PATENT SPECIFICATION】

【TITLE】 Positioning joint structure of steel beam column or steel cage or diaphragm wall having infinitely extending connection

【TECHNICAL FIELD】

【0001】 The present invention relates to a positioning joint structure, more specifically, a positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection.

【DESCRIPTION OF PRIOR ART】

【0002】 No matter whether it is construction or civil engineering, the implementation of structures, including beams, columns, steel cages, diaphragm walls, will use the joining method of beam-column connections. The conventional joining methods can be divided into two categories: tying and welding. The conventional methods significantly rely on the worker's skills. Thus, in order to prevent the joint structure from becoming slanted due to the deviation of the base, constant adjustments of the angles of beams and columns are required so that each beam or column maintains a horizontal or vertical position respectively with respect to the base, resulting in a slow construction progress and consuming more time and manpower.

【0003】 In view of this, the inventor of the present invention investigated the aforementioned deficiency and searched intensively for the solutions thereof based on years of experience of research and development in relevant fields. After a long period of time of research and many experiments, the present invention is completed.

【SUMMARY】

【0004】 The main objective of the present invention is to shorten the time required to join the steel beam columns or steel cages or diaphragm walls.

【0005】 To achieve the aforementioned objective, the present invention creates two different structural forms based on different joining methods, whereas the first structural form of the present invention is a positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection that comprises a first joint piece, a second joint piece, and a pivot device.

【0006】 The first joint piece is formed by joining a first steel beam section and a first pivot section through fiction welding wherein the location of friction welding of the first steel beam section and the first pivot section has a first protruding part. In addition, a first external tooth and a first mounting element, screwed into the first external tooth, are installed on the first pivot section. The first external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, and the entrance end of the first external tooth has a first external guide tooth.

【0007】 The second joint piece is formed by joining a second steel beam section and a second pivot section through fiction welding wherein the location of friction welding of the second steel beam section and the second pivot section has a second protruding part. In addition, a second external tooth is installed on the second pivot section wherein the second external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads; the entrance end of the second external tooth has a second

external guide tooth; the length of the second pivot section is smaller than the length of the first pivot section.

【0008】 The pivot device has a through hole wherein the through hole is with inner threads corresponding to the first external tooth and the second external tooth. Both ends of the pivot device are screwed to the first external tooth and the second external tooth respectively, wherein the end of the pivot device, where the first external tooth is screwed to, is on close contact with the first mounting element.

【0009】 Furthermore, the second structural form of the present invention relates to a positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection that comprises a first joint piece, a second joint piece, and a pivot assembly.

【0010】 The first joint piece is formed by joining a first steel beam section and a first pivot section through fiction welding wherein the location of friction welding of the first steel beam section and the first pivot section has a first protruding part. In addition, a first external tooth and a first mounting element, screwed into the first external tooth, are installed on the first pivot section. The first external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads.

【0011】 The second joint piece is formed by joining a second steel beam section and a second pivot section through fiction welding wherein the location of friction welding of the second steel beam section and the second pivot section has a second protruding part. In addition, a second external tooth and a second mounting element, screwed into the second external tooth, are installed on the second pivot

section. The second external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads.

【0012】 The pivot assembly has a plurality of positioning holes for inserting the first pivot sections and the second pivot sections; a containing space connecting with the positioning holes and accommodating the first pivot sections and the second pivot sections. The pivot assembly has the third mounting elements screwed onto the first pivot section and the second pivot section through the containing space, so that the first joint piece and the second joint piece are mounted onto the pivot assembly.

【0013】 In summary, the advantages of the positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection of the present invention help the construction workers to shorten the period of time to complete the joining operations for connecting the steel beam columns or steel cages or diaphragm walls.

【BRIEF DESCRIPTION OF THE DRAWINGS】

【0014】 The present invention will become more fully understood from the detailed description and figures given herein below for illustration only which thus does not limit the present invention, wherein:

Fig. 1: a schematic diagram (1) of the first structural form of the present invention;

Fig. 2: a cross-sectional schematic diagram (1) of the first structural form of the present invention;

Fig. 3: an exploded schematic diagram (1) of the first structural form of the present invention;

Fig. 4A: a schematic diagram (2) of the first structural form of the present invention;

Fig. 4B: a cross-sectional diagram of the pivot device of the schematic diagram (2) of the first structural form of the present invention;

Fig. 5: a schematic diagram (3) of the first structural form of the present invention;

Fig. 6A: a schematic diagram (4) of the first structural form of the present invention;

Fig. 6B: a schematic diagram (5) of the first structural form of the present invention;

Fig. 6C: a schematic diagram (6) of the first structural form of the present invention;

Fig. 7A: a schematic diagram (7) of the first structural form of the present invention;

Fig. 7B: a schematic diagram (8) of the first structural form of the present invention;

Fig. 8A: a schematic diagram (9) of the first structural form of the present invention;

Fig. 8B: a schematic diagram (10) of the first structural form of the present invention;

Fig. 9: a schematic diagram (1) of the preferred embodiment of the first structural form of the present invention;

Fig. 10: a schematic diagram (2) of the preferred embodiment of the first structural form of the present invention;

Fig. 11: a schematic diagram (1) of the second structural form of the present invention;

Fig. 12: an exploded schematic diagram of the second structural form of the present invention;

Fig. 13: a schematic diagram (2) of the second structural form of the present invention;

Fig. 14A: a schematic diagram (3) of the second structural form of the present invention;

Fig. 14B: a schematic diagram (4) of the second structural form of the present invention;

Fig. 15: a schematic diagram (1) of the preferred embodiment of the second structural form of the present invention;

Fig. 16: a schematic diagram (2) of the preferred embodiment of the second structural form of the present invention;

Fig. 17: a schematic diagram (3) of the preferred embodiment of the second structural form of the present invention;

Fig. 18: a schematic diagram (4) of the preferred embodiment of the second structural form of the present invention.

【DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS】

【0015】 The aforementioned objectives, advantages, characteristics and structures of the present invention will become more fully understood from the detailed description given herein below by way of embodiments with reference to the accompanying drawings for illustration only. Thus, the description does not limit the present invention.

【0016】 First, please refer to Fig. 1 to Fig. 3 together. Fig. 1 is a schematic diagram (1) of the first structural form of the present invention; Fig. 2 is a cross-sectional schematic diagram (1) of the first structural form of the present invention; and Fig. 3 is an exploded schematic diagram (1) of the first structural form of the present invention.

【0017】 The present invention creates two different structural forms based on different joining methods, whereas the first structural form of the present

invention relates to a positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection 1 that comprises a first joint piece 11, a second joint piece 12, and a pivot device 13.

【0018】 The first joint piece 11 is formed by joining a first steel beam section 111 and a first pivot section 112 through fiction welding wherein the location of friction welding of the first steel beam section 111 and the first pivot section 112 has a first protruding part 113. In addition, a first external tooth ~~1121~~114 and a first mounting element ~~114~~115, screwed into the first external tooth ~~1121~~114, are installed on the first pivot section 112. The first external tooth ~~1121~~114 can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, whereas employing screws of double-start threads or multi-start threads consisting of three or more intertwined threads can shorten the time required for the first pivot section 112 to be screwed into other objects. The entrance end of the first external tooth ~~1121~~114 has a first external guide tooth 1122. Furthermore, the first external guide tooth 1122 is formed by cutting off most of the crests of threads that belong to a section in the entrance end of the first external tooth ~~1121~~114 through machining, so that the first pivot section 112 is easier to be screwed into other objects.

【0019】 The second joint piece 12 is formed by joining a second steel beam section 121 and a second pivot section 122 through fiction welding wherein the location of friction welding of the second steel beam section 121 and the second pivot section 122 has a second protruding part 123. In addition, a second external tooth ~~1221~~124 is installed on the second pivot section 122 wherein the second external

tooth ~~1221~~124 can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, whereas employing screws of double-start threads or multi-start threads consisting of three or more intertwined threads can shorten the time required for the second pivot section 122 to be screwed into other objects. The entrance end of the second external tooth ~~1221~~124 has a second external guide tooth 1222. Furthermore, the second external guide tooth 1222 is formed by cutting off most of the crests of threads that belong to a section in the entrance end of the second external tooth ~~1221~~124 through machining, so that the second pivot section 122 is easier to be screwed into other objects. The length of the second pivot section 122 is smaller than the length of the first pivot section 112.

【0020】 The pivot device 13 has a through hole 131 wherein the through hole 131 is with inner threads corresponding to the first external tooth ~~1121~~114 and the second external tooth ~~1221~~124. Both ends of the pivot device 13 are screwed to the first external tooth ~~1121~~114 and the second external tooth ~~1221~~124 respectively, wherein the end of the pivot device 13, where the first external tooth ~~1121~~114 is screwed to, is on close contact with the first mounting element ~~114~~115. The objective of installing the first mounting element ~~114~~115 is to fasten the pivot device 13 tightly to the first pivot section 112 and to eliminate the gap between the pivot device 13 and the first pivot section 112.

【0021】 Screws with double-start threads or multi-start threads consisting of three or more intertwined threads are the preferable choice for the first external tooth ~~1121~~114 and the second external tooth ~~1221~~124. The implementation of the multi-start thread screws can enhance the efficiency of the lock mounting action.

Take the screw with double-start threads as an example. A screw with double-start threads is formed by having two threads that start 180 degrees apart from each other; a screw with multi-start threads, consisting of three or more intertwined threads, is formed by having three threads that start 120 degrees apart from one another. On this basis, the start angle is an angle produced by dividing 360 degrees evenly by the number of starts. Thus the advantages of using multi-start threads to screw objects are the operational enhancements with larger lock mounting leads and faster screw speeds for insertion or removal. For a double-start thread screw, the travelling speed is twice that of the single-start thread screw. In other words, the distance travelled when a double-start thread screw rotates once is equivalent to that when the single-start thread screw rotates twice. For a triple-start thread screw, the travelling speed is three times that of the single-start thread screw. In other words, the distance travelled when a triple-start thread screw rotates once is equivalent to that when the single-start thread screw rotates three times. Therefore, the design of the multi-start thread screws can enhance the efficiency of the lock mounting action.

【0022】 Next, please refer to Fig. 4A and Fig. 4B along with Fig. 3. Fig. 4A is a schematic diagram (2) of the first structural form of the present invention; Fig. 4B is a cross-sectional diagram of the pivot device of the schematic diagram (2) of the first structural form of the present invention.

【0023】 In addition to installing the first external guide tooth 1122 and the second external guide tooth 1222 at the entrance ends of the first external tooth ~~1121~~114 and the second external tooth ~~1221~~124 respectively, as shown in Fig. 3, the present invention can also have internal guide teeth 132 installed at both ends of the

inner threads of the pivot device 13 respectively, as shown in Fig. 4A and Fig. 4B, wherein the setup method therefor is the same as previously mentioned by cutting off most of the crests of threads that belong to a section of both ends of the inner threads respectively through machining, so that the first pivot section 112 and the second pivot section 122 are easier to be screwed into the pivot device 13 respectively. Therefore, in order to make the first pivot section 112, the second pivot section 122, and the pivot device 13 to be screwed in to one another much easier, any selection among settings of having the first external guide tooth 1122 and the second external guide tooth 1222 installed only at the entrance ends of the first external tooth ~~1121~~114 and the second external tooth ~~1221~~124 respectively, or having internal guide teeth 132 installed only at both ends of the inner threads of the pivot device 13 respectively, or having the first external guide tooth 1122, and the second external guide tooth 1222, and internal guide teeth 132 installed at the entrance ends of the first external tooth ~~1121~~114, and the second external tooth ~~1221~~124, and at both ends of the inner threads of the pivot device 13 respectively at the same time, can fulfill such objective.

【0024】 Please refer to Fig. 5. Fig. 5 is a schematic diagram (3) of the first structural form of the present invention.

【0025】 The second pivot section 122 of the present invention can also be installed with a second mounting element ~~124~~125 that is screwed to the second external tooth ~~1221~~124, so that, after the pivot device 13 is screwed to the first pivot section 112 and the second pivot section 122 respectively, both ends of the pivot device 13 are on close contact with the first mounting element ~~114~~115 and the second

mounting element ~~124~~125 respectively. By applying the method of installing the first mounting element ~~114~~115 and the second mounting element ~~124~~125 to a tight spot separately while on close contact with both ends of the pivot device 13 respectively, the gaps between the pivot device 13 and the first pivot section 112, and between the pivot device 13 and the second pivot section 122 respectively can be eliminated.

【0026】 Please refer to Fig. 6A, Fig. 6B, and Fig. 6C. Fig. 6A is a schematic diagram (4) of the first structural form of the present invention; Fig. 6B is a schematic diagram (5) of the first structural form of the present invention; Fig. 6C is a schematic diagram (6) of the first structural form of the present invention.

【0027】 As shown in these figures, examples of the joining operations applied to the steel cage to steel cage connection are presented here for the purpose of describing the present invention. The joining method of the steel cage to steel cage connection is the same as those previously described. After the pivot device 13 is screwed to the first pivot section 112 and the second pivot section 122 respectively (as shown in Fig. 5), the first mounting element ~~114~~115 is installed to a tight spot and on close contact with the pivot device 13 to complete the steel cage to steel cage connection, wherein the difference between Fig. 6A and Fig. 6B is that all pivot devices 13 installed on the steel cages in Fig. 6A are coplanar whereas all pivot devices 13 installed on the steel cages in Fig. 6B are in an non-coplanar alternating arrangement. The advantage of pin connection of the pivot devices 13 installed in an alternating non-coplanar form is to prevent the joints between steel cages from fracture simultaneously when the steel cages are impacted by the external force. Furthermore, the difference between Fig. 6B and Fig. 6C is that the steel cages shown

in Fig. 6B have the bottom portions of the first joint pieces 11 bended into an "L" shape to support the overall weight whereas the steel cages illustrated in Fig. 6C are installed with a support area at the bottom of the first joint pieces 11 individually to support the overall weight.

【0028】 Please refer to Fig. 7A and Fig. 7B. Fig. 7A is a schematic diagram (7) of the first structural form of the present invention; Fig. 7B is a schematic diagram (8) of the first structural form of the present invention.

【0029】 As shown in these figures, examples of the joining operations applied to the steel column to steel beam connection are presented here for the purpose of describing the present invention. The joining method of the steel column to steel beam connection is the same as those previously described. After the pivot device 13 is screwed to the first pivot section 112 and the second pivot section 122 respectively (as shown in Fig. 5), the first mounting element ~~114~~115 is installed to a tight spot and on close contact with the pivot device 13 to complete the steel column to steel beam connection, wherein the difference between Fig. 7A and Fig. 7B is that all pivot devices 13 installed on the steel beams in Fig. 7A are coplanar, and the steel columns have one end portions thereof bended into an "L" shape to support the overall weight, and the steel beams have one end portions thereof bended into an "L" shape to be joined with the steel columns, whereas all pivot devices 13 installed on the steel beams in Fig. 7B are in an non-coplanar alternating arrangement, and the steel columns are installed with a support area at the bottom of the steel columns individually to support the overall weight, and the steel beams are installed with a support area at one end of the steel beams individually to be joined with the steel

columns. Furthermore, the advantage of pin connection of the pivot devices 13 installed in an alternating non-coplanar form is to prevent the joints between steel columns and beams from fracture simultaneously when the steel columns and beams are impacted by the external force.

【0030】 Please refer to Fig. 8A and Fig. 8B. Fig. 8A is a schematic diagram (9) of the first structural form of the present invention; Fig. 8B is a schematic diagram (10) of the first structural form of the present invention.

【0031】 As shown in these figures, examples of the joining operations applied to the diaphragm wall to diaphragm wall connection are presented here for the purpose of describing the present invention. The joining method of the diaphragm wall to diaphragm wall connection is the same as those previously described. After the pivot device 13 is screwed to the first pivot section 112 and the second pivot section 122 respectively, the first mounting element ~~114~~115 is installed to a tight spot and on close contact with the pivot device 13 to complete the diaphragm wall to diaphragm wall connection, wherein the difference between Fig. 8A and Fig. 8B is that all pivot devices 13 installed on the diaphragm walls in Fig. 8A are coplanar whereas all pivot devices 13 installed on the diaphragm walls in Fig. 8B are in an non-coplanar alternating arrangement. The advantage of pin connection of the pivot devices 13 installed in an alternating non-coplanar form is to prevent the joints between diaphragm walls from fracture simultaneously when the diaphragm walls are impacted by the external force.

【0032】 The preferred embodiment of the first structural form of the present invention and relevant figures are given herein below for illustration:

【0033】 Please refer to Fig. 9 and Fig. 10. Fig. 9 is a schematic diagram (1) of the preferred embodiment of the first structural form of the present invention; Fig. 10 is a schematic diagram (2) of the preferred embodiment of the first structural form of the present invention.

【0034】 Prior to preceding the joining construction, the present invention must have the steel beam columns or steel cages or diaphragm walls that have the first joint pieces 11 to be positioned and mounted. Next, the pivot device 13 is screwed to the first pivot section 112 until reaching the full depth of the first pivot section 112. Position and align the second pivot section 122, which is on the steel beam column or steel cage or diaphragm wall for the joining operation, with the pivot device 13; rotate the pivot device 13 aiming toward the second pivot section 122 so that the pivot device 13 is screwed simultaneously on to the first pivot section 112 and the second pivot section 122 respectively. Last, install the first mounting elements ~~114~~115 to eliminate the gap between the pivot device 13 and the first pivot section 112, and the gap between the pivot device 13 and the second pivot section 122. For the screwing operation, the numbers of threads of the first pivot section 112 and the second pivot section 122 shall be the same as that of the pivot device 13 to be screwed to, respectively. Otherwise, the level of tensile strength of the first joint piece 11 and the second joint piece 12 will be uneven, as a result, causing harm to the building structure.

【0035】 Please refer to Fig. 11 and Fig. 12. Fig. 11 is a schematic diagram (1) of the second structural form of the present invention; Fig. 12 is an exploded schematic diagram of the second structural form of the present invention.

【0036】 The second structural form of the present invention relates to a positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection 1 that comprises a first joint piece 11, a second joint piece 12, and a pivot assembly 14.

【0037】 The first joint piece 11 is formed by joining a first steel beam section 111 and a first pivot section 112 through fiction welding wherein the location of friction welding of the first steel beam section 111 and the first pivot section 112 has a first protruding part 113. In addition, a first external tooth ~~1121~~114 and a first mounting element ~~114~~115, screwed into the first external tooth ~~1121~~114, and a washer 2 are installed on the first pivot section 112. The first external tooth ~~1121~~114 can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, to shorten the time required for the first pivot section 112 to be screwed into other objects.

【0038】 The second joint piece 12 is formed by joining a second steel beam section 121 and a second pivot section 122 through fiction welding wherein the location of friction welding of the second steel beam section 121 and the second pivot section 122 has a second protruding part 123. In addition, a second external tooth ~~1221~~124 and a second mounting element ~~124~~125, screwed into the second external tooth ~~1221~~124, and a washer 2 are installed on the second pivot section 122. The second external tooth ~~1221~~124 can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, whereas employing screws of double-start threads or multi-start threads consisting of

three or more intertwined threads can shorten the time required for the second pivot section 122 to be screwed into other objects.

【0039】 The pivot assembly 14 has a plurality of positioning holes 141 for inserting the first pivot sections 112 and the second pivot sections 122, a containing space 142 connecting with the positioning holes 141 and accommodating the first pivot sections 112 and the second pivot sections 122. The pivot assembly 14 has the third mounting elements 143 screwed onto the first pivot section 112 and the second pivot section 122 through the containing space 142, so that the first joint piece 11 and the second joint piece 12 are mounted onto the pivot assembly 14.

【0040】 Please refer to Fig. 13 together with Fig. 12. Fig. 13 is a schematic diagram (2) of the second structural form of the present invention.

【0041】 As shown in these figures, examples of the joining operations applied to the steel cage to steel cage connection are presented here for the purpose of describing the present invention. The joining method of the steel cage to steel cage connection is the same as those previously described. After the first pivot section 112 and the second pivot section 122 are inserted into the positioning holes 141 of the pivot assembly 14 respectively, the third mounting elements 143 are installed to a tight spot and on close contact with the first pivot section 112 and the second pivot section 122 respectively and the first mounting elements ~~114~~115 and the second mounting elements ~~124~~125 are fastened at the same time, so that the first joint piece 11, the second joint piece 12, and the pivot assembly 14 are joined together to complete the steel cage to steel cage connection.

【0042】 Please refer to Fig. 14A and Fig. 14B along with Fig. 12. Fig. 14A is a schematic diagram (3) of the second structural form of the present invention; Fig. 14B is a schematic diagram (4) of the second structural form of the present invention.

【0043】 As shown in these figures, examples of the joining operations applied to the diaphragm wall to diaphragm wall connection are presented here for the purpose of describing the present invention. The joining method of the diaphragm wall to diaphragm wall connection is the same as those previously described. After the first pivot section 112 and the second pivot section 122 are inserted into the positioning holes 141 of the pivot assembly 14 respectively, the third mounting elements 143 are installed to a tight spot and on close contact with the first pivot section 112 and the second pivot section 122 respectively and the first mounting elements ~~114~~115 and the second mounting elements ~~124~~125 are fastened at the same time, so that the first joint piece 11, the second joint piece 12, and the pivot assembly 14 are joined together to complete the diaphragm wall to diaphragm wall connection, wherein the difference between Fig. 14A and Fig. 14B is that all pivot assemblies 14 installed on the diaphragm walls in Fig. 14A are coplanar whereas all pivot assemblies 14 installed on the diaphragm walls in Fig. 14B are in an non-coplanar alternating arrangement. The advantage of pin connection of the pivot assemblies 14 installed in an alternating non-coplanar form is to prevent the joints between diaphragm walls from fracture simultaneously when the diaphragm walls are impacted by the external force.

【0044】 The preferred embodiment of the second structural form of the present invention and relevant figures are given herein below for illustration:

【0045】 Please refer to Fig. 15 to Fig. 18 together. Fig. 15 is a schematic diagram (1) of the preferred embodiment of the second structural form of the present invention; Fig. 16 is a schematic diagram (2) of the preferred embodiment of the second structural form of the present invention; Fig. 17 is a schematic diagram (3) of the preferred embodiment of the second structural form of the present invention; Fig. 18 is a schematic diagram (4) of the preferred embodiment of the second structural form of the present invention.

【0046】 Prior to preceding the joining construction, the present invention must have the steel beam columns or steel cages or diaphragm walls that have the first joint pieces 11 to be positioned and mounted. Next, install the first mounting element ~~114~~115 and the washer 2 on the first pivot section 112. Install the pivot assembly 14 by inserting the pivot assembly 14 into the first joint piece 11 through positioning and aligning the positioning hole 141 with the first pivot section 112. Install the third mounting element 143 and the washer 2 on the first pivot section 112; fasten the first mounting element ~~114~~115 and the third mounting element 143 separately, so that the first joint piece 11 is joined with the pivot assembly 14. During the screwing operation, if more than two pieces of the third mounting elements 143 are used, the torque values of each of the third mounting elements 143 applied to the screwing operation must be the same. If the torque values of each of the third mounting elements 143 are different, when the building structure is under huge impact by the external force, the external force will be transmitted first to the third

mounting element 143 with the lowest torque value. When the third mounting element 143 with the lowest torque value is stressed beyond its maximum capacity by the external force, it will break, resulting in the load increase to the rest of the third mounting elements 143. When the torque forces to the rest of the third mounting elements 143 also reach beyond the maximum capacities thereof, the third mounting elements 143 will break, as a result, causing harm to the building structure.

【0047】 Next, install the second mounting element ~~124~~125 and the washer 2 on the second pivot section 122. Then, insert the second joint piece 12 into the positioning hole 141 (as shown in Fig. 5) through aligning with and aiming at the positioning hole 141. After the second joint piece 12 is inserted, install the third mounting element 143 and the washer 2 on the second pivot section 122. Fasten the second mounting element ~~124~~125 and the third mounting element 143 separately, so that the second joint piece 12 is joined with the pivot assembly 14 to complete the steel beam columns or steel cages or diaphragm walls connection. During the screwing operation, if more than two pieces of the third mounting elements 143 are used, the torque values of each of the third mounting elements 143 applied to the screwing operation must be the same.

【0048】 In summary, the advantages of the positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection of the present invention help the construction workers to shorten the period of time to complete the joining operations for connecting the steel beam columns or steel cages or diaphragm walls.

【0049】 Therefore, the present invention has made excellent progress and presented high practicality compared to other products of same categories. Meanwhile, after searching domestic and foreign publications related to the technology of this type of structure, it is concluded that no identical or similar structures exist in the patents approved prior to the submission of the application of the present invention. Thus, the present invention meets the key requirements of "novelty", "applicable to industrial use", "progress" for patentability and, therefore, hereby the application is submitted in accordance with the laws and regulations.

【0050】 However, the aforementioned examples are a few preferred embodiments of the present invention. Alternative embodiments will become apparent to those skilled in the art to which the present invention pertains without departing from its spirit and scope.

【COMPONENT SYMBOL】

【0051】

1 positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection

1 1 first joint piece

1 1 1 first steel beam section

1 1 2 first pivot section

~~1 1 2 1~~ 114 first external tooth

1 1 2 2 first external guide tooth

1 1 3 first protruding part

~~1 1 4~~ 115 first mounting element

12 second joint piece

121 second steel beam section

122 second pivot section

~~1221~~ 124 second external teeth

1222 second external guide tooth

123 second protruding part.

~~124~~ 125 second mounting element

13 pivot device

131 through hole

132 internal guide tooth

14 pivot assembly

141 positioning hole

142 containing space

143 third mounting element

2 washer

【DEPOSIT OF BIOLOGICAL MATERIAL】

【0052】 None

CLAIMS

What is claimed is:

1. A positioning joint structure of steel beam columns or steel cages or diaphragm walls ~~having infinitely extending connection~~, comprising a first joint piece, a second joint piece, and a pivot device, wherein

~~a~~ the first joint piece is formed by joining a first steel beam section and a first pivot section through ~~fiction~~ friction welding; the location of friction welding of the first steel beam section and the first pivot section ~~has~~ having a first protruding part; a first external tooth and a first mounting element, screwed ~~into~~ onto the first external tooth, are installed on the first pivot section; the first external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads, a first external guide tooth installed at the entrance end of the first external tooth;

~~a~~ the second joint piece is formed by joining a second steel beam section and a second pivot section through ~~fiction~~ friction welding; the location of friction welding of the second steel beam section and the second pivot section ~~has~~ having a second protruding part; a second external tooth is installed on the second pivot section, a second mounting element, screwed onto the second external tooth and in close contact with the pivot device; the second external tooth ~~can be~~being a screw with ~~single-start thread,~~ double-start threads, or multi-start threads consisting of three or more intertwined threads; ~~the~~ a length of the second pivot section is smaller than ~~the~~ a length of the first

pivot section, a second external guide tooth installed at the entrance end of the first second tooth; and

a the pivot device has having a through hole wherein the through hole is withhaving inner threads corresponding to the first external tooth and the second external tooth; both ends of the pivot device are screwed to the first external tooth and the second external tooth respectively; the end of the pivot device, where the first external tooth is screwed to, is on in close contact with the first mounting element, the pivot device having internal guide teeth installed separately at both ends of the inner threads;

wherein the first second external guide tooth and second external guide tooth are formed by removing the crests of the double-start threads, or the multi-start threads.

2. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 1, wherein a second mounting element, screwed into the second external tooth, is installed on the second pivot section.

3. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 2, wherein the second mounting element is on close contact with the pivot device.

4. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 1,

~~wherein a first external guide tooth is installed at the entrance end of the first external tooth.~~

~~5. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 1, wherein a second external guide tooth is installed at the entrance end of the second external tooth.~~

~~6. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 1, wherein internal guide teeth are installed separately at both ends of the inner threads of the pivot device.~~

~~7. A positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection, comprising a first joint piece, a second joint piece, and a pivot assembly, wherein~~

~~a first joint piece is formed by joining a first steel beam section and a first pivot section through fiction welding; the location of friction welding of the first steel beam section and the first pivot section has a first protruding part; a first external tooth and a first mounting element, screwed into the first external tooth, are installed on the first pivot section, wherein the first external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads;~~

~~a second joint piece is formed by joining a second steel beam section and a second pivot section through fiction welding; the location of friction welding of the second steel beam section and the second pivot section has a second protruding~~

~~part; a second external tooth and a second mounting element, screwed into the second external tooth, are installed on the second pivot section; the second external tooth can be a screw with single-start thread, double-start threads, or multi-start threads consisting of three or more intertwined threads; and~~

~~a pivot assembly has a plurality of positioning holes for inserting the first pivot sections and the second pivot sections; a containing space connecting with the positioning holes and accommodating the first pivot sections and the second pivot sections; the pivot assembly has the third mounting elements screwed onto the first pivot section and the second pivot section respectively through the containing space, so that the first joint piece and the second joint piece are mounted onto the pivot assembly.~~

~~8. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 7, wherein the number of the third mounting elements is more than one.~~

~~9. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 7, wherein washers are installed on the first pivot section.~~

~~10. The positioning joint structure of steel beam columns or steel cages or diaphragm walls having infinitely extending connection as claimed in claim 7, wherein washers are installed on the second pivot section.~~