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FIREPROOF WALL BOARD

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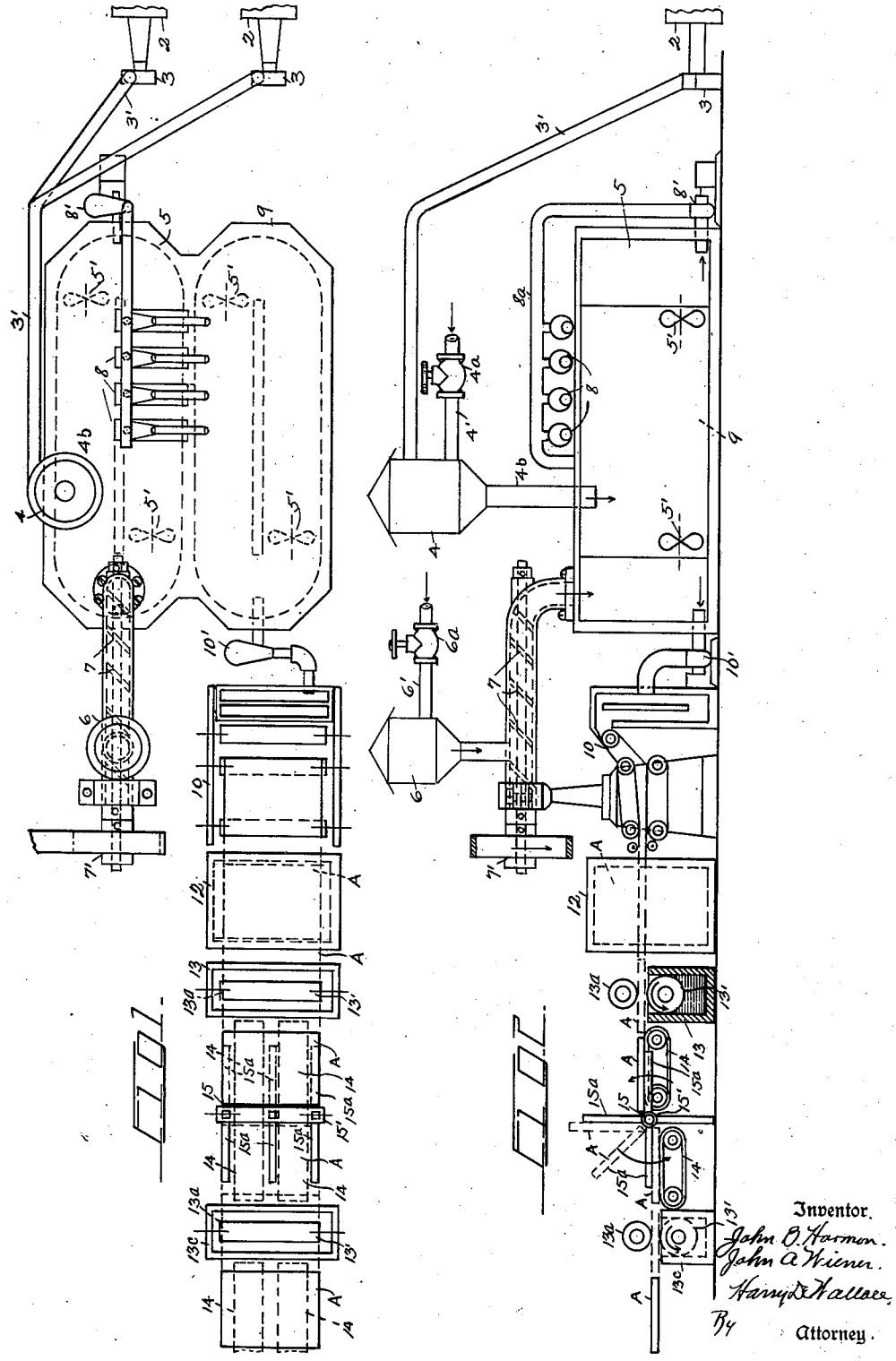

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FIREPROOF WALL BOARD

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This invention relates to the manufacture of wood-fiber wall covering, designed to supplant the ordinary lath-and-plaster finish for walls of dwellings and other buildings, and has particular reference to fireproof wall board and the method of producing the same.

The primary object of my method is the production of single-ply boards or sheets in which the predominant constituent is shredded wood fiber, that may be manufactured at relatively low cost and yield highly efficient insulating and sound-deadening qualities, with which may be incorporated, during the process of manufacture, certain non-metallic, mineral binding elements, preferably of micaceous nature or origin, to bond and harden as well as to render the boards fireproof. The process may be initiated by taking from 60 to 70 pounds of prepared wood pulp that possesses generally the characteristics of the fibrous wallboard product described in United States Patent No. 1,831,940, dated Nov. 17, 1931. This product is preferably fed, together with a certain amount of water, into an ordinary stock or pulping chest to be beaten or agitated in order to separate all of the matted fibers. A further step of the process is to admix with the wood fiber from 25 to 35 pounds of vermiculite that has been heated, dried and exfoliated, for example, by the "Zonolite" process, and thereafter crushed or otherwise reduced to relatively small flakes or particles such as may be passed through screens of from 30 to 40 mesh. This finely broken up vermiculite is preferably mixed separately though concurrently, with an amount of water sufficient to form a viscous or pasty mass, which is immediately combined with the shredded wood pulp and thoroughly mixed by agitating means common to pulping chests for a suitable length of time, or preferably until the vermiculite is brought into contact with and protectively films or coats the individual fibers and renders the wood non-combustible. The vermiculite, when converted into a paste, has a decidedly clingy nature, and this accounts for its ready filming of the fibers. The primary heating or baking of the original mined or quarried product, by which its moisture content is entirely dispersed, and the exfoliation and expansion of the vermiculite binder is effected, has been found to be highly advantageous to the reduction of the said binder to the viscous state preparatory to its incorporation with the wood pulp, by the herein described process, and greatly facilitates the production of a thoroughly fireproof bonded and lasting wall board which is characterized by its extremely light weight and its non-liability to expansion, contraction or warping, both before and after the boards are fixed to the walls.

The next step in the process consists of reducing the coarser wood fibers to a still finer state, after which the refined stock is subjected to final beating, agitating and fireproofing, of the combustible fibrous content of the boards. The finished stock may then be delivered to any suitable forming machine to be converted into boards or sheets ready to be dried and otherwise seasoned and cured. The drying out of the boards after the molding is preferably accomplished by passing them through a highly heated oven, which effects the evaporation of any residue of moisture in the fiber and vermiculite binder, and effects the lasting bonding of the boards.

This final heating of the wall boards constitutes an important and essential step of the process, since it has for its object the dispersing of all moisture in order to insure uniform strength and consistency in all parts of the boards. This drying out, however, renders the boards liable to warp and expand when they are again exposed to the atmosphere. This danger and its deleterious effect will be appreciated when it is understood that the normal atmosphere in a plant or storage room contains a variable amount of humidity or moisture, which may be communicated to the wall board the same as to other absorbent substances after a short exposure. This being a natural phenomena, the thoroughly dried wall boards begin absorbing the moisture from the air immediately following their discharge from the driers and injurious warping results. To obviate this trouble, I have added still another step to my process which consists of

immediately passing the warm boards over a series of vats which are filled with diluted silicate of sodium, or with a liquor prepared from the vermiculite, by which treatment, upwards of 10% moisture is restored to the boards before they are placed in storage. This moisture is applied to the opposite sides of the boards sequentially, the diluted silicate not only suitably moistening the boards, but also providing efficient sizing for subsequent painting or plastering of the walls. Wall boards treated to this artificial moistening thereafter retain their shape and size in addition to being rendered fireproof to a greater degree.

In carrying out this process, a suitable plant is naturally required, and in order that this description may be more clearly understood, reference may be had to the accompanying drawing, in which is diagrammatically shown the progressive steps of the process, and in which—

Figure 1 is a diagrammatic plan view of the apparatus. And Fig. 2 is a side elevation of the same.

By the present method, boards may be formed which can almost immediately be applied to the walls of buildings without requiring any prolonged or special seasoning or curing.

In the drawing, 2 represents conventionally a series of pulp shredding or defiberizing machines, from which the pulp may be drawn by suction fans 3, that lift the fibers via conduits 3′ to a collector 4, in which the matted fibers are separated by strong convulsive currents created by said fan. Water may be applied to the separated fibers by means of a pipe 4′, which preferably enters the lower portion of the collector, and may be accurately controlled and measured by a cock, as 4*a*, carried by the latter pipe. From the collector 4, the separated and moistened fibers gravitate via a spout 4*b* into an ordinary stock-chest, as 5, the latter being equipped with a plurality of rotary agitators 5′, which effect the continuous circulating, beating and mixing of said pulp.

The vermiculite is preferably supplied in finely broken up state to a hopper 6, that discharges this fireproofing and bonding ingredient into a worm or other suitable conveyor 7, wherein the vermiculite is mixed with water supplied by a pipe 6′ equipped with a cock 6*a* and reduced to a viscous or pasty state. The conveyor 7 may be rotated by a belt-and-pulley drive 7′, which carries the viscid product towards the pulping chest 5 where it becomes thoroughly mixed with the wood fibers by the agitators 5′. By treating the vermiculite in the conveyor 7, the product is characterized by an inherent sliminess or soapiness, which has the advantage of readily adhering to the solid wood fibers, upon which the vermiculite forms an enveloping film or coat which later renders the fibers fireproof. This adhering quality of the pasty vermiculite also facilitates the effectual bonding of the fibers of the sheets or boards when the latter are molded under relatively great pressure and afterwards suitably dried. The complete enveloping of the separated wood fibers with the sticky vermiculite greatly heightens the insulating and sound-deadening effect upon walls covered by said boards. My improved waterproofed and sized wall boards may be painted the same as natural wood, or said boards may be treated with a light skim coat of lime or other putty, if desired.

The fiber employed in the manufacture of my fireproof wall board may be obtained very cheaply by the reclaiming and utilizing of the unmarketable waste products of paper mills as well as the relatively great fibrous waste of sawmills and the like.

After the composite mass, comprising the wood fibers and the vermiculite, has been primarily agitated in the chest 5, as explained, the said mass is next passed through a series of refiners, as 8, by a pump 8′, which reduces the heavier or coarser fibers to a still finer state, and from which the refined product preferably flows by gravity into a second stock-chest, as 9, for completing the conditioning of the stock. This finished stock may then be delivered by a pump 10′ to any suitable wet-end machine or press, as 10, to be formed into sheets or boards, as A, which are immediately passed through a drying press, as 12, which disperses the residue of moisture content. The thoroughly dried out boards are then passed over a vat 13 containing about 70% soluble glass and 30% water that remoistens one side of the boards, and in order to accomplish this, said vat is equipped with a driven roller 13′, which is preferably covered with felt for applying evenly a coating of the glass to the under side during the transit of the boards. This vat is also provided with a press roll 13*a* that traverses the top face and serves with roll 13′ as a conveyor for the boards. From the vat 13, the boards A are transported by belt conveyors 14, towards a reversing reel 15, which comprises a shaft 15′ and end and medial radial fingers or spokes 15*a*, which rotate between the latter conveyors and in regular sequences pick up, reverse and deposit the boards by gravity bottom side upwards in the plane of a second vat 13*c*, which applies a similar coating of the sizing to the unmoistened face of the boards. From the latter vat, the boards may be transported by suitable means to the place of storage.

The transit of the boards A through the Fourdrinier machine or press 10 and thence through the drier, and the sizing and moistening machines 13—13*c* is necessarily governed by the duration of drying intervals, but

when the boards are finally discharged from the aforesaid machines, they still contain enough warmth to carry the moistening agent substantially throughout the area and depth of the board.

A satisfactory but somewhat cheaper and lighter non-combustible wall board may be produced by substituting finely ground mica for the vermiculite, the mica preferably being primarily mixed with the wood fibers and a suitable quantity of water in the chests 5 and 9 and thereafter treated by the machines 10, 12, 13 and 13*a*, as described.

Having thus described our invention, what we claim, is—

1. The hereindescribed process of making wall boards, which resides in conveying vermiculite from a source of supply, supplying a fluid to the vermiculite at its said source, then in mixing the vermiculite and fluid with pulp at a point remote from the said source of supply of the vermiculite and during conveying mixing the vermiculite with said fluid to render same viscous, then in refining the mass and forming same in sheets.

2. The hereindescribed process of making wall boards, which resides in conveying vermiculite from a source of supply, supplying a fluid to the vermiculite at its said source, then in mixing the vermiculite and fluid with pulp at a point remote from the said source of supply of the vermiculite and during conveying mixing the vermiculite with said fluid to render same viscous, then in refining the mass, then in again agitating the mass, and forming same in sheets.

3. The hereindescribed process of making wall boards, which resides in conveying a micaceous material from a source of supply, supplying a fluid to the micaceous material at its said source, then in mixing the micaceous material and fluid with pulp at a point remote from the said source of supply of the micaceous material and during conveying mixing the micaceous material with said fluid to render same viscous, then in refining the mass and forming same in sheets.

In testimony whereof we affix our signatures.

JOHN A. WIENER.
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