

March 10, 1953

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CASTING FORM

2,630,614

Filed May 4, 1951

2 SHEETS—SHEET 1

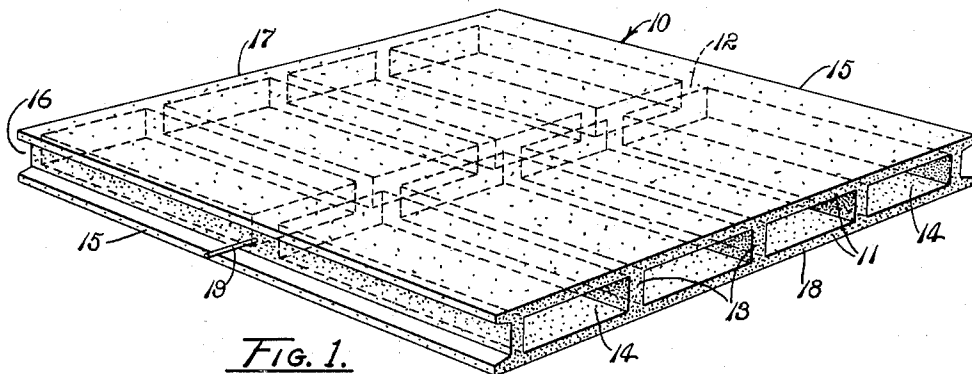


FIG. 1.

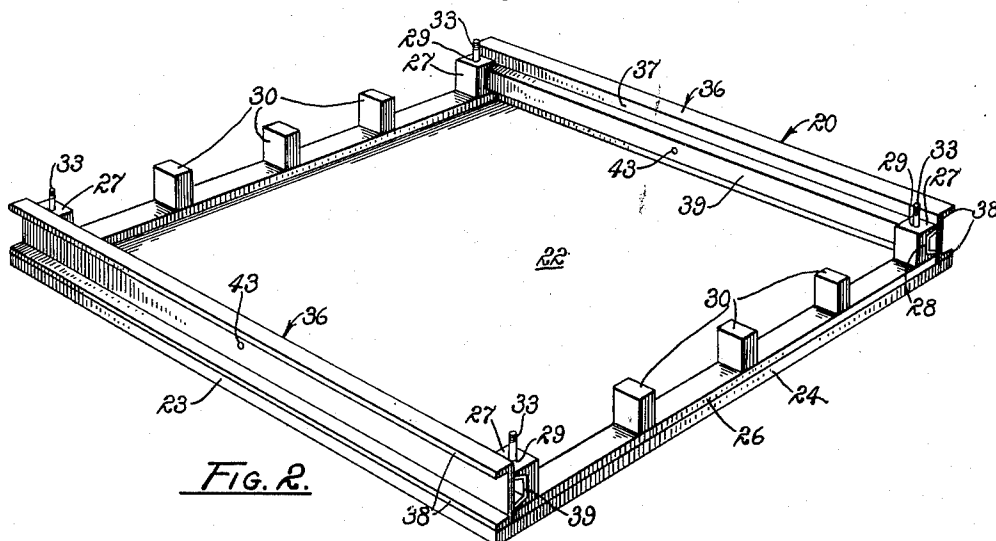


FIG. 2.

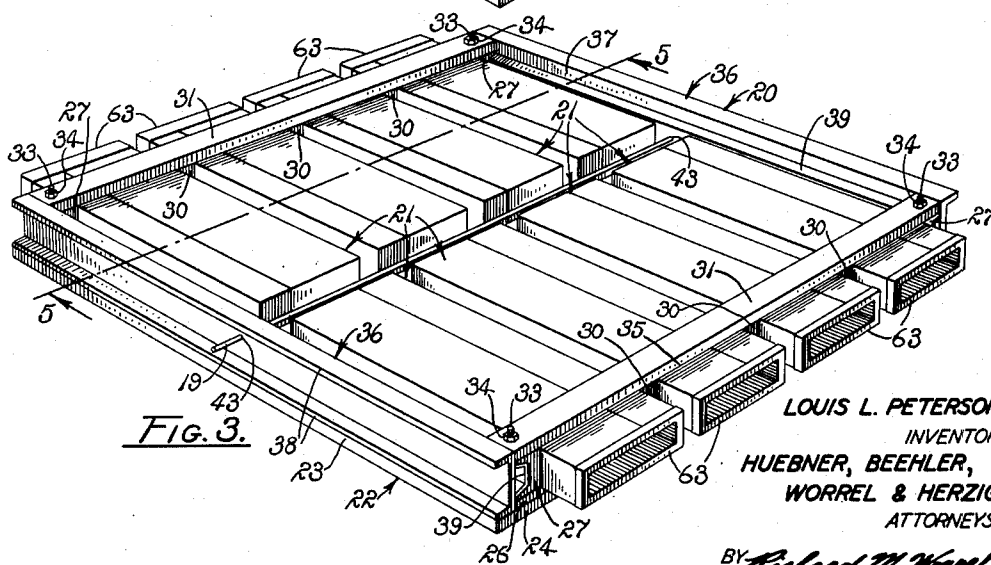


FIG. 3.

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2 SHEETS—SHEET 2

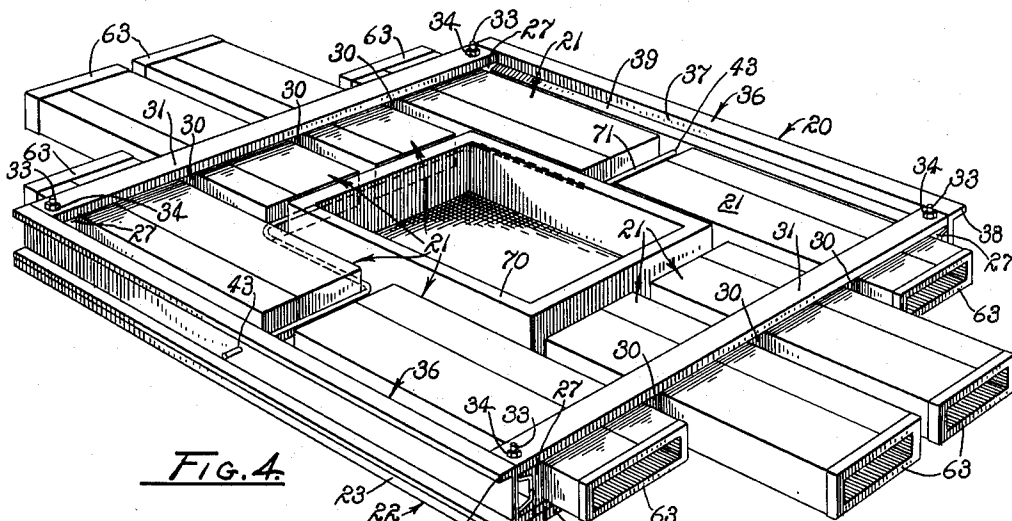


FIG. 4.

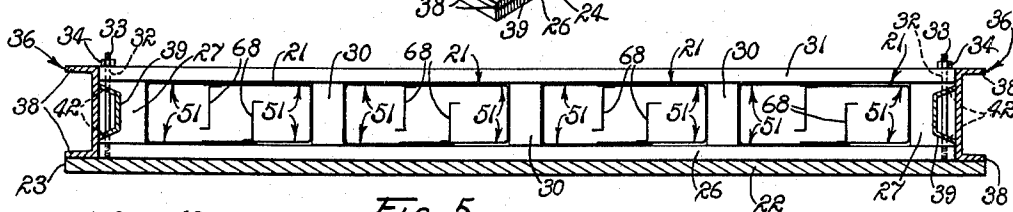


FIG. 5.

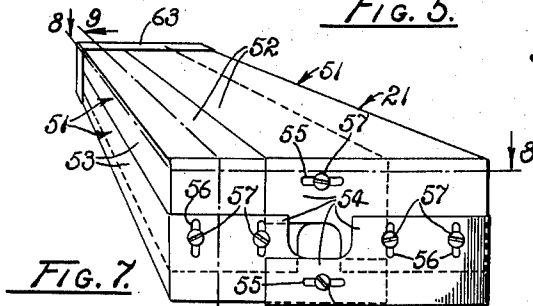


FIG. 7.

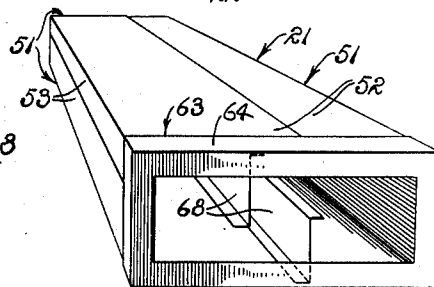


FIG. 6.

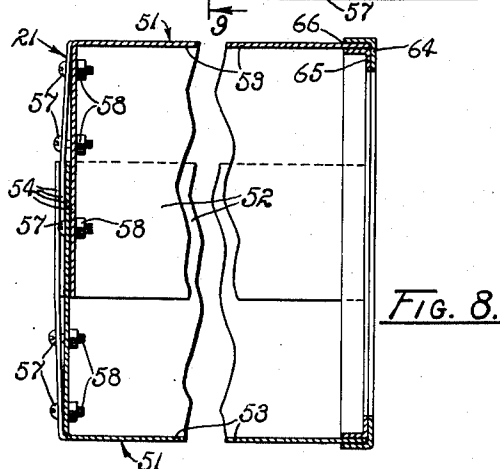


FIG. 8.

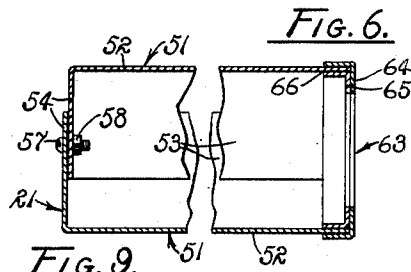


FIG. 9.

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CASTING FORM

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Application May 4, 1951, Serial No. 224,570

6 Claims. (Cl. 25—121)

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The present invention relates to molds adapted to receive amorphous or flowable casting material and to constrain the material during a hardening period and more particularly to such a mold especially suited to the formation of hollow bodies of slab or wafer-like shape.

The difficulties incident to the casting of hollow members of cement, plastic or other material by a single operation are well known. Excessively complex molds are usually required for such purposes and substantial difficulties encountered in separating the cast members from the molds in which they are formed. Although molds intended for use in the formation of hollow bodied members have been known, the difficulties incident to their employment have been such that commercial production of hollow bodied members has involved the casting of fragmentary portions thereof of convenient shape and subsequently assembling the portions into a completed unit.

Recent developments in the prefabrication of buildings has resulted in the discovery by the applicant of a building slab of specialized configuration having construction advantages. The slabs have voids therein for insulation and weight reducing purposes and are characterized by an assembly convenience enabling the speedy and dependable association of a plurality of such slabs in building construction. The molding or casting of slabs of the type to which reference has been made characterizes the casting difficulties which the present invention has successfully overcome. The slab, to which reference herein is subsequently made in greater particularity, is described for illustrative convenience and it is evident that the mold of the present invention is not limited to the production of such slabs but may successfully be employed in the production of cast articles of various configurations having voids extended inwardly from outer surfaces thereof.

An object of the present invention is to provide an improved mold for casting members of various shapes and sizes particularly adapted to the formation of voids or openings in such members.

Another object is to provide a mold which makes provision for the dependable location of a plurality of removable cores therein.

Another object is to provide an improved collapsible core for matrixes which is conveniently assembled for casting operations and expeditiously collapsed for removal from formed articles.

Another object is to provide an improved combination of matrix and core therefor accommo-

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dating adjustable arrangement of the cores in the form to suit specialized production requirements.

Other objects are to provide improved elements and arrangements thereof in a device of the character and for the purposes set forth that is economical, durable, and possesses improved operating characteristics.

Further objects and advantages will become apparent in the subsequent description in the specification.

Referring to the drawings:

Fig. 1 is a perspective view of a slab formed from concrete or other flowable material by use of the mold of the present invention.

Fig. 2 is a perspective view of the matrix of the instant invention at a stage of its assembly.

Fig. 3 is a perspective of a completely assembled matrix and cores constituting a mold embodying the principles of the invention herein described.

Fig. 4 is a perspective of the mold showing a modified association of the parts thereof, as for the reception of an auxiliary frame adapted to define a window opening or the like.

Fig. 5 is a transverse section through the mold, as taken along line 5—5 in Fig. 3.

Fig. 6 is a perspective view of one of a plurality of collapsible cores used in connection with the matrix for forming the hollowed or cored out portions of the slab shown in Fig. 1.

Fig. 7 is a perspective view of the end of the collapsible core, opposite to that viewed in Fig. 6.

Fig. 8 is a horizontal longitudinal section through the collapsible core, foreshortened for illustrative convenience, taken along line 8—8 of Fig. 7.

Fig. 9 is a foreshortened vertical longitudinal section through the collapsible core, as viewed from line 9—9 of Fig. 7.

Referring in greater detail to the drawings:

The mold of the present invention is adapted to be used in the cast formation of a block or slab from amorphous or flowable material by the constraining of such material to predetermined shape during a hardening period. Such a slab of concrete is indicated at 10 in Fig. 1. The block is formed with a pair of spaced parallel panels 11 of generally rectangular form interconnected by a central transverse rib 12 and a plurality of parallel longitudinal ribs 13. The spaces between the parallel ribs 13 and the panels 11 provide pockets or voids 14 which reduce the weight of the block and provide insulating space and access between the panels, as for plumbing and wiring convenience in building construction.

The slab 10 is formed with parallel side edges 15 which are recessed at 16 to provide longitudinal grooves which are transversely generally of trapezoidal form. When panels of the character described are arranged in edge to edge relation with the grooves 16 in juxtaposition and vertically disposed, the grooves define vertical bores adapted to receive slab interlocking pillars of concrete and reinforcing steel. The remaining edges 17 and 18 of the slab, nominally the top and bottom edges respectively, are in parallel relation with the pockets 14 extending inwardly from these top and bottom edges and terminating slightly short of the center of the slab to provide the central rib 12 of the slab. A reinforcing rod 19 extends longitudinally through the rib 12 and projects beyond the confines of the slab into the grooves 16. The reinforcing rods of adjacent slabs in a building construction are hooked or twisted together to prevent separation of the slabs subsequent to which mortar such as concrete is poured therebetween to form the described interlocking pillars.

The mold of the present invention employs a matrix 20 which mounts a plurality of cores 21 subsequently more fully described. The matrix includes a base plate 22 which is shown in the drawings as square but which may be given any suitable form. The base plate is conveniently of flat sheet material such as steel plate and provides parallel side edges 23 and end edges 24. An elongated strip 26 of predetermined thickness is welded, bolted, or otherwise affixed to the opposite end edges 24 of the base plate. Corner blocks 27 are secured to the ends of each of the strips 26 and extend upwardly therefrom predetermined equal distances and provide faces flush with the ends of the strip 26. The corner blocks are recessed inwardly at 28, as shown. A vertical bore 29 is formed through each of the corner blocks 27 for purposes hereinafter more fully described. A plurality of intermediate blocks 30 are recessed to each of the strips 26 in equally spaced relation therealong and extend upwardly therefrom to the plane of the upper extremities of the corner blocks 27.

The spaces across the upper portions of the corner blocks 27, intermediate blocks 30 and the blocks themselves are covered by a removable cover strip 31 of substantially the same dimensions as the strip 26 with bores 32 formed through each cover strip in alignment with the bores 29. With a cover strip 31 overlaying each set of blocks 27 and 30 an attaching pin 33 is insertible through the bores 29 and 32. The pins may take the form of suitable nuts and bolts or other structure adapted dependably to locate its associated members in place on the base plate. The pins 33 are preferably rigidly and releasably mounted in the base plate as by screw-threaded engagement in bores, not shown, formed therein and provided with nuts 34 which are screw-threadably tightened on the upper ends thereof. With the cover strips in place, their upper surfaces are in a common plane in spaced parallel relation to the upper surface of the base plate and spaced therefrom a distance equal to the thickness of the slab 10 to be molded thereby. Also, with the cover strip in place, the spaces between adjacent slabs, the strips 26, and the cover strips 31 provide core openings 35 through opposite end walls of the matrix. The spaced parallel strips 26, blocks 27 and 30 extending upwardly therefrom, and the cover strips 31 are adapted to form portions of the top 17 and bot-

tom edges 18 of the slab 10 when formed in the matrix.

Means are provided along the remaining opposite side edges 23 of the base plate 25 for forming the recessed side edges 15 of the slab 10. These means include a pair of channel members 36 which are located on the base plate in spaced parallel relation. The channels 36 provide walls 37 which face toward each other and legs 38 extending outwardly therefrom. In order to form the trapezoidal recessed portion 16 in the side edges 15 of the slab 10, a convex extension 39 of suitable shape is secured to the wall of each channel 36. The extension 39 and the spaced walls of the channel members 36 together form the recessed side edges 15 of the slab. The channel members 36 are maintained in assembled relation on the base plate with the extensions 39 located in the recesses 28 of the corner blocks 27 by the attaching pins 33 extended downwardly through the openings in the blocks and strips 26 while passing also through bores 42 formed vertically through the extensions 39 adjacent to opposite ends thereof. Other openings 43 are optionally formed horizontally through the channels 36 and extensions 39 substantially midway of their lengths for the support of the reinforcing rod 19 therethrough.

In order to form the pockets or voids 14 inwardly of the top 17 and bottom edges 18 of the slab 10, a plurality of cores 21 are provided which are illustrated in Figs. 6 to 9, inclusively. The cores are slidably fitted to the core openings 35 and held therein by placement of the cover strips 31 thereover, as shown in Figs. 3 and 4. Each of the cores 21 is made of sheet metal and is of hollow rectangular form. Each core is also constructed of four substantially identical reversed corner segments 51. Each of the corner segments 51 is formed of three integral panels including a face panel 52, a side panel 53 and an inner end panel 54. The four corner segments 51 are located in overlapping relation, as illustrated in Fig. 7 of the drawing. The corner sections overlap or are nested with corresponding face panels 52, side panels 53, and end panels 54 of adjacent sections overlapping. The overlapping end panels provide a closed inner end for their respective cores. It will be noted that the transversely adjacent end panels horizontally overlap and the vertically adjacent end panels vertically overlap. Juxtapositioned horizontally elongated slots 55 are formed through overlapping portions of the horizontally adjacent end panels. Juxtapositioned vertically elongated slots 56 are formed through the overlapping portions of the vertically adjacent end panels 54. Bolts 57 are extended inwardly through the slots 55 and 56 and are provided with nuts 58 screw-threadably mounted thereon. The bolts are preferably welded to the outermost end panel through which they extend for convenience in tightening the nuts within the cores. It will be noted that by loosening the nuts on their bolts the overlapping end panels are telescopically adjustable to contract or expand the cores. Conversely, tightening the nuts on their bolts dependably locks the end panels and thus the corner segments at their inner ends in adjusted relation determining selected transverse dimensions.

The bolts 57 extending through the slots 55 and 56 maintain the overlapping ends of the corner segments only in selected relation. It is also desirable to maintain the corner segments of the opposite, or open, end of the cores in

fixed relation whenever they are in use in a mold. This is accomplished by providing a channelled collar 63 for each of the cores 21. Each collar 63 is constructed of a pair of nested frames, namely, an outer frame 64 and an inner frame 65 somewhat smaller than the outer frame. Each of the frames are of open rectangular form and of angular shape in cross section having rearwardly disposed flanges, as seen in Figs. 8 and 9. The frames 64 and 65 are concentrically nested and contacting portions thereof spot welded so that the flanges provide a rearwardly disposed channel 66. The collar 63 is of such a size that when the open end edges of the corner segments 51 are inserted into the channel of a collar, the open end of the core is maintained in expanded condition fitted to the core receiving openings 35.

To reinforce each core longitudinally so that it will not buckle along its length when flowable material is poured into the matrix or amorphous material compacted therein, an elongated Z-strip 68 of sheet metal is secured to the inner face of each face panel 52 and extended longitudinally thereof. The Z-shape of the strips 68 impart a rigidity to the cores desirable in sustaining loads imposed thereon intermediate the support offered by the interconnected end panels 54 and the collars 63.

In the construction of slabs of the form indicated at 10 in Fig. 1, the cores 21 are arranged in the matrix 20 in the manner illustrated in Fig. 3. This is conveniently accomplished by removing the cover strips 31 from the blocks 27 and 30 and positioning the cores in the openings 45 between the blocks 27 and 30. The cores are preferably arranged in parallel relation and located so that their inner ends are equally spaced and define therebetween a form for the reception of flowable material in the formation of a transverse rib 12 and reinforcing rod 19. When the cores are properly arranged, the cover strips 31 are arranged in overlaying relation thereto and rigidly mounted by the attaching pins 33.

It sometimes is desirable to provide a window or door opening through the slab 10. Slabs of such formation are conveniently formed by adjusting the mold of the present invention, as shown in Fig. 4. A frame 70 of the size and shape of a desired opening in the slab is rested on the base plate 22 in any desired position. The cores 21 which are laterally adjacent to the frame 70 are positioned as described in Fig. 3 for the formation of a slab 10 of the type shown in Fig. 1. The cores which are endwardly aligned with the frame 70 are slid outwardly through the openings 35 until the inner ends thereof are substantially equally spaced from the frame 70 as adjacent inner ends of the adjacent cores are spaced when no frame is employed. A reinforcing rod or rods of any desired configuration are arranged in the mold. A suitable generally U-shaped rod is indicated at 71 extended through the openings 43 and bent around the frame 70. It is to be understood that the clamping of the cover strips 31 against the cores 21 by means of the attaching pins 33 serves dependably to secure the cores in position whether fully inserted as shown in Fig. 3 or partially retracted in order to utilize an auxiliary frame to form window openings, door openings, and the like. As previously indicated, the nuts 58 are tightened on the bolts 57 and the collars 63 slidably located on the outer ends of the cores preliminary to clamped positioning in the matrix so that the

segments 51 thereof are dependably interconnected and constrained to desired relation.

Operation

The operation and utility of the mold of the present invention are believed to be apparent and are briefly summarized at this point. In order to form the slab 10 as illustrated in Fig. 1, the matrix 20 is located in a horizontal position adjacent to a convenient source of casting material. The cores 21 and the cover strips 31 are removed therefrom but the strips 26 and channel members 38 all constrained to the positions shown in Fig. 2 by the pins 33 which extend through the end blocks 27, extensions 39 mounted on the channel members 38, and the strips 26. While in this condition a quantity of flowable or amorphous material, such as fluid cement, is poured onto the base plate covering it to a depth substantially equal to the thickness of the strips 26. With the cores adjusted to cross sectional dimensions, having a width equal to the distances between the adjacent blocks 27 and 30 and a thickness equal to the heights of the blocks 27 and 30, they are positioned between the blocks with their closed ends inwardly extended and arranged in equally spaced relation, as illustrated in Fig. 3. The space is maintained between the inner ends of adjacent cores so that the central rib 12 of a completed slab 10 is formed therein. The reinforcing rod 19 is inserted through the openings 43 between the ends of the cores and extended outwardly beyond the confines of the mold. The cover strips 31 are thereafter laid over aligned sets of blocks 27 and 30 with the attaching pins 33 extending upwardly through the openings 32 through the cover strips. The nuts 34 provide a quick means of lightening the cover strips down on the blocks and clamping the cores on the strip 26 in cantilever extension into the mold. With the mold members thus assembled an additional quantity of the flowable material is poured into the mold sufficient to fill the mold flush with the upper surfaces of the channel members 36 and the cover strips 31. The flowable material is troweled smooth and permitted to set or harden.

After the flowable material, such as cement, has hardened the cores 21 are removed therefrom and the slab removed from the matrix 20. The cores 21 are easily removed from the pockets 14 of the slab by inserting a long shank socket wrench, not shown, into each of the cores and loosening the nuts 58 on the bolts 57. In order to collapse the cores 21 throughout their lengths, the channelled collars 63 are slid endwardly from their respective cores. With the inner and outer ends of the cores thus free, each core may be easily and conveniently collapsed by a simple shaking movement and endwardly withdrawn from their respective pockets 14 in collapsed condition.

The cover strips 31 may be removed prior to withdrawal of the cores 21 or retained in position to protect the newly formed slab during core withdrawal. Subsequent to removal of the cores, the attaching pins 33 are disconnected from the base plate 22, as by being screw-threadably disengaged therefrom, and the channel members 36 and the strips 26 and 31 with their interconnecting blocks 27 and 30 removed from the base plate and the formed slab. The production of a slab having a window or door opening therein, as illustrated in Fig. 4, is substantially similar to that described for the slab 10 shown in Fig. 1.

and in view of the prior discussion thereof is not described further at this point.

The cores 21 of the present invention are readily adjustable, conveniently assembled, dependably locked in adjusted arrangement, and easily arranged in the openings 35 as described. The matrix 20 is speedily assembled, receives the cores 21 in simple association, and the cores and matrix locked in casting arrangement by tightening the nuts 34.

It will be apparent to anyone skilled in the art that the matrix and cores may be made of any desired size and suitable shape and that slabs of relative proportions other than shown may be constructed merely by permitting the extension of the channel members 38 and/or the strips 26 and 31 passed the ends of their associated wall elements to define a smaller casting area.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices and structures.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a casting form, the combination of a base plate; wall members mounted on the base plate defining a casting area thereon, one of said wall members comprising a base strip of predetermined thickness rigidly mounted on the base plate, a plurality of blocks mounted on the strip in predetermined spaced relation, and a cover strip releasably mounted in overlaying relation to the blocks; an elongated transversely collapsible core fitted between the blocks of the wall and extended inwardly in substantially parallel relation to the base plate into the casting area providing an inner end in spaced relation to all portions of the wall member; and means for tightening the cover strip down on the blocks and clamping the core against the base strip in cantilever extension into the casting area in spaced relation to the base plate.

2. In a casting form, the combination of a base plate; walls releasably mounted on the base plate defining a casting area thereon, one of said walls comprising a base strip of predetermined thickness mounted on the base plate, a plurality of blocks mounted on the strip in predetermined spaced relation, and a cover strip releasably mounted in overlaying relation to the blocks; elongated transversely collapsible cores fitted between the blocks of the wall and inwardly extended into the casting area providing inner ends within the walls and open outer ends, each core consisting of a plurality of elongated longitudinal segments transversely slidably associated for adjustment of the over-all transverse dimensions thereof having angularly related inner ends slidably overlapped, and releasable means interconnecting the slidably overlapped inner ends to constrain the segments in adjusted transversely slidable relation; and means for tightening the cover strip down on the blocks and clamping the core against the base strip in cantilever extension into the casting area in spaced relation to the base plate.

3. In a casting form, the combination of a base plate; walls mounted on the base plate defining a casting area thereon, one of said walls includ-

ing a base strip of predetermined thickness rigidly mounted on the base plate, a plurality of blocks mounted on the strip in predetermined spaced relation, and a cover strip releasably mounted in overlaying relation on the blocks; elongated transversely collapsible cores of substantially rectangular longitudinal and transverse configuration fitted between the blocks of the wall, inwardly extended into the casting area, and providing closed inner ends within the walls and outwardly disposed open ends, each of the cores including two pairs of elongated segments of sheet material arranged in substantially parallel pairs and the segments of each pair being in substantially parallel relation, each segment having a pair of integral elongated longitudinal panels transversely in substantially right angular relation, the segments of each pair having adjacent panels arranged in transversely slidable overlapping relation and the corresponding segments of the pairs having adjacent panels arranged in transversely slidable overlapping relation, the segments having right angularly extended inner ends slidably overlapped and providing elongated juxtapositioned openings, bolts extended through the openings having tightening means disposed within the core accessible through the open end thereof, and a collar telescopically slidably mounted on the segments at the open end of the core constraining the segments to predetermined overlapping relation and having an access opening therethrough; and means for tightening the cover strip down on the blocks and clamping the core against the base strip in cantilever extension into the casting area in spaced relation to the base plate.

4. In a casting form the combination of a base plate; walls mounted on the base plate defining a casting area thereon, one of said walls comprising a base strip of predetermined thickness rigidly mounted on the base plate, a plurality of blocks mounted on the strip in predetermined spaced relation, and a cover strip releasably mounted in overlaying relation to the blocks; and elongated transversely collapsible cores of substantially rectangular longitudinal and transverse configuration fitted between the blocks of the wall, inwardly extended into the casting area, and clamped cantilever extension in substantially parallel relation to the base plate by the cover strip; each of the cores including two pairs of elongated segments of sheet material arranged in substantially parallel pairs and each pair consisting of substantially parallel segments, each segment including an elongated face panel longitudinally of the segment, an elongated side panel longitudinally of the segment transversely in substantially right angular relation to the face panel, and an end panel interconnecting corresponding ends of the face panel and the side panel in fixed angular relation, the face panels and the end panels respectively of the segments of each pair of segments slidably overlapping and the side panels and the end panels respectively of corresponding segments of the pairs slidably overlapping, the overlapping portions of the end panels having juxtapositioned elongated openings formed therethrough, screw-threaded means mounted in the openings adapted to clamp their respective end members in adjusted overlapping relation, and a collar abutted against the ends of the segments opposite to the end panels, said collar having a rectangular channel telescopically fitted to the abutted ends of the segments.

5. An elongated transversely collapsible core

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having an open end and an opposite closed end comprising two pairs of elongated segments of sheet material arranged in substantially parallel pairs and the segments of each pair being in substantially parallel relation, each segment having a pair of integral elongated longitudinal panels transversely in substantially right angular relation and an end panel normal thereto interconnecting the longitudinal panels in said angular relation, the segments of each pair having adjacent panels arranged in transversely slidable overlapping relation, the corresponding segments of the pairs having adjacent panels arranged in transversely slidable overlapping relation, said end panels slidably overlapping and defining the closed end of the core, locking means accessible through the open end of the core releasably interconnecting the end panels in overlapped relation, and a collar having an opening therein releasably mounted on the opposite end of the segments from the end panels having a rectangular channel telescopically receiving the ends of the longitudinal panels opposite to the end panels constraining the segments to predetermined overlapping rectangular relation.

6. An elongated transversely collapsible core comprising two pairs of elongated segments of sheet material arranged in substantially parallel pairs and each pair consisting of substantially parallel segments, each segment including an elongated face panel longitudinally of the segment, an elongated side panel longitudinally of the segment transversely in substantially right angular relation to the face panel and integral therewith, and an end panel interconnecting

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corresponding ends of the face panel and the side panel in fixed angular relation, the face panels and the end panels respectively of the segments of each pair of segments slidably overlapping and the side panels and the end panels respectively of corresponding segments of the pairs slidably overlapping, the overlapping portions of the end panels having juxtapositioned elongated openings formed therethrough; screw-threaded means mounted in the openings adapted to clamp their respective end members in adjusted overlapping relation; and a collar having an access opening therein abutted against the ends of the segments opposite to the end panels, said collar having a rectangular channel releasably telescopically receiving the abutted ends of the segments.

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