— and for this purpose extends longitudinally of the vat —1— and frame —A— and has its front portion supported upon a relatively small drum —12— directly over the cylinder mold —4— so as to bring the lower side of the adjacent portion of the felt —11— in direct contact with the upper face of the cylinder mold and thereby to cause the thin film of pulp stock carried upwardly by the upwardly moving portion of the cylinder mold to be transferred by adhesion to the adjacent portion of the felt. The level of the stock in the vat —1— is indicated by the dotted line —1'— and it will be noted that, while the level is a slight distance above the surface of the "making board" —9— and that the "making board" is disposed in or slightly above the horizontal plane of the axis of the cylinder mold —4—, the latter is of sufficient diameter to project some distance above the stock level —1'— so that the actual area of contact of the surface stock with the cylinder mold is relatively small as compared with the surface area of the mold, the object of which is to cause the cylinder mold to pick up only the finer floating surface stock in the form of a thin film and to convey the same directly to the adjacent portion of the felt —11— through the relatively small transferring space between the level of the stock and the line of contact between the upper face of the mold and the overlying portion of the felt.

The felt belt —11— may be caused to travel in the direction of the movement indicated by the arrows either by contact with the cylinder mold —4— or by any other suitable means which will cause it to move in synchronism with the movement of the surface of said mold. The lower side of the felt —11— between the mold —4— and frame —A— travels in a substantially horizontal plane across and in contact with the upper side of a suction box —13— which is mounted on the rear end of the vat —1— and adapted to be connected to any suitable suction device for withdrawing moisture from the felt preparatory to receiving the wet stock from the cylinder mold, the remaining portions of the lower side of the felt being extended downwardly and rearwardly around suitable idler-drums —14— beneath the drying cylinder —10— and preferably beyond the vertical plane of the axis thereof, one of the idler-drums being mounted upon an adjustable support —15— which in turn is engaged by a threaded screw —16— constituting a means for tightening the felt or rather for keeping it under the proper tension for efficient work. The upper side of the felt —11— extends rearwardly and upwardly in an inclined plane from the drum —12— directly under and in contact with a plurality of, in this instance two, suction boxes —13'— which may also be connected to any suitable suction devices for withdrawing moisture from this portion of the felt and stock thereon while in transit from the cylinder mold —4— to the drying cylinder —10—. The upper portion of the felt —11— extends over the upper face of the drying cylinder —10— and around a suitable idler —17— on the frame —A— and thence downwardly around the front half of the cylinder and around the upper face of a presser-roll —18— and return around the rear-most idler —14—. The presser-roll —18— is journaled upon a vertical movable support —19— which is hinged at —20— to the frame —A— and is pivotally connected through the medium of links —21— and a lever —22— to an underlying weighted lever —23—, which is also pivotally mounted upon the frame —A— and is adapted to press the roller —18— and overlying portion of the felt —11— against the under side of the drying cylinder —10—.

This drying cylinder —10— is journaled upon the frame —A— to rotate about a horizontal axis parallel with that of the cylinder mold —4— but is of considerably larger diameter than that of the cylinder mold to afford a relatively large drying surface for the stock which is brought into contact therewith by the felt —11—. The idler —17— and presser-roll —18— are located at nearly diametrical sides or above and below, respectively of the drying cylinder —10— thereby causing the transferring portion of the felt —11— to engage approximately half of the drying cylinder which may be rotated by the movement of the felt in contact therewith or may be operated by any other power to cause its surface to move in substantial synchronism with the felt.

It is now clear that the lighter floating particles of the fluid pulp are brought into contact with a relatively small surface area of the cylinder mold —4— and that under these conditions an extremely light, thin film of the pulp is transferred to the felt —11— and thereby conveyed to a relatively large surface area of the drying cylinder —10— where, owing to the thinness of the pulp film and the distribution over the large drying surface it is quickly dried and pressed into a thin or membranous sheet ready for stripping as a finished product having a highly absorptive power and readily soluble in water. The means by which the fluid pulp is transferred from the cylinder mold —4— to the felt —11— is commonly known as "couching," the felt belt serving as the means for conveying the pulp film directly from the cylinder mold to the drying cylinder.

The means for removing the dried membranous sheet preferably termed "wadding" comprises a stripping plate —24— commonly known as a "doctor" mounted upon the upper portion of the frame —A— directly over and in contact with the upper surface of the drying cylinder —10— and preferably in proximity to the adjacent portion of the felt —11— thereby allowing the membranous sheet to adhere to a considerable portion of the surface of the drying cylinder and pressed therein against by the presser-roll —18— before it is "doctored" therefrom. This doctor plate —24— is arranged to cause a slight "creeping" effect of the finished product. Suitable means is provided for conveying the doctored product from the drying cylinder, said means consisting in this instance of an apron —25— which is passed around an idler —26— on the frame —A— and its remaining portions supported upon additional idlers —27— on a supplemental frame —A'— at the rear of the frame —A— one of the idlers being mounted upon an adjustable support —28— which is adapted to be adjusted longitudinally of the apron by means of a screw —29— for maintaining said apron under the desired tension.

The idler —26— is located just at the rear of and in close proximity to the doctor plate —24— and also in close proximity to the periphery of the drying cylinder —10— so that the finished product which is doctored from the drying cylinder —10— may be transferred by said plate directly upon the upwardly and rearwardly traveling side of the apron —25— which is preferably inclined downwardly and rearwardly from the idler —26—. The intermediate portion of the upper side of the apron is caused to travel around and against the front and lower side of a winding drum —30— which is journaled upon the supplemental frame —A'— to rotate about an axis parallel with that of the drying cylinder.

A reel —31— is revolubly mounted upon one end of a weighted lever —32— having its other end provided with a counter balance and weight —33— arranged to permit the reel —31— to contact with the upper surface of the winding drum —30— and to be rotated thereby for progressively winding the finished membranous sheet wadding as —W— on the reel as it is formed ready for use.

Operation.

The lighter pulp stock which floats upon the surface of the bulk in the vat —1— is picked up by a relatively small area of the upwardly moving side of the cylinder mold —4— and couched therefrom in a more or less saturated condition directly upon the felt —11— in the form of an extremely thin film and is then conveyed directly to a relatively large surface area of the drying cylinder —10— after a considerable portion of the moisture has been withdrawn therefrom by the suction boxes —13'—. This pulp film is progressively transferred from the felt —11— to the surface of the drying cylinder by adhesion increased by pressure of the roll —18— which also serves to distribute the film more evenly over the surface of the drying cylinder.

The dried membranous sheet is then progressively doctored from the drying cylinder on to the delivery apron —25— which conveys it to the winding drum —30— and thence to the reel —31— as a finished product having a high degree of absorptive power and also readily soluble in water and if desired the reeled membranous sheet may be cut up into various small sizes according to the use to which it is to be put.

What I claim is:—

An apparatus for making membranous sheet wadding comprising a rotary cylinder mold, means for applying a fluid pulp to the cylinder mold, a rotary drying cylinder, means for couching the stock from the cylinder mold directly to the drying cylinder, a winding drum, and means for doctoring the product from the drying cylinder and conveying it directly to the winding drum.

In witness whereof I have hereunto set my hand this 23d day of September 1924.

EDWARD M. HALL.