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FIREPROOFING

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The present invention relates to a fibre board and to a method of manufacturing the same, and is a continuation in part of my copending application, Serial No. 468,982 filed July 18, 1930 issued as U. S. Patent No. 1,939,082 dated Dec. 12, 1933.

More particularly the present invention relates to a fireproof fibre board and which may also be waterproof or water resistant.

One of the difficulties with the fireproofing processes known and with fireproof boards resulting from such processes is that the fireproofing salts or other materials are largely disposed on the surface of the product or on the layer of material immediately adjacent the surface of the product. This is due to the fact that in the drying of the fibre board two actions take place. One action is the evaporation of moisture from the surface of the board and the second action is the movement of the moisture from the center of the board to the surface thereof by the capillary action of the fibre. As a result of these actions the board obtained by the fireproofing processes known hitherto contains its fireproofing salts or other materials largely either on the surface of the product or within the layer of material immediately adjacent the surface, whereas the inner portions of the board contain considerably less fireproofing material and are therefore frequently insufficiently fireproof.

One of the objects of the present invention, therefore, is to overcome these difficulties and to produce a fireproof fibre board which contains the fireproofing materials substantially uniformly dispersed throughout the body of the board and to substantially minimize the excess of such fireproofing material in the outer layers of the board.

Other practical and commercial difficulties involved in the manufacture of fireproof fibre board reside in various other phases of the processes known heretofore, such as the large volumes of solutions that are required which makes the operation of such processes unwieldy and expensive. The present invention, therefore, has for one of its objects to provide a process in which the volume of solutions required for operation are minimized and maintained in a closed circuit within the process, the circuit being replenished by such amounts of solution as are actually withdrawn by the final product, and thereby maintaining the composition of the treating solution substantially constant. Another object of the invention is to produce a fibre board which is fire-

proof and water resistant and to provide a process for the manufacture of such a product.

The drawing accompanying the present application illustrates the present process diagrammatically and indicates the flow of various materials employed in the process. It will be understood, however, that the present invention is not to be limited to the specific process outlined in the drawing and specifically described hereafter for many variations and modifications thereof, embodying the principles of the present invention, will be apparent to persons skilled in the art.

Before proceeding with the detailed description of the process, the materials employed in the present process and some of the phases of the invention will be first described.

The raw material from which the board is made preferably consists of two types of fibre, one of which is relatively long and may be referred to as coarse stock. This coarse stock fibre makes possible an open formation of board but when used alone would not produce sufficient rigidity for commercial use. The other type of fibre, which may be referred to as fine stock, is short and is used to provide desired rigidity and reduce porosity. It also tends to give a smoother surface to the finished product.

For the fire-proofing material commercial or crude mono-ammonium phosphate is employed. This product is readily obtained on the market and in addition to the mono-ammonium phosphate it also contains about fifteen percent of other inorganic salts such as calcium phosphate and sulphate and an excess of ammonia. In the process described herein, boric acid is preferably added to the crude or commercial mono-ammonium phosphate solution and the excess of ammonia reacts with the boric acid to form ammonium borate.

The crude mono-ammonium phosphate is preferred to the refined material not only on account of its lower cost but also on account of the presence therein of some insoluble salts. These salts appear in the crude product in a pulverized condition. When the crude material is mixed with water, the soluble portions thereof, such as the mono-ammonium phosphate, the excess ammonia, the chlorides and similar salts which the crude material may contain go into solution and a gelatinous residue is formed containing more or less colloidal qualities. These colloidal or semi-colloidal particles have the effect of preventing the fire-proofing salts from migrating to the surface of the board during the drying opera-

tion and thereby retaining the fire-proofing substances substantially uniformly dispersed throughout the body of the finished product.

Water-proofing agents are desirably added in the course of the manufacture of the fibre board. While it will be understood that a large variety of commonly employed water-proofing agents may be employed in the present process, the present process contemplates the employing of a wax-like chlorinated naphthalene or diphenyl derivatives containing chlorine or other non-inflammable resinous or wax-like substances having the property of forming a film impervious to moisture. These non-inflammable resinous substances, such as the chlorinated naphthalene or chlorine diphenyl derivatives are added in a colloidal or dispersed state and serve to coat the fibres thereby adding water-resistant qualities to the final product. In the preferred form of the invention, however, the above resinous and/or wax-like substances are preferably employed in combination with some other water-proofing material, such as paraffin or the like. The water-proofing agent actually employed in the present process is made up of nine parts of paraffin and one part of the selected non-inflammable wax-like substance such as the chlorinated naphthalene or the like. This mixture is non-inflammable and the water-proofing material employed in the present process therefore serves to add to the non-inflammability of the product. The water-proofing agent is prepared by melting the mixture as composed above and dispersing the same in water, soap or other similar substances being employed as the dispersing agent. The water-proofing agent, therefore, as will be seen from the more detailed description of the process, is added to the beater in the form of an aqueous emulsion of chlorinated naphthalene and paraffin, a size or soap being employed as the emulsifying agent.

Another phase of the present process which adds to the efficiency of the same, to the high quality of the product obtained, and reduces the cost of its manufacture, resides in the fact that the fire-proofing solution is brought into intimate contact with the fibre stock at the very beginning of the process. This permits the fire-proofing solution to remain in intimate contact with the raw material for the maximum length of time and thereby permits the thorough penetration of the fibre stock with such fire-proofing solution. Moreover, the addition of the boric acid to the crude mono-ammonium phosphate which results in the formation of ammonium borate in the fire-proofing solution serves to assist in the penetration of the fibre stock with the fire-proofing solution by reason of the fact that ammonium borate is particularly active as a penetrant and facilitates the entrance of the mono-ammonium phosphate into the fibre during the impregnation period.

The following detailed description of the process in its practical form and embodying the principles of the present invention will be readily understood by reference to the accompanying drawing which illustrates the various apparatus employed in the process in a conventional manner and indicates the flow of the various materials employed in the process.

As has already been stated, the present process preferably employs two types of fibre. The coarse stock is introduced into the present process from a wet machine and contains approximately sixty per cent water and approximately forty

per cent fibre. This coarse stock in this form is introduced into the tank 1, which is indicated on the drawing by the legend "unscreened coarse stock tank". Fire-proofing solution is employed to wash the forty per cent stock from the wet machine into the unscreened coarse tank 1. This form of the stock from the wet machine is much too thick for the subsequent operations to which the same is to be subjected, and it, therefore, needs to be diluted. Instead, however, of adding water to this coarse stock, as was commonly practiced prior to the present invention, in the present process the solution of fire-proofing chemicals is added as the stock drops from the wet machine. This addition of this solution is indicated on the drawing by the flow lines which originate in tank 6 and which holds a solution of crude mono-ammonium phosphate and boric acid. The solution in this tank is preferably maintained at a concentration of from four to five degrees Baumé. Make up solution is added from the chemical solution tank 2 to tank 1 in amount equal to that leaving the complete system. This solution is made by adding mono-ammonium phosphate and boric acid to 4° to 5° Baumé solution. The solution flowing from tank 2 to tank 1 has a Baumé of 7° to 8°. The amount of solution that flows from the tank 6 to the wet machines is controlled so that the consistency of the stock is reduced to 0.8 per cent fibres. The contents of tank 1 may be subjected to agitation. This thin mixture of coarse fibrous stock and fire-proofing chemicals is then passed over suitable screens conventionally indicated at 3. The fibres together with the solution that pass through the screen pass through the deckers 4 and into the screened coarse stock tank 5 where the mixture is preferably subjected to agitation. The rejected fibres or the fibres which are too coarse to pass through the screen 3 are run over the inclined screen 61 and through refiners 7 where they are subjected to some additional refining and are then permitted to flow back into the system by conducting the same into the coarse stock tank 1.

Fire-proofing solution is employed to wash rejected fibre away from the screens. This is indicated by the line which flows from the chemical solution storage tank 6 to the coarse screens 3.

The stock in tank 1 may vary from 0.6 per cent to one per cent in fibre consistency. This stock is concentrated to 3.5 to 5 per cent consistency in passing over the deckers or thickeners, and then drops into the screened coarse stock tank 5. The stock is drawn from this tank into the beaters 8 intermittently and as needed.

The fine stock is subjected to a similar process which process is also illustrated in the accompanying drawing. The logs or chips are fed into the apparatus 9 which may be in the form of stone grinders or in the form of serrated plate or other type refiners. In the first type of apparatus, logs are forced by hydraulic pressure against a revolving grinding stone and the ground wood is removed from under the stone by process water. In the present process, embodying the principles of the present invention, fire-proofing solution is made to flow from the chemical solution storage tank 6 or from the chemical solution tank 2, as desired, to the grinder for the purpose of removing the ground wood therefrom. The introduction of the fire-proofing solution at this point enhances the penetration of the fibres by reason of the heat developed in the grinding operation. It will be seen, therefore, that in the treatment of

the coarse stock as well as in the treatment of the fine stock, the chemical solution is brought into intimate contact with the raw material at the very earliest stage of the process. This phase of the invention permits the fibres to remain in intimate contact with the fire-proofing solutions for a maximum period of time without unnecessarily lengthening the time of treatment, and this phase of the invention further assists and permits of the operation of the closed system in such a manner that the amount of liquid and the amount of chemicals in the closed circuit may be retained substantially constant. The penetration of the fibre stock by fire-proofing chemicals is also enhanced.

The fine stock flows from the grinder 9 into the unscreened fine tank 10 and thence onto the fine screens 11. The material passing through these screens then flows into the deckers 12 and then into the screened fine stock tank 13 and then into the beaters 8 where the two types of stock become thoroughly intermingled. The concentration in the screened coarse and screened fine tanks is from 3.5 per cent to 5 per cent consistency. The stock is drawn into the beaters at this fibre concentration and diluted to 2.75 per cent to 3 per cent by the further addition of fire-proofing solution. The material is fed to the forming unit 22 at approximately 2.5 per cent consistency. The necessary thinning is accomplished by the consistency regulator 21 to which more fire-proofing solution may be added if necessary. The fibre concentration in the beaters is substantially 2.75 per cent.

The rejected materials from the fine screens 11 are removed preferably with fire-proofing solution as in the similar treatment of the coarse screens 3 and is passed over the inclined screen 14 and through the refiner 15 and is then again introduced into the unscreened fine tank 10 where it is returned to the process.

As has already been set forth in an earlier portion of this specification, the water-proofing substances or preparations and the size are added to the beaters. The drawing illustrates the manner in which these materials are prepared and added to the beaters. Paraffin or other suitable wax or resin is introduced into the melter 16 together with a suitable amount of chlorinated naphthalene or chlorinated diphenyl derivatives. These materials are mixed and molten in the apparatus 16 and are then introduced into the emulsifier 17. Other size materials, such as rosin, are cooked with soda ash or caustic soda in the cooker 18 and these are also introduced into the emulsifier 17 and the entire mixture contained therein is converted into an emulsion carrying the size and water-proofing materials. This emulsion is stored in the tank 19 indicated as a size storage tank and suitable quantities thereof are permitted to flow from this tank 19 into the beaters 8.

In the melter 16 where the mixture of paraffin and chlorinated naphthalene is prepared, the proportions are substantially nine parts of paraffin or other wax and one part of the chlorinated derivative, the latter serving to fireproof the former. The product prepared in the emulsifier contains approximately two parts of rosin size (sodium resinate) to one part of the paraffin-chlorinated naphthalene mixture. The size emulsion when made up contains from five to ten per cent solids.

The size emulsion is fed into the beaters in quantities varying with the rate of flow of fibre

passing therethrough. Generally from 1.5 per cent to 2 per cent of water-proofing solids are used. This percentage is based upon the bone dry fibre weight in the beater.

From the beaters the material flows through the machine chest 20 and through the consistency regulator 21 into which some of the chemical solution may be permitted to flow from the tank 6. The material then enters the forming unit 22. A preferred type of forming apparatus exerts a pressure of from 400 to 450 lbs. per square inch on the fibre and forms a board-like wet mat. This pressure further enhances penetration. This pressure serves to remove from the material substantially all of the liquid, which liquid is permitted to return to the tank 6. It will be seen that liquid also returns to the tank 6 from other apparatus employed in the process, such as from the deckers 4 and 12 and from the inclined screens 6 and 14.

The wet formed board produced by the apparatus 22 is then introduced into the drier 23 which is preferably a tunnel drier whose temperature is preferably regulated so as not to exceed 290° F. Temperature substantially in excess of 290° F. is likely to bring about an excessive decomposition of the fire-proofing agents within the board. By maintaining this temperature at or below 290° F., this action is minimized. The preferred drying temperature is from 280° F. to 290° F.

It will be seen that the wet board which enters the drier contains uniformly dispersed therethrough fire-proofing and water-proofing substances and that these materials are retained uniformly dispersed therethrough during the drying operation by reason of the presence of a substantial amount of colloidal material which serves to prevent the migration of the fire-proofing salts to the surface of the board. As a result of this process, therefore, the board obtained is fire-proof and water-resistant and these qualities are uniform through the thickness of the board.

The board leaving the drier 23 may, if desired, be passed through the trimmer and cut-off saws 24 and if desired the surface of the board may be rendered smooth by passing the boards through the sanding machines 25.

The trimmings produced by the trimmer 24 may be subjected to shredding in the shredder 26, this product being mixed with the dust of the sanding machine in the dust tank 27 and then added to the unscreened coarse stock tank 1.

In the drying operation conducted in the drier 23, a small portion of the ammonia in the board is vaporized. If desired this may be subsequently replaced by subjecting the board to a conditioning treatment with a solution of ammonia. This solution, which is preferably about a four percent solution of ammonium hydroxide, is formed in the ammonia spray solution tank 28 whence it passes to the spraying unit 29. In this unit the solution is sprayed on the upper surface of the board while the remainder passes between a pair of rolls, the lower one of which rotates in contact with the solution.

The board is then stored in piles and the ammonia solution penetrates the board. This treatment replaces the ammonia removed from the board during the drying and brings the moisture content of the board up to normal.

The spraying solution also aids in giving the surface of the material a slightly greater fire-proofing quality by reason of the fact that this

treatment forms some diammonium phosphate on the surface of the board which has somewhat greater fire-proofing properties than the mono-ammonium phosphate. The spraying solution also serves to neutralize any free acid that may have formed in the board caused by the loss of ammonia in the treatment.

In order to preserve and economize in its use, the fire-proofing solution with which the fibre is treated is moved in a closed cycle, namely the amount of fibre which enters the solution is always maintained equal in weight to the fibre leaving the system. Furthermore, the amount of fire-proofing compounds added is always equal to the amount of such compounds leaving the system and entering the drier. Moreover, the amount of water which is caused to enter the system is always kept equal to the amount contained in the wet mat entering the drier. The system is kept closed by returning water expressed in the forming operation back to the storage tank of the solution. The solution is maintained at a concentration of from four to five degrees Baumé. Additional ammonium phosphate and boric acid are added, preferably to the solutions at chemical solution tank 2, as required to maintain the concentration of the solution.

It will be understood that the solution with which the fibre is treated throughout the process is returned from the presses or other forming machines to the solution supply tank and that it is strengthened by the addition of chemicals required to maintain the required concentration. This strengthening may take place in tank 2 from which the solution flows at a regulated rate into the unscreened coarse tank 1. The solution in the closed cycle is maintained at a temperature of substantially 90 to 105° F., so that a high rate of penetration may be secured. This temperature is maintained by heat generated by friction, and steam or warm fire-proofing solution added at the refiners.

The board so formed is both fire and water resistant. The chlorinated compounds make the sizing material non-inflammable and substantially assist the other salts in rendering the board resistant to fire.

It will be apparent that the cost of treating the fibre with chemicals of the character mentioned is necessarily high and that, therefore, the present process is of great commercial importance in greatly reducing such cost and at the same time producing an improved product. The conditioning treatment (ammonia spray) to which the formed board is subjected is desirable in that all free acid in the board is neutralized and in the effect of the fire-proofing salts of the ammonia solution causing the formation of some di-ammonium phosphate and ammonium borate. This procedure makes it possible to produce the desired board with a minimum consumption of chemicals. If the di-ammonium phosphate be added to begin with, the ammonia lost in the drier would be much greater.

Under conditions of high humidity, when board containing monoammonium phosphate is used, the attack of bacterial organisms is frequently an important consideration, particularly since the nitrogen in the ammonium phosphate provides a nutrient for bacterial growth. The chlorinated sizing compounds used herein have the additional advantage of protecting the fibre from such bacterial growth. Furthermore, these compounds protect the fibre

from the attack of insect pests prevalent in some climates.

While the chlorinated compounds specified are preferred, it will be apparent that other similar non-inflammable waxlike or resinous compounds may be employed without departing from the present invention.

The process as set forth in detail hereinabove may be modified in a variety of manners and in several portions thereof. Instead of employing the crude commercial monoammonium phosphate described hereinabove and which has many advantages in that it contains a substantial amount of colloidal material which serves the function of entrapping the fire-proofing salts during the drying operation and thereby prevents the migration of such salts through the pores of the board to the surface thereof, other fire-proofing materials may be employed together with other addition agents which have a similar effect of entrapping the fire-proofing salts and preventing their migration during the drying operation.

This process as outlined is suitable for the production of a board having a weight of 770 to 800 pounds per thousand superficial feet. To produce lighter, less dense board, the Baumé would have to be increased approximately as follows:

700 to 770 lb. board—5.5° to 6° Bé.

650 to 700 lb. board—6° to 7° Bé.

The sizing would be increased to 2.5 per cent to 3.0 per cent solids.

After the system has been in operation awhile the amount of size in the final product is the same as that furnished to the beater. The percentage of size in the finished product may, therefore, be said to equal the per cent added to the beater.

The solution employed for bringing about the penetration of the fibrous stock with the fire-proofing solution, namely the solution as made up of boric acid and crude mono-ammonium phosphate has a pH of approximately 5.2. With the addition of the alkali with the size the pH of the system becomes 5.4 to 5.6.

As has been stated above when fire-proofing solutions or salts are employed which do not contain any colloidal material, another addition agent may be employed which will serve the function of entrapping the fire-proofing salts. One such agent may be a colloidal asphalt in which clay is used as a dispersing agent or a clay emulsion may be used which may or may not contain any asphalt. When the process is modified as just described, the clay emulsion or colloidal asphalted clay may be employed in lieu of the rosin employed in the process as described in an earlier portion of the present specification. When a clay emulsion is employed the amount of soda ash or caustic soda employed is substantially reduced or may entirely be eliminated.

What I claim is:

1. A continuous process for making fibre board, comprising the steps of preparing a stock solution of commercial monoammonium phosphate and boric acid of predetermined quantity and concentration, and containing finely divided colloidal material, adding a portion of said solution to coarse fibre stock, simultaneously subjecting other fibrous stock to a refining operation in the presence of another portion of said solution to form fine fibrous stock, separately screening the said coarse and said fine stock, commingling the stocks with an emulsion of

size, wax and chlorinated naphthalene or the like, subjecting the mixture to beating action, forming the mixture into boards, recovering the solution expressed during the forming step, adding the recovered solution to the stock solution, drying the board, moistening the surfaces of the board with ammonia solution, and replenishing the stock solution with the amount removed from the system by the board, thereby maintaining a substantially constant amount of solution in contact with the fibre stock.

2. A continuous process for making fibre board, comprising the steps of preparing a stock solution of commercial monoammonium phosphate and boric acid, containing finely divided colloidal material, adding a portion of said solution to coarse fibre stock, adding another portion of said solution to fine fibre stock, separately screening the said coarse and said fine stock, commingling the stocks with an emulsion of size and fire-proofed water-proofing materials, subjecting the mixture to beating action, forming the mixture into boards, recovering the solution expressed during the forming step, adding the recovered solution to the stock solution, drying the board, moistening the surfaces of the board with ammonia solution, and replenishing the stock solution with the amount removed from the system by the board, thereby maintaining a substantially constant amount of solution in contact with the fibre stock.

3. A continuous process for making fibre board, comprising the steps of preparing a stock solution of fireproofing agents, containing finely divided colloidal material, adding a portion of said solution to coarse fibre stock, adding another portion of said solution to fine fibrous stock, separately screening the said coarse and said fine stock, commingling the stocks, subjecting the mixture to beating action, forming the mixture into boards, recovering the solution expressed during the forming step, adding the recovered solution to the stock solution, drying the board, and replenishing the stock solution with the amount removed from the system by the board, thereby maintaining a substantially constant strength of solution in contact with the fibre stock.

4. A continuous process for making fibre board comprising the steps of preparing a stock solution of fire-proofing agents, adding a portion of said solution to coarse fibre stock, adding another portion of said solution to fine fibrous stock, separately screening the said coarse and said fine stock, commingling the stocks, subjecting the mixture to beating action, forming the mixture into boards, recovering the solution expressed during the forming step, adding the recovered solution to the stock solution, drying the board, and replenishing the stock solution and the fibre stocks with the respective amounts removed from the system by the board, thereby maintaining a substantially constant strength of solution in contact with a substantially constant amount of fibre stock.

5. A system for the continuous manufacture of fire-proof fibre board comprising the steps of preparing a stock solution of a commercial monoammonium phosphate and boric acid having finely divided colloidal material, and having a concentration of 4° to 6° Baumé, feeding said solution continuously and commingling same with fibrous stock, subjecting the mixture to beating in the presence of an emulsified mixture of sizing and fire-proofed water-proofing materials, forming

boards from said mixture, recovering the liquids expressed during the forming step, adding the same to the stock solution, drying the boards, moistening the surface of the boards with ammonium hydroxide, and continuously feeding to the system fibre stock and solution in amounts equal to the amounts removed by the board.

6. A system for the continuous manufacture of fire-proof fibre board comprising the steps of preparing a stock solution of a commercial monoammonium phosphate and boric acid having finely divided colloidal material, feeding said solution continuously and commingling same with fibrous stock, subjecting the mixture to beating in the presence of an emulsified mixture of sizing and fire-proofed water-proofing materials, forming boards from said mixture, recovering the liquids expressed during the forming step, adding the same to the stock solution, drying the boards, moistening the surface of the boards with ammonium hydroxide, and continuously feeding to the system fibre stock and solution in amounts equal to the amounts removed by the board.

7. A system for the continuous manufacture of fire-proof fibre board comprising the steps of preparing a stock solution of a commercial monoammonium phosphate and boric acid, having finely divided colloidal material, feeding said solution continuously and commingling same with fibrous stock, subjecting the mixture to beating in the presence of an emulsified mixture of sizing and water-proofing materials, forming boards from said mixture, recovering the liquids expressed during the forming step, adding the same to the stock solution, drying the boards, moistening the surface of the boards with ammonium hydroxide, and continuously feeding to the system fibre stock and solution in amounts equal to the amounts removed by the board.

8. A system for the continuous manufacture of fire-proof fibre board comprising the steps of preparing a stock solution of fire-proofing agents, feeding said solution continuously and commingling same with fibrous stock to produce a mixture containing approximately one per cent of fibre, subjecting the mixture to beating in the presence of an emulsified mixture of sizing material, forming boards from said mixture, recovering the liquids expressed during the forming step, adding the same to the stock solution, drying the boards, and continuously feeding to the system fibre stock and solution in amounts equal to the amounts removed by the board.

9. A process of making fibre board which comprises mixing ammonium phosphate, boric acid and a non-inflammable water-proofing composition with fibres in fluid suspension, forming such fibre into board, drying and treating the surfaces of the board with a solution of ammonia.

10. A process of making a fire-resistant, water-proof fibre board which comprises mixing ammonium phosphate, boric acid, and chlorinated derivatives of naphthalene with fibres in fluid suspension, and forming the mixture into boards.

11. The process defined in claim 10, wherein the solution liberated on forming the board is returned for further use and strengthened with more of said chemicals.

12. A fiber board, the fibers of which are impregnated with ammonium phosphate and ammonium borate and coated with chlorinated naphthalene.

13. A process for making fibre board which comprises impregnating the fibres with ammonium phosphate and ammonium borate, coating

the fibres with non-inflammable waterproofing compounds, forming boards therefrom and treating the formed boards with a solution of ammonium hydroxide.

5 14. In a process of making fibre board the step of adding to the fibre stock an emulsion of a size, a wax, and chlorinated diphenyl.

10 15. In a process of making fibre board the step of adding to the fibre stock an emulsion of a wax and a chlorinated naphthalene.

15 16. In a process of making fibre board the step of adding to the fibre stock an emulsion of a wax and a chlorinated naphthalene in the ratio of nine parts of wax to one part of chlorinated naphthalene.

20 17. A continuous process for making fibre board comprising the steps of preparing a stock solution of commercial ammonium phosphate and boric acid of pre-determined concentration, adding a portion of said solution to fibre stock, comingling the stock with an emulsion of size, wax and a chlorinated derivative of naphthalene, forming the mixture into boards, recovering the solution expressed during the forming step, add-

ing the recovered solution to the stock solution, drying the board and replenishing the stock solution with the amount removed from the system by the board, thereby maintaining a substantially constant amount of solution in contact with the fibre stock. 5

18. A process of making fibre board which comprises treating fibres in fluid suspension with fireproofing agents and then adding to this suspension a non-inflammable waterproofing composition including chlorinated naphthalene. 10

19. A process of making fibre board which comprises treating fibres in fluid suspension with fireproofing agents including as one of the constituents thereof borax and then adding to the suspension of non-inflammable waterproofing composition including chlorinated naphthalene. 15

20. A process of making fibre board which comprises treating fibres in fluid suspension with fireproofing agents including as one of the constituents borax, then adding to the suspension a non-inflammable waterproofing organic compound containing chlorine. 20

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