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BLOCK MOLDING MACHINE

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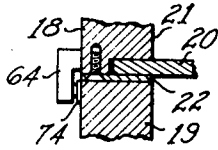
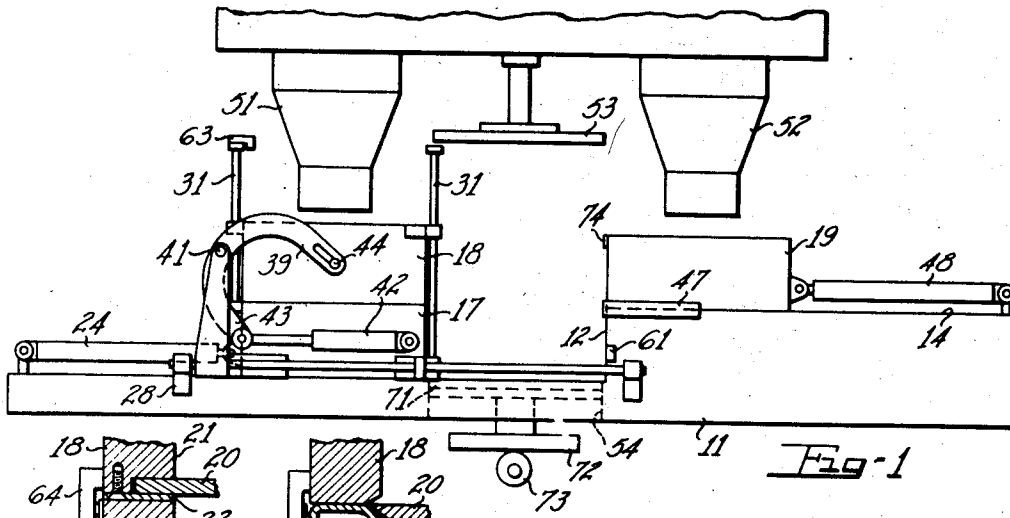


Fig-5

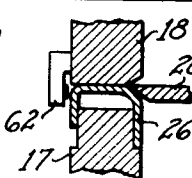


Fig-6

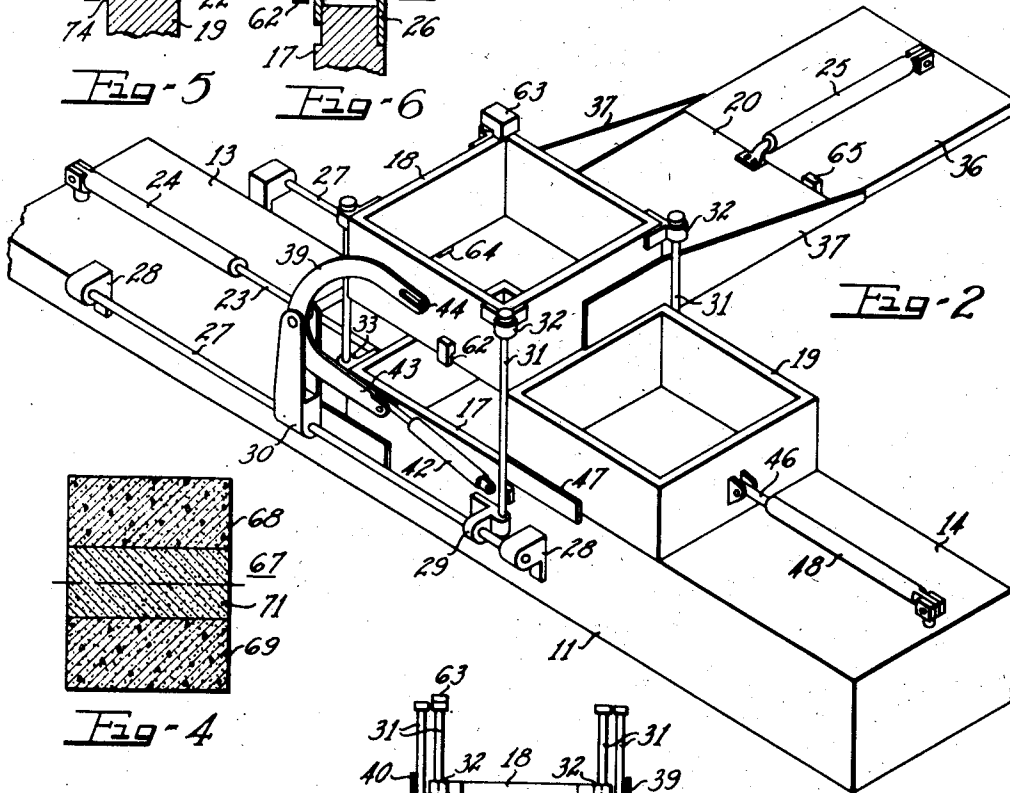


Fig-2

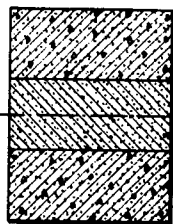


Fig-4

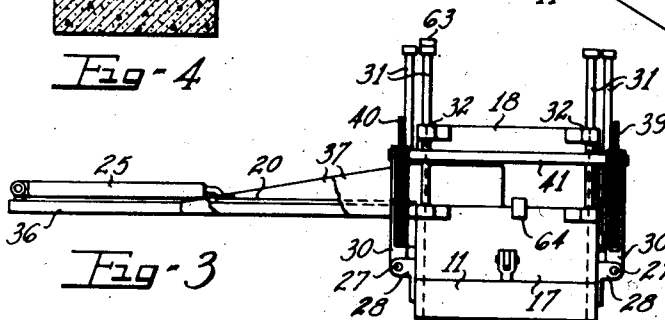


Fig-3

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BLOCK MOLDING MACHINE

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6 Claims. (Cl. 25—41)

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This invention relates generally to concrete block making apparatus and more particularly to a machine for forming concrete blocks in layers of aggregates.

It has been suggested that concrete blocks be faced with an attractive, ornamental aggregate which includes pigment and small reflective particles whereby these concrete blocks are made to have cut stone appearance, and the primary object of this invention is to provide a machine for efficiently and inexpensively molding blocks of such type quickly and accurately.

In providing this ornamental facing which is made from relatively expensive aggregate, previously suggested methods of facing such blocks have involved difficulties and disadvantages both in the manufacturing processes and in the quality of results. Whether the facing aggregate be the bottom or top portion of the concrete mix in the mold form, special care and sometimes special coatings have had to be provided in trying to make the surface of the special aggregate simulate natural cut stone. These specially faced blocks, like all concrete blocks, must be able to be produced on highly competitive basis. Special treatment must be avoided and speedy machine production must be achieved. Therefore, another object of this invention is to provide a new, improved concrete block in which the bottom and top portions of the molded concrete block are of similar standard aggregates between which an ornamental aggregate is sandwiched so that natural, finished modular blocks faced with this ornamental aggregate are obtained by simply cutting through the ornamental aggregate in the process of subdividing the molded block.

Still another object of this invention is to provide a machine for combining at least two kinds of aggregates in three separate layers in a mold box.

And still another object is to provide an automatic machine by which a layer of special ornamental aggregate is sandwiched between layers of standard aggregate for obtaining high production of improved quality, ornamentally faced concrete blocks.

These and other objects and advantages of this invention will be evident to those skilled in the art from a consideration of the following description taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a front elevation view of a concrete block manufacturing machine embodying the teaching of this invention, showing the machine in position at the start of the block manufactur-

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ing operation and including a partial showing of hoppers for containing different aggregates utilized in making an improved concrete block in accordance with this invention;

Fig. 2 is a perspective view of the machine represented by Fig. 1, showing that machine with its parts in such relative positions as to best illustrate those parts and their interrelationship;

Fig. 3 is an elevation view of the machine illustrated in Fig. 1, as seen from the left side thereof;

Fig. 4 is a sectional view taken through a three layer concrete block made with this machine and which may be subdivided into improved quality modular blocks each having an ornamental facing; and

Figs. 5 and 6 are sectional views partially showing modified details of the sides of the two section container of the machine represented in Fig. 1.

The illustrated machine is partly diagrammatic in nature in order to best show the principle of operation of the parts of this preferred embodiment thereof. The embodiment does not include a showing of fasteners and minor parts that are considered unnecessary to an understanding of the machine and which may be supplied as a matter of routine by a skilled designer.

The machine includes a base which constitutes a table 11, having a rise 12 at the middle thereof defining a stepped table top with a lower surface 13 to the left of the rise and an upper surface 14 to the right of the rise.

This table supports a mold box for concrete block aggregate, which for this machine comprises three separate sections 17, 18 and 19, hereinafter referred to as mold forms. Each of these is only a four sided frame and is open at its top and bottom. However, these three mold forms are associated with other parts of the machine so that their respective bottoms are closed off to provide aggregate supporting means during certain steps in the operation of the machine.

At such times, lower form 17 rests on the lower surface of the table or on pallet 71, and intermediate mold form 19 rests on the upper surface of the table. Thus, those table surfaces comprise bottoms or aggregate support means for those mold forms. As for upper mold form 18, plate 20 may constitute a bottom or aggregate support means. That plate is insertable between mold forms 17 and 18 for supporting a predetermined quantity of aggregate in the upper mold form when that mold form is raised above the lower mold form. While the cantilever plate 20

may be firm and strong enough to support the aggregate, additional means may also be provided so that when plate 20 is inserted to close off the bottom it will easily bear the weight of the aggregate in the upper mold form; for example, as shown in Fig. 5, mold form 18 may be provided with slots defined by ledges 21 along the bottom of its side walls so the plate 20 rests on those ledges when it is inserted as the bottom of the mold form. And when such ledges are provided, the upper edges of the front and rear sides of mold forms 17 may be beveled or provided with a resilient lip 26 (Fig. 6) so that plate 20 may be inserted between those mold forms to ride on top of the ledges.

In this preferred embodiment of this machine the three mold forms are movable with respect to the table and with respect to each other, and each form has its own associated mechanism for causing its movement. Lower form, 17, is slidably guided along the lower table surface from its aggregate loading position (Fig. 1) to its aggregate combining or molding position (Fig. 2) in which its right side abuts rise 12, the height of which equals the height of mold form 17. Any suitable motivating means may provide the pushing and pulling force applied to the mold form. In this instance this sliding movement is effected by hydraulic cylinder 24 and its plunger or ram 23 which has an end thereof attached to the left side wall of form 17.

The guide means to restrain the lower mold form from being affected by unevenness or obstructions upon the table surface which might tend to cause the mold form to veer from its straight path along the table surface comprises stationary guide rods 27 and horizontally disposed guides 29, 30. These rods which extend through the guides are held by brackets 28 fastened in any suitable well known manner to the table, and the guides are fixed to mold form 17.

When lower mold form 17 is moved from its loading position to its aggregate combining position it carries upper mold form 18 along with it because the upper mold form at that period of the machine operation is lowered until, as shown in Fig. 1, it rests on top of lower mold form 17. Interconnecting these two mold forms there are four vertical guide posts 31 and four vertically disposed guides 32. One of these guide posts is fastened at each corner of the mold form for example one is attached to horizontal guide 29 and another to bracket 33. These vertically disposed guides extend laterally of the upper mold form and slide on the vertical guide posts as that mold form is raised or lowered. The movement of the upper mold form is therefore directly vertical over the lower mold form, and the upper mold form, when in the loading position or the aggregate combining position, is exactly superposed over lower mold form 17.

In this embodiment the upper mold form, its bottom plate 20, and platform 36 which is attached by side braces 37 to the upper mold form, are raised as a unit by levers 39, 40 disposed at the front and rear of the upper mold form. These two levers are fast on shaft 41 which is journaled on either side of those levers in the upstanding arms of horizontal guides 30. These levers are disposed at the front and rear of mold form 18 and are simultaneously moved by a single hydraulic cylinder 42 which is pivotably linked to lever 43 that is integral with lever 39 forming a bell crank.

The upper mold form has trunnions which ex-

tend outwardly therefrom, one being shown as member 44. These trunnions are slidably connected with slotted ends of levers 39 and 40 so that when those levers are simultaneously moved, mold form 18 is raised or lowered. The hydraulic cylinder 42 is attached to the lower mold form 17; thus there is adjustable connecting means between mold forms 17 and 18.

As mentioned previously the intermediate mold form 19 also is provided with motivating means, and this may, as shown, be hydraulic means as is provided for moving the lower mold form. Ram 46 has one end thereof connected to the right side wall of mold form 19 and is hydraulically operated by cylinder 48 to slide the intermediate mold form along the upper table surface. As with the other two mold forms, guide means may be arranged along the front and rear of the table to assure that this mold form is directed properly to its aggregate combining position in which it slides off the upper surface onto the lower mold form where it is sandwiched between the upper and the lower mold form. For the intermediate mold form, the guide means is an upstanding rail 47 at the front of the table and a similar rail (not shown) at the rear of the table. These upstanding rails preferably extend to the left of rise 12 to assure that the intermediate mold form is guided as it slides off the upper surface all the way to its sandwiched, aggregate combining position, which position is common to all three mold forms with respect to the table.

Other parts illustrated include hopper chutes 51, 52 and press 53 which may be used to slightly compress the molded block of the combined three layers of aggregates just before that mold block is lowered through the bottom of the three section mold box and through an opening 54 disposed at the aggregate combining position. A pallet 71, pallet stand 72 and eccentric vibrator 73 are also disposed at the aggregate combining position. Also shown are switches 61, 62, 63, 64, and 65 which respectively initiate the successive automatic operational steps of the machine by any suitable well known electrical control (not shown).

In operation this machine is preferably completely automatic through its complete block making cycle. Fig. 1 illustrates the machine at the beginning of its cycle in which the bottom edge of the upper mold form rests on the top edge of the lower mold form. These two mold forms together constitute a temporary two section container with the table surface as a bottom. This container has its loading position directly beneath hopper chute 51 from which it is gravity filled with standard concrete block aggregate. While this two section container is being filled, the intermediate mold form is in its loading position directly beneath hopper chute 52 where it is being gravity filled with a special ornamental aggregate. The special aggregate in this mold form is similarly supported by the table surface which constitutes its temporary bottom. When the three mold forms are filled, hydraulic cylinder 24 is actuated and ram 23 moves the two section container from its loading position and slides it along the lower surface 13 until the lower mold form of this two section container abuts the table rise 12 and switch 61 fixed to the table at the rise. The next operating step of the machine is started by contact of mold form 17 with switch 61 which actuates hydraulic cylinder 25 that moves plate 20 between mold forms 17 and 18 dividing the standard aggregate with half the

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total quantity being in each of the two mold forms. When plate 20 is forced all the way under mold form 18, the leading edge of the plate extends slightly past the front side of the mold form and strikes switch 62 (Fig. 6) thereby actuating hydraulic cylinder 42 which operates its ram and pivots the bell crank causing the slotted ends of levers 39 and 40 to raise upper mold form vertically by its trunnions. The upper mold form is lifted a distance equal the height of the intermediate mold form. When in its fully raised position, the upper mold form abuts switch 63 fixed to the top of a vertical guide post and starts the next step of the machine operation.

This step involves the actuation of hydraulic cylinder 48 causing its ram 46 to push the intermediate mold form from its loading position, sliding it off table surface 13 and over the top edge of the lower mold form to the aggregate combining position, which is a position common to all three mold forms with respect to the table. In this position mold form 19 is between the upper and lower mold forms and is properly aligned over table opening 54 in which pallet 71 is disposed as the bottom of the mold box for holding the molded block. Since the intermediate mold form is pushed off the table surface, this series of steps places the special, ornamental aggregate and mold form between the two layers of standard aggregate in the other two mold forms, and the special aggregate rests on the standard aggregate in mold form 17 but as yet is separated from the standard aggregate in the upper mold form. When in this sandwiched position a projection 74 on the intermediate mold form abuts switch 64 (Fig. 5) fixed to the left side of the upper mold form and causes the ram of cylinder 25 to withdraw plate 20 whereby the standard aggregate in the upper mold form will rest directly on top of the special aggregate. Thus, the three mold forms are combined to constitute a three section mold box in which three layers of aggregate are also combined.

When plate 20 is fully withdrawn it abuts switch 65 fixed to platform 36 and thereby starts any desired vibratory action of the molded form by eccentric 73 vibrating stand 72 in a well known manner to assure uniform density of the three layer block 67. After this vibration the press 53 partially compacts the combined aggregates before the three layer block is lowered through opening 54 on pallet 71.

Finished modular concrete blocks 68, 69 each having a facing of ornamental aggregate are made by subdividing the three layer molded block 67. A cut is made along line 77 splitting the intermediate, ornamental layer into half thickness each of which is backed up by an integral layer of standard aggregate. The ornamental facing of the finished block which has a cut surface is of improved quality and closely simulates natural cut stone in appearance.

Although but one embodiment of this invention is shown and described, modifications thereof will occur to those skilled in the art without departing from the scope of my invention, as defined by the appended claims.

It is claimed and desired to secure as Letters Patent:

1. A machine for molding a concrete block having at least three layers of aggregate, comprising a lower form, an intermediate form, an upper form, each of said forms having four sides, means for separately supporting a quantity of concrete block aggregate in each of said forms,

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means for holding said upper form and its associated aggregate support means superposed and spaced above said lower form, means for moving said intermediate form relative to its associated aggregate support means with said intermediate form moved to a position intermediate said upper and said lower forms whereby the aggregate in said intermediate form rests on the aggregate in said lower form, means for moving said aggregate support of said upper form from its position associated with said upper form whereby the aggregate of said upper form rests on the aggregate of said lower form, and means for moving said aggregate support means of said lower form from its position associated with said lower form to provide for the removal of the combined three layers of aggregate from said three forms.

2. A machine for molding a concrete block having at least three layers of aggregate, comprising a lower form, an intermediate form, an upper form, each of said forms having four sides and having an open bottom and top, aggregate support means separately associated with the bottom of each of said forms, means for separately providing relative movement of each of said forms and its aggregate support, means for moving said upper form and its associated aggregate support means above said lower form, means for moving said intermediate form from its associated aggregate support means to a position intermediate said upper form and said lower form whereby the open bottom of said intermediate form rests on the open top of said lower form, means for moving said aggregate support means of said upper form from its position associated with the bottom of said upper form whereby the open bottom of said upper form rests on the open top of said lower form, and means for moving said aggregate support means of said lower form from its position associated with the bottom of said lower form to provide for the removal of the combined three layers of aggregate from said three forms.

3. A machine for molding a concrete block having at least three layers of aggregate, comprising a lower form, an intermediate form, an upper form, each of said forms having four sides with an open bottom and top, an aggregate support for each of said forms, means for holding said upper form and its associated aggregate support means superposed and spaced above said lower form, means for positioning said intermediate form directly over said lower form, means for moving each of said aggregate support means with respect to its respective form to combine the three layers of aggregates of said forms.

4. A concrete block forming machine comprising a lower form, an intermediate form, an upper form, each of said forms having four sides and an open bottom and an open top, means connecting said upper form and said lower form, said connecting means having a first position in which the open bottom of said upper form is in contact with the open top of said lower form, a first aggregate support means for closing off the bottom for said lower form, means for moving said upper form and said lower form together from a first aggregate loading position to a block forming position, a second aggregate support means for closing off the bottom of said upper form, means for moving said second aggregate support means to a position between said upper form and said lower form to close off the

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bottom of said upper form, means for moving said connecting means to raise said upper form and said second aggregate support means above said lower form, a loading position for said intermediate form, a third aggregate support means for closing off the bottom of said intermediate form when said intermediate form is in its said loading position, means for moving said intermediate form from its said loading position to the space between said upper form and said lower form, means for separating said intermediate form from said third aggregate support means, means for moving said second aggregate support means from beneath said upper form, and means for moving said first aggregate support means from beneath said lower form.

5. A concrete block molding machine comprising a lower form, an intermediate form, an upper form, each of said forms having four sides with an open bottom and an open top, means connecting said upper form and said lower form and retaining said upper form over said lower form, said connecting means having a retracted position with bottom of said upper form in contact with the top of said lower form, said upper form and said lower form having a common loading position, means for moving said upper form and said lower form from said loading position to a block molding position, means for guiding said upper and lower forms in said movement, a first aggregate support means for closing the bottom of said upper form, a second aggregate support means for closing the bottom of said lower form, means for moving said first support means into a position beneath said upper form when said upper form and said lower form are in said block molding position, means for moving said connecting means to an extended position to raise said upper form and said first aggregate support means above said lower form, means for guiding said upper form as said connecting means is extended, a third aggregate supporting means for said intermediate form, said intermediate form having a loading position, means for moving said intermediate form from its said loading position into the space between said upper and said lower form in said block molding position, means for guiding said intermediate form in its said movement, means for moving said first aggregate support means from said upper form, and means for moving said second aggregate support means from said lower form.

6. A concrete block molding machine compris-

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ing a lower form, an intermediate form, an upper form, each of said forms having four sides and having an open bottom and an open top, means connecting said upper form and said lower form, said connecting means having a first position in which the bottom edge of said upper form rests on the top edge of said lower form, a table having a step shaped top defining a lower surface and an upper surface, said upper and said lower forms having a common aggregate loading position and a common block molding position on said lower surface, means for moving said upper and said lower forms from a said loading position to said molding position, means for guiding said lower form in its said movement, a first aggregate support means for said upper form, a second aggregate support means for said lower form, means for moving said first support means into a position beneath said upper form between said upper form and said lower form, means for moving said connecting means to raise said upper form above said lower form, means for guiding said upper form in its said movement above said lower form, said intermediate form having a first aggregate loading position on said upper surface, a rise between said table surfaces being substantially equal in height to the height of the side walls of the lower form, a side wall of said lower form abutting said rise in said molding position, means for sliding said intermediate form from its said loading position off said upper surface onto said lower form into said common molding position whereby the aggregate in said intermediate form rests on top of the aggregate in said lower form, means for moving said first support means from beneath said upper form, whereby the aggregate of said upper form rests on top of the aggregate of said intermediate form combining the aggregates of said forms in three layers, and means for moving said second aggregate support means from beneath said lower form.

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