

No. 870,881.

PATENTED NOV. 12, 1907.

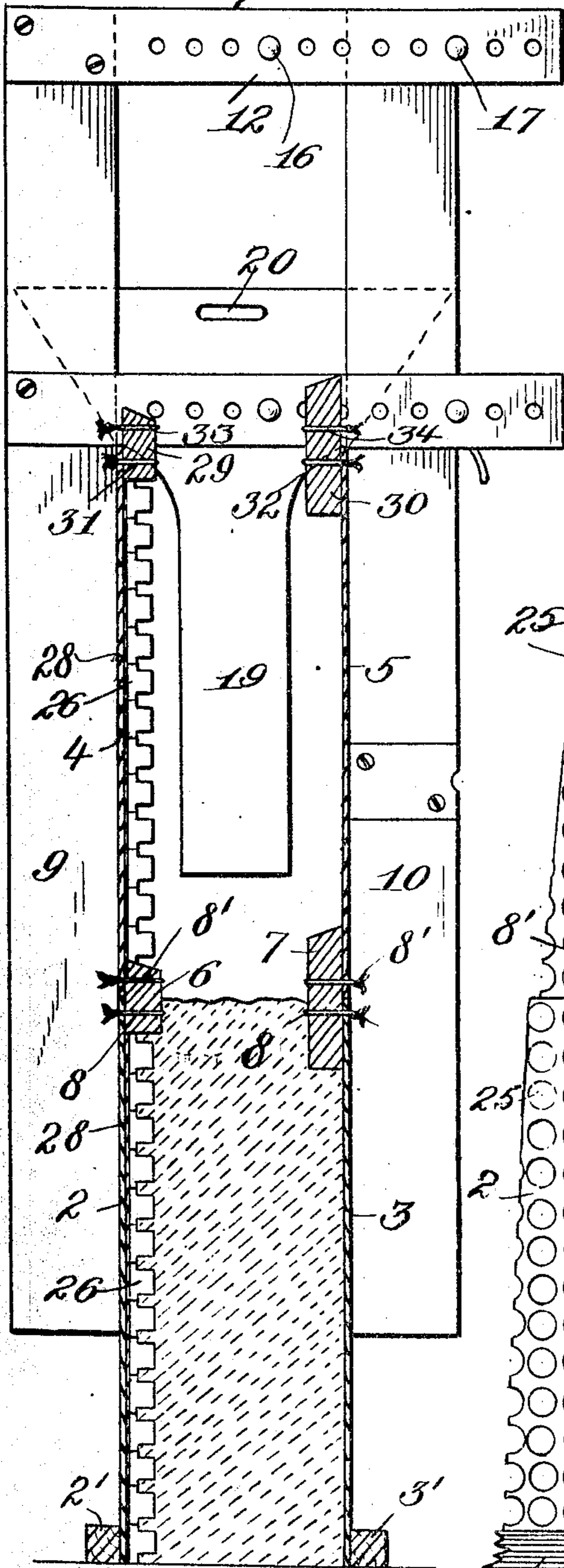
W. D. HAM.

METHOD OF AND APPARATUS FOR MAKING WALLS.

APPLICATION FILED NOV. 20, 1906.

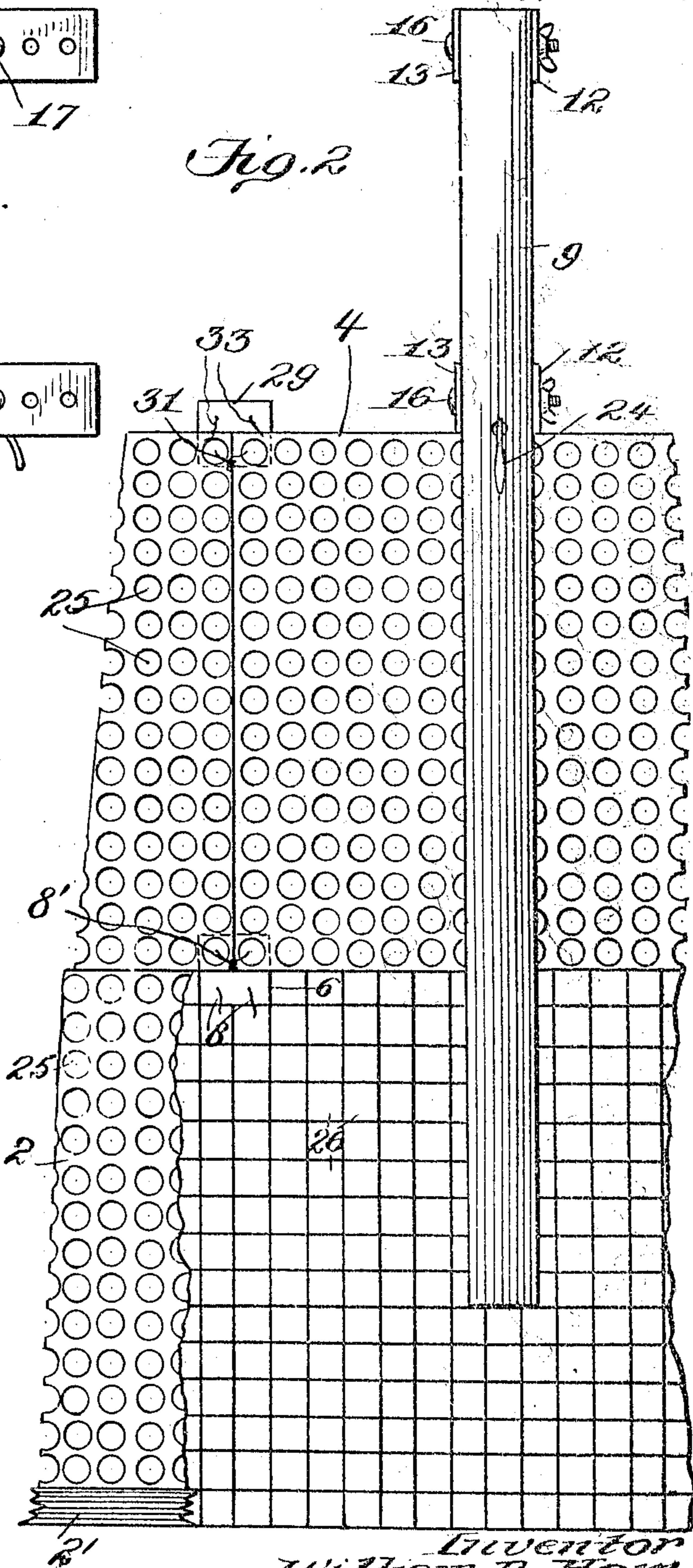
2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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Fig. 2.



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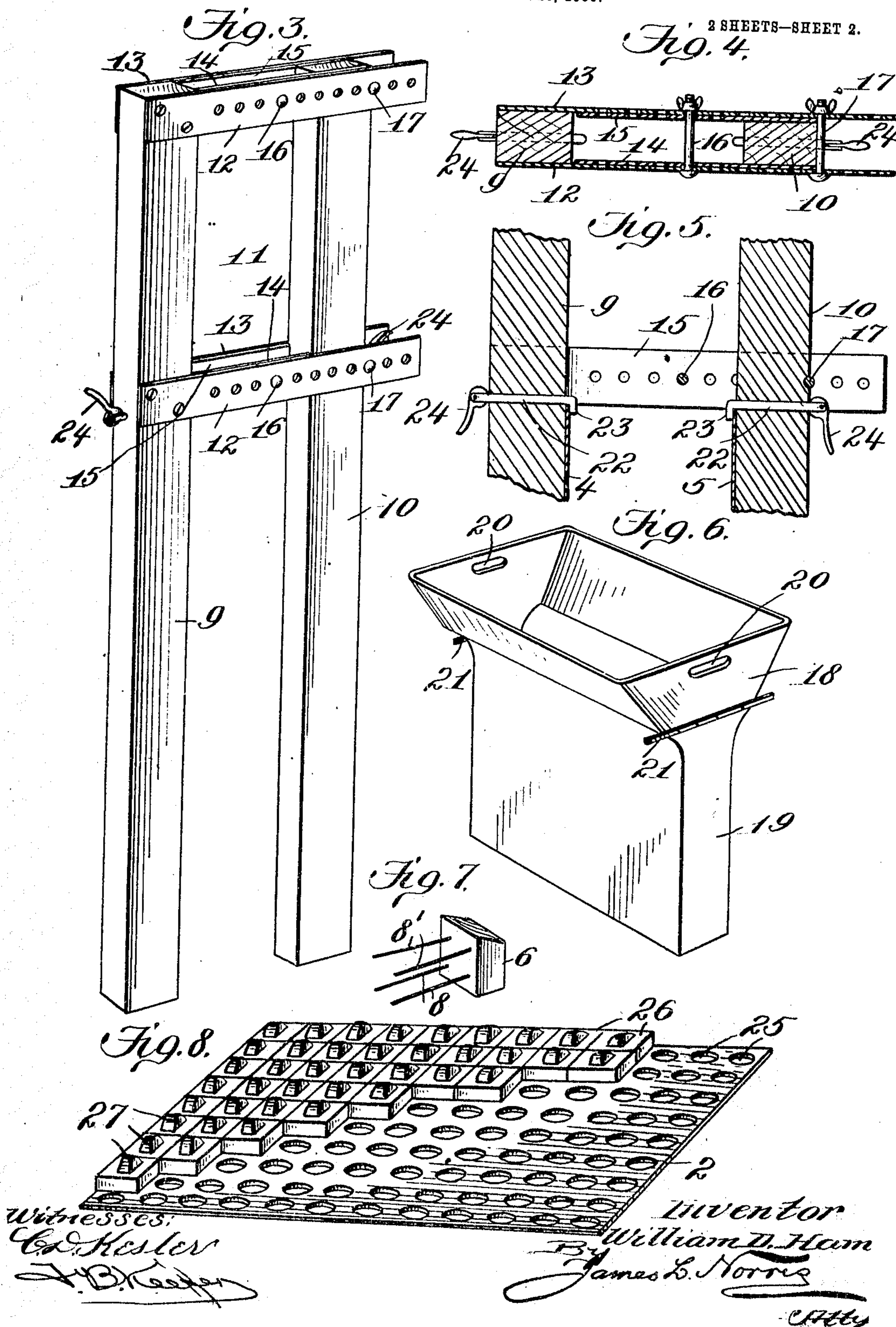
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2 SHEETS—SHEET 2.



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METHOD OF AND APPARATUS FOR MAKING WALLS.

No. 870,881.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed November 20, 1906. Serial No. 344,306.

To all whom it may concern:

Be it known that I, WILLIAM D. HAM, a citizen of the United States, residing at Knoxville, in the county of Knox and State of Tennessee, have invented new and useful Improvements in Methods of and Apparatus for Making Walls, of which the following is a specification.

This invention relates to a method of and apparatus for making walls of cement.

10 A wall made by the method and apparatus has a facing applied thereto and held in place by the material of which the wall is composed and this wall is preferably made of cement, by which I mean to include not only the article so known, but other substances which
15 can be satisfactorily employed for forming a molded wall. The facing in question may be of any desired character, although it is preferably of a water-proof nature as in this case an important result follows the same. Solid walls of cement are prime conductors of moisture
20 so that this obstacle ordinarily precludes their satisfactory use in the building of residences and other buildings where a dry interior is an essential. I can build a solid wall of cement and by applying a water-proof facing thereto can obtain a room or apartment
25 into which no moisture can pass through the wall. The waterproof facing is held in place by the material of which the wall is composed and when said wall is made of cement such material binds the facing in position in a permanent effective manner. Ordinarily
30 the facing is in sections and I find that tiles or stone blocks answer the purpose. When tiles are used I obtain a glazed effect and the design may be a plain or ornamental one to conform to the wishes of the particular user. The facing is applied in position during
35 the building up or molding of the wall which is one of the fundamental features of my method.

In the drawings accompanying and forming a part of this specification I show apparatus of certain forms involving my invention, the construction and use of
40 which will be hereinafter fully set forth to enable those skilled in the art to practice the method. Other forms of apparatus may be employed for this purpose and I may modify the apparatus, all within the scope of my claims.

45 Referring to the drawings, Figure 1 is a cross section of a portion of a wall, and a mold in elevation and certain coöperative devices, the mold being in its operative relation. Fig. 2 is an elevation of the parts shown in Fig. 1 and as seen from the left in the latter,
50 certain of the parts in said Fig. 2 being broken away. Fig. 3 is a perspective view of a holding device. Fig. 4 is a transverse section through the lower cross strips of said holding device. Fig. 5 is a sectional face view of the holding member at the lower cross strips. Fig.
55 6 is a perspective view of a hopper. Fig. 7 is a like

view of a filling block. Fig. 8 is a similar view of a mold side with several tiles laid thereon.

Like characters refer to like parts throughout the several figures.

To form a wall by my method and apparatus a mold 60 of some suitable character is employed and I have shown in the drawings a mold which can be readily utilized for such purpose. Said mold includes in its construction two lower sections as 2 and 3 and two upper sections as 4 and 5, it being customary to place the
65 section 4 on the section 2 and the section 5 on the section 3, and these several sections may be of metal, wood or any other desirable substance. The sections 2 and 4, therefore, present one side of the mold while the sections 3 and 5 present the other side of the mold and
70 these two sides are arranged in parallelism and separated a distance agreeing with the thickness of the wall to be molded. It naturally follows that the cement material is delivered into this space.

The making of a molded wall according to my method 75 involves the following operation: The sections 2 and 3 are placed vertically upon a foot-wall and are separated a distance which is to define the thickness of the cement wall. Said sections are placed between guide strips as 2' and 3', see Fig. 1 for example. Prior to mounting
80 the said sections 2 and 3 I connect therewith blocks as 6 and 7 of wood or other suitable material, and for the purpose of connecting the said blocks with the said sections I may utilize wires each designated by 8 which extend through registering perforations in the blocks
85 6 and 7 and sections 2 and 3 respectively, the wires being twisted together upon the outer faces of said sections 2 and 3 to hold said blocks in firm relation. When the sections 2 and 3 are set up they are straddled exteriorly by the vertical and parallel legs 9 and 10 of
90 a spacer or holding device as that denoted in a general way by 11. These legs may be made of timber if desired and are held in parallelism by several strips, the relation between the strips and legs being such that one of the legs can be adjusted toward and from the com-
95 panion leg to adapt the spacer to walls of different thicknesses. In Figs. 3, 4 and 5 I have shown in detail the holding member or spacer 11 and the same will now be fully set forth. There are two series of strips connecting the legs and I will describe in detail the lower series
100 of strips as this description will apply to the upper series. Said series of strips includes two outer ones as 12 and 13 and two inner ones as 14 and 15. The strips 12 and 13 are removably connected with the leg 9 for which purpose screws may be provided. The strips
105 14 and 15 may be likewise connected with the leg 10 and have a sliding movement upon the outer strips 12 and 13, the several strips composing the lower series having perforations or holes which are adapted to register to receive bolts as 16 and 17. I provide prefer-
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ably two bolts with each series of strips, as when the bolts are in operative relation they effectually hold the legs 9 and 10 in absolute vertical parallelism. The strips 12 and 13 are longer than the strips 14 and 15.

- 5 In some cases the bolt 17 may fit the outermost perforations in the two outer strips 12 and 13, although in Fig. 4 said bolt 17 is shown as extending through two transversely alined inner perforations and as fitting against the leg 10. By removing the bolts 16 and 17, 10 the leg 10 can be moved away from the companion leg 9 and when the desired adjustment is obtained the two bolts will be mounted in place and their nuts set up so as to clamp the strips together. It will be understood, of course, that while I have described in detail 15 the operation following the adjustment of one series of cross strips the same proceeding is followed out with the other series, which in this case is above that described in detail.

- When two sections such as 2 and 3 have been placed 20 in position on a foot-wall or other foundation and when the legs 9 and 10 have been fitted in place, either one of the series of cross strips is brought down and fastened to the legs 9 and 10 immediately over the sections 2 and 3 and against the upper edges thereof to hold the spacing member in relation. In Figs. 1 and 3 the legs 9 and 25 10 are shown as being so formed as to provide for the connection therewith of either one of said series of upper cross strips. When about to commence the molding of the wall, therefore, there will be the sections 2 30 and 3 in place and these sections will be straddled by the legs 9 and 10 and one of the series of strips which I have described will lie across and in contact with the said sections 2 and 3 and the blocks 6 and 7 will be in position. When the parts are in this relation cement 35 material is placed in the space between the sections 2 and 3 and for directing such material into said space a hopper or filler as 18 may be employed, said hopper being adapted to be supported by the mold members 2 and 3 and having a depending spout as 19 to occupy 40 said space. When the two sections 2 and 3 are set up and held in spaced relation by one or more spacers as 11 the hopper is set upon said sections 2 and 3 with the spout 19 thereof between the same. Cement material is then poured into the hopper and is directed by the 45 spout thereof into the space between the plates. The spout as shown clearly in the upper portion of Fig. 1 does not extend the complete depth of two opposite sections. The cement material emerges from the spout and fills the space between the two sections as 2 and 3 50 below the lower end of the spout. It will be assumed at this time that the hopper and its spout are filled with cement, at which time the hopper is elevated vertically and as it is elevated the cement material flows from the spout and fills the space between the said two sections 55 2 and 3 up to the upper edges of said two sections 2 and 3 and covers the lower halves of the two blocks 6 and 7 which lower halves as will be obvious are then embedded in the cement. The capacity of the hopper with its spout is sufficient after the lower portion of the 60 space between two sections is filled in the manner indicated, to supply enough material to said space to entirely fill the remainder of said space.

- After cement material has filled in the space between the sections 2 and 3 the series of cross strips as 65 12 to 15 inclusive hereinbefore described are moved

from their lower position to an upper position or to occupy either of those shown for example in Figs. 1 and 3. This puts the spacing device in its normal relation or one to straddle at least four sections as 2, 3 4 and 5. After the space between the sections 2 and 3 is filled 70 with cement similar sections as 4 and 5 are placed on the sections 2 and 3 and are connected with the blocks 6 and 7 by wires as 8', the blocks serving to hold the superimposed sections against perpendicular displacement. When the sections 4 and 5 are mounted on the 75 sections 2 and 3 and are connected to the blocks 6 and 7, other blocks exactly like the blocks 6 and 7 are connected with the upper ends of the sections 4 and 5, after which the spacer 11 is put in place as shown in Fig. 1. The hopper 18 is then mounted in place, after 80 which cement is poured into the space between the upper sections 4 and 5 by the aid of said hopper until said space is filled, the second batch of cement uniting with the first batch which has been previously placed in the space between the sections 2 and 3. This pro- 85 cedure is followed until the wall is completed to the requisite height. After the first course of cement is laid the spacing device is then in a relation to straddle four or more sections of a mold. The number of sections of the mold, however, is not material. To facilitate 90 the removal and transportation or elevation of the hopper 18, two of the opposite walls thereof may as shown clearly in Fig. 6 have slots as 20 to receive the hands for the purpose indicated. Said hopper may be 95 provided below the slots 20 or near the upper end of the spout 19 with cross bars 21, the ends of which extend outward beyond the opposite side faces of the hopper and are adapted to rest on the upper edges of the mold sections to hold the hopper in operative relation.

The spacer is provided with clamping means, for 100 clamping the upper edges of the mold sections such as the upper edges of the mold sections 4 and 5 as indicated clearly in Fig. 1. The clamping means is shown as consisting of two bolts of duplicate construction and each designated by 22 having at their 105 inner ends depending toes as 23. The shanks of the bolts extend freely through holes formed in the legs 9 and 10, the toes 23 being at the inner ends thereof while the outer ends of said bolts pivotally carry cam levers as 24, the cams of which are adapted to co- 110 operate with the outer side faces of the legs 9 and 10 to hold said toes 23 in clamping relation with the upper edges of the mold sections. When the toes 23 are in their inoperative relations they are separated 115 from the adjacent faces of the legs 9 a distance greater than the thickness of the mold sections 4 and 5 so that the upper edges of said mold sections can be slipped into the spaces between said toes and legs, after which the cam levers 24 are operated to cause the cams thereof to ride against the legs in such a 120 manner as to draw the toes solidly against the mold sections 4 and 5 to firmly clamp the same to the spacing device.

I have hereinbefore described in detail the mode of operation following the making of a solid cement wall 125 and advantageous apparatus for use in molding such wall. The latter may as will be understood be made in other ways, for which purpose different apparatus from that thus described may be utilized.

A wall made by my method has a facing held in 130

place thereto by the material of which the wall is composed and this facing may be of different types. It is preferably of water-proof material, tiling having been found advantageous for this purpose, as thereby

5 I obtain the water-proof effects and also obtain an ornamental appearance. I utilize the mold to associate the tiling with the wall and in this way obtain accuracy and rapidity of operation as well as a permanent finished structure. In the present instance

10 the mold sections 2 and 4 or one of them, assuming that the mold only comprises two sections are utilized as a means for effecting the application to the wall of the facing and prior to mounting either of said sections 2 and 4 in vertical relation, I separably connect

15 therewith tiling as shown in Fig. 8, which it will be assumed represents the mold section 2. This mold section is provided with some means for carrying temporarily an adhesive and the means for attaining this result may be of various kinds, the mold section or plate preferably having openings to receive the adhesive which may be paste practically like that employed by paper hangers, the openings in the plate receiving the paste which serves to cause the tiles to adhere for the time being to the plate or mold section,

25 tion, or at least to secure this relation a time sufficient to enable the mold section to be set up and to receive between it and a companion mold section cement. The openings in the mold section may take different forms. The openings shown consist of perforations 25, there being in the present instance one

30 perforation for each tile, as shown clearly in Fig. 8. This, however, is mentioned simply as an illustration. Previous to mounting the mold section 2, or as far as this is concerned, the mold section 4, although

35 I will describe the mode of operation following the use of the plate 2, I apply to the inner face of said plate 2 paste which covers the same and which enters the perforations 25, said plate or mold section being at this time flat upon a suitable foundation. After

40 applying the paste to the plate or mold section 2 I put thereupon tiles as 26, the tiles being in abutting relation or in the relation they would occupy in the finished wall. The tiles, therefore, are arranged in transversely disposed rows, the area of the group of

45 tiles agreeing substantially with that of the mold section and when the paste is set the plate or mold section 2 can be safely handled and set in an upright position without danger of the tiles being accidentally separated therefrom. When the necessary number of

50 tiles has been applied to a mold section, the latter will be set up opposite a corresponding mold section as hereinbefore fully outlined and cement will be placed in the space between the two mold sections, all as hereinbefore fully brought out. To facilitate

55 the positive connections of the tiles with the cement and the binding of the two together in a firm substantial manner, the tiles may be provided on their inner faces or those farthest removed from the mold section 2 with anchoring projections 27 which are sur-

60 rounded by the cement material.

It will be assumed that a wall has been built up to a height agreeing with the superimposed mold sections shown in Fig. 1. When this is done it becomes necessary to remove the mold sections 2 and 3 from the wall thus partially made. it being understood, of course,

that the hopper 18 has been already dismantled. The spacing device 11 is now removed, after which the wires 8 are clipped off so as to disconnect the mold sections 2 and 3 from the blocks 6 and 7. When this is done the mold section 3 can be easily taken from place,

70 but before the mold section 2 can be removed it is necessary to employ some substance such as water to dissolve the paste between the mold section 2 and the tiles 26. Water can be easily brought into contact with the pasted area by way of the perforations 25.

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In some cases I may as shown only in Fig. 1 mount the tiles 26 upon a sheet of paper as 28 and the paper in turn may be pasted or otherwise attached to the mold sections. In addition to the sheet of paper there will be presented a sheet of tiles, and these tiles in the present case abut in transverse directions, that is, the inner tiles are wholly surrounded by outer tiles. To put the matter in another light, the tiles when they stand vertically abut vertically as well as horizontally and are upheld by a rigid backing. When paper is employed a group of tiles can be applied thereto at the place at which said tiles are made and the composite article consisting of a sheet of paper and a group of tiles can be shipped from the factory as an article of manufacture to be used at the field of operation as required.

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In Fig. 1 I have shown blocks 29 and 30 counterparts of the blocks 6 and 7 hereinbefore described and which are connected to the mold sections 4 and 5 by wires as 31 and 32 and which have other wires as 33 and 34, the function of which will now be described.

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After removing the lowermost sections 2 and 3 I elevate the same and place them on top of the mold sections 4 and 5, the latter when this result is attained being the uppermost sections. The mold sections 2 and 3 will then abut against the upper blocks 29 and 30 and will be connected to said blocks by the wires 33 and 34 exactly as hereinbefore described. When this is done the spacer 11 will be put into place by being first passed over the mold sections 2 and 3 and then over the mold sections 4 and 5 following which the hopper 18 can be put in place. It will be understood that when I employ superimposed mold sections the legs of the spacer extend across the butt joint between said superimposed sections.

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In Fig. 7 I have shown one of the blocks hereinbefore described, for example, the block 6, the wires 8 and 8' thereof being shown in said figure in their untwisted relation or in condition to be passed through perforations in superimposed mold sections. After the sections of the mold have been removed to uncover said wooden blocks the latter are removed from the wall and the spaces occupied by those on the outer side of the wall are filled with cement into which are placed tiles, it being customary to make the superficial area of the blocks 6 equal to one or a given number of tiles. When the inner blocks 7 are removed the spaces they occupy are filled only with cement. The blocks 7 are made longer than the blocks 6 for a purpose that will now appear. The mold sections 2 and 4 have associated therewith tiles and when the tiled area is covered with cement up to a certain point the tiles act as anchoring devices to prevent positively the vertical displacement of the sections 2 and 4. The mold sections 3 and 5 do not carry tiles and there is, therefore, a greater

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tendency to move them downward during the course of building. This tendency, however, is obviated by making the blocks 7 longer and wider than the blocks 6.

What I claim is:

- 5 1. A method which consists in adhesively applying tiles to a mold and then introducing cement into the mold to unite with the tiles.
2. A method involving the use of a mold which consists in separably applying a facing to the mold by a suitable adhesive, then setting up the mold and then supplying the same with cement to make a wall having said facing attached thereto.
- 10 3. A method involving the use of a mold which consists in applying paste to the mold, laying tiles against the pasted surface, then setting up the mold and finally supplying the mold with cement material to make a wall.
- 15 4. A method which consists in adhesively applying simultaneously several tiles to a mold and then uniting cement with the tiles.
- 20 5. A mold having paste-receiving openings.
6. A mold having perforations to receive paste.
7. A mold comprising two opposite sections, one of which has means for retaining paste.
8. A mold provided with a rigid portion, said rigid portion having means for receiving paste for the purpose of uniting a facing to said rigid portion.
- 25 9. A mold comprising a rigid portion provided with perforations through which paste can be passed to unite a wall facing temporarily to the mold or through which water may be passed to separate said facing from the rigid portion of the mold.
- 30 10. A mold comprising two opposing sections, at least one of which is rigid, such rigid section having a plurality of perforations.
- 35 11. A spacing device including two legs each having a pair of strips attached thereto, the strips of one leg being adapted to move longitudinally with respect to the other

strips for securing adjustment, and means cooperative with the strips for holding the legs in an adjusted position.

12. A spacing device including two legs each having two pairs of strips attached thereto at points separated longitudinally with respect to the legs, the respective pairs of strips of one leg being adapted to move longitudinally relatively to the respective strips of the other leg, and all the strips having perforations, and bolts extending through registering perforations of the respective strips at opposite sides of one of said legs for maintaining the adjustment.

13. A spacing device including two legs each having two pairs of strips attached thereto at points separated longitudinally with respect to the legs, the respective pairs of strips of one leg being adapted to move longitudinally relatively to the respective strips of the other leg, and all the strips having perforations, bolts extending through registering perforations of the respective strips at opposite sides of one of said legs for maintaining the adjustment, other bolts extending through said legs having clamping means at their inner ends, and means operative against the outer ends of said other bolts for moving the clamping means into effective relations.

14. A mold comprising two sides each consisting of superposed sections, blocks inside the mold, extending across the joints between the sections of the sides, and means for separably connecting the blocks with the sides.

15. A mold involving two opposite sides each consisting of superimposed sections, blocks within the mold extending across the joints between the sections thereof, and wires for separably connecting the blocks with said sides.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM D. HAM.

Witnesses:

FRANCIS H. WIGGINS,
HARRY CHAPMAN.