

UNITED STATES PATENT OFFICE

1,937,679

FIREPROOF FIBER BOARD

John A. Wiener and John B. Harmon, Oswego,
N. Y.No Drawing. Application September 21, 1932
Serial No. 634,146

1 Claim. (Cl. 92—21)

This invention relates to fireproofing matted defiberized wood, and has especial reference to a novel method of rendering non-inflammable fibrous wall board and other artificial fiber products.

The invention relates particularly to improvements in the process shown and described in our pending application, Serial No. 609,424, filed May 5, 1932.

- 10 The primary object of the invention is to treat shredded wood pulp preparatory to the same being formed into boards, or sheets suitable for covering walls of buildings, so that in case the buildings are set on fire the consumption of
- 15 the walls and the spread of the fire may be prevented. A further object is to provide a heat-resisting and sound-insulating wall board composed chiefly of felted or matted wood fiber that may be produced at extremely low cost by reclaiming saw mill and paper mill waste products that heretofore have had little or no market value; the said boards being manufactured by a continuous operation which includes the collecting and combining of the several ingredients
- 25 comprising the prepared stock, subjecting the said stock to beating and the several additional steps hereinafter set forth, and finally drying the product ready for use. And a further object is to provide a novel formula comprising a number of
- 30 wood-preserving and fire-resisting chemicals which protectively film the individual wood fibers and together with a non-metal mineral binder substantially fill the interstices between the fibers, in order to solidify and effectually bond the fibrous
- 35 mass when the moisture is dispersed during the forming and drying of the boards.

In carrying out our process, for the manufacture of 1000 square feet of wall board, for example, we employ about

40 500 lbs. shredded wood fiber
250 lbs. mica
25 lbs. ammonium sulfate
25 lbs. borax
45 25 lbs. zinc chloride.

- The first step in the process consists of charging an ordinary stock chest with a given amount of water, to which are added the several chemicals. The beaters are then started, and after
- 50 a few minutes agitation, the wood fiber is added until a 3% stock is obtained. This is then followed by the addition of the mica, after which the fiber, mica and chemicals are beaten by agitation in the usual manner, and the resultant
- 55 stock is next pumped from the primary pulping

chest to a series of refiners for reducing the coarser fibers to uniform fineness. The refined stock may then gravitate from the refiners to a storage chest, where it is subjected to final agitation until the mica is evenly distributed throughout the mass of separated fibers and the chemicals protectively film or coat the individual fibers. The mica is preferably first ground or otherwise reduced to relatively small flakes such as may pass through screens of 60 to 80 mesh. These fine mica flakes overlay as well as become interwoven with and tend to bind the fibers after the latter become impregnated with the heat-resisting chemicals, by which the boards are rendered non-inflammable. The chemicals of the above formula have been selected particularly with reference to their fireproofing, bonding and preservative qualities, and also because their melting points present a considerable range that increases progressively in substantially the following order and degree:

Ammonium sulphate.....	140° C.
Borax.....	184° C.
Zinc chloride.....	262° C.

The advantages accruing from the employment of this particular group of chemicals may be appreciated when it is understood that when fire attacks a wall covered with our improved boards, it has no appreciable effect in its early stages upon the fibrous content of the board or the heat-resisting or wood-preserving chemicals that film or coat the fibers. As the heat intensifies and rises to approximately 140° C., it melts and liquefies the ammonium sulfate of the coating of the individual fibers, and tends to halt the fire and prevent it from consuming or injuring the fibers. As the heat increases and rises to 184° C. it melts the borax and again temporarily slows down the progress of the fire without injury, as yet, to the wood fibers. In case the fire persists and registers still higher temperature that finally approximates 262° C., it melts the deposit of zinc chloride and repeats the slowing-down performance, as explained.

Thus it will be understood that by employing the aforesaid fireproofing chemicals, most of which also act as wood preservatives, the chemicals will sequentially become melted during the rise of temperature, with such frequency as to materially retard the progress of the fire due to the virtual wetting of the fibres, as explained. This periodical interruption of the progress of the fire at regular recurring temperature levels acts to intermittently check the fire and prevent

- quicker and greater destruction, as would be the case if the wall boards were not impregnated with the said fireproofing and preserving agents that form important parts of the general combination.
- 5 In neither of the last-named steps are the chemicals consumed; they still protectively film the wood fibres and cooperate with the closely interspersed mica which largely accounts for the boards retaining their normal shape and usefulness until the fire has died down or been put out by the firemen.
- 10 Wall board manufactured in accordance with the present process will not glow nor burst into flame when subjected to fire yielding up to 2000° F., and fire will not penetrate, and hence its flames cannot spread beyond the boards. Boards subjected to this excessive heat will not collapse even though the fibers become charred, due to the presence of the several protective and bonding
- 15 chemicals that cooperate with the mica, which is closely interspersed among the fibers, to prevent distortion and disintegration of the boards. The chemicals of the formula have been selected and so proportioned as to obviate all danger of the acid content of the solution injuring or destroying the relatively delicate wood fibers.
- 20 The chemicals when mixed with water are substantially dissolved and form a fireproofing liquor or solution, which comprises the only liquid employed in the process. After the refined stock is finally treated in the second or storage chest, it may then be delivered to a suitable forming machine and converted into boards or sheets which are immediately dried and stored ready for use.
- 25 In practice, the forming machine disperses about 40% of the liquid content of the prepared stock, which is returned to the primary pulping chest to be used for thinning out additional stock which is constantly being prepared, and requires that the liquor be in such condition as to maintain the 3% stock. In order to maintain this liquor at suitable chemical strength, fresh chemicals are added from time to time to replace the chemicals that may be carried off in the wet boards produced by the forming machine.
- 30 When the surplus moisture is dispersed by the forming of the boards a precipitate composed of the chemicals form the coating or film that completely envelopes the fibers during the drying of the boards and thereafter renders them non-inflammable.
- 35 Wood fiber wall board fireproofed by the practice of the aforesaid process may be produced, owing to the use of the zinc chloride, at substantially 25% less cost as compared with the common run of fire resisting fiber products. The zinc chloride, moreover, is employed in the present process to preserve the wood from fungus and rot, as well as to fireproof the same. Our processed boards when subjected to a temperature of 1700° F., only show charring of a comparatively small percentage of the fiber.
- 40 Having thus described our invention, what we claim, is—
- 45 A wall board comprising a base including fibers and mica, impregnated with ammonium sulfate having a melting point of 140° C., borax having a melting point of 184° C. and zinc chloride having a melting point of 262° C. whereby to progressively retard the heat as said temperatures are reached.
- 50 JOHN A. WIENER.
JOHN B. HARMON.

40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150