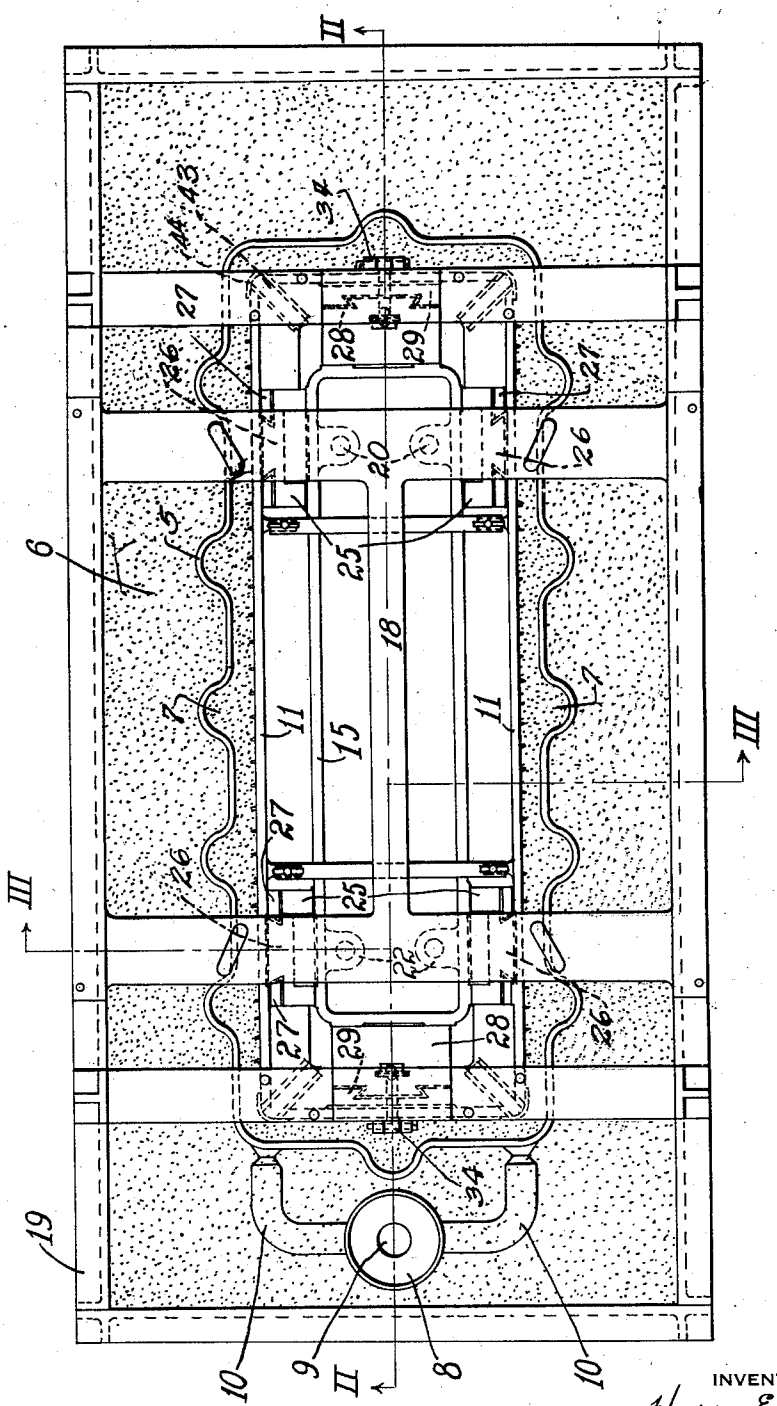
Oct. 7, 1930. H. E. SHELDON 1,777,506

MECHANISM FOR CASTING ANNEALING BOX COVERS

Filed March 8, 1929 4 Sheets-Sheet 1

Fig. 1.



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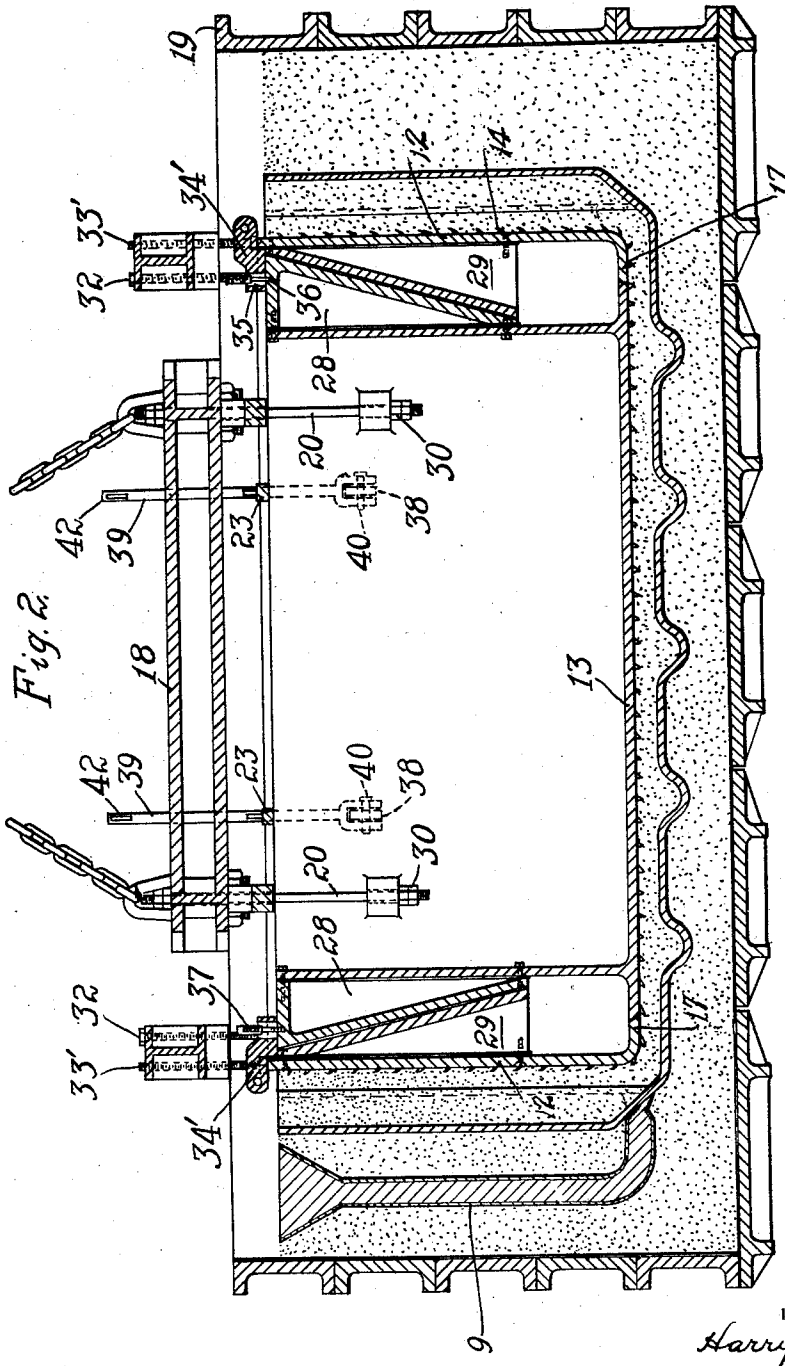

Fig. 2.

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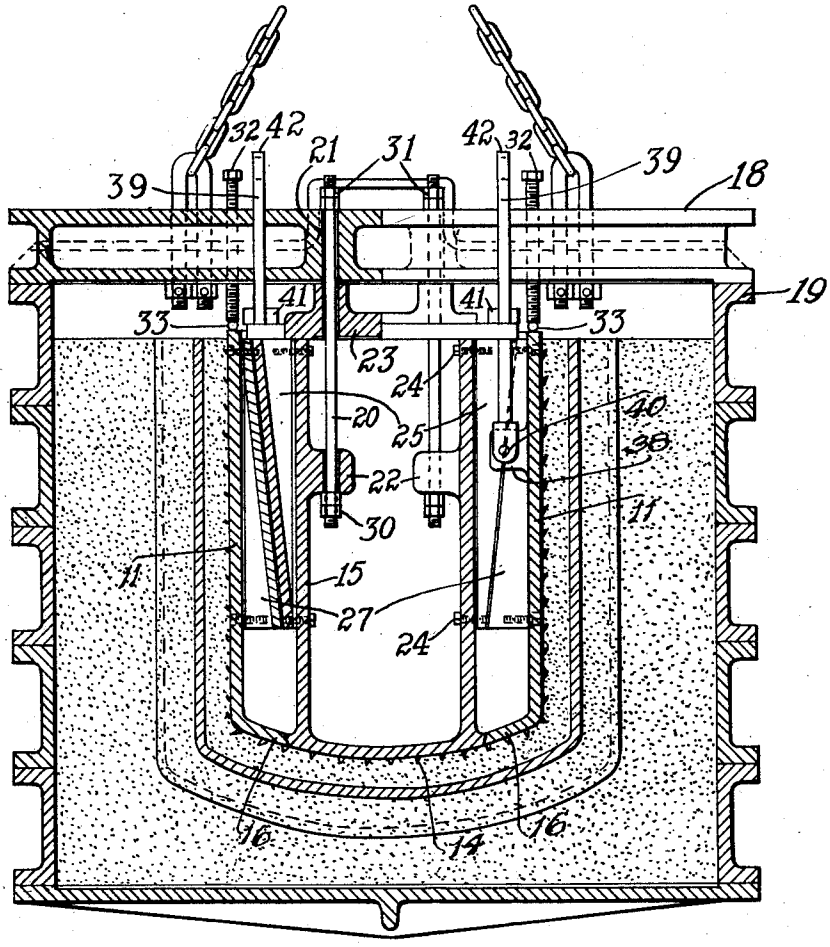
Fig. 3.



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MECHANISM FOR CASTING ANNEALING BOX COVERS

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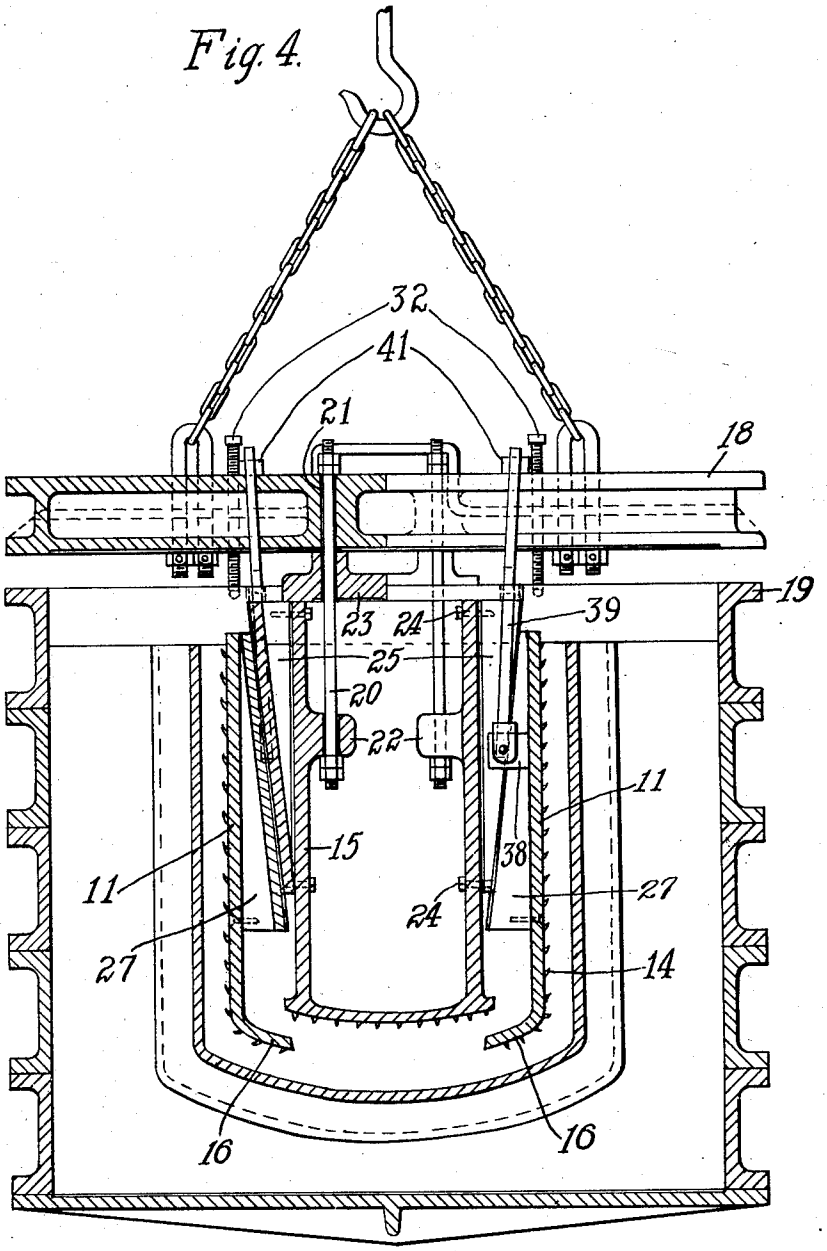
Fig. 4.



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UNITED STATES PATENT OFFICE

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MECHANISM FOR CASTING ANNEALING-BOX COVERS

Application filed March 8, 1929. Serial No. 345,416.

This invention relates to casting and more particularly to collapsible core supports for sand molds employed in connection with casting operations, and more especially to those employed in the casting of annealing box covers or similar structures.

In my co-pending application Serial No. 345,417, filed March 8, 1929, I have described an improved method of casting annealing box covers and an object of the present invention is to provide a simple, practical and rugged apparatus for use in casting annealing box covers by such method.

A further object is to provide an improved form of collapsible sand core support for providing a support for the sand core during the pouring operation but constructed and arranged so as to permit the collapse of such core after the metal has "set".

These and other objects which will be apparent to those skilled in this particular art are accomplished by means of the invention illustrated in the accompanying drawings in which Fig. 1 is a top plan view of a box casting mechanism provided with a collapsible core support constructed in accordance with one embodiment of this invention. In order to illustrate the mold cavity I have shown in top plan, the flask, the mold formed within the flask, the core frame, with the sand core thereof suspended in proper position within the mold whereby the mold cavity is formed between the mold and the core. Fig. 2 is a longitudinal sectional view of the elements shown in Fig. 1 on the line II—II thereof, but in this view it is assumed that the mold cavity is filled with molten metal. It is assumed that the view is taken at the instant pouring is finished and before the core is collapsed. Fig. 3 is a sectional view in elevation taken on the line 3—3 of Fig. 1 and it also assumes that the mold cavity is filled with molten metal. Fig. 4 is a view in some respects similar to Fig. 3 since it is taken on the same line but the mold forming the sand core is omitted and the core supporting device is shown as it appears during the core collapsing operation.

Although the present invention is shown in connection with a mechanism for casting annealing box covers in inverted position, it will be readily apparent that the device is equally applicable to other casting operations. As illustrated, a mold cavity 5 is provided in the sand mold 6 between the mold and a collapsible core 7. In Fig. 1, I have shown the mold cavity before actual pouring of the metal. The device is arranged for bottom pouring and I pour through an opening 8 having a single vertical channel 9 (Figs. 1 and 2) and branch channels 10 for connection with the mold cavity at the bottom thereof and at opposite sides of one end thereof.

Since I cast the covers in inverted position, the pouring channels connect with the mold cover at a point which in the finished cover will be adjacent one end thereof near its top, thus insuring that the top of the cover is cast from the hottest metal. This insures homogeneous gas tight tops, for whatever impurities are in the metal will rise in the mold cavity to the top thereof and will appear in the covers at the sides and ends. When the bottoms of the covers are faced off, those impurities which could cause porous spots are removed.

The present invention permits the collapse of the core 7 as soon as pouring is finished and the casting "sets" to allow the metal to shrink without setting up such strains as would occur if the core were not collapsed. This is most important in the casting of ferrous alloys containing a high percentage of steel alloy elements, such for example, as chromium or nickel, because of the relatively great coefficient of linear expansion.

The particular core support which has been chosen for the purpose of illustration includes two side members, two end members and a bottom member and means for holding said members in core supporting position and for moving the same to collapse the core. The outer surface of the side members 11, end members 12 and bottom member 13 are provided with gaggers 14 for facilitating adhesion between the outer surfaces of these members and the sand forming core.

Suspended in position within the space defined by the side and end members is a box-like frame 15. The top of this frame is open

and the bottom, which is closed, forms the bottom of the core support or rather the central section of the bottom of the core support, since the side and end members extend inwardly at their bottoms as shown at 16 and 17.

When the frame 15 is in supporting position as shown in Figs. 2 and 3, the bottom thereof lines up with the inwardly extending bottom portions of the sides and ends.

The central frame 15 is more or less rigidly secured to a supporting frame 18, which, prior to and during the casting operation is supported upon the flask 19 within which the mold is formed. A connection between support frame 18 and central frame 15 is made by means of four rods or bolts 20 which project through the support frame 21 and through ears 22 which project inwardly from frame 15. A spacer casting 23, for each pair of rods or bolts 20, is interposed between the top of frame 15 and the bottom of support frame 18, so that, even though there is a considerable space between the bottom of the supporting frame 18 and the top of frame 15, a more or less rigid connection between these frames is secured.

Secured to the sides of the frame 15 adjacent its opposite ends, by means of screws 24, are vertically positioned wedgelike members 25. These members project outwardly from the side of the frame 15 and have a dovetailed connection 26, see Fig. 1, with reversely or invertedly arranged wedgelike members 27 which are secured to and project inwardly from the inner sides of side members 11.

The ends of frame 15 adjacent their centers are also provided with outwardly extending vertically positioned wedgelike members 28, Figs. 1 and 2, corresponding to wedgelike members 25, and these members 28 dovetail with the reversely or invertedly arranged members 29 which are secured to and project inwardly from end members 12.

Figs. 2 and 3 illustrate the mold support in expanded operative position. The central member 15 is rigidly secured to supporting frame 18 by means of rods 20 which carry at their lower threaded ends nuts 30 and at their upper threaded ends nuts 31.

Hold down screws 32 threaded through supporting frame 18 have their lower ends hollowed out to receive balls 33. The hollowed ends are peened over so that the balls are retained in position, but permit the rotation of the hold down screws. These balls bear on the top surface of side members 11 and hold these members in core supporting position.

Screws 33′ which are also threaded through supporting frame 18 and are identical with screws 32 have similar ball ends bearing on the top surface of the end members 12 when the core support is in supporting position.

Positioned at the center of each end member and hinged thereto as shown at 34, Fig. 1, is a supporting dog 34′. This dog at its free end is provided with an opening 35 extending therethrough from top to bottom and adapted to receive a key or holder 36 which is formed in the manner of a pin threaded into the top member of wedge 28 and enlarged at its upper end and provided with a laterally extending slot for receiving a key 37, see Fig. 2.

When the core support is in expanded operative position, Figs. 2 and 3, keys 37 extend through slots in the key holder 36 and rigidly support the end members 12 preventing them from moving down below such operative position.

Each of the side members 11 is provided with two inwardly extending ears 38 and each of these ears supports a rod 39. The lower end of each rod 39 is bifurcated and straddles its ear 38 to which it is secured by a suitable pin 40.

When the parts are assembled these rods extend up through holes or slots formed therefor in the supporting frame 18 and each rod is provided with a laterally extending slot immediately above the spacer casting 23 for the insertion of a key 41 and a second laterally extending slot 42 is located adjacent the top of each rod.

When the keys 41 are placed in the upper slots 42 of rods 39, the keys 37 are removed from their slots. This permits the dogs 34 to swing upwardly about their pivot pins as the support 18 is lifted, thus allowing end members 12 to move inwardly or downwardly with relation to the forward moving center frame 15. In other words, after the frame 15 is raised by the lifting of the associated support frame 18, the end and side members move inwardly or toward the center member 15, collapsing the core supports and the core carried thereby. The keys 41, when positioned in the upper slot of their associated rods, prevent the end of the rods from sliding through the slotted frame, and permit or cause the rods to be raised with the frame 18, when the keys contact with the upper face of the supporting frame 18.

The end and side members are so formed that when the assembly is in operative position a space is left at the miter joint between the members, and this space which is shown in dotted lines at 43, Fig. 1, is closed or covered by means of sheet metal strips 44. These strips are bent so as to close the corner openings and lap over the sides and ends, and are so formed as to extend underneath the core supporting surfaces of the side and end members and the corners as shown in Fig. 1 at 43. These are held in place by the sand forming the core and when the core is collapsed they are easily forced out of place.

In operation, the mold 6 is formed in a flask in the usual manner of forming dry sand molds. The mold surfaces are swept

and the mold baked. The mold support suspended from the support frame 18 in expanded operative position is covered with the sand core 7 and formed to the proper contour by sweeping and it is then baked. The core and core support are positioned in the flask and the metal poured into the opening.

When the casting has "set" the keys 37 are removed from the key holders and the keys 41 removed from the lower slots in the rods 39 to permit the central frame to move upwardly with respect to the side and end members respectively. The keys 41 are placed in the upper slots 42 of the rods 39. Upward movement of the support frame 18 and central mold frame 15, see Fig. 4, through the sliding wedge shaped connections of the central frame with the side and end members, causes the latter to move inwardly into the contracted position shown in Fig. 4, allowing the sand core to collapse permitting shrinkage of the casting. The keys 41 in the upper slots or rods 39 provide supports for the side members 11 in the collapsed position.

Although I have described a specific form of core support in more or less detail, it will be readily understood that various changes, additions, omissions and substitutions can be made therein without departing from the spirit of this invention or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A collapsible sand core supporting frame, having separate side and end members provided with inwardly projecting lower ends and a vertically movable member located within the space formed between the side and end members and having a bottom, which in conjunction with said inwardly projecting lower ends of said side and end members completes the support for the bottom of said core, said movable member having means disposed on its outer side cooperating with the inner sides of said side and end members for holding said members in position.

2. In a sand core support for use in casting annealing box covers in an inverted position, spaced apart side members each having an inwardly projecting lower end forming a support for a portion of the bottom of the sand core, spaced apart end members having similar projections on their lower ends, a member located within the space bounded by the side and end members and adapted to be raised from and lowered into position within said space and having a bottom which when in lowered position fills the space between the lower inwardly projecting ends of the side and end members and means connecting the central member to the side and end members and which is adapted when the central member is raised to cause the side and end members to move inwardly for the purpose of collapsing the support and the sand core carried thereby.

3. In a sand core support for use in casting annealing box covers in an inverted position, spaced apart side members each having an inwardly extending lower end forming a support for the bottom of the sand core, spaced apart end members having similar projections on their lower ends, a vertically movable member located within the space bounded by the side and end members and having a bottom which when in conjunction with the inwardly projecting lower ends of the side and end members, completes the support for the bottom of the sand core, and means connecting the vertically movable member to the side and end members and employing inclined elements which are adapted when the vertically movable member is raised to draw the side and end members inwardly for the purpose of collapsing the support and the sand core carried thereby.

4. In a sand core support for use in casting annealing box covers in an inverted position, spaced apart side members each having an inwardly extending lower end forming a support for the bottom of the sand core, spaced apart end members having similar projections on their lower ends, a vertically movable member located within the space bounded by the side and end members and having a bottom which when in conjunction with the inwardly projecting lower ends of the side and end members, completes the support for the bottom of the sand core, and means carried partially by the vertically movable member and partially by the side and end member for connecting said members and which is adapted when the vertically movable member is raised to move the side and end members inwardly for the purpose of collapsing the support.

5. A collapsible sand core supporting frame, having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, each of said side members having means disposed on and extending from their inner sides and cooperating with means disposed on and extending from the outer side of said movable member, so that said side member will be held in position thereby.

6. A collapsible sand core supporting frame, having separate side and end members and a vertically movable member located within the space formed between the side and end members, said vertically movable member having a bottom cooperating with the bottom edges of said side and end members and completing the support of the bottom of said core, said movable member having means disposed on and extending from its outer side and cooperating with means disposed on and projecting inwardly from the inner sides of

said side and end members, so that said side and inner members will be held in position thereby.

7. A collapsible sand core supporting frame, having separate side and end members, and a vertically movable member located within the space formed between the side and end members, having a bottom, said bottom cooperating with the lower edges of the side and end members and completing the support of the bottom of said core, said movable member having a vertically positioned means disposed on and extending from its outer side for cooperating with a similar but inverted vertically positioned means disposed on and extending from the inner sides of said side and end members, means for lifting said movable member, so that said side and end members will no longer be held in position at their sides and at their bottom edges.

8. A collapsible sand core supporting frame, having separate side and end members provided with inwardly projecting lower ends, a vertically movable member located within the space formed between the side and end members and having a bottom, said bottom cooperating with said inwardly projecting lower ends of said side and end members and completing the support for the bottom of said core, each of said side members having a wedge mounted on its inner side, said vertically movable member having wedges mounted on and extending from its outer side and dovetailing with said wedges of said side members for providing a support therefor.

9. A collapsible sand core supporting frame, having separate side and end members provided with inwardly projecting lower ends and a vertically movable member located within the space formed between the side and end members, said movable member having a bottom cooperating with said inwardly projecting lower ends of said side and end members and completing the support of the bottom of said core, the upper portions of said side and end members having wedges extending inwardly therefrom, said movable member having inverted wedges extending outwardly therefrom for cooperating with said inwardly extending wedges, so that the upper portions of said side and end members will be held in position.

10. A collapsible sand core supporting frame, having separate side and end members provided with inwardly projecting lower ends, and a vertically movable member located within the space formed between said side and end members, having a bottom, said bottom having inclined edges cooperating with similar but oppositely sloped edges of the side and end members and completing the support of the bottom of the core, said movable member having means disposed on and extending from its outer side, means disposed on and extending inwardly from the inner sides of said side and end members, the latter of said means being similar to the former and cooperating therewith but having an inverted position in respect thereto, so that the upper portions of said side and end members will be held in position and so that when said movable member is raised said side and end members are no longer held in position and can move inward.

11. A collapsible sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, each of said side and end members having means disposed on and extending from their inner sides and cooperating with means disposed on and extending from the outer side of said movable member so that said side members will be held in position thereby, and means for additionally holding said side members in position.

12. A collapsible sand core supporting frame having side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, a supporting frame for holding said side members and said vertical members in position and for raising said movable member out of position.

13. A collapsible sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, each of said side and end members having means disposed on and extending from their inner sides, and cooperating with means disposed on and extending from the outer side of said movable member, and a supporting means for additionally positioning said side and movable members and for raising said movable member.

14. A sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, each of said side and end members having means disposed on and extending from their inner sides and cooperating with means disposed on and extending from the other side of said movable member, so that said side members will be positioned thereby, a supporting frame for raising said movable member, means cooperating with said supporting frame for collapsing said side members.

15. A collapsible sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said

frame, a supporting frame cooperating with said movable member for raising and lowering said member, said supporting frame cooperating with said side and end members for collapsing and positioning the said members.

16. A collapsible sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming the bottom of said frame, a supporting means for raising said movable member and for collapsing said side and end members.

17. A collapsible sand core supporting frame having separate side and end members, a vertically movable member located within the space formed between the side and end members and forming a bottom of said frame, collapsing means disposed on the inner sides of each of said side and end members and cooperating with means for raising said movable member, so that said side and end members will be collapsed by said raising means.

18. A collapsible sand core supporting frame having separate side and end members, a supporting means for said members having slots extending therethrough, rods pivoted to said members and positioned to slide in said slots, removable keys formed to fit on said rods, for locking the side and end members in position, and for holding the upper end of each rod in its respective slot when the supporting frame is raised.

In testimony whereof, I have hereunto subscribed my name this 5th day of March, 1929.

HARRY E. SHELDON.