Dec. 28, 1954 J. BANNEYER 2,697,864

PROCESS FOR FORMING FLOORS

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Fig. 1

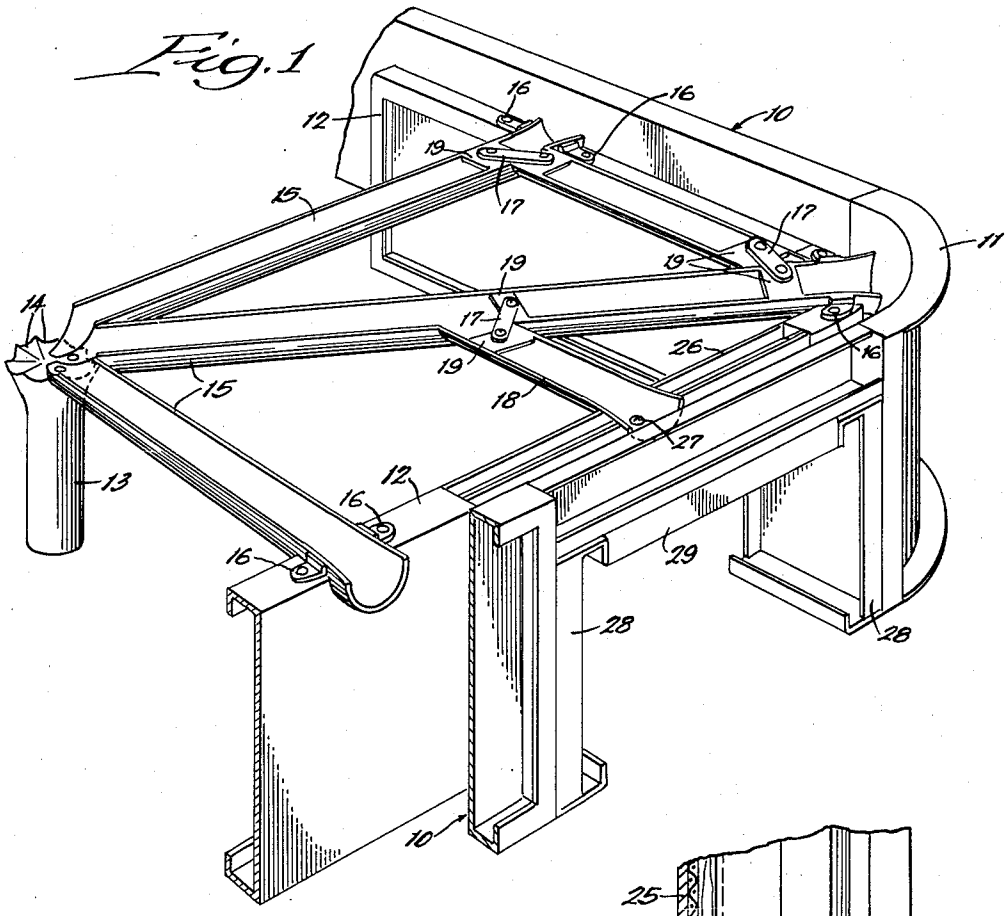
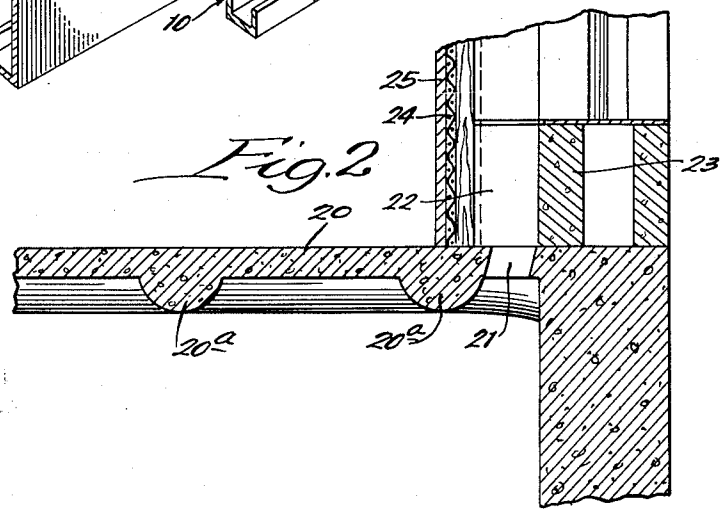


Fig. 2



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Fig. 3

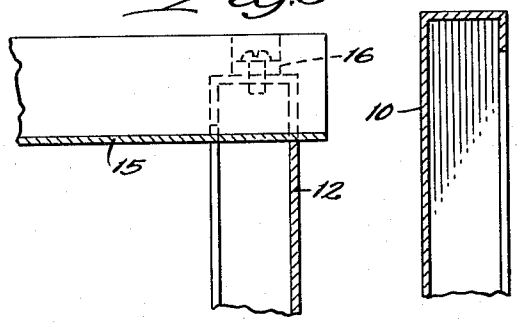


Fig. 4

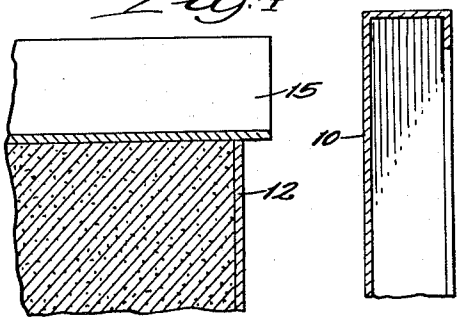


Fig. 5

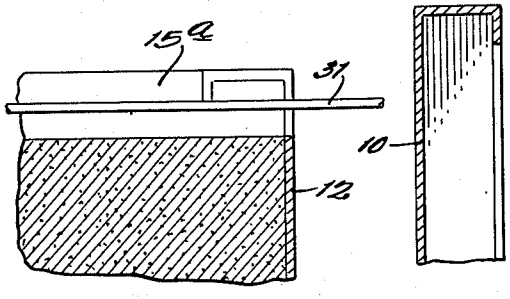


Fig. 6

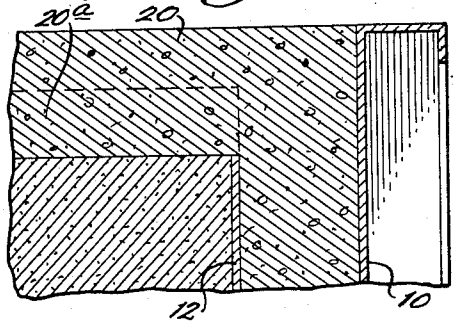


Fig. 7

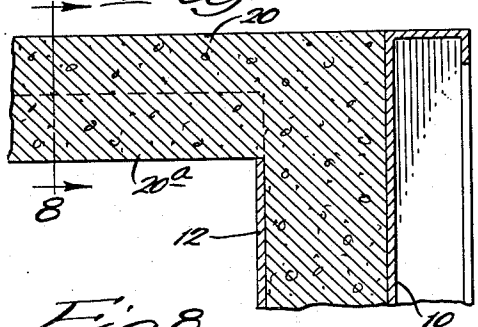


Fig. 8

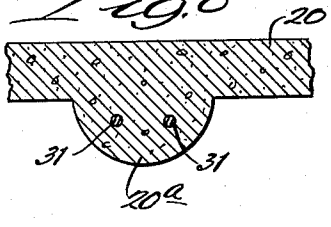
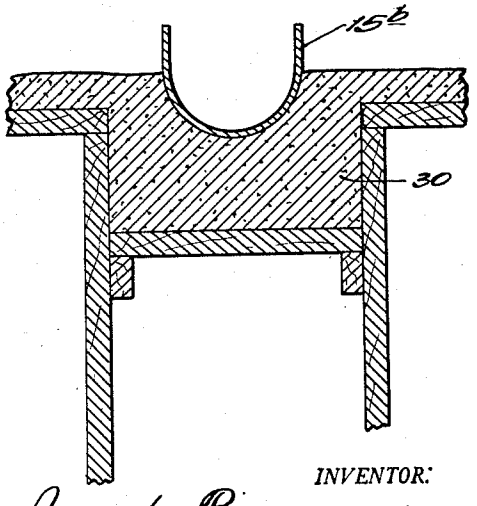


Fig. 9



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Fig. 10

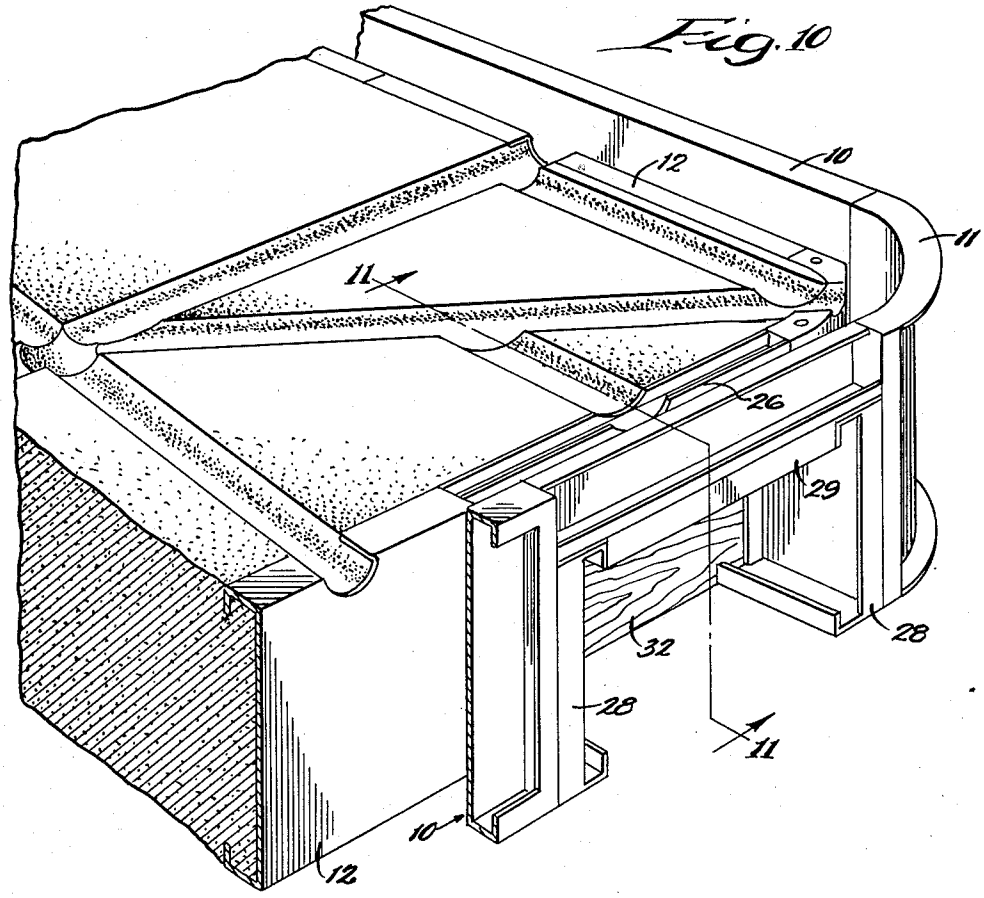
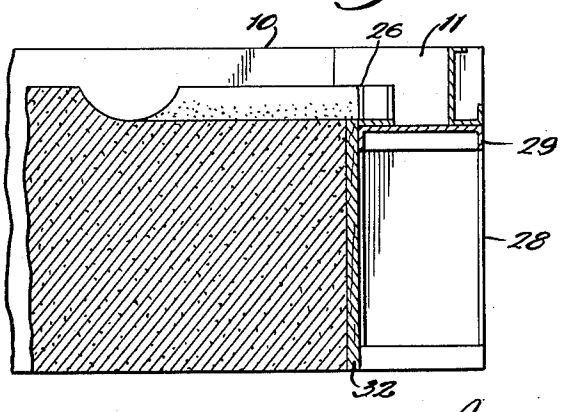


Fig. 11



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PROCESS FOR FORMING FLOORS

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Application May 26, 1950, Serial No. 164,572

4 Claims. (Cl. 25—131)

This invention relates to a floor-forming method and apparatus and is adapted for the forming of a foundation and floor simultaneously.

An object of the invention is to provide a floor and foundation-forming method and means whereby this structure or structures may be formed in a minimum of time and at a minimum of expense. Yet another object is to provide in such a method a step and means for providing an air circulating space permitting the flow of air from the space below the floor upwardly through a wall structure and to the attic or top space of the structure. Yet another object is to utilize inexpensive means such as sand and the like for forming molds which provide reinforcing beams integral with the floor, while at the same time enabling the molding material to be readily removed after the completion of the floor and foundations, etc. Other specific objects and advantages will appear as the specification proceeds.

The invention is illustrated in a single embodiment, by the accompanying drawings, in which—

Fig. 1 is a broken perspective view of apparatus which may be employed in the practice of my invention and in the carrying out of my new process; Fig. 2, a broken transverse sectional view of an edge portion of the floor after completion and of a portion of the wall above; Fig. 3, a broken sectional detail view of the form apparatus in position for forming a floor and wall adjacent one side of the building; Fig. 4, a view similar to Fig. 3 but showing sand or the like in position below and around the inner forms or beam-molds; Fig. 5, a view similar to Fig. 4 but showing reinforcing rods in the molded channel within the sand and after the removal of the beam-form apparatus; Fig. 6, a broken sectional view similar to Fig. 5 but showing the concrete after pouring; Fig. 7, a view similar to Fig. 6 but showing the sand or molding material removed; Fig. 8, a transverse sectional view, the section being taken as indicated at line **8—8** of Fig. 7; Fig. 9, a broken sectional detail view showing a modified form of the invention in which the trough showing the placing of the beam or form directly upon sand and without the use of support apparatus; Fig. 10, a broken perspective view similar to Fig. 1 showing the sand or molding material in place with the beam-form removed preparatory to pouring the concrete; and Fig. 11, a sectional view taken on line **11—11** of Fig. 10 showing the relationship of the archway to the molding material.

In the illustration given, I provide forms which illustrate apparatus that may be used in the new process. It is believed sufficient for the purposes herein to describe merely the apparatus used in one corner of a floor structure. As illustrated, I provide an outer form **10** having a curved corner portion **11**. Spaced inwardly from the outer form **10** is an inner form **12**. The form **12** is shorter than the outer form, as shown more clearly in Figs. 3 and 4. It is the purpose of the inner and outer forms to receive the poured concrete to form the foundation wall which supports the floor. If desired, a base slab or footing may be formed below the forms **10** and **12** and thereafter in the floor-forming operation concrete is poured to form the floor and also the foundation wall (between inner form **12** and outer form **10**) simultaneously.

I desire to form the floor with reinforcing beams extending thereunder and I provide apparatus by which such beams may be formed integrally with the floor section. In the illustration given, I provide a base member **13** which may be formed of cast material such as concrete,

etc. and which may be placed at any point within the structure to form an inner support. Preferably the top portion **14** of the base is enlarged and it may be preformed to receive and securely hold the inner ends of the beam-molds which will be described. The support may be formed of metal, concrete or any suitable material and may be fabricated to receive and be secured to the inner end of the beam-molds **15**.

The beam-molds **15** may be of any suitable shape, length or curvature. In the illustration given, the beam-molds **15** are trough-like in character and are substantially semicircular in cross section. If desired, the inner forms **12** may be recessed to receive the beam-molds **15** and the beam-molds may be equipped with laterally-extending brackets or flanges **16** by which they may be secured to the forms **12** through the use of bolts, screws, etc.

I prefer to secure the beam-molds **15** together in the desired arrangement and for this purpose connecting straps **17** may be used. In some instances, I prefer to have a beam-mold provided with a laterally-extending beam-mold **18** which extends at an acute angle from the first-mentioned mold. The molds **15** may be provided with horizontal straps **19** to which the connecting links **17** may be connected by bolts or other means.

I have found it highly advantageous to provide a building wall above the floor which has a circulating space therethrough, and I desire to form in the floor an elongated slot communicating with the circulation space in the wall of the building. In the finished structure illustrated in Fig. 2, the floor **20** is provided with an air space **21** communicating with an air space **22** thereabove. In the specific structure shown, the wall is formed by the use of building blocks **23** and an inner wall formed of metal lath **24** and plaster **25** is spaced from the block wall **23** by the vertical air space **22**. The air space **22** extends from the floor **20** to the attic and by providing the floor space or open area **21** air may circulate freely from the space below the floor through the air space **22**, and thence, if desired, into and through the attic which may be provided with louvers or other control means. The entrance to the space below the floor may also be controlled by louvers or other means for controlling the circulation of the air.

In order to provide the space **21** in the floor, I provide a spaced channel-mold **26** which may be releasably secured by means of the screw or bolt **27** to the beam-mold **18** and which preferably lies along one side of the structure with the top of the mold **26** approximately flush with the top of the floor **20** after it is poured.

In order to provide an arch in the wall to permit the removal of sand, I provide in the outer form **10** spaced standards **28**, as shown in Fig. 1, and between the arches extends a bottom wall **29**. The arch members **28** are extended thereabove to provide a space for receiving concrete to form a bridge **30**, as shown more clearly in Fig. 9.

Operation

In the operation of the process and apparatus, the inner and outer forms **10** and **12** are placed into position and then the beam-forms are secured in position, as illustrated in Fig. 1, with the inner ends of the long beam-molds resting upon the support **13**. Sand or other molding means is then introduced into the space below the beams **15**. In many areas, it will be found that the depth of the space below the beams will be only a foot or so while in other cases the depth may be greater. In some instances the space may be only a few inches. In any event, it requires little expense and time to fill the space below the beams **15** and to bring the sand or other molding material around the beams and up to the level of the top of the beam-molds. If desired, sand which is treated or particularly good for molding purposes may be used in the area immediately around the molding beams **15**. At the same time, I prefer to fill the space beam-mold **26** with sand.

It will be understood when it is desired to employ arches in the walls to permit removal of the sand after the hardening of the concrete that means should be provided for preventing the sand or molding material from receding through the arches. The obvious method to ac-

complish this purpose is to provide a closure member **32** resting against the inner edges of arch members **28**, as seen more clearly in Figs. 10 and 11. However, it will be apparent that a closure member is not required, since the sand itself can be used to close the archway by piling it within and around the exterior of the archway.

After the molding material has been tamped around the molding beams, the beam-molds may then be removed, leaving the sand itself forming the mold-channels therebelow, as seen more clearly in Figs. 10 and 11. The beam **26**, which is to form the space in the floor, is, however, separated from the beam-mold **18** and the member **26** is left in place supported by the sand therebelow and with the top of the member **26** flush with the top of the floor which is to be poured.

I next pour the concrete to fill the spaces between the forms **10** and **12** and also to fill the mold impressions in the sand, while at the same time forming the floor slab **20**. After the concrete has set, the outer forms may be removed and the standards **28** and wall **29** removed to expose the arch formed in the wall. The sand within the space below the floor may now be withdrawn through this arch area. At the same time, the filled channel-form **26** may be lowered and removed and, in so doing, the space **21** is formed in the floor wall.

The floor **20** may be thus formed with integral reinforcing beams **20a** at any desired points, and I prefer to form a beam **20a** adjacent the air space **21** so as to reinforce the floor at this point. It will be understood, however, that the reinforcing beams may be placed at any point desired and the air space also may be located as desired so as to provide communication with the air space in the wall.

Upon the removal of the sand and molding material on the interior of the foundation walls, the inner forms **12** may be drawn through the archways in the walls and thus recovered for reuse. The inner supports **13** are preferably left in place and in supporting relation to the beams **20a** of the floor.

It will be understood that any reinforcing means may be used in the making of the floor or walls. For example, a rod **31** may be supported in the mold area or impression **15a** formed in the sand after the removal of the beam-mold or beam-form **15**, as shown more clearly in Fig. 5. Any number of supporting rods, wire or other means may be thus used for the strengthening of the beams, floor or walls.

The mold system above described is highly useful where the space ordinarily is not of sufficient height to remove the form after the concrete has been poured. It is also very economical since the making of the mold requires the use only of sand or other inexpensive materials, and these materials may be reused many times. With the structure shown, the air may be taken into the air space below the floor through louvers or screens set in the wall below the floor and these openings may be closed or opened according to the season of the year, or the air may be taken in through a common intake duct. In the latter case, the air may be controlled, heated, cooled or otherwise air-conditioned. From the air space beneath the floor, the air may circulate through the active air space **22** in the wall to the attic and through louvers in the room into the atmosphere, the circulation being increased if desired by the use of an exhaust fan in the roof.

In the modification shown in Fig. 9, the form or trough **15b** is placed directly upon sand and the sand packed around the form to form the sand mold. While I have shown special forms, it will be understood that existing brick walls or any form of wall may be used instead of a form. Also, the inner and outer forms may be omitted, and a concrete block wall with openings for sand removal may be used with the beam forms to produce the sand molds. Thus when the concrete has set, it is necessary only to remove sand through the openings.

While in the foregoing specification I have set forth a specific structure in considerable detail for the purpose of illustrating one embodiment of the invention, it will be understood that such details of structure and method may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a method of simultaneously forming in place a floor and a foundation wall, the steps comprising erecting vertically-extending inner and outer forms for the wall on the site of construction, both of said forms extending downwardly to the ground and said inner form terminating at a spaced distance below the top of said outer form, supporting horizontally-extending beam-forms upon the inner form, placing molding material about the beam-forms to form a bed of said molding material with said beam-forms lying in recesses in the upper surface of said bed, removing the beam-forms, and pouring concrete to fill the spaces between the inner and outer forms and the space above said molding material, including said recesses in the upper surface of said bed, to form an integral wall and floor with integral reinforcing beams extending along the underside of the floor.

2. In a process for forming a floor and a supporting wall therefor, the steps of placing inner and outer vertically-extending forms for the wall, placing a vertically-extending support on the inner side of said inner form, placing horizontally-extending beam-forms on said support and said inner form, filling the area around the beam-forms with mold-forming sand to form a bed of sand with said beam-forms lying in open recesses in the upper surface of said bed, removing the beam-forms and pouring concrete to fill the spaces between the inner and outer forms and the space over said mold-forming sand, including said recesses in the upper surface of said bed, whereby a concrete floor can be formed with integral reinforcing beams extending along its underside.

3. In a process for forming a floor and supporting wall, the steps of placing inner and outer vertically-extending forms in spaced relation for forming the wall, setting a central vertically-extending support on the inner side of the inner form, placing horizontally-extending beam-forms on the support and the inner form, filling the area around the beam-forms with mold-forming sand and partially covering said beam-forms to provide a bed of sand with said beam-forms lying in recesses in the upper surface of said bed, supporting a beam-form along one side and filling the same with sand, removing all except the last-mentioned beam-form, pouring concrete between the inner and outer forms and over the sand and into the recesses left by the removing beam-forms, thereby forming a concrete floor with integral reinforcing beams extending along its underside, and subsequently removing said last-mentioned beam to form a space in said wall.

4. In a process for forming a floor and a supporting wall therefor, the steps of placing inner and outer vertically-extending forms in spaced relation, providing arch forms for forming a hole in the finished wall, supporting vertically-extending beam-forms at the inner side of said inner form, packing molding sand about said forms and partially covering said beam-forms to provide a bed of sand with said beam-forms lying in recesses in the upper surface of said bed, removing said beam-forms to uncover the recesses in said molding sand, pouring concrete into the space between said inner forms and over said sand to fill the recesses therein, removing the outer form after the concrete is set, and then removing sand from the inner space through said hole in the cast wall whereby a concrete floor can be formed with integral reinforcing beams extending along its underside.

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