

July 26, 1938.

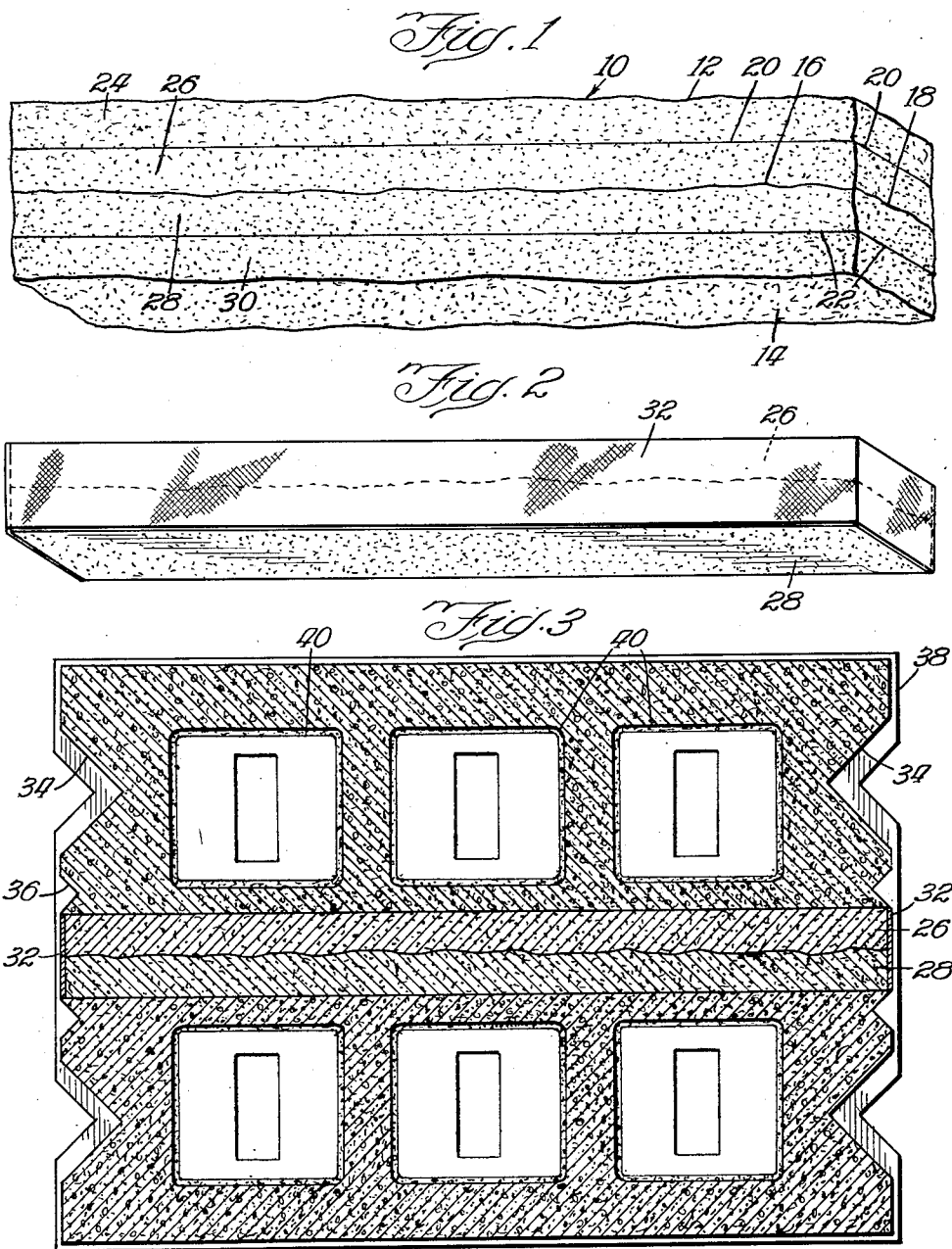
M. W. BRADBYER

2,124,759

BUILDING BLOCK MOLD AND METHOD OF FORMING FACED BUILDING UNITS

Filed Oct. 8, 1937

5 Sheets-Sheet 1



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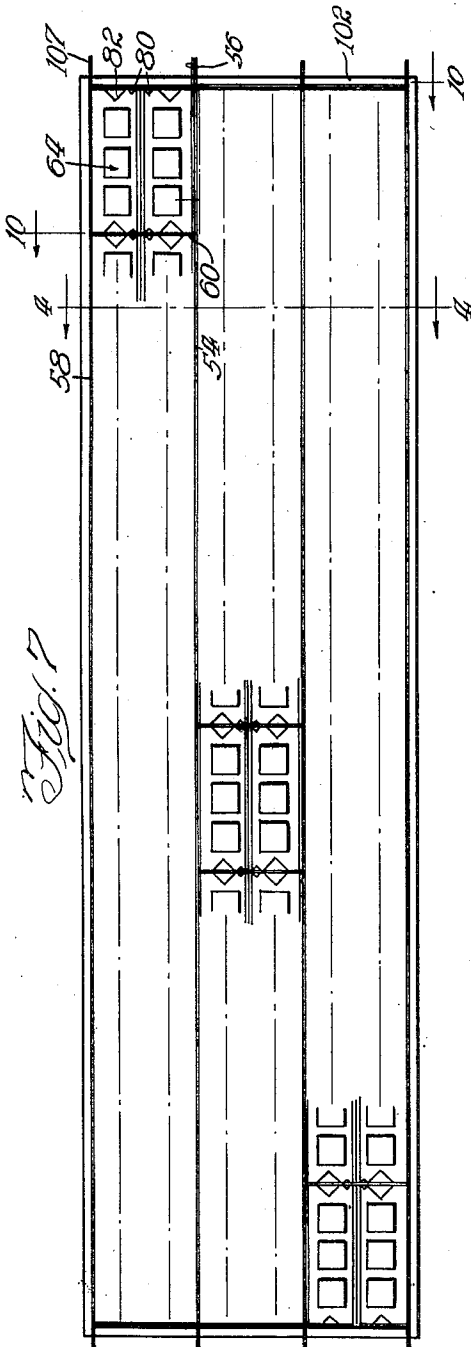
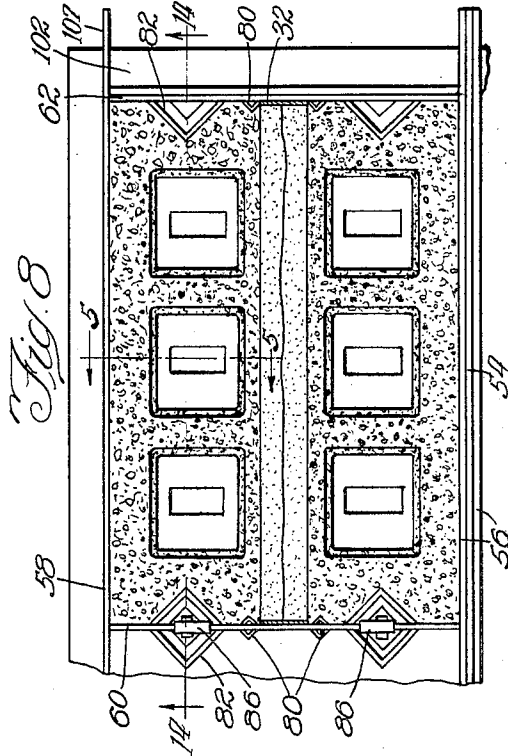
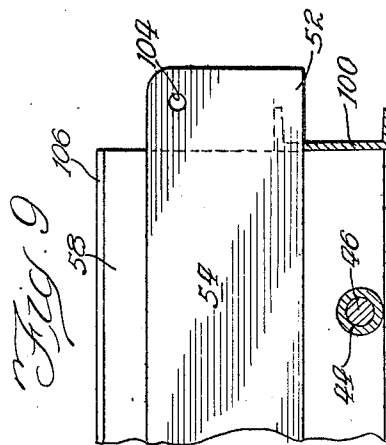
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BUILDING BLOCK MOLD AND METHOD OF FORMING FACED BUILDING UNITS

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5 Sheets-Sheet 3



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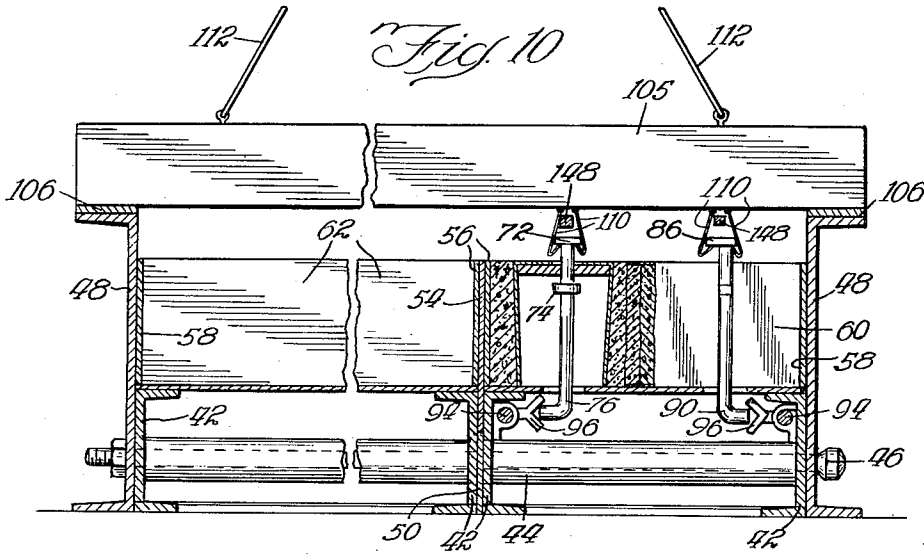
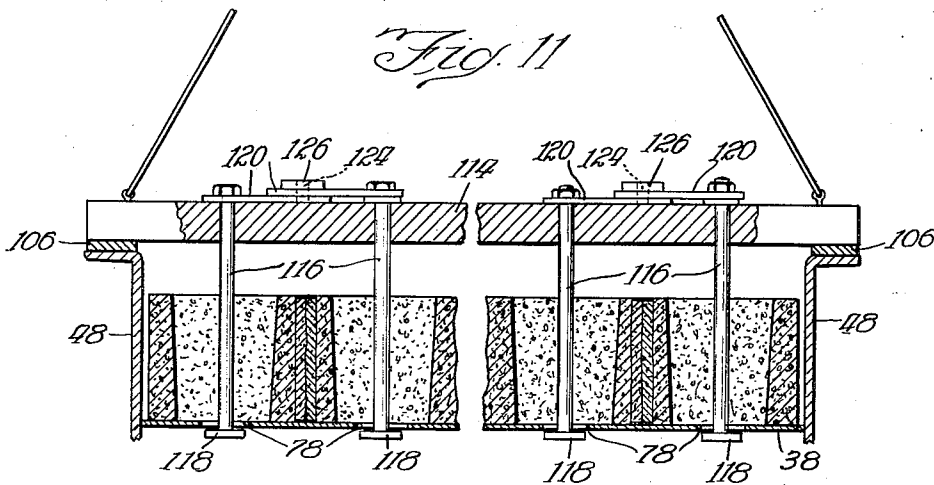
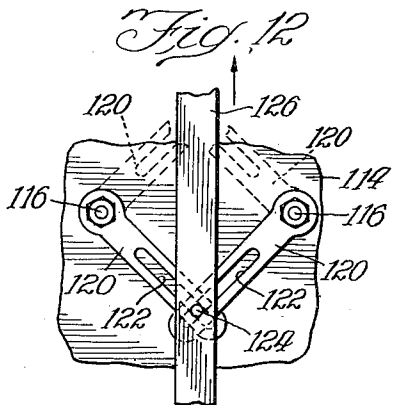
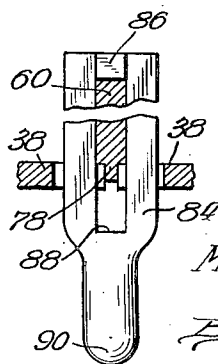
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BUILDING BLOCK MOLD AND METHOD OF FORMING FACED BUILDING UNITS

Filed Oct. 8, 1937

5 Sheets-Sheet 4



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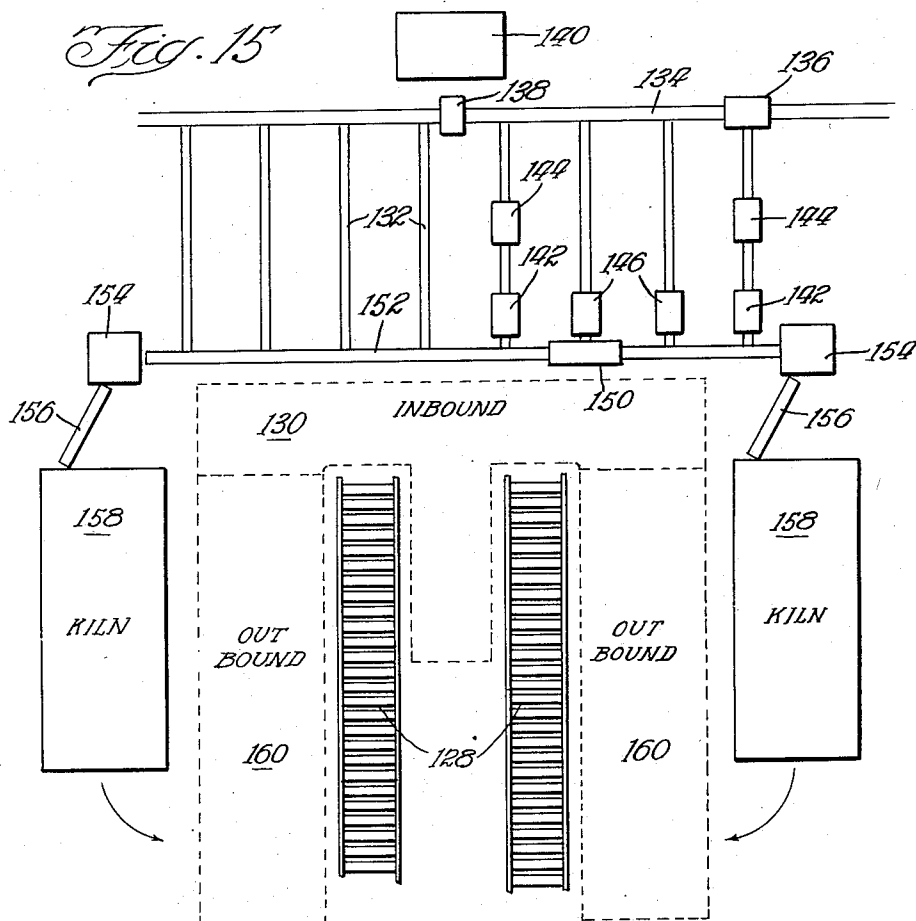
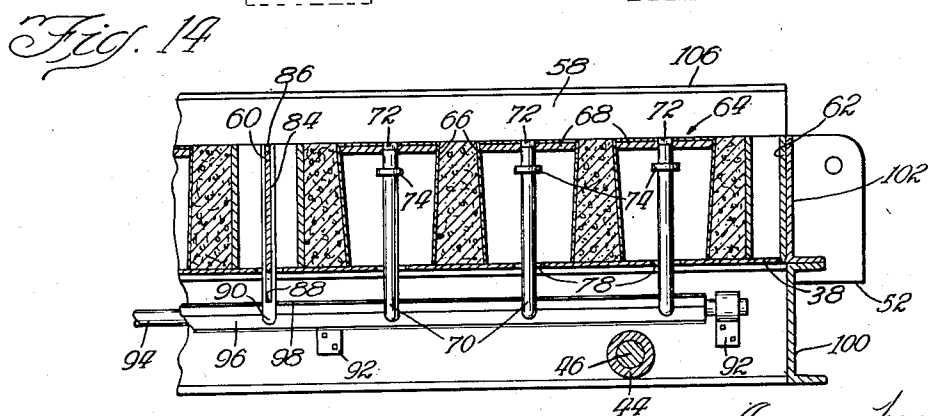
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BUILDING BLOCK MOLD AND METHOD OF FORMING FACED BUILDING UNITS

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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BUILDING BLOCK MOLD AND METHOD OF
FORMING FACED BUILDING UNITS

Myron W. Bradbyer, Hammond, Ind.

Application October 8, 1937, Serial No. 167,931

3 Claims. (Cl. 25—121)

My invention relates to building materials and includes among its objects and advantages an improved material for buildings with external surfaces of stone or concrete, and an improved method for forming and fabricating units of such material for either load-bearing or facing use.

In the accompanying drawings:

Figure 1 is a perspective view of a piece of stone, indicating the manner in which it is to be split and sawed;

Figure 2 is a perspective view of part of the pieces of a stone according to Figure 1, taped together, ready for insertion in a form;

Figure 3 is a horizontal section of a pair of finished units on their off-bearing pallet;

Figure 4 is a section of a supporting frame substantially as on line 4—4 of Figure 7;

Figure 5 is a section of one of the cores as on line 5—5 of Figure 8;

Figure 6 is a plan view of the parts illustrated in Figure 5 looking down from above;

Figure 7 is a partially diagrammatic plan view of a complete frame after the units have been poured and struck off but before the cores and dividers have been pulled or the pallets borne off;

Figure 8 is an enlarged detail of one corner of Figure 7 with the cores removed to show the pallet formation.

Figure 9 is a fragmentary view on an enlarged scale as on line 9—9 of Figure 4;

Figure 10 is an end elevation of a forming frame and a core-pulling frame above it, partly in section as on line 10—10 of Figure 7 to indicate more clearly the manner of extracting the cores and transverse dividers;

Figure 11 is a similar view of the same frame after all the dividers have been removed, together with the off-bearing frame in position to pick up the pallets;

Figure 12 is a detail plan view of a mechanism for actuating the pick up bolts of the off-bearing frame;

Figure 13 is a fragmentary view substantially as on line 14—14 of Figure 8, showing the removal bolt for one of the longitudinal dividers;

Figure 14 is a complete section on line 14—14 of Figure 8; and

Figure 15 is a diagrammatic plan view of a plant arrangement.

The face unit

In the embodiment of the invention selected for illustration in Figures 1, 2, and 3, the stone 10 of Figure 1 is a piece of stone of a well known

type, capable of being split by impact between parallel knife edges, in substantially the plane of the knife edges. As received from the quarry this stone is of substantially the proportions illustrated. A common size is four inches square by twenty three and three-fourths inches long. As received, two large opposed faces at 12 and 14 have irregular split surfaces and the other four surfaces are sawed. According to the invention this stone is placed between a knife edge lying substantially along the irregular line 16 and a parallel knife edge on the opposed side of the stone and subjected to heavy impact, whereupon it will split substantially in the plane of the knife edges, as indicated by the fracture lines 16 and 18, into two halves.

Each of these halves is then placed in a suitable sawing machine and sawed into slabs of equal thickness, one piece being sawed in the plane of cutting lines 20 and the other in the plane of cutting lines 22. The original stone 10 is thus formed into four slabs 24, 26, 28, and 30, each having one of its largest faces with a split surface and the other of its largest faces with a sawed surface.

Referring now to Figure 2, I have illustrated slabs 26 and 28 reassembled with their split surfaces fitting each other and held in assembly by one or more complete convolutions of a suitable water-proof tape 32 which is wrapped around the edges of the assembled slabs and adheres thereto with sufficient firmness to protect the crack between the slabs during pouring.

These slabs are then placed in any suitable frame and the exposed faces sprayed or painted with a thin coating of neat cement. Immediately after this coating, the form is poured full, preferably of a suitable light weight concrete, of which several well known brands are on the market under the trade names Waylite, Haydite and Pottscoc. Referring to Figure 3, I have selected one illustrative form which the finished units may have in which each of the slabs is backed by a firmly cemented mass of much greater depth than itself, with a large mortar notch 34 and a small mortar notch 36 at each end of the finished unit. The units of Figure 3 are illustrated as resting on a pallet 38 and as having three cored out spaces 40 to reduce weight.

After the completed pair of units according to Figure 3 have hardened sufficiently to permit handling, the tape 32 can be stripped off, but I prefer to leave them assembled in pairs as in Figure 3 until they are about to be placed in a final position in a building or the like, at which

time they can be separated. When this is done, the tape 32 serves not only to prevent cementing the slabs 26 and 28 to each other during pouring, but to form a sealed package of the two units, so far as exposure to wind and weather is a storage yard or during handling is concerned, with respect to the only surfaces which are exposed in the finished building.

It will be obvious that slabs 24 and 30 can be assembled as in Figure 2 with their sawed faces in contact and made up into units otherwise identical with those of Figure 3. Thus the single stone 10 is built up into four complete building units, two of which have split faces and two of which have sawed faces. In case the demand for units with sawed faces is greater than for units with split faces, it will be obvious that all four units could be delivered with sawed faces by taping slabs 24 and 26 together and also slabs 28 and 30.

Pouring frame assembly

In Figure 4 I have illustrated a unitary pouring frame adapted, when assembled with suitable cores and dividers, for use in pouring simultaneously forty-two such units as those illustrated in Figure 3. The pouring frame is an assembly of channel-shaped longerons 42 arranged in pairs back to back and spaced by tubular struts 44 and clamped together by tension bolts 46. The outermost longerons 42 are set back to back with larger channels 48 forming the side members of the frame. Except for the outermost longerons, each pair of longerons is spaced as by inserts 50, which extend up above the level of bolts 46, but terminate below the top of the longerons to leave a slot adapted to receive the heel 52 of a longitudinal divider built up of a central plate 54 and cleats 56 attached to both sides thereof in any suitable way, as by riveting or spot welding. For forming units in matched pairs as in Figure 3, I only employ two such longitudinal dividers. In Figure 4 the frame is illustrated with five dividers for forming independent units substantially half as wide as the assembly of Figure 3.

The pallets 38 rest directly on the upper flanges of the longerons 42 with the cleats 56 overlying the edges of the pallets. Adjacent each channel 48 and overlying the edges of the adjacent pallets, I lay in place a thinner longitudinal divider or cleat 58 so that the material of the finished unit will terminate a little short of the edge of the pallet on that side also.

Thus the frame as shown in Figure 4 is assembled by first laying the pallets 38 in place and then the dividers 54 and cleats 58.

To complete the assembly ready for pouring I add to the parts shown in Figure 4, suitable transverse dividers 60 and 62 and cores 64. Each core 64 is a sheet metal box with its lower side open and its side walls 66 slightly tapered downwardly to make it possible to draw the core out of the damp concrete without injury to the concrete. The top of the core is reinforced by a filler 68 with a central bore to receive the handling bolt 70. The upper end of the bolt 70 is T-shaped and the cross piece 72 is received in a countersink in the top of the core. Below the reinforcement 68 the bolt 70 carries an annular abutment 74, and at its bottom end the bolt is provided with a heel 76. The pallet is provided with a transversely elongated slot 78 to receive the bolt 70 and also to receive the pick-up bolts of the off-bearing frame of Figure 11.

Each transverse divider 60 is a plate having edge abutment at its ends with the cleats 56 or

with one cleat 56 and one cleat 58 (see Figure 8). At its lower edge, as best illustrated in Figures 13 and 14 it has a central rib 78 projecting downwardly between the abutting edges of the pallets 38. It is also provided with projections for forming the mortar notches 34 and 36, which projections are illustrated in Figure 8 as small angles 80 and large angles 82 with their edges welded to the plate 60. The transverse dividers 60 are provided with means for pulling them vertically up out of the formed mass of concrete simultaneously with the withdrawal of the cores 64. Referring to Figures 8 and 13 I have illustrated slotted bolts 84 having lateral projections 86 at their upper ends, which lateral projections set in notches in the upper edges of the plates 60. The slot in each bolt ends at 88 below the adjacent lower edge 78 of the plate 60 and the bolt is continued downwardly and has a heel 90 at its lower end similar to the heel 76 on the bolt 70.

Pivoted in suitable brackets 92 fastened to the longerons 42 I provide holding shafts 94, each extending from end to end of the forming frame. Each shaft 94 carries a substantially channel-shaped heel-engaging member 96, the upper flange 98 of which is adapted to overlie the heels 76 and 90 and hold the associated transverse dividers and cores down on the pallets 38. Upon reference to Figures 5 and 10, it will be apparent that rotation of the shafts 94 in a direction to release the heels will lift all the bolts 70 and 84 to the positions illustrated in Figure 10 and in dotted lines in Figure 5, and that in this lifted position the upper flanges 98 of the holding channels 96 will be moved laterally clear of the vertical path of the heels 76 and 90 so as to permit complete withdrawal of the bolts and associated cores and dividers by movement vertically upward.

At the ends of the frame I prefer to employ transverse plates 62 provided with angles 82 and 80 identical with those for the transverse dividers 60, but not provided with any withdrawal bolts. The side frame members 48 are braced across each end by transverse channel members 100 (see Figure 14) suitably notched to receive the heels 52 of the longitudinal dividers, and a series of angle plates 102 are fastened to the upper flanges of these end channels to provide end abutments for the end dividers 62.

It will be noted that the projections 86 on the bolts 84 are asymmetrical and project towards the center in Figure 8, so that they are longitudinally in line with the symmetrical T-heads 72 of the bolts 70.

Pouring

After the pouring frames are assembled as in Figures 7 and 8 they are pushed under the discharge of a suitable concrete mixer and preferably supported on a vibrating table while the concrete is poured. After the concrete is poured a striker plate can be drawn across over the form to strike off any concrete above the level of the tops of the cores 64, longitudinal dividers 54 and transverse dividers 60 and 62, all of which have their upper edges in the same plane. This leaves the parts as illustrated in Figure 14 with the units completely formed and of correct size and proportions.

Pulling

Thereafter, as soon as the concrete has set sufficiently to permit it, which is ordinarily a matter of a few minutes only, I first withdraw the longitudinal dividers 54 and the cleats 58. Referring to Figure 9, the divider 54 and its cleats

56 project beyond the end of the frame and are provided with a transverse aperture 104 into which a suitable hooked tool can be inserted to pull the divider out by sliding it longitudinally. This not only gets rid of the divider, but the sliding movement of the divider along the faces of the concrete units in contact with it smooths these faces and provides a finished surface for the resulting unit. The cleats 58 also project as at 107 in Figure 8 and may be similarly drawn out endwise.

The next withdrawal is to remove the cores 64 and transverse dividers 60. The cores and pallets may be separated by holding the cores stationary and moving the pallets either up or down, or by holding the pallets stationary and moving the cores either up or down. I have illustrated an embodiment in which the pallets remain stationary and the cores are moved up. To accompany this I rotate all the shafts 94 to lift the bolts 70 and 84 into the positions illustrated in Figure 10 and then lower gently into position above the pouring frame a pulling frame 105. The pulling frame 105 overlies the top flanges of the side members 48 of the forming frame, and, to secure accurate registration of the parts, I prefer to lay a removable cleat 106 on each upper flange so that, by suitably varying the thickness of the cleats 106 precise registration of the parts in the position of Figure 10 may be maintained regardless of any slight wear or warping in use.

Above each longitudinal line of bolts 70 and 84 I provide a series of pivoted plates having a hooked shape in end elevation as clearly indicated at 110 in Figure 10. The hooked portions of these plates are so shaped as to be deflected by contact with the ends of the T's 72 and 86 and then fall under by gravity into the positions illustrated in Figure 10. In operation the frame 105 is suspended as by tension members 112 from a suitable crane and is lowered gently into the position of Figure 10 and then gently lifted up again, carrying up with it all the cores 64 and transverse dividers 60.

Off-bearing

After the cores are pulled, I lower into position above the pouring frame an off-bearing frame 114 similar to the pulling frame 105 except that instead of the pulling hooks 110 it is provided with relatively long vertical bolts 116 having T heads 118 at their lower ends. As clearly indicated in Figure 11 when the frame 114 is lowered into place the heads 118 pass downwardly through slots 78 in the pallets 38. Subsequent rotation of the bolts 116 through 90 degrees will turn the heads 118 so that when the frame 114 is again elevated it will carry with it all the pallets, and all the completed units. It will also slide the end transverse dividers 62 vertically upwards until they no longer are held in place by the angle plates 102. As soon as this happens the plates 62 may fall off of themselves, or if they cleave to the concrete a little, a workman can readily remove them by hand.

I have illustrated mechanism for rotating all the bolts 116 to cause the heads 118 to engage the pallets. Referring to Figures 11 and 12, each bolt carries at its upper end above the frame 114 a projecting arm 120 rigid with the bolt. The arms 120 are slotted at 122 and receive pins 124 projecting downwardly on a longitudinal actuating bar 126. With the parts in the position of Figure 12 the heads 118 are in the position of Figure 11, but movement of the rod 126 in the

direction of the arrow of Figure 12 will swing the arms 120 to the dotted line positions of Figure 12. Thus a longitudinal movement of each of three rods 126 will turn all the bolts 116 in the entire off-bearing frame.

Plant layout

Referring to Figure 15, I have illustrated a pair of railroad tracks 128 by means of which the stones 10 and other raw materials may be delivered and stacked in the inbound shed or storage space 130. The individual forming frames of Figures 4 and 7 are mounted on suitable wheel cars running on a series of narrow gauge tracks 132. At one end of the series of tracks 132 I provide a transfer track 134 equipped with one or more transfer cars 136 adapted to receive the individual cars carrying the forming frames. At an intermediate point at track 134 I provide a vibrating table 138 of well known construction and adjacent to the vibrating table a concrete mixer 140 also of any suitable well known construction. Accordingly, the frames may be assembled with pallets, dividers and cores at assembly positions indicated at 142 in Figure 15 and then moved to positions indicated at 144 for spraying or painting the neat cement on the face slabs. Each sprayed frame is then immediately run on to the transfer car 136 and over to the vibrating table 138 where it is vibrated and poured. Immediately after pouring, the frame may be sent back, preferably over a different track, to a position at 146 where the cores and the dividers may be pulled as previously described. It will be obvious that the cores and dividers pulled from one frame at 146 may be immediately set over and installed in an empty frame at 142, either manually, or by swinging the entire pulling frame 105 over the new forming frame and depositing all the parts simultaneously. For this purpose I have illustrated square deflector rods 148 in Figure 10 which may be rotated to tip the hooks 110 back and cause them to release the bolts 70 and 84. After the cores and dividers are pulled, the forming frame, in the condition of Figure 11, is run onto a transfer car 150 on the opposite transfer track 152 and then to either end of track 152 where an off-bearing crane at 154 may lower the frame 114 and pick up the pallets and transfer them to a suitable conveyor 156 for delivery to a storage and drying kiln 158. By providing the off-bearing cranes in duplicate at opposite ends of the track 152 the production of the plant for a given period, say half a day or a day, may be put in the kiln at one end, and while the contents of that kiln are curing the kiln at the other end may be filled.

After drying in the kiln, the individual units may be picked up off the pallets without injury and stored in the outbound sheds 160 ready for shipment.

Without further elaboration the foregoing will so fully explain my invention that others may, by applying knowledge current at the time of application, readily adapt the same for use under various conditions of service. It will, for instance, be obvious that a wide variety of shapes and sizes of units may be produced according to the invention. Specifically, if load bearing units entirely of concrete are desired, the slabs of Figure 3 may be omitted, either with or without adding three more longitudinal dividers to the assembly of Figure 4, and either with or without changing the size or shape of the cores and mortar notches.

I claim:

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1. Building block fabricating equipment comprising: a skeleton pouring frame adapted to support a plurality of rows of pallets, each row comprising a plurality of pallets; a plurality of
5 rows of pallets resting on said frame; cores resting on said pallets; each core having a handling bolt; each handling bolt having a transverse projection at its top and a laterally projecting heel at its bottom; each handling bolt having a
10 lost motion connection with its core to permit said transverse projections to be lifted vertically above the core or divider; said pallets having slots to receive all said bolt heels; clamping and ejecting means on said frame below said pallets
15 for engaging the heels of all said bolts and holding said cores down on said pallets; means for moving said clamping and ejecting means to release all said bolts and project them upward to the extent of their lost motion; a pulling frame
20 adapted to be lowered over said pouring frame; hook means on said pulling frame for engaging the upper ends of said handling bolts to lift said cores; and removable dividers for subdividing the space above said pallets into subdivisions register-

ing with the individual pallets and the cores thereon.

2. The method of forming faced building units with exposed faces of irregular contour formed by cleavage which comprises: cleaving a piece of
5 stone facing material; reassembling a pair of cleft pieces; covering the edges of the cleft; pouring cementitious backing material on both sides of the assembled pieces to form a pair of composite
10 units; striking off excess backing material; permitting the remaining backing material to harden and set; and removing the covering from the edges of the cleft at any time after striking off.

3. The method of forming faced building units with exposed faces of stone facing material; as-
15 sembling a pair of pieces of facing material with the sides to be exposed in the finished units in contact with each other; covering the edges of the contacting faces; pouring cementitious backing material on both sides of the assembled pieces to
20 form a pair of composite units; and removing the covering from the edges of the contacting faces.

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