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[72] Inventor **Donald Alfred Bell**
Holmcroft, Athy, Ireland

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[73] Assignee **Bowaters United Kingdom Paper Company Limited**
London, England

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[54] **FLAME RETARDANT HARDBOARD AND ITS MANUFACTURE**
3 Claims, No Drawings

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Primary Examiner—S. Leon Bashore
Assistant Examiner—Richard H. Anderson
Attorney—Baldwin, Wight, Diller & Brown

ABSTRACT: A process of manufacturing flame retardant hardboard which includes forming, in continuous manner, a travelling layer of wet wood fiber, continuously forming on a surface of said wood fiber layer as it advances, a layer comprising wet asbestos fiber and wood pulp, and subsequently removing water from the two layers whereby the two layers combine and unite together. Preferably, as a binder, starch is present with the asbestos fiber and the surface of the wood-asbestos layer may be treated with flame retardant chemicals, some of which penetrate to the wood fiber layer.

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FLAME RETARDANT HARDBOARD AND ITS MANUFACTURE

This invention relates to flame retardant hardboard and to its manufacture. Hardboard having flame retardant properties for example Class I as defined in British Standard B.S.476 is known and is produced by subjecting the finished board to a further process such as impregnation with chemicals. This has the disadvantage that it is as a rule outside the control of the board manufacturer and it produces a board which, after being treated to impart the flame retardant properties, is markedly inferior to the same board before treatment. Boards processed in this way lose much of their strength, the water absorption rate is greatly increased and often the surfaces of the boards are blemished with crystal deposits from the chemicals used in the flame retardant processing.

A known process for producing hardboard comprises the steps of conveying wood logs to a chipper which reduces the logs to chips, conveying the chips to a defibrator wherein the wood chips are treated by steam at pressures up to 170 lbs. per square inch before being fed to means for breaking the chips into basic wood fibers, feeding the resultant mixture of wood fibers and water (hereinafter referred to as wood pulp) to a thickener which removes a percentage of the water, processing the wood pulp in a refiner which breaks down the larger fibers and thereby produces a consistently fine wood pulp, feeding the refined wood pulp into a box or chamber where chemicals (normally containing aluminum sulfate) are added to the refined wood pulp, feeding the chemically treated wood pulp through a cyclone where foreign particles such as, for example, sand and grit are removed, conveying the cleansed wood pulp to the headbox or hopper of a mat forming machine from whence the wood pulp is spread evenly upon a continuous wire mesh belt moving below the headbox and through which water from the wood pulp falls by gravity as the boards assume shape, applying vacuum suction below the wire mesh belt at three stages to assist the dewatering process, passing the mat of wet pulp between pressure rollers, subsequently cutting the continuous mat of wet pulp (hereinafter referred to as a "lap") into sheets, placing each of the wet laps upon a steel wire cloth located upon a mild steel carrier plate, conveying the carrier plates to a loading magazine where the carrier plates are stacked one upon the other, conveying the magazine when loaded to a hydraulic press to produce a dry dense board approximately one-eighth of the thickness of the mat of wet pulp, feeding the boards into an oven where they are subjected to high temperatures for several hours, transferring the boards to humidifying chambers where the boards are impregnated with moisture under controlled conditions, and subsequently cutting the boards into predetermined sizes.

The present invention seeks to overcome the aforesaid disadvantage and according to the present invention a process of manufacturing flame retardant hardboard includes forming, in continuous manner, a travelling layer of wet wood fiber, continuously forming on a surface of said wood fiber layer as it advances, a layer comprising wet asbestos or mica fibers and wood pulp, and subsequently removing water from the two layers whereby the two layers combine and unite together.

Preferably starch is present with the asbestos or mica fibers to assist in the bonding thereof to the wood fiber. Although reference has been made above to asbestos or mica fibers, it is envisaged that other similar chemically inert noncellulosic heat-insulating materials could be used.

Also according to the present invention there is provided flame retardant hardboard comprising a composite board having two layers bonded together in the process of production of the composite board, one layer thereof being produced from wood fiber and the other layer thereof being produced from a mixture of wood fiber, asbestos fiber and starch.

Advantageously, the surface of the wood-asbestos or mica layer is treated with flame retardant chemicals some of which penetrate to the wood fiber layer.

One embodiment of the invention is now described more particularly with reference to the following description given by way of example only.

In the process according to the present invention, a secondary headbox is provided, in the mat forming machine mentioned hereinbefore, above the continuous wire and before the vacuum. A mixture of wood fiber, asbestos fiber or mica fiber, starch and water is supplied to this secondary headbox from which it is disposed, in the form of a layer, upon the wet mat of wood pulp formed in the mat forming machine and, following passage through the pressure rollers, the upper surface of the lap is sprayed with a chemical some of which passes through the asbestos or mica-wood layer to the wood fiber layer. The presence of starch ensures that the wood fiber and asbestos or mica fibers bond together.

Advantageously, the chemical contains a mixture of Polybor (a trade name for a mixture of boric acid and borax), Urea FX (a trade name for a powder mixture having a high nitrogen content and containing urea) and Formalin (a trade name for formaldehyde) dissolved in water, the chemical being sprayed onto the exterior surface of the asbestos-wood layer from whence it penetrates to the wood fiber layer.

Preferably, the chemically treated composite board is then sprayed with a Tall Oil emulsion which obviates any tendency for the board to stick to the surface plate following compression in the hydraulic press.

The asbestos fiber and wood fiber mixture is prepared by adding 250 gallons of water to 50 lbs. of asbestos fiber to form an asbestos slurry, mixing 30 lbs. of wood pulp in 150 gallons of water, mixing the asbestos slurry and the diluted wood pulp thoroughly and adding 4 lbs. of starch, the starch additive being equivalent to 8 percent of the dry weight of asbestos fiber.

The mixing of the asbestos fiber, wood fiber and starch is effected in a tank or chest and is applied to the surface of the wet mat of wood pulp through the intermediary of the second headbox referred to above, so that 7 lbs. of asbestos (dry basis) is spread evenly over 80 square feet of wet lap. The quantity described above would, therefore, be sufficient to cover approximately 560 square feet.

Preferred portions in the chemical mixture are 23 lbs. polybor, 31 lbs. Urea FX and 3,400 ccs. of Formalin (15 percent Methanol) with water added to constitute a mixture of 11.25 gallons. The chemical may advantageously be applied at the rate of 2 gallons per 18' 4" of wet lap.

It is to be appreciated that other chemicals, besides those mentioned above, possessing flame retardant properties may be used in the flame retardant solution. Further, the quantities of materials used may be changed and varied to suit particular requirements.

A primary advantage of the composite board produced according to the present invention is that, when subjected to flame, the wood fiber in the finished asbestos-wood surface will carbonize and, together with the asbestos will provide insulation against the heat.

What we claim is:

1. A process of manufacturing flame retardant hardboard consisting of the steps of forming in a continuous manner a first travelling layer of wet wood fiber, continuously forming on a surface of the wood fiber layer as it advances a second layer comprising an admixture of wet noncellulosic heat-insulating fibers and wood fibers, applying to an upper exposed surface of the second layer a flame retardant chemical in an amount sufficient to pass through the second layer and reach the first layer, and subsequently pressing and drying the two layers whereby the two layers combine and unite together to provide a high density hardboard.

2. The process of manufacturing flame retardant hardboard as defined in claim 1 wherein said noncellulosic heat-insulating fibers are asbestos or mica fibers.

3. Flame retardant hardboard consisting of a composite board formed of two layers bonded together in the process of production of the composite board and collectively containing

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a flame retardant chemical, one of said layers being defined by wood fibers, the other of said layers being defined by an admixture of noncellulosic heat-insulating fibers and wood fibers, said other layer containing substantially all of said flame retardant chemical.

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