Jan. 22, 1963 P. E. BALCOMB ETAL 3,074,140

MEANS FOR FORMING VOIDS IN CONCRETE PRODUCTS

Filed April 18, 1960

3 Sheets-Sheet 1

Fig. 2

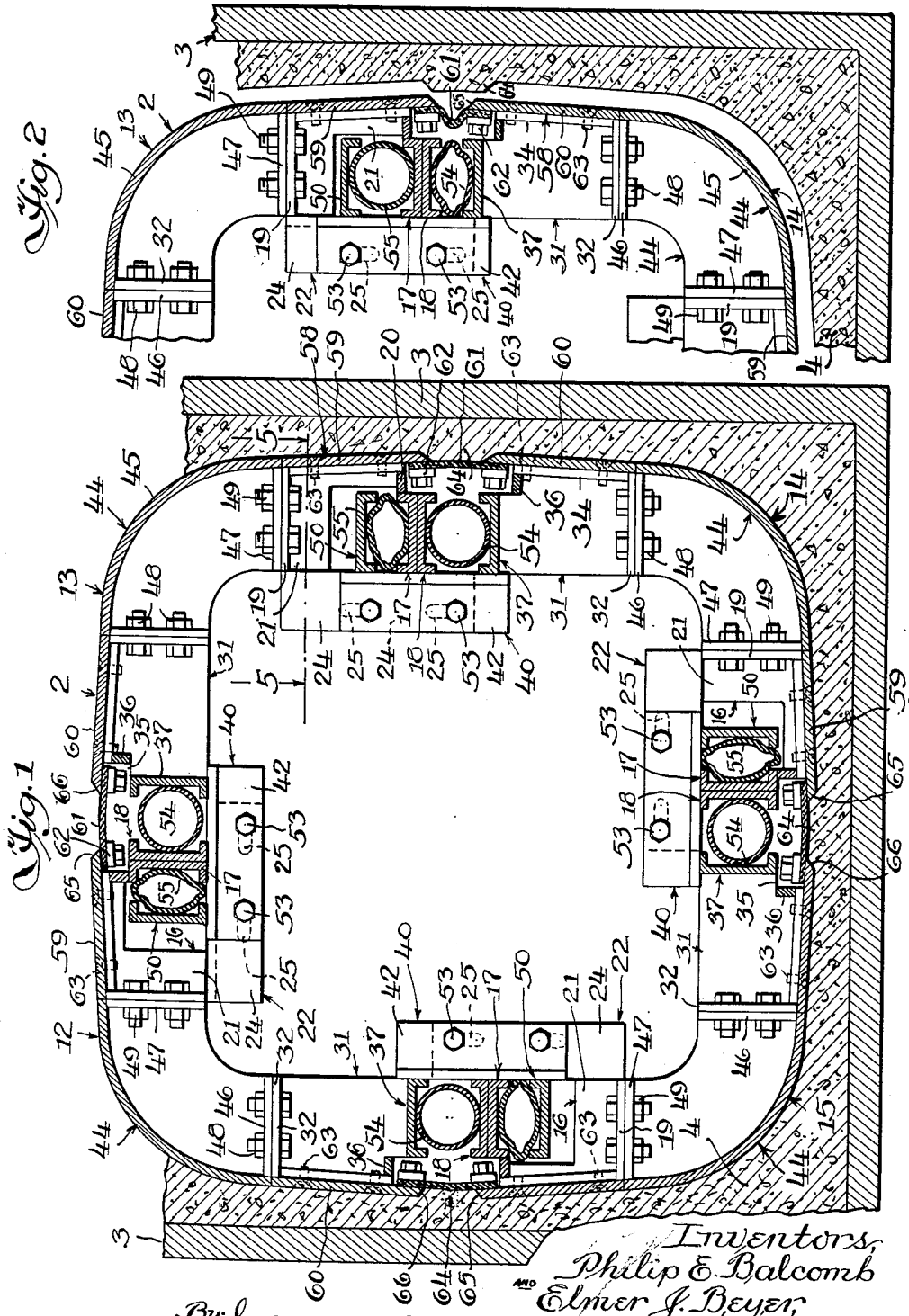


Fig. 1

Inventors,
Philip E. Balcomb
and
Elmer J. Beyer,
By: Schneider, Bressler, Goldsmith & Clement, Attys.

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Filed April 18, 1960 3 Sheets-Sheet 2

Fig. 3

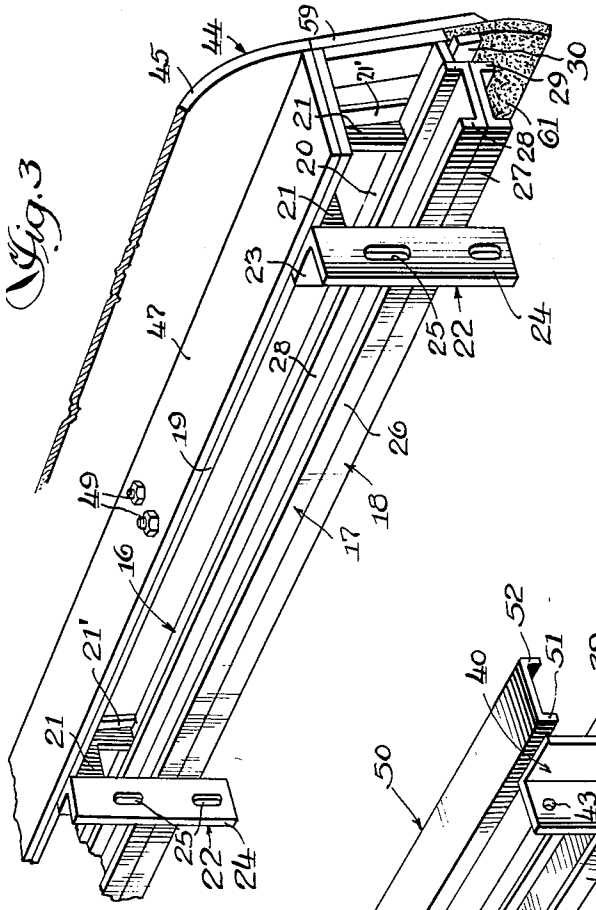
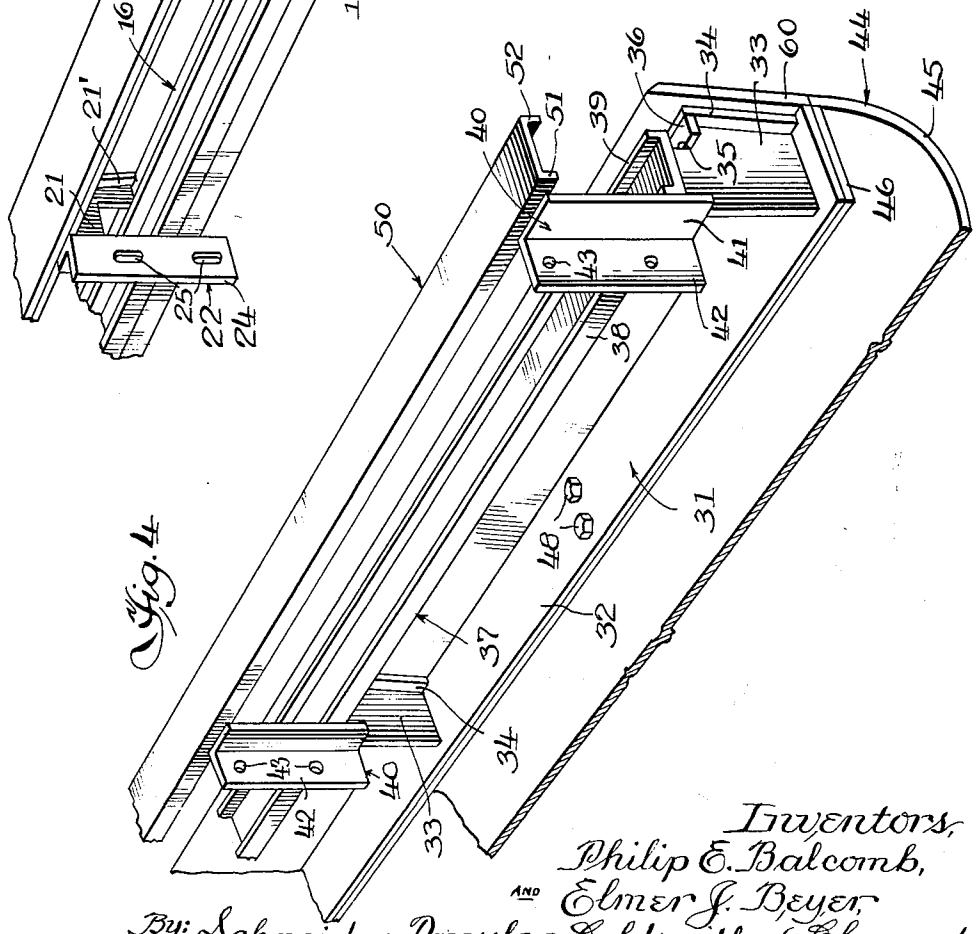


Fig. 4



Inventors,
Philip E. Balcomb,
and Elmer J. Beyer,
By: Schneider, Dressler, Goldsmith & Clement
Attys.

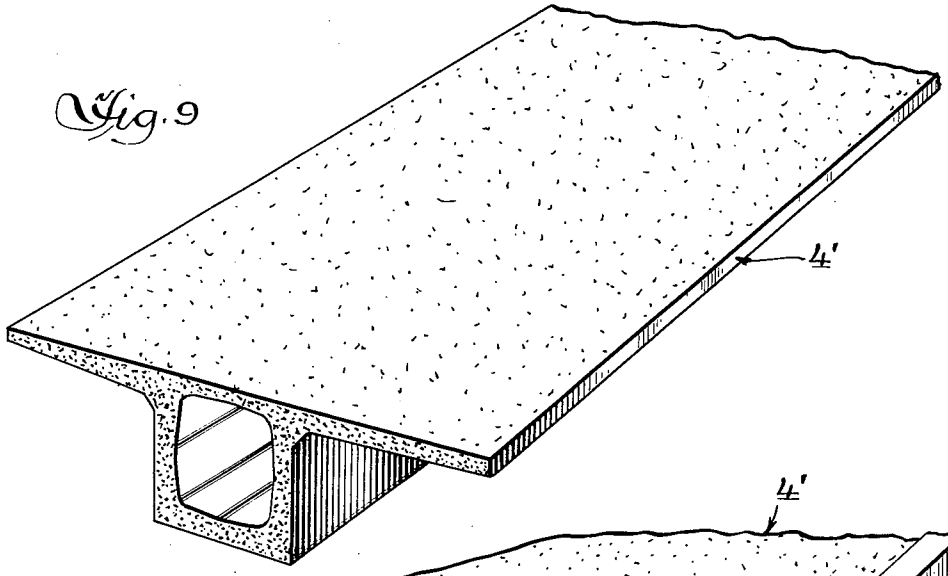
Jan. 22, 1963 P. E. BALCOMB ETAL 3,074,140

MEANS FOR FORMING VOIDS IN CONCRETE PRODUCTS

Filed April 18, 1960

3 Sheets-Sheet 3

Fig. 9



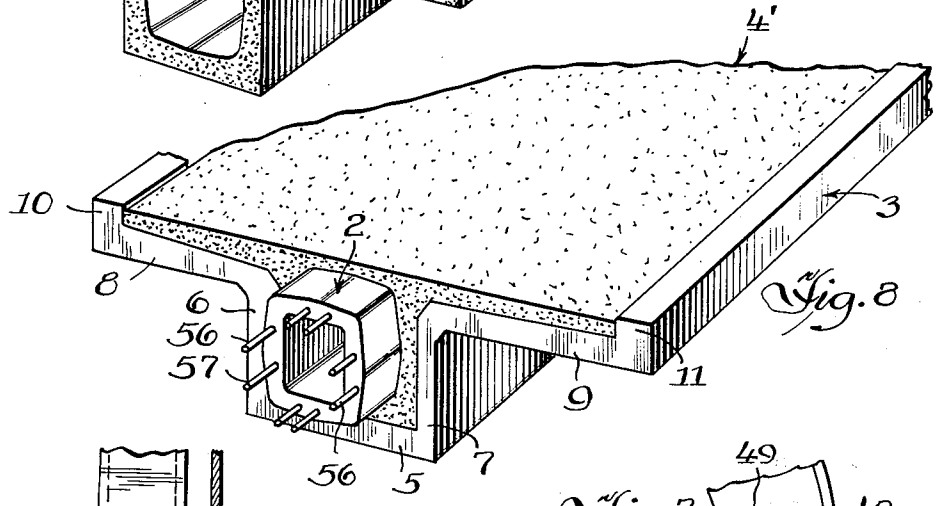


Fig. 8

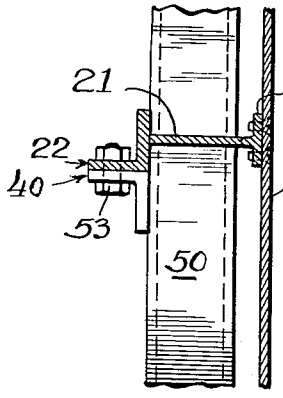


Fig. 5

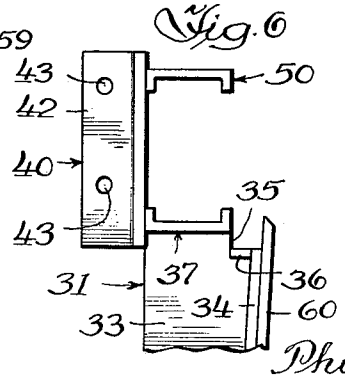


Fig. 6

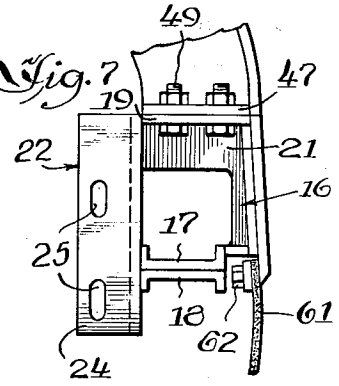


Fig. 7

Inventors,
Philip E. Balcomb
AND
Elmer J. Beyer,
By: Schneider, Dressler, Goldsmith & Clement, Attys.

United States Patent Office

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3,074,140

MEANS FOR FORMING VOIDS IN CONCRETE PRODUCTS

Philip E. Balcomb, Naperville, and Elmer J. Beyer, La Grange, Ill., assignors, by mesne assignments, to Martin-Marietta Corporation, Chicago, Ill., a corporation of Maryland

Filed Apr. 18, 1960, Ser. No. 22,764
11 Claims. (Cl. 25—128)

This invention relates to means for forming voids of accurate dimensions in concrete products, and is particularly concerned with an inner mold that can be expanded into void-forming position and contracted to remove it from the concrete product after the concrete has set.

The provision of voids of regular cross section extending longitudinally within concrete products, such as beams, is not a new idea, but heretofore the formation of such voids of accurate dimensions was difficult, particularly with beams of considerable length. In the previously preferred method of forming voids in a concrete beam, one or more corrugated paper box members were positioned in a form, and concrete was poured around the box members to fill the form.

After the concrete was set it was difficult to remove the corrugated paper box members from the interior of the beam. The corrugated paper was often torn in the attempt to remove it after the concrete had set, and scraps or remnants of the corrugated paper were left projecting into the completed void. The projecting portions of the corrugated paper partially blocked the void, thereby making it difficult to use the void as a conduit for carrying pipes or wires. Even more serious disadvantages occurred when any of the corrugated paper box members failed before the concrete had set. In such cases portions of the space intended to be voided were filled with concrete, with consequent waste of concrete, and the beam was unable to carry pipes or wires intended to extend longitudinally through the void.

Although the void forming inner mold is shown in the drawings as adapted to form a void of rectangular cross section, and said mold will be described with particular reference to a void of rectangular cross section, it will be understood that the invention is not limited to such shape. The mold may be constructed to form a void of any desired cross sectional configuration in which the longitudinally extending planes defining the sides of the void intersect at angles of not less than 90 degrees. It should also be understood that the use of the mold is not limited to concrete beams of any particular cross section. Although a T-beam is shown in the drawings, the void may be formed in a concrete beam of any desired configuration, or in any other concrete product in which a longitudinal void is desirable.

In accordance with the present invention a retractable mold of the required length is placed in an open form. The length of the mold is limited only by the ability to handle it. Molds up to 100 feet in length may be handled without difficulty. The expansion of the mold may be accurately controlled, and when the mold is expanded into void-forming position, spaces of predetermined width are left between the outer walls of the mold and the bottom and sides of the open form so that each wall of the beam may have the desired thickness.

Preferably enough concrete for the bottom of the concreate beam is poured into the open form before the retractable mold is positioned in the form. The mold is then placed in the form, and the rest of the concrete is poured before the concrete for the bottom wall of the beam has set. Any suitable reinforcement may be placed in the open form before the concrete sets. After the concrete sets, the mold is retracted to move its walls inwardly from the concrete surfaces defining the void, and the mold is removed by pulling it out through one end of the beam.

The retractable mold is constructed of a plurality of interconnected sections, one section being provided for each longitudinally corner of the void to be formed. In the case of a void having a rectangular cross section, four retractable mold sections are provided. Each of the mold sections is a duplicate of the others, and therefore only one section will be described.

Each section comprises an angular member having oppositely disposed longitudinal edge portions joined by a curved intermediate portion. The angularity of the longitudinal edge portions depends upon the cross sectional configuration of the void to be formed. If the void is to have a rectangular cross section, the opposite longitudinal edge portions will extend outwardly at approximately right angles to each other. One longitudinal edge portion of the mold section has a pair of channels rigidly secured thereto in back to back relationship. Two channels in spaced relationship are rigidly secured to each section adjacent its other longitudinal edge.

The use of channels is preferred because of convenience, but any suitable means capable of holding a longitudinally extending member that is expansible in its transverse cross section may be substituted for the channels, if desired. The channel structure at one or both of the longitudinal edges of the mold section projects beyond the longitudinal edge to which it is secured. When the mold is assembled, the channel structures of adjoining mold sections overlap, although the adjacent longitudinal edges of the mold sections are spaced from each other.

Each of the channels extends along substantially the entire length of the section. The second mentioned channels are spaced apart far enough to fit on opposite sides of the first mentioned channels of the adjacent mold section when the mold is assembled. Each of the second mentioned channels has its flanges extending toward the flanges of the other second mentioned channel. When the retractable mold sections are assembled in operative position, the flanges of one of the first mentioned channels extend toward the flanges of the adjacent second mentioned channel, and the flanges of the other first mentioned channel extend toward the flanges of the other second mentioned channel. The flanges on all corresponding edges of the channels are aligned in the same plane.

A suitable transversely expansible tubular conduit, such as a lenugth of fire hose, for example, is placed in each of the two spaces between the adjacent first and second mentioned channels of adjacent mold sections. The conduits are connected to a source of air, or any suitable hydraulic fluid, under pressure and are so arranged that either conduit may be inflated when the other is deflated. The inflation of one conduit and the deflation of the other is preferably simultaneous, although one conduit may be inflated after the other conduit has been deflated. Preferably all of the conduits of the mold are interconnected so that half of them are inflated simultaneously and operate as a unit to move all of the mold sections into void-forming position, and the rest of the conduits are also inflated simultaneously and operate as a unit to retract the mold sections.

A plurality of angle irons spaced longitudinally of the mold section extend perpendicularly to the channel members and are rigidly secured to the inner flanges of the first mentioned channels. Similar angle irons, having the same longitudinal spacing relative to the mold section as said first mentioned angle irons, are rigidly secured to the inner flanges of the second mentioned channels. The angle irons secured to the different channels are arranged in pairs when the mold is assembled.

In the assembled position of the mold, each of the angle

irons secured to the flanges of one pair of channels has one leg juxtaposed in face to face relationship to one leg of one of the angle irons secured to the flanges of the other pair of channels adjacent thereto. One of said legs of each angle iron is provided with a pair of slots, and the adjacent leg of the other angle iron of said pair is provided with a pair of holes each of which registers with one of the slots. Although the slots and holes are described as being in legs of angle irons, it will be understood that any suitable plates may be used instead of angle irons.

Bolts or screws extending through each of the holes and the slot with which said hole registers provide a pin and slot connection for each pair of angle irons. The pin and slot connection permits adjacent mold sections to move toward and away from each other a distance equal to the length of the slots. Accordingly, inflation of one flexible conduit held between two of the opposed channels causes the conduit to expand transversely to spread the channels apart and move the mold into void-forming position.

Pressure of the air in the conduit is maintained to hold the mold sections in void-forming position until the concrete poured between the mold and the form sets. The air pressure applied to the conduits may be accurately controlled by any suitable valve and gage. Inflation of the other conduit, when the first conduit is deflated, or open to the atmosphere so that it can be deflated by the expansion of the second conduit, spreads the other two channels apart to move the longitudinal edges of the adjacent mold sections together, thereby retracting the mold so that it can be removed from the void by pulling it out of the end of the void.

Although the structure is operative when the adjacent outer walls of adjoining mold sections are coplanar, it is preferred to have said outer walls inclined outwardly toward each other at an angle of about 3 degrees. The angularity of the outer walls of the mold sections facilitates separation of the walls of the mold from the concrete wall surfaces defining the void when the mold is retracted.

A strip of flexible material, such as rubberized fabric, for example, is connected at its opposite edges to the adjacent longitudinal edges of the outer plates of adjoining mold sections to form a closure for the gap between the longitudinal edges of said outer plates. When the retractable mold is expanded into void-forming position its sections are separated as far as possible, limited by the pin and slot connections of the perpendicularly extending angle irons secured to the channels of adjoining mold sections. In this position the flexible strips are substantially taut. When the mold is retracted, the flexible material buckles inwardly, thereby avoiding the possibility of the flexible strip getting caught between the longitudinal edges of adjoining plates as they are moved toward each other.

Each retractable mold section comprises an intermediate portion having a curved or angular outer plate, and two longitudinal edge portions detachably secured to opposite longitudinal edges of the intermediate portion. The intermediate portion of the mold section is provided with longitudinally extending strips at each longitudinal edge, and each longitudinal edge portion is provided with a similar strip adjoining the intermediate portion. The intermediate portion of each mold section is joined to the longitudinal edge portions of said mold sections by bolts or screws extending through the longitudinal strips.

If either dimension of the void is to be increased, appropriate longitudinal edge portions of the mold sections are removed, and an insert is then interposed between each intermediate portion and each of said longitudinal edge portions that have been removed. The insert, which may be in the form of a channel member, has one flange secured to the longitudinal strip of the intermediate portion of the mold section, and the other flange secured to the longitudinal strip of the longitudinal edge portion that has been removed.

The structure by means of which the above and other

advantages of the invention are attained will be fully described in the following specification, taken in conjunction with the accompanying drawings showing a preferred illustrative embodiment of the invention, in which:

FIG. 1 is a cross sectional view showing a retractable mold embodying the invention, the mold being shown in its expanded, void-forming position, with portions of the form and concrete broken away;

FIG. 2 is a fragmentary cross sectional view showing one side of the retractable mold in its retracted position;

FIG. 3 is a fragmentary perspective view showing one longitudinal edge portion of a mold section;

FIG. 4 is a view, similar to FIG. 3, showing the other longitudinal edge portion of said mold section, with one channel separated therefrom;

FIG. 5 is a fragmentary cross sectional view, taken along the line 5—5 of FIG. 1;

FIG. 6 is a fragmentary end view of one longitudinal edge portion of a mold section;

FIG. 7 is a fragmentary end view of the other longitudinal edge portion of a mold section;

FIG. 8 is a fragmentary perspective view of a T-shaped concrete beam with a retractable mold shown in expanded, void-forming position in said beam; and

FIG. 9 is a fragmentary perspective view of a T-shaped concrete beam having a longitudinally extending void made in accordance with the invention.

Referring to the drawings, FIG. 1 shows a retractable mold **2** positioned in expanded, void-forming position in an open form **3** with concrete **4** poured between the mold and the form. FIG. 2 shows a portion of the same mold in retracted position with its outer walls spaced from the concrete. Form **3** may be of any desired shape, but is shown in FIG. 5 as being shaped to form a longitudinal beam **4'** having a T-shaped cross section. In FIG. 8 the form shown comprises a bottom wall **5**, a pair of upstanding vertical side walls **6** and **7**, and a pair of wing members **8** and **9** extending laterally outwardly from the upper longitudinal edges of side walls **6** and **7**, respectively. Vertical flanges **10** and **11** extend upwardly from the outer longitudinal edges of wing members **8** and **9**, respectively. The retractable mold is preferably positioned closer to the plane of the upper edges of flanges **10** and **11** than to the inner surface of bottom wall **5**, to provide the concrete beam with a bottom wall of greater thickness than its top wall.

As shown in FIG. 1, the mold comprises four mold sections **12**, **13**, **14** and **15**. These mold sections are identical, and therefore only one will be described.

Each mold section comprises a frame **16** (FIG. 3) adjacent one longitudinal edge thereof for supporting a pair of channels **17** and **18** in back to back relationship. The frame includes longitudinal strips **19** and **20** spaced from each other by a plurality of inverted L-shaped plates **21** welded thereto. Plates **21'** are welded to the outer edge of each plate **21** to provide increased rigidity to the frame. Plate **21'** preferably extends on both sides of the outer edge of plate **21** and is flush with the outer edge of strip **19**. Angle irons **22** are welded to the inner edges of plates **21** and to the inner longitudinal edge of strip **19** at any desired intervals longitudinally of the mold. Angle irons **22** depend from the inner edge of strip **19**. Each angle iron **22** has one leg **23** disposed in a plane parallel to the length of the frame, and another leg **24** disposed at right angles to leg **23**. Leg **24** is provided with a pair of elongated slots **25** extending longitudinally of the leg.

Channels **17** and **18** are preferably welded together in back to back relationship, and are provided with coplanar flanges **26** and **27**, respectively, along one longitudinal edge, and with similar flanges **28** and **29** along the opposite longitudinal edge It is apparent that an H-shaped beam or any suitably shaped member capable of holding a transversely expansible flexible conduit can be substituted for channels **17** and **18**, if desired. Channels **17** and **18** are rigidly secured in frame **16** by welding flanges

26 and 27 to legs 23 of angle irons 22 and flange 28 to strip 20. A longitudinal strip 30 extending parallel to flanges 28 and 29 is welded to the outer edge of strip 20 to provide added rigidity to frame 16. An angle iron may be substituted for strips 20 and 30, if desired.

Each mold section has another frame 31 (FIG. 4) adjacent its opposite longitudinal edge. Frame 31 comprises a longitudinal strip 32 and a plurality of T-shaped ribs 33 welded in perpendicular relationship to one surface thereof. The cross bars 34 of ribs 33 are disposed flush with the outer edge of strip 32. Ribs 33 may be integral, or may be formed of two plates welded together. The outer upper edge of each rib 33 is recessed, as indicated at 35, and a strip 36 extending parallel to strip 32 is welded to each rib 33 in recess 35 to add rigidity to frame 31. A channel 37, parallel to strip 32, is welded to one edge of each rib 33. Channel 37 has flanges 38 and 39 extending away from the edge of rib 33 to which it is welded.

A plurality of angle irons 40 each have one leg 41 welded to flange 38 and to the inner edge of each rib 33. The inner edge of each rib 33 is coplanar with flange 38. The angle irons 40 have the same longitudinal spacing at which angle irons 22 are welded to frame 16. Each angle iron 40 projects above flange 38 and has its other leg 42 extending perpendicularly to said flange. Each leg 42 is provided with two holes 43, each of which is adapted to register with one of the slots 25 when the mold sections are assembled as hereinafter described. Legs 41 of angle irons 40 are oppositely disposed with respect to legs 23 of angle irons 22 so that legs 24 and 42 can be juxtaposed when the mold sections are assembled.

The two longitudinal edge portions of the mold section hereinabove described are united by an intermediate longitudinal portion 44 comprising a curved outer plate 45 rigidly secured at its longitudinal edges to longitudinally extending strips 46 and 47 in any suitable manner, such as, for example, welding. Outer plate 45 may be reinforced in any suitable manner. Strip 46 is juxtaposed against strip 32 and is secured thereto by bolts or screws 48 passing through registering apertures in said members. Strip 47 is juxtaposed against strip 19 and is secured thereto by bolts or screws 49.

Intermediate portion 44 comprises a structure that can be handled as a unit to facilitate adjustment of the size of the complete mold. The mold is made in the smallest desired size, and may be readily increased in either or both transverse dimensions. For example, the mold shown in FIG. 1 has a substantially square cross section. If it is desired to increase the height of said mold, bolts 48 are removed and strip 46 is separated from the uxtaposed strip 32. A spacer channel (not shown) having apertures in each flange conforming to the apertures in strips 32 and 46 is inserted between these two strips with one flange of the spacer channel against each of the strips. Bolts or screws are then secured in each registering pair of apertures to connect one flange of the spacer channel to each of the strips. Any suitable spacer may be substituted for the channel described. Strips 19 and 47 can be separated and spaced apart in the same manner as strips 32 and 46.

The mold structure described above is only partially fabricated, but the complete mold structure will be understood clearly by reference to the method of interengaging complementary longitudinal edge portions of adjacent mold sections. The longitudinal edge portions of the mold section are secured to the intermediate portion in the partially fabricated condition described above, and the fabrication is completed after said securement. As shown in FIGS. 1 and 2, the structure shown in FIG. 3, constituting part of one mold section, is interengaged with the structure shown in FIG. 4, but constituting part of an adjacent mold section, in the complete mold structure.

The parts described above are moved into interengaging position with channel 37 aligned with channel 18, and flanges 38 and 39 extending toward flanges 27 and 29 with which they are aligned. Leg 41 of angle iron 40 is in engagement with flanges 26 and 27, and leg 42 is juxtaposed against leg 24 of angle iron 22. The outer surfaces of the mold structure heretofore described have not been closed, and the interior of each portion of the mold is accessible for certain necessary assembling operations, as hereinafter described.

A channel 50 is slid longitudinally into the opening defined by channel 17, legs 23 of angle irons 22, and inverted L-shaped plates 21. Channel 50 has flanges 51 and 52 aligned with and extending toward flanges 26 and 28, respectively. Flanges 51 are welded to legs 41 of angle irons 40. Channel 50 cannot be welded to angle irons 40 until after the structures of FIGS. 3 and 4 are interengaged. If channel 50 were welded to angle irons 40 before the structures of FIGS. 3 and 4 are interengaged, the channel could not pass through angle irons 22, and therefore would not be able to move into alignment with channel 17.

Legs 24 and 42 of angle irons 22 and 40 are secured together by bolts or screws 53 which extend through slots 25 and holes 43 to provide a pin and slot connection that permits the adjacent interengaged mold sections to move relative to each other at right angles to the longitudinal axis of the mold a distance equal to the length of slot 25. This movement between adjacent mold sections is effected by flexible tubular conduits 54 and 55 that are alternately expanded and deflated by air or any suitable hydraulic fluid under pressure.

Channels 17 and 50 cooperate to provide a space for receiving a flexible tubular conduit that may be in the form of a fire hose, for example. Channels 18 and 37 similarly provide a space for receiving a similar flexible conduit 55. Flanges 26 and 28 of channel 17 cooperate with oppositely disposed flanges 51 and 52 of channel 50 to prevent transverse movement of conduit 54 and maintain its longitudinal alignment with channels 17 and 50 for purposes hereinafter disclosed. Similarly, flanges 27 and 29 of channel 18 cooperate with oppositely disposed flanges 38 and 39 of channel 37 to prevent transverse movement of conduit 55 and maintain its longitudinal alignment with channels 18 and 37. Preferably all conduits 54 are connected, through pipes 56 (FIG. 8), to one side of a manifold (not shown) that is connected to a source of air under pressure, and all conduits 55 are connected, through pipes 57, to the opposite side of the manifold.

Positioning of conduits 54 and 55 completes the assembly of the mold except for closing the outer surfaces of the longitudinal edge portions of each mold section and the longitudinally extending gaps between the mold sections. A closure unit 58 is applied to each gap and to the longitudinal edge portions of the mold sections adjacent thereto. Each closure unit 58 comprises two flat outer plates 59 and 60, of the same length as the mold, adapted to extend longitudinally of the mold and having their adjacent edges connected by a longitudinal strip 61 of flexible material, such as, for example, rubberized fabric. Opposite longitudinal edges of flexible strip 61 are bolted to edges of plates 59 and 60, as indicated at 62.

Plates 59 and 60 are secured to frames 16 and 31, respectively, of adjoining mold sections by flat headed screws 63 flush with the outer surface of plates 59 and 60. The longitudinal edges of plates 59 and 60 opposite the edges bolted to strip 61 normally engage one longitudinal edge of the curved intermediate plates 45 of adjacent mold sections. The outer surface of each of the plates 59 and 60 is flush with the outer surface of plate 45 adjacent said meeting edges. If the mold has been increased in size, the spacer channel inserted between the intermediate portion and the longitudinal edge portion of each mold section involved has its outer surface flush with the adjacent intermediate plate 45 and the adjacent portion of the outer surface of plate 59 or 60.

In operation, the mold is placed in the open form,

preferably after enough concrete has been poured into the form for the bottom of the beam, and is secured in place by conventional hold down means (not shown). The mold is then adjusted to void-forming position by simultaneously inflating all conduits 54 and venting conduits 55 to the atmosphere. The air pressure line leading to the manifold is provided with a gage (not shown) so that the pressure may be accurately controlled. One end of each conduit 54 and 55 is closed so that the air pressure expands each conduit transversely. If the conduits are connected to the manifold intermediate their ends, both ends of each conduit are closed. A three-way valve (not shown) mounted in the pressure line vents conduits 55 to the atmosphere when it directs air into conduits 54, and similarly vents conduits 54 when it directs air into conduits 55.

Expansion of conduits 54 causes each channel 37 to move away from the adjacent channel 18, thereby moving each channel 50 toward adjacent channel 17, since channels 37 and 50 are each rigidly secured to angle irons 40. The movement of channels 50 toward channels 17 collapses conduits 55 and forces the air from them. Movement of channels 37 and 50 in the above mentioned direction force adjacent mold sections apart, thereby expanding the mold into void-forming position. The movement of channels 37 and 50, relative to channels 17 and 18, is limited by the length of slots 25.

Plates 59 and 60 may be coplanar, but preferably each plate 59 is inclined outwardly at an angle of about 3 degrees toward the adjacent edge of the plate 60 of the adjacent mold section. Similarly, each plate 60 is inclined outwardly toward the adjacent edge of the plate 59 of the adjacent mold section. The angularity of plates 59 and 60 facilitates the separation of said plates from the surface of the concrete after the concrete has set, and thereby facilitates movement of the mold sections to retracted position.

In the void-forming position of the mold, the adjacent longitudinal edges of plates 59 and 60 are separated, and the gap between them is closed by flexible strip 61. Since the flexible strip is secured to the inner surfaces of plates 59 and 60, the outer surface of the mold is recessed a distance equal to the thickness of plates 59 and 60 at each gap between said plates. These recessed areas cause the formation of an inwardly extending projection 64 extending longitudinally along the inner surface of each wall of the concrete beam. The longitudinal edge of each plate 59 adjacent the gap is tapered, as indicated at 65, and the corresponding edge of plate 60 is tapered, as indicated at 66, to facilitate separation of said edges from the concrete when the mold sections are moved toward retracted position.

Since channels 17, 18, 37 and 50 are each rigidly secured to each of the mold sections 12, 13, 14 and 15, whenever the channels are moved in either direction by the inflation of conduits 54 or 55 each mold section must move with the channels secured thereto. In FIG. 1 the mold sections are in expanded, void-forming position. After the concrete has set, conduit 54 is vented to the atmosphere, and conduit 55 is inflated, as shown in FIG. 2. Referring to FIGS. 1 and 2, inflation of conduits 55 adjacent opposite edges of mold section 14 exerts forces tending to pull it upwardly and toward the left, resulting in an inward movement of said section at an angle of approximately 45 degrees. At the same time similar forces are exerted against section 15 tending to pull it upwardly and to the right. In the same manner each mold section is pulled inwardly toward the longitudinal center of the void at an angle of 45 degrees to retract the mold. The inward movement of each section is limited by the length of slots 25.

Although we have described a preferred embodiment of the invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, since many details of structure may be modified or changed without departing from the spirit or scope of the invention. Accordingly, we do not desire to be restricted to the exact structure described.

We claim:

1. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinal mold sections, each of said mold sections having longitudinal edge portions positioned adjacent the longitudinal edge portions of two adjacent mold sections, two series of interconnected longitudinally extending expansible members positioned adjacent said longitudinal edge portions of said mold sections, projections rigidly secured to each of said mold sections adjacent said longitudinal edge portions, each of said expansible members engaging and being held between two of said projections secured to edge portions of two adjacent mold sections, and means for alternately expanding the expansible members of one of said series of expansible members in a transverse direction and simultaneously deflating the expansible members of said other series of expansible members to alternately separate the projections engaged by each of said expansible members, and thereby move said mold sections into void-forming position and into retracted position.

2. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinally extending angular mold sections, flexible strips securing longitudinal edge portions of adjacent mold sections together, two separate series of interconnected longidudinally extending members positioned adjacent the longitudinal edge portions of said mold sections, said longitudinally extending members being expansible in a transverse direction under the influence of internal fluid pressure, projections rigidly secured to each of said mold sections adjacent said longitudinal edge portions, each of said longitudinally extending members engaging and being held between two of said projections secured to edge portions of two adjacent mold sections, and means for applying internal fluid pressure to the longitudinally extending members of either series to expand them transversely and thereby separate the projections engaged thereby to move said mold sections alternately into void-forming position and into retracted position.

3. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinal mold sections, each of said mold sections having longitudinal edge portions positioned adjacent the longitudinal edge portions of two adjacent mold sections, an expansible member positioned adjacent the longitudinal edge portions of each mold section, cooperating means on the longitudinal edge portions of adjacent mold sections engaging each of said expansible members and holding them against accidental displacement, means for selectively expanding said expansible members, said expansible members spreading the cooperating means in engagement therewith as they are being expanded, some of said cooperating means being so connected to said mold section as to move said mold sections into void-forming position as they are spread apart, said other cooperating means being so connected to said mold sections as to retract said mold sections as they are spread apart.

4. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinal mold sections, each of said mold sections having longitudinal edge portions adjacent the longitudinal edge portions of two adjacent mold sections, an expansible member positioned adjacent the longitudinal edge portion of each mold section, a pair of channels secured to each of said longitudinal edge portions, each of said channels cooperating with a channel of the other pair to engage one of said expansible members and hold it against accidental displacement, means for selectively expanding half of said expansible members simultaneously, said expansible members moving the channels engaged thereby outwardly

from each other, half of said channels being so connected to said mold sections as to spread the mold sections into void-forming position as the expansible members engaging said last mentioned channels are being expanded, said other half of said channels being so connected to said mold sections as to retract said mold sections as the expansible members engaging said last mentioned channels are being expanded.

5. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinal mold sections, an expansible member extending longitudinally of said mold adjacent each longitudinal edge of each mold section, cooperating means on said mold sections edjacent each longitudinal edge engaging said expansible members and holding them against accidental displacement, means for selectively expanding said expansible members, half of said expansible members moving the cooperating means engaged thereby to spread said mold sections into void-forming position as said expansible members are being expanded, said other expansible members moving the cooperating means engaged thereby to retract said mold sections as said last mentioned expansible members are being expanded.

6. A retractable mold for forming voids in concrete products, said mold comprising a plurality of closely spaced longitudinal mold sections, cooperating channels on the longitudinal edge portions of adjacent mold sections, two expansible members each engaging and being held between two of said channels, means for selectively expanding said expansible members to move the channels engaged thereby outwardly, two of said channels being so connected to said mold sections as to spread said mold sections into void-forming position as one of said expansible members is being expanded, said other two channels being so connected to said mold sections as to retract said mold sections as the expansible member engaging them is being expanded.

7. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinal mold sections, each of said mold sections having longitudinal edge portions positioned adjacent the longitudinal edge portions of two adjacent mold sections, a pair of longitudinally extending channels projecting inwardly from each mold section adjacent each longitudinal edge portion of each mold section, both channels projecting inwardly from one of said mold sections being positioned between the channels projecting inwardly from the adjacent edge of an adjacent mold section, an expansible member engaging each channel of one of said pairs of channels and the adjacent channel of said other pair of channels, means for selectively expanding said expansible members, one of said expansible members moving the channels engaged thereby to spread said mold sections into void-forming position as it is being expanded , said other expansible member moving the channels engaged thereby to retract said mold sections as it is being expanded.

8. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinally extending mold section, plates projecting inwardly from the longitudinal edge portions of said mold sections, each of the plates being juxtaposed against a plate projecting from the adjacent longitudinal edge portion of an adjoining mold section, a pin and slot connection between each pair of juxtaposed plates, a pair of longitudinally extending channels rigidly secured to the plates projecting from the edge portion of one mold section, a second pair of longitudinally extending channels rigidly secured to the plates projecting from the adjacent edge portions of an adjoining mold section, said second pair of channels being interposed between said first mentioned pair of channels, an expansible member held between each of said channels and the adjacent channel of the other pair of channels, means for expanding one of said tubular conduits to spread the channels between which it is held, the movement of said last mentioned channels being effective to move said adjacent mold sections into void-forming position, and means for expanding said other tubular conduit to spread the channels between which it is held and thereby retract said adjacent mold sections.

9. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinally extending mold sections, a series of plates projecting inwardly from the longitudinal edge portion of one of said mold sections, a second series of plates projecting inwardly from the adjacent longitudinal edge portion of an adjoining mold section, the plates of one series being slidably connected to the plates of the other series to permit limited sliding movement therebetween, a pair of longitudinally extending channels rigidly secured to the plates of said first series, a second pair of longitudinally extending channels rigidly secured to the plates of said second series, said second pair of channels being interposed between said first mentioned pair of channels, a tubular conduit held between each of said channels and the adjacent channel of the other pair of channels, means for inflating one of said tubular conduits to spread the channels between which it is held, the movement of said last mentioned channels being effective to move said adjacent mold sections into void-forming position, and means for inflating said other tubular conduit to spread the channels between which it is held and thereby retract said adjacent mold sections.

10. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinally extending mold sections, a series of plates projecting inwardly from the longitudinal edge portion of one of said mold sections, a second series of plates projecting inwardly from the adjacent longitudinal edge portion of an adjoining mold section, the plates of one series being slidably connected to the plates of the other series to permit limited sliding movement therebetween, a pair of longitudinally extending channels rigidly secured to the plates of said first series, a second pair of longitudinally extending channels rigidly secured to the plates of said second series, said second pair of channels being interposed between said first mentioned pair of channels, a tubular conduit held between each of said channels and the adjacent channel of the other pair of channels, and means for separately inflating each of said tubular conduits held between one channel of said first pair of channels and the adjacent channel of said second pair of channels, and simultaneously deflating the tubular conduits held between the other channel of each of said first pair of channels and the adjacent channel of each of said second pair of channels, the inflation of said first mentioned tubular conduits being effective to move said adjacent mold sections outwardly into void-forming position, and the inflation of said second mentioned tubular conduits being effective to retract said adjacent mold sections.

11. A retractable mold for forming voids in concrete products, said mold comprising a plurality of longitudinally extending angular mold sections, a plurality of plates projecting inwardly from the longitudinal edge portions of each of said mold sections, each of said plates being slidably connected to a plate projecting from the adjacent longitudinal edge portion of an adjoining mold section to permit limited sliding movement therebetween, a first pair of longitudinally extending channels rigidly secured in back to back relationship to the plates projecting from corresponding edges of each mold section, a second pair of longitudinally extending channels rigidly secured to the plates projecting from the opposite edge of each mold section, said second pair of channels being aligned with said first mentioned pair of channels and spaced on opposite sides thereof to provide a space be-

tween each channel of said first pair of channels and the adjacent channel of the second pair of channels, a first expansible member held in longitudinally extending position in each of said spaces between corersponding channels of the first pair of channels and the adjacent channel of the second pair of channels, a second expandsible member held in longitudinally extending position in each of said spaces between the other channels of the first pair of channels and the adjacent channels of the second pair of channels, means for expanding each of said first expansible members and to simultaneously deflate each of said second expansible members to spread the channels between which said first expansible members are held, the movement of said last mentioned channels being effective to move said adjacent mold sections into void-forming position, and means for expanding said second expansible members and simultaneously deflating each of said first expansible members to spread the channels between which said second expansible members are held and thereby retract said adjacent mold sections.

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