

UNITED STATES PATENT OFFICE.

STEPHEN M. ALLEN, OF WOBURN, MASSACHUSETTS, ASSIGNOR TO EDWARD RICHMOND.

IMPROVEMENT IN DRYING LEATHER, PAPER, &c.

Specification forming part of Letters Patent No. 41,348, dated January 19, 1864.

To all whom it may concern:

Be it known that I, STEPHEN M. ALLEN, of Woburn, county of Middlesex, and State of Massachusetts, have invented a new and improved process of drying leather or straw board, made by grinding and pulping vegetable and animal fibers and depositing the same in sheets on any ordinary paper-machine; and I hereby declare that the following is a full, clear, and exact description of the same.

The difficulties in drying these sheets in the various ways heretofore tried have been very great for many causes, among which are the following: first, expense and trouble in handling; second, warping of the board consequent upon unequal drying; third, difficulty in presenting an uneven-surfaced board to the calender-rolls; and, fourth, the brittleness imparted to the board by unequal compression of the particles when submitted to the action of the calender-rolls subsequently to being dried in the manner heretofore practiced.

In most cases leather, paper, or straw board is taken from the cylinder and dried outdoors in the sun; or, if dried within doors, it is generally laid flat upon some level surface, drying only upon one side at a time. This mode of drying has for effect the shriveling and shrinking of the leather or straw board on the side exposed to the sun or heat, while the side opposite, being still wet, is proportionately distended, which causes the separation of the fibers and the disintegration of the whole texture. The same operation goes on when the board is turned over—that is to say, shrinkage on the one side and distension on the opposite side, where the fibers become wet partially by condensation and partially by capillary action. In this way the resistance or strength of the board is diminished, while its subsequent treatment by calenders is not only rendered difficult, but produces irregular condensation of the fibers. On the other hand, if the board is dried principally from one side the moisture evaporates unequally and passes off, leaving the glutinous matter hard and crystallized, rendering the board brittle; but if dried at the proper temperature of heat and with free circulation of air on both sides of the sheet the vapor passes off slowly and

regularly and leaves the two surfaces in good condition, so that the leather-board is elastic, pliable, and yet tough and strong. The difficulties above mentioned I have found very troublesome in manufacturing my leather, paper, or board, and at times the mill had to be stopped to await the result of the drying.

The method I have discovered for drying my leather-board, and which is applicable to the drying of all kinds of paper-board, is as follows, viz: I take the sheets of leather-board as they come wet and soft from the cylinder of the paper-machine, of a size averaging twenty-four inches wide by thirty-six inches long, and attach them to a frame of about the same size, made of wood or metal. The board may be attached by nails, hooks, or clamps, with wire or twine strands drawn across the frame to rest upon, if, indeed, any support is necessary, and slide the same edgewise into a heated chamber made in a manner convenient for the purpose, having grooves or supports to place the frames at proper distances apart in order to give the requisite amount of air to fill the whole space on the bottom tier and to circulate through other tiers on top. I usually give more intermediate space between the frames in the bottom tier than in that directly above, and so on to the top of the chamber, which is so formed as to let out the vapor at the top. I also force hot air up through the chamber between the sheets, either by means of fans through heated pipes or tubes, or by a strong current of hot air from a furnace. The result of this method of drying is that the draft of hot air passing up on both sides of the sheets thus set on the edge and confined in their place draws the moisture from the center of the board toward the two surfaces at the same time, leaving the surfaces even and smooth. The boards thus dried retain their elasticity and strength, present a better surface for the calender, and produce a better superficial glazing of the sheet when calendered. By this method I also save much labor and expense and secure a uniform amount of drying every day, which is an important consideration in view of the machinery, which should run as regularly as possible.

Having thus described my invention, I claim—

The drying of leather-board in heated chambers so arranged that the hot air may pass up through the same between and on both sides of the sheets, which are held in or attached to frames or supports set upon their edges at proper distances apart, substantially as here-in described.

In testimony whereof I have hereunto signed my name before two subscribing witnesses.

STEPHEN M. ALLEN.

Witnesses:

LYSANDER BURNETT,
ABEL CHANDLER.