PREFABRICATED FRAME AND CONSTRUCTION METHOD USING THE SAME

Field of the Invention

The present invention relates to a construction structure and a construction method thereof, and in particular, to a prefabricated frame using prefabricated members and a construction method using such a prefabricated frame. The present invention is especially applicable to all buildings with a frame or frame-shear structure.

Background of the Invention

A conventional frame structure building established through assembling prefabricated members mainly uses prefabricated members such as a prefabricated secondary beam, a prefabricated slab, or the like. During construction, a column should be cast in situ first, followed by mounting of the prefabricated secondary beam and the prefabricated slab, and then casting of main beam reinforcing bars in situ. Finally, concrete is cast in situ on the prefabricated slab, so as to connect the main beam, the prefabricated secondary beam, and the prefabricated slab together. The use of prefabricated members can reduce on-site construction work, save labors, and improve construction efficiency. However, in a frame structure building, the main beam accounts for a large proportion of the whole structure, such that the on-site construction for the frame structure building with prefabricated members through the conventional method with still requires heavy workload. Thus the construction industry is still unable to get rid of its dependence on labor resources.

Summary of the Invention

The technical problem to be solved by the present invention is to provide a prefabricated frame and a construction method thereof, wherein the prefabricated members account for a large proportion of all structural members used, thus significantly reducing the amount of on-site construction work.

The technical solution to the above technical problem used in the present invention is to provide a prefabricated frame, comprising a column, a main beam connected to the column, a secondary beam connected to the main beam, and a floor. The main beam and the secondary beam both are prefabricated members, and are provided with, on respective top portions thereof, exposed reinforcing bars, and reinforcing bars at cast-in-situ parts. The floor is a laminated plate, with a prefabricated slab arranged at a lower portion thereof. The prefabricated slab, the main beam, and the secondary beam are connected together by means of cast-in-situ concrete on the respective top portions thereof.

The main beam is provided, on the top portion thereof, with a recess opening to its two end faces. Width of two end portions of the main beam is greater than or equal to that of a middle portion of the main beam. Depth of the recess at the two end portions of the main beam is greater than depth of the recess at the middle portion of the main beam. The reinforcing bar at the cast-in-situ part of the main beam is located at the recess on the top portion thereof.

The secondary beam is provided, on the top portion thereof, with a recess opening to its two end faces. Width of two end portions of the secondary beam is greater than or equal to that of a middle portion of the secondary beam. Depth of the recess at the two end portions of the secondary beam is greater than depth of the recess at the middle portion of the secondary beam. The reinforcing bar at the cast-in-situ part of the secondary beam is located at the recess on the top portion thereof.

A reinforcing bar connector is provided at a junction between the main beam and each of the secondary beams located at left and right sides of the main beam, and connects a reinforcing bar provided inside of the main beam to the reinforcing bar provided at the cast-in-situ parts of the end portion of each of the secondary beams that are connected to the main beam. A connecting reinforcing bar is provided at a top portion of the cast-in-situ part at the end portion of the secondary beam located at one side of the main beam, and passes through the main beam and extends to the secondary beam located at the other side of the main beam. The connecting reinforcing bar partially overlaps, through its two end portions, the reinforcing bars

provided at the top portions of the cast-in-situ parts of the secondary beams located at the left and right sides of the main beam respectively, the end portion of the secondary beam being provided with a stirrup connecting the reinforcing bar at a prefabricated part and the reinforcing bar at the cast-in-situ part thereof.

At a connecting node between the main beam and the column, connecting reinforcing bars are provided at both an upper portion and a lower portion of the cast-in-situ part at the end portion of the main beam, and extend inside of the column with a bent end. The end portion of the main beam is provided with a stirrup connecting the reinforcing bar at a prefabricated part and the reinforcing bar at the cast-in-situ part thereof.

At connecting nodes between the column and the main beams located at left and right side of the column, connecting reinforcing bars are provided at both an upper portion and a lower portion of the cast-in-situ part at the end portion of the main beam located at one side of the column, pass through the column, and extend to the main beam located at the other side of the column. Two end portions of the connecting reinforcing bar of the upper portion partially overlap the reinforcing bars provided at the top potions of the cast-in-situ parts of the main beams located left and right sides of the column respectively, the end portions of the main beams located at the left and right sides of the column being provided with respective stirrups for connecting the reinforcing bars at a prefabricated part with the reinforcing bars at the cast-in-situ part thereof.

The present invention further provides a construction method using the above prefabricated frame, comprising the following steps:

step A) prefabricating the main beam, the secondary beam, and the prefabricated slab according to design requirements, wherein exposed reinforcing bars are provided for all of the main beam, the secondary beam, and the prefabricated slab as reserved members, and the top portions of the main beam and the secondary beam are provided in advance with recesses opening to respective end faces, the reinforcing bars at the cast-in-situ parts of the main beam and the secondary beam being arranged in the recesses at the top portions thereof and temporarily fixed;

step B) performing cast-in-situ construction of the column on site;

step C) mounting temporary support scaffolds for respective prefabricated members on site, and lifting prefabricated main beam, secondary beam, and prefabricated slab in place;

step D) moving or inserting, after the prefabricated main beam, secondary beam, and prefabricated slab are lifted in place, the reinforcing bars at the cast-in-situ parts provided in the recesses of the main beam and secondary beam into designed positions, wherein the reinforcing bars are bound in series and connected to the prefabricated member or column associated therewith; and

step E) casting concrete in situ on the main beam, the secondary beam, and the prefabricated slab that are bound with the reinforcing bars to connect the three together, wherein the concrete is also cast into the recesses on the top portions of the main beam and the secondary beam.

According to one embodiment, in step A), the reinforcing bar connector connecting to internal reinforcing bars is pre-arranged at the junction between the main beam and the secondary beam, and the secondary beam, at the prefabricated part of the end portion thereof, is provided with exposed stirrups connecting to the reinforcing bar at the cast-in-situ part thereof, while at the recess thereof, is placed with the connecting reinforcing bar which is temporarily fixed. And in step D), the reinforcing bar provided at the cast-in-situ part of the end portion of the secondary beam is connected to the reinforcing bar connector, and the connecting reinforcing bar in the recess of the secondary beam located at one side of the main beam is moved to pass through the main beam and extend to the secondary beam located at the other side of the main beam, with the two end portions of the connecting reinforcing bar partially overlapping the reinforcing bars provided at the top portions of the cast-in-site parts of the secondary beams located at the left and right sides of the main beam, respectively.

According to one embodiment, in step A), the exposed stirrups are provided at the prefabricated part of the end portion of the main beam and connected to the reinforcing bars provided at the cast-in-situ part thereof, and pre-bent upper and lower connecting reinforcing bars are provided at the recess of the main beam, and are temporarily fixed. And in step D), at the connecting node between the main beam and the column, the upper and lower connecting reinforcing bars provided in the recess of

the main beam are disposed such that bending portion of the upper and lower connecting reinforcing bars extend into the column.

According to one embodiment, in step A), the exposed stirrups are provided at the prefabricated part of the end portion of the main beam and connected to the reinforcing bar provided at the cast-in-situ part thereof, and the upper and lower connecting reinforcing bars are provided at the recess of the main beam, and are temporarily fixed. And in step D), at the connecting nodes between the column and the main beams located at the left and right sides of the column, the upper and lower connecting reinforcing bars placed at the recess of the main beam are moved to pass through the column and extend to the main beam located at the other side of the column, and the two end portions of the upper and lower connecting reinforcing bars partially overlap the upper and lower reinforcing bars provided at the cast-in-situ parts of the main beams located at the left and right sides of the column, respectively.

Compared with the prior arts, the prefabricated frame and the construction method using the prefabricated frame according to the present invention have the following advantages.

At the outset, a cast-in-situ main beam is replaced with the prefabricated main beam, and the reinforcing bars at the cast-in-situ parts of the prefabricated main beam and secondary beam are provided as reserved and fixed on the prefabricated members. This will save a lot of construction work on site, and reduce investment into the human resources for on-site reinforcement breaking and reinforcement fixing.

Besides, construction progress can be accelerated, thereby improving construction efficiency and shortening an overall project duration.

Moreover, as a result of increase in factory production of the prefabricated members, the quality of products can be more effectively guaranteed, and as the prefabricated members can be favorably completed, on-site polishing and secondary repair procedures can be directly saved.

In addition, the main beams, the secondary beams, and the floor are all in form of

prefabricated members, which can reduce the use of a large number of wood plate molds. Only a few gaps between members are necessary to be blocked with plate molds. This also remarkably reduces construction waste on site, and thus is more environmentally friendly.

Furthermore, the construction method using the prefabricated frame according to the present invention requires only a temporary working platform for direct lifting operations of the main beam, the secondary beam, and the floor. Compared with conventional construction methods, the present invention not only enables more reasonable arrangements of construction procedures, but also guarantees safe on-site construction.

Brief Description of the Drawings

Fig. 1 schematically shows the structure of a prefabricated frame of the present invention;

Fig. 2 is a main structural diagram of a prefabricated main beam 2 according to Embodiment 1 thereof, wherein its exposed reinforcing bars as reserved are not shown;

Fig. 3 is a main structural diagram of the prefabricated main beam 2 according to Embodiment 2 thereof, wherein its exposed reinforcing bars as reserved are not shown;

Fig. 4 is a main structural diagram of a prefabricated secondary beam 3 according to Embodiment 1 thereof, wherein its exposed reinforcing bars as reserved are not shown;

Fig. 5 is a main structural diagram of the prefabricated secondary beam 3 according to Embodiment 2 thereof, wherein its exposed reinforcing bars as reserved are not shown;

Fig. 6 schematically shows a temporary support for the main beam 2, the secondary beam 3, and a prefabricated slab 51 during construction;

Fig. 7 is a detail view showing an end node at a junction between a cast-in-situ column 1 and the main beam 2;

Fig. 8 is a detail view showing a central node at a junction between the cast-in-situ column 1 and the main columns 2 located at left and right sides of the column 1; and

Fig. 9 is a detail view showing a node at a junction between the main beam 2 and the secondary beams 3 located at left and right sides of the main beam 2.

Detailed Description of the Embodiments

The present invention will be described in further detail with reference to preferred embodiments shown in the accompanying drawings.

As shown in Figs. 1 and 6, a prefabricated frame according to the present invention includes a column 1, a main beam 2 connected to the column 1, a secondary beam 3 connected to the main beam 2, and a floor 5. The present invention is characterized in that both the main beam 2 and the secondary beam 3 are prefabricated members, and the floor 5 is a laminated plate, wherein a lower part of the floor 5 is a prefabricated slab 51 while an upper part thereof is a cast-in-situ concrete layer 52. The main beam 2, the secondary beam 3, and the prefabricated slab 51 are all provided in advance with exposed reinforcing bars at respective top portions thereof, and with reinforcing bars at respective cast-in-situ parts thereof. The reinforcing bars are temporarily fixed. During construction, after prefabricated main beam, secondary beam, and floor are mounted through hoist, the reinforcing bars provided at cast-in-situ parts and arranged in recesses are moved or inserted into their respective designed positions, bound in series, and then fixed. The reinforcing bars provided at cast-in-situ parts are connected to the exposed reinforcing bars as reserved in the prefabricated members. The prefabricated slab 51, prefabricated main beam 2, and prefabricated secondary beam 3 are used as a bottom mold, and connected together through in-situ casting concrete on top of the bottom mold.

According to the present invention, the main beam 2 may be configured in either

of the following two structural modes.

In Embodiment 1 of the main beam 2 as shown in Fig. 2, width at two end portions 22 of the main beam 2 is larger than width at a middle portion 21 of the main beam 2, and the middle portion 21 is connected to each of the end portions 22 through a step part. The middle portion 21 and the two end portions 22 of the main beam 2 are provided, on top portions thereof, with recesses 23 and 24, respectively, wherein the recess 23 of the middle portion 21 is relatively shallow, and the recesses 24 of the end portions 22 are relatively deep and open to respective end faces of the main beam 2. Two sides of the middle portion 21 and two sides of each of the end portions 22 are equally high. Concrete, while being cast in situ on the floor, is also cast in situ in the recesses 23 and 24 on the top portion of the main beam 2, thus forming the cast-in-situ part of the main beam 2.

Embodiment 2 of the main beam 2 as shown in Fig. 3 differs from Embodiment 1 of the main beam 2 in that, in Embodiment 2, the width of the two end portions 22 is equal to the width of the middle portion 21 of the main beam 2, whereas height of the two sides of the end portions 22 is much lower than height of the two sides of the middle portion 21. Therefore, a small amount of templates are necessary to block both sides of the end portions 22 during on-site construction.

Similarly, in the present invention, the secondary beam 3 may also be configured in either of the following two structural modes.

In Embodiment 1 of the secondary beam 3 as shown in Fig. 4, width at two end portions 32 of the secondary beam 3 is larger than width at a middle portion 31 of the secondary beam 3, and the middle portion 31 is connected to each of the end portions 32 through a step part. The middle portion 31 and the two end portions 32 of the secondary beam 3 are provided, on top portions thereof, with recesses 33 and 34, respectively, wherein the recess 33 of the middle portion 31 is relatively shallow, and the recesses 34 of the end portions 32 are relatively deep and open to end faces of the secondary beam 3. Two sides of the middle portion 31 and two sides of the end portions 32 are equally high. Concrete, while being cast in situ on the floor, is also cast in situ in the recesses 33 and 34 on the top portions of the secondary beam 3, thus

forming the cast-in-situ part of the secondary beam 3.

Embodiment 2 of the secondary beam 3 as shown in Fig. 5 differs from Embodiment 1 of the secondary beam 3 in that, in Embodiment 2, the width of the two end portions 32 is equal to the width of the middle portion 31 of the secondary beam 3, whereas height of the two sides of the end portions 32 is much lower than height of the two sides of the middle portion 31. Therefore, a small amount of templates are necessary to block both sides of the end portions 32 during on-site construction.

Main reinforcing bars at the cast-in-situ parts of the main beam 2 and the secondary beam 3 can be respectively provided in advance in the recesses 23 and 24 at respective top portions of the main mean 2, and in the recesses 31 and 34 at respective top portions of the secondary beam 3, and then transported to the construction site together with the prefabricated members. After the main beam 2 and the secondary beam 3 are mounted through hoist, the above main reinforcing bars are separately moved or inserted into corresponding positions, bound in series, and then fixed.

As shown in Fig. 1, the main beam 2 is mounted between two adjacent columns 1, and the end portions of the main beam 2 are disposed on top edges of the columns 1 in a specific layer. The secondary beam 3 is mounted between two adjacent main beams 2. The end faces of the secondary beam 3 abut against side walls of the main beams 2. At a position where the side wall of the main beam 2 connects the secondary beam 3 is provided with an opening 25, in order to facilitate passing of the reinforcing bars at the top portion of the secondary beam 3.

As shown in Fig. 9, a reinforcing bar connector 78 is provided in advance on the main beam 2 at a lower portion of junction between the main beam 2 and each of the secondary beams 3 located at left and right sides of the main beam 2, and is connected to a reinforcing bar 77 provided in a prefabricated part of the main beam 2. Before concrete is cast in situ, a reinforcing bar 93 provided in the recess 34 at the end portion of the secondary beam 3 is connected to the reinforcing bar connector 78 arranged at a corresponding position, thereby achieving connection of the reinforcing

bar 77 provided in the prefabricated part of the main beam 2 to the reinforcing bar 93 provided at the cast-in-situ part of the secondary beam 3 at the end portion thereof. And a connecting reinforcing bar 79 is provided at a top portion of the cast-in-situ part at the end portion of the secondary beam 3 located at one side of the main beam 2, passes along a bottom portion of a reinforcing bar provided at the top portion of the main beam 2, and extends to the secondary beam 3 provided at the other side of the main beam 2. Two end portions of the connecting reinforcing bar 79 partially overlap reinforcing bars 92 provided at the top portions of the cast-in-situ parts of the left and right secondary beams 3, respectively. The end portions of the secondary beams 3 are provided with exposed stirrups 94, as reserved members, which extend from the prefabricated parts thereof. These stirrups 94 connect reinforcing bars 91 provided in a prefabricated part of the secondary beam 3 with the reinforcing bars 92 and 79 provided at the cast-in-situ part of the secondary beam 3, and enclose them. The reinforcing bars 93, 79, and 92 may be arranged in the recesses of the secondary beams 3 at a prefabrication factory in advance, and directly moved or inserted, after the main beams and secondary beams are mounted, into the corresponding positions, bound in series, and then fixed.

As shown in Fig. 7, at a connecting node between the main beam 2 and an end column 1, connecting reinforcing bars 74 and 73 are respectively provided at an upper portion and a lower portion of the cast-in-situ part of the main beam 2 at the end portion thereof. The lower connecting reinforcing bar 73 has one end extending into the column 1 connected thereto and being bent upwardly; and the upper connecting bar 74 has one end extending similarly into the column 1 connected thereto and being bent downwardly, and another end partially overlapping a reinforcing bar 72 provided at a cast-in-situ concrete part at an upper portion of the main beam 2. The end portion of the main beam 2 is provided with exposed stirrups 75, as reserved members, which extend from the prefabricated part of the main beam 2. These stirrups 75 connect the reinforcing bar 71 provided in the prefabricated part of the main beam 2 with the reinforcing bars 74 and 72 provided at the cast-in-situ part of the main beam 2, and enclose them. The reinforcing bars 72, 73, and 74 may be arranged in the recesses of the main beam 2 at a prefabrication factory in advance, and directly moved or inserted, after the main beam 2 is mounted, into the corresponding positions, bound in series, and then fixed.

As shown in Fig. 8, at connecting nodes between the column 1 and the main beams 2 located at left and right sides of the column 1, connecting reinforcing bars 81 and 82 are respectively provided at upper and lower portions of the cast-in-situ part at the end portion of the main beam 2 located at one side of the column 1, pass through the column 1, and extend to the main beam 2 located at the other side of the column 1. Two end portions of the upper connecting reinforcing bar 81 partially overlap the reinforcing bars 72 provided at the top portions of the cast-in-situ parts of the left and right main beams 2, respectively. The end portions of each of the main beams 2 located at both sides of the column 1 are provided with exposed stirrups 76 as reserved members, which extend from the prefabricated part thereof. These stirrups 76 connect the reinforcing bars 71 provided in the prefabricated parts of the main beams 2 with the reinforcing bars 72 and 81 provided in the cast-in-situ parts thereof, and enclose them. The reinforcing bars 72, 81, and 82 may be arranged in the recesses of the main beam 2 at a prefabrication factory in advance, and directly moved or inserted, after the main beam 2 is mounted, into the corresponding positions, bound in series, and then fixed.

A construction method using the above prefabricated frame according to the present invention includes the following steps.

In step A), the main beam 2, the secondary beam 3, and the prefabricated slab 51 are prefabricated according to design requirements. The main beam 2, the secondary beam 3, and the prefabricated slab 51 are all provided with exposed reinforcing bars as reserved members, and the top portions of the main beam 2 and the secondary beam 3 are provided with respective recesses opening to respective end faces thereof, these recesses being relatively deep at the two end portions and relatively shallow in the middle portion. The reinforcing bars at the cast-in-situ parts of the main beam 2 and the secondary beam 3 can be provided in the recesses, and temporarily fixed.

In step B), on-site cast-in-situ construction of the column is performed.

In step C), temporary support scaffolds for respective prefabricated members are mounted on site, and the prefabricated main beam 2, secondary beam 3, and

prefabricated slab 51 are lifted in place through hoist. As shown in Fig. 6, first, door scaffolds 61 and 62 of the prefabricated main beam 2 and secondary beam 3, and a temporary mobile working platform are mounted. Next, after the prefabricated main beam 2 and secondary beam 3 are lifted, the temporary mobile working platform is lifted to positions for other main beams and secondary beams to be mounted, followed by mounting of a floor door scaffold 63. Finally, the prefabricated slab 51 is lifted in place.

In step D), after lifting operations are completed, reinforcing bars at the cast-in-situ parts provided in the recesses of the prefabricated main beam 2 and secondary beam 3 are moved or inserted into corresponding designed positions, bound in series, and then connected to the prefabricated member or column associated therewith.

In step E), concrete is cast in situ on the main beam 2, the secondary beam 3, and the prefabricated slab 51 that are bound with reinforcing bars, so as to connect the three together, and also cast into the recesses on the top portions of the main beam 2 and the secondary beam 3.

With respect to components at the connecting node between the main beam 2 and the secondary beam 3, as shown in Fig. 9, in above step A), the reinforcing bar connector 78 connecting to internal reinforcing bars is pre-embedded at the junction between the prefabricated main beam 2 and secondary beam 3. The prefabricated part at the end portion of the secondary beam 3 is provided with the exposed stirrups 94, which are connected to the reinforcing bar provided at the cast-in-situ part thereof. The connecting reinforcing bars 79 and 93 are placed at the recesses of the secondary beam 3, and are temporarily fixed. In above step D), the reinforcing bar 93 placed at the recesses of the secondary beam 3 is connected to the corresponding reinforcing bar connector 78. The connecting reinforcing bar 79 placed at the recess of the secondary beam 3 located at one side of the main beam 2 extends under the reinforcing bar at the top portion of the main beam 2 to the secondary beam 3 located at the other side of the main beam 2. The two end portions of the connecting reinforcing bar 79 partially overlap the reinforcing bars 92 provided at the top portions of the cast-in-site parts of the left and right secondary beams 3, respectively.

With respect to components at the connecting node between the main beam 2 and the column 1, as shown in Fig. 7, in above step A), the exposed stirrups 75 are provided at the prefabricated part of the end portion of the main beam 2, and connected to the reinforcing bars provided at the cast-in-situ part thereof. The upper and lower connecting reinforcing bars 74 and 73 with 90-degree bends at the end portions thereof are placed at the recesses of the main beam 2, and temporarily fixed. In above step D), the end portions of the upper and lower connecting reinforcing bars 74 and 73 with the 90-degree bends, which are placed at the recesses of the main beam 2, are moved into the column 1 one above another. The other end portion of the upper connecting reinforcing bar 74 partially overlaps the reinforcing bar 72 provided at the upper portion of the cast-in-situ part of the main beam 2, and the other end portion of the lower connecting reinforcing bar 73 is connected to the reinforcing bar provided at the lower portion of the cast-in-situ part of the main beam 2.

With respect to components provided at the connecting nodes between the column 1 and the main beams 2 located at left and right sides of the column 1, as shown in Fig. 8, in above step A), the exposed stirrups 76 as reserved members are provided at the prefabricated part of the end portion of the main beam 2, and connected to the reinforcing bars provided at the cast-in-situ part thereof. The upper and lower connecting reinforcing bars 81 and 82 are placed at the recesses of the main beam 2, and are temporarily fixed. In above step D), the upper and lower connecting reinforcing bars 81 and 82 placed at the recesses of the main beam 2 pass through the column 1 one above another, and extend to the main beam 2 located at the other side of the column 1. The two end portions of the upper connecting reinforcing bar 81 partially overlap the reinforcing bars 72 provided at the top portions of the cast-in-situ parts of the main beams 2 located at the left and right sides of the column 1, respectively. The two end portions the lower connecting reinforcing bar 82 are respectively connected to the reinforcing bars provided at the lower portions of the cast-in-situ parts of the main beam 2 located at the left and right sides of the column 1.

According to the prefabricated frame and the construction method using the prefabricated frame in the present invention, the prefabricated main beam, secondary beam, and prefabricated slab are used, thereby remarkably reducing the amount of construction work on site, reducing pollution and waste, and saving labor forces

significantly. The construction efficiency can be effectively improved, and the duration can thus be shortened.

The foregoing is merely preferred embodiments of the present invention, but is not intended to be limitation of the present invention. It will be apparent to those skilled in the art that various changes and modifications can be made to the present invention. Any modifications, equivalent substitutions, improvements, and the like within the spirit and principles of the present invention are intended to be included within the scope of the present invention.

CLAIMS

1. A prefabricated frame, comprising a column (1), a main beam (2) connected to the column (1), a secondary beam (3) connected to the main beam (2), and a floor (5),

wherein the main beam (2) and the secondary beam (3) both are prefabricated members, and are provided with, on respective top portions thereof, exposed reinforcing bars, and reinforcing bars at cast-in-situ parts,

wherein the floor (5) is a laminated plate, with a prefabricated slab (51) arranged at a lower portion thereof, and

wherein the prefabricated slab (51), the main beam (2), and the secondary beam (3) are connected together by means of cast-in-situ concrete on the respective top portions thereof.

2. The prefabricated frame according to claim 1, wherein the main beam (2) is provided, on the top portion thereof, with a recess opening to its two end faces,

wherein width of two end portions of the main beam (2) is greater than or equal to that of a middle portion of the main beam (2),

wherein depth of the recess at the two end portions of the main beam (2) is greater than depth of the recess at the middle portion of the main beam (2), and

wherein the reinforcing bar at the cast-in-situ part of the main beam (2) is located at the recess on the top portion thereof.

3. The prefabricated frame according to claim 2, wherein the secondary beam (3) is provided, on the top portion thereof, with a recess opening to its two end faces,

wherein width of two end portions of the secondary beam (3) is greater than or equal to that of a middle portion of the secondary beam (3),

wherein depth of the recess at the two end portions of the secondary beam (3) is greater than depth of the recess at the middle portion of the secondary beam (3), and

wherein the reinforcing bar at the cast-in-situ part of the secondary beam (3) is located at the recess on the top portion thereof.

4. The prefabricated frame according to claim 3, a reinforcing bar connector is provided at a junction between the main beam (2) and each of the secondary beams (3) located at left and right sides of the main beam (2), and connects a reinforcing bar

provided inside of the main beam (2) to the reinforcing bar provided at the cast-in-situ parts of the end portion of each of the secondary beams (3) that are connected to the main beam (2),

wherein a connecting reinforcing bar is provided at a top portion of the cast-in-situ part at the end portion of the secondary beam (3) located at one side of the main beam (2), and passes through the main beam (2) and extends to the secondary beam (3) located at the other side of the main beam (2), and

wherein the connecting reinforcing bar partially overlaps, through its two end portions, the reinforcing bars provided at the top portions of the cast-in-situ parts of the secondary beams (3) located at the left and right sides of the main beam (2) respectively, the end portion of the secondary beam (3) being provided with a stirrup connecting the reinforcing bar at a prefabricated part and the reinforcing bar at the cast-in-situ part thereof.

5. The prefabricated frame according to claim 3, wherein at a connecting node between the main beam (2) and the column (1), connecting reinforcing bars are provided at both an upper portion and a lower portion of the cast-in-situ part at the end portion of the main beam (2), and extend inside of the column (1) with a bent end, and

wherein the end portion of the main beam (2) is provided with a stirrup connecting the reinforcing bar at a prefabricated part and the reinforcing bar at the cast-in-situ part thereof.

6. The prefabricated frame according to claim 3, wherein at connecting nodes between the column (1) and the main beams (2) located at left and right side of the column (1), connecting reinforcing bars are provided at both an upper portion and a lower portion of the cast-in-situ part at the end portion of the main beam (2) located at one side of the column (1), pass through the column (1), and extend to the main beam (2) located at the other side of the column (1), and

wherein two end portions of the connecting reinforcing bar of the upper portion partially overlap the reinforcing bars provided at the top potions of the cast-in-situ parts of the main beams (2) located left and right sides of the column (1) respectively, the end portions of the main beams (2) located at the left and right sides of the column (1) being provided with respective stirrups for connecting the reinforcing bars at a

prefabricated part with the reinforcing bars at the cast-in-situ part thereof.

7. A construction method using the prefabricated frame according to any one of claims 1 to 6, comprising the following steps:

step A): prefabricating the main beam (2), the secondary beam (3), and the prefabricated slab (51) according to design requirements, wherein exposed reinforcing bars are provided for all of the main beam (2), the secondary beam (3), and the prefabricated slab (51) as reserved members, and the top portions of the main beam (2) and the secondary beam (3) are provided in advance with recesses opening to respective end faces, the reinforcing bars at the cast-in-situ parts of the main beam (2) and the secondary beam (3) being arranged in the recesses at the top portions thereof and temporarily fixed;

step B): performing cast-in-situ construction of the column on site;

step C): mounting temporary support scaffolds for respective prefabricated members on site, and lifting prefabricated main beam (2), secondary beam (3), and prefabricated slab (51) in place;

step D): moving or inserting, after the prefabricated main beam (2), secondary beam (3), and prefabricated slab (51) are lifted in place, the reinforcing bars at the cast-in-situ parts provided in the recesses of the main beam (2) and secondary beam (3) into designed positions, wherein the reinforcing bars are bound in series and connected to the prefabricated member or column associated therewith; and

step E): casting concrete in situ on the main beam (2), the secondary beam (3), and the prefabricated slab (51) that are bound with the reinforcing bars to connect the three together, wherein the concrete is also cast into the recesses on the top portions of the main beam (2) and the secondary beam (3).

8. The construction method according to claim 7, wherein, in step A), the reinforcing bar connector connecting to internal reinforcing bars is pre-arranged at the junction between the main beam (2) and the secondary beam (3), and the secondary beam (3), at the prefabricated part of the end portion thereof, is provided with exposed stirrups connecting to the reinforcing bar at the cast-in-situ part thereof, while at the recess thereof, is placed with the connecting reinforcing bar which is temporarily fixed; and

wherein in step D), the reinforcing bar provided at the cast-in-situ part of the end

portion of the secondary beam (3) is connected to the reinforcing bar connector, and the connecting reinforcing bar in the recess of the secondary beam (3) located at one side of the main beam (2) is moved to pass through the main beam (2) and extend to the secondary beam (3) located at the other side of the main beam (2), with the two end portions of the connecting reinforcing bar partially overlapping the reinforcing bars provided at the top portions of the cast-in-site parts of the secondary beams (3) located at the left and right sides of the main beam (2), respectively.

9. The construction method according to claim 7 or 8, wherein, in step A), the exposed stirrups are provided at the prefabricated part of the end portion of the main beam (2) and connected to the reinforcing bars provided at the cast-in-situ part thereof, and pre-bent upper and lower connecting reinforcing bars are provided at the recess of the main beam (2), and are temporarily fixed; and

wherein in step D), at the connecting node between the main beam (2) and the column (1), the upper and lower connecting reinforcing bars provided in the recess of the main beam (2) are disposed such that bending portion of the upper and lower connecting reinforcing bars extend into the column (1).

10. The construction method according to claim 7 or 8, wherein, in step A), the exposed stirrups are provided at the prefabricated part of the end portion of the main beam (2) and connected to the reinforcing bar provided at the cast-in-situ part thereof, and the upper and lower connecting reinforcing bars are provided at the recess of the main beam (2), and are temporarily fixed; and

wherein in step D), at the connecting nodes between the column (1) and the main beams (2) located at the left and right sides of the column (1), the upper and lower connecting reinforcing bars placed at the recess of the main beam (2) are moved to pass through the column (1) and extend to the main beam (2) located at the other side of the column (1), and the two end portions of the upper and lower connecting reinforcing bars partially overlap the upper and lower reinforcing bars provided at the cast-in-situ parts of the main beams (2) located at the left and right sides of the column (1), respectively.