No. 757,767. PATENTED APR. 19, 1904.

G. H. POOR.

SECTIONAL CORE FOR MAKING CONCRETE PILES.

APPLICATION FILED FEB. 23, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

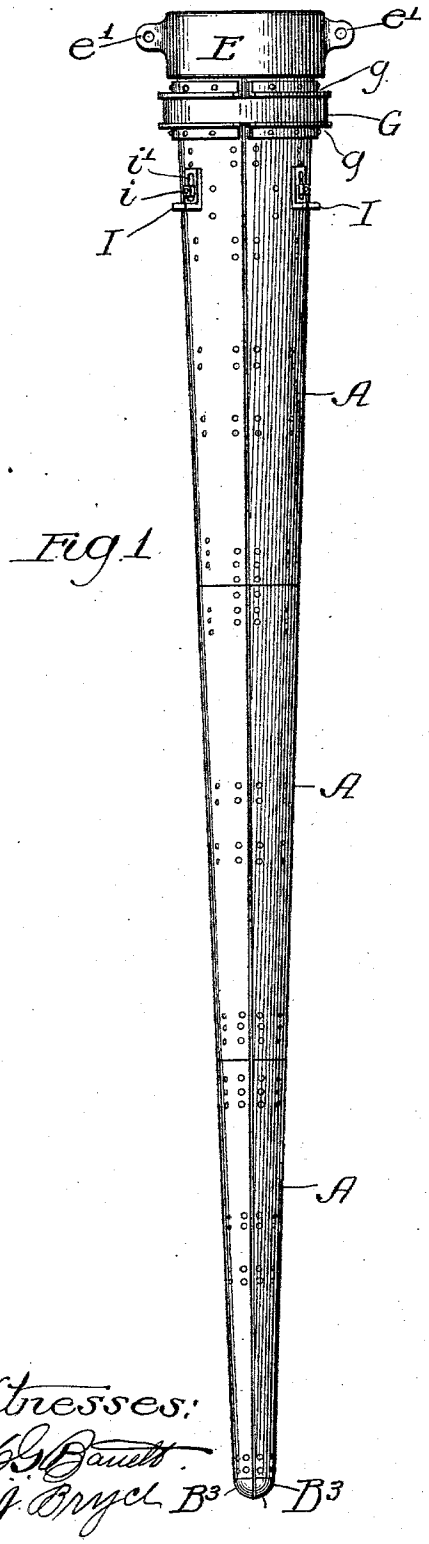


Fig. 1

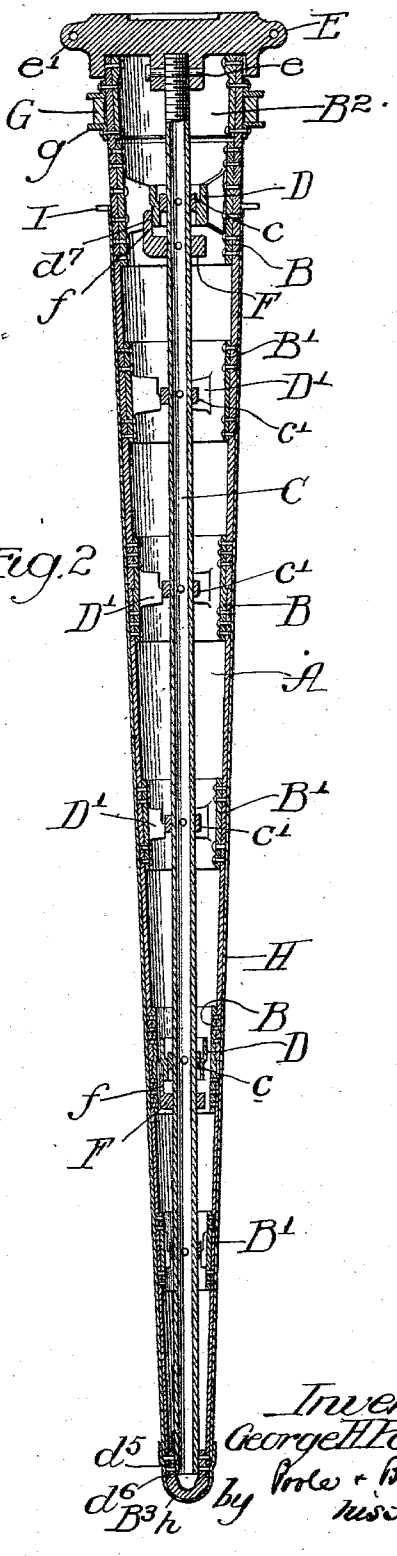


Fig. 2

Witnesses:
H. G. Dewitt.
G. J. Bryce.

Inventor
George H. Poor.
by Poole & Brown
his Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3

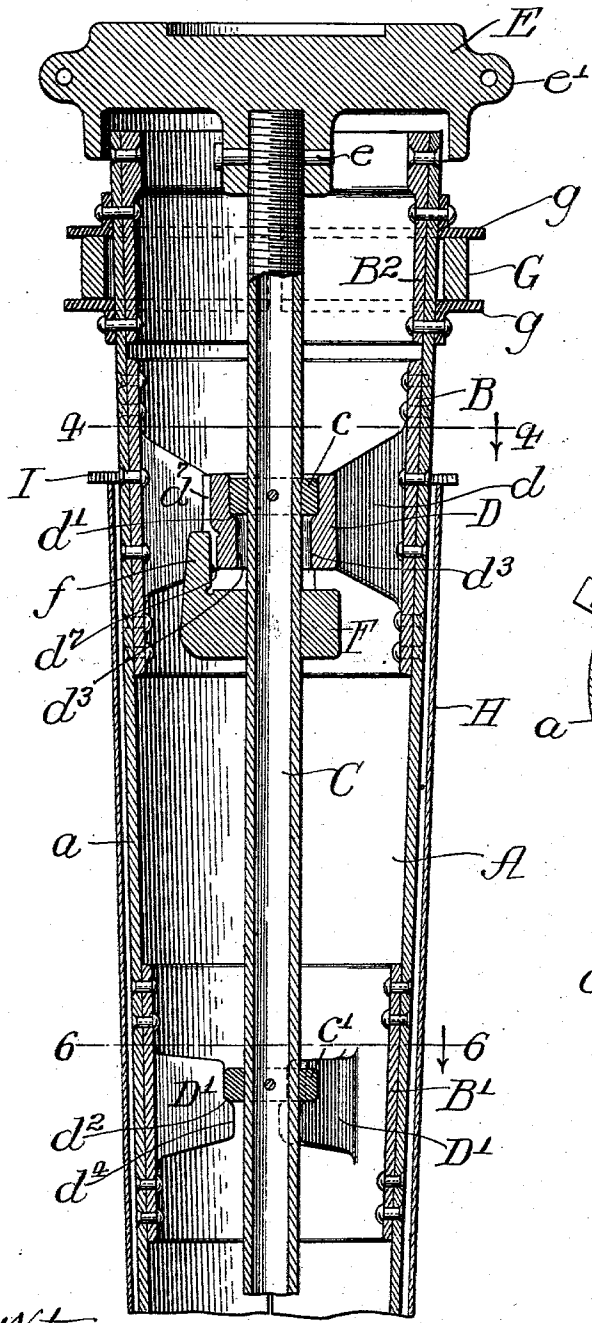


Fig. 5

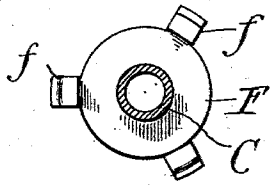


Fig. 4

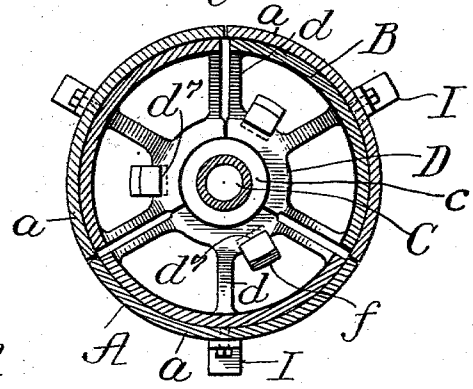
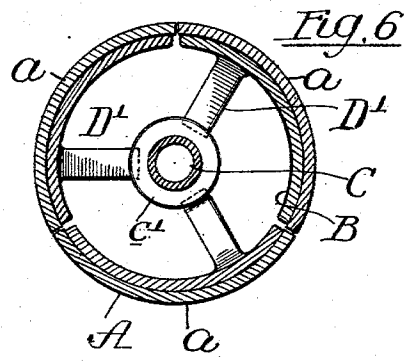


Fig. 6



Witnesses:
H. G. Barrett
G. J. Bryce

Inventor:
George H. Poor
by Poole & Morse
his Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 757,767. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

GEORGE H. POOR, OF CHICAGO, ILLINOIS, ASSIGNOR TO SAMUEL WORTHINGTON McMUNN, OF CHICAGO, ILLINOIS.

SECTIONAL CORE FOR MAKING CONCRETE PILES.

SPECIFICATION forming part of Letters Patent No. 757,767, dated April 19, 1904.

Application filed February 23, 1904. Serial No. 194,928. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. POOR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sectional Cores for Making Concrete Piles; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to a novel construction in sectional expansible cores adapted for use in driving hollow shells of paper or other material in that process of making concrete-pile foundations in which a core with a surrounding shell is driven into the ground. The core is then withdrawn from the shell, which is left in the ground, and the empty shell then filled with a solid mass of concrete, which upon hardening forms a concrete pile.

The invention consists in the matters hereinafter described, and pointed out in the appended claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a view in side elevation of a sectional core embodying my invention. Fig. 2 is a longitudinal axial section of the same. Fig. 3 is an enlarged detail longitudinal section of the larger or upper end of the core, showing the same in its contracted condition. Fig. 4 is a cross-section taken on line 4 4 of Fig. 3. Fig. 5 is a detail plan view of the collar on the operating-rod shown in Fig. 3. Fig. 6 is a cross-section taken on line 6 6 of Fig. 3.

A core embodying my invention is hollow or tubular and is divided longitudinally into a plurality of separate sections which are movable radially to effect the enlargement and contraction of the core, together with means for expanding or spreading apart the sections. Said core is preferably made of tapered form, being larger at its upper than at its lower end and closed at its lower end or point. As illustrated in the accompanying drawings, the core consists of three sections A A A, which meet edge to edge to form the complete core.

First referring to certain details of construction in the hollow core itself, each section A is shown as consisting of a plurality of curved exterior sheet-metal plates *a a a*, the end margins of which meet each other edge to edge or in abutting relation, so as to form a smooth exterior surface on the core. The said plates *a a a* are joined by means of interior segmental plates B B B′ B′, to the outer surface of which the ends of the plates *a a a* are secured by bolts or rivets. Other similar segmental plates B B′ are secured by rivets to the inner surfaces of the plates *a a a*. Said plates B B′ serve to stiffen transversely or to hold rigidly in their curved form the plates *a a a*, and if desired to make the plates *a a a* shorter than as shown all of the plates B B′ may serve as joint-plates. At the top or larger end of the core the plates *a a a* are reinforced by interior cast-metal segments B^2 B^2, which are riveted to the plates and extend to the upper edges thereof. At the lower ends of the sections the latter are provided with exteriorly rounded or convex segmental heads B^3 B^3, which together form the rounded lower end or point of the core.

Now referring to the means shown for spreading apart or expanding the sections of the core and holding them in their expanded position while the core is within the paper shell and is being driven into the ground devices are provided as follows:

C indicates a centrally-arranged longitudinal actuating-rod which extends through the hollow core from end to end thereof and has a limited endwise movement therein. Said rod C is provided with a plurality of enlargements or collars *c c c′ c′*. In connection with two or more of the collars *c c* on the rod C are provided segmental plates or ring-segments D D, which together form rings surrounding the said collars and which are provided with inwardly-facing bearing-surfaces adapted for engagement with said collars. Each ring-segment D is connected with one of the sections A by radial arms *d d*. Preferably the said arms are attached to the joint-plates B B. Preferably, also, the ring-segments D D and the arms *d d* are cast integral with said joint-

plates. On the several sections A A A are also located inwardly-projecting arms D′ D′, provided with inwardly-facing bearing-surfaces adapted for engagement with the collars *c′ c′*. Said arms D′ D′ are preferably attached to the interior segmental plates B′ B′, which are secured to the inner faces of the plates *a a a*. Said arms are conveniently formed with said plates each by an integral casting.

The inner ends of the ring-segments D D and arms D′ D′ are provided with shoulders *d′ d²* and below said shoulders with bearing-faces *d³ d⁴*, parallel with the central axis of the core, said shoulders and bearing-faces being adapted for contact with the enlargements or collars *c c′* on the rod C, and the parts being so arranged that when the said rod is moved downward within the shell the collars *c c′* will by acting upon the said shoulders force the sections A A A outwardly, and said collars will then engage the bearing-faces *d³ d⁴*, so as to positively hold the sections in their expanded positions. Said bearing-surfaces *d³ d⁴* being approximately parallel with said rod, it follows that after said rod is moved downwardly to bring the collars *c c′* into engagement with said surfaces the sections cannot be forced inwardly or collapsed without first lifting the rod to bring the collars *c c′* above the said shoulders *d′ d²*.

The meeting or contacting edges of the collars *c c′* and the arms D′ and ring-segments D are beveled or rounded in such manner that when the several collars are together shifted or moved downwardly through the endwise downward movement of the rod C the collars will not catch on the shoulders, but will pass over the same to effect the expansion of the sections.

At the lower end of the shell or core the segmental heads B³ B³ are provided with interior shoulders *d⁵* and longitudinal bearing-surfaces *d⁶*, said shoulders and surfaces being adapted for engagement with the lower end of the rod C, so that in the downward movement of said rod the said segmental heads will be forced outwardly in the same manner as are the ring-segments D and arms D′.

The actuating-rod C is attached at its upper end to a metal head or disk E, which is located at the top of the core and which is vertically movable relatively to the core and which when the actuating-rod C is depressed and is in its lowermost position rests upon the top edge of the several core-sections A A A. The rod C is shown as consisting of a tube which is secured to the head E by having its upper end screw-threaded and inserted in a screw-threaded socket in the said head. A transverse pin *e*, inserted through the head and rod, serves to hold the rod securely in the head. Said head E is designed for contact therewith of the driving head or hammer by which the core and its surrounding shell are driven into the ground. Said head is, moreover, provided with attaching means, such as the perforated lugs *e′ e′*, by which hoisting-chains connected with the driving apparatus may be connected therewith when hoisting the core to bring it into position over the place where it is to be driven and when lifting the core from the shell after the same has been driven into the ground. In a construction in which the said actuating-rod is attached to the head E, therefore, the rod is moved upwardly to lift the several collars *c c′* and permit the collapse of the sections of the core through the power applied to the head E for lifting the core. In other words, when the core is bodily lifted through hoisting means connected with the head E a preliminary upward movement of the head relatively to the core has the effect of shifting the actuating-rod C upwardly in the core, and thereby bringing the collars *c c′* above the the shoulders *d′ d²* and permitting the collapse of the core-sections and consequent decrease in the exterior size of the core in readiness for the placing of the exterior paper shell thereon. When the shell has been placed on the core and the core and shell lowered for driving, as soon as the lower end of the shell and core rest upon the ground and suitable resistance is thereby afforded to the downward movement of the core and shell the head and attached actuating-rod move downwardly within the core, so that the collars *c c′*, acting on the shoulders *d′ d²*, force the sections of the core outward into close contact with the interior of the shell, and the parts will then be in condition for the driving of the core and shell into the ground. Such downward movement of the actuating-rod C may be effected by the weight of the parts themselves or by applying downward pressure on the head through the action of the driving-hammer used to force the shell and core into the ground.

It follows from the above that when the parts are constructed as herein described—that is to say, when the actuating-rod C is connected with a head E, upon which the driving-hammer acts and which has vertical movement with respect to the core—the operation of the device in the contraction and expansion of the core is practically automatic, requiring no special manipulation of the parts to effect such expansion and contraction. So far as the operation of the said actuating-rod in connection with the expansible and contractible sections is concerned, however, said rod may be given endwise movement otherwise than through its connection with a head which is acted upon by the driving-hammer, and some of the principal features of the invention may, therefore, be carried into practice without the employment of the driving-head E, connected with the rod C, in the particular manner herein shown and above described.

In addition to the features of construction

hereinbefore set forth the devices herein illustrated include means for limiting the outward movement or spread of the core-sections A A A when the same are expanded, said means being constructed as follows: On the said actuating-rod C below the ring-segments D D are arranged rigidly-affixed collars F F, provided with upwardly-extending arms *f*, arranged generally parallel with the said rod C and adapted to engage the outwardly-facing bearing-surfaces on the core-sections in such manner as to limit the outward movement of said sections. Said outwardly-facing surfaces are shown as formed on the outer surfaces of the ring-segments D. The collars F F are movable with the actuating-rod C; but the arms *f* thereon are made of such length that they will be in position to engage the said ring-segments D D when the said rod is moved downwardly, so as to bring the collars *c c'* into engagement with the lower bearing-surfaces d^4 of said ring-segments. The arms *f* are shown as engaging guide grooves or notches d', formed in the ring-segments D between the arms *d*, the sides of the notches forming guide-surfaces, which by their engagement with the sides of the arms *f* serve to hold the core-segments A A A accurately in position with respect to each other and the rod C.

The core illustrated is provided with two sets of ring-segments D and two collars F, provided with holding-arms *f f;* but the core may be provided with a greater number of these parts if found necessary or desirable in any particular instance.

The sets of arms D' D' and coacting collars *c' c'* will preferably be arranged intermediate to the ring-segments D D and at such distances apart along the length of the core-segments as to prevent any inward bending or deflection of the same under pressure coming upon the exterior of the core in driving the core and shell into the ground.

In order to hold the core-segments A A A from relative endwise movement both in the handling of the core and in the driving operation, I provide a construction as follows: G is a ring which surrounds the upper end of the core above the part thereof which is covered by the shell when the shell is on the core and below its upper margin. Attached to each core-section A above and below the ring G are outwardly-extending flanges *g g*, preferably having the form of angle-irons, riveted to the core-sections. Said flanges *g g* bear upon the opposite or upper and lower edges of the ring G and form guide or bearing surfaces adapted to prevent endwise movement of either of the sections with respect to the others. The inner or adjacent faces of said flanges *g g*, constituting the guide-surfaces referred to, are parallel with each other, so as to permit free inward and outward movement of the core-sections in the expansion and contraction thereof.

H in the drawings indicates the paper shell which is applied to the exterior surface of or surrounds the core and which is placed over or upon the core preparatory to the driving operation. Said shell will usually be made open at both ends, as heretofore, and in connection therewith will be used a cap *h*, which covers the rounded lower end of the core and overlaps the lower edge of the shell.

To enable the shell to be accurately located on the core previous to the expansion of the latter, so as to prevent the shell from being forced too far upon the core and consequent liability of bursting the shell during the expansion of the core, one or more stops or lugs I are secured to the core-sections A A A in position for contact with the upper edge of the shell when the latter is in proper position upon the core. Said lugs I are preferably made adjustable endwise of the core. The construction illustrated for providing such adjustment consists of holding-bolts *i*, which pass through longitudinal slots *i'*, formed in longitudinal extensions of said stops I.

The sectional and collapsible core described is used in connection with the paper shell in the same manner as such cores have heretofore been employed—that is to say, the shell is placed over the core when the same is contracted, and the sections are then expanded to bring the core into close contact with the surrounding shell, the shell and core are then driven into the ground by a pile-driver or like device acting upon the upper end of the core, and after the core has been driven a sufficient depth into the ground the core is contracted and withdrawn from the shell, the latter remaining in the ground and being filled with cement or like material.

Expansible cores adapted for use in connection with shells have heretofore been provided with endwise-movable rods, and the rods and core-sections have been provided with inclined or wedge-like contacting surfaces by which the core-sections are forced outwardly through endwise movement of the said rod. In devices of this kind, however, the contacting wedge surfaces on the core-sections and actuating-rod have been uniformly inclined, so that inward pressure on the core-sections tends to move the said rod endwise, and thereby permit inward movement of the sections. Such inward movement is especially liable to occur in such prior construction by reason of the action of the hammer in driving, which tends especially when the actuating-rod is attached to the head or disk E to produce a rebound or backward movement of the actuating-rod and consequent shifting of the rod in a direction to permit inward movement of the sections. In the construction herein described the inwardly-facing bearing-surfaces

on the sections being parallel with the central axis of the core have positive locking engagement with the collars on the rod, so that there can be no inward movement of the sections unless the rod be first moved endwise far enough to release said collars from said bearing-surfaces.

I claim as my invention—

1. A core for the purpose set forth comprising a plurality of radially-movable sections, each consisting of a plurality of transversely-curved metal plates, and interior segmental joint-plates arranged transversely of the sheet-metal plates and to which the adjacent ends of the latter are riveted.

2. A core for the purpose set forth comprising a plurality of radially-movable sections provided each with a plurality of inwardly-facing bearing-surfaces, and an endwise-movable actuating-rod extending lengthwise of the core and provided with a plurality of enlargements or collars adapted for engagement with said bearing-surfaces on the sections, said bearing-surfaces being provided with shoulders and adjacent to said shoulders with parts parallel with the longitudinal axis of the core, for engagement with said collars or enlargements, when the sections are expanded.

3. A core for the purpose set forth comprising a plurality of radially-movable sections, each provided with a plurality of inwardly-facing bearing-surfaces and an endwise-movable actuating-rod extending endwise of the core and provided with enlargements or collars adapted to engage said inwardly-facing bearing-surfaces, said bearing-surfaces having shoulders and adjacent to said shoulders parts parallel with the central axis of the core adapted for engagement with the said collars when the actuating-rod is moved endwise in the core, and a head to which said rod is attached, which is movable endwise of the core and adapted to bear upon the upper end of the same.

4. A core for the purpose set forth comprising a plurality of radially-movable sections, and a central actuating-rod provided with enlargements or collars adapted to engage inwardly-facing surfaces on the sections to hold the latter expanded, said rod being also provided with arms which extend longitudinally of the rod and are adapted to engage outwardly-facing surfaces formed on said sections to limit the outward movement of the same.

5. A core for the purpose set forth comprising a plurality of radially-movable sections, each section consisting of a plurality of curved sheet-metal plates joined end to end and segmental joint-plates to which the adjacent ends of the plates are riveted, and an endwise-movable actuating-rod extending lengthwise of the core and provided with a plurality of enlargements or collars, said joint-plates being provided with inwardly-facing bearing-surfaces adapted for engagement with the said enlargements or collars on the actuating-rod.

6. A core for the purpose set forth, comprising a plurality of radially-movable sections, each section consisting of a plurality of curved sheet-metal plates joined end to end and segmental joint-plates to which the adjacent ends of the plates are riveted, and an endwise-movable actuating-rod extending lengthwise of the core and provided with a plurality of enlargements or collars, said bearing-plates being provided with rigidly-attached ring-segments having inwardly-facing bearing-surfaces adapted for engagement with the said collars and also with outwardly-facing bearing-surfaces, and the said rod being provided with arms extending parallel therewith and adapted to engage the said outwardly-facing bearing-surfaces on said ring-segments.

7. A core for the purpose set forth comprising a plurality of radially-movable sections, each provided with a plurality of ring-segments having inwardly-facing bearing-surfaces, and an endwise-movable actuating-rod extending endwise of the core and provided with enlargements or collars adapted to engage the said inwardly-facing bearing-surfaces, said ring-segments being also provided with outwardly-facing bearing-surfaces, and the rod having arms arranged parallel with the rod and adapted to engage said outwardly-facing bearing-surfaces on said ring-segments.

8. A core for the purpose set forth, comprising a plurality of radially-movable sections, each provided with a plurality of ring-segments and also with a plurality of inwardly-extending arms, and an actuating-rod provided with a plurality of enlargements or collars adapted to engage collars, said ring-segments and arms being provided with inwardly-facing bearing-surfaces adapted for engagement with said enlargements or collars on the rod, the ring-segments being also provided with outwardly-facing bearing-surfaces, and the actuating-rod being provided with a plurality of arms arranged parallel therewith and adapted to engage said outwardly-facing bearing-surfaces of the ring-segments.

9. A core for the purpose set forth, comprising a plurality of radially-movable sections, each provided with a plurality of rigidly-attached ring-segments, an endwise-movable actuating-rod extending lengthwise of the core and provided with enlargements or collars, said ring-segments being provided with inwardly-facing bearing-surfaces adapted for engagement with said ring-segments, and having in their outer faces guide grooves or notches, and the said actuating-rod having arms extending parallel thereof and adapted to engage said guide grooves or notches in said ring-segments.

10. A core for the purpose set forth, comprising a plurality of radially-movable sections, each provided with a plurality of inwardly-facing bearing-surfaces, an endwise-movable actuating-rod extending lengthwise

of the core and provided with a plurality of enlargements or collars adapted for engagement with the bearing-surfaces on the sections, a ring which surrounds the core, said core-sections being provided with guide-surfaces adapted to engage opposite sides of the ring.

11. A core for the purpose set forth comprising a plurality of radially-movable sections, each provided with a plurality of inwardly-facing bearing-surfaces, an endwise-movable actuating-rod extending lengthwise of the core and provided with a plurality of enlargements or collars adapted for engagement with the bearing-surfaces of the sections, and a ring which surrounds the core; the several core-sections being provided with circumferentially-extending flanges which engage opposite edges of said ring.

12. A core for the purpose set forth comprising a plurality of radially-movable sections, provided each with a plurality of inwardly-facing bearing-surfaces, an endwise-movable actuating-rod provided with enlargements or collars adapted for engagement with the bearing-surfaces on the sections; and an adjustable stop on the exterior surface of the core adapted for contact with the edge of a shell placed thereupon.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 19th day of February, A. D. 1904.

GEORGE H. POOR.

Witnesses:

C. CLARENCE POOLE,

GERTRUDE BRYCE.