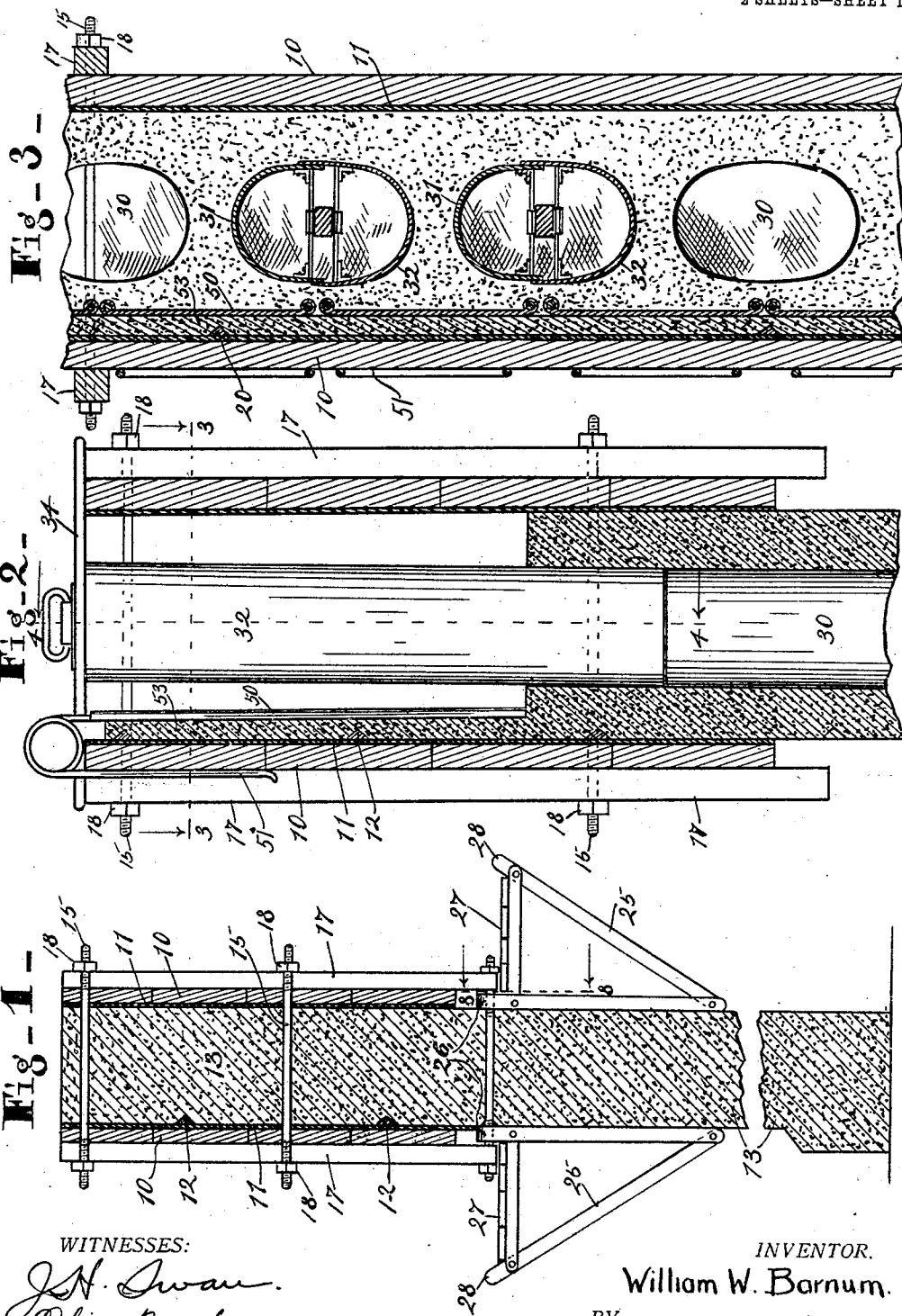


W. W. BARNUM.
 MEANS FOR BUILDING CONCRETE STRUCTURES.
 APPLICATION FILED APR. 16, 1908.

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Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.



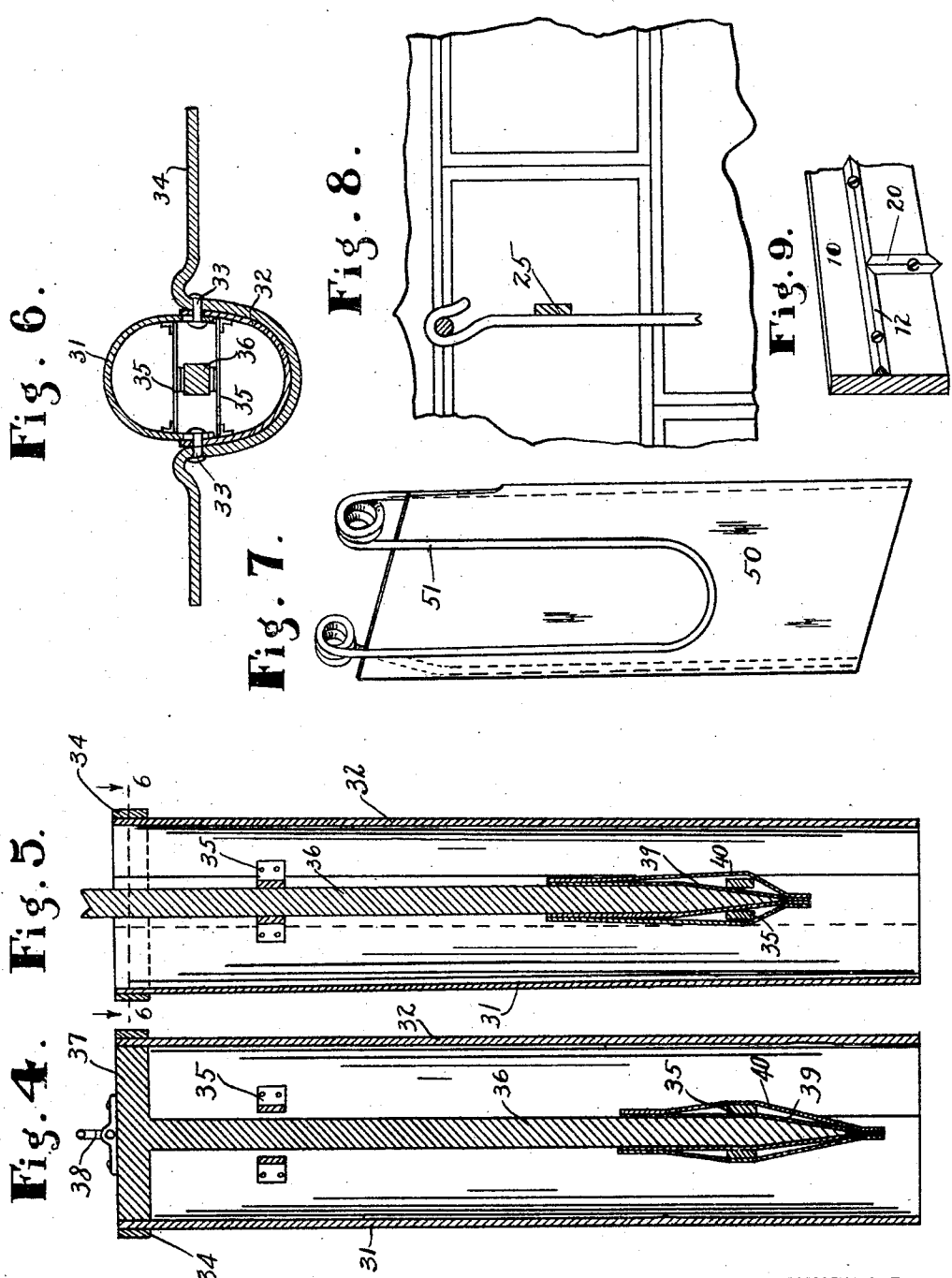
WITNESSES:
J. H. Swan.
Oliver Brecken

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UNITED STATES PATENT OFFICE.

WILLIAM W. BARNUM, OF INDIANAPOLIS, INDIANA.

MEANS FOR BUILDING CONCRETE STRUCTURES.

946,991.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed April 16, 1908. Serial No. 427,350.

To all whom it may concern:

Be it known that I, WILLIAM W. BARNUM, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Means for Building a Concrete Structure; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is to provide an improved means for erecting concrete structures.

One feature of the invention consists in providing metal lined wooden molds or forms. These wooden molds or forms are lined with sheet metal. With this arrangement of molds or forms the wood is thoroughly protected from the moisture of the concrete by the metal lining. I score the wall to produce a satisfactory imitation of walls built of blocks of stone or the like by adjustably securing horizontal and vertical triangular-like bars of metal to the metal lining of the mold.

Another feature of the invention consists in the means for holding the molds or forms in position. To that end I provide threaded bolts extending entirely through the mold or form with nuts on the end and vertically disposed battens through which said bolts pass. The lower part of the molds or forms are secured to the finished part of the wall so that the upper part of the mold or form will be open to be filled with concrete to form an additional layer. The vertical battens maintain the vertical alinement of the mold and the wall. In this connection the bolts are left temporarily in the wall and the battens are notched so as to be readily secured to the bolts without removing the nuts.

In connection with the mold and means mounted on a portion of the wall which is finished for building the wall higher, I provide platform brackets on each side of the wall that are hung upon the bolts that extend through the wall and which are used to hold the pieces of the mold or form in place as stated.

Another feature of the invention consists in removable spring-held plates mounted on the upper part of the molds or forms, said plates being held within the molds or forms parallel with the inner wall thereof and spaced somewhat therefrom to receive

a facing of relatively hard smooth material or water-proofing material so that after said facing material is inserted in the mold, the concrete is introduced for finishing the remaining thickness of the wall and as it is introduced said removable plate that holds the facing material in place is gradually elevated and removed. By this means I am enabled to build a homogeneous wall out of differing concrete materials so that the outer portion thereof may be relatively hard or water-proof and the outer surface smooth and solid and yet the inner portion and main body of the wall be formed of ordinary concrete.

Another feature of the invention consists in peculiar collapsible cores employed which consist of two sheets of sheet metal substantially semi-circular in cross section and mounted adjacent each other so that the edges of one overlap the edges of the other and the two together form a tubular core. Means are provided within this tubular core for spreading or contracting the two halves thereof.

These and the other features of my invention will be understood from the accompanying drawings and the following description and claims:

In the drawings Figure 1 is a central vertical section through the finished concrete wall with the molds or forms and platform support in place, said wall being centrally broken away near the lower end. Fig. 2 is a vertical section of the wall being built with my said molds or forms and with the outer facing of the wall formed slightly in advance of and of possible different material from the main portion of the wall and with a collapsible core in place. Fig. 3 is a horizontal section on the line 3—3 of Fig. 2. Fig. 4 is a central vertical section through the collapsible core showing the same spread. Fig. 5 is the same with the core collapsed for removal. Fig. 6 is a horizontal section on the line 6—6 of Fig. 5. Fig. 7 is a perspective view of the plate for holding the facing in connection with the mold or form when the facing of the wall is being built. Fig. 8 is a section on the line 8—8 of Fig. 1. Fig. 9 is a detail of a part of the mold showing scoring means attached thereto.

The mold or form employed for building a wall consists of longitudinally extending boards 10 to form each side of the mold.

To the boards 10 on each side of the mold sheets of metal 11 are secured in the nature of a metal lining, it being formed of sheet metal; and having longitudinally extending triangular metal pieces 12 secured removably thereto and projecting inwardly to form the horizontal scores of the wall 13.

After the foundation has been started the lower part of the mold or form is clamped on the finished wall so that a portion of the mold extends upwardly therefrom in position to receive concrete to make an additional layer to the wall. The sides of the mold or form are held in place by bolts 15 that extend through them horizontally and through vertical battens 17 and are threaded on their outer ends for nuts 18. The nuts 18 on the bolts 15 are so situated that the battens can be slipped in laterally between the sides 10 of the mold or form and the nuts 18, without the removal of the nuts, and then by tightening the nuts somewhat the sides of the mold or form will be clamped by the battens against the finished part of the wall. After the mold or form has thus been secured to the finished part of the wall, the concrete is filled into the form and after it has set somewhat the mold or form is lifted up higher on the wall and secured in position to add another layer. As the mold or form is thus moved upwardly from time to time, the bolts 15 are withdrawn from the finished part of the wall. The grooves or scores in the outer surface of the wall serve to properly locate the mold or form when it is being relocated, as the lower corrugations 12 in the mold or form can fit in such groove or score. This insures always that the mold or form will be properly located to make the horizontal scores in the outer surface of the wall equi-distant.

To provide in the outer surface of the wall vertical grooves or scores, so as to make the wall look like a stone wall or one built of cement blocks with beveled corners I provide adjustable vertical scoring pieces 20 secured to the metal lining 11. These pieces are V-shaped, the same as the pieces 20 and may be made of sheet metal, angle iron or anything of the like and secured to the side 10 of the mold or form by nails or by any other means which renders the location of said vertical pieces 20 adjustable with reference to each other. This enables them to be situated at different distances apart in the location of various walls or buildings so as to give to the external surface of the wall the appearance of being made of stone or concrete blocks of the size desired.

As the wall is built up I combine with the form or mold a platform on each side of the wall on which the workmen can stand and do the work. This is accomplished by suspending the triangular-shaped brackets 25 on the lower bolts 15. Since these bolts

extend through the portion of the wall already finished and the sides of the form, they are a durable means for supporting the platform brackets 25. The inner vertical member of said triangular bracket 25 is provided at its upper end with a hook 26 adapted to be caught over the bolt 15 between the finished wall and the batten 17. Thus is furnished a durable connection for the brackets 25 and upon them boards 27 are placed for forming the platform. The outer inclined member of each bracket 25 extends upwardly beyond the horizontal member of each bracket so as to form the projection 28 to hold the boards 25 in place against the wall and prevent them slipping off the brackets. Thus it is seen that as the wall goes up higher and higher the platforms on which the workmen are mounted are placed successively in higher positions at the same time that the mold or form is placed successively in higher positions.

The metal sheet lining on the sides of the mold serves two or three functions. In the first place it protects the wooden sides 10 of the mold from moisture. Without the metal lining the wooden boards soon become wet and out of shape and cannot be used again and become useless. Another advantage is that it gives to the wall a smooth hard surface which is very desirable, that is, a much better surface than can be formed by a wooden mold. A third advantage is that it furnishes a very convenient means for scoring the surface of the wall, as has been heretofore explained.

To provide air chambers 30 in the wall, as is desirable for ventilation, drying and other purposes, I provide collapsible cores to be inserted in the molds during the building of the wall, which cores I will now describe. These cores are formed of two members 31 and 32 formed of sheet metal curved substantially semi-circular so that the edges of one will overlap the edges of the other and when the two members are thus placed together, they will form a tube. The completed tube may be substantially circular or as is preferable, elongated in cross section substantially as shown. The two members 31 and 32 of said core are pivoted together at one end by the pins 33, as seen in Fig. 6 and said pivot pins 33 pass through the bar 34 whereby the core is supported on the top of the mold, as shown in Fig. 2. This bar 34 has oppositely extending arms or projections that rest on the tops of the sides of the molds and the bar 34 is curved around one-half or side of the core as shown so that the core will be open at its upper end for the insertion of means for spreading and collapsing the same as shown in Figs. 4 and 5. On the inside I provide stiffening bars 35 for each side of the core to prevent the members thereof from collapsing under

pressure. Between one set of these bars 35 I mount a vertically movable bar 36 that has a cap 37 on its upper end that practically closes the upper end of the core and a handle 38 is secured on the top of the lid 37. The lower end of the bar 36 tapers and has secured to it on each side a pair of plates 39 and 40 between which the bars 35 extend. Therefore, as appears in Fig. 4, when the rod 36 is pressed downwardly, the two halves of the core will be pressed apart and the core remains in that position while the concrete is being inserted in the mold. Afterward, to remove the core, the handle 38 is lifted up which moves the bar 36 from the position shown in Fig. 4 to that shown in Fig. 5, where the inclined plates 40 draw the bars 35 toward each other and collapse the sides of the core somewhat, at least sufficiently to enable the core to be readily taken out of the concrete wall. It is observed that the lower end of the core collapses relatively more and faster than the upper end and that makes it easier to remove the core, as then it tapers somewhat toward the lower and remote end from the handle 38. The lid 37 closes the core while the core is spread so that concrete will not enter the core. Any number of the collapsible cores may be used as desired and they are carried up periodically as the mold or form is elevated and when thus carried up and reset for another layer of concrete, the lower ends of the cores are inserted in the holes or passage-ways 30 already formed in the concrete wall. This appears in Fig. 2, where the lower end of the core projects into the opening 30.

In order to face the wall, as is often desired, with water-proofing material or a material different from or harder than the body of the concrete wall to give the surface of the wall any desired character or appearance, I provide facing plates 50, as shown in Figs. 2 and 7. These facing plates are made of sheet metal and have secured on their upper ends spring clamps 51 that extend down parallel with the plate, as shown, so that said facing plate may be properly mounted on the mold or form, as seen in Fig. 2.

The manner of using the facing plate is as follows. The mold or form, before it is placed in a vertical position on the wall to add an additional layer thereto, is laid in horizontal position, and upon one side thereof material is placed to form the facing 53, and as seen in Fig. 2 that facing may be relatively thick, as shown, or considerably thinner and made of any desired means to accomplish the end desired. After the facing has been placed on the horizontally disposed side of the mold or form, the plate 50 is laid thereon with the clamping spring 51 on the outside of the mold, as seen in Fig. 2.

Then the mold or form is placed in its vertical position and adjusted on the upper part of the wall already finished, that is, put in position shown in Fig. 2. The plate 50, therefore, holds said facing material in its proper place during the manipulation of the mold and the filling thereof with concrete. As the mold is filled with concrete the plate 50 is gradually drawn upwardly and thus the concrete below the plate 50 comes in contact with the facing material and thereafter continues to hold the facing material in proper position and to unite therewith and make the whole wall, including the facing material solid and homogeneous. It is obvious that the facing material may be put on one side of the wall or on both, as desired.

In building a ceiling the special facing material may be applied without the plate 50. In that instance, by using molds with metal lining, as set forth herein and said molds being in a horizontal position, the facing can be deposited upon the metal lining of the mold, and such metal lining will give to the facing the desired hardness and smoothness. After the facing is thus deposited as a layer on the metal lining of the mold, the concrete is superimposed upon it in building the ceiling so that the special layer will adhere thereto when the mold is removed.

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

1. A mold for concrete walls and the like formed of horizontally disposed plates or boards, vertically disposed battens outside of said boards or plates with the ends of the battens extending below the edge of said boards or plates, means for securing the two sides of the mold in place including bolts extending through the battens at their lower ends and through the finished portion of the wall being built, and platform brackets with hooks adapted to catch over said bolts between the wall and the battens and platform thereon.

2. The combination with a mold for concrete walls or the like, of a spring-held removable plate thereon for protecting the inner surface of the facing or outside portion of the wall, whereby said facing may be formed in the mold before the mold is placed upon the wall, substantially as set forth.

3. The combination with a mold for concrete walls or the like, of a plate for holding the inner surface of the facing of the wall in place, and a spring connected with the upper end of said plate and extending on the outside of said mold for holding said plate removably in place, whereby the facing may be put in the mold before it is placed in the wall and said plate may be gradually elevated as the concrete is put in

the mold against the facing, substantially as set forth.

4. The combination with a mold for forming a concrete wall or the like, of a collapsible core for forming an opening in the wall which core consists of two substantially semi-tubular members with their edges overlapping each other, a bar adapted to rest upon the mold and to which the upper ends of said semi-tubular members of the core are pivoted, stiffening bars extending transversely between the walls of each core member, a vertically movable bar projecting into the core with guides cooperating with said stiffening bars, whereby when the vertical bar is depressed the core will be spread and when elevated the core will be contracted, a lid secured to said vertically movable bar for closing the upper end of the core, and a handle on said lid, substantially as set forth.

5. The combination with a mold for forming a concrete wall or the like, of a collapsible core for forming an opening in the wall, which core consists of two substan-

tially semi-tubular members with their edges overlapping each other and formed so as to have a substantially uniform diameter from top to bottom and the lower end be adapted to be inserted in the hole in the previously formed hole in the wall, and whereby the lower end of the core is held in position, a bar adapted to rest upon the mold at its upper end and to which the upper ends of said semi-tubular members of the core are pivoted, stiffening bars extending transversely between the walls of each core member, and a vertically movable bar projecting into the core with guides engaging and cooperating with said stiffening bars, whereby when the vertical bar is depressed the core will be spread and when elevated the core will be contracted.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

WILLIAM W. BARNUM.

Witnesses:

V. H. LOCKWOOD,
OLIVE BREEDEN.