To all whom it may concern:

Be it known that I, HERMAN J. KESTLER, a citizen of the United States, and a resident of the city of New York, Port Richmond, borough of Richmond, in the county of Richmond and State of New York, have invented a new and Improved Collapsible Mold for Concrete Structures, of which the following is a description.

My invention relates to a mold for concrete structures and more particularly it relates to a mold for forming a structure with double walls having a space or cavity extending with substantial continuity to run with the wall or around the several sides of a building structure, the said double wall thus referred to being distinguished from a solid wall formed with separated holes giving the wall a cellular character. The method most practiced in forming walls with continuous cavities is to form the respective wall sections separately although molds have been suggested having planks arranged and set up for the pouring of the inner and outer sections of the double wall at the same time.

The invention has in view to provide a mold for forming walls with continuous cavities, improved in various particulars and having various characteristics which can best be stated in connection with the description of a specific embodiment and the variants thereof.

I would state here, however, that the invention provides a mold that may be assembled on the ground and then placed in position either vertically, for the forming of walls, or horizontally, for the forming of a double floor.

An important feature also is the character of sockets provided to receive and align the opposed ends of adjacent planks, the sockets being formed of separable inner and outer members with their associated spacing means, the advantages of which will clearly appear as the description proceeds, there being corner socket elements comprising separable inner and outer sides and receiving bolts and their appurtenances to coordinate the corner sockets and the associated collapsing core units with the other sockets and core units along the walls at intervals between the corners.

Reference is to be had to the accompanying drawings forming a part of this specification, it being understood that the drawings are merely illustrative of a practical example of the invention.

Figure 1 is a fragmentary perspective view showing a portion of a mold and wall sections formed thereby;

Figure 2 is a horizontal section;

Figure 3 is a vertical section on the line 3-3, Figure 2; showing the collapsible core unit in position;

Figure 4 is a vertical section on the line 4-4, Figure 2;

Figure 5 is a longitudinal vertical section through the collapsible core elements showing the same in collapsed form;

Figure 6 is a perspective view of one of the core elements;

Figure 7 is a perspective view of the mating core element;

Figure 8 is a plan view of the mold including the corner members thereof;

Figure 9 is a partly sectional side elevation of mating core elements of modified form showing the same collapsed;

Figure 10 is a fragmentary perspective view of the core elements shown in Figure 8 illustrating the same in expanded form;

Figure 11 is a partly sectional side elevation taken at right angles to Figure 10;

Figure 12 is a horizontal section on line 12-12, Figure 9;
Figure 13 is a horizontal section on line 13—13, Figure 10.

Referring more particularly to Figures 1 to 7 my improved mold includes two series of planks to constitute the inner and outer sides of the respective mold sections for pouring the inner and outer wall sections of the double wall, of any length or height, the numeral 10 indicating the planks forming the sides of the inner mold section and the numeral 11 indicating the planks forming the walls of the outer mold section.

The planks do not break joint, the joints of the respective layers of planks alining and I provide improved sockets for the opposed ends of the planks. The sockets are formed with separate inner and outer sides, there being strips 12 overlying the plank joints at the outer side and strips 17 forming the inner sides of the sockets. Bolts 13 pass through the said socket sides 12 and 17 and receive nuts 14. The joints are such as to permit expansion and contraction of the planks and contributing to this end the planks are formed with cut-outs 15 at the opposed ends at the bolts. Additional strips 12 corresponding with the strips 12 are employed to cross the planks between the joints, there being bolts 13 passing through said strips 12 and through the planks as shown in Figures 1 and 2. 14 indicates the nuts on bolts 13. Round holes 16 are provided in the planks 10, 11, through which bolts 13 pass. In addition to the flexible sockets formed by the strips 12 and 17 for the exterior planks 10, 11 of the respective mold sections, washer strips 17 corresponding with the sides 17 are provided against the sides of the interior planks 10, 11 or those planks factoring in forming the cavity, said strips 17 coating with collapsible core units hereinafter described to form sockets for the opposed ends of the said interior planks 10, 11. Spacing sleeves 18 are employed between the elements 17, 17 of each mold section and remain in the poured wall. The elements 17, 17 minimize the entrance of cement to the end joints between the planks and they permit expansion and contraction of the planks. Sleeves 19 corresponding generally with the sleeves 18 are employed on the bolts 13 remote from the plank joints, said sleeves 19 being of a length to bear respectively at their ends against the planks 10, 10 and 11, 11 instead of bearing against the elements 17, 17.

My improved collapsible core units as best seen in Figures 5 to 7 are each composed of an elongated element 21 and a coating element 22 forming the opposite sides of the unit. Said elements may, as shown, consist of essentially flat strips. The one side (21) of the collapsible core unit is formed with a vertical series of oblong holes 23 therein and the other elongated element (22) has formed thereon or secured thereto bevelled lugs 24 on the inner face thereof. The lugs 24 in the collapsed position of the core unit are accommodated in the corresponding openings 23 and lie substantially in the plane of the opposed element 21. On the other hand when the elements 21, 22 are disposed between the interior planks 10, 11 for the forming of the cavity, a relative longitudinal movement of the elements will cause the bevelled surfaces of the lugs 24 to engage the bottom walls of the openings 23, thereby separating or expanding the elements forming the sides of the core units and causing them to exert an outward holding pressure against the interior planks 10, 11. The elements 21, 22 are held in spread or expanded relation by suitable means, there being shown for the purpose a key 26 having one longitudinal edge bevelled so that the key is essentially wedge-shape. Said key 26 is accommodated in aligned holes 25 in the elements 21, 22 adjacent to ends thereof when the core is expanded. When it is desired to remove the core, the key 26 is removed which permits the sides of the core to collapse. It is to be noted that in forming double walls it is the practice to lay transverse reinforcing elements that cross the intervening space between the inner and outer wall sections, said reinforce elements being laid at the respective floors. Thus, when the core units are collapsed with the withdrawal of their keys 26, the cores may be readily removed. The adjacent interior planks 10, 11 can now readily be removed. The planks cannot fall below the next lowest transverse reinforce elements. The window openings, door openings, etc., afford access to any of the planks falling to the transverse reinforce elements therebeneath.

In the form of the collapsing core unit shown in Figures 9 to 13, the elements thereof are in the general form of channel bars, the one being partially or wholly receivable one within the other in the collapsed form. The one element 21 has transverse rods or pins 23 adapted to be engaged by bevelled integral lugs 24 on the other element so that the longitudinal movement of the elements relative to each other will cause the rods 23 to engage the bevelled surfaces of the lugs 24 for expanding the unit. The respective elements have transverse holes 25, 25 to receive a key 26 for holding the unit in expanded form. In both forms of the collapsible core or spacing unit, the wedging lugs 24 or 24 of the one element overlap and engage the other element. In assembling the mold the parts may be brought together beginning at either the inner or outer ends of the bolts. As for example, referring to Figure 2, the bolts may be passed through the outer elements 12, 12, 12.
and the nuts 14, 14° then applied outside of said elements. Next, the outermost or exterior planks 11 are applied and then the adjacent element 17 is applied to the bolt 13 and placed against the inner faces of the outermost planks 11; the outermost sleeve 18 will be then applied to the bolt, and next an element 17° so that said sleeve 18 is held between the outer elements 17, 17° of the outer mold section to determine the width of the wall section A, it being understood that planks of varying thickness may be employed and sleeves 18 of various lengths according to the width of the wall section.

The interior planks 11 of the outer mold section are applied against the adjacent element 17°, and the collapsible core units, the sides of which are formed by the elements 21, 22 or 21°, 22°, are then placed in position and the adjacent planks 10 pertaining to the inner mold section at the interior or cavity of the mold may be laid so that the collapsing core units lie between the interior planks of the respective mold sections. A second elements 17° and a second sleeve 18 are placed on the bolt next that element 17 forming with the inner strip 12 the socket for the planks 10 at the inner face of the mold, said last-mentioned strip 12 and the inner nut being finally placed in position.

With the tightening of the nuts 14 all the parts are held in clamped relation, the interposed collapsing units 21, 22 having been expanded by relative movement of said elements to engage the bevelled lugs 24 with the walls of the openings 23. Thus, it will be seen that the units when expanded exert an outward pressure on the interior planks of both mold sections and the pressure is opposed by the nuts 14 or both head andnut to effect a firm and solid clamping of the mold parts into a rigid unitary structure.

The keys 26 of the collapsing core units are removed permitting the cores to collapse or enabling the collapsing to be brought about by longitudinal movement of one element 21 relatively to the other element 22, (or relative movements of elements 21°, 22°). With the removal of the nuts 14 and bolts, the respective planks may be successively removed as well as the strip 17, 17° leaving the sleeves 18, 18°, 19 in position. With the mold as described it will be seen that in assembling and disassembling, the collapsing core units factor largely in clamping the parts in position and releasing the same for removal.

It will be readily understood that instead of a single cavity and therefore a single series of collapsing core units, a wall with two or more cavities may be produced, the illustrated example showing a wall with only one cavity between a pair of wall sections.

The construction of the mold at a corner embodies the essential elements above described but modified to adapt them to the corner formation of the building structure, said corner elements being illustrated in Figure 8.

In said Figure 8 the characters 10°, 11° indicate planks corresponding with the planks 10, 11 and arranged in pairs to form a central space or cavity between the wall sections. Angle elements are employed to form the sockets for the ends of the planks at the inner and outer faces of the mold. Thus, the outer angle is advantageously composite in practice, being formed of channel bars 27, 28 disposed at the exterior of the mold, said channel bars being united at the corner as by bolts 29. Each element 27, 28 has a vertical angle piece 30 formed on or secured thereto, forming with the back of the adjacent channel bar a socket for the ends of the adjacent planks. The sockets formed by the members 30 and the channel bars 27, 28 are given a size to accommodate planks of varying thickness and filler blocks 30° may be employed according to the thickness of the plank. The angle members 30 of the plank sockets offset the channel bars 27, 28 forming the outermost side of the outer section of the mold at the corner so that said channel bars lie outward of the intersecting general planes of adjacent sides of the wall and thereby a pilaster effect may be produced. The dotted lines a, Figure 8, indicate the general planes of the wall and the material run outside of said lines forms the pilaster. When a pilaster effect is not desired, the space within the channel bars 27, 28 is filled to the intersecting planes indicated by the dotted lines a. To coat with the outer angle structure represented by the elements 27, 28 and 30 and in forming the outer section of the double wall, an inner angle piece 31 is provided at the corner against which the interior planks 11° of the outer mold section are laid. The described collapsible core units composed of the elements 21, 22 or 21°, 22° are placed at the inner side of the interior planks 10°, 11°, the cores of a pair being slightly distant from the corner but within the angle piece 31 thus automatically squaring the mold. A pair of bolts 13° corresponding with bolts 13 are employed at right angles adjacent to the corner and passing through the angle piece 31, planks 11°, and the angle 27, 28 as well as through the socket members 30, said bolts having the necessary complement of sleeves 18°.

In the corner construction the exterior elements 27, 28 correspond with a clamp strip 12 or 12° while the angle pieces 30 form the inner side of the exterior clamp socket adjacent the corner. The element 31, it will be observed, corresponds in function with outer element 17°. Additional corner angle pieces 130
are provided for the molding of the inner wall section through the medium of the planks 10° corresponding with the planks 10, there being an outer angle piece 33 against which those planks 10° at the interior or cavity of the mold are laid, inward of the expansible core units, the planks being disposed between said core units and said angle piece 33. Thus, the angle piece 33 corresponds with the second described element 17. At the same time, the outermost sleeves 18 correspond with the outer sleeve 18 and the inner sleeves 18° correspond with the inner sleeve 18. The corner socket for those planks 10° at the inner surface of the mold are formed by an angle piece 34 corresponding with the second or inner socket strip 12 while the angle piece 32 corresponds with the innermost strip or washer 17.

By means of separate socket sides or elements 12, 17, a socket very light in weight is produced and one involving the minimum cost of time, labor and material. The coating and interdependent organism comprising the sockets, collapsing cores, planks and spacers serves to attain the important object of providing a collapsible mold which can be rapidly set up, easily taken down, and one that may be used over and over again, and the important desideratum is attained that the mold is characterized by extreme simplicity and few elements outside of the plank. Thus, the mold may be made up wholly or very largely of standard elements ready to be completed by use of ordinary planks slightly modified to accommodate the transverse bolts. By forming the sockets for the meeting ends of the planks as described, with the separate and independent inner and outer sides, the important object is attained that the sockets are characterized by desirable flexibility and a wide range of adjustment to conform the sockets to varying thickness of planks or metal plates employed in lieu of the planks in forming the sides of the inner and outer mold sections.

The corner assemblage is such that the positioning of its successive layers of planks makes the mold at the corner self-squareing and self-plumbing.

I would state in conclusion that while the illustrated examples constitute practical embodiments of the invention, I do not limit myself strictly to the exact details herein illustrated, since manifestly the same can be considerably varied without departure from the spirit of the invention as defined in the amended claims.

Having thus described my invention, I claim:

1. A mold for double walls comprising separated inner and outer mold sections each having spaced planks forming the exterior and the interior sides of the respective mold sections, sockets for the ends of the exterior planks, transverse clamp elements extending through both mold sections at said sockets, members positioned at the joints of the interior planks of each mold section and lying against the inner surfaces of said interior planks, spacing means in the respective mold sections between the respective sides thereof and expansible cores between the mold sections to press the interior planks against said members, and hold the two mold sections rigidly together as a unitary structure.

2. A mold for double walls comprising separated inner and outer mold sections each having spaced planks forming the exterior and the interior sides of the respective mold sections, sockets for the ends of the exterior planks, transverse clamp elements extending through both mold sections at said sockets, members positioned at the joints of the interior planks of each mold section and lying against the inner surfaces of said interior planks and expansible cores between the mold sections to press the interior planks against said members, and hold the two mold sections rigidly together as a unitary structure; together with spacing means on said transverse clamp elements between the sockets of the exterior planks and the members at the joints of the interior planks.

3. As a new article of manufacture, a collapsing core unit for use between the inner and outer molding means for molding double walls to hold said means spaced, said unit comprising elongated elements, the one element having a series of openings therein and the other element having a corresponding series of bevelled lugs adapted to enter said openings when the cores collapse and adapted to engage the other element at said openings by a relative longitudinal movement of said elements for expanding the unit.

4. As a new article of manufacture, a collapsing core unit for use between the inner and outer molding means of double walls for holding said means spaced, said unit comprising elongated elements, the one element having a series of openings therein and the other element having a corresponding series of bevelled lugs adapted to enter said openings when the core collapses and adapted to engage the other element at said openings by a relative longitudinal movement of said elements for expanding the unit.

5. A mold for forming double concrete walls, including plank sides arranged in pairs constituting mold sections to form said double walls, clamping means for the several series of planks, said clamping means extending through all the planks of both
pairs, said clamping means including transverse bolts, and elongated vertically disposed elements on said bolts and extending along the joints at the inner sides of the respective series of planks, together with expansible means between those planks forming the inner sides of the respective mold sections.

6. A mold for forming double concrete walls, including plank sides arranged in pairs constituting mold sections to form said double walls, strips on the outer faces of the outermost planks at the joints thereof, elongated elements extending along the joints of the inner planks, clamp bolts extending transversely through said strips and continuously through both mold sections, elongated elements, and planks, and spacers on the bolts between said elements, together with expansible means between those planks forming the inner sides of the respective mold sections.

7. In a mold for concrete walls, spaced planks forming the inner and outer sides of the mold, transverse clamp bolts for said planks, elongated elements on said bolts and extending along the joints at the inner faces of the planks, and spacers on the bolts between said elements, said planks at the joints thereof having edge cut-outs at the bolts.

8. A mold for concrete walls presenting planks forming the inner and outer sides of the mold, and corner sockets for the ends of the adjacent plank sides, the outer corner elements including members engaging the planks and sustaining said outer corner elements offset outwardly from the adjacent sides of the mold.

9. A mold for concrete walls comprising planks forming the inner and outer sides of the mold, and corner elements connected with the ends of adjacent planks, said corner elements including means for sustaining said corner elements offset from the general planes of the outer adjacent sides; together with an angle piece at the said corner and spaced from the first-mentioned corner element to determine the inner surface of the molded wall at the corner.

10. A mold for double walls comprising separated mold sections having plank sides, angular corner sockets for the adjacent ends of the exterior planks, said exterior sockets having angular members at the inner sides of the sockets between which angular members and the outer sides of said exterior sockets the plank ends are accommodated, angle elements overlapping the adjacent ends of the interior plank sides of each mold section and transverse bolts at right angles to each other and passing through said planks, socket members and angle elements.

11. A mold for double walls comprising separated mold sections having plank sides, angular corner sockets for the adjacent ends of the exterior planks, said sockets having separate angular inner and outer members between which the ends of the outermost plank sides of the double mold are accommodated, angle elements overlapping the adjacent ends of the interior plank sides of each mold section and transverse bolts at right angles to each other and passing through said planks, socket members and angle elements; together with spacing sleeves on the bolt between the plank sides of each section.

12. A mold for forming concrete structures of the indicated type including separated sections for molding separate wall sections, each mold section comprising plank sides, sockets for receiving the adjacent ends of the planks, spacing means in the respective mold sections between the sides of the respective sections a core unit and expansible to exert lateral pressure against the inner sides of both mold sections between said mold sections and transverse clamp bolts passing jointly through the sockets of both mold sections and adapted to hold said mold sections and said unit together as a unitary rigid mold.

13. A mold for concrete structures of the indicated type, including separated mold sections having plank sides and having sockets presenting separate inner and outer side walls accommodating the ends of the planks therebetween, a core between the adjacent planks of the respective sections and expansible to exert lateral pressure against the inner sides of both mold sections, and bolts passing transversely through said socket sides of both mold sections, and spacing means between the respective sides of each mold section, the bolts, core and spacing means jointly serving to bind the sockets against the planks, as well as serving to hold said mold sections and said core together as a rigid unitary structure.

14. A mold for concrete structures of the indicated type including separated mold sections, and an expansible and collapsible core unit adapted to exert pressure against the sections tending to separate the same; together with external clamp means exerting pressure on said sections and means between the sides of each mold section and resistant of the pressure exerted by said core, and by said external clamp means to hold the whole together in the form of a unitary portable mold under said pressure.

15. A mold for concrete structures having separated mold sections adapted to mold the separate wall sections, said sections having plank sides and sockets for the clamp ends, and a plurality of separate expansible and collapsible core units disposed at intervals between said sections together with spacing means between the sides of each section, and
transverse bolts passing through both of said mold sections at said sockets to cause said sections to clamp said mold sections and core units together as a rigid unitary mold.

16. A mold of the class described comprising inner and outer mold sections, each having separate inner and outer sides, clamp bolts extending transversely through the both mold sections, spacing elements on said bolts and disposed between the sides of the respective mold sections, the bolts being removable from said clamping elements, an expansible core adapted to be disposed between the mold sections and means to expand the sides of the core to press the inner sides of the mold sections against said clamping elements on the bolt.

17. A mold for forming double walls, said mold comprising molding units for pouring the separate wall sections of the double wall, and an expansible core unit between said mold units adapted to exert lateral pressure against the inner sides of both mold sections, each of said mold units constituting a molding assemblage complete in itself independently of said core unit; together with removable means to hold said molding units and said core unit rigidly together to constitute a unitary double mold.

18. A mold for forming double walls, said mold comprising separated mold sections for the pouring of the wall sections, those sides of the respective mold sections at the interior of the mold being separate and disconnected from each other, spacing means in the respective sections between the sides of the respective sections, means to clamp the interior and exterior sides of each mold section immovably in spaced relation to each other, and a removable expansible core unit accommodated between said interior sides and adapted to exert lateral pressure against the inner sides of both mold sections.

19. A mold for forming double walls, said mold comprising separated mold sections for the pouring of the wall sections, those sides of the respective mold sections at the interior of the mold being separate and disconnected from each other, and a removable core unit accommodated between said interior sides adapted to exert lateral pressure against the inner sides of both mold sections, said interior sides being dependent on said unit to hold the respective interior sides in place in their respective sections; together with spacing means in the respective mold sections, between the respective sides thereof, and clamp means extending transversely through the interior and exterior side walls of the respective mold sections for exerting clamping pressure on the outer sides of the mold, to hold said mold sections and said core unit together rigidly assembled as a unitary double mold.

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