

T. MALCOLM.
 MANUFACTURE OF FIBER BOARD.
 APPLICATION FILED JULY 2, 1907.

906,044.

Patented Dec. 8, 1908.

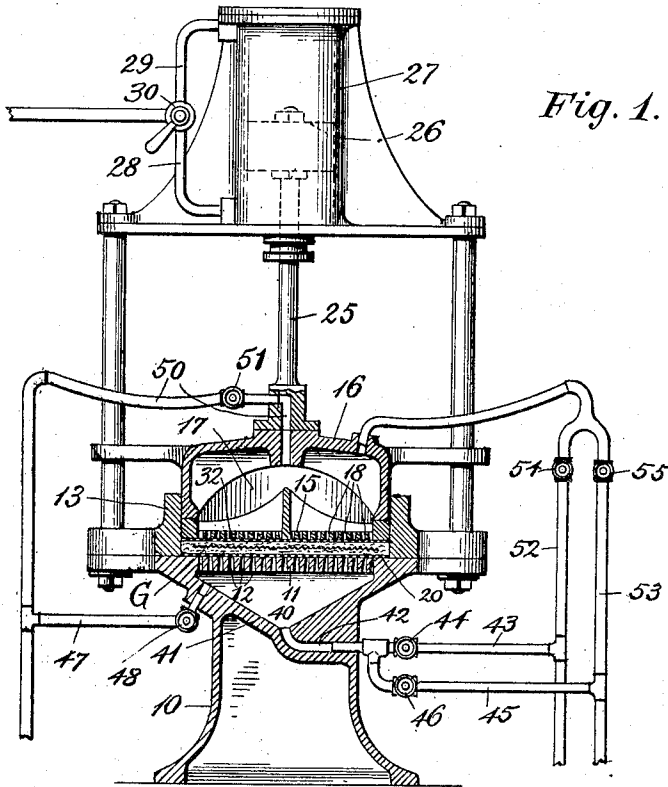


Fig. 1.

Fig. 2.

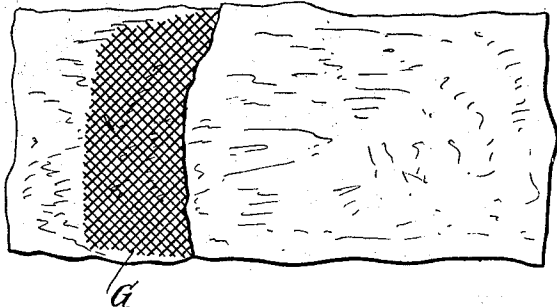
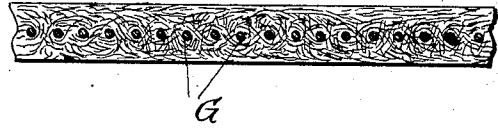


Fig. 3.



WITNESSES:

A. J. Curtiss.
 A. F. Burn

INVENTOR.

T. Malcolm,

BY Chas. F. Schuchz

ATTORNEY.

UNITED STATES PATENT OFFICE.

THOMAS MALCOLM, OF HARTFORD, CONNECTICUT, ASSIGNOR TO JOHN TREGONING, OF HARTFORD, CONNECTICUT.

MANUFACTURE OF FIBER-BOARD.

No. 906,044.

Specification of Letters Patent.

Patented Dec. 8, 1908.

Application filed July 2, 1907. Serial No. 381,947.

To all whom it may concern:

Be it known that I, THOMAS MALCOLM, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in the Manufacture of Fiber-Board, of which the following is a full, clear, and exact specification.

This invention relates to the art of manufacturing sheets of fibrous substances, and more especially to the manufacture of what is generally known as "leather board," and it has for one of its objects the production of such board the fibers of which are thoroughly knit together and compressed, this knitting together or intermingling being the result of constant agitation during the compression of the pulp mass, as for instance by a machine and a method shown, described, and claimed in a contemporaneously-pending application for Letters Patent, filed by me on May 18, 1907, under Serial Number 374,939, and to which reference may be had.

My invention has, furthermore, for its object the provision of a fiber-board embodying a resilient or flexible reinforcing medium which consists substantially of a sheet of open-texture fabric or a wire-netting, through the meshes of which the fibers of the pulp pass and intermingle at opposite sides thereof; thus producing an article which possesses materially-increased tensile strength, can be very cheaply made, and has all the qualities of density of the best tanned and seasoned leather; while, on the other hand, the pulp or fiber-sheet can readily be molded into any desired shape or form, such as pails, vessels, dress-suit cases, trunks, etc.

In order to give a clear understanding of the present invention, I have shown in the drawings a machine in which my improved fiber-board may be economically manufactured, the particular method of forming such board being of importance as far as the product is concerned.—Figure 1 being a central vertical section of such a machine. Fig. 2 represents a top view of a plain sheet of my improved fiber-board, some portions being broken away to disclose others, and Fig. 3 shows a section through the sheet.

Referring to the drawing, the numeral 10 denotes the base or stand of the machine provided at its top with a plate 11, having aper-

tures 12 and carrying on its upper face a molding box 13 which may be of any suitable shape and be secured to the plate 11 in any desired manner. Disposed for movement and closely fitting in said box 13, is a plunger, preferably made in two parts and comprising the bottom plate 15 and top casing 16 so as to leave a chamber 17 which is in communication with apertures 18 in the plate 15. Disposed on top of the base plate 11 is a screen 20 consisting preferably of a foraminated sheet plate, the apertures of which are comparatively fine so as to permit the water in the pulp to escape therefrom and yet retain the pulp fibers within the molding box 13. The plunger casing 16 is attached to the lower end of a piston rod 25 having at its upper end a piston 26 movable in a cylinder 27, and operable therein by fluid pressure which may be either in the nature of air, steam, or liquid. In the present instance I deem it advantageous to employ compressed air which may be admitted at either end of the cylinder (to raise or lower the piston as required), by conduits 28, 29, respectively, connected with a pressure supply through the intervention of a three-way valve 30 of ordinary construction. Secured to the underside of plunger-plate 15 is a foraminated plate 32 having a series of fine apertures registering with the somewhat larger openings 18 of the plate 15 above mentioned.

In using the machine for compressing the leather pulp which consists principally of scrap leather reduced to the required fineness, and water, the plunger is first raised out of the molding box 13, and a thin layer of pulp is then laid on top of the foraminated plate 20. On top of this pulp layer I place the reinforcing member, consisting of a sheet of open-mesh textile fabric or fine wire netting or gauze G, and then another layer of pulp is laid on top of said gauze-sheet. The plunger is then lowered into the molding box, and a current of air under high pressure is sent through the mass. This action will naturally result in driving the fibers of the upper pulp layer through the interstices in the gauze-sheet and cause them to intermingle and knit together with those of the lower pulp layer, while at the same time the water in the pulp will be forced through the foraminated plate 20, the apertures 12 in the plate 11,

and then into the chamber 40 of the base 10. This chamber 40 has a bottom plate 41 provided with a discharge-conduit 42 through which the waste water may be withdrawn 5 from the chamber 40, the conduit 42 being connected with a waste-pipe 43 which may be closed by a valve 44, and also with a pipe 45 leading to a suction pump (not shown) and adapted to be closed by a valve 46. The 10 chamber 40 is also connected with the pressure supply above mentioned, by a pipe 47, having a valve 48.

Air under pressure may be introduced into the plunger casing 16 by a pipe 50 provided 15 with a valve 51, and said casing is also connected with the waste-pipe, and with the suction pump, by pipes 52, 53, respectively, having valves 54, 55. By virtue of the several valves above mentioned, I am enabled 20 to meet almost any condition required to produce a board the fibers of which are thoroughly interwoven and knit together, and which has been completely relieved from moisture without the aid of heat, so that 25 the liability of the finished board to warp, will be minimized.

As above stated the pulp-mass is maintained in agitation during the compressing process by air under pressure, in which case 30 the air-valve 51 and waste-valve 44 are open. By now closing the waste-valve 44, and opening the suction-valve 46, I am enabled to increase the efficiency of the air blast through the pulp to any desired degree within the capacity 35 of the machine. By closing the air valve 51, suction valves 55, 45, and waste-valve 44, and then opening suction-valve 55 and lower air valve 48, the direction of the air current passing through the pulp-mass will be reversed, and the moisture will be ejected from 40 the upper portion of the pulp without passing through the body thereof. In a manner similar to that above-stated, the efficiency of the upward air-current may be increased by 45 closing the waste-valve 54, and opening the suction-valve 55.

It may be stated that the medium employed for actuating the plunger when compressing the pulp in the mold-box, may be 50 in the nature of any high pressure fluid, and, inasmuch as the movement of the plunger should necessarily be comparatively slow, in order to permit the air-current to agitate the fibers of the pulp mass and at the same 55 time exclude the moisture therefrom, it may be advantageous to operate said plunger under a hydraulic system so as to obtain the required plunger speed, and also the high pressure necessary to perform the work.

From the foregoing it will be understood 60 that, when leather is to be employed for the formation of the board, scraps may be used, these scraps being shredded rather than ground, so as not to destroy the fibrous qualities. Also instead of forming the pulp-mass 65 by adding water to the leather, any suitable "sizing" or cementing mixture, either plain or water-proof, may be used according to the purposes for which the finished product is intended, the principal feature of the present 70 invention residing in the fact that the fibers of the pulp are really crossed and recrossed among themselves, instead of simply compressed while in a dormant condition. The intimate, not to say homogeneous quality 75 and coherence of the fibers, is naturally due to the constant agitation by air-currents forced through the mass and consequently crowding the fibers in all directions so that a thorough intermingling results. 80

Under some circumstances, as for instance when forming vessels, pails, dress-suit cases, trunks, or similar articles of a predetermined or fixed shape, the reinforcing medium may be of a stiff nature, so that the 85 latter may be instrumental in preserving the original shape of the article, without relying upon the strength of the pulp to sustain the same, so that in such an instance the density of the pulp and its imperviousness to moisture 90 only are taken advantage of to render such vessel water-tight.

I am aware that fiber-board reinforced by wire-netting has been made and patented, 95 and I do not lay any claim to a fiber board in which the layers of fiber pulp placed on the opposite sides of the netting or gauze are caused to adhere to each other merely by force of rolling or compression, the principal feature of the present invention residing in 100 the fact, that the fibers of the pulp-layers are crossed and recrossed through the meshes of the netting, so as to be knit together at opposite sides of the latter, therefore rendering it impossible to separate the layers either from 105 each other or from the sides of the netting.

I claim:

As an improved article of manufacture, a leather-board consisting of fibrous material having embedded therein a sheet of wire 110 gauze, the fibers passing through the meshes of the gauze and being interlaced at the opposite sides thereof.

THOMAS MALCOLM.

Witnesses:

CHAS. F. SCHMELZ,
A. F. BURNS.

It is hereby certified that Letters Patent No. 906,044, granted December 8, 1908, upon the application of Thomas Malcolm, of Hartford, Connecticut, for an improvement in the "Manufacture of Fiber-Board," were erroneously issued to "John Tregoning," as owner of the entire interest in said invention; whereas said Letters Patent should have been issued to the inventor *Thomas Malcolm and John Tregoning, jointly*, said John Tregoning being the assignee of *part* interest only in said patent, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of January, A. D., 1909.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.