May 3, 1932. J. J. TURNER 1,856,936

PLASTER BOARD APPARATUS

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Fig. 1.

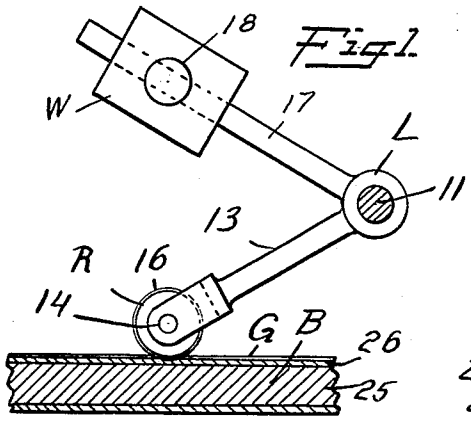


Fig. 2.

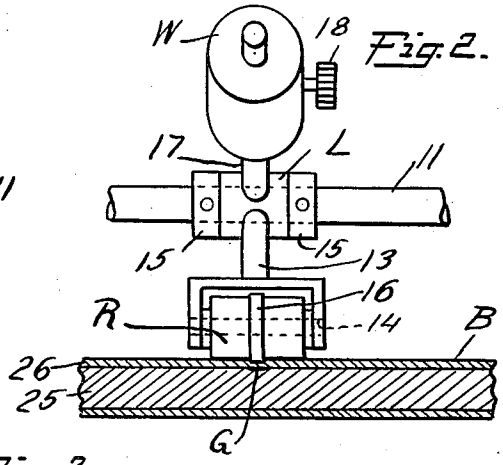


Fig. 3.

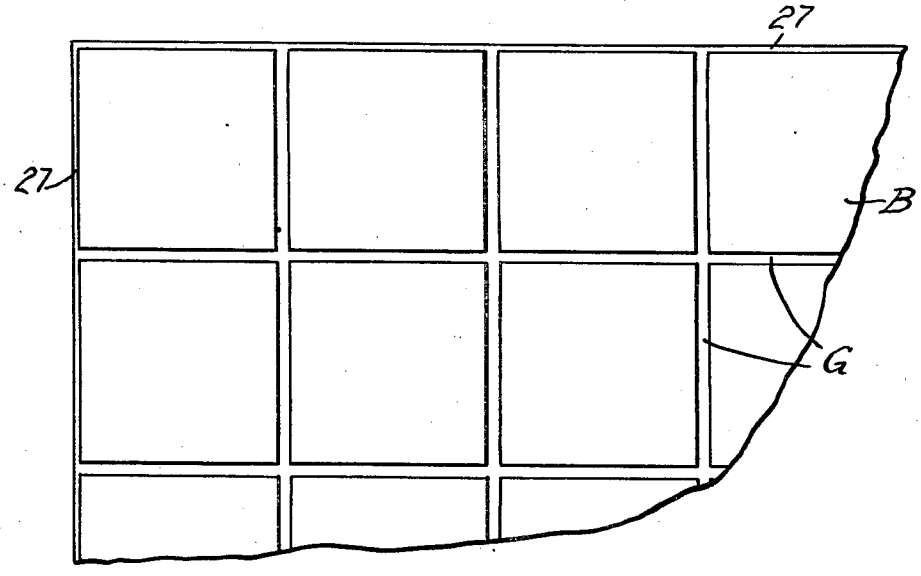
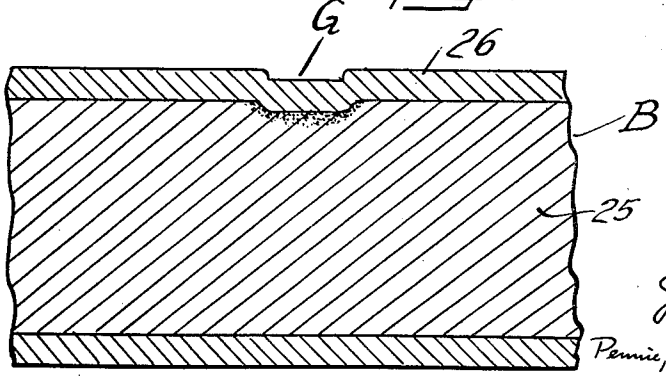


Fig. 4.



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PLASTER BOARD APPARATUS

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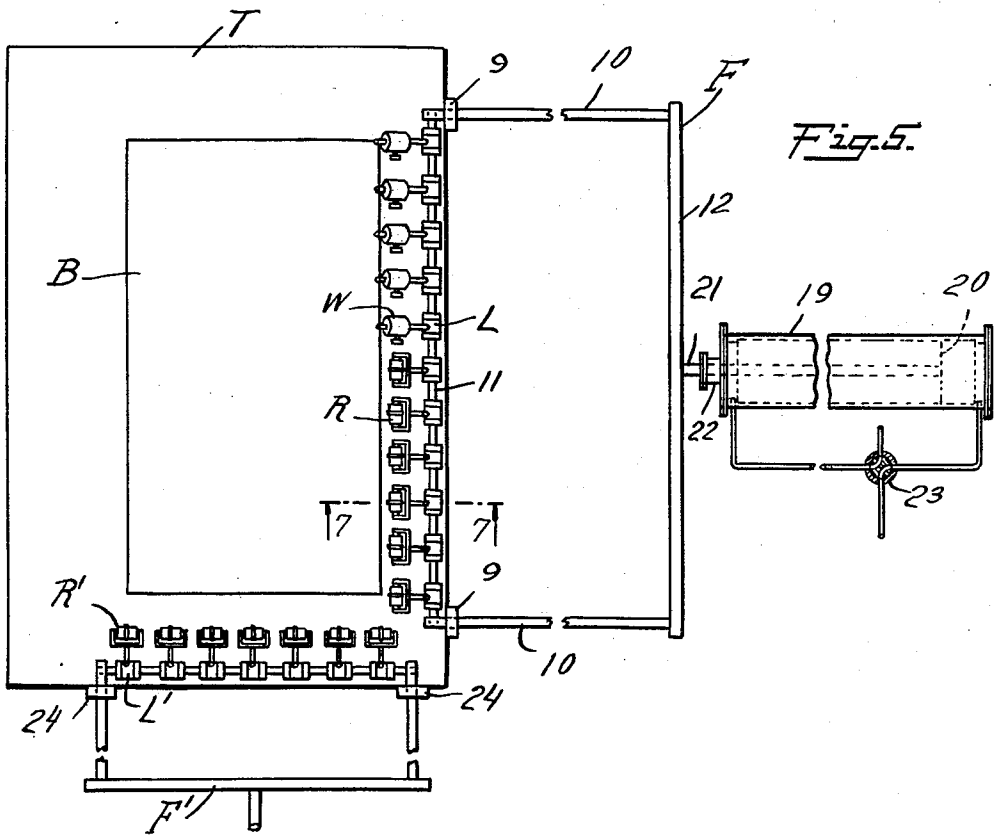

Fig. 5.

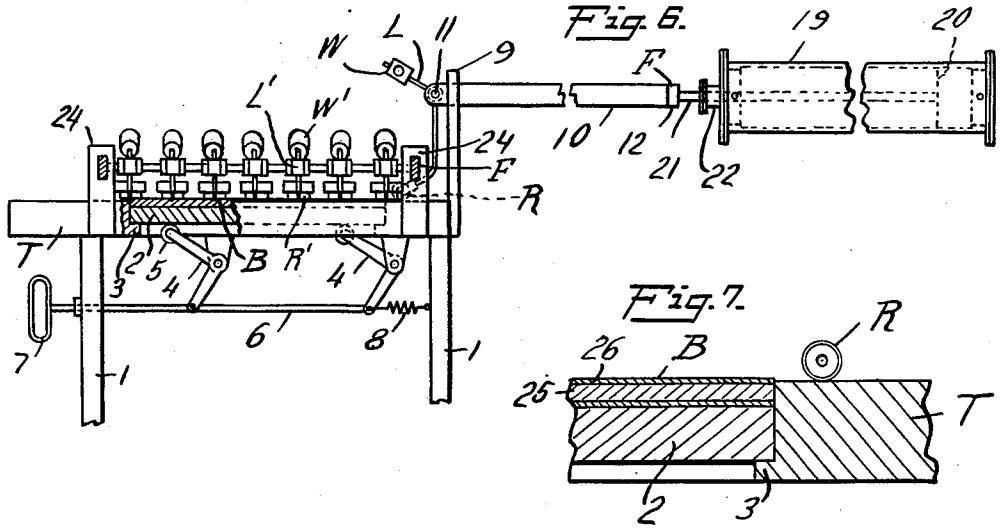

Fig. 6.

Fig. 7.

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Fig. 8.

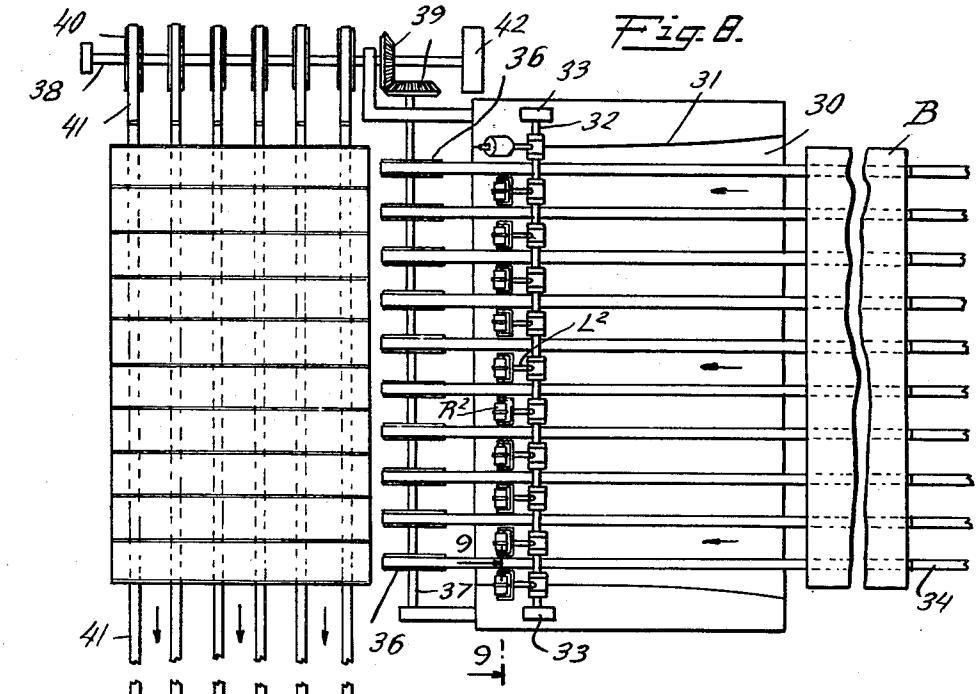
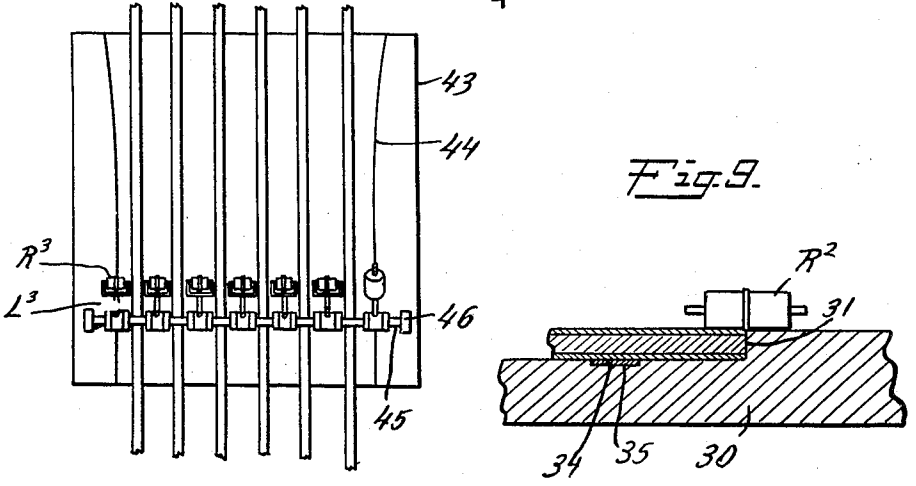


Fig. 9.



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UNITED STATES PATENT OFFICE

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PLASTER BOARD APPARATUS

Application filed August 11, 1928. Serial No. 298,983.

This invention relates to plaster board and more particularly concerns a plaster board formed to resemble a composite surface of tile, brick or other separate blocks or elements. The invention includes not only an improved plaster board, but an improved method of producing this board and improved apparatus for carrying out this method.

In the construction of modern dwellings and in the building arts generally, a considerable demand has arisen for a wall, floor, ceiling, or partition slab or covering which has the appearance of a composite tile or brick construction. Boards formed of gypsum plaster and generally known as plaster board are extensively employed in building constructions, and it is therefore desirable that such materials be formed to resemble tiled or other composite surfaces. Due to the construction of the plaster boards and to the properties of the materials from which they are formed, considerable difficulty has been encountered in forming the surfaces thereof to resemble tiled constructions, and previous attempts to so form plaster boards have been unsuccessful for various reasons.

In the manufacture of plaster board, a suitable gypsum plaster is usually enclosed within a pair of paper cover sheets and pressed or squeezed to the required thickness by suitable apparatus. Due to the fact that the plaster is necessarily in a semi-fluid or plastic state during the forming operation, this material has a tendency to slip or run between the cover sheets, and even when the pressing operation is carried out with the utmost care and with the most modern apparatus, the thickness of the finished board is nonuniform and the surfaces thereof are slightly waved. Due to the above described irregularities in the surfaces of the plaster boards, a series of grooves or depressions cannot be readily formed thereon by the usual means, as such grooves would be of irregular depths corresponding to the surface irregularities of the board. Further, the gypsum plaster as well as the cover sheets of which many plaster boards are formed is very brittle, and, when grooves or other impressions are pressed into the surfaces of such boards, the core and the cover sheets are frequently cracked, or weakened to such an extent as to be rendered unfit for use.

In accordance with the present invention, it is proposed to provide a plaster board having a plurality of crossed parallel grooves or depressions on the surface thereof, such grooves being formed to represent the joints between adjacent tiles, bricks or other blocks. It is further proposed to form a plaster board of a tough or strong plastic material and to employ a non-brittle cover sheet on at least one surface thereof in order that the board may withstand the action of the groove forming means without cracking or other undesirable deformation.

It is a further object of the present invention to provide an improved method of forming the above noted grooves or impressions in the surface of the hardened plaster board whereby grooves of uniform depth are formed in spite of irregularities in the surface of the board. A still further object of the invention resides in the provision of improved apparatus for carrying out the grooving process.

Various other specific objects, advantages and characteristic features of the invention will become apparent as the description thereof progresses.

In general, the above noted objects of the invention are carried out in the following manner. The plaster core of the board is formed of a tough, strong, plastic mixture including gypsum and wood fibers, the plaster described in the pending application of Joseph F. Haggerty, Serial No. 43,407, filed July 13, 1925, Patent No. 1,702.966, issued February 19, 1929, being suitable for this purpose. At least one cover sheet of the board is formed of a tough, non-brittle paper such as kraft paper. The formed and hardened board is subjected to an embossing or impressing operation whereby grooves are formed in at least one surface thereof. This is accomplished by passing over the kraft paper lined surface of the board, a plurality of separately supported rollers, each having a circumferential rib on the surface thereof.

Each of the rollers is supported in a separate vertical movable guiding device, and the rollers rise and fall independently over the surface irregularities of the board. In this manner, grooves of equal depth are pressed into the surface of the board. Two sets of such embossing rollers are preferably successively passed over the surface of the board in paths at right angles to each other, thereby forming a plurality of square or rectangular blocks representing separate tiles, bricks or other members on the surface of the board.

In describing the invention in detail, reference will be made to the accompanying drawings, in which:

Figure 1 is a side view of one of the groove impressing devices employed in connection with the apparatus of the present invention;

Fig. 2 is an end view of the device shown in Fig. 1;

Fig. 3 is a plan view of a portion of a plaster board grooved in accordance with the present invention;

Fig. 4 is a sectional view of the grooved board shown in Fig. 3;

Fig. 5 is a plan view of one embodiment of the groove forming apparatus of the present invention;

Fig. 6 is an end view of the apparatus shown in Fig. 5;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 5 and viewed in the direction of the arrows;

Fig. 8 is a plan view of a modified form of the grooving apparatus of the invention; and

Fig. 9 is a sectional view taken along the line 9—9 of Fig. 8.

Referring to the drawings, and particularly to Figs. 1 through 7, in one embodiment of the invention, the plaster board is maintained stationary while two independent sets of similar rollers are successively passed thereover to impress intersecting grooves thereon. In the construction shown, a supporting table T having suitable supporting legs 1 is provided, and a vertically movable bed-plate 2 is carried in an opening in the table on the inwardly extending ledges 3 as clearly shown in Figs. 6 and 7. Suitable means are preferably provided for lifting the bed-plate 2, and in the embodiment disclosed, these means comprise a plurality of bell crank levers 4, pivotally secured to the lower surface of the table T and provided with rollers 5 on their upper arms for engagement with the lower surface of the bed-plate 2. The lower arms of the bell crank levers 4 are pivotally connected to a rod 6 which is slidably supported in one of the legs 1 of the table T, and a handle 7 is provided on the outer end of this rod as shown. The rod 6 and the bell crank levers 4 are biased to the position shown by a spring 8, secured between one end of the rod 6 and a leg 1 of the table T. It will be apparent from the disclosure that the bed-plate 2 may be lifted by pulling the handle 7 of the rod 6 outwardly.

Referring now more particularly to the grooving means of the invention, a pair of vertically extending supports 9 are secured to the edge of the table T at the points beyond the ends of the bed-plate 2 as shown in Fig. 5. The parallel side bars 10 of a rectangular frame F are respectively slidably supported in openings in the supports 9. The frame F includes a cross rod 11 connecting the inner ends of the side bars 10, and a cross bar 12 connecting the outer ends thereof as shown. The cross rod 11 carries a plurality of equally spaced vertically movable roller supports, which preferably comprise bell crank levers L.

The bell crank levers and the rollers supported thereby are shown in detail in Figs. 1 and 2. Each of the bell crank levers L is rotatably journaled on the rod 11 and is held against endwise movement thereon by a pair of fixed rollers 15 or other suitable means. The lower arm 13 of each bell crank lever L is bifurcated at its lower end and a roller R is journaled on a shaft 14 carried in the bifurcated end of the arm. Each roller R is provided with a continuous circumferential rib or extension 16 which is preferably of a height and width corresponding to the depth and width of the groove which it is desired to press into the surface of the plaster board. The upper arm 17 of each bell crank lever L is provided with a weight W which is slidably supported thereon and is held in any desired adjusted position by a set screw 18. The weight W is of a mass sufficient to press the circumferential rib 16 of the roller R into the surface of the plaster board, but not sufficient to press the entire cylindrical surface of the roller into the board. A weight of approximately 50 lbs. has been found satisfactory for this purpose.

Suitable means are provided for moving the frame F together with the rollers R across the surface of a plaster board B on the bed-plate 2. In the embodiment shown, a hydraulic cylinder 19 is provided for this purpose. A piston 20, fitted within the cylinder 19, is connected by a piston rod 21 passing through a stuffing box 22 to the cross bar 12 of the frame F. A fluid under pressure is connected to the opposite ends of the cylinder 19 through a valve 23, and it will be readily apparent by proper manipulation by this valve, the piston 20, together with the frame F and the rollers R, will be moved across the plaster board B lying on the bed-plate 2.

A second frame F', similar to the frame F, is slidably carried in the supports 24 extending upwardly from one end of the table T at points beyond the side edges of the bed-plate

2. The frame F′ carries a plurality of independently movable bell crank levers L′ which respectively support ribbed rollers R′ similar to the rollers R. The bell crank levers L′ are weighted in the manner described in connection with the frame F, by adjustable weights W′, and suitable means such as a hydraulic cylinder similar to the cylinder 19 are provided for moving the frame F′ across the plaster board B.

The operation of the described embodiment of the invention will now be explained. A plaster board B is first placed on the lowered bed-plate 2 within the opening in the table T. The board B comprises a plaster core 25 formed of a tough plaster including wood fibers, this plaster having the characteristic of crumbling locally when subjected to a compressing force, rather than cracking across under a stress of this nature. The upper cover sheet 26 of the board is preferably formed of a tough paper such as kraft paper, and is capable of bending without cracking or substantial weakening. The bed-plate 2 is so arranged that the board B extends above the upper surface of the table T a distance substantially equal to the depth of the grooves desired in the surface thereof, as shown in Fig. 7.

With the board B in place, the valve 23 is operated to admit compressed fluid to the outer end of the cylinder 19, and the frame F together with the independently movable rollers R carried thereby is moved across the surface of the board B. The circumferential ribs 16 on the rollers R impress a set of parallel grooves G on the surface of the board B, and since the rollers are independently weighted and independently movable vertically, they ride up and down over the surface irregularities of the board and impress grooves of uniform depth on the surface of the board. The depth of the grooves is limited by the height of the ribs 16, the cylindrical surfaces of the rollers bearing against the surface of the board and limiting the downward movement of the rollers. The frame F is next returned to its retracted position by proper manipulation of the valve 23, and the frame F′, carrying the rollers R′, is moved across the board B by its operating means. The rollers R′ impress a plurality of parallel groves G′ on the board at right angles of the grooves G, and the surface of the board B is thus impressed with a plurality of intersecting grooves resembling the lines of mortar between tiles, bricks or other blocks of a composite surface.

It should be noted that the outer rollers of each set are so disposed as to impress substantially a half of their circumferential ribs 16 on the edges of the board. In this manner, a half groove 27 is pressed in the edges of the board as shown in Fig. 3. Boards formed in this manner, may be laid in edge-to-edge relation to form a groove at their meeting edges, and a uniform grooving on the completed surface is thereby produced.

After the pressing operation has been completed and the frame F′ withdrawn, the rod 6 is pulled out, lifting the bed-plate 2, and the board B is removed from the table T. The grooved board is preferably given several coats of paint, enamel or lacquer, and is then ready for use.

In a modified form of the apparatus shown in Figs. 8 and 9, the two sets of groove-forming rollers are maintained stationary, and the plaster board is moved under these rollers. A guide plate 30 having converging side walls 31 is arranged to receive the plaster board to be grooved. A plurality of rollers R^2, similar to the rollers R described above, are individually supported respectively on a plurality of weighted bell crank levers L^2, journaled on a cross bar 32. The rod 32 is carried by a pair of supports 33 fixed to the guide plate 30 near the inner end thereof as shown. A plurality of parallel endless belts 34 pass over the plate 30 between the side walls 31 in a plurality of parallel grooves 35 as shown in Fig. 9. The belts 34 are carried by suitable pulleys 36 fixed to a common shaft 37, and are returned over a similar set of pulleys, not shown. A second shaft 38 is suitably journaled at right angles to the shaft 37 and is connected thereto through the beveled gears 39. The shaft 38 carries a plurality of spaced pulleys 40 over which a plurality of parallel endless belts 41 pass. The shafts 37 and 38 are continuously rotated in the directions indicated by the arrows by a suitable source of power which is preferably connected to the shaft 38 through the pulley 42.

A second guide plate 43 is disposed beneath the parallel belts 41 at one side of the plate 30 as shown, the belts 41 passing through grooves in the surface of the plate 43. The plate 43 is provided with converging side walls 44 and a set of ribbed rollers R^3 is supported over the outer end of this plate. The rollers R^3 are independently supported by a plurality of weighted bell crank levers L^3 carried by a cross rod 45 which is secured to the plate 43 by the supports 46. The arrangement of the rollers R^3, their supporting levers L^3 and the roller weighting means, employed in connection with the guide plate 43, is similar to the corresponding details of the sets of rollers described above in connection with the modification of Figs. 5 and 6.

In the operation of the modified form of the invention shown in Figs. 8 and 9, a plaster board B is placed on the belts 34 and is carried by these belts on to the plate 30 between the side walls 31 thereof. The converging side walls 31 center the board B, and the moving belts 34 carry the board be-

neath the individually vertically movable weighted rollers R^2. The ribs of the rollers R^2 impress a plurality of parallel grooves on the surface of the board, and the belts 34 pass the grooved board on to the belts 41. The board B is then moved on the belts 41 in a direction at right angles to its former direction of travel and is carried over the guide plate 43, being centered by the converging side walls 44 thereof, and passes under the set of rollers R^3. The rollers R^3 impress a second set of parallel grooves on the surface of the board at right angles to the first set of grooves. In this manner a plurality of intersecting sets of parallel grooves are formed on the board, and the surface thereof is made to resemble a tiled or brick structure. The grooved board may be painted or treated as described above, and is then ready for use.

The outside rollers of each set disclosed in Fig. 8 are disposed with their circumferential ribs partly overlying the side walls of the guide plates associated therewith, as clearly shown in Fig. 9. In this manner a half groove is formed along each edge of the board for the purpose described above.

From the description given, it will be apparent that the present invention incorporates numerous advantageous features. Due to the independently movable supporting means for carrying the several rollers of each set, the rollers are individually permitted to move vertically over any surface irregularities on the plaster boards, and the grooves impressed on such surfaces are therefore of uniform depth. The plaster forming the core of the board employed is so reinforced with wood fibers that it does not crack across when compressed by the ribs of the rollers, but merely crushes locally around the groove as clearly shown in Fig. 4. Further, the upper paper cover sheet 26 is pliable and extensible to a high degree, and is not ruptured by the forming of the grooves therein. The apparatus disclosed is capable of rapidly and accurately forming the desired intersecting grooves in the surfaces of the plasterboard with a minimum amount of manual attention, and the construction and arrangement of the apparatus is such that it may be inexpensively installed and operated.

Although the groove forming method as well as the grooved plaster board and apparatus of the invention have been described in connection with certain specific embodiments and example, it should be clearly understood that the method, the apparatus employed and the board produced may vary in many respects without departing from the scope of the invention as defined by the appended claims.

I claim:

1. Apparatus for impressing a plurality of parallel grooves on a surface comprising a plurality of spaced parallel rollers each having a groove forming extension thereon, means for separately movably mounting each of said rollers, means for independently pressing each of said rollers downward and means for simultaneously moving all of said rollers over a surface.

2. Apparatus for forming a plurality of parallel grooves in a surface comprising a plurality of spaced rollers each having a circumferential rib thereon, an independent vertically movable guide supporting each of said rollers, means for independently pressing each of said guides downward and means for simultaneously moving all of said rollers across a surface.

3. Apparatus for forming a plurality of parallel grooves in a surface comprising a plurality of rollers each having a single circumferential rib on the surface thereof, an independent supporting member for each of said rollers, hinge means for connecting each of said supporting members to a single frame, said hinge means permitting the independent movement of each supporting member and roller in a vertical plane, and means for moving said frame over a surface.

4. Apparatus for forming a plurality of parallel grooves in a surface comprising a frame, a plurality of spaced supporting members hingedly connected to said frame for independent vertical movement with respect thereto, a roller having a single circumferential rib protruding from the cylindrical surface thereof rotatably supported by each supporting member, a weight carried by each supporting member for pressing said roller downward, and means for moving said frame across a surface.

5. Apparatus for forming a plurality of intersecting sets of parallel grooves in a surface comprising a set of parallel rollers, each having a groove-forming extension thereon, means for separately movably connecting each of the rollers of said set to a single frame. a second set of spaced parallel rollers similar to said first set and similarly movably connected to a second frame, and means for separately moving said frames across the surface in different angular directions.

6. Apparatus for forming a plurality of intersecting sets of parallel grooves in a surface comprising a set of parallel rollers, each having a groove-forming extension thereon, means for separately movably connecting each of the rollers of said set to a single frame, means for independently weighting each of the rollers of said set, means for moving said set of rollers across a surface whereby a plurality of parallel grooves are formed in said surface, a second set of spaced parallel rollers similar to said first set and similarly movably connected to a second frame, and means for moving said second set of rollers across said surface in a direction at right angles to the

direction of movement of said first set of rollers.

7. Apparatus for impressing a plurality of parallel grooves on a surface comprising a plurality of spaced parallel groove forming devices each having a groove forming extension thereon, means for separately movably mounting each of said groove forming devices, means for independently pressing each of said groove forming devices downward and means for causing relative movement between a surface and said groove forming devices.

In testimony whereof I affix my signature.

JOHN J. TURNER.