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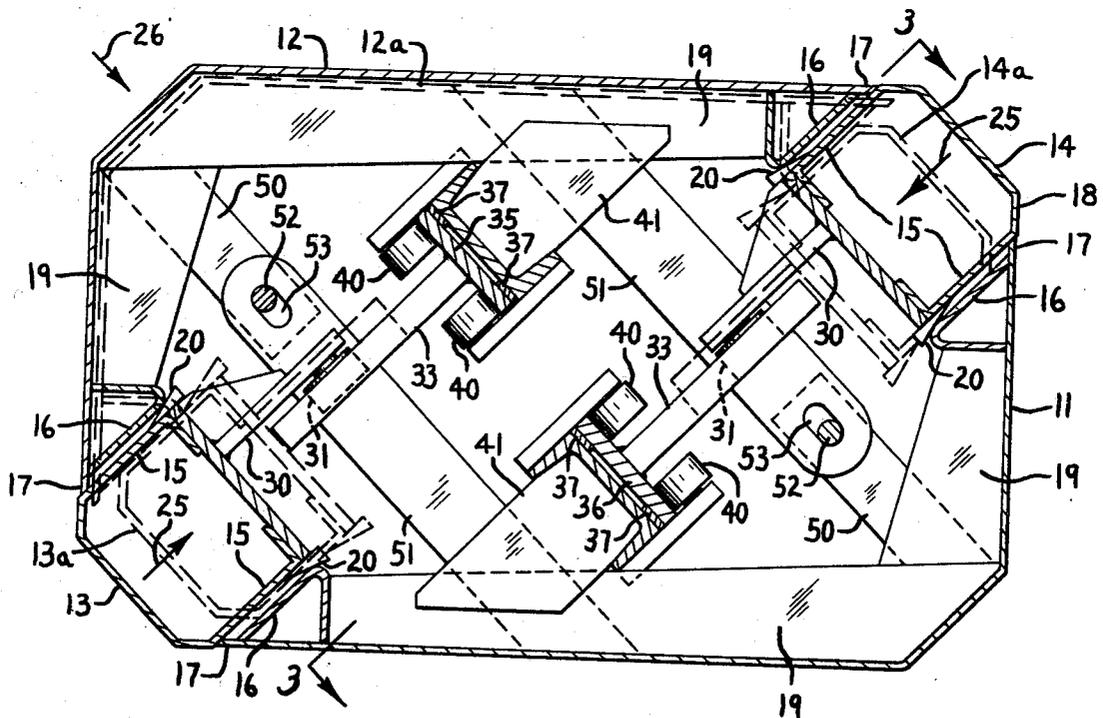
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[54] **COLLAPSIBLE CORE FOR CONCRETE BOX GIRDER**
 6 Claims, 3 Drawing Figs.

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 [51] Int. Cl. B28b 7/30
 [50] Field of Search..... 249/48, 63,
 64, 82, 175, 179, 180, 181, 182, 184, 186; 25/128
 (E), 128 (K), 128 (S), 128 (R), 128.1; 18/45 (M),
 (Camming Digest), (Core Digest)

ABSTRACT: The core comprises a pair of identical upper and lower members which are L-shaped in cross section and two corner members. The two corner members are diagonally opposite each other and are retractable in two parallel approximately diagonal planes by cam followers actuated by cams on a pair of longitudinally slidable actuating strips. The girder is molded in horizontal position, the upper L-shaped core member moving down by gravity in an approximately diagonal direction perpendicular to said parallel planes when the corner members are retracted.



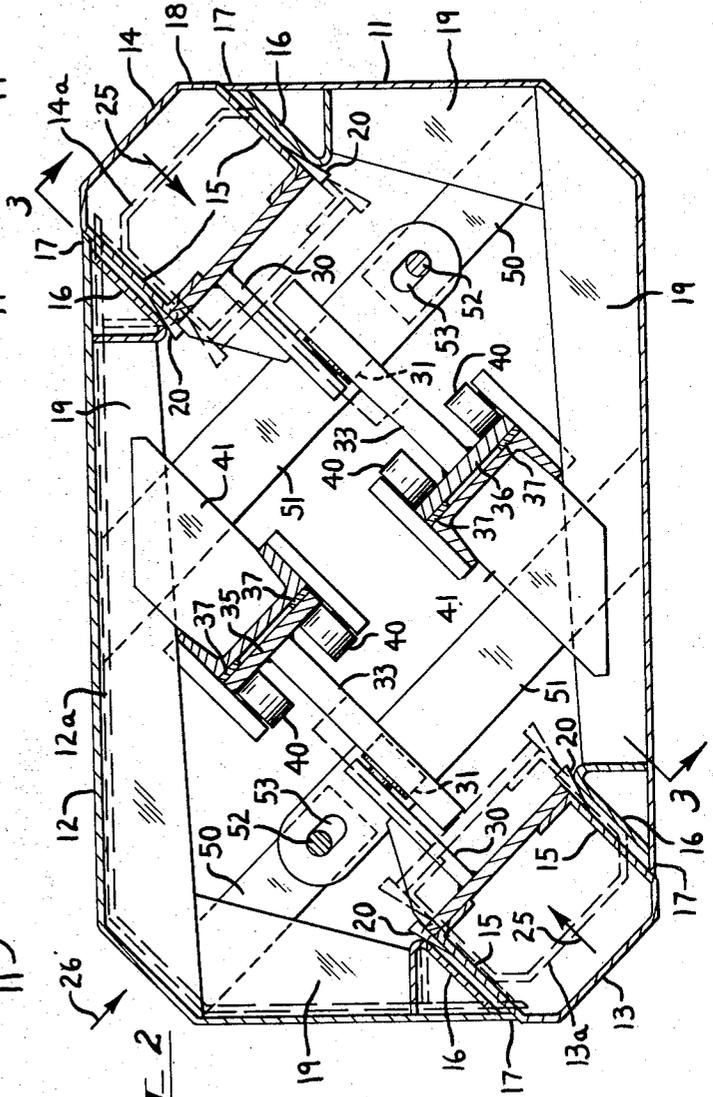
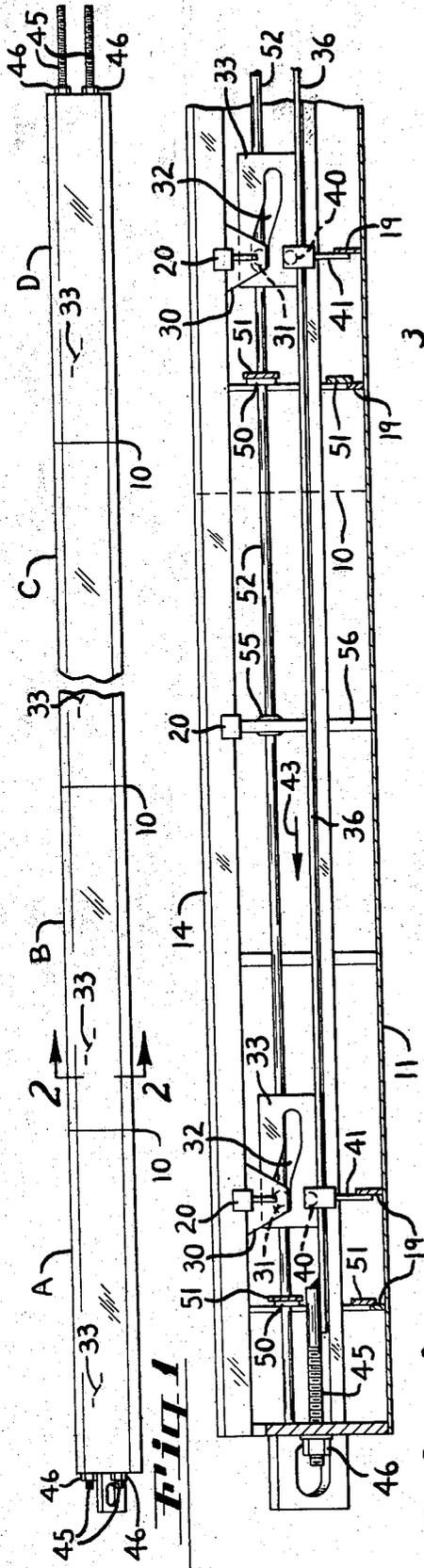


Fig. 3

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COLLAPSIBLE CORE FOR CONCRETE BOX GIRDER

BACKGROUND OF THE INVENTION

This invention relates to a collapsible core for molding concrete box girders, hollow piles and the like.

In molding an elongated hollow concrete structure, such as a box girder or a pile, it is necessary to provide a collapsible core which may be withdrawn from one end of the structure after the concrete has set. Cores heretofore used for such purposes have been objectionably complicated and expensive, difficult to use and have not been suited for use in unusually long girders or piles.

Objects of the invention are to provide a collapsible core for such purposes which is of relatively simple construction, less expensive to make, easier to use, adapted for use in horizontal position and well adapted for structures of great length, such as unusually long box girders and hollow piles.

SUMMARY OF THE INVENTION

The present core is designed for use in horizontal position. It comprises essentially a pair of upper and lower side members which are L-shaped in cross section and two diagonally opposite corner members. The two corner members are retractable in two parallel approximately diagonal planes, allowing the upper side member to retract by gravity, moving in an approximately diagonal direction perpendicular to said two planes.

This arrangement obviates the necessity for providing positive retracting means for the side members whereby the retracting mechanism is rendered relatively simple and inexpensive to manufacture. This arrangement is also well adapted to the fabrication of cores of any desired length. The corresponding side and corner members in standard length sections may be welded together end-to-end with keeper bars and cam-actuating strips running continuously through all the sections. Longitudinal movement of the actuating strips collapses all the sections simultaneously.

The invention will be better understood and additional objects and advantages will become apparent from the following description of the preferred embodiment illustrated in the accompanying drawing. Various changes may be made, however, in the details of construction and arrangement of parts and certain features may be used without others. All such modifications are included in the invention. BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevation view of a collapsible core embodying the principles of the invention;

FIG. 2 is an enlarged cross-sectional view on the line 2-2 in FIG. 1; and

FIG. 3 is a view in reduced scale on the line 3-3 in FIG. 2. DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a plurality of identical 10-foot core sections A, B, C and D welded together at joints 10 to make a core of desired length. Each section comprises essentially a lower side member 11, an upper side member 12, a lower corner member 13 and an upper corner member 14. The side members 11 and 12 are identical, each being of L-shape in cross section having a rigid corner portion interconnecting a horizontal side and a vertical side. The two corner members 13 and 14 are also identical and occupy diagonally opposite positions in the core between side members 11 and 12. The core is used in horizontal position as shown in FIGS. 1 and 2.

Each corner member 13 and 14 is of hollow construction with parallel opposite sidewalls 15 slidable between two parallel inclined walls 16 extending inwardly from adjacent portions of side members 11 and 12. The outer surface plates of side members 11 and 12 have beveled edge portions 17 projecting beyond the walls 16 and the corner members 13 and 14 have beveled corner surfaces 18 parallel with the adjacent surfaces of the side members. Interiorly, the side members 11 and 12 are stiffened at intervals by gusset plates 19.

When the core parts are expanded to normal position, the sidewalls 15 of corner members 13 and 14 fit snugly between

the beveled projecting edges 17 of the side members 11 and 12 as shown in solid lines. The beveled corner surfaces 18 on the corner members form a continuation of the surfaces of the side members without any appreciable gaps in the joints. Walls 16 of the side members are held spaced from walls 15 of the corner members by pairs of wedge blocks 20 at intervals along the corner members.

Mechanisms presently to be described is provided for retracting the corner members in the directions of arrows 25 to the broken line positions shown at 13a, and 14a. When the core members are thus retracted, withdrawal of the wedge blocks 20 from the walls 16 allows the underneath walls 15 of both corner members 13 and 14 to drop down on the underlying supporting walls 16 of the lower side member 11 and allows the overlying walls 16 of upper side member 12 to drop down on the upper walls 15 of the side members. The retraction of corner members 13 and 14 is by positive cam action while the retraction of upper side member 12 is by gravity. Upper side member 12 is constrained by means presently to be described to move in the approximately diagonal direction of arrow 26 to its retracted or collapsed position as indicated in broken lines at 12a. In collapsed condition the projecting edges 17 of the side members overhang the beveled surfaces 18 of the corner members as also indicated in broken lines. Thus, it will be observed that the corner members 13 and 14 retract in two parallel approximately diagonal planes as indicated by the arrows 25 while the upper side member 12 retracts by movement in an approximately diagonal plane perpendicular to said planes as indicated by arrow 26, the corner members 13 and 14 being moved by mechanical means and the side member 12 being moved by gravity. This combination of movements of the two corner members and the upper side member collapses the core in all directions so that it may readily be withdrawn lengthwise from the core cavity in the concrete structure.

Each corner member 13 and 14 is equipped with a bracket 30 carrying a cam follower roller 31. Each roller 31 rides in a cam slot 32 in a cam plate 33. The two cam plates 33, the four walls 15 and the four walls 16 are all parallel with each other. One cam plate 33 is mounted on a longitudinal actuating strip 35 and the other is mounted on a longitudinal actuating strip 36. These strips have longitudinal movement between slide bearings 37 and guide rollers 40. These bearings and rollers are mounted on brackets 41 on the gussets 19, actuating strip 35 for the lower corner member 13 being carried by upper side member 12 and actuating strip 36 for upper corner member 14 being carried by lower side member 11.

Actuating strip 36 appears in FIG. 3, the strip normally being disposed in the position shown. When the strip 36 is pulled in the direction of arrow 43, corner member 14 is retracted by the movement of cam slot 32 on roller 31. Similarly, longitudinal movement of actuating strip 35 retracts corner member 13 to its broken line position at 13a, in FIG. 2. Longitudinal movement of the actuating strips in opposite directions may be produced by threaded studs 45 and nuts 46 on opposite ends of the strips or by double acting hydraulic actuators connected to one end of each strip. The two actuating strips 35 and 36 may be connected together at their ends for simultaneous reciprocation by a single actuating means, if desired. FIG. 1 shows a threaded stud 45 and nut 46 on each end of each strip 35 and 36.

Side members 11 and 12 are further equipped with short bracket arms 50 and long bracket arms 51 mounted on gusset plates 19. A pair of longitudinal keeper bars 52 extend through slots 53 in the overlapping ends of these bracket arms to hold the parts in assembled relation. Slots 53 are elongated in directions perpendicular to the planes of cam plates 33 to control the direction of movement of upper side member 12 as indicated by arrow 26. The keeper bars 52 may be supported at one or more intermediate points by guides 55 in a transverse member or members 56.

As previously explained, the core is made of a plurality of identical sections such as A, B, C and D to provide the neces-

sary length. Each of the four members 11, 12, 13 and 14 in adjacent sections are welded together end to end at each joint 10. There is a pair of the cam plates 33 near the left end of each section as indicated symbolically in FIG. 1. Right end section D may be equipped with another set of cam plates near the extremity of the core, if desired, and each section may be equipped with additional sets of cam plates, if desired. Actuating strips 35 and 36 and keeper bars 52 extend continuously through all the sections whereby all the sections are expanded and contracted simultaneously.

I claim:

1. A collapsible core comprising a pair of side members of generally L-shape in cross section, a pair of diagonally opposite corner members disposed adjacent edge portions of said side members, cam followers on said corner members, a pair of longitudinal actuating strips having cam plates operative on the cam followers of said corner members, respectively, guide means on one of said side members for one of said actuating strips, guide means on the other side member for the other actuating strip, means for sliding said actuating strips in opposite longitudinal directions to retract and extend said corner members, guide means interconnecting said side members for relative movement toward and away from each other, said last guide means comprising overlapping arms on said side members having registering elongated slots therein, and longitudinal keeper bars extending through said slots to hold said members in assembled relation and guide the direction of said relative movement.

2. A core as defined in claim 1 disposed in horizontal position, one of said side members being a lower member and the other of said side members being an upper member, said upper member resting on said corner members and being

movable toward said lower member by gravity when said corner members are retracted.

3. A core as defined in claim 1 including wedge blocks on said corner members engageable with said side members to move said side members relatively away from each other when said corner members are extended.

4. A collapsible core comprising a pair of side members of generally L-shape in cross section, a pair of diagonally opposite corner members disposed adjacent edge portions of said side members, cam followers on said corner members, a pair of longitudinal actuating strips having cam plates operative on the cam followers of said corner members, respectively, guide means on one of said side members for one of said actuating strips, guide means on the other side member for the other actuating strip, means for sliding said actuating strips in opposite longitudinal directions to retract and extend said corner members, guide means interconnecting said side members for relative movement toward and away from each other, each of said side members having a narrow side and a wide side, said guide means for said actuating strips being mounted on said wide sides, and said cam plates on said pair of actuating strips being laterally spaced from each other in two parallel planes for movement of said corner members in said two planes.

5. A core as defined in claim 4, said pair of side members being movable relatively toward and away from each other in a direction at right angles to said two parallel planes.

6. A core as defined in claim 1 in which each of said members is connected end-to-end with the corresponding members of a second identical core, said longitudinal actuating strips extending through both of said cores.

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