

Mold system for building precast elements and method for precasting the elements

Technical Field

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The present invention relates to a mold for producing building precast elements and the method for precasting the elements, and more specifically to a mold system for producing precast kitchens, precast bathrooms, precast outer walls, precast beams, precast columns, precast floors etc., as well as the method for precasting the elements.

10 The mold system and the method for precasting the elements according to the present invention are especially suitable to regions where land resources are very short.

Background

15 Currently, for producing building precast elements, such as precast kitchens, precast bathrooms, precast outer walls, precast beams, precast columns, precast floors and so on, one mold will occupy a certain size of worksite. Since it will generally require about 16 hours for pouring concrete into a mold, waiting the concrete to reach a specified strength and removing the mold, only one precast element can be produced
20 in one worksite within one working day. Thus this will lead to the following problem: when the construction period is very tight or a large number of precast elements are required within a particular period, the productivity of building precast products cannot be increased for a fixed-area worksite. Consequently, the construction requirement cannot be satisfied without improved productivity. The problem that the
25 productivity of precast elements is dependent on factory areas is particularly acute for regions where land resources are very short and thus the factory area is not very large.

Summary of the Invention

30 To overcome the defects existing in the prior arts, the present invention provides a mold system and a corresponding method for precasting vertically-layered building precast elements, which can increase the productivity of building precast elements doubly without changing the factory area.

The present invention provides a mold system for building precast elements, comprising a bottom mold unit and at least one upper mold unit, wherein said upper mold unit is provided with an upper working platform at the periphery thereof, and is supported by a supporting frame, and wherein one side of the upper mold unit is rotatably connected with said supporting frame through a rotating shaft, so that said upper mold unit can rotate upwardly from a horizontal posture to a vertical posture or downwardly from the vertical posture to the horizontal posture according to the requirements in operation.

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Said supporting frame comprises supporting pillars that support both sides of said upper mold unit, and a fixing rack arranged at one side of the rotating shaft of the upper mold unit. When said upper mold unit rotates upwardly from the horizontal posture to the vertical posture, the upper mold unit will abut against said fixing rack.

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Said upper working platform can be fixed on said support pillars.

Alternatively, said upper working platform can be fixed on said upper mold unit.

Said upper working platform can be provided with safety guardrails secured on the outside thereof.

Said upper mold unit can be provided with hoisting holes or hoisting members at the side of the upper mold unit away from the fixing rack.

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Said fixing rack can be provided with stairs at one side thereof, an operating platform being arranged at the top of the stairs.

The method for precasting building precast elements according to the present invention comprises the following steps:

Step A, removing and hoisting out the precast elements produced on the previous day from the upper mold unit;

Step B, fixing the related components of the upper mold unit and then rotating

the upper mold unit upwardly to the position abutting against said fixing rack, and securing the upper mold unit;

Step C, removing and hoisting out the lower precast elements produced on the previous day from the bottom mold unit;

5 Step D, cleaning the bottom mold unit, assembling rebars, and pouring concrete into the bottom mold unit in order to produce new lower precast elements;

Step E, releasing the upper mold unit and rotating it downwardly to the horizontal posture, cleaning the upper mold unit, assembling rebars, and pouring concrete into the upper mold unit in order to produce new upper precast elements; and

10 Step F, repeating Steps A to E for a new production cycle.

Said Steps A, B and C together may last 90 to 150 minutes; said Step D may last 90 to 150 minutes; and said Step E may last 90 to 150 minutes.

15 The period between Step E in one production cycle and Step A in the next production cycle may be at least 16 hours.

As compared with the prior arts, the mold system for building precast elements according to the present invention is of a structure with at least two layers, and the upper mold unit body can rotate downwardly to the horizontal posture or upwardly to abut against the fixing rack. Therefore, the height space of the worksite can be utilized sufficiently, thus increasing the productivity of building precast elements more than double without changing the factory area.

25 **Brief Description of the Drawings**

Fig. 1 schematically shows the state when the second layer precast elements are hoisted from the mold system of the present invention;

30 Fig. 2 schematically shows the state when said upper mold unit is rotated upwardly and secured and the first layer precast elements are hoisted;

Fig. 3 schematically shows the state when concrete is poured into said bottom

mold unit; and

Fig. 4 schematically shows the state when said upper mold unit is rotated downwardly to the horizontal operating position and concrete is poured into the upper mold unit.

Specific Embodiments of the Invention

In the following the embodiments of the present invention will be explained in detail with reference to the attached drawings.

As shown in Figs. 1-4, the mold system for building precast elements according to the present invention mainly comprises a mold body and a supporting frame 3. The mold system is characterized in that said mold body is of a structure with at least two layers, comprising a bottom mold unit 11 and at least one upper mold unit 12. The specific number of the layers is determined by the heights of the precast elements and the mold, the workload as needed, and the setting time of concrete, etc. If the mold is low, the workload as needed is small or the setting time of concrete is short, a structure with three layers or even four layers is feasible. Said supporting frame 3 comprises supporting pillars 31 and a higher fixing rack 32 arranged at one side of the mold body. Two layers of mold units are provided in this embodiment. The bottom mold unit 11 is generally placed on the ground directly, and the upper mold unit 12 is supported by supporting pillars 31 so that it is placed over said bottom mold unit 11. The side of the upper mold unit 12 toward said fixing rack 32 is articulated to a supporting pillar 31 through a rotating shaft 122, while the side of the upper mold unit 12 away from said fixing rack 32 is directly supported on another supporting pillar 31. In this manner, said upper mold unit 12 can be pivoted around its articulated end downwardly to a horizontal posture, or upwardly to a vertical posture in which the upper mold unit 12 abuts against the fixing rack 32.

For convenience of the operation of workers, said upper mold unit 12 is provided with an upper working platform 2 at the periphery thereof. The upper working platform 2 can be fixed on said supporting pillars 31 or said upper mold unit 12. Fixed

on the supporting pillars 31, the upper working platform 2 is independent of the upper mold unit 12 and will not rotate with the upper mold unit 12. Therefore, the upper working platform 2 can be temporarily used for receiving the components removed from the upper mold unit 12. Besides, when the height of the upper working platform 2 is beyond the stipulated safety height, safety guardrails 6 should be provided on the outside of said upper working platform 2, in order to prevent workers from accidentally falling from the upper working platform 2.

To facilitate the upward rotation of the upper mold unit 12 through a crane, said upper mold unit 12 can be provided with hoisting holes or hoisting members 121 at the side of the upper mold unit 12 away from the fixing rack 32. When said upper mold unit 12 is rotated upwardly to abut against said fixing rack 32, the upper mold unit 12 can be fixed on the top of the fixing rack 32 through the hoisting holes or hoisting members 121. At this moment, the center of gravity of the upper mold unit 12 should be in a position outside of the upper working platform 2, in order to prevent the upper mold unit 12 from accidentally rotating downwardly due to fixation failure. In this embodiment, when the upper mold unit 12 is rotated upwardly to the vertical posture and secured, the bottom surface of the upper mold unit 12 forms an angle of about 88 degrees with the horizontal plane.

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Said fixing rack 32 is vertically fixed on one side of the mold body, the height of the fixing rack being greater than or equal to that of the hoisting holes or hoisting members 121 when said upper mold unit 12 is rotated upwardly to abut against the fixing rack 32. To facilitate workers to fix the upper mold unit 12, said fixing rack 32 can be provided with stairs 5 at one side thereof, on the top of which is provided with an operating platform 51. Similarly, in view of safety consideration, safety guardrails 52 should also be provided on the outside of the operating platform 51.

In designing the mold system for building precast elements according to the present invention, the heights of the upper and lower mold units should be taken into consideration. The mold unit including many components is preferably placed on the lower layer, so as to reduce the quantity of the components which should be fixed when the upper mold unit is rotated. Besides, the upper and lower mold units are

preferably used for producing the precast elements with substantially identical types and specifications.

5 In the following the method for precasting building precast elements with the mold system of the present invention will be explained in combination with the production time.

1. From 8:00am to 10:00am, as shown in Fig. 1, firstly the workers standing on the upper working platform 2 remove the precast elements 82 produced on the
10 previous day from the upper mold unit 12, and hoist them out to storage areas. Subsequently, as shown in Fig. 2, the related components of the upper mold unit 12 are fixed, and then the upper mold unit 12 is rotated upwardly to a position abutting against said fixing rack 32, and secured. At this moment, the space of the bottom mold unit 11 is released, and the workers can carry out the operation of dismantling the
15 mold on the ground, and remove and hoist out the precast elements 81 produced on the previous day from the bottom mold unit 11.

2. From 10:00am to 12:00pm, as shown in Fig. 3, the bottom mold unit 11 is cleaned, rebars are assembled, and concrete is poured into the bottom mold unit 11 in
20 order to produce new lower precast elements 81;

3. From 2:00pm to 4:00pm, as shown in Fig. 4, the upper mold unit 12 is released and rotated downwardly to the horizontal operating posture. At this moment, workers can stand on the upper working platform 2, and then clean the mold,
25 assemble rebars, and pour concrete into the upper mold unit 12 in order to produce new upper precast elements 82;

4. From 4:00pm to 8:00am the next day, there is about 16 hours available for the setting of the precast elements 82 in the upper mold unit 12, and a still longer time
30 available for that of the precast elements 81 in the bottom mold unit 11, so that concrete can completely reach the stipulated strength. Beginning from 8:00am the next day, workers can repeat the work progress as the previous day. Therefore, production of two precast elements in the upper and lower layers can be completed in

one single worksite within one working day, thus doubling the productivity as compared to current molds.

5 If the mold system according to the present invention has three or more layers, it can be operated in a similar manner, i.e., removing and hoisting from the upper layer to the bottom layer in sequence, and then assembling rebars and pouring concrete from the bottom layer to the upper layer in sequence.

10 It should be noted that the above-mentioned embodiment shows particularly preferred one but that this is not restricted thereto. Any amendments, equivalents or improvements made under the spirit and principle of the present invention shall be included in the protection scope of the present invention.

Claims

1. A mold system for building precast elements, characterized in that, comprising a bottom mold unit (11) and at least one upper mold unit (12), wherein said upper mold unit (12) is provided with an upper working platform (2) at the periphery thereof; and said upper mold unit (12) is supported by a supporting frame (3), wherein one side of the upper mold unit (12) is rotatably connected with said support frame (3) through a rotating shaft, so that said upper mold unit (12) can be rotated upwardly from a horizontal posture to a vertical posture or rotated downwardly from the vertical posture to the horizontal posture according to the requirements in operation.

2. The mold system for building precast elements according to claim 1, characterized in that, said support frame (3) comprises supporting pillars (31) that support both sides of said upper mold unit (12), and a fixing rack (32) arranged at one side of the rotating shaft of said upper mold unit (12), wherein said upper mold unit (12) will abut against said fixing rack (32) when it rotates upwardly to the vertical posture.

3. The mold system for building precast elements according to claim 2, characterized in that, said upper working platform (2) is fixed on said supporting pillars (31).

4. The mold system for building precast elements according to claim 2, characterized in that, said upper working platform (2) is fixed on said upper mold unit (12).

5. The mold system for building precast elements according to any one of claims 1 to 4, characterized in that, safety guardrails (6) are provided on the outside of said upper working platform (2).

6. The mold system for building precast elements according to any one of claims 1 to 4, characterized in that, said upper mold unit (12) is provided with hoisting holes or hoisting elements (121) at the side of the upper mold unit away from the fixing

rack (32).

7. The mold system for building precast elements according to any one of claims 1 to 4, characterized in that, said fixing rack (32) is provided with stairs (5) at one side thereof, a working platform being arranged at the top of the stairs (5).

8. A method for precasting building precast elements by means of the mold system according to claim 1, characterized in that, the method comprises the following steps:

10 Step A: removing and hoisting out the precast elements produced on the previous day from the upper mold unit (12);

Step B: fixing the related components of the upper mold unit (12) and then rotating the upper mold unit upwardly to the position abutting against said fixing rack (32), and securing the upper mold unit;

15 Step C: removing and hoisting out the lower precast elements produced on the previous day from the bottom mold unit (11);

Step D: cleaning the bottom mold unit (11), assembling rebars, and pouring concrete into the bottom mold unit (11) in order to produce new lower precast elements;

20 Step E: releasing the upper mold unit (12) and rotating it downwardly to the horizontal posture, cleaning the upper mold unit (12), assembling rebars, and pouring concrete into the upper mold unit (12) in order to produce new upper precast elements;

Step F: repeating Steps A to E for a new production cycle.

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9. The method for precasting building precast elements according to claim 8, characterized in that, said Steps A, B and C last 90 to 150 minutes, said Step D lasts 90 to 150 minutes, and said Step E lasts 90 to 150 minutes.

30 10. The method for precasting building precast elements according to claim 8, characterized in that, the period between Said Step E and Step A in a next production cycle is at least 16 hours.