

July 31, 1934.

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1,968,774

APPARATUS FOR MOLDING LITHIC TIMBERS

Original Filed April 16, 1923 4 Sheets-Sheet 1

Fig. 1.

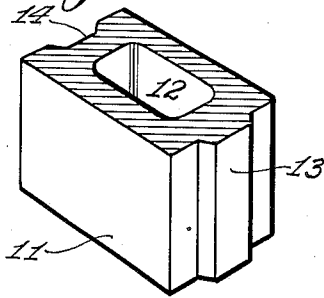


Fig. 3.

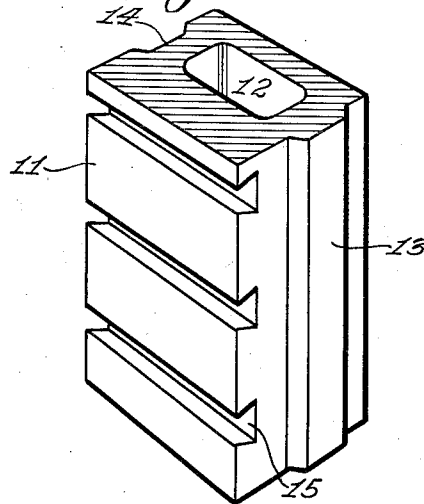
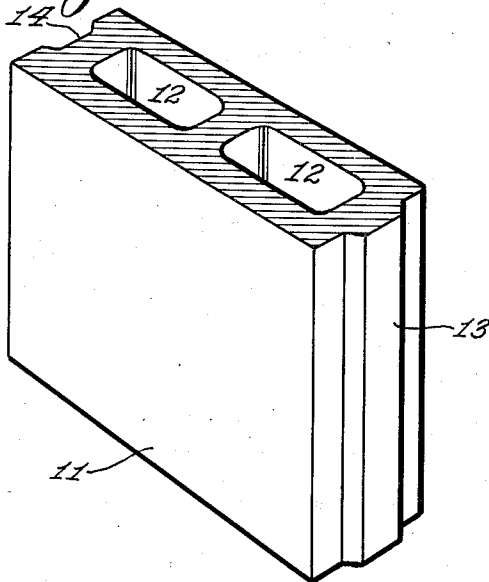


Fig. 2.



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Original Filed April 16, 1923 4 Sheets-Sheet 2

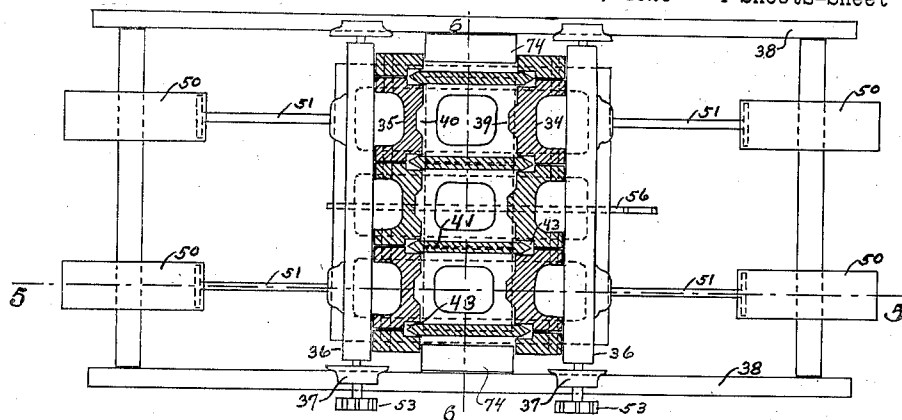


Fig. 4.

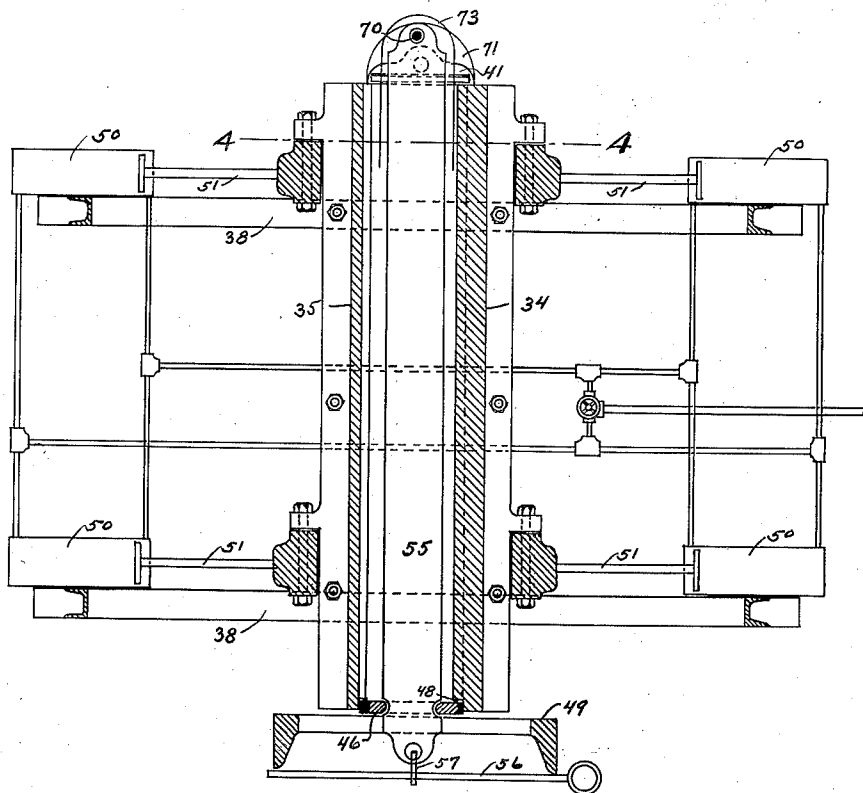


Fig. 5.

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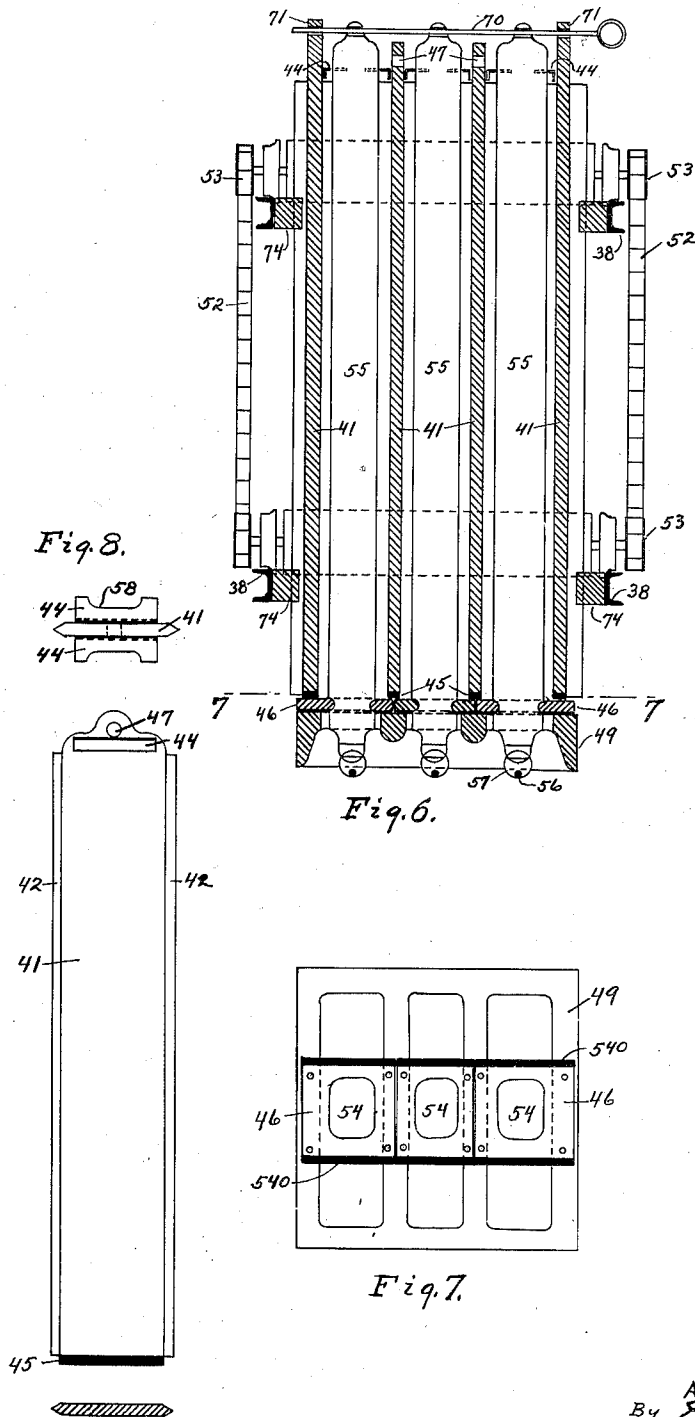
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APPARATUS FOR MOLDING LITHIC TIMBERS

Original Filed April 16, 1923 4 Sheets-Sheet 3



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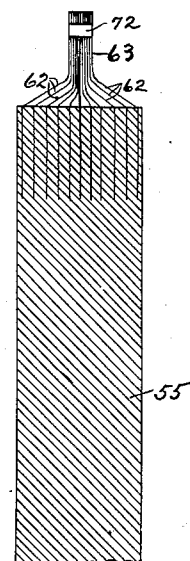
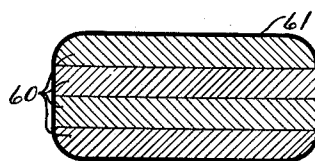
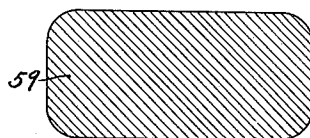
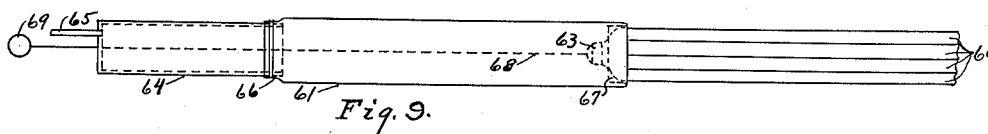
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APPARATUS FOR MOLDING LITHIC TIMBERS

Original Filed April 16, 1923 4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

1,968,774

APPARATUS FOR MOLDING LITHIC
TIMBERS

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Original application April 16, 1923, Serial No.
632,425. Divided and this application Decem-
ber 18, 1930, Serial No. 503,254. In Germany
August 1, 1927

7 Claims. (Cl. 25—41)

This invention relates to building timbers, and more particularly to such timbers artificially manufactured by casting out of lithic material.

In accordance with the present invention the material used for the manufacture of this timber is gypsum in the calcined form which, after being mixed with water, may be poured into molds in a manner similar to the manufacture of reenforced concrete structures or the like. Gypsum in this or similar forms has been used for casting various shapes, such as small statuary and ornaments of various kinds. This material is also cheap and easy to handle. It is not strong enough, however, to lend itself readily to structural purposes in the same way as cement concrete which may be reenforced by steel in those parts which are subjected to tensile stresses.

An object of this invention is to provide means for manufacturing a building timber of cast gypsum which may be effectively used in building construction.

Further objects will appear from the detail description taken in connection with the accompanying drawings, in which:

Figures 1, 2 and 3 are perspective views illustrating forms of timbers which may be manufactured in accordance with this invention.

Figure 4 is a plan view, partly in section, illustrating the apparatus for molding the timbers. This view is taken on line 4—4, Figure 5.

Figure 5 is a vertical section taken on line 5—5, Figure 4.

Figure 6 is a vertical section on line 6—6, Figure 4.

Figure 7 is a section on line 7—7, Figure 6.

Figure 8 illustrates side, top and bottom views of the partitions used in this mold.

Figure 9 illustrates the method of making the mold core.

Figures 10 and 11 are transverse sectional views of the core; and

Figure 12 is a longitudinal sectional view of the core.

This application is a division of application Serial No. 632,425, filed April 16, 1923. While some features of the general building system of which this invention forms a part, are described in this specification, only those novel features pertaining to the apparatus for molding the timber are claimed herein. Other features thereof are claimed in the parent application and in other divisional applications bearing Serial Nos. 503,251, 503,252 and 503,253, filed of even date herewith.

In accordance with this invention, a hollow building structure timber of cast gypsum is pro-

vided, which is characterized by the feature that it has a length which is large compared to its transverse dimension, but is of sufficient rigidity and strength to carry a load when supported at its ends. It, therefore, distinguishes from building blocks and the like, which are not timbers. This timber preferably has incorporated therein and with the gypsum, a suitable binder, such as bagasse, although other fibrous binders, such as cut rope or wood chips may be used. The timber may also be suitably reenforced with rods, bars or other elements such as are employed in the reenforcement of concrete generally.

In practice, where a binder, such as bagasse, is used, the binder, in the proportion of 5% to 10% of the total mass, and in shredded form and short lengths of the size of hogs hair, is mixed with the water in order to form a thick soupy mixture. To this is then added the calcined gypsum, and the whole is cast in a suitable form or mold.

The timbers should be hollow, but since they are long and friable, since the cavities are in most cases of comparatively small cross section compared with the length, and since the gypsum contracts upon setting, difficulties are encountered in their production. In accordance with this invention, therefore, a core is used which is resilient and contractible, and a suitable core is one which is made of rubber. This rubber core is suspended or stretched in the mold and centered therein in order to permit the gypsum to be cast therearound. After the material sets, the core can then be readily pulled out of the casting, since it will, upon stretching, contract and progressively separate from the casting along the length thereof. Furthermore since the core is yielding, the material will not crack upon setting.

The timber when used for a wall is formed to provide one or more cavities or cells therealong, and it may be formed to provide a tongue and groove therealong. The timber may also be provided with channels or other means in order to provide a plaster-receiving and retaining face. When erected in a wall, certain of the cavities may be filled with concrete suitably reenforced, in order to provide supporting means for the wall.

When the timber is to form a floor or other load bearing part, it is constructed to receive concrete in order to provide a beam. Accordingly, the timber is formed to provide a channel adapted to receive concrete, suitably reenforced; and in order to provide for shipment the timber has a series of cavities therealong, the

wall of one of which may be broken open to provide the channel.

Figures 1 to 3 inclusive show wall timbers constructed in accordance with this invention.

5 These are cast in substantially rectangular form in cross-section having a cavity 12 as illustrated in Figure 3 or a number of cavities as illustrated in Figure 2, according to the service for which the unit is intended. One edge of the
10 timber is provided with a tongue 13 and the opposite edge with a groove 14 so that the adjoining timbers may be interlocked by engagement of tongues and grooves in a well known manner. One or both faces of the timber may
15 be provided with transverse grooves 15 for the engagement of plaster or other suitable facing to be applied to the wall as a finish.

In casting these timbers, a suitable paper facing may be placed in the mold so that the
20 finished timber will be provided with a reinforcing facing of paper, fabric or other fibrous material which will not only assist in reinforcing the surface but will also provide a surface to which materials used for finishing will ad-
25 here. It is, of course, immaterial whether the paper be inserted in the mold and attached to the surface during the casting operation or the casting be completed first and the facing applied afterward.

30 Apparatus for molding the timbers is illustrated in Figures 4 to 12 inclusive. This comprises a mold in which two of the sides 34 and 35 are each supported on a frame 36 carried on rollers 37 adapted to run on rails 38 so that the sides
35 of the mold may be separated in order to remove the timber after the casting is completed. The sides 34 are provided with suitable tongues 39 and grooves 40 adapted to form respectively the grooves and tongues of the finished timber. In
40 the apparatus illustrated the mold is arranged for casting three timbers at once and the mold spaces are separated by partitions 41. These partitions are illustrated in Figure 8 showing top, bottom and side views thereof. Each par-
45 tition has its edges 42 reduced so as to freely enter sockets 43 formed in the sides 34 of the mold. Each partition is provided at its top with a pair of spacers 44 adapted to center the core at the top but leaves spaces to permit pouring.
50 Each partition is provided at its bottom with a strip of soft rubber 45 which is adapted to form a sealing contact with the bottom plates 46 which close the lower end of the mold space. The par-
55 titions are provided with ears 47 by which they may be handled while being removed from or inserted in the mold. The plates 46 are arranged to fit into sockets 48 in the lower end of the sides 34 and rest upon a foundation plate 49.

60 Pneumatic or hydraulic cylinders 50 having suitable connections 51 with the sides 34 are arranged to operate those sides to draw them apart or move them together for opening or closing the mold. During this movement the
65 sides are carried by the rollers 37 which move along the rails 38, suitable provision being made for insuring that the sides remain parallel. Spacing blocks 74 serve to hold the side plates at the proper distance from each other. In this case
70 chains 52 working on sprockets 53 on the shafts carrying the rollers 37 insure the same rate of movement of the upper and lower ends of the sides 34. When a timber is to be cast the mold is closed with the partitions 41 in place and each
75 mold closed at its lower end by a plate 46.

The plates 46 are provided with openings 54 into which the lower end of the core 55 is inserted and are edged with soft rubber 540 to make sealing engagement with the side plates 34.

The core 55 is of resilient material, such as
80 soft rubber, and is inserted in the opening 54 by being forced therein so as to tightly close the opening. When the core has been inserted in the opening 54 it may be locked against removal therefrom by any suitable means, such as the
85 rod 56 passing through a link 57 engaging the end of the core, the rod 56 abutting against the foundation plate 49 as shown. The upper end of the core is positioned by the spacers 44 which
90 are also provided with recesses 58 adapted to fit the core. The core upon being placed in the mold and after it has been secured in the lower plate 46 is tensioned upwardly so as to stretch the
95 same to keep it straight, the cores being held tensioned by a rod 70 passing through eyes 72 and supported by side brackets 71 on the outside partitions 41.

When the mold has been properly prepared just as described, the lithic material may be
100 poured into the mold cavity. The material used in accordance with this invention is properly calcined gypsum ground to a fine powder such as is used in the manufacture of plaster of Paris. This material when properly prepared will, after
105 having been mixed with water, take a set upon becoming dry so as to form a hard lithic body of considerable strength. As previously described, a binder, such as shredded bagasse, is incorporated with the gypsum. This material in
110 the wet condition is poured into the mold cavity and suitably worked therein if required, so that a solid and homogeneous casting may be made. When the material has become properly set the
115 core may be removed therefrom. This core is of rubber and will stretch upon being tensioned, at the same time reducing its cross-sectional dimensions. When the core is to be removed, the
120 rod 56 is first removed and then the core is tensioned from the upper end thereof. Since the greater portion of the core is imbedded in the cast material, no stretching can take place until the surface of the core has been separated from the walls of the cavity to which it adheres during the molding process. Upon tensioning, however,
125 the free end of the core stretches and reduces its cross-section, this reduction of cross-section communicating itself to that part which is imbedded in the upper extremity of the casting. This reduction of cross-section will operate to
130 separate the core from the casting. As each portion of the core becomes separated, it is free to stretch and reduce its cross-section and thereby separate the adjoining portions from the casting. It will thus be seen that the stretching and
135 reduction of cross-section travels gradually from the upper to the lower end of the core and the separation from the cast is effected at the same time. This separation is accomplished progressively from one end of the core to the other so that no excessive strains are put on the casting
140 during this process and the core comes away clean. When the core has been completely separated the sides 34 may be moved away from the cast so as to free the same for removal. Prior to pouring this lithic material, stout cords 73
145 or other suitable devices may be arranged so that their ends will be imbedded in the casting when finished. The finished casting may then be handled by means of such devices.

Figure 9 illustrates a method of making the 150

elastic core used in this process and Figures 10, 11 and 12 illustrate the core. This core may be constructed either of a solid block 59 of rubber or it may be built up of a series of slabs 60 covered by a suitable elastic covering 61 such as is used for the inner tubes of automobiles tires. In casting the core a series of sheets 62 of fabric or other suitable material are imbedded in the ends thereof and which may later be formed into a suitable terminal 63 by means of which the core may be handled in tensioning and removing from the mold. The device shown in Figure 9 is for positioning the covering 61 on the assembled slabs 60. In this device a tube 64 has a suitable connection 65 to a compressed air supply. The cover 61 may be attached as at 66 to the end of the tube 64. Its free end is then turned in as shown at 67 and the turned in end is slipped over the assembled slabs 60. A suitable cord or other tensioning member 68 is attached to the terminal 63 of the core and passes through the tube 64 to a suitable manipulative device 69 by means of which tension may be put thereon. With the device in this condition compressed air is now admitted to the tube 64 and the cover 61, which being elastic, becomes inflated and stretched beyond its normal diameter. The core may now be pulled into the tube 61 by pulling on the cord 68 whereupon the turned over end 67 will be drawn into the inflated tube 61, the tube being doubled back upon itself as the core is drawn therethrough. In this way the cover may be held in distended form while the core is being drawn thereinto.

It will be noted that this invention provides a novel and economical apparatus for manufacturing lithic timbers of the type described. The timber is cast in an openable mold having a resilient core. Upon completion of the casting the core is simply tensioned, whereupon it is progressively separated from the cast from one end to the other and then withdrawn, after which the cast is removed from the mold.

While this invention has been described as applied to a unitary system of manufacture, it will be obvious that certain features or sub-combinations may be employed without reference to other features or the complete system. It is understood, therefore, that the employment of such individual features or sub-combinations is contemplated by this invention and is within the scope of the appended claims.

It is obvious that various changes may be made in details of construction without departing from the spirit of this invention; it is, therefore, to be understood that this invention is not to be limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. An apparatus for casting hollow lithic timber, comprising, a vertical mold, a compressible, stretchable core, and means engaging each end of said core for holding said core stretched vertically within said mold.

2. In an apparatus for casting hollow lithic

timbers, a mold having a long narrow vertical mold cavity, an elastic core suspendable in said cavity, anchoring means for said core at the bottom of said cavity, and means engageable with said mold and with said core when the latter has been stretched in said cavity adapted to retain the core in stretched condition.

3. Apparatus for casting hollow lithic timbers, comprising, a mold structure having a pair of separable side walls, means for mounting said side walls for separating movement adapted to maintain substantial parallelism between them during such movement, a compressible, stretchable core, and fixtures at the top and bottom of said mold structure adapted to anchor said core in stretched condition along said mold.

4. Apparatus for casting hollow lithic timbers, comprising, a mold structure having a pair of separable side walls, means for mounting said side walls for separating movement adapted to maintain substantial parallelism between them during such movement, a compressible stretchable core, and fixtures at the top and bottom of said mold structure adapted to center said core in the mold and provided with means adapted to anchor said core in stretched condition along said mold.

5. Apparatus for casting hollow lithic timbers, comprising, a mold structure having a pair of separable side walls provided with vertical grooves therealong, a loose partition having its edge portions formed to enter said grooves, means for mounting said side walls for separating movement adapted to maintain substantial parallelism between them during such movement, a compressible, stretchable core, and fixtures at the top and bottom of said mold structure adapted to anchor said core in stretched condition along said mold.

6. Apparatus for casting hollow lithic timbers, comprising, a mold structure having a pair of separable side walls, a carriage adapted to support one of said walls, a frame on which said carriage travels, means for mounting said carriage for movement on said frame adapted to maintain substantial parallelism between said walls during such movement, a compressible, stretchable core, means for mounting said core in stretched relation along said mold, and power means for moving said carriage.

7. Apparatus for casting hollow lithic timbers, comprising, a mold structure having a pair of separable side walls, a carriage adapted to support one of said walls, a frame on which said carriage travels, means for mounting said carriage for movement on said frame adapted to maintain substantial parallelism between said walls during such movement, a compressible, stretchable core, fixtures at the top and bottom of said mold structure adapted to center said core in the mold and provided with means adapted to anchor said core in stretched condition along the mold, and power means for moving said carriage.

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