

# UNITED STATES PATENT OFFICE.

WARREN B. HOWE, OF CHICAGO, ILLINOIS.

## WATER OR GREASE PROOF MATERIAL.

SPECIFICATION forming part of Letters Patent No. 524,024, dated August 7, 1894.

Application filed May 5, 1891. Serial No. 391,636. (No specimens.)

### *To all whom it may concern:*

Be it known that I, WARREN B. HOWE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Water or Grease Proof Materials; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to improvements in porous or absorbent fibrous materials such as paper or straw-board.

It has for its object to provide a material of the character referred to which shall be proof against the action of oily and greasy substances and adapted to be applied as a wrapping or for making boxes or cartons for articles of commerce, or for other purposes, and it consists in paper, straw-board or other similar fibrous or porous material having its surface or exterior fibers saturated with silicate of soda to prevent absorption in the interior or body of the material of grease or oily substances, and provided on its surface with an adherent, non-penetrating coating of paraffine.

As one way in which my improved material may be made I apply to a web or sheet of pulp board or other similar material, liquid silicate of soda from a roller covered therewith, by passing the roller over the sheet or web and thereby transferring to the web or sheet a limited quantity of silicate of soda, or a quantity much less than that required for saturating the material or for producing a coating on the surface thereof, but sufficient only for saturating the surface or exterior fibers. I then apply to the surface of the paper, after it has been so treated with silicate of soda, an adherent layer or coating of paraffine to make the material water or moisture proof.

I have found that the best results are obtained when the sheet or web is passed with uniform speed over a roller to which the liquid silicate of soda is applied in a smooth and uniform layer or coating. I have found that a machine similar to that set forth in my previous patent, No. 437,435, dated September 30, 1890, is best adapted for carrying out this process, said machine embracing revolving rollers and suitable feeding devices for supplying the liquid silicate of soda thereto. The

same general result may be obtained by the use of a roller or rollers otherwise arranged or operated, but a better article can be made by the use of a machine of the character therein shown, because without such machine it is difficult to evenly or uniformly apply the silicate of soda to sheets of large size.

I have found in practice that when the liquid silicate of soda is applied to one side of the material it has the effect of expanding the fibers and that thereafter when the silicate of soda dries or hardens it draws together the fibers, the result being that the sheets are first warped or curved in one direction and then in the other direction during the process. If it is desired to apply the silicate of soda to both sides of the material, I have found that this can be best done by applying the liquid silicate of soda to both sides of the material at once or simultaneously, so as to prevent any warping of the material at any step in the process.

Sheets or webs of paper, pulp-board or other porous fibrous material treated with silicate of soda in the manner above described differs from a product which would be made by saturating the material with silicate of soda or coating it with the same, not only in the less quantity of silicate of soda used, but in the general character of the product and its availability for use for the purposes for which it is intended. This will be better understood by consideration of the fact that whenever pulp-board or similar material is saturated with liquid silicate of soda which is thereafter allowed to dry or harden the material will become practically solid and brittle and will lose its elasticity, so that it will become broken if sharply curved or bent. Similarly, if pulp-board or similar porous material is provided with a coating of silicate of soda, the coating will when dry become cracked or fractured as would a similar coating of glass in case the material is bent. It follows that a material of the kind mentioned, if either saturated or coated with silicate of soda would be useless for making boxes or wrappers for articles of merchandise or for any similar purpose.

The paper or pulp-board made as proposed by me, has its external fibers saturated with silicate of soda which is applied thereto by the roller in a limited quantity, not sufficient

to penetrate the interior of the material and the silicate of soda thus applied fills the interstices adjacent to the surface of the material and surrounds and unites the fibers  
 5 without, however, forming a continuous or glazed surface and the silicate of soda thus present in the surface fibers is found to prevent the absorption of grease or oily substances while at the same time it does not  
 10 materially lessen the flexibility of the material and the latter may be bent, folded, creased or otherwise handled in the usual way, without injury thereto. This result is obviously due to the fact that in the material  
 15 so treated the interior parts thereof retain their usual strength and flexibility while there is no external coating of a character to crack or break when the material is creased or bent.

The coating of paraffine may also be applied  
 20 to the paper or pulp board after it has been treated with silicate of soda, by passing it through a machine similar to that hereinbefore referred to as set forth in my previous patent. Obviously the silicate of soda previously applied will, owing to its grease proof  
 25 properties, prevent the paraffine from soaking into the paper or board, and will consequently limit the amount of paraffine which needs to be applied thereto by preventing  
 30 absorption of any portion of the same, and holding it all on the surface of the material treated, thereby effecting a considerable saving in the quantity of paraffine used. Furthermore, if the paraffine be melted from any  
 35 cause, as for example, by reason of hot crackers or other articles being packed in boxes made of the material treated in the manner described, it will not be absorbed into the

paper board and become so diffused therein as to lose its moisture-excluding qualities, 40 but by reason of the presence of the silicate of soda, will remain on the surface in the form of a film and will harden thereon in cooling, so that such melting of the paraffine will have no injurious effect whatever. 45

Material treated with both silicate of soda and paraffine is not only grease proof but water proof, and wrappers, boxes and cartons made thereof are not only capable of resisting the action of an oil therein, but of water 50 or moisture from without, so that they possess many of the advantages heretofore obtainable by means of metal boxes or cans, and are practically indestructible except by violent handling, while they are capable of 55 exerting no injurious effects whatever upon their contents.

It will of course be understood that the silicate of soda has no effect upon the paraffine used for coating the pulp-board or other ma- 60 terial.

I claim as my invention—

As a new article of manufacture, paper or straw-board having its surface fibers saturated with silicate of soda, and provided on 65 its surface with an adherent, non-penetrating coating of paraffine, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence 70 of two witnesses.

WARREN B. HOWE.

Witnesses:

IRVINE MILLER,  
 C. CLARENCE POOLE.