CONCRETE BUILDING BLOCK MOLDING MACHINE

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Fig. 6.

Fig. 7.

Fig. 8.

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This invention relates to improvements in the manufacture of concrete building blocks and a general object of the invention resides in facilitating the manufacture of such blocks as well as producing a block of improved formation.

The ordinary concrete building block, used in the erection of foundation, building and other walls comprises a substantially rectangular body formed with a plurality of vertically extending cells of uniform proportions and configuration throughout the length thereof, the cells being provided to decrease somewhat the weight of the block. The provision of these cells results in the formation of mortar-receiving surfaces of restricted area which frequently result in the improper bonding of the blocks in assembled relation when erected to produce a wall. It is an outstanding object of the present invention to provide for the manufacture of a concrete block wherein the desired lightness in weight is obtained and yet wherein is produced a cell structure of unusual configuration by which improved strength and wearing qualities are imparted to the block, its lightness in weight established and also wherein enlarged mortar-receiving surfaces are provided for facilitating the joining of the blocks in assembled order.

It is another object of the invention to provide a concrete building block wherein the cells are each of ellipsoidal configuration with the ends of the cells of smaller diameter than the medial portions thereof, whereby a substantially truss formation is imparted to the block affording a high degree of resistance to compressive and other loads or strains, together with lightness in weight and augmented mortar-receiving area.

In the manufacture of the block, in order to produce the cells of ellipsoidal form, I have provided a mold having openings formed in the sides thereof which receive a removable core structure provided with an inflatable and collapsible tubing, the core being adapted to be inserted in the mold in a deflated state during the pouring of the mold with cementitious materials and whereby following the filling of the mold, and the closing of all sides of the same, the said tubing may be inflated through pneumatic or other fluid pressure to crowd and compact the cementitious materials in desired regions of the mold and at the same time producing the substantially elliptical cells above set forth. I am aware of the fact that it has been proposed heretofore to use inflatable cores in the manufacture of bodies formed from cementitious or ceramic mixtures but so far as I am aware, I am the first to produce a block or building unit formed from plastic cementitious materials to provide therein cells.

It is another object of the invention to provide for the manufacture of a concrete building block wherein one or more surfaces of said block is formed with a hard dense smooth structure of desired color characteristics and possessing many of the attributes of thin fired ceramic tiles.

For a further understanding of the invention, reference may be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a view in front elevation of a machine for manufacturing concrete block in accordance with the present invention;

Fig. 2 is an end elevation of the machine;

Fig. 3 is a top view thereof;

Fig. 4 is a vertical sectional view taken through the machine on a somewhat larger scale;

Fig. 5 is a horizontal sectional view taken on the line 5-5 of Fig. 4;

Fig. 6 is a perspective view of a concrete block formed in accordance with the present invention;

Fig. 7 is a horizontal longitudinal sectional view taken through the block and the cells thereof;

Fig. 8 is a vertical longitudinal sectional view thereof.

Referring more particularly to the drawings and especially to Figs. 6 and 7, the improved concrete block produced by the present invention comprises a substantially rectangularly sided body formed from appropriate mixtures of cementitious materials, and wherein the body includes one or more substantially ellipsoidal cells of these cells is subject to considerable variation and they may or may not be strictly ellipsoidal, their distinguishing feature, however, is the fact that the intermediate portions of said cells are of material greater diameter than the ends thereof which open to the mortar-receiving surfaces of said block. Hitherto, as explained above, such building units have been formed to provide cells of uniform or constant cross sectional shape throughout their lengths, formed by extrusion or molding processes but in the present invention, by the use of means to be herein-after described, the substantially oval or ellipsoidal form is imparted to the cells for the purpose of securing a high degree of mechanical strength in the finished block, together with the desired lightness in weight, the employment of but a minimum amount of material necessary to secure the desired strength and augmented surface area for receiving mortar or other bonding.
material employed in uniting adjoining blocks in assembled or wall formation. When the cells are of uniform diameter throughout their length, uniform strength in weight can only be obtained at the expense of the mortar-receiving area and, on the other hand, when a larger mortar-receiving area is desired than in the ordinary block, increased weight will necessarily result in the diminishing diameter of the block cells. In the block com-

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prising the present invention, I have combined these advantages in a single unit, and providing augmented mortar-receiving area without any substantial increase in weight or use of amount of material in the block and at the same time have provided enlarged cell area without decrease in strength or diminished or restricted mortar-receiving area.

In attaining these advantages, I have resorted to the use of a fluid expansible and removable core structure for producing the cell openings in the body and contrary to the teachings of the prior art with the use of such cores in the manufacture of concrete blocks, I have designed said cores so that when expanded, the cell openings of the desired contour, as above described, is obtainable. Thus, I have provided molding apparatus comprising a frame formed to include vertical or extending legs 5 joined at the top by means of a top plate 6, the legs being further joined by horizontally extending cross members 7. Arranged on the upper surface of the top plate 6 is a mold box formed to comprise stationary spaced vertical side walls 8-8, rigidly joined at their ends with spaced end walls 9-9, and arranged for sliding movement between the walls 8 and 9 is a vertically movable bottom wall or platen 10, the top of the mold box being provided with a movable closure or cover 11 which, in this instance has been shown as hinged as at 12 to one of the side walls 8, although this feature is subject to modification in that it is merely necessary that the closure 11 should be movable with respect to the stationary side and end walls of the mold box.

The side walls 8-8 are provided with longitudinally spaced openings 13 arranged in transverse alignment with each other, and removable positioned within the mold box to occupy these openings is a core structure by which the cells 2 are produced in the concrete box formed in the mold box. This core structure comprises in the specific embodiment of the invention, herein selected for illustration, a pair of heads 14 which are carried by or formed with a con-

necting with a hose or other similar line leading from a source of compressed air supply (not shown). The air passage 23 in the bar 15 leads to ports 24 provided in the heads 14 and which communicate with the hollow interior of the 5 tubes 18, whereby when air or other operating fluid, is supplied to the tubes 18, pressure is applied to the inflatable tubes 18, causing the latter to expand against the resistance offered therein by the plastic cementitious materials placed in the mold box and assuming a shape which, when the tubes 19 are fully expanded, corresponds to the desired formation of the cells 2.

It will be understood in the manufacture of the block that the plastic cementitious material is placed in the mold box following the positioning of the removable core structure in the openings 13. When the mold box has been filled to the desired degree with the cementitious material, the cover 11 is moved to a position of closure, and is locked in such a position by means of the sliding locking bar 25 carried by one of the side walls 8, and which cooperates with spaced brackets 26 formed with the cover 11 to retain the latter against movement in an upward direction during inflation of the cores to produce the cells 2. The heads 17 are of smaller diameter than the heads 14 in order that following the deflation of the core structure, the latter may be removed from the mold box, by a sliding movement along the guides 16, without interference with the block-forming material arranged in the mold. The expansion of the tubes 19 crowds the cementitious material towards the walls of the mold box, causing the desired compaction of the cementitious materials so that the formed and finished blocks will present hard dense walls wherein the aggregate used is securely united by the Portland cement content, enabling the block to possess a high degree of mechanical strength with lightness in weight and the use of but a minimum amount of material. This feature is likewise further developed by the truss-like formation of the walls of the block surrounding the cells.

Following the formation of the cells in the more or less plastic block, the core is removed from the mold box and the cover 11 released and moved to an open position. The platen 10 is then bodily elevated, by means heretofore described, to a position above the upper edges of the walls 8 and 9. The platen, with the concrete block thereon, may then be removed from the mold box and placed in a drying or curing chamber, wherein the block is allowed to set and harden for the desired period of time, after which the block may be removed from the platen and the latter re-used in subsequent operations. Preferably, the platen is formed from a chrome-alloy steel, such as stainless steel, which admits of the free separation of the concrete block from the platen and provides a smooth dense surface on that face of the block which engages with the platen. To effect the elevation of the platen, I have provided in connection with the table frame a cylinder 27 in which is slidably mounted a piston 28 carrying at its upper end a web 29 with which the under surface of the platen may be engaged. Normally, the marginal edges of the platen are supported by the top plate 8 of the table frame adjacent to an opening 30 formed in the plate 8 through which the web 29 may extend. Air or other fluid enters the bottom of the cylinder 27 through a pipe line 31, and by controlling the flow of this
pumping fluid through any suitably regulated valve structure, the piston 28 may be elevated, to move the platen to a position above the mold box, where the platen together with the concrete block arranged thereon may be conveniently removed as aforesaid. The cylinder 27 may be provided with a relief valve 32 providing for the gradual checking of the movement of the piston and the weighted platen when said platen approaches the upper limits of its movement, in order that the platen may be brought gradually to a stationary position without any abrupt stoppage in the movement thereof, since any abruptness in arresting the movement of the platen might tend to injure the more or less plastic mass of material supported by the platen.

The concrete block may or may not be provided with a decorative and finished tile surface as indicated at 33 produced in accordance with the disclosures contained in my prior application Serial No. 633,158, filed September 14, 1932. Where a decorative surface is provided, an initial plastic mixture of cementitious materials is placed on the upper surface of the stainless steel platen composed of substantially equal parts of Portland cement and fine sand, together with mineral oxide coloring matter and sufficient water so that the mixture will possess a cream-like consistency. To cause the desired distribution of the coloring matter in this primary mixture, the table may be provided with an electric motor 34 which drives a belt 35 extending over a pulley arranged on a shaft 36 provided with an eccentric 37. The rapid rotation of this shaft imparts vibration to the table which causes the settling of the mixture and color distribution. Following this, the operation of the shaft 36 is discontinued, and a coating of fine dry sand and/or cement is sprinkled over the upper surface of the primary or facing layer of the block. This facing layer is indicated by the numeral 33 and following its formation, the body materials of the block may be inserted in the mold box, which body materials may be composed of coarser materials wherein the percentage of cement and aggregate employed may be that which is commonly used in the manufacture of concrete block. It will be understood, however, that my invention may be used equally as well in the manufacture of plain concrete block as well as in the manufacture of a special-purposed faced block.

I am aware of the disclosures set forth in the patents of Henry 1,715,920 and Adams 1,624,704 and do not claim in the disclosure herein. The block produced by the present invention, however, differs from that formed in the above patents by the production of the ellipsoidal cell structure wherein the advantages above discussed are obtained.

While I have described what I consider to be one of the preferred embodiments of the present invention in the production of improved concrete block, nevertheless it will be understood that the invention is not limited to the specific details of construction and steps of production specifically set forth, illustrated and described, but that variations may be made therein from time to time without departing from the scope of the invention as set forth in the following claim.

What is claimed is:

In combination, a concrete hollow block apparatus comprising means for supporting a mold box, a mold box thereon having fixed side and end walls and a loose platen defining the mold box bottom and movable vertically with respect to said side and end walls, a plurality of sets of transversely disposed openings in said side walls in longitudinal alignment with each other respectively, a plurality of inflatable core structures entering said transverse openings and sealed therein by head elements, a connecting bar secured to said head elements, slideable guides carried by the fixed end walls of the mold box and operatively connected to said connecting bar, said connecting bar having a passage therethrough communicating with the aforesaid inflatable core structures to admit and evacuate fluid after the core structures are slideably guided into said mold box.

AUGUST H. SEXTON.