May 25, 1926. 1,586,321

C. F. NEWPORT

SECTIONAL CORE

Filed Dec. 28, 1922

Fig. 1.

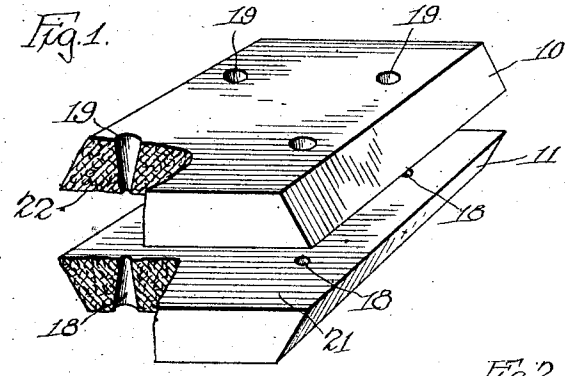


Fig. 3.

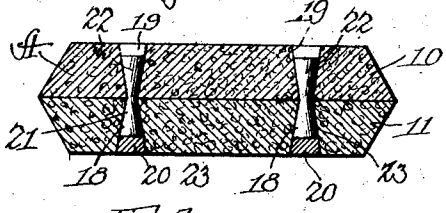


Fig. 2.

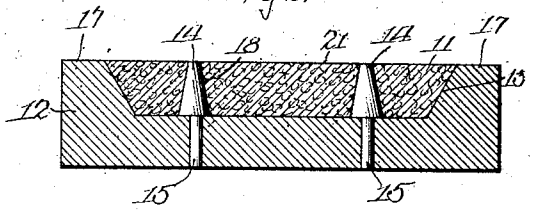


Fig. 4.

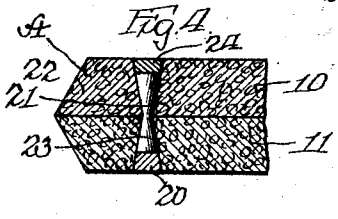


Fig. 5.

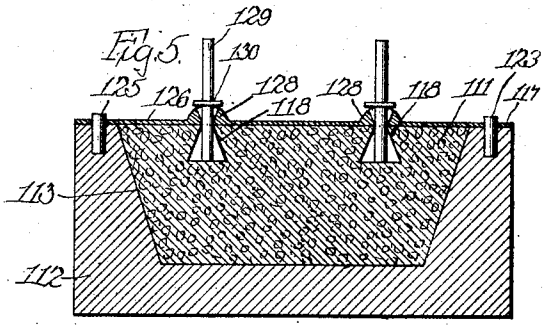


Fig. 6.

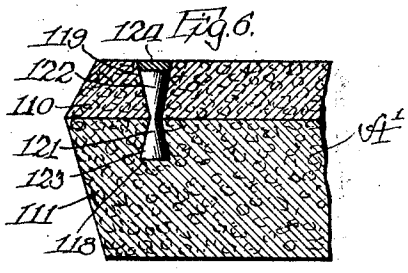


Fig. 8.

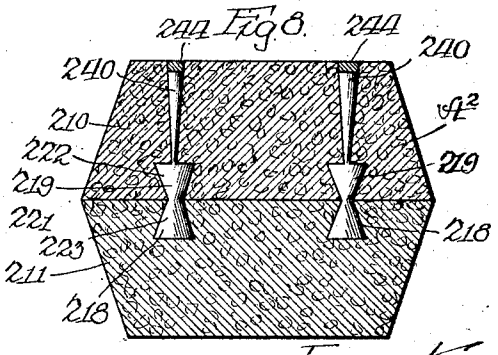
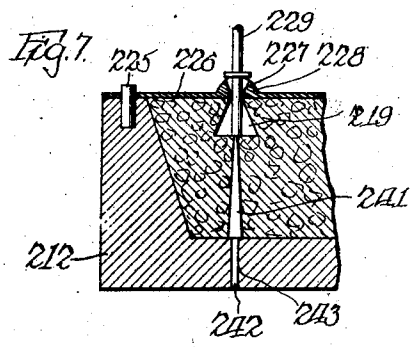


Fig. 7.



Inventor:
Charles F. Newport
by George I. Haight
his Attys.

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UNITED STATES PATENT OFFICE.

CHARLES F. NEWPORT, OF CHICAGO, ILLINOIS.

SECTIONAL CORE.

Application filed December 28, 1922. Serial No. 609,381.

This invention relates to improvements in sectional cores and the process of making the same.

One object of the invention is to provide a core used in foundry practice, comprising a plurality of sections, wherein the core sections are tightly held together by simple, efficient, and economical connecting means.

Another object of the invention is to provide an exceedingly simple and effective process of making sectional cores and uniting the sections thereof.

Another and more specific object of the invention is to provide a core of the type specified, wherein the sections are secured together by integral joining members securely anchored in adjacent contacting portions of the core sections, by forming in the contacting portions of said sections, pairs of alined recesses, flaring inwardly from the meeting faces thereof and securing the sections together by casting a joining member in each pair of said recesses, while the sections of the core are in assembled relation, thereby forming integral connecting members provided with oppositely extending flaring portions imbedded in the respective core sections.

A further object of the invention is to provide a sectional core, wherein the sections are secured together solely by a plurality of joining members, each of which is provided with flaring anchorage portions extending into adjacent sections, and wherein the joining members are formed by casting the same in alined recesses in said sections, the material composing the joining members being such that it contracts upon cooling, whereby the sections are tightly drawn together into intimate face to face contact.

In the drawings forming a part of this specification, Fig. 1 is a perspective view of a pair of core sections constructed in accordance with my invention, said core sections being shown separated and partly broken away and partly in section, to more clearly illustrate the form and arrangement of the recesses. Fig. 2 is a transverse vertical sectional view of a core box and a core section, and illustrates one of the steps of the process. Fig. 3 is a transverse vertical sectional view through a pair of assembled core sections, each constructed as shown in Fig. 2, and illustrates a subsequent step of the process. Fig. 4 is a transverse vertical sectional view of the completed sectional core, partly broken away, and illustrates the final step of the process. Figs. 5 and 6 are views similar to Figs. 2 and 4 respectively, illustrating a modification of the invention. And Figs. 7 and 8 are views showing a further modification of the invention, Fig. 7 being a view similar to Fig. 5, and Fig. 6 showing a transverse sectional view of the finished article, and illustrating the final step of the process.

In said drawings, 10 indicates the upper section and 11 the lower section of a core A constructed in accordance with my invention, and 12, a core box or mold used in carrying out the process.

The core box 12 is interiorly recessed as indicated by 13 to conform in shape to the core section to be formed, and is provided with spaced tapered pins 14 upwardly projecting from the bottom of the recess, with the smaller end of each pin uppermost. As clearly shown in Fig. 2, the pins 14 are fixed to the bottom of the core box by stems 15 seated in recesses 16. The pins 14 are of such a height that the upper end thereof will be in alinement with the plane of the upper face 17 of the core box 13, and with the line of parting of the sectional core.

In carrying out the process as illustrated, in Figs. 1 to 4 inclusive, the prepared core sand is packed into the core box 12, thereby forming a core section 11 having downwardly flaring openings 18 therethrough.

The upper core section 10 is formed in a similar manner, in an upper or cope core box provided with downwardly tapering pins, whereby the core 10 is provided with upwardly flaring openings 19 therethrough, the relative location of the pins being such that the openings 18 and 19 will be in alinement when the core sections 11 and 10 are in assembled relation.

The core sections 10 and 11 are then removed and thoroughly baked, in the usual manner. After the core sections have been baked, the large ends of the openings 14 of the section 11 are plugged with green sand as indicated by 20 in Fig. 3. The core sections are then assembled as shown in Fig. 3, with the upper face 21 of the core section 11 abutting the lower face 22 of the section 10 and the respective openings 18 and 19 alined, with the smaller ends thereof ad-

jacent each other and registering. Molten lead or other suitable cheap metal is next poured into the openings through the upper enlarged ends of the openings 19 in the section 10, and allowed to set, thereby casting integral connecting members 21 of double tapered formation. As clearly shown in Figs. 3 and 4, the connecting members 21 are thus formed with upper outwardly flaring portions 22 securely anchored in the upwardly flaring openings 19 of the upper core section 10 and lower downwardly flaring portions 23 securely anchored in the downwardly flaring openings 18 of the lower core section 11.

It will be evident that, as the cast lead or other metal connecting member 21 shrinks during cooling, a strong pull will be exerted thereby on the sections 10 and 11, thus drawing and holding the sections tightly together and forming a tight seam therebetween.

To provide the core with a smooth exterior finish, the spaces left at the upper ends of the openings 19 above the connecting members 21 may be filled with green sand as indicated at 24.

Although in the specific form of core as illustrated in Fig. 1, the sections are shown as provided with four openings, thereby providing for four connecting members, it will be evident that the number of connecting members and their relative positions in the core sections may be varied as desired, as circumstances require, to suit conditions and to produce the best results.

The improved sectional core A, as clearly shown in Fig. 4, comprises the upper core section 10 and the lower core section 11 rigidly joined by double tapered cast connecting members 21, each provided with an upwardly flaring portion 22 seated in the upwardly tapering recesses of the upper core sections 10 and a downwardly flaring portion seated in the downwardly tapered recesses of the lower core section 11, the connecting members 21 forming the sole means for holding the core sections together.

In the modifications shown in Figs. 5 and 6, a core section A^1 is shown comprising an upper thin core section 110 and a lower relatively thick core section 111. As clearly shown in Fig. 6, the core sections 110 and 111 are joined by double tapered cast connecting members 121 similar to the connecting member 21 of the preferred form, having the tapered portions 122 and 123 thereof seated in correspondingly tapered recesses 119 and 118. The space left at the upper end of the opening 119 may be filled with green sand as indicated at 124 in a manner similar to that shown in connection with the preferred form in Fig. 4.

The core box 112 is interiorly recessed as indicated at 111 to conform in shape to the core to be formed. The upper side of the core box 112 is provided with upwardly projecting guide pins 125 to engage with corresponding recesses in a template 126 to properly center the same. The template 126 is in the form of a flat plate adapted to rest on the upper surface 117 of the core box 112 and is provided with a plurality of downwardly tapering recesses 127 corresponding in number and position to the openings 118 to be formed in the core section 111. The material around the openings 127 is thickened as clearly shown in Fig. 5, to provide upwardly extending hemispherical bearing members 128 for the rods 129. The rods 129 serve as tools for forming the flaring openings 118 in the core section 111 and are provided with fixed collars 130 adapted to rest upon the bearing members 127, and so spaced from the lower end of the rods 129 that the same will project the proper distance downwardly into the core 111 to form the proper depth of openings 118.

In carrying out the modified form of process as illustrated in Figs. 5 and 6, the prepared core sand is first packed into the core box member 112, the template 126 is then placed on the upper face 117 of the core box 112 with the pins 125 engaging the gage recesses in said plate and the rod 129 inserted through one of the openings 127 and pushed down into the green core sand and given a lateral swinging and rotary movement, thereby forming the flaring opening 118 in the core section 111. This operation is repeated by inserting the rod 129 through each of the remaining openings in the template and manipulating the same to form the desired number of openings 118 in the core section.

The upper core section 110 is formed in a manner similar to that described in connection with the formation of the core sections 10 and 11, and provided with upwardly flaring openings 122 therethrough; the relative location of the openings 119 and 118 being such that the same will be in alinement when the core sections 110 and 111 are assembled.

After removal from the respective core boxes, the core sections 110 and 111 are baked in the usual manner. The core sections are then assembled as shown in Fig. 6 with the upper face of the core section 111 abutting the lower face of the core section 110 and the respective openings 118 and 119 alined with the smaller ends thereof adjacent each other and registering. Molten lead is next poured into the openings through the upper enlarged ends of the openings 119 and allowed to set, thereby casting integral connecting members 121 of double tapered formation, in all respects similar to the connecting members 21 shown in the preferred

form of the invention. The space left at the upper ends of the openings 119 above the connecting members 121 may then be filled with green sand as indicated at 124.

In the modification illustrated in Figs. 7 and 8, a sectional core A^2, comprising upper and lower relatively thick core sections 210 and 211 is shown. The core sections 210 and 211 are joined by a double tapered cast connecting member 221, similar to the connecting member 21 of the preferred form, comprising the tapered portions 222 and 223 fixed in correspondingly tapered recesses 219 and 218 respectively of said core sections.

The lower core section 210 is in all respects similar to the lower core section 110 and the process of forming the flaring openings therein is the same as that described in connection with Fig. 5, therefore a detailed description thereof is not deemed necessary.

The tapered openings 219 of the upper core section 210 do not extend entirely through the same, but are all, approximately, of the same size and depth as the openings 218, and means is therefore provided for permitting the molten metal to enter the same. This means comprises ducts or gates 240 opening through the upper side of the core section and communicating with the recesses 219.

The steps involved in forming the upper core section 210 with the recesses 219 and the gates 240, and the means employed are clearly disclosed in Fig. 7, in which 212 indicates a core box. The core box 212 differs from the core box 112 previously described, in connection with the form of the invention disclosed in Figs. 5 and 6, only, in that the same is provided with a plurality of upwardly tapering pins 241 secured to the bottom of the core box by stems 242 fixed in the recesses 243. The pins 242 extend upwardly from the bottom of the core to a point corresponding to the depth of the recesses 219, as clearly shown in Fig. 7. In forming the core section 210, the prepared core sand is first packed into the core box 212 and around the pins 241. Then template 226, which is in all respects similar to the template 126, described in connection with the form of the invention shown in Figs. 5 and 6, is placed on top of the core box member 212, and held in proper position thereon by the centering pins 225. The rod 229 is then inserted successively through the openings 227 in said plate and the recesses 219 formed in a manner similar to that described in connection with the form of the invention disclosed in Fig. 5. The lower end of the rod 229 projects into the green core section 210 a sufficient distance, to engage with or come very close to the upper end of the pin 241, whereby communication is established between each opening 219 and the corresponding duct or gate 240 formed by the pin 241.

After removal of the green core sections 210 and 211 from their respective core box members, they are thoroughly baked in the usual manner, and after the baking operation, the sections 210 and 211 are assembled as shown in Fig. 8. Molten lead is then poured through the gates 240 into the openings formed by the recesses 218—219, thereby casting the integral connecting members 221 of double tapered formation, and joining the core sections. The upper end of the openings 240 may then be closed by plugging the same with sand as indicated at 244.

It will be evident from the foregoing description taken in connection with the drawing that a great saving of material is effected by forming shallow recesses 118, 218 and 219 in the thick core sections 111, 210 and 211 as shown in Figs. 5 to 8 inclusive, instead of forming recesses extending entirely through the sections.

After forming the cores as hereinbefore described, they are ready for the use in connection with the operation of forming the casting. A mold for the desired article to be cast is prepared and the core inserted therein, in a usual and well known manner. Molten lead or any other suitable metal, is then poured into the mold and allowed to set. After the casting has cooled sufficiently, the same is removed from the mold and the core broken up and extracted therefrom, either by a tumbling operation or in any other well known manner usual in foundry practise. The operation of breaking up the core also serves to free the metal connecting members which serve to unite the core sections. After the metal connecting members have been thus freed, they are collected and remelted, thereby recovering the greater portion of the lead or other metal used in joining the sections of the core, thus effecting a great saving in cost of material. The amount actually recovered is approximately 75 to 80% of that originally used.

In disclosing different forms of the invention, the same has been illustrated in connection with cores of somewhat regular shape and composed of two sections, but it will be understood that cores of any shape and composed of any number of sections may be joined in accordance with my invention.

Heretofore, the customary practice in making sectional cores has involved the making of the baked core sections, pasting the meeting faces of the sections with a tightening medium such as flour paste, pressing the sections together, which causes a certain amount of the binding material to exude around the parting line, wiping off the exuded excess binding material, allowing the binding material to set or dry, and, in a

great many cases, wire is required to more securely hold the sections together. In this old or common practice, the labor time element is comparatively high and particularly so where large sectional cores are made, having a big area to be covered with the binding medium. Furthermore, the cost of the binding material and the wire runs to large figures in a foundry of large capacity and it is obvious that there can be no recovery of the binding medium or the wire. With my improved process, the labor time element is reduced to a minimum, it being evident that, in the process as illustrated in Figures 1, 2, 3 and 4, no extra time is required in making the openings and in the process illustrated in Figures 5 and 6, a number of openings can be made in the core sections in a few minutes. The plugging of the openings with green sand requires but a few seconds and the pouring of the metal can also be done very rapidly. In actual practice, I have found that the labor cost when employing my process is only a fraction of that involved in the usual or common practice. Furthermore, as hereinbefore pointed out, the greater part of the metal used in my process for the connecting means is recovered when the castings are tumbled so that the material cost is also very much less as compared with prior practice, and in the course of a year, in a large foundry, the saving amounts to considerable sums.

I have herein shown and described what I now consider the preferred manner of carrying out the invention, but the same is merely illustrative and I contemplate all changes and modifications that come within the scope of the claims appended hereto.

I claim:

1. In a process of forming cores composed of a plurality of sections, the following steps: forming a plurality of core sections, each having a plurality of tapering openings therethrough, the openings being arranged to register with the smaller ends thereof communicating when said sections are assembled; baking said core sections; closing the larger ends of the openings of one of said sections; assembling said sections with corresponding openings thereof in registration and with the last named section lowermost; and joining the core sections by casting metal in said alined openings.

2. In a process of making cores, providing a pair of complementary core sections having inwardly flaring recesses in the faces thereof corresponding to the line of parting; assembling said core sections with the recesses thereof registered; and filling said registered recesses with molten metal, thereby joining said sections by integral metal connecting members.

3. In a process of making cores, molding a plurality of core sections; forming inwardly flaring recesses in one face of each of said sections; assembling the core sections with said faces in contact and the respective recesses of said core sections in alinement; filling said alined recesses with molten metal; and permitting said metal to solidify, thereby forming integral connecting members and drawing said core sections tightly together.

4. In a process of making cores composed of a plurality of sections, providing a plurality of core sections having faces adapted to abut when the core sections are in assembled relation; forming recesses in said faces for receiving joining elements, said recesses being inwardly enlarged; assembling said core sections with the respective recesses of said sections in alinement; and uniting said sections by forming joining elements in said alined recesses.

5. In a process of making cores composed of a plurality of sections adapted to be assembled in face to face contact; molding a plurality of core sections having flat faces provided with means extending inwardly therefrom for receiving the enlarged portions of connecting members; assembling said sections with the flat faces thereof in contact and the respective receiving means of said sections in registration; and uniting said sections by casting in said alined receiving means connecting members having oppositely extending enlarged portions.

6. In a process of making cores composed of a plurality of sections adapted to be assembled in face to face contact, forming a plurality of sections, each having a plurality of tapered openings extending therethrough, by molding each section in a core box member interiorly shaped to correspond with the section to be formed, and provided with upwardly tapering pins projecting from the bottom thereof; baking said sections; assembling the sections with corresponding openings thereof in alinement and the smaller ends of said openings communicating; filling said alined openings with molten metal; and permitting said metal to solidify, thereby forming integral connecting members having oppositely extending enlarged ends anchored in the respective sections and drawing the same together.

7. The hereinafter described process of making sectional cores for castings which includes the following steps: providing a pair of baked core-sections adapted to be placed in face to face contact, said sections, on their meeting faces, having registering recesses, each undercut with respect to the meeting faces of its respective section; filling said recesses with metal in a molten condition when the recesses are registered; then allowing the metal to cool and contract.

8. In the process of making cores, providing a plurality of core sections; forming

inwardly extending recesses in one face of each of said sections; assembling the core sections with said faces in contact and the respective recesses of said core sections in alinement; pouring molten metal in said alined recesses; and permitting said metal to solidify, thereby forming integral connecting members and drawing said core sections tightly together.

9. In a process, the following steps: forming a plurality of core sections, each having a plurality of recesses therein, said recesses being arranged to register with their open ends communicating when said sections are assembled; baking said core sections; assembling said sections with corresponding recesses thereof in registration; joining the core sections by casting metal in said alined recesses; preparing a mold for forming a casting and inserting the sectional core in said mold; pouring molten metal into the mold; removing the casting from the mold; and recovering the metal forming the joining members by breaking up the core and removing the same from the casting.

In witness that I claim the foregoing I have hereunto subscribed my name this 16th day of December 1922.

CHARLES F. NEWPORT.